

INhome TEAM PURDUE

INhome@purdue.edu



PROJECT MANUAL
As-Built Documentation
August 11, 2011



U.S. DEPARTMENT OF ENERGY SOLAR DECATHLON 2011

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SUMMARY OF CHANGES



Summary of Changes

August 11, 2011 Revision

The construction of the INhome brought about a number of changes to the home. Most of the changes were due to supplier issues or from donations being received. Major aspects of the design are listed and briefly described in each of the following areas below.

- **Architecture/Interior**
 - The decision was made to change the exterior of the home from a blue to a lighter grayish blue.
 - The roof shingles were changed to a different company.
 - Most of the tiling and light fixtures were changed in the home.
 - The flooring was changed from a laminated flooring to a composite floor.
 - The east door in the living room was changed to a window
- **Engineering**
 - The Living Wall was renamed to the Biowall and was designed and built by an INhome team member instead of being purchased from a manufacturer.
 - The control platform for the house was changed from LabView to Automated Logic
 - The PV array drawings were updated to show the new PV design.

May 3, 2011 Revision

- Mechanical main supply and return duct sizes in the kitchen bulkhead changed from 12 inch diameter to 14 inch diameter
- The PV array changed to central inverter system with 36 240 W SunPower panels.
- The generator was changed to conform to Rule 4-5.

March 22, 2011 Revision

The project has changed significantly since the design development submission in fall of 2010. Nearly every construction drawing has been changed or refined in some manner. Major aspects of the design are listed and briefly described in each of the following areas below.

- **Architecture/Interior**
 - Multiple changes have taken place within interior and exterior finishes as well as design. The major factor that motivated most changes was cost.
 - The major flooring material in the home has changed from solid hickory hardwood to engineered plank flooring in order to facilitate easier access to components under the flooring in case of unforeseen problems.
 - The countertop material in both the kitchen and bath has changed from quartz to a less expensive solid surface that contains 40% post-consumer recycled content.
 - The custom shower is now a tub/shower combination.
 - Some of the other plumbing fixtures changed due to the decision not to design the home with full ADA compliance.
 - The walls of the west side screened-in porch were removed.

- All installed tile has changed due to an agreement of support from a manufacturer.
 - Casework has changed in a more sustainable direction with a veneer product.
 - Interior as well as exterior lighting fixtures have changed due to donations.
 - The garage was placed on grade and an elevated walkway was added to the interior of the garage to maintain an ADA tour path.
 - The bathroom layout was modified to maximize space.
 - The kitchen layout was modified
 - The hall closet was enlarged
 - The pergola was completely removed from the design
 - Many more details were added into the construction documents related to the interior and exterior components of the home to clarify the design.
- **Landscaping**
 - The landscaping was completely redesigned to accommodate a ramp, deck, and planter design that will be easier to quickly set up during the competition assembly period.
 - Rain water cisterns were added as a rain water collection system to the landscape design.
 - The ramp path was changed to accommodate the new tour path that now enters through the front door instead of the garage.
 - Details were added to the landscape plan to show that no spills will occur during the competition.
- **Structural**
 - All concrete footings have been eliminated and been replaced with plastic footings that will be easier and safer to place during the competition assembly.
 - Design and calculations have been updated to reflect other design changes
- **Windows/doors**
 - Triple pane windows were selected
 - Reconfigured north facing windows and changed sizes
 - Added a door to the office that enters onto a private backyard deck
 - Eliminated bathroom window facing west
 - Added a door to the rear of the garage
- **Mechanical**
 - Relocated A/C Condenser
 - The main duct lines now all run within the central module. This allows easier construction since less duct crosses into other modules.
 - The duct layout in the bedrooms now runs over the central closet areas.
 - Two duct run extensions were added into the living room area.
 - The ERV supplies directly into the zone now instead of into the return line.
 - Resized the air handling unit to fit the house loads better and run more efficient
- **Controls**
 - Switched from ALC controller to LabVIEW for the main control platform.
 - Heat pump and air handling unit are now controlled solely by the Comfort LinkII.
 - SchlageliNK was added to the home to control both the door locks and the lights in the home.
 - Appliance controller was removed from the home and appliances will be manually controlled.
 - Clerestory windows are to be controlled manually via single pole double throw switch.

- Automated dampers have been removed from the controls platform.
- **Plumbing**
 - Relocated physical location of supply and waste tanks. The supply tank is now in the garage and is fully shaded. The waste tank is on the east side of the home.
 - Relocated fill and removal locations for tanks
- **Fire Protection**
 - Redesigned to be easily disconnected in central core

November 23, 2010 Revision

Since this is the first project manual submission, there are no revisions to cite for this document. However, the project as a whole has changed significantly since the submission of the conceptual model and schematic design review document in early 2010. First, the most obvious change is that Team Purdue has changed the name of their competition home from flex/home to INhome (Indiana Home). This was done due to the similar name of Team Florida's Flex House. The team is excited about the new name and the prospect of representing the entire state at the 2011 competition. Other major changes include modifying the exterior to allow for easier transportation of the various modules and also to provide more roof area for the photovoltaic array.

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RULES COMPLIANCE CHECKLIST



Rules Compliance Checklist

RULE	RULE DESCRIPTION	LOCATION DESCRIPTION	LOCATION
Rule 4-2	Construction Equipment	Assembly Sequence Drawing	O-101, 102,103
Rule 4-2	Construction Equipment	Specifications for heavy machinery	PM P.120
Rule 4-3	Ground Penetration	Drawing of location and depth of ground penetration	E-502 E-605
Rule 4-4	Impact on the Turf	Drawing of site contact plan showing location, area, and pressure	C-101, 103
Rule 4-5	Generators	Specifications for generators	PM P. 121
Rule 4-6	Spill Containment	Drawing showing the locations of all liquid filled equipment, containers, and pipes	P-101 P-102 P-103 L-101 L-102 L-103
Rule 4-6	Spill Containment	Specifications for all liquid filled equipment, containers, and pipes	22 11 16 22 11 19 22 12 00 22 13 42 22 33 00 32 80 00 32 94 33
Rule 4-7	Lot Conditions	Calculations showing that the structural design remains compliant even if 18 in. of vertical elevation change exists	PM P. 22
Rule 4-7	Lot Conditions	Site-Adjustment details and drawings	S-501
Rule 5-2	Solar Envelope Dimensions	Solar envelope compliance drawings	G-201 G-202
Rule 5-2	Solar Envelope Dimensions	Solar envelope exemption requests and justifications	N/A
Rule 6-1	Structural Design Approval	List of structural drawings to be approved by licensed engineer	All structural drawings/ calculations
Rule 6-2	Finished Square Footage	Finished square footage area plan	G-101
Rule 6-2	Finished Square Footage	Moveable component drawing	A-601
Rule 6-3	Entrance and Exit Routes	Accessible public tour route drawing	G-103
Rule 7-1	Placement	Drawings showing the location of all vegetation	L-101
Rule 7-2	Watering Restrictions	Drawing showing the layout and operation of greywater irrigation systems	N/A
Rule 8-1	PV Technology Limitations	Specifications for photovoltaic components	48 14 13
Rule 8-3	Batteries	Drawing showing the location and quantity of all batteries	E-604
Rule 8-3	Batteries	Specifications for all primary and secondary batteries and stand-alone, PV-powered devices	26 28 00 8 7 00 2.5

Rule 8-4	Desiccant Systems	Drawing of the desiccant system	N/A
Rule 8-4	Desiccant Systems	Specifications for desiccant system components	N/A
Rule 8-5	Village Grid	Completed interconnection application form.	PM P. 68
Rule 8-5	Village Grid	Drawing(s) showing the locations of the photovoltaics, inverters, terminal box, meter housing, service equipment, and grounding means	A-113 E-502
Rule 8-5	Village Grid	Specifications for the photovoltaics, inverters, terminal box, meter housing, service equipment, and grounding means	DIV 26 DIV 48
Rule 8-5	Village Grid	One-line electrical diagram	E-601
Rule 8-5	Village Grid	Calculation of service/feeder net computed load per NEC 220	PM P. 70
Rule 8-5	Village Grid	Site plan showing the house, decks, ramps, tour paths, and terminal box	E-605
Rule 8-5	Village Grid	Elevations showing the meter housing, main utility disconnect, and other service equipment	E-502
Rule 9-1	Container Locations	Drawing showing the location of all liquid containers relative to the finished square footage	P-101, A-101
Rule 9-1	Container Locations	Drawings showing shading of supply water tanks per rule 9-1c	P-101
Rule 9-2	Team-Provided Liquids	Schedule showing quantity, characteristics, and delivery of all team-provided liquids	P-601
Rule 9-3	Greywater Reuse	Drawing showing greywater reuse systems	N/A
Rule 9-4	Rainwater Collection	Drawings showing the layout and operation of rainwater collection systems	L-102
Rule 9-6	Thermal Mass	Drawing showing the locations of liquid-based thermal mass systems	N/A
Rule 9-6	Thermal Mass	Specifications for components of liquid-based thermal mass systems	N/A
Rule 9-7	Greywater Heat Recovery	Drawing showing the layout and operation of greywater heat recovery systems	N/A
Rule 9-8	Water Delivery	Drawing showing the complete sequence of water delivery and distribution events	A-405 P-101
Rule 9-8	Water Delivery	Specifications of containers for water delivery	22 12 00
Rule 9-9	Water Removal	Drawing showing the sequence of water consolidation and removal events	A-405 P-101
Rule 9-9	Water Removal	Specifications for the containers from which water will be removed	22 12 00
Rule 11-4	Public Exhibit	Interior and exterior plans showing entire accessible tour route	G-103

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STRUCTURAL CALCULATIONS



Structural Calculations

Overview

Safety of the public, who will view this home, as well as the eventual inhabitants, was the key factor in the structural design of the Purdue INhome. Other critical design elements were the cross- country transportation to and from the competition site, quick and safe assembly and disassembly of the home, and the use of both temporary foundations for the competition, and permanent foundations at the final home location.

In order to maximize energy efficiency, new building materials were utilized to produce high rates of insulation as well as provide required strength and stiffness values.

A modular system was chosen to meet the short assembly period requirements. Due to transportation requirements, a creative approach was used to determine module dimensions, roof attachment, and inter-modular connections. Footing attachment and adjustability was resourceful to meet the onsite soil requirements of the competition, while maximizing dimensions within the solar envelope.

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Project Location and Design Criteria

Project #: [D10108.00](#)
Project Title: [Solar Decathlon - InHome](#)
Client: [Solar Decathlon](#)
[Purdue University](#)
[West Lafayette, IN](#)

Location: [West Lafayette, IN](#)

Date Started: [09/26/2010](#)

Codes Used: [IBC 2006 Edition](#)
[ASCE 7-05](#)
[NDS 2005 Edition](#)
[ACI 318-05](#)
[AISC Steel Construction Manual, 13 Ed.](#)

Occupancy Category: [II \(ASCE 7-05 Table 1-1\)](#)

Vertical Loads

Roof:	pitch := 4.5	Roof Pitch (___/12)
	$\text{slope} := \text{atan}\left(\frac{\text{pitch}}{12}\right)$	
	slope = 20.556·deg	Roof Slope
	surface := N	Roof Surface (S=Slippery, N=Non-Slippery)
	$C_e := 1.0$	Exposure Factor (ASCE 7-05 Table 7-2)
	$C_t := 1.1$	Thermal Factor (ASCE 7-05 Table 7-3)
	$I_s := 1.0$	Snow Importance Factor (ASCE 7-05 Table 7-4)
	$p_g := 20\text{psf}$	Ground Snow Load (Per Local Building Department)
	$p_f := 0.7 \cdot C_e \cdot C_t \cdot I_s \cdot p_g$	
	$p_f = 15.4 \cdot \text{psf}$	Flat Roof Snow Load
	$dl_r := 20 \cdot \text{psf}$	Roof Dead Load (15psf + 5psf for PV Panels)
	$sl_{rs} := 20 \cdot \text{psf}$	Sloped Roof Snow Load
	$sl_{rub} := 20\text{psf}$	Roof Unbalanced Snow Load
	$sl_{rd.lv} := 26\text{psf}$	Living Room Lower Roof Snow Drift Load
	$sl_{rd.wp} := 30\text{psf}$	West Porch Lower Roof Snow Drift Load
	$sl_{rub.t.max} := 35.5\text{psf}$	Max. Truss Unbalanced Snow Load
	$sl_{rub.t.R} := 300\text{plf}$	Max. Truss Unbalanced Snow Reaction Load
Floor:	$dl_f := 15 \cdot \text{psf}$	Floor Dead Load
	$ll_f := 50\text{psf}$	Floor Live Load
	$ll_{ft} := 100\text{psf}$	Floor Live Load - Solar Decathlon Tour
Walls:	$dl_w := 10 \cdot \text{psf}$	Wall Dead Load
Soil:	$q_{brg} := 1500 \cdot \text{psf}$	Bearing Capacity of Soil

Variables Defined

w	Uniform Load
P	Point Load
a	Distance to Point Load (assumed from left edge of beam u.n.o.)
L	Length
L_a	Cantilever Length
L_{brg}	Required Bearing Length
h	Height
h_{ret}	Retained Soil Height
h_{toe}	Soil Height above Toe
h_{xunb}	Column Unbraced Height in X-X Axis
h_{yunb}	Column Unbraced Height in Y-Y Axis
Δ_{max}	Maximum Allowable Deflection

Lateral Seismic Load

PARAMETERS FROM ASCE 7-05 TABLES

$$S_1 := 0.0777 \quad F_a := 1.6$$

$$S_s := 0.1758 \quad F_v := 2.4$$

Site Class = B

SPECTRAL ACCELERATION PARAMETERS

$$S_{ms} := S_s \cdot F_a = 0.281$$

$$S_{m1} := S_1 \cdot F_v = 0.186$$

$$S_{ds} := \left(\frac{2}{3}\right) \cdot S_{ms} = 0.188$$

$$S_{d1} := \left(\frac{2}{3}\right) \cdot S_{m1} = 0.124$$

DESIGN RESPONSE SPECTRUM

$$T_o := 0.2 \cdot \frac{S_{d1}}{S_{ds}} = 0.133$$

$$T_s := \frac{S_{d1}}{S_{ds}} = 0.663$$

$$T_l := 0.0833 \quad \text{from FIG. 22-15}$$

$$C_t := .02$$

$$x := 0.75$$

$$h_n := 18$$

$$T_a := C_t \cdot h_n^x$$

$$R := 2.0 \quad \text{from Table 12.2-1}$$

$$I := 1.0 \quad \text{importance factor } I = 1$$

$$OS := 2.5 = 2.5 \quad \text{overstrength factor}$$

$$C_s := \frac{S_{ds}}{\left(\frac{R}{I}\right)} = 0.094$$

$$C_s < \text{Equation 12.8-3: } C_s := \frac{(S_{d1} \cdot T_l)}{\left(T_a^2 \cdot \frac{R}{I}\right)} = 0.17 \text{ s}$$

$$S_a := S_{ds} \cdot \left(0.4 + 0.6 \cdot \frac{T_a}{T_o}\right)$$

Seismic design category based upon short period response: Class B

U.S. DOE Solar Decathlon 2011
Purdue INhome

Calculation by: [Matt Hebdon](#)
Date: [1/20/2011](#)

Calculation of Wind Pressures for Low-Rise Buildings
2006 IBC 1609, ACSE 7-05
Simplified provisions for Low-Rise buildings per Section 6.4

Building Data:

Location [West Lafayette, IN](#)
Terrain [Open Terrain](#)

Dimensions

Width	46 ft	
Length	54 ft	
Eave ht.	9.5 ft	
Roof slope (vertical)	5.00 V:12	22.62 degrees
Mean roof ht.	13.75 ft.	

Basic Wind Speed	90 mph	Figure 6-1
Exposure	C	Section 6.5.6
Building Category	2	Table 1-1
Wind Importance Factor (Iw)	1.00	Table 6-1
Height and Exposure Coeff.	1.21	Figure 6-2 (Interpolate from table)
Topographic Factor (Kzt)	1.00	Section 6.5.7
Alt Basic Load Comb w	1.3	Wind force adjustment factor for load combinations

Check:

Mean roof ht must be equal to or less than the least horizontal dimension or 60 ft. Whichever is less
If the above condition is met continue, else this method cannot be used to calculate wind pressures.

Edge Strip and End Zone Calculation

10% of least horizontal dimension	4.6 ft
40% of the mean roof height	5.5 ft
not less than 4% of least hor. dim.	1.8 ft
not less than 3 ft.	3.0 ft
Edge Strip Width	4.6 ft
End Zone Width	9.2 ft

Apply End Zone pressures to one corner of building for wind base shear

West Lafayette, IN
1/20/2011

Basic Wind Pressure³

Load Case	Roof Pitch Flat	Horizontal Pressures				Vertical Pressures				Overhang	
		A	B	C	D	E	F	G	H	Eoh	Goh
Transverse	22.62	16.95	-1.05	11.8	0.05	-11.3	-10.25	-7.95	-7.95	-17.45	-14.15
Longitudinal	0	12.8	N/A	8.5	N/A	-15.4	-8.8	-10.7	-6.8	-21.6	-16.9

Use with Alternate Basic Load Combinations of 1605.3.2 (w=1.3)

Revised for Height and Exposure, and Importance Factors, and w

Loading in Transvers Direction (Fig. 2)											
Wind Pressure	26.7	-1.7	18.6	0.1	-17.8	-16.1	-12.5	-12.5	-27.4	-22.3	
Building Surf. Location	A	B	C	D	E	F	G	H			

Loading in Longitudinal Direction (Fig 3)											
Wind Pressure	20.1	N/A	13.4	N/A	-24.2	-13.8	-16.8	-10.7	-34.0	-26.6	
Building Surf. Zone	A	B	C	D	E	F	G	H	NA	NA	

- Notes:
1. Pressures are applied in accordance with the loading diagrams shown in Fig.1.
 2. Plus and minus signs signify pressures acting toward and away from the projected surfaces.
 3. Transverse and longitudinal loads for a building with mean roof ht 30 ft. Figure 6-2
Basic wind speed of 90 mph.
 4. Longitudinal & Transverse Zones listed for gable wall or hip conditions, respectively.

Base Shear Summation of Wind Forces

Transverse Wind Zone Area (square feet)

Transverse area for each building zone (for Vertical zones use tributary area per holdown devise)

Building Surf. Zone	A	B	C	D
Transverse	51	87	223	240
Longitudinal (See note 4)	0	N/A	0	N/A

Transverse Base Wind Shear by Zone (Pounds)

Transverse Load Case 1	1360	0	4139	19
Longitudinal (See note 4)	0	N/A	0	N/A

Total Horizontal Transverse Base Wind Shear	Min. Wind Shear (10 psf)
Transverse 5518 lbs.	6010 lbs.

Longitudinal Wind Zone Area (square feet)

Longitudinal area for each building zone (for Vertical zones use tributary area per holdown devise)

Building Surf. Zone	A	B	C	D
Longitudinal	67	N/A	235	N/A
Transverse (See note 4)	0	7	0	0

Longitudinal Base Wind Shear by Zone (Pounds)

Longitudinal	1349	N/A	3142	N/A
Transverse (See note 4)	0	-12	0	0

Total Horizontal Longitudinal Base Wind Shear	Min. Wind Shear (10 psf)
Longitudinal 4480 lbs.	3090 lbs.

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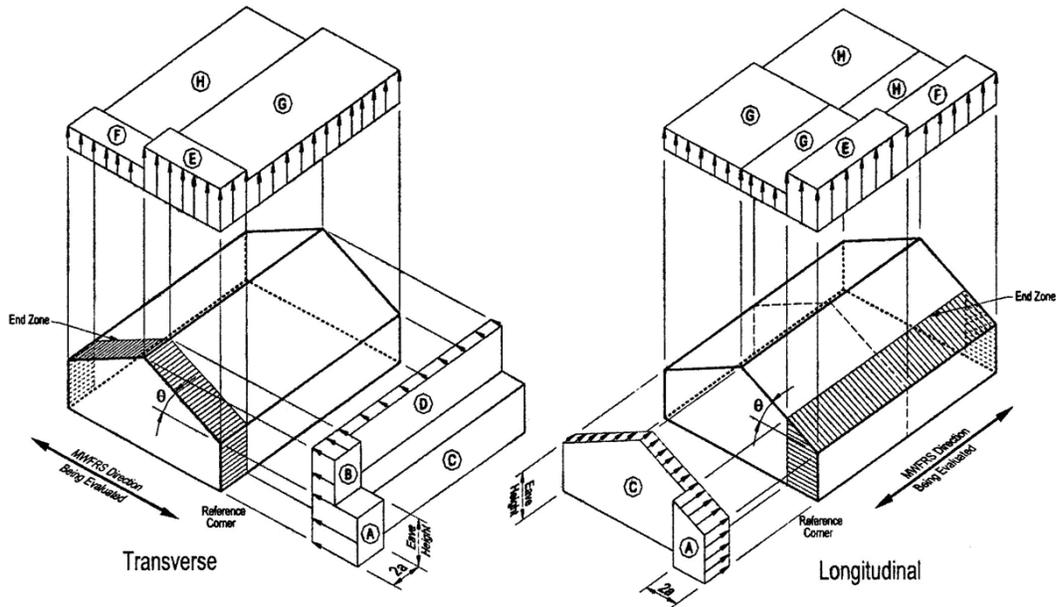


FIGURE 1609.6.2.1
MAIN WINDFORCE LOADING DIAGRAM

Figure 1. Main Wind Force Loading Diagram

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Positive Value = pressure
Negative Value = suction

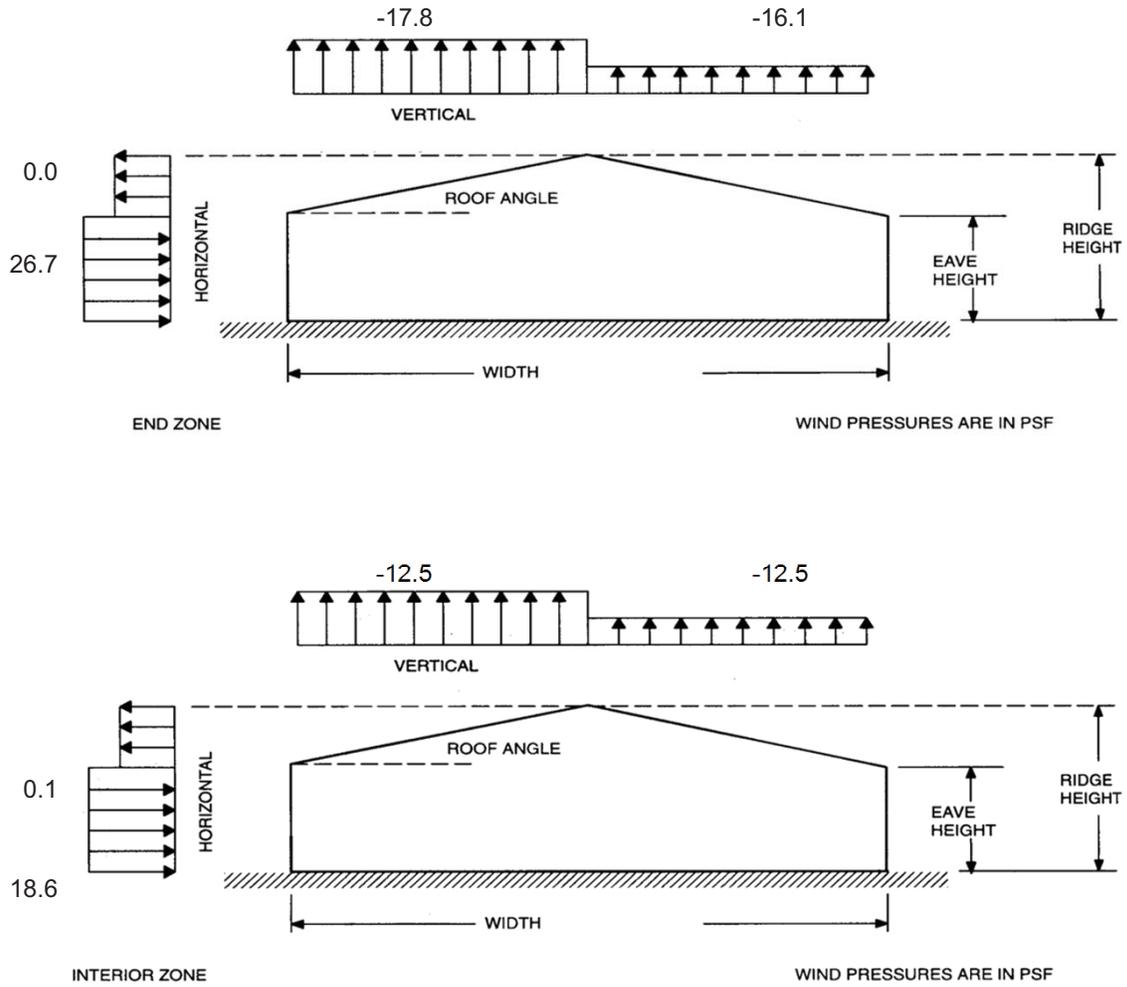


Figure 2. Application of MWFRS Loads in the Transverse Direction

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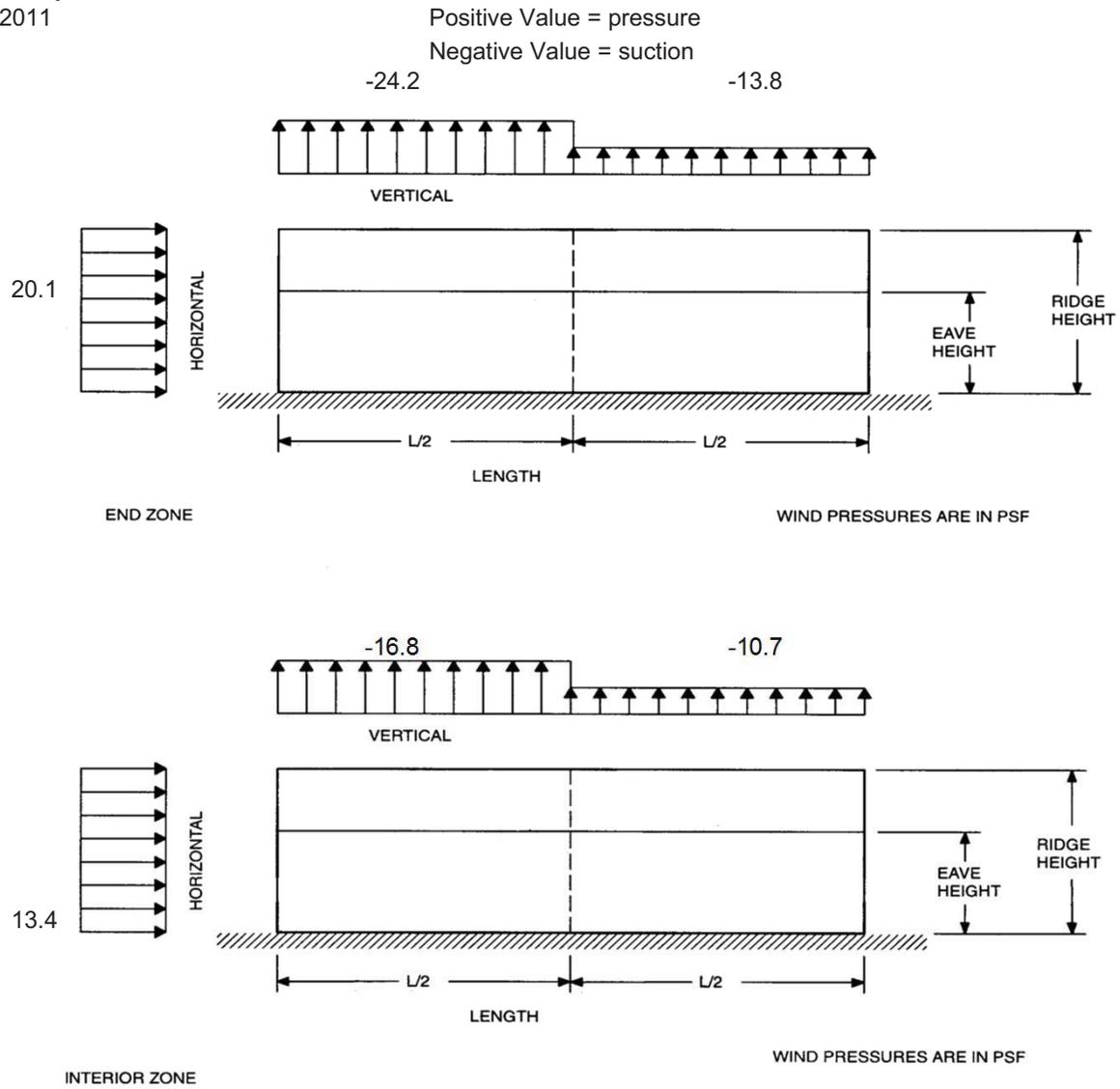
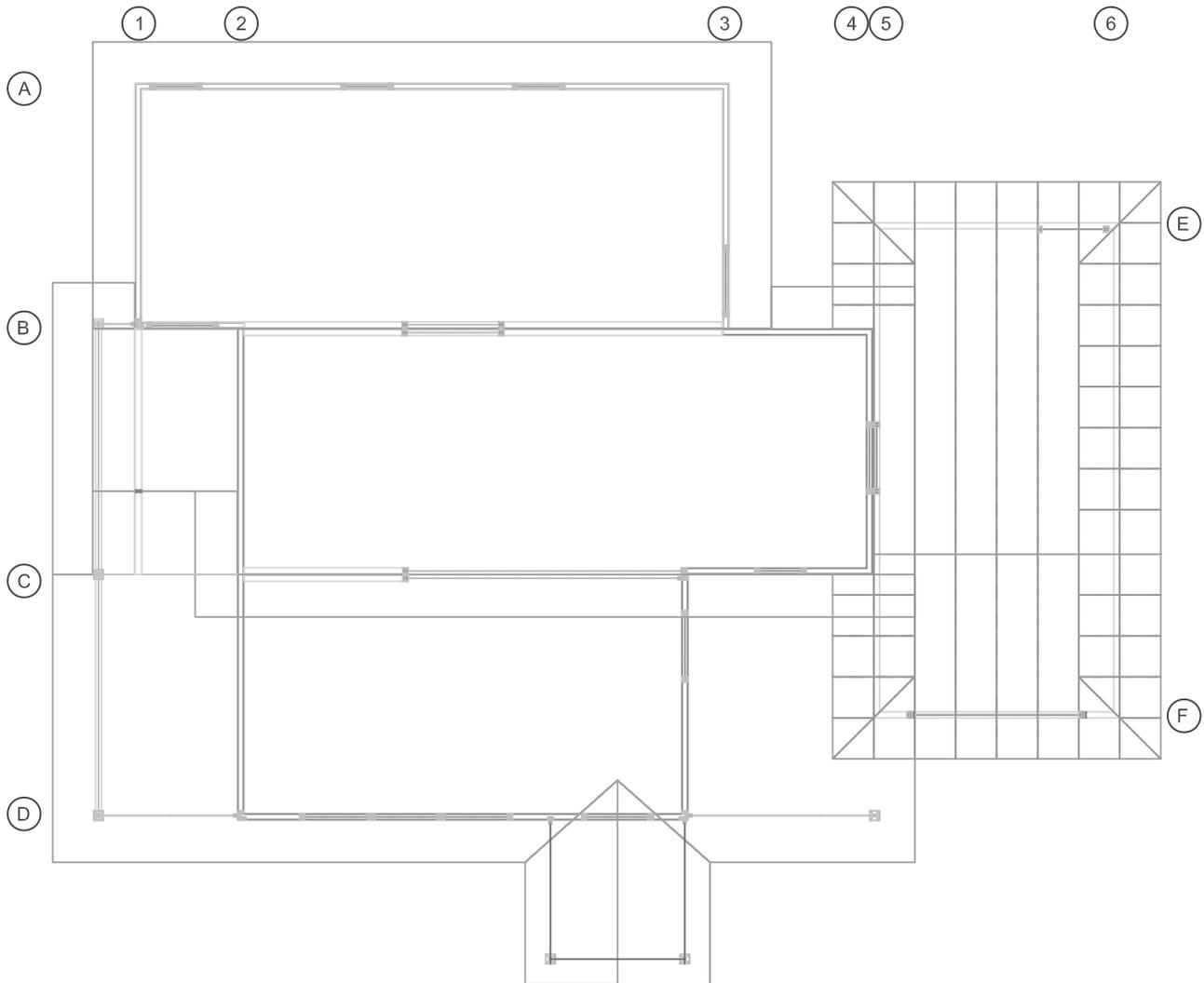


Figure 3. Application of MWFRS Loads in the Longitudinal Direction

BRACED WALL LINE KEY



Braced Wall Requirements

Continuous Wood Structural Panel Sheathing

IRC 2009 R613.5.3

Length of Bracing

R602.10.1.2

Wind

$$L_{\text{wind.unf}} := 3.5\text{ft} + (24\text{ft} - 20\text{ft}) \cdot \frac{(5.0\text{ft} - 3.5\text{ft})}{(30\text{ft} - 20\text{ft})} = 4.1\text{ft}$$

Unfactored Length based on Wind (Table R602.10.1.2(1))

$$f_{\text{ex}} := 1.2$$

Exposure/Height Factor

$$f_{\text{roof.ht}} := 0.7 + (9\text{ft} - 5\text{ft}) \cdot \frac{(1.0 - 0.7)}{(10\text{ft} - 5\text{ft})} = 0.94$$

Roof Eave-to-Ridge Height Factor

$$f_{\text{tp.ht}} := 0.9$$

Top Plate Height Factor

$$f_{\text{bwl}} := 1.60$$

Number of Braced Wall Lines Factor

$$L_{\text{wind}} := f_{\text{ex}} \cdot f_{\text{roof.ht}} \cdot f_{\text{tp.ht}} \cdot f_{\text{bwl}} \cdot L_{\text{wind.unf}} = 6.66\text{ft}$$

Length based on Design Wind Speed (R602.10.1.2)

Seismic

$$L_{\text{seismic.unf}} := 2.7\text{ft} + (24\text{ft} - 20\text{ft}) \cdot \frac{(4.1\text{ft} - 2.7\text{ft})}{(30\text{ft} - 20\text{ft})} = 3.26\text{ft}$$

Unfactored Length based on Seismic (Table R602.10.1.2(2))

$$f_{\text{st.ht}} := 1.0$$

Story Height Factor

$$f_{\text{bwl}} := 1.0$$

Braced Wall Line Spacing Factor

$$f_{\text{dl.w}} := 1.0$$

Wall Dead Load Factor

$$f_{\text{dl.rf}} := 1.1$$

Roof Dead Load Factor

$$L_{\text{seismic}} := f_{\text{st.ht}} \cdot f_{\text{bwl}} \cdot f_{\text{dl.w}} \cdot f_{\text{dl.rf}} \cdot L_{\text{seismic.unf}} = 3.586\text{ft}$$

Length based on Seismic Design Category (R602.10.1.2)

Min. Braced Wall Length

$$L_{\text{min}} := \max(L_{\text{wind}}, L_{\text{seismic}}, 48\text{in}) = 6.66\text{ft}$$

Min. Braced Wall Length Per Braced Wall Line (R602.10.1.2)

Spacing

$$s_{\text{min}} := 24\text{ft}$$

Min. Spacing = 25ft (R602.10.1.4)

(1) Braced Wall Line

$L_1 := 12\text{ft}$ Braced Wall Segment Lengths

$h_{1,ao} := 0\text{ft}$ Adjacent Opening Heights

Verify that Segment Length > Table R602.10.4.2 value (based on Adjacent Opening Height)

$L_{tot} := L_1 = 12\text{ft}$ Total Braced Wall Length

check := if($L_{tot} < L_{min}$, "No Good", "Okay") = "Okay" Minimum Length Check (R602.10.4.3)

Full-Height Braced Wall Panels must be located at each end of BWL and at 25'-0" o.c. (R602.10.4.4)

$hd_{req} := \text{"no"}$ No Holdown required

Min. 2'-0" Returns at each end of Brace Wall Line. Otherwise, holdown required (R602.10.4.4)

$hd_{req} := \text{"yes"}$ Use: 800lbf Holdown @ Each Corner

(2) Braced Wall Line

$L_1 := 24\text{ft}$ Braced Wall Segment Lengths

$h_{1,ao} := 0\text{ft}$ Adjacent Opening Heights

Verify that Segment Length > Table R602.10.4.2 value (based on Adjacent Opening Height)

$L_{tot} := L_1 = 24\text{ft}$ Total Braced Wall Length

check := if($L_{tot} < L_{min}$, "No Good", "Okay") = "Okay" Minimum Length Check (R602.10.4.3)

Full-Height Braced Wall Panels must be located at each end of BWL and at 25'-0" o.c. (R602.10.4.4)

$hd_{req} := \text{"no"}$ No Holdown required

Min. 2'-0" Returns at each end of Brace Wall Line. Otherwise, holdown required (R602.10.4.4)

$hd_{req} := \text{"no"}$ No Holdown required

(3) Braced Wall Line

$L_1 := 8\text{ft}$ $L_2 := 7\text{ft}$ Braced Wall Segment Lengths

$h_{1,ao} := 6.66\text{ft}$ $h_{2,ao} := 6.66\text{ft}$ Adjacent Opening Heights

Verify that Segment Length > Table R602.10.4.2 value (based on Adjacent Opening Height)

$L_{tot} := L_1 + L_2 = 15\text{ft}$ Total Braced Wall Length

check := if($L_{tot} < L_{min}$, "No Good", "Okay") = "Okay" Minimum Length Check (R602.10.4.3)

Full-Height Braced Wall Panels must be located at each end of BWL and at 25'-0" o.c. (R602.10.4.4)

$hd_{req} := \text{"no"}$ No Holdown required

Min. 2'-0" Returns at each end of Brace Wall Line. Otherwise, holdown required (R602.10.4.4)

$hd_{req} := \text{"no"}$ No Holdown required

(4) Braced Wall Line

$L_{1a} := 4.75\text{ft}$ $L_{2a} := 4\text{ft}$ Braced Wall Segment Lengths

$h_{1aov} := 6.66\text{ft}$ $h_{2aov} := 6.66\text{ft}$ Adjacent Opening Heights

Verify that Segment Length > Table R602.10.4.2 value (based on Adjacent Opening Height)

$L_{tot} := L_1 + L_2 = 8.75\text{ft}$ Total Braced Wall Length

$check := \text{if}(L_{tot} < L_{min}, \text{"No Good"}, \text{"Okay"}) = \text{"Okay"}$ Minimum Length Check (R602.10.4.3)

Full-Height Braced Wall Panels must be located at each end of BWL and at 25'-0" o.c. (R602.10.4.4)

$hd_{req} := \text{"no"}$ No Holdown required

Min. 2'-0" Returns at each end of Brace Wall Line. Otherwise, holdown required (R602.10.4.4)

$hd_{req} := \text{"no"}$ No Holdown required

(5) Braced Wall Line

$L_{1a} := 9.75\text{ft}$ $L_{2a} := 11\text{ft}$ Braced Wall Segment Lengths

$h_{1aov} := 6.66\text{ft}$ $h_{2aov} := 6.66\text{ft}$ Adjacent Opening Heights

Verify that Segment Length > Table R602.10.4.2 value (based on Adjacent Opening Height)

$L_{tot} := L_1 + L_2 = 20.75\text{ft}$ Total Braced Wall Length

$check := \text{if}(L_{tot} < L_{min}, \text{"No Good"}, \text{"Okay"}) = \text{"Okay"}$ Minimum Length Check (R602.10.4.3)

Full-Height Braced Wall Panels must be located at each end of BWL and at 25'-0" o.c. (R602.10.4.4)

$hd_{req} := \text{"no"}$ No Holdown required

Min. 2'-0" Returns at each end of Brace Wall Line. Otherwise, holdown required (R602.10.4.4)

$hd_{req} := \text{"no"}$ No Holdown required

(6) Braced Wall Line

$L_{1a} := 24\text{ft}$ Braced Wall Segment Lengths

$h_{1aov} := 6.66\text{ft}$ Adjacent Opening Heights

Verify that Segment Length > Table R602.10.4.2 value (based on Adjacent Opening Height)

$L_{tot} := L_1 = 24\text{ft}$ Total Braced Wall Length

$check := \text{if}(L_{tot} < L_{min}, \text{"No Good"}, \text{"Okay"}) = \text{"Okay"}$ Minimum Length Check (R602.10.4.3)

Full-Height Braced Wall Panels must be located at each end of BWL and at 25'-0" o.c. (R602.10.4.4)

$hd_{req} := \text{"no"}$ No Holdown required

Min. 2'-0" Returns at each end of Brace Wall Line. Otherwise, holdown required (R602.10.4.4)

$hd_{req} := \text{"yes"}$ Use 800lbf Holdown @ North Corner

(A) Braced Wall Line

$L_1 := 7.25\text{ft}$ $L_2 := 6.33\text{ft}$ $L_3 := 8\text{ft}$ Braced Wall Segment Lengths

$h_{1.ao} := 4\text{ft}$ $h_{2.ao} := 4\text{ft}$ $h_{3.ao} := 4\text{ft}$ Adjacent Opening Heights

Verify that Segment Length > Table R602.10.4.2 value (based on Adjacent Opening Height)

$L_{min} := L_1 + L_2 + L_3 = 21.58\text{ft}$ Total Braced Wall Length

$check := \text{if}(L_{tot} < L_{min}, \text{"No Good"}, \text{"Okay"}) = \text{"Okay"}$ Minimum Length Check (R602.10.4.3)

Full-Height Braced Wall Panels must be located at each end of BWL and at 25'-0" o.c. (R602.10.4.4)

$hd_{req} := \text{"yes"}$ Use 800lbf Holdown @ West Corner

Min. 2'-0" Returns at each end of Brace Wall Line. Otherwise, holdown required (R602.10.4.4)

$hd_{req} := \text{"no"}$ No Holdown required

(B) Braced Wall Line

$L_1 := 8\text{ft}$ $L_2 := 18\text{ft}$ Braced Wall Segment Lengths

$h_{1.ao} := 6.66\text{ft}$ $h_{2.ao} := 6.66\text{ft}$ Adjacent Opening Heights

Verify that Segment Length > Table R602.10.4.2 value (based on Adjacent Opening Height)

$L_{min} := L_1 + L_2 = 26\text{ft}$ Total Braced Wall Length

$check := \text{if}(L_{tot} < L_{min}, \text{"No Good"}, \text{"Okay"}) = \text{"Okay"}$ Minimum Length Check (R602.10.4.3)

Full-Height Braced Wall Panels must be located at each end of BWL and at 25'-0" o.c. (R602.10.4.4)

$hd_{req} := \text{"no"}$ No Holdown required

Min. 2'-0" Returns at each end of Brace Wall Line. Otherwise, holdown required (R602.10.4.4)

$hd_{req} := \text{"no"}$ No Holdown required

(C) Braced Wall Line

$L_1 := 8\text{ft}$ $L_2 := 3.5\text{ft}$ Braced Wall Segment Lengths

$h_{1.ao} := 11\text{ft}$ $h_{2.ao} := 2\text{ft}$ Adjacent Opening Heights

Verify that Segment Length > Table R602.10.4.2 value (based on Adjacent Opening Height)

$L_{min} := L_1 + L_2 = 11.5\text{ft}$ Total Braced Wall Length

$check := \text{if}(L_{tot} < L_{min}, \text{"No Good"}, \text{"Okay"}) = \text{"Okay"}$ Minimum Length Check (R602.10.4.3)

Full-Height Braced Wall Panels must be located at each end of BWL and at 25'-0" o.c. (R602.10.4.4)

$hd_{req} := \text{"no"}$ No Holdown required

Min. 2'-0" Returns at each end of Brace Wall Line. Otherwise, holdown required (R602.10.4.4)

$hd_{req} := \text{"no"}$ No Holdown required

(D) Braced Wall Line

$L_{1a} := 3.25\text{ft}$ $L_{2a} := 3.75\text{ft}$ $L_{3a} := 2\text{ft}$ Braced Wall Segment Lengths

$h_{1a} := 6\text{ft}$ $h_{2a} := 6.66\text{ft}$ $h_{3a} := 6.66\text{ft}$ Adjacent Opening Heights

Verify that Segment Length > Table R602.10.4.2 value (based on Adjacent Opening Height)

$L_{tot} := L_1 + L_2 + L_3 = 9\text{ft}$ Total Braced Wall Length

$check := \text{if}(L_{tot} < L_{min}, \text{"No Good"}, \text{"Okay"}) = \text{"Okay"}$ Minimum Length Check (R602.10.4.3)

Full-Height Braced Wall Panels must be located at each end of BWL and at 25'-0" o.c. (R602.10.4.4)

$hd_{req} := \text{"no"}$ No Holdown required

Min. 2'-0" Returns at each end of Brace Wall Line. Otherwise, holdown required (R602.10.4.4)

$hd_{req} := \text{"no"}$ No Holdown required

(E) Braced Wall Line

$L_1 := 8\text{ft}$ Braced Wall Segment Lengths

$h_{1a} := 6.66\text{ft}$ Adjacent Opening Heights

Verify that Segment Length > Table R602.10.4.2 value (based on Adjacent Opening Height)

$L_{tot} := L_1 = 8\text{ft}$ Total Braced Wall Length

$check := \text{if}(L_{tot} < L_{min}, \text{"No Good"}, \text{"Okay"}) = \text{"Okay"}$ Minimum Length Check (R602.10.4.3)

Full-Height Braced Wall Panels must be located at each end of BWL and at 25'-0" o.c. (R602.10.4.4)

$hd_{req} := \text{"yes"}$ Use 800lbf Holdown @ W Edge of Door

Min. 2'-0" Returns at each end of Brace Wall Line. Otherwise, holdown required (R602.10.4.4)

$hd_{req} := \text{"no"}$ No Holdown required

(F) Braced Wall Line

$L_{1a} := 2\text{ft}$ $L_{2a} := 2\text{ft}$ Continuous Portal Frame Wall Segment Lengths

Use: Continuous Portal Frame Wall

Use: (4) 800lbf Holdowns (@ each corner and @ Edges of Garage Door)

Base Shear

Seismic

Roof Diaphragm

$h := 10 \cdot \text{ft}$ Height to Diaphragm

$$W_{\text{sr.M}} := (d_{\text{Lr}}) \cdot (1983 \cdot \text{ft}^2) + d_{\text{Lw}} \cdot (10 \cdot \text{ft}) \cdot (118 \text{ft} + 110 \text{ft} + 68 \text{ft} + 72 \text{ft})$$

$$W_{\text{sr.M}} = 76460 \text{ lbf} \quad \text{Seismic Weight at Roof Diaphragm}$$

Floor Diaphragm

$h := 2 \cdot \text{ft}$ Height to Diaphragm

$$W_{\text{sf.M}} := (d_{\text{Lf}}) \cdot (992 \cdot \text{ft}^2) + d_{\text{Lw}} \cdot (4 \cdot \text{ft}) \cdot (118 \text{ft} + 110 \text{ft} + 68 \text{ft} + 72 \text{ft})$$

$$W_{\text{sf.M}} = 29600 \text{ lbf} \quad \text{Seismic Weight at Floor Diaphragm}$$

$\rho := 1.0$ Seismic Redundancy Factor

Seismic Base Shear

$$V_s := \rho \cdot 6890 \text{ lbf}$$

Wind Pressure

Transverse Direction

$$P_{\text{T.A}} := 26.7 \cdot \text{psf} \quad \text{Zone A Transverse Wind Pressure}$$

$$P_{\text{T.B}} := -1.7 \cdot \text{psf} \quad \text{Zone B Transverse Wind Pressure}$$

$$P_{\text{T.C}} := 18.6 \cdot \text{psf} \quad \text{Zone C Transverse Wind Pressure}$$

$$P_{\text{T.D}} := 0.1 \cdot \text{psf} \quad \text{Zone D Transverse Wind Pressure}$$

Longitudinal Direction

$$P_{\text{L.A}} := 20.1 \cdot \text{psf} \quad \text{Zone A Longitudinal Wind Pressure}$$

$$P_{\text{L.C}} := 13.4 \cdot \text{psf} \quad \text{Zone C Longitudinal Wind Pressure}$$

Wind Shear

$$A_{\text{T.A}} := 43 \cdot \text{ft}^2 \quad A_{\text{T.B}} := 94 \cdot \text{ft}^2 \quad A_{\text{T.C}} := 176 \cdot \text{ft}^2 \quad A_{\text{T.D}} := 274 \cdot \text{ft}^2 \quad \text{Transverse Wind Areas}$$

$$A_{\text{L.A}} := 0 \cdot \text{ft}^2 \quad A_{\text{L.C}} := 0 \cdot \text{ft}^2 \quad \text{Longitudinal Wind Areas}$$

$$V_w := P_{\text{T.A}} \cdot (A_{\text{T.A}}) + P_{\text{T.B}} \cdot (A_{\text{T.B}}) + P_{\text{T.C}} \cdot (A_{\text{T.C}}) + P_{\text{T.D}} \cdot (A_{\text{T.D}}) + P_{\text{L.A}} \cdot (A_{\text{L.A}}) + P_{\text{L.C}} \cdot (A_{\text{L.C}})$$

$$V_{\text{w.min}} := [(A_{\text{T.A}}) + (A_{\text{T.B}}) + (A_{\text{T.C}}) + (A_{\text{T.D}}) + (A_{\text{L.A}}) + (A_{\text{L.C}})] \cdot 10 \cdot \text{psf}$$

$$V_{\text{www}} := \max(V_w, V_{\text{w.min}}) = 5870 \text{ lbf}$$

Maximum Shear Force:

$$V_{\text{www}} := \max(V_w, V_s) \quad V = 6890 \text{ lbf} \quad \text{Maximum Shear Force}$$

Overturing Calculations

$L_{\text{ext.min}} := 46\text{ft}$ Minimum Out-to-Out Length of House

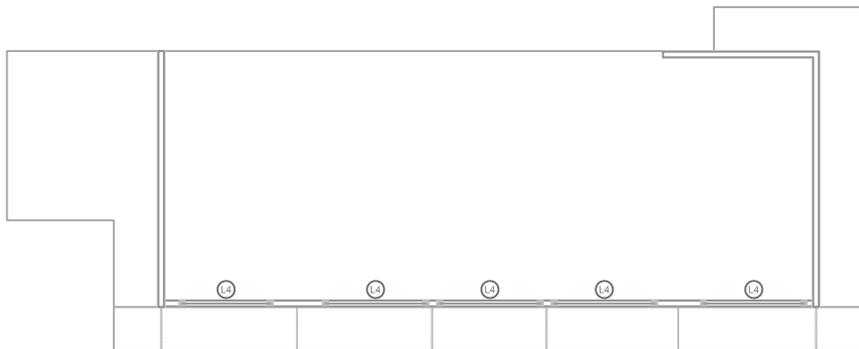
$M_o := V \cdot 10\text{ft} = 68900 \cdot \text{lb} \cdot \text{ft}$ Overturing Moment

$$M_r := \left[(d_{l_r}) \cdot (1983\text{ft}^2) + (d_{l_f}) \cdot (992 \cdot \text{ft}^2) + d_{l_w} \cdot (14 \cdot \text{ft}) \cdot (118\text{ft} + 110\text{ft} + 68\text{ft} + 72\text{ft}) \right] \cdot \left(\frac{L_{\text{ext.min}}}{2} \right) = 2439380 \cdot \text{lb} \cdot \text{ft}$$

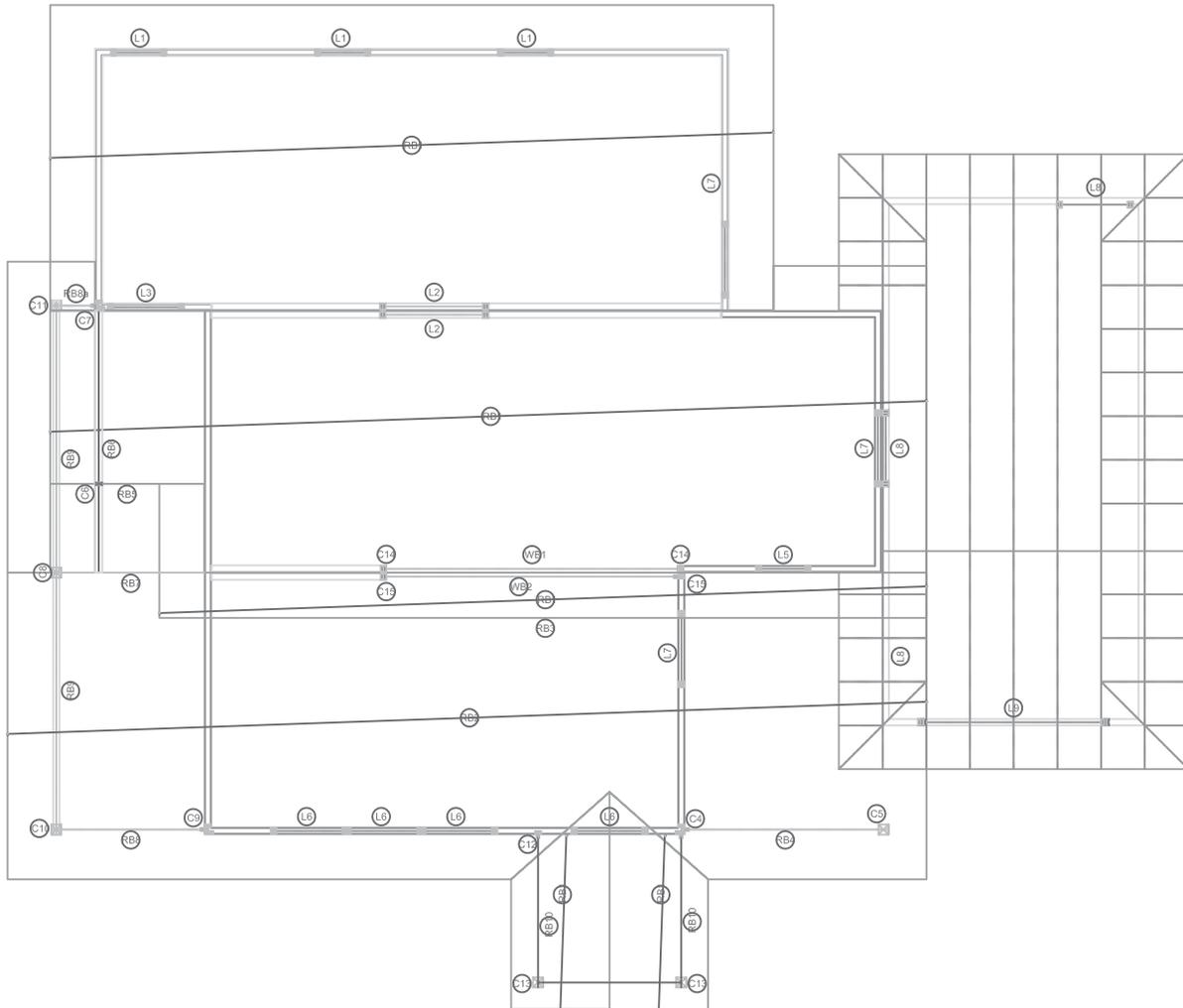
$U := M_o - M_r = -2370480 \cdot \text{lb} \cdot \text{ft}$ Restoring Moment

No Holdowns required for Overturing Moment

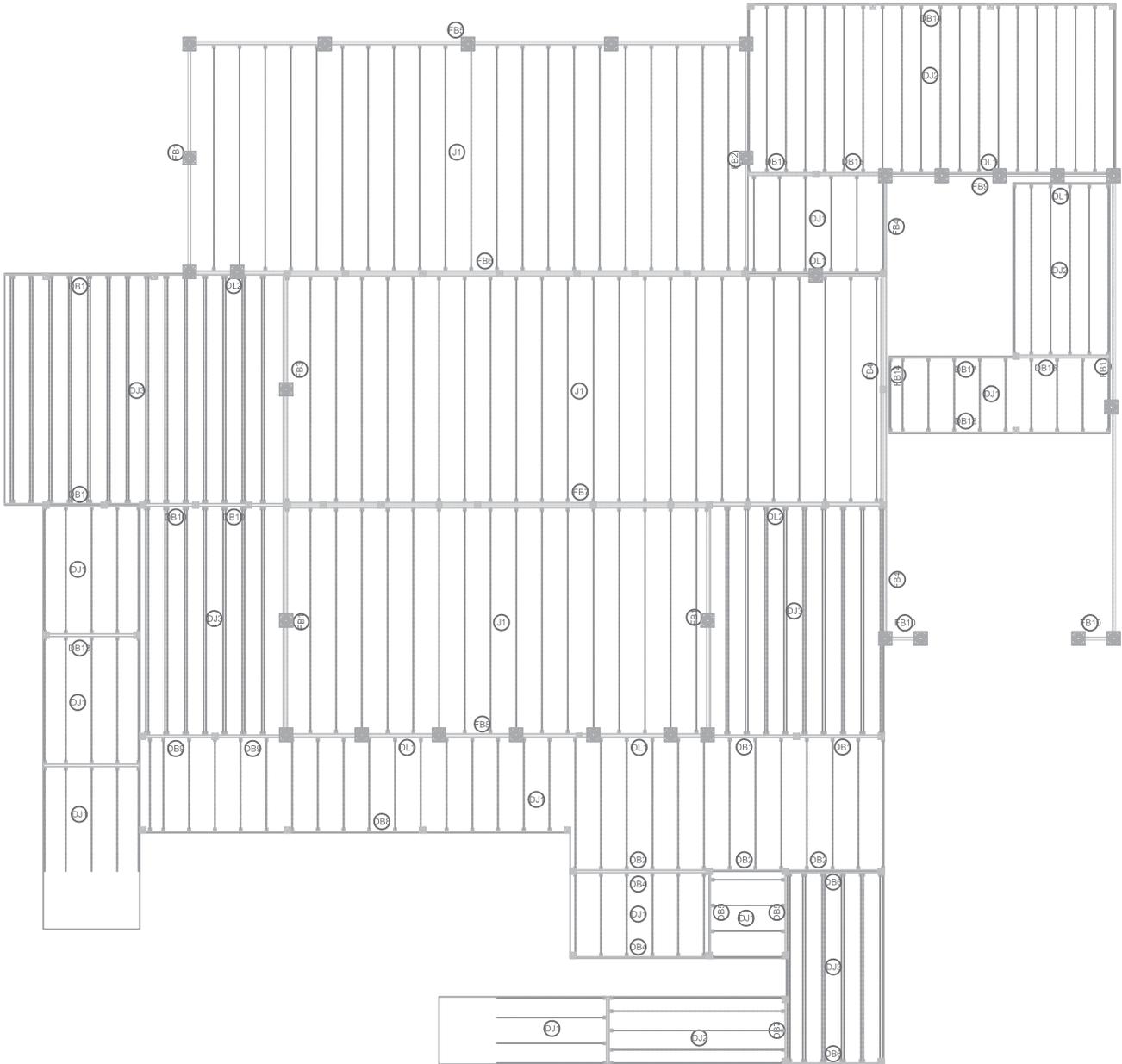
UPPER ROOF FRAMING KEY



ROOF FRAMING KEY



1ST FLOOR FRAMING KEY



(RB1) Sip Panel Roof (Bedrooms, Kitchen)

$$w_{dl} := dl_r \qquad w_{dl} = 20 \cdot \text{psf}$$

$$w_{sl} := sl_{rub} \qquad w_{sl} = 20 \cdot \text{psf}$$

$$L_w := 12 \text{ft} \qquad L_a := 2 \text{ft}$$

$$\Delta_{max} := \frac{L}{360} \qquad \Delta_{max} = 0.4 \cdot \text{in}$$

Use: 6-1/2" SIP Panel Roof $w_{allow} := 54.4 \text{psf}$

Reactions:

$$dl_{int} := 120 \text{plf} \qquad dl_{ext} := 160 \text{plf}$$

$$sl_{int} := 120 \text{plf} \qquad sl_{ext} := 160 \text{plf}$$

(RB2) Sip Panel Roof (Living Room)

$$w_{dl} := dl_r \qquad w_{dl} = 20 \cdot \text{psf}$$

$$w_{sl} := sl_{rub} \qquad w_{sl} = 20 \cdot \text{psf}$$

Trapezoidal Load From 0ft to 6.25ft

$$w_{rd.lv} := sl_{rd.lv} \qquad w_{rd.lv} = 26 \cdot \text{psf}$$

$$L_w := 12 \text{ft} \qquad L_{max} := 2 \text{ft}$$

$$\Delta_{max} := \frac{L}{360} \qquad \Delta_{max} = 0.4 \cdot \text{in}$$

$$M_{max} := 770 \text{lb} \cdot \text{ft}$$

$$V_{max} := 340 \text{lb}$$

$$S := 29.69 \text{in}^3$$

$$F_t := 495 \text{psi}$$

$$F_c := 575 \text{psi}$$

$$\text{check} := \text{if}(M_{max} \leq F_t \cdot S, \text{"okay"}, \text{"no good"}) = \text{"okay"}$$

$$\text{check} := \text{if}(M_{max} \leq F_c \cdot S, \text{"okay"}, \text{"no good"}) = \text{"okay"}$$

Use: 6-1/2" SIP Panel Roof

Reactions:

$$dl_{int} := 120 \text{plf} \qquad dl_{ext} := 160 \text{plf}$$

$$sl_{int} := 180 \text{plf} \qquad sl_{ext} := 180 \text{plf}$$

Attach 2x8 Ledger w/ Simpson SDS Screws @ 8" o.c., Staggered $tl_{allow} := 420 \text{plf}$

(RB3) Structural Fascia @ Upper Roof

$$w_{dl} := dl_r \cdot \frac{(1.5ft)}{2} \quad w_{dl} = 15 \cdot plf$$

$$w_{sl} := sl_{rub} \cdot \frac{(1.5ft)}{2} \quad w_{sl} = 15 \cdot plf$$

$$L := 12.75ft \quad L_{max} := 2ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.425 \cdot in$$

Use: 2x8 Southern Pine No. 2 in SIPs Panel

Reactions:

$$dl := 170plf$$

$$sl := 190plf$$

(RB4) SE Porch Bearing Beam

$$w_{dl} := 180plf \quad w_{dl} = 180 \cdot plf$$

$$w_{sl} := 180plf \quad w_{sl} = 180 \cdot plf$$

$$L := 8.75ft \quad L_{max} := 2ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.292 \cdot in$$

Use: (3) 2x10 Southern Pine No. 2

$$R := 1540lbf$$

Use: Simpson HUC210-3

$$R_{allow} := 1870lbf$$

(RB5) W Porch Upper Ridge Beam

$$w_{dl} := dl_r \cdot \frac{(12.66ft)}{2} \quad w_{dl} = 126.6 \cdot plf$$

$$w_{sl} := sl_{rs} \cdot \frac{(12.66ft)}{2} + sl_{rd.wp} \cdot \frac{(4.75ft)}{2} \quad w_{sl} = 197.85 \cdot plf$$

$$L := 5ft \quad L_{max} := 2ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.167 \cdot in$$

Use: 1.5x7.125 Southern Pine No. 2

$$R := 690lbf$$

Use: Attach Ledger w/ (4)
Simpson SDS3512
Screws - (2) each side of
ridge

$$R_{allow} := 1360lbf$$

(RB6) W Porch Pony Wall Bearing Beam

$$w_{dl} := dl_w \cdot 2.66ft \quad w_{dl} = 26.6 \cdot plf$$

Point Load @ 8ft

$$P_{dl} := 640lbf$$

$$P_{sl} := 970lbf$$

$$L := 12.66ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.422 \cdot in$$

Use: (5) 1.5x7.125 Southern Pine No. 2

$$R := 850lbf$$

Use: Attach Ledger w/ (4)
Simpson SDS3512 Screws

$$R_{allow} := 1360lbf$$

(RB7) W Porch Lower Ridge Beam

$$w_{dl} := dl_r \cdot \frac{(24ft)}{2} + dl_r \cdot \frac{(4.75ft)}{2} \quad w_{dl} = 287.5 \cdot plf$$

$$w_{sl} := sl_{rs} \cdot \frac{(16ft)}{2} + sl_{rd.wp} \cdot \frac{(16ft)}{2} \quad w_{sl} = 400 \cdot plf$$

Point Load @ 4.75ft

$$P_{dl} := 560lbf$$

$$P_{sl} := 610lbf$$

$$L_w := 7ft \quad L_{max} := 2ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.233 \cdot in$$

Use: (4) 1.5x7.125 Southern Pine No. 1

$$R_w := 2620lbf$$

Use: Attach Ledger w/ (8)
Simpson SDS3512 Screws-
(4) Each Side of Ridge

$$R_{allow} := 2720lbf$$

(RB8) W Porch Bearing Beam (S)

$$w_{dl} := dl_r \cdot \left[\frac{(11ft)}{2} + \frac{(7ft)}{2} \right] \quad w_{dl} = 180 \cdot plf$$

$$w_{sl} := sl_{rs} \cdot \left[\frac{(11ft)}{2} + \frac{(7ft)}{2} \right] \quad w_{sl} = 180 \cdot plf$$

$$L_w := 7ft \quad L_{max} := 2ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.233 \cdot in$$

Use: (3) 2x10 Southern Pine No. 2

$$R_w := 1190lbf$$

Use: Simpson HUC210-3

$$R_{allow} := 1870lbf$$

(RB8a) W Porch Bearing Beam (N)

$$w_{dl} := dl_r \cdot \left[\frac{(8.25ft)}{2} + 2ft \right] \quad w_{dl} = 122.5 \cdot plf$$

$$w_{sl} := (sl_{rs} + sl_{rd.wp}) \cdot \left[\frac{(8.25ft)}{2} + 2ft \right] \quad w_{sl} = 306.25 \cdot plf$$

$$L_w := 1.75ft \quad L_{max} := 2ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.058 \cdot in$$

Use: (3) 2x10 Southern Pine No. 2

$$R_w := -120lbf$$

Use: Simpson HUC210-3

$$R_{allow} := -940lbf$$

(RB9) W Porch Eave Bearing Beam (W/ Ridge Above)

$$w_{dl} := dl_w \cdot (4.5ft) \quad w_{dl} = 45 \cdot plf$$

$$L_w := 12ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.4 \cdot in$$

Use: (3) 2x10 Southern Pine No. 2

(RB10) Front Porch Bearing Beams

$$w_{dl} := dl_r \cdot \left[\frac{(6.5\text{ft})}{2} + 2\text{ft} \right] \quad w_{dl} = 105 \cdot \text{plf}$$

$$w_{sl} := (sl_{rs}) \cdot \left[\frac{(6.5\text{ft})}{2} + 2\text{ft} \right] \quad w_{sl} = 105 \cdot \text{plf}$$

$$L := 7\text{ft}$$

$$\Delta_{max} := \frac{L}{360}$$

$$\Delta_{max} = 0.233 \cdot \text{in}$$

$$R := 700\text{lbf}$$

Use: Simpson HUC26-3

$$R_{allow} := 1065\text{lbf}$$

Use: (3) 2x6 Southern Pine No. 2

Kickout Force:

$$T_s := (dl_r + sl_{rs}) \cdot \left[\frac{(7\text{ft})}{2} + 1\text{ft} \right] \cdot (6.5\text{ft}) \cdot \cos(18\text{deg}) \quad T_s = 1112.736 \text{ lbf}$$

$$A_{w.req} := \frac{T_s}{550\text{psi}}$$

$$A_{w.req} = 2.023 \cdot \text{in}^2$$

Wood Tension Member Area Required

$$th_{req} := \frac{T_s}{172 \frac{\text{lbf}}{\text{in}}}$$

$$th_{req} = 6.469 \cdot \text{in}$$

Required Thread Penetration to Main Member

Use: (3) 2x6 Southern Pine No. 2
w/ Min. (3) SDS25800 Screws

(L1) Bedroom Window Lintels

$$w_{dl} := dl_r \cdot \left[\frac{(12ft)}{2} + 2ft \right] \quad w_{dl} = 160 \cdot plf$$

$$w_{sl} := (sl_{rs}) \cdot \left[\frac{(12ft)}{2} + 2ft \right] \quad w_{sl} = 160 \cdot plf$$

$$w_{tl} := w_{dl} + w_{sl} \quad w_{tl} = 320 \cdot plf$$

$$L := 2ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.067 \cdot in$$

Use: Unreinforced Sip Panel Header $w_{allow} := 1268plf$

(L2) Bedroom To Kitchen Hallway Lintels

$$w_{dl} := dl_r \cdot \left[\frac{(12ft)}{2} \right] \quad w_{dl} = 120 \cdot plf$$

$$w_{sl} := (sl_{rs}) \cdot \left[\frac{(12ft)}{2} \right] \quad w_{sl} = 120 \cdot plf$$

$$L := 4.5ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.15 \cdot in$$

Use: (2) 2x4 Southern Pine No. 2

(L3) Bedroom To Exterior Exit Lintel

$$w_{dl} := dl_r \cdot \left[\frac{(20ft)}{2} \right] + dl_r \cdot \left[\frac{(12.66ft)}{2} \right] \quad w_{dl} = 326.6 \cdot plf$$

$$w_{sl} := (sl_{rs}) \cdot \left[\frac{(20ft)}{2} \right] \quad w_{sl} = 200 \cdot plf$$

$$w_{tl} := w_{dl} + w_{sl} \quad w_{tl} = 526.6 \cdot plf$$

$$L := 3ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.1 \cdot in$$

Use: Unreinforced Sip Panel Header $w_{allow} := 1268plf$

(L4) Clerestory Window Lintels

$$w_{dl} := dl_r \cdot \left[\frac{(14ft)}{2} \right] \quad w_{dl} = 140 \cdot plf$$

$$w_{sl} := (sl_{rs}) \cdot \left[\frac{(14ft)}{2} \right] \quad w_{sl} = 140 \cdot plf$$

$$L := 4ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.133 \cdot in$$

Use: 2x8 Southern Pine No. 2 in SIP Panel

(L5) Mechanical Window Lintel

$$w_{dl} := dl_r \cdot \left[\frac{(20ft)}{2} \right] + dl_w \cdot \left[\frac{(8ft)}{2} \right] \quad w_{dl} = 240 \cdot plf$$

$$w_{sl} := (sl_{rs}) \cdot \left[\frac{(20ft)}{2} \right] \quad w_{sl} = 200 \cdot plf$$

$$w_{tl} := w_{dl} + w_{sl} \quad w_{tl} = 440 \cdot plf$$

$$L := 2ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.067 \cdot in$$

Use: Unreinforced Sip Panel Header $w_{allow} := 1268plf$

(L6) South Living Room Wall Lintels

$$w_{dl} := 160plf + dl_r \cdot \left[\frac{(7ft)}{2} \right] \quad w_{dl} = 230 \cdot plf$$

$$w_{sl} := 180plf + sl_{rs} \cdot \left[\frac{(7ft)}{2} \right] \quad w_{sl} = 250 \cdot plf$$

$$w_{tl} := w_{dl} + w_{sl} \quad w_{tl} = 480 \cdot plf$$

$$L := 3ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.1 \cdot in$$

Use: Unreinforced Sip Panel Header $w_{allow} := 1268plf$

(L7) Non-Sips Bearing Lintels

$$w_{dl} := dl_w \cdot 10ft \quad w_{dl} = 100 \cdot plf$$

$$w_{sl} := 0plf \quad w_{sl} = 0 \cdot plf$$

$$w_{tl} := w_{dl} + w_{sl} \quad w_{tl} = 100 \cdot plf$$

$$L := 3ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.1 \cdot in$$

Use: Unreinforced Sip Panel Header $w_{allow} := 1268plf$

(L8) Garage Man Door Lintel

$$w_{dl} := dl_r \cdot \left[\frac{(24.25ft)}{2} + 2ft \right] \quad w_{dl} = 282.5 \cdot plf$$

$$w_{sl} := sl_{rub.t.R} \quad w_{sl} = 300 \cdot plf$$

$$L := 3.25ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.108 \cdot in$$

Use: (2) 2x6 SPF No. 2

(L9) Garage Door Lintels

$$w_{dl} := dl_r \cdot \left[\frac{(24.25 \text{ ft})}{2} + 2 \text{ ft} \right]$$

$$w_{dl} = 282.5 \cdot \text{plf}$$

$$w_{sl} := sl_{\text{rub.t.R}}$$

$$w_{sl} = 300 \cdot \text{plf}$$

$$L := 8.25 \text{ ft}$$

$$\Delta_{\text{max}} := \frac{L}{360}$$

$$\Delta_{\text{max}} = 0.275 \cdot \text{in}$$

Use: (2) 2x12 Southern Pine No. 2

(WB1) Kitchen Vault Beam

$$w_{dl} := dl_r \cdot \left[\frac{(14ft)}{2} \right] \quad w_{dl} = 140 \cdot plf$$

$$w_{sl} := (sl_{rs}) \cdot \left[\frac{(14ft)}{2} \right] \quad w_{sl} = 140 \cdot plf$$

$$L := 14ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.467 \cdot in$$

Use: (2) 1-3/4"X11-7/8" Microllam LVL

(WB2) Living Room Vault Beam

$$w_{dl} := 120plf \quad w_{dl} = 120 \cdot plf \quad \text{See RB2 for Loads}$$

$$w_{sl} := 180plf \quad w_{sl} = 180 \cdot plf$$

$$L := 14ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.467 \cdot in$$

Use: (2) 1-3/4"X11-7/8" Microllam LVL

$$R := 2160lb$$

Use: Simpson HUC612 Max

$$R_{allow} := 2550lb$$

(C1) Knee Brace

$$P_{dl} := \frac{190\text{ lbf}}{\cos(45\text{ deg})} \quad P_{dl} = 268.701 \text{ lbf}$$

$$P_{sl} := \frac{170\text{ lbf}}{\cos(45\text{ deg})} \quad P_{sl} = 240.416 \text{ lbf}$$

$$h := 2.5\text{ ft} \quad h_{xunb} := 2.5\text{ ft} \quad h_{yunb} := 2.5\text{ ft}$$

Use: Steel TS 2x2x3/16"

Or: Steel Pipe 1/2 STD

(C2) Lintel Trimmer Studs (L2,L8)

$$\begin{pmatrix} P_{dl} \\ P_{sl} \end{pmatrix} :=$$

	L2	L8
R _{dl}	280	100
R _{sl}	270	170
R _{total}	550	270
	MAX	

$$P_{dl} := 280\text{ lbf} \quad P_{dl} = 280 \text{ lbf}$$

$$P_{sl} := 270\text{ lbf} \quad P_{sl} = 270 \text{ lbf}$$

$$h := 7\text{ ft} \quad h_{xunb} := 0\text{ ft} \quad h_{yunb} := 7\text{ ft}$$

$$L_{brg} := \frac{(P_{dl} + P_{sl})}{375 \cdot \text{psi} \cdot 3.125 \cdot \text{in}} \quad L_{brg} = 0.469 \cdot \text{in}$$

Use: 2x4 No. 2

(C3) Lintel Trimmer Studs (L9)

$$P_{dl} := 1170\text{ lbf} \quad P_{dl} = 1170 \text{ lbf}$$

$$P_{sl} := 1240\text{ lbf} \quad P_{sl} = 1240 \text{ lbf}$$

$$h := 7\text{ ft} \quad h_{xunb} := 0\text{ ft} \quad h_{yunb} := 7\text{ ft}$$

$$L_{brg} := \frac{(P_{dl} + P_{sl})}{375 \cdot \text{psi} \cdot 3 \cdot \text{in}} \quad L_{brg} = 2.142 \cdot \text{in}$$

Use: (2) 2X4 SPF No. 2

(C4) Wall Column for RB4 & RB10 (SE Porch/Front Entry)

$$P_{dl} := 800\text{ lbf} + 380\text{ lbf} \qquad P_{dl} = 1180\text{ lbf}$$

$$P_{sl} := 750\text{ lbf} + 340\text{ lbf} \qquad P_{sl} = 1090\text{ lbf}$$

$$h := 8\text{ ft} \qquad h_{umb} := 0\text{ ft} \qquad h_{umb} := 0\text{ ft}$$

Use: 1.5x3.125 SPF No. 2

(C5) Exterior Column for RB4 (SE Porch)

$$P_{dl} := 1270\text{ lbf} \qquad P_{dl} = 1270\text{ lbf}$$

$$P_{sl} := 1190\text{ lbf} \qquad P_{sl} = 1190\text{ lbf}$$

$$h := 8\text{ ft} \qquad h_{umb} := 8\text{ ft} \qquad h_{umb} := 8\text{ ft}$$

$$L_{brg} := \frac{(P_{dl} + P_{sl})}{375 \cdot \text{psi} \cdot 4.5 \cdot \text{in}} \qquad L_{brg} = 1.458 \cdot \text{in}$$

Use: 6x6 Southern Pine No. 2

(C6) Exterior Column for RB5 (W Porch)

$$P_{dl} := 640\text{ lbf} \qquad P_{dl} = 640\text{ lbf}$$

$$P_{sl} := 970\text{ lbf} \qquad P_{sl} = 970\text{ lbf}$$

$$h := 3\text{ ft} \qquad h_{umb} := 0\text{ ft} \qquad h_{umb} := 3\text{ ft}$$

$$L_{brg} := \frac{(P_{dl} + P_{sl})}{375 \cdot \text{psi} \cdot 3.5 \cdot \text{in}} \qquad L_{brg} = 1.227 \cdot \text{in}$$

Use: (2) 2x4 SPF No. 2

(C7) Wall Column for RB6 & RB8a (W Porch, N Side)

$$P_{dl} := 490\text{ lbf} + 40\text{ lbf} \qquad P_{dl} = 530\text{ lbf}$$

$$P_{sl} := 360\text{ lbf} + 80\text{ lbf} \qquad P_{sl} = 440\text{ lbf}$$

$$h := 8\text{ ft} \qquad h_{umb} := 0\text{ ft} \qquad h_{umb} := 0\text{ ft}$$

Use: 1.5x3.125 SPF No. 2

(C8) Exterior Column for RB7, RB9 (W Porch)

$$P_{dl} := 2110\text{ lbf} + 2 \cdot 310\text{ lbf} \qquad P_{dl} = 2730\text{ lbf}$$

$$P_{sl} := 2730\text{ lbf} \qquad P_{sl} = 2730\text{ lbf}$$

$$h := 8 \cdot \text{ft} \qquad h_{umb} := 0 \cdot \text{ft} \qquad h_{umb} := 4 \cdot \text{ft}$$

$$L_{brg} := \frac{(P_{dl} + P_{sl})}{375 \cdot \text{psi} \cdot 3.5 \cdot \text{in}} \qquad L_{brg} = 4.16 \cdot \text{in}$$

Use: 6x6 SPF No. 2

(C9) Wall Column for RB8 (W Porch, S Side)

$$P_{dl} := 620\text{ lbf} \qquad P_{dl} = 620\text{ lbf}$$

$$P_{sl} := 1145\text{ lbf} \qquad P_{sl} = 1145\text{ lbf}$$

$$h := 8 \cdot \text{ft} \qquad h_{umb} := 0 \cdot \text{ft} \qquad h_{umb} := 0 \cdot \text{ft}$$

Use: 1.5x3.125 SPF No. 2

(C10) Exterior Column for RB8, RB9 (W Porch, S Side)

$$P_{dl} := 1120\text{ lbf} + 310\text{ lbf} \qquad P_{dl} = 1430\text{ lbf}$$

$$P_{sl} := 2600\text{ lbf} \qquad P_{sl} = 2600\text{ lbf}$$

$$h := 8 \cdot \text{ft} \qquad h_{umb} := 8 \cdot \text{ft} \qquad h_{umb} := 8 \cdot \text{ft}$$

$$L_{brg} := \frac{(P_{dl} + P_{sl})}{375 \cdot \text{psi} \cdot 3.5 \cdot \text{in}} \qquad L_{brg} = 3.07 \cdot \text{in}$$

Use: 6x6 Southern Pine No. 2

(C11) Exterior Column for RB8a, RB9 (W Porch, N Side)

$$P_{dl} := 540\text{ lbf} + 310\text{ lbf} \qquad P_{dl} = 850\text{ lbf}$$

$$P_{sl} := 1230\text{ lbf} \qquad P_{sl} = 1230\text{ lbf}$$

$$h := 8 \cdot \text{ft} \qquad h_{umb} := 8 \cdot \text{ft} \qquad h_{umb} := 8 \cdot \text{ft}$$

$$L_{brg} := \frac{(P_{dl} + P_{sl})}{375 \cdot \text{psi} \cdot 3.5 \cdot \text{in}} \qquad L_{brg} = 1.585 \cdot \text{in}$$

Use: 6x6 Southern Pine No. 2

(C12) Wall Column for RB10 (Front Entry)

$$P_{dl} := 380 \text{ lbf}$$

$$P_{dl} = 380 \text{ lbf}$$

$$P_{sl} := 340 \text{ lbf}$$

$$P_{sl} = 340 \text{ lbf}$$

$$h := 8 \cdot \text{ft}$$

$$h_{amb} := 0 \text{ ft}$$

$$h_{amb} := 0 \cdot \text{ft}$$

Use: 1.5x3.125 SPF No. 2

(C13) Exterior Columns for RB10 (Front Entry)

$$P_{dl} := 680 \text{ lbf}$$

$$P_{dl} = 680 \text{ lbf}$$

$$P_{sl} := 610 \text{ lbf}$$

$$P_{sl} = 610 \text{ lbf}$$

$$h := 8 \cdot \text{ft}$$

$$h_{amb} := 8 \cdot \text{ft}$$

$$h_{amb} := 8 \cdot \text{ft}$$

$$L_{brg} := \frac{(P_{dl} + P_{sl})}{375 \cdot \text{psi} \cdot 3.5 \cdot \text{in}}$$

$$L_{brg} = 0.983 \cdot \text{in}$$

Use: 6x6 Southern Pine No. 2

(C14) Columns for WB1 (Kitchen)

$$P_{dl} := 1040 \text{ lbf}$$

$$P_{dl} = 1040 \text{ lbf}$$

$$P_{sl} := 980 \text{ lbf}$$

$$P_{sl} = 980 \text{ lbf}$$

$$h := 11 \cdot \text{ft}$$

$$h_{amb} := 0 \cdot \text{ft}$$

$$h_{amb} := 11 \cdot \text{ft}$$

$$L_{brg} := \frac{(P_{dl} + P_{sl})}{375 \cdot \text{psi} \cdot 3.5 \cdot \text{in}}$$

$$L_{brg} = 1.539 \cdot \text{in}$$

Use: (2) 2x4 SPF No. 2

Or: (2) 1.5x3.125 SPF No. 2

(C15) Columns for WB2 (Living Room)

$$P_{dl} := 900 \text{ lbf}$$

$$P_{dl} = 900 \text{ lbf}$$

$$P_{sl} := 1260 \text{ lbf}$$

$$P_{sl} = 1260 \text{ lbf}$$

$$h := 11 \cdot \text{ft}$$

$$h_{amb} := 0 \cdot \text{ft}$$

$$h_{amb} := 11 \cdot \text{ft}$$

$$L_{brg} := \frac{(P_{dl} + P_{sl})}{375 \cdot \text{psi} \cdot 3.5 \cdot \text{in}}$$

$$L_{brg} = 1.646 \cdot \text{in}$$

Use: (2) 2x4 SPF No. 2

Or: (2) 1.5x3.125 SPF No. 2

(J1) 1st Floor Joists

$$w_{dl} := dl_f$$

$$w_{dl} = 15 \cdot \text{psf}$$

$$w_{ll} := ll_f$$

$$w_{ll} = 50 \cdot \text{psf}$$

$$L := 12 \text{ft}$$

$$R := 875 \text{lb}$$

$$\Delta_{\text{max}} := \frac{L}{360}$$

$$\Delta_{\text{max}} = 0.4 \cdot \text{in}$$

Use: Simpson ITS2.06/9.5

$$R_{\text{allow}} := 1550 \text{lb}$$

Use: 9-1/2" TJI 210 @ 16" o.c.

(FB1) Floor Beam 1 (Private Mod, W Side)

$$w_{dl} := dl_r \cdot 3ft + dl_w \cdot 10ft + dl_f \cdot 2ft \quad w_{dl} = 190 \cdot plf$$

$$w_{ll} := ll_f \cdot 2ft \quad w_{ll} = 100 \cdot plf$$

$$w_{sl} := sl_{rs} \cdot 3ft \quad w_{sl} = 60 \cdot plf$$

$$L := 12ft$$

Supports:

$$l := 6ft, 6ft$$

Use: (2) 9-1/2" Microllam LVL

$$R := 810lb$$

Use: Simpson HUC410

$$R_{allow} := 1625lb$$

(FB2) Floor Beam 2 (Private Mod, E Side)

$$w_{dl} := dl_r \cdot 3ft + dl_w \cdot 10ft + dl_f \cdot 2ft \quad w_{dl} = 190 \cdot plf$$

$$w_{ll} := ll_f \cdot 2ft \quad w_{ll} = 100 \cdot plf$$

$$w_{sl} := sl_{rs} \cdot 3ft \quad w_{sl} = 60 \cdot plf$$

Point Load @ 5.25ft from DB15

$$P_{dl} := 140$$

$$P_{ll} := 920$$

$$L := 12ft$$

Supports:

$$l := 6ft, 6ft$$

Use: (2) 9-1/2" Microllam LVL

$$R := 880lb$$

Use: Simpson HUC410

$$R_{allow} := 1625lb$$

(FB3) Floor Beam 3 (Wet Mod, W Side)

$$w_{dl} := dl_r \cdot 2ft + dl_w \cdot 14ft + dl_f \cdot 2ft \quad w_{dl} = 210 \cdot plf$$

$$w_{ll} := ll_f \cdot 2ft \quad w_{ll} = 100 \cdot plf$$

$$w_{sl} := sl_{rs} \cdot 2ft \quad w_{sl} = 40 \cdot plf$$

Point Load @ 4ft from RB5

$$P_{dl} := 270$$

$$P_{sl} := 420$$

$$L := 12ft$$

Supports:

$$l := 6ft, 6ft$$

Use: (2) 9-1/2" Microllam LVL

$$R := 970lb$$

Use: Simpson HUC410

$$R_{allow} := 1625lb$$

(FB4) Floor Beam 4 (Wet Mod, E Side)

$$w_{dl} := dl_f \cdot 3\text{ft} + 2dl_w \cdot 14\text{ft} + dl_f \cdot 2\text{ft} \quad w_{dl} = 370 \cdot \text{plf}$$

$$w_{ll} := ll_f \cdot 2\text{ft} \quad w_{ll} = 100 \cdot \text{plf}$$

$$w_{sl} := sl_{rs} \cdot 3\text{ft} \quad w_{sl} = 60 \cdot \text{plf}$$

Point Load @ 10.75ft from DB18

$$P_{dl} := 80$$

$$P_{ll} := 520$$

Point Load @ 14.25ft from DB17

$$P_{dl} := 100$$

$$P_{ll} := 650$$

$$L := 24\text{ft}$$

Supports:

$$l := 7\text{ft}, 6\text{ft}, 6\text{ft}, 5\text{ft}$$

Use: (2) 9-1/2" Microllam LVL

$$R := 1320\text{lbf}$$

Use: Simpson HUC410

$$R_{allow} := 1625\text{lbf}$$

(FB5) Floor Beam 1 (Private Mod, N Side)

$$w_{dl} := 120\text{plf} + dl_w \cdot 8\text{ft} + dl_f \cdot \frac{(12\text{ft})}{2} \quad w_{dl} = 290 \cdot \text{plf}$$

$$w_{ll} := ll_f \cdot \frac{(12\text{ft})}{2} \quad w_{ll} = 300 \cdot \text{plf}$$

$$w_{sl} := 160\text{plf} \quad w_{sl} = 160 \cdot \text{plf}$$

Point Load @ 0ft from FB1

$$P_{dl} := 440$$

$$P_{ll} := 230$$

$$P_{sl} := 140$$

Point Load @ 29ft from FB2

$$P_{dl} := 450$$

$$P_{ll} := 290$$

$$P_{sl} := 140$$

$$L := 29\text{ft}$$

Supports:

$$l := 7\text{ft}, 7.5\text{ft}, 7.5\text{ft}, 7\text{ft}$$

Use: (2) 9-1/2" Microllam LVL

(FB6) Floor Beam 6 (Private/Wet Marriage Wall)

$$w_{dl} := 2 \cdot 120 \text{plf} + 2 d_{lw} \cdot 12 \text{ft} + 2 d_{lf} \cdot \frac{(12 \text{ft})}{2} \quad w_{dl} = 660 \cdot \text{plf}$$

$$w_{ll} := 2 l_{lf} \cdot \frac{(12 \text{ft})}{2} \quad w_{ll} = 600 \cdot \text{plf}$$

$$w_{sl} := 2 \cdot 120 \text{plf} \quad w_{sl} = 240 \cdot \text{plf}$$

Trapezoidal Load from 0ft to 5ft

$$w_{dl} := d_{lf} \cdot \frac{(12 \text{ft})}{2} \quad w_{dl} = 90 \cdot \text{plf}$$

$$w_{ll} := l_{lf} \cdot \frac{(12 \text{ft})}{2} \quad w_{ll} = 300 \cdot \text{plf}$$

Point Loads @ 0ft from RB6, RB8a, DB12, FB1

$$P_{dl} := 490 \text{lbf} + 0 \text{lbf} + 0 \text{lbf} + 440 \text{lbf} \quad P_{dl} = 930 \text{ lbf}$$

$$P_{ll} := 0 \text{lbf} + 230 \text{lbf} \quad P_{ll} = 230 \text{ lbf}$$

$$P_{sl} := 360 \text{lbf} + 0 \text{lbf} + 140 \text{lbf} \quad P_{sl} = 500 \text{ lbf}$$

Point Loads @ 5ft from FB3

$$P_{dl} := 480 \text{lbf} \quad P_{dl} = 480 \text{ lbf}$$

$$P_{ll} := 280 \text{lbf} \quad P_{ll} = 280 \text{ lbf}$$

$$P_{sl} := 90 \text{lbf} \quad P_{sl} = 90 \text{ lbf}$$

Point Loads @ 29ft from FB2

$$P_{dl} := 440 \text{lbf} \quad P_{dl} = 440 \text{ lbf}$$

$$P_{ll} := 180 \text{lbf} \quad P_{ll} = 180 \text{ lbf}$$

$$P_{sl} := 140 \text{lbf} \quad P_{sl} = 140 \text{ lbf}$$

Point Loads @ 36ft from FB4

$$P_{dl} := 2370 \text{lbf} \quad P_{dl} = 2370 \text{ lbf}$$

$$P_{ll} := 690 \text{lbf} \quad P_{ll} = 690 \text{ lbf}$$

$$P_{sl} := 380 \text{lbf} \quad P_{sl} = 380 \text{ lbf}$$

$$L := 36 \text{ft}$$

Supports:

$$l := 2.5 \text{ft}, 2.5 \text{ft}, 3 \text{ft}, 4 \text{ft}, 4 \text{ft}, 4 \text{ft}, 3 \text{ft}, 2 \text{ft}, 3 \text{ft}, 3.5 \text{ft}, 3.5 \text{ft}$$

Use: (2) 9-1/2" Microllam LVL

(FB7) Floor Beam 7 (Wet/Living Marriage Wall)

Trapezoidal Load from 0ft to 8.25ft, and from 21.75ft to 31ft

$$w_{dl} := 160\text{plf} + 120\text{plf} + 2d_{lw} \cdot 16\text{ft} + 2d_{lf} \cdot \frac{(12\text{ft})}{2} \quad w_{dl} = 780 \cdot \text{plf}$$

$$w_{ll} := 2l_{lf} \cdot \frac{(12\text{ft})}{2} \quad w_{ll} = 600 \cdot \text{plf}$$

$$w_{sl} := 160\text{plf} + 180\text{plf} \quad w_{sl} = 340 \cdot \text{plf}$$

Trapezoidal Load from 8.25ft to 21.75ft

$$w_{dl} := 2d_{lf} \cdot \frac{(12\text{ft})}{2} \quad w_{dl} = 180 \cdot \text{plf}$$

$$w_{ll} := 2l_{lf} \cdot \frac{(12\text{ft})}{2} \quad w_{ll} = 600 \cdot \text{plf}$$

Point Loads @ 0ft from RB7, FB3, FB1

$$P_{dl} := 1140\text{lbf} + 550\text{lbf} + 440\text{lbf} \quad P_{dl} = 2130 \text{ lbf}$$

$$P_{ll} := 330\text{lbf} + 230\text{lbf} \quad P_{ll} = 560 \text{ lbf}$$

$$P_{sl} := 1480\text{lbf} + 90\text{lbf} + 140\text{lbf} \quad P_{sl} = 1710 \text{ lbf}$$

Point Loads @ 8.25ft from WB1, WB2

$$P_{dl} := 1050\text{lbf} + 910\text{lbf} \quad P_{dl} = 1960 \text{ lbf}$$

$$P_{sl} := 980\text{lbf} + 1260\text{lbf} \quad P_{sl} = 2240 \text{ lbf}$$

Point Loads @ 21.75ft from WB1, WB2, FB1

$$P_{dl} := 1050\text{lbf} + 910\text{lbf} + 440\text{lbf} \quad P_{dl} = 2400 \text{ lbf}$$

$$P_{ll} := 230\text{lbf} \quad P_{ll} = 230 \text{ lbf}$$

$$P_{sl} := 980\text{lbf} + 1260\text{lbf} + 140\text{lbf} \quad P_{sl} = 2380 \text{ lbf}$$

Point Loads @ 31ft from FB4

$$P_{dl} := 2880\text{lbf} \quad P_{dl} = 2880 \text{ lbf}$$

$$P_{ll} := 890\text{lbf} \quad P_{ll} = 890 \text{ lbf}$$

$$P_{sl} := 450\text{lbf} \quad P_{sl} = 450 \text{ lbf}$$

$$L := 31\text{ft}$$

Supports:

$$l := 2\text{ft}, 3\text{ft}, 3\text{ft}, 2\text{ft}, 6\text{ft}, 4\text{ft}, 2\text{ft}, 2\text{ft}, 4\text{ft}, 3\text{ft}$$

Use: (2) 9-1/2" Microllam LVL

(FB8) Floor Beam 8 (Living Mod, S Side)

$$w_{dl} := 160 \text{plf} + d_{lw} \cdot 8 \text{ft} + d_{lf} \cdot \frac{(12 \text{ft})}{2} + d_{lf} \cdot \frac{(7 \text{ft})}{2} \quad w_{dl} = 382.5 \cdot \text{plf}$$

$$w_{ll} := 11 \text{ft} \cdot \frac{(12 \text{ft})}{2} + 11 \text{ft} \cdot \frac{(7 \text{ft})}{2} \quad w_{ll} = 650 \cdot \text{plf}$$

$$w_{sl} := 180 \text{plf} \quad w_{sl} = 180 \cdot \text{plf}$$

Point Loads @ 0ft from RB8, DB9, FB1

$$P_{dl} := 610 \text{lbf} + 160 \text{lbf} + 440 \text{lbf} \quad P_{dl} = 1210 \text{ lbf}$$

$$P_{ll} := 1040 \text{lbf} + 230 \text{lbf} \quad P_{ll} = 1270 \text{ lbf}$$

$$P_{sl} := 580 \text{lbf} + 140 \text{lbf} \quad P_{sl} = 720 \text{ lbf}$$

Point Loads @ 15.25ft from RB10

$$P_{dl} := 360 \text{lbf} \quad P_{dl} = 360 \text{ lbf}$$

$$P_{sl} := 340 \text{lbf} \quad P_{sl} = 340 \text{ lbf}$$

Point Loads @ 22ft from RB4, RB10, DB1, FB1

$$P_{dl} := 790 \text{lbf} + 360 \text{lbf} + 240 \text{lbf} + 440 \text{lbf} \quad P_{dl} = 1830 \text{ lbf}$$

$$P_{ll} := 1600 \text{lbf} + 230 \text{lbf} \quad P_{ll} = 1830 \text{ lbf}$$

$$P_{sl} := 750 \text{lbf} + 340 \text{lbf} + 140 \text{lbf} \quad P_{sl} = 1230 \text{ lbf}$$

$$L := 22 \text{ft}$$

Supports:

$$l := 4 \text{ft}, 4 \text{ft}, 4 \text{ft}, 4 \text{ft}, 4 \text{ft}, 2 \text{ft}$$

Use: (2) 9-1/2" Microllam LVL

(FB9) Floor Beam 9 (Garage Mod, N Side)

$$w_{dl} := dl_r \cdot \frac{(28ft)}{2} + dl_w \cdot 8ft + dl_f \cdot \frac{(9ft)}{2} \quad w_{dl} = 427.5 \cdot plf$$

$$w_{ll} := ll_{ft} \cdot \frac{(9ft)}{2} \quad w_{ll} = 450 \cdot plf$$

$$w_{sl} := 291plf \quad w_{sl} = 291 \cdot plf$$

Trapezoidal Load from 6.66ft to 12ft

$$w_{dl} := dl_f \cdot \frac{(9ft)}{2} \quad w_{dl} = 67.5 \cdot plf$$

$$w_{ll} := ll_{ft} \cdot \frac{(9ft)}{2} \quad w_{ll} = 450 \cdot plf$$

Point Loads @ 0ft from DB15, FB4

$$P_{dl} := 140lbf + 70lbf \quad P_{dl} = 210 \text{ lbf}$$

$$P_{ll} := 920lbf + 170lbf \quad P_{ll} = 1090 \text{ lbf}$$

$$P_{sl} := 110lbf \quad P_{sl} = 110 \text{ lbf}$$

$$L := 12ft$$

Supports:

$$l := 3ft, 3ft, 3ft, 3ft$$

Use: (2) 9-1/2" Microllam LVL

(FB10) Floor Beam 10 (Garage Mod, S Side)

$$w_{dl} := dl_r \cdot \frac{(28ft)}{2} + dl_w \cdot 8ft \quad w_{dl} = 360 \cdot plf$$

$$w_{sl} := 291plf \quad w_{sl} = 291 \cdot plf$$

Point Loads @ 2ft from L9

$$P_{dl} := 1160lbf \quad P_{dl} = 1160 \text{ lbf}$$

$$P_{sl} := 1200lbf \quad P_{sl} = 1200 \text{ lbf}$$

$$L := 2ft$$

Supports:

$$l := 2ft$$

Use: (2) 9-1/2" Microllam LVL

(FB11) Floor Beam 11 (Garage Mod, E Side)

$$w_{dl} := dl_r \left[\frac{(2ft)}{2} + 2ft \right] + dl_w \cdot 12ft \quad w_{dl} = 180 \cdot plf$$

$$w_{sl} := sl_{rub} \left[\frac{(2ft)}{2} + 2ft \right] \quad w_{sl} = 60 \cdot plf$$

Point Loads @ 0ft from FB10

$$P_{dl} := 360lbf \quad P_{dl} = 360 \text{ lbf}$$

$$P_{sl} := 290lbf \quad P_{sl} = 290 \text{ lbf}$$

Point Loads @ 10.75ft from DB18

$$P_{dl} := 50lbf \quad P_{dl} = 50 \text{ lbf}$$

$$P_{ll} := 330lbf \quad P_{ll} = 330 \text{ lbf}$$

Point Loads @ 14.75ft from DB16

$$P_{dl} := 250lbf \quad P_{dl} = 250 \text{ lbf}$$

$$P_{ll} := 1630lbf \quad P_{ll} = 1630 \text{ lbf}$$

Point Loads @ 24ft from FB9

$$P_{dl} := 590lbf \quad P_{dl} = 590 \text{ lbf}$$

$$P_{ll} := 1050lbf \quad P_{ll} = 1050 \text{ lbf}$$

$$P_{sl} := 340lbf \quad P_{sl} = 340 \text{ lbf}$$

$$L := 24ft$$

Supports:

$$l := 12ft, 12ft$$

Use: (2) 9-1/2" Microllam LVL

Deck Hand Rail

$$w_{ll} := 50 \text{ plf}$$

$$P_{ll} := 200 \text{ lbf}$$

$$L := 4.5 \text{ ft}$$

Use 2x4 SPF No. 2 Handrail

Deck Hand Rail Columns

$$P_{ll} := 200 \text{ lbf}$$

$$m_{aII} := 4.66 \text{ ft}$$

$$M_{II} := P_{II} \cdot m_{aII} = 932 \cdot \text{lbf} \cdot \text{ft}$$

Maximum Moment Arm (Force Applied @ Top of Column-Measure to bottom of Deck Bearing Beam)

$$m_{a_h} := 6 \text{ in}$$

Moment Arm of Resisting Bolt (Allowing 1.25in to top of Deck Bearing Beam)

$$P_{\text{req}} := \frac{M_{II}}{m_{a_h}} = 1864 \text{ lbf}$$

$$A_{b,\text{req}} := \frac{P_{\text{req}}}{36 \text{ ksi}} = 0.052 \cdot \text{in}^2$$

Minimum Bolt Area to resist Force

Use 1/2" Bolt

$$A_{\text{brg}} := \frac{P_{\text{req}}}{480 \text{ psi}} = 3.883 \cdot \text{in}^2$$

Use 3"x3" Plate Washer @ Top & Bottom

$$A_w := (3 \text{ in})(3 \text{ in}) - \pi \cdot \frac{(.5 \text{ in})^2}{4} = 8.804 \cdot \text{in}^2$$

Use 6x6 SPF No. 2 w/ 1/2" Bolt w/ 3"x3" Plate Washer

(DJ1) Deck Joist - 7 ft max span

$$w_{dl} := dl_f$$

$$w_{dl} = 15 \cdot \text{psf}$$

$$w_{ll} := ll_f$$

$$w_{ll} = 100 \cdot \text{psf}$$

$$L := 7 \text{ ft}$$

$$\Delta_{max} := \frac{L}{360}$$

$$\Delta_{max} = 0.233 \cdot \text{in}$$

$$R := 540 \text{ lbf}$$

Use: Simpson JB28

$$R_{allow} := 1050 \text{ lbf}$$

Use: 2x8 Southern Pine No. 2 @ 16" o.c.

(DJ2) Deck Joist - 9 ft max span

$$w_{dl} := dl_f$$

$$w_{dl} = 15 \cdot \text{psf}$$

$$w_{ll} := ll_f$$

$$w_{ll} = 100 \cdot \text{psf}$$

$$L := 9 \text{ ft}$$

$$\Delta_{max} := \frac{L}{360}$$

$$\Delta_{max} = 0.3 \cdot \text{in}$$

$$R := 520 \text{ lbf}$$

Use: Simpson JB28

$$R_{allow} := 1050 \text{ lbf}$$

Use: 2x8 Southern Pine No. 2 @ 12" o.c.

(DJ3) Deck Joist - 12 ft max span

$$w_{dl} := dl_f$$

$$w_{dl} = 15 \cdot \text{psf}$$

$$w_{ll} := ll_f$$

$$w_{ll} = 100 \cdot \text{psf}$$

$$L := 9 \text{ ft}$$

$$\Delta_{max} := \frac{L}{360}$$

$$\Delta_{max} = 0.3 \cdot \text{in}$$

$$R := 690 \text{ lbf}$$

Use: Simpson HUS228-2TF

$$R_{allow} := 3455 \text{ lbf}$$

Use: (2) 2x8 Southern Pine No. 2 @ 12" o.c.

(DL1) Deck Ledger (8.75' Max Span)

$$w_{dl} := dl_f \cdot \frac{(8.75\text{ft})}{2} \quad w_{dl} = 65.625 \cdot \text{plf}$$

$$w_{ll} := ll_f \cdot \frac{(8.75\text{ft})}{2} \quad w_{ll} = 437.5 \cdot \text{plf}$$

$$w_{tot} := w_{dl} + w_{ll} \quad w_{tot} = 503.125 \cdot \text{plf}$$

$$P_{sds} := 340\text{lbf} \quad \text{Simpson SDS25312 Shear Capacity}$$

$$s_{min} := \frac{P_{sds}}{w_{tot}} \quad s_{min} = 8.109 \cdot \text{in}$$

Use: 2x8 Southern Pine No. 2 Ledger w/ Simpson SDS25312 screws @ 8" o.c. staggered

(DL2) Deck Ledger (12' Max Span)

$$w_{dl} := dl_f \cdot \frac{(12\text{ft})}{2} \quad w_{dl} = 90 \cdot \text{plf}$$

$$w_{ll} := ll_f \cdot \frac{(12\text{ft})}{2} \quad w_{ll} = 600 \cdot \text{plf}$$

$$w_{tot} := w_{dl} + w_{ll} \quad w_{tot} = 690 \cdot \text{plf}$$

$$P_{sds} := 340\text{lbf} \quad \text{Simpson SDS25312 Shear Capacity}$$

$$s_{min} := \frac{P_{sds}}{w_{tot}} \quad s_{min} = 5.913 \cdot \text{in}$$

Use: 2x8 Southern Pine No. 2 Ledger w/ Simpson SDS25312 screws @ 4" o.c. staggered

(DB1) Deck Bearing Beam 1

$$w_{dl} := dl_f \cdot \frac{(19ft)}{2} \quad w_{dl} = 142.5 \cdot plf$$

$$w_{ll} := ll_f \cdot \frac{(19ft)}{2} \quad w_{ll} = 950 \cdot plf$$

$$L := 4.5ft, 4.5ft$$

Use: (3) 2x8 Southern Pine No. 2

$$R := 1840lb$$

Use: Simpson HUC28-2 (Ma)
Okay w/ Cont. Ledger Ext.

$$R_{allow} := 1625lb$$

(DB2) Deck Bearing Beam 2

$$w_{dl} := dl_f \cdot \frac{(7ft)}{2} \quad w_{dl} = 52.5 \cdot plf$$

$$w_{ll} := ll_f \cdot \frac{(7ft)}{2} \quad w_{ll} = 350 \cdot plf$$

Point Load @ 0ft, 7ft from C13

$$P_{dl} := 680lb \quad P_{dl} = 680 \text{ lbf}$$

$$P_{sl} := 610lb \quad P_{sl} = 610 \text{ lbf}$$

$$L := 7ft, 4ft, 5ft$$

Use: (2) 2x8 Southern Pine No. 2

(DB3) Not Used

(DB4) Deck Bearing Beam 4

$$w_{dl} := dl_f \cdot \frac{(4.5ft)}{2} \quad w_{dl} = 33.75 \cdot plf$$

$$w_{ll} := ll_f \cdot \frac{(4.5ft)}{2} \quad w_{ll} = 225 \cdot plf$$

$$L := 7ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.233 \cdot in$$

Use: (2) 2x8 Southern Pine No. 2

(DB5) Deck Bearing Beam 5

$$w_{dl} := dl_f \cdot \frac{(4ft)}{2} \quad w_{dl} = 30 \cdot plf$$

$$w_{ll} := ll_f \cdot \frac{(4ft)}{2} \quad w_{ll} = 200 \cdot plf$$

$$L := 4.5ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.15 \cdot in$$

Use: 2x8 Southern Pine No. 2

(DB6) Deck Bearing Beam 6

$$w_{dl} := dl_f \cdot \frac{(10ft)}{2}$$

$$w_{dl} = 75 \cdot plf$$

$$w_{ll} := ll_f \cdot \frac{(10ft)}{2}$$

$$w_{ll} = 500 \cdot plf$$

$$L := 5ft$$

$$\Delta_{max} := \frac{L}{360}$$

$$\Delta_{max} = 0.167 \cdot in$$

Use:(2) 2x8 Southern Pine No. 2

(DB7) Deck Bearing Beam 7

$$w_{dl} := dl_f \cdot \frac{(9.5ft)}{2}$$

$$w_{dl} = 71.25 \cdot plf$$

$$w_{ll} := ll_f \cdot \frac{(9.5ft)}{2}$$

$$w_{ll} = 475 \cdot plf$$

$$L := 3.5ft$$

$$\Delta_{max} := \frac{L}{360}$$

$$\Delta_{max} = 0.117 \cdot in$$

Use:2x8 Southern Pine No. 2

(DB8) Deck Bearing Beam 8

$$w_{dl} := dl_f \cdot \frac{(5ft)}{2}$$

$$w_{dl} = 37.5 \cdot plf$$

$$w_{ll} := ll_f \cdot \frac{(5ft)}{2}$$

$$w_{ll} = 250 \cdot plf$$

$$L := 7.5ft, 7.5ft, 7.5ft$$

Use:(2) 2x8 Southern Pine No. 2

(DB9) Deck Bearing Beam 9

$$w_{dl} := dl_f \cdot \frac{(17ft)}{2}$$

$$w_{dl} = 127.5 \cdot plf$$

$$R := 1200lbf$$

Use: Simpson HUC28-2 (Max)

$$w_{ll} := ll_f \cdot \frac{(17ft)}{2}$$

$$w_{ll} = 850 \cdot plf$$

$$R_{allow} := 1875lbf$$

Point Load @ 0ft from C10

$$P_{dl} := 1430lbf$$

$$P_{dl} = 1430 \text{ lbf}$$

$$P_{sl} := 2600lbf$$

$$P_{sl} = 2600 \text{ lbf}$$

$$L := 3.25ft, 3.25ft$$

Use:(3) 2x8 Southern Pine No. 2

(DB10) Deck Bearing Beam 10

$$w_{dl} := dl_f \cdot \frac{(24ft)}{2} \quad w_{dl} = 180 \cdot plf$$

$$w_{ll} := ll_f \cdot \frac{(24ft)}{2} \quad w_{ll} = 1200 \cdot plf$$

Point Load @ 0ft from C8

$$P_{dl} := 2730lbf \quad P_{dl} = 2730 \text{ lbf}$$

$$P_{sl} := 2730lbf \quad P_{sl} = 2730 \text{ lbf}$$

$$L := 2.75ft, 2.75ft \quad L_{max} := 2ft$$

Use:(4) 2x8 Southern Pine No. 2

(DB11) Deck Bearing Beam 11

$$w_{dl} := dl_f \cdot \frac{(18.75ft)}{2} \quad w_{dl} = 140.625 \cdot plf$$

$$w_{ll} := ll_f \cdot \frac{(18.75ft)}{2} \quad w_{ll} = 937.5 \cdot plf$$

$$L := 3ft, 2ft \quad L_{max} := 2ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = \bullet \cdot in$$

Use:(3) 2x8 Southern Pine No. 2

(DB12) Deck Bearing Beam 12

$$w_{dl} := dl_f \cdot \frac{(12ft)}{2} \quad w_{dl} = 90 \cdot plf$$

$$w_{ll} := ll_f \cdot \frac{(12ft)}{2} \quad w_{ll} = 600 \cdot plf$$

Point Load @ 7.5ft from C11

$$P_{dl} := 850lbf \quad P_{dl} = 850 \text{ lbf}$$

$$P_{sl} := 1230lbf \quad P_{sl} = 1230 \text{ lbf}$$

$$L := 5.5ft, 1.75ft \quad L_{max} := 2ft$$

Use:(2) 2x8 Southern Pine No. 2

(DB13) Deck Bearing Beam 13

$$w_{dl} := dl_f \cdot \frac{(13.5ft)}{2} \quad w_{dl} = 101.25 \cdot plf$$

$$w_{ll} := ll_f \cdot \frac{(13.5ft)}{2} \quad w_{ll} = 675 \cdot plf$$

$$L := 4.75ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.158 \cdot in$$

Use:(2) 2x8 Southern Pine No. 2

(DB14) Deck Bearing Beam 14

$$w_{dl} := dl_f \cdot \frac{(9ft)}{2} \quad w_{dl} = 67.5 \cdot plf$$

$$w_{ll} := ll_f \cdot \frac{(9ft)}{2} \quad w_{ll} = 450 \cdot plf$$

$$L := 6.33ft, 6.33ft, 6.33ft$$

Use:(2) 2x8 Southern Pine No. 2

(DB15) Deck Bearing Beam 15

$$w_{dl} := dl_f \cdot \frac{(14ft)}{2} \quad w_{dl} = 105 \cdot plf$$

$$w_{ll} := ll_f \cdot \frac{(14ft)}{2} \quad w_{ll} = 700 \cdot plf$$

$$L := 3.5ft, 3.5ft$$

Use:(3) 2x8 Southern Pine No. 2

$$R := 1060lbf$$

Use: Simpson HUC28-2

$$R_{allow} := 1160lbf$$

Use: Simpson HUC28-3 (Max)

$$R_{allow} := 1390lbf$$

(DB16) Deck Bearing Beam 16

$$w_{dl} := dl_f \cdot \frac{(13ft)}{2} \quad w_{dl} = 97.5 \cdot plf$$

$$w_{ll} := ll_f \cdot \frac{(13ft)}{2} \quad w_{ll} = 650 \cdot plf$$

$$L := 5ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.167 \cdot in$$

Use:(3) 2x8 Southern Pine No. 2

$$R := 1880lbf$$

Use: Simpson HGUS26-3

$$R_{allow} := 3410lbf$$

(DB17) Deck Bearing Beam 17

$$w_{dl} := dl_f \cdot \frac{(4ft)}{2} \quad w_{dl} = 30 \cdot plf$$

$$w_{ll} := ll_f \cdot \frac{(4ft)}{2} \quad w_{ll} = 200 \cdot plf$$

$$L := 6.5ft$$

$$\Delta_{max} := \frac{L}{360} \quad \Delta_{max} = 0.217 \cdot in$$

Use:(2) 2x8 Southern Pine No. 2

$$R := 750lbf$$

Use: Simpson HUC28-2

$$R_{allow} := 1160lbf$$

(DB18) Deck Bearing Beam 18

$$w_{dl} := dl_f \cdot \frac{(4ft)}{2} \quad w_{dl} = 30 \cdot plf$$

$$w_{ll} := ll_f \cdot \frac{(4ft)}{2} \quad w_{ll} = 200 \cdot plf$$

$$L := 6.5ft, 5ft$$

Use:(2) 2x8 Southern Pine No. 2

$$R := 600lbf$$

Use: Simpson HUC28-2

$$R_{allow} := 1160lbf$$

$$R := 380lbf$$

Use: Simpson HUC28-2

$$R_{allow} := 1160lbf$$

Min. psf 1000
Max. psf 1500

		Dim. (in.)	Ftg. Mark	Min. Cap.	Max Cap.
Circular	Diameter	10	F1	545.4154	818.1231
		16	F2	1396.263	2094.395
Square	Side Length	16	F3	1777.778	2666.667
		18.5	F4	2376.736	3565.104
		20	F5	2777.778	4166.667
		24	F6	4000	6000

Label	Location	DL (lbf)	LL (lbf)	SL (lbf)	TL (lbf)	Ftg. Mark	Check
FTG 1	FB1	1480	750	450	2380	F3	Okay
FTG 2	FB2	1620	1650	450	3195	F4	Okay
FTG 3	FB3	1860	1110	300	2917.5	F4	Okay
FTG 4	FB4	1420	270	460	1967.5	F2	Okay
FTG 5		2230	1540	330	3632.5	F5	Okay
FTG 6	FB1	1250	1040	570	2457.5	F3	Okay
FTG 7		2440	2460	1310	5267.5	F6	Okay
FTG 8		2140	2150	1150	4615	F6	Okay
FTG 9		2440	2460	1310	5267.5	F6	Okay
FTG 10		1260	1100	570	2512.5	F3	Okay
FTG 11	FB6	1680	1110	740	3067.5	F4	Okay
FTG 12		2150	2590	680	4602.5	F6	Okay
FTG 13		2250	2110	1500	4957.5	F6	Okay
FTG 14		2420	2150	870	4685	F6	Okay
FTG 15		2720	2450	980	5292.5	F6	Okay
FTG 16		2680	2410	960	5207.5	F6	Okay
FTG 17		2600	2330	930	5045	F6	Okay
FTG 18		1190	1060	430	2307.5	F3	Okay
FTG 19		1830	1640	660	3555	F4	Okay
FTG 20		2570	2090	910	4820	F6	Okay
FTG 21		2680	2410	960	5207.5	F6	Okay
FTG 22		3290	1510	710	4955	F6	Okay
FTG 23	FB7	2670	990	1940	4867.5	F6	Okay
FTG 24		2160	1580	960	4065	F5	Okay
FTG 25		2510	2120	990	4842.5	F6	Okay
FTG 26		3010	180	2740	5200	F6	Okay
FTG 27		1250	3850	130	4235	F6	Okay
FTG 28		740	2420	0	2555	F3	Okay
FTG 29		1030	2550	230	3115	F4	Okay
FTG 30		2860	550	2550	5185	F6	Okay
FTG 31		2590	2120	1020	4945	F6	Okay
FTG 32		3170	2390	1370	5990	F6	Okay
FTG 33		3710	1530	810	5465	F6	Okay
FTG 34	FB8	1830	2300	1000	4305	F6	Okay
FTG 35		1770	2950	820	4597.5	F6	Okay
FTG 36		1490	2510	680	3882.5	F5	Okay
FTG 37		1630	2600	790	4172.5	F6	Okay
FTG 38		1940	2670	1060	4737.5	F6	Okay
FTG 39		1290	2220	570	3382.5	F4	Okay
FTG 40		2040	2150	1330	4650	F6	Okay

FTG 41	FB9	720	1630	450	2280	F3	Okay
FTG 42		1480	1490	1000	3347.5	F4	Okay
FTG 43		1260	1590	810	3060	F4	Okay
FTG 44		1730	3130	1000	4827.5	F6	Okay
FTG 45	FB10	1520	0	1490	2637.5	F3	Okay
FTG 46	FB11	1190	0	560	1610	F2	Okay
FTG 47		3090	1840	900	5145	F6	Okay
FTG 48		880	330	370	1405	F2	Okay
FTG 49	DB1	800	5340	0	4805	F6	Okay
FTG 50		240	1600	0	1440	F2	Okay
FTG 51	DB2,DB4	950	1800	610	2757.5	F4	Okay
FTG 52	DB2,DB4,DB5	1230	3610	610	4395	F6	Okay
FTG 53	DB2,DB6,DB5	480	3160	0	2850	F4	Okay
FTG 54	DB2,DB6	300	2010	0	1807.5	F2	Okay
FTG 55	DB4	120	790	0	712.5	F1	Okay
FTG 56	DB4,DB5	390	1440	0	1470	F2	Okay
FTG 57	DB5	170	550	0	582.5	F1	Okay
FTG 58	DB6	190	1650	0	1427.5	F2	Okay
FTG 59	DB6,DB7	320	2080	0	1880	F2	Okay
FTG 60	DB7	130	830	0	752.5	F1	Okay
FTG 61	DB8	110	750	0	672.5	F1	Okay
FTG 62		310	2060	0	1855	F2	Okay
FTG 63	DB9	1590	1040	2600	4320	F6	Okay
FTG 64		520	3450	0	3107.5	F4	Okay
FTG 65	DB10	2950	1460	2530	5942.5	F6	Okay
FTG 66		420	2820	0	2535	F3	Okay
FTG 67		710	4730	0	4257.5	F6	Okay
FTG 68	DB11	490	3280	0	2950	F4	Okay
FTG 69	DB12	420	2830	0	2542.5	F3	Okay
FTG 70		1290	2950	1230	4425	F6	Okay
FTG 71	DB13	240	1600	0	1440	F2	Okay
FTG 72	DB14	170	1640	0	1400	F2	Okay
FTG 73		470	3130	0	2817.5	F4	Okay
FTG 74	DB15	460	3060	0	2755	F4	Okay
FTG 75	DB16,DB17	350	2280	0	2060	F2	Okay
FTG 76	DB18	220	1660	0	1465	F2	Okay

INhome

DETAILED WATER BUDGET



Detailed Water Budget

Team Purdue generated a water budget for the competition based off of the type and frequency of water-related contests. The contests accounted for were the 20 hot water draws at 15 gallons each, 10 clothes washing cycles at 12 gallons each, five dish washing events at 10 gallons each, and four water vaporization events at 1.25 gallons each. A large portion of the water budget was allocated for the fire protection system. An additional 280 gallons of water were required for fire protection just in case. A 100 gallon safety factor was also included. In total, all contests and activities required 1000 gallons. It should be noted that all water consumed was provided by the team. This included water for cooking and drinking.

Table 1: Water Budget

FUNCTION	WATER USE (GALLONS)	CALCULATIONS		NOTES
		GAL	EVENTS	
Hot Water Draws	330	15	20	additional 10% included
Laundry	120	12.0	10	WF=4.33, cap=2.6 cu ft
Dishwasher	50	10	5	
Water Vaporization	5.0	1.25	4	5 lbs water = 0.6 gal, use 1.25 gal/event
Fire Protection	280	280	1	40 gpm for 7 minutes
Testing	40	5	8	
Initial DHW Tank Fill	50	50	1	
Living Wall basin	25	25	1	
Safety Factor	100	100	1	
WATER REQUIRED	1000	gallons		

To accommodate for 1000 gallons of water, the team has selected a 1050 gallon cone bottom storage tank. The supply tank measured 72" diameter by 85" high. The supply tank rested in a completely shaded corner of the garage. Access to the supply tank inlet was through the back garage door. To collect waste from the house during competition there was an intermediate ejector sewage pit located in the garage. This ejector pit held 19.5 gallons of water until the pump initiated. This ejector pump sent waste to a 1050 gallon flat bottom tank located outside the garage. This vertical tank was 86" diameter by 54" high. Both supply and waste tanks had 16" main way openings at the top of each tank.

INhome

SUMMARY OF UNLISTED COMPONENTS



Summary of Unlisted Electrical Components

All electrical components installed in the INhome will carry an approved testing agency's listing per Section 6-7 of the SD 2011 Building Code.

INhome

SUMMARY OF RECONFIGURABLE FEATURES



Summary of Reconfigurable Features

Team Purdue's INhome contains mechanically actuated clerestory windows that are operated by a toggle switch on the wall. The purpose of the windows is to allow for natural ventilation to occur in the home, and the actuators allow this process to occur easier than if the windows were manual.

INhome

INTERCONNECTION APPLICATION FORM



Interconnection Application Form

Team Purdue: Lot 201

PV Systems

Module Manufacturer	Short Description of Array	DC Rating of Array (sum of the DC ratings)
SunPower SPR-238	9 Modules connected in series to central inverter	2160 W
SunPower SPR-238	9 Modules connected in series to central inverter	2160 W
SunPower SPR-238	9 Modules connected in series to central inverter	2160 W
SunPower SPR-238	9 Modules connected in series to central inverter	2160 W

Total DC power of all arrays is 8.6 kW (in tenths)

Inverters

Inverter Manufacturer	Model Number	Voltage	Rating (kVA or KW)	Quantity
SunPower	SPR-8000m	240V (AC)	8kWac	1

Total AC power of the inverter is 8kW (in whole numbers)

1. One-line electrical schematic: E-601
2. Calculations of service/feeder net computer load and neutral load: next page
3. Plan view of the lot showing the house, decks, ramps, tour paths, the service point and the distribution panel or load center: E-605

INhome

SERVICE CALCULATION



Service Calculation

Service Loads	Calculations	VA Rating	Amp Rating
984ft ² @ 3VA	$(984) \times (3) =$	2,952	
(7) 20A appliance outlet circuit at 1500 VA each	$(7) \times (1500) =$	10,500	
Laundry Circuit (Clothes Washer)	nameplate rating	1,500	
Oven & Cooktop	$(\text{Cooktop, } 7.7\text{kVA}) + (\text{Oven, } 2.4\text{kVA}) =$	10,100	
Water Heater	nameplate rating	4,500	
Dishwasher	nameplate rating	1,200	
Clothes Dryer	nameplate rating	5,600	
SUB-TOTAL GENERAL LOADS		34,852	
First 10kVA @ 100%		10,000	
Remainder of General load @ 40%	$(24,852\text{VA}) \times (0.4) =$	9,941	
TOTAL NET GENERAL LOAD	$(10,000\text{VA}) + (9,941\text{VA}) =$	19,941	
Heat Pump and Supplementary Heat	nameplate	2,760	
5kW Electric Heat: Heat Pump VA + (5000VA * 0.65)	$(2,760\text{VA}) + ((5000\text{VA}) \times (0.65)) =$	6,010	
TOTAL NET GENERAL LOAD		19,941	
Heat Pump and Supplementary Heat		6,010	
Fire Protection Pump		3,300	
Water Supply Pump		1,032	
TOTAL	$(19,941\text{VA}) + (10,342\text{VA}) =$	30,283	
CALCULATED LOAD FOR SERVICE	$(30,283\text{VA}) / (240\text{V}) =$		126.2A

INhome

ENERGY ANALYSIS



Energy Analysis Results and Discussion

1. Introduction

Team Purdue conducted a thorough energy analysis of the INhome using a variety of methods, including energy modeling and investigating the end-uses of electricity in the home. As the design of the INhome evolved, the level of detail and accuracy of the analysis did, as well. Each component of the study had a significant impact on the design of the INhome, allowing Team Purdue to create a cost-effective and energy-efficient design.

The energy analysis was critical in order to ensure proper performance of the INhome during both the competition week in Washington, D.C., as well as during normal operation in West Lafayette, Indiana. Due to the similarities of these climates, which are further demonstrated in this report, few compromises were made to the effectiveness of design for either climate.

Innovative technologies, as developed by the student team for a variety of multidisciplinary research and educational endeavors, are investigated in this analysis. The incorporation of these projects has had a notable effect on INhome performance, while providing both the public and the educational sector with an invaluable learning tool.

2. Design Considerations and Objectives

Passive Design Meets the Midwest

Passive design has proven its effectiveness in reducing energy consumption in homes, and is gaining momentum as a design standard in nations across the world. Passive design features, when integrated into initial home planning, can result in energy savings without additional, unnecessary equipment. Utilizing passive design features in the INhome has had a significant impact on its overall concept. However, as the INhome embodies the Midwestern traditional home, the size, shape, and architectural features remain true to this architectural style. Finding a balance between these two design metrics has impacted nearly every aspect of the home design.

Natural daylighting and window orientation are critical in order to provide passive solar heating and space lighting without significant energy usage. The INhome accommodated this through the implementation of extensive glazing on the southern façade. To be exact, 73% of the INhome's windows face south. Additionally, the windows on the north side of the home have a lower solar heat gain coefficient, providing diffuse light without extra heat gain to the space. The clerestory windows serve dual purposes – extensive daylighting is provided to more than 60% of the home through their use and, when opened, natural ventilation can flow from the lower windows on the south façade through them, as illustrated in Figure 1 below.



Figure 1: Natural ventilation paths through the south façade and clerestory windows

Another key feature of the INhome that employs passive design principles includes the utilization of strategically placed overhangs to optimize daylighting and solar gains into the space. During the winter, when the sun is lower in the sky, the sunlight reaches into the main living space, heating the area. Alternately, during the summer months, the overhang obscures the sun's rays, allowing only diffuse daylight into the space, and mitigating extra solar thermal gains. This phenomenon can be seen in Figure 2 below.

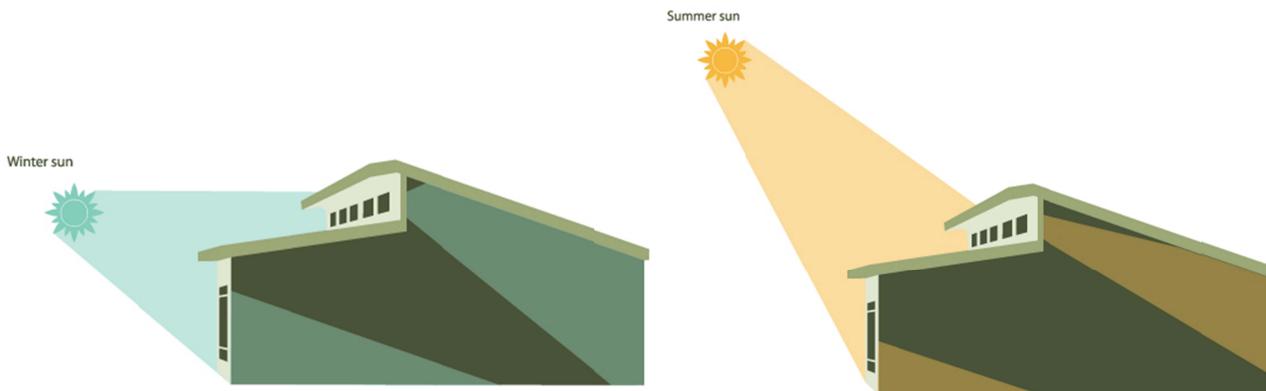


Figure 2: Seasonal Solar Radiation through the South Façade

Traditionally, homes featuring passive design have been limited to long, narrow sections, with a single indoor space. This design concept does not fit the practicality of Midwestern living, and the INhome has been adjusted to reflect the needs of a modern homeowner. In order to maximize the volumetric living space while maintaining an efficient footprint, the south roof has been given a slope of 22 degrees.

Climate Considerations

In order to design a home that is both well-suited to the Indiana climate, as well as functional during the Solar Decathlon competition week, design considerations had to be taken into account for the climate conditions of Washington, D.C., as well. Fortunately, West Lafayette, Indiana and Washington, D.C. have similar latitudes. While climatic differences do exist due to proximity to the Atlantic Ocean and altitude, the similar climate

conditions allowed for development of a home that is practical in both scenarios. The comparison made in Figure 3 below demonstrates the nearness of the average temperatures experienced by the two locations.

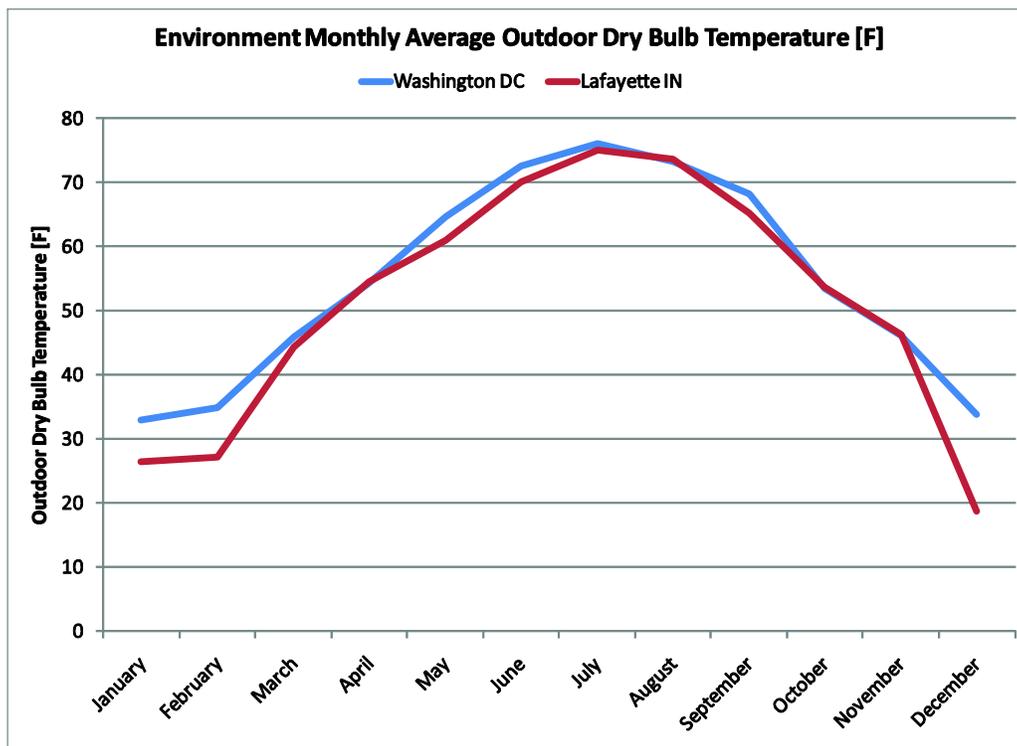


Figure 3. Annual Outdoor Dry Bulb temperature for Washington D.C.

During late September, in the midst of the competition, the Washington, D.C. average high temperature ranges from 50°F-70°F. The most notable differences in climate conditions occur during December and January, when the Lafayette average daily high is significantly lower than in Washington D.C. This has been incorporated into the design of the INhome, through the use of highly insulated panel systems, as well as the inclusion of auxiliary heat sources for the coldest winter days.

3. Overall Energy Modeling Approach

Engineering for efficiency is one of the cornerstones of the Purdue University INhome design team. In order to make this goal a reality, a full understanding of the function of the home is critical. Simulation of the INhome through the use of computer modeling allowed for predictions of performance and educated design decisions that would not otherwise be possible.

EnergyPlus, developed by the United States Department of Energy, was used to conduct the vast majority of the building energy modeling. According to the U.S. Department of Energy, "modeling the performance of a building with EnergyPlus enables building professionals to optimize the building design to use less energy and water" ("EnergyPlus Simulation Software"). This software has been elemental in demonstrating performance characteristics.

A detailed energy model, developed from the final footprint, envelope construction, window placement, and shading structures of the INhome was created within EnergyPlus. This modeling process began more than a year before the start of construction of the home, allowing for iterations and improvements to both the model and the engineering design which has been influenced by its energy predictions. The end result is a highly accurate prediction of the anticipated performance of the INhome, both during the 2011 Solar Decathlon and in its final location. The isometric model of the INhome in EnergyPlus can be seen in Figure 4 below.

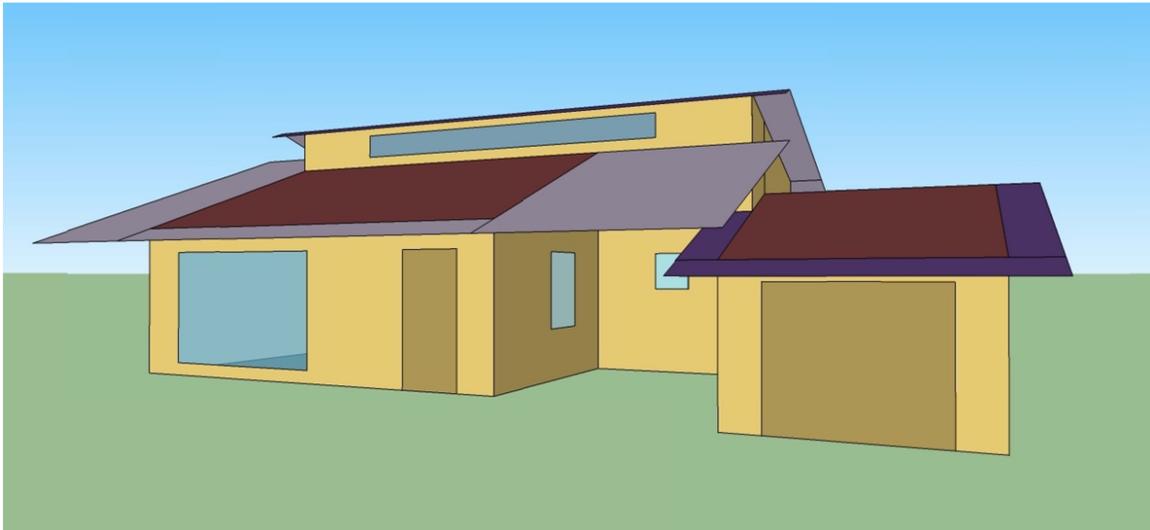


Figure 4. Isometric view of the Google SketchUp OpenStudio EnergyPlus model – Southwest façade.

Estimating overall energy consumption of the home is a critical element in determining the viability of the home for net-zero. The impact of this overall prediction affects the required size of the photovoltaic array, which in turn greatly impacts the affordability of the home. This can potentially be detrimental to the viability of the home in today's marketplace. In order to accurately assess this performance, as well as to get a preliminary size for the mechanical equipment, the monthly heating and cooling loads on the space were determined. This was done for the Lafayette, Indiana location, as this is the final location of the INhome. It can be seen from the Figure 4 that the Indiana climate, while realizing a greater heating demand than cooling, experiences a full six months of both heating and cooling, thus necessitating a system that can be optimized for either condition. In order to most accurately assess these potential loads, the building internal heat gains and losses were estimated using the energy model.

Modeled Building Shell

The structure of the home, comprised of Structurally Insulated Panels (SIPS), provides excellent insulating values far exceeding those required by local building codes. The walls and roof of the INhome, comprised of SIPS, have R-values of 26 and 56, respectively. These values were accurately reflected in the model according to their thermally resistive properties. The window glazing properties, as further described in the window properties optimization description below, were compared via parametric analysis to determine the most beneficial type. Additionally, the entire 984 square feet of conditioned space within the INhome is considered as one HVAC zone, serviced by a single unitary heating and cooling system. The garage, which is unconditioned

and uninsulated, is modeled as a series of shading devices that are attached to the home. Using these basic characteristics, the heat losses and gains to the INhome were determined, as can be seen in the figure below.

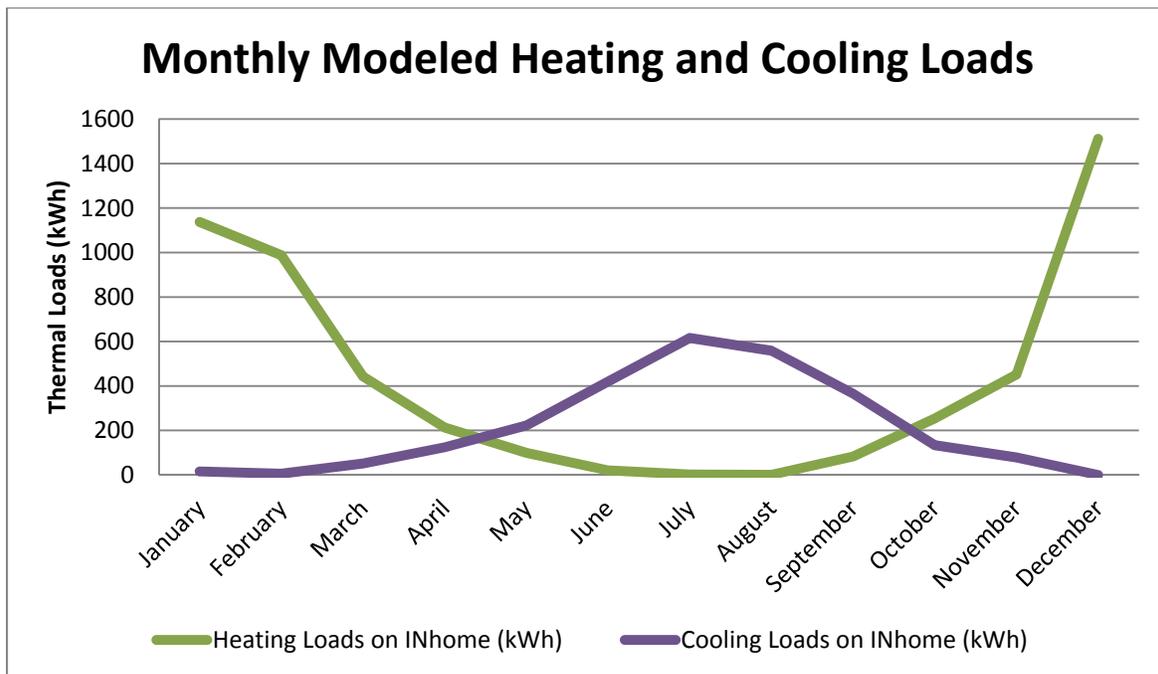


Figure 5. Modeled Monthly Heating and Cooling Loads on the INhome for a Representative Year

Modeled Mechanical System

From the heating and cooling load information, an assessment of the mechanical needs of the INhome was done, and equipment sized appropriately. Based on peak demands during both the winter and summer months, the maximum required size from the energy model was approximately one ton (or 12,000 Btu/h) for cooling, and 1.5 tons (18,000 Btu/h) for heating. For this particular design scenario, a two-ton dual compressor heat pump, reaching up to 19 SEER in air-conditioning mode and 9.0 HSPF in heating mode, was selected to meet the cooling needs, as well as a majority of the heating needs, of the home. The complete benefits of choosing this particular system are discussed in the Systems Details section of this analysis. As the Solar Decathlon competition required the use of all-electric components, an auxiliary electric resistance heater (5 kW) was integrated into the variable speed air handler to ensure proper function of the system during more extreme Midwestern winter days. The variable speed air handler accurately adjusts volumetric flow depending on the amount of heating and cooling required. This was also accommodated for in our anticipated energy use.

EnergyPlus was set to autosize required supply air rates. Minimum supply air flow rates for fresh air requirements were based on ASHRAE 62.2-2003 ventilation standards of 3 CFM/1000ft² of conditioned space plus 7.5 CFM/person. This determined a required minimum flow rate of 25.4CFM for three occupants.

There are several important things to note with this design minimum flow rate. First, this is the occupied rate. However, when the home is unoccupied this flow rate is even less than 3 CFM.

Additionally, filtration and fresh air generated by the Biowall, as described in the Systems Detail section of this report, should be accounted for within the home. This model does not account for this additional air

purification. Therefore, the minimum air flow rate required through use of the Biowall in combination with the ERV may result in a reduction of overall electricity. From this mechanical arrangement and system configuration, the annual heating and cooling energy demands could be determined, which can be seen below in Figure 6.

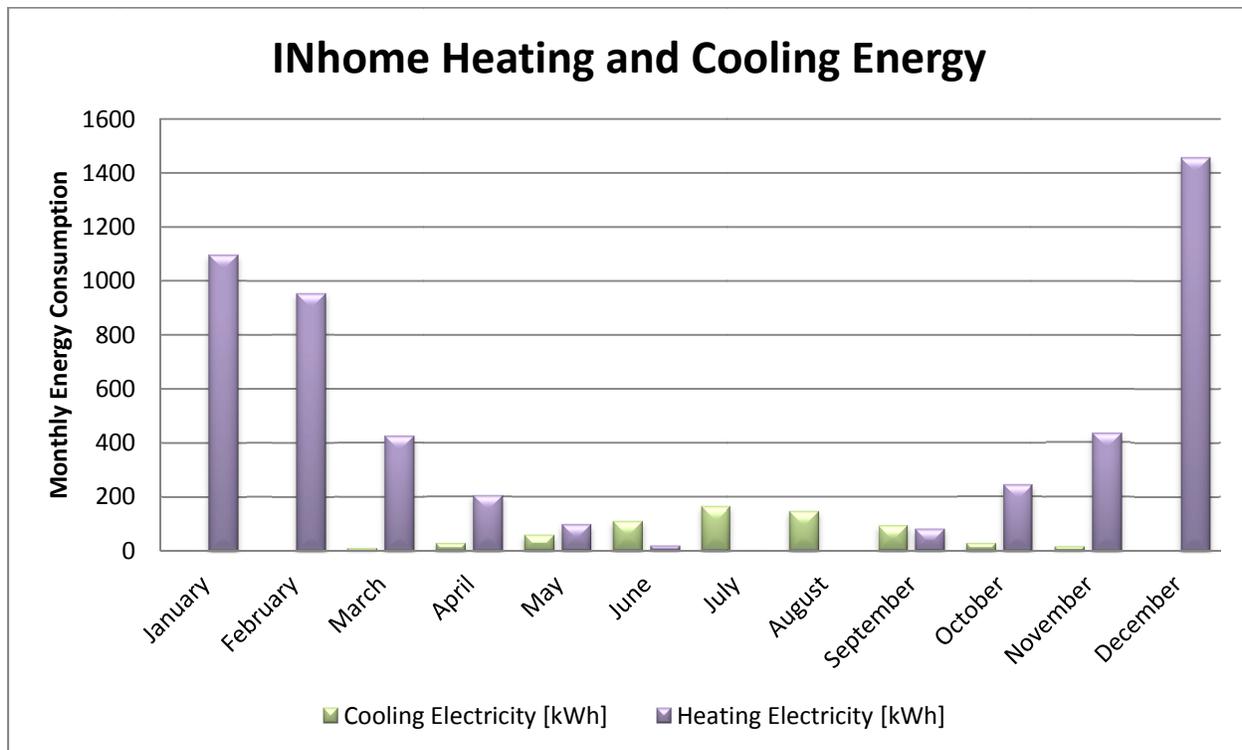


Figure 6. Modeled annual cooling and heating energy requirements for the INhome.

It can be seen from Figure 6 above that the heating electricity requirements far exceed those of the cooling electricity during the summer months. This is due largely to the more moderate Indiana summers, as compared to the much colder winter climate as experienced in the northernmost regions of the state.

Glazing Sizing, Properties, and Optimization

In order to optimize the passive design properties of the windows and corresponding overhangs, the length of the roof overhang for both the south facing overhangs and clerestories was parametrically evaluated to maximize solar heat gains in the winter and minimize solar heat gains in the summer. The clerestory and south living room overhangs were independently modeled at 12, 18, and 24 inches respectively. It was found that when the INhome has a 12-inch overhang on all roof sections, it consumes the least energy on an annual basis. However, in order to gain the most roof area possible to accommodate photovoltaic panels, a 24-inch overhang was selected for the south roof. The clerestory overhang was reduced to 10 inches in order to be easily constructed and transported. This configuration allowed for maximum daylighting into the space without compromising overall appearance or power production in the home.

Next, a window glass analysis was performed to determine the benefits of the passive solar design used. Triple pane casements and awnings were selected for the south facing windows and clerestory windows because

they have a high solar heat gain coefficient of 0.38 and a very low U-Value for windows of 0.22 Btu/hr*ft²*F. This means that in direct sunlight, heat will be transmitted to the interior more easily, but are well insulated when shaded. The results are illustrated in figure 5.

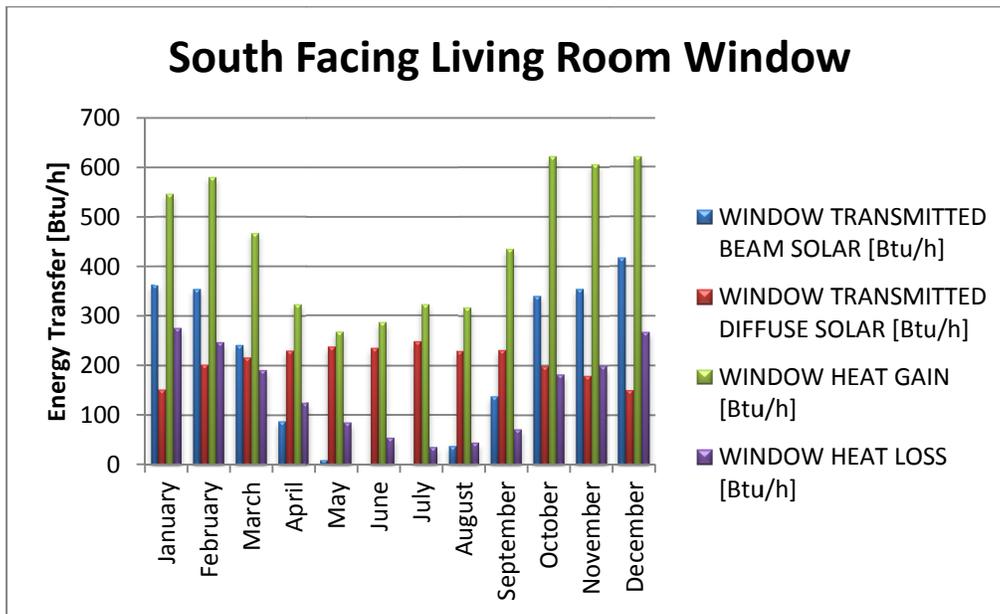


Figure 7. South-facing living room window performance

The practical efficiency of window selection and placement is proven in Figure 7. The south-facing window heat gain has a higher average around 600 Btu/h during the winter months and lower around 300 Btu/h during the summer months. Therefore, total heat gain is minimized during the summer months and then maximized during the winter months. Similar results occur when investigating the clerestory windows. Figure 8 illustrates the annual performance of the clerestory windows.

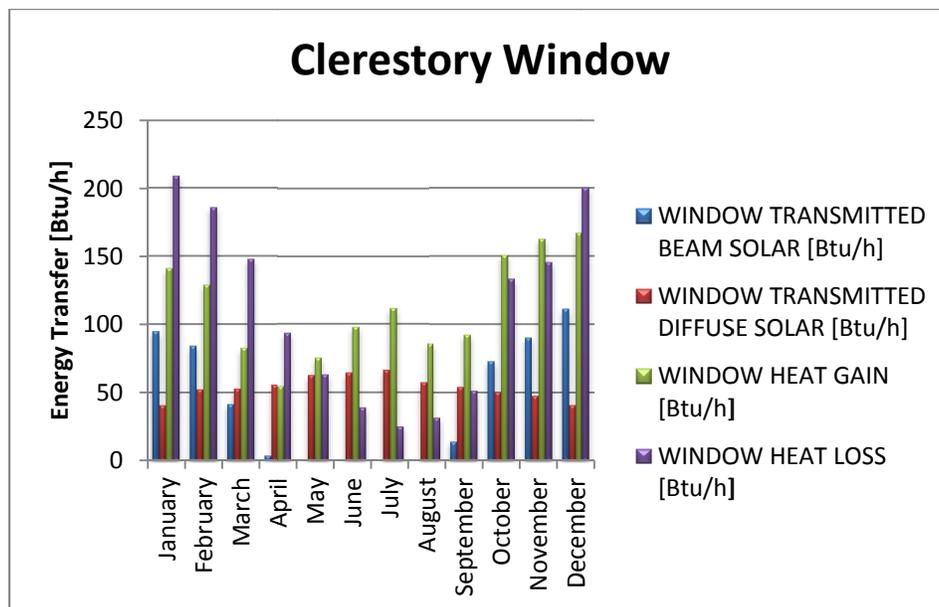


Figure 8. South-facing clerestory window performance

The south facing windows are not only used for heating during the winter. Natural daylight is also diffused from the south and illuminated throughout the home year round. The bathroom, kitchen, utility room, and family room all benefit from this natural lighting. As seen below in Figure 9, daylight levels are highest during the winter months and lowest during the summer months due to the passive solar design. It should be noted that low direct sunlight is not desired during the summer since it is both harsh lighting that causes glare as well as causing an undesired cooling load on the space.

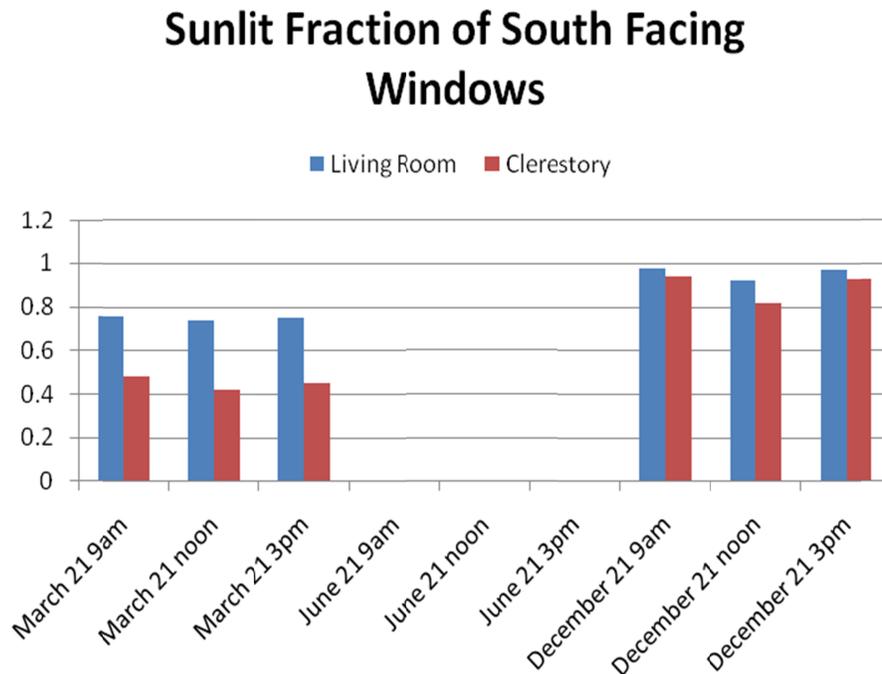


Figure 9. Sunlit fraction of south-facing windows

Other Model Attributes

Lighting, electrical loads, and occupancy were also adjusted to reflect the reality of the INhome. Lighting loads were based on the total design load of about 500W. This resulted in a power density of 0.5W/ft². The lighting was taken as 0.4 fraction radiant which is based on the Lighting Handbook from Illuminating Engineering Society of North America.

Two main electrical gains were modeled. The first was the electric induction cooking range. A best guess operating wattage of 4 kW was used as each heating element has different rated wattages and could be used in various combinations. No suggested schedules existed for a single appliance like a stove, therefore a schedule was developed around mealtimes to reasonably estimate usage times. The second equipment load modeled was the general equipment gain load based on ASHRAE 90.2 Table 8.8.1 Low-Rise Residential Single Zone Internal Heat Gain Profile. This includes all residential plug loads such as TV's, task lighting, fans, small appliances, computers, etc. This resulted in a load of 3.8 W/m² based on the ASHRAE 90.2 standard.

It was assumed that the home would house three long term residents and the occupancy schedule was based on standard single family residence occupancy schedules included in the EnergyPlus database. A standard activity level was taken from the 2005 ASHRAE Handbook of Fundamentals, page 8.6, Table 4.

Figure 10 below illustrates the electricity breakdown within the home by end use. It can be seen that a majority of energy is being used in the HVAC system. The building loads include all plug loads and other various internal energy uses such as appliances and electronics.

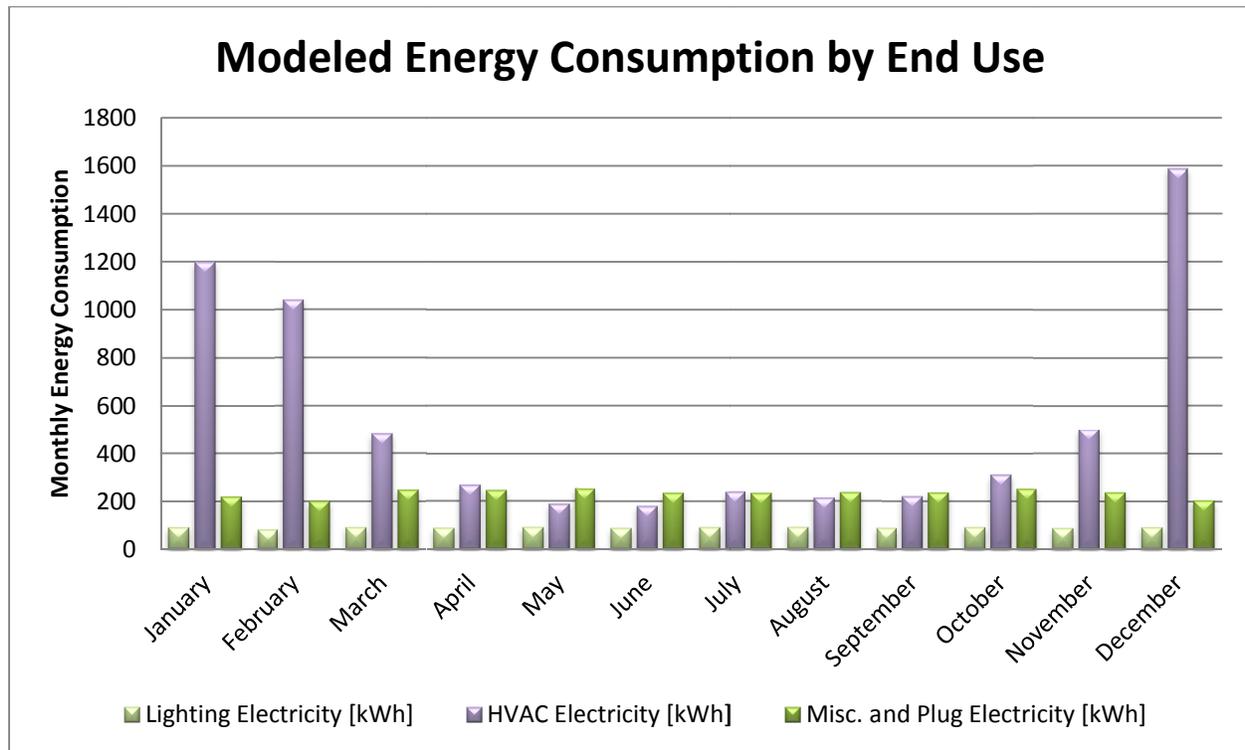


Figure 10. Electricity Usage by End Use

The HVAC system dominates the electrical use during the colder months, which is to be expected with the climb in heating demand in the home. It can be seen that the percentage of energy used in space conditioning drops significantly during the warmer summer months.

4. Comfort Zone and Fluid Dynamic Modeling

In order to ensure our final HVAC design fell within the bounds of the comfort zone requirements as set forth by the Solar Decathlon and to ensure a comfortable ambient environment, a computational fluid dynamic (CFD) model was developed using the software Fluent. This provided a detailed prediction of the temperature gradient that can be expected within the INhome during normal operation. This model was created with the assumption that the variable speed air handler would operate at 600 CFM, which is the minimum recommended value for operation with the auxiliary resistance heat. During normal operation of the HVAC system, there is little need for the blower to operate a speed higher than this value.

Of specific consideration in this case were the kitchen, dining, and living rooms. These were modeled using CFD software due to the high ceilings and large volumetric space of this open area, and in order to ensure proper mixing of the air. This particular model was analyzed for late September, when the competition actually takes place. Note that the CFD analysis was taken at 6 feet, or approximately eye level.

Figure 11 below demonstrates that the room has a very even temperature distribution. There is a 0.54°F (0.3°C) temperature change from the coolest spot to the warmest spot throughout the main living area. The coolest part of the house is located in the middle of the house, near the kitchen supply diffuser. The warmest spots of the house are located in the living room, along the west wall and near the front door.

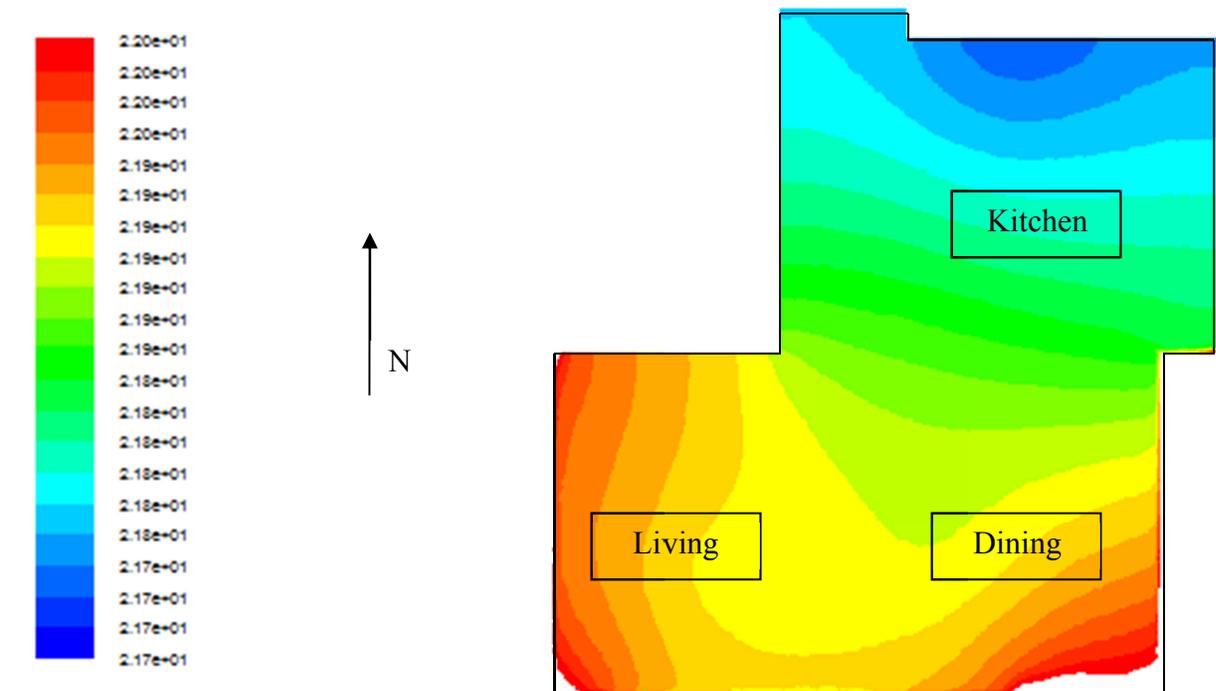


Figure 11. Plan view temperature (degrees C) distribution at the 6' level, in late September

This analysis was validated through the use of temperature monitoring with thermocouples in the home after completion. During the more extreme climate conditions of late July, the overall temperature differential of the entire house was 2.0°F (1.1°C), which was the variance in temperature between the Private Core and the Public Core. The temperature readings validate the accuracy of the Fluent model, and give certainty to the ability of the home during the Solar Decathlon competition to meet comfort zone requirements.

5. Competition Week Energy Budgeting

Solar Decathlon Competition Week – Energy Predictions

During the specific dates of the competition, special care was taken to ensure the optimal performance and net-zero energy balance of the home. As the event took place in Washington, D.C., location adjustments were

made to validate building performance in this location. Fortunately, due to the similar climatic conditions of Washington, D.C. to Indiana, especially during warmer or transitional months, no adjustments were needed to ensure success in both regions. From the analyses completed for the competition week in September, it was found that an estimated 161 kWh of electricity will be required to power the home. As the second and third weeks of September are transitional in nature, and weather can be highly variable, allowances were made in the week’s energy budget to accommodate any type of space conditioning scenario. Based on historical typical meteorological year (TMY) data, the following energy demands can be expected in the home, as demonstrated in Figure 12 below.

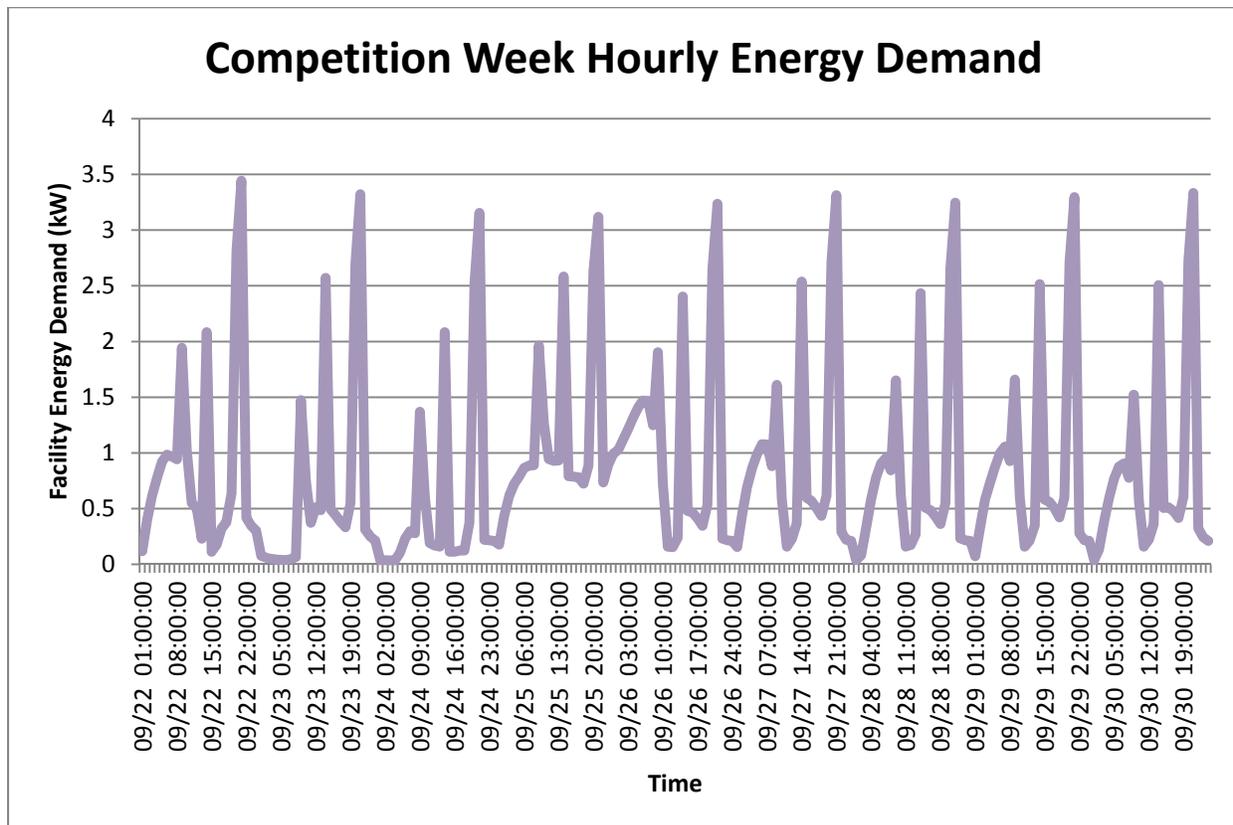


Figure 12. Hourly Energy Demand of the Home during the Competition Week, as Modeled in EnergyPlus

The overview provided through energy modeling results served as a spectacular point of reference for the overall predicted performance of the INhome, enabling the team to size the correct heating and cooling equipment and understand how changes in the building envelope characteristics impact its energy consumption. However, in order to ensure the most accurate sizing possible of the photovoltaic array for the needs of the home, further analysis was needed.

Energy consumption in the home during the competition week was designed to be representative of a given time frame in actual home use. The appliance use, home occupancy, and thermal requirements of the space were quite realistic, and provided a baseline for determining the energy needs of the home. Therefore, Team Purdue determined the anticipated electrical usage for each component of the building. Initially, this was based upon rated values and other historical data for appliances and mechanical components. Eventually, due to the construction schedule of the INhome, time was allotted for complete testing and monitoring of nearly

every component of the home. Each appliance, fixture, and equipment was tested using digital multimeters to determine its energy consumption during certain modes of operation. After this, a whole-house monitoring system, eMonitor, was implemented to track and record each circuit's energy consumption at any time. This provided the validation necessary to accurately budget for energy consumption during the competition and in the years to come.

From Figure 13, it can be seen that the total daily energy consumption as anticipated by the EnergyPlus model was slightly lower than that of the budgeted total. This occurs for more than one reason. First, the energy budget was created in order to ensure that the solar photovoltaic system could successfully match the demand and consumption incurred by the energy loads in the home. For this reason, all estimations of schedules were adjusted to match the highest possible runtime for equipment, which may not always be reality. Also, the modeled daily energy use, while taking into account a number of building plug loads and appliances, likely does not account for the large amount of electronics incorporated into the INhome, including home entertainment equipment and automated controls. To further illustrate this point, Figure 14 below separates these components of consumption.

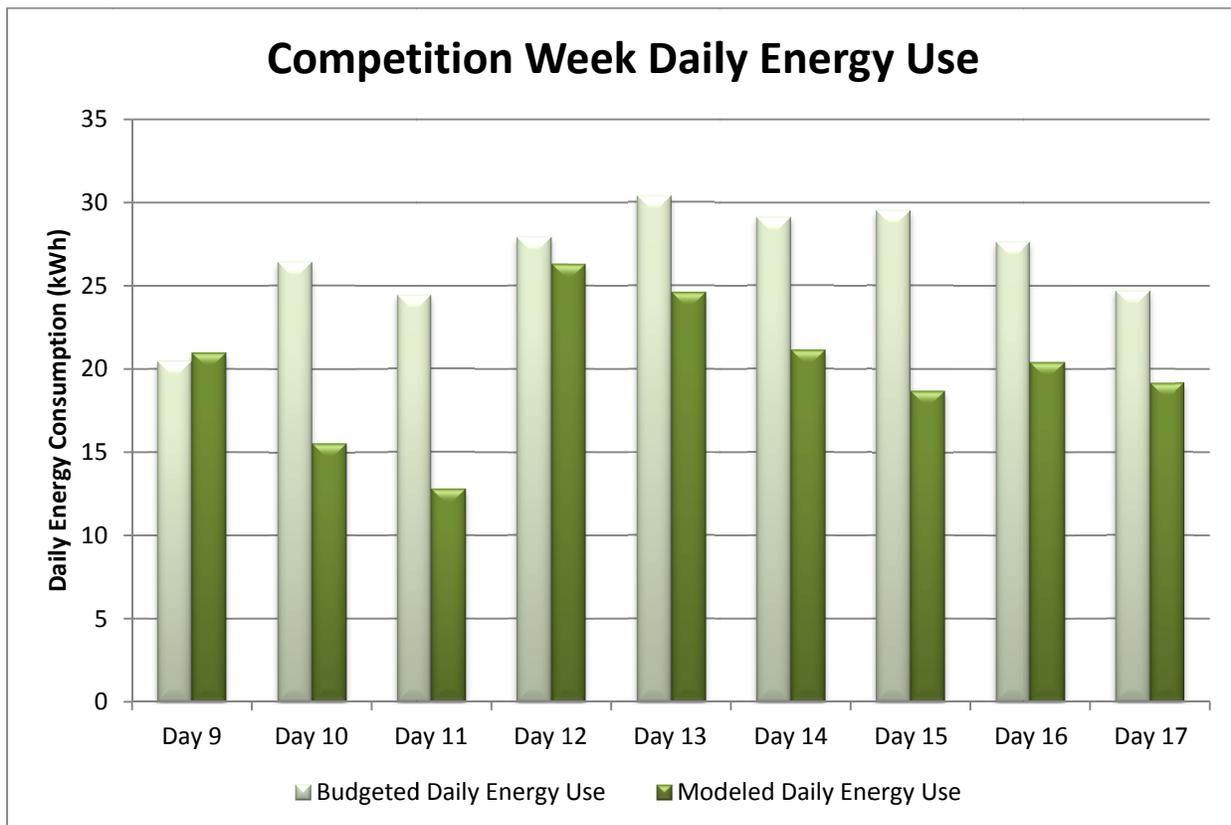


Figure 13. Budgeted and Modeled Total Daily Energy Use During the 2011 Solar Decathlon

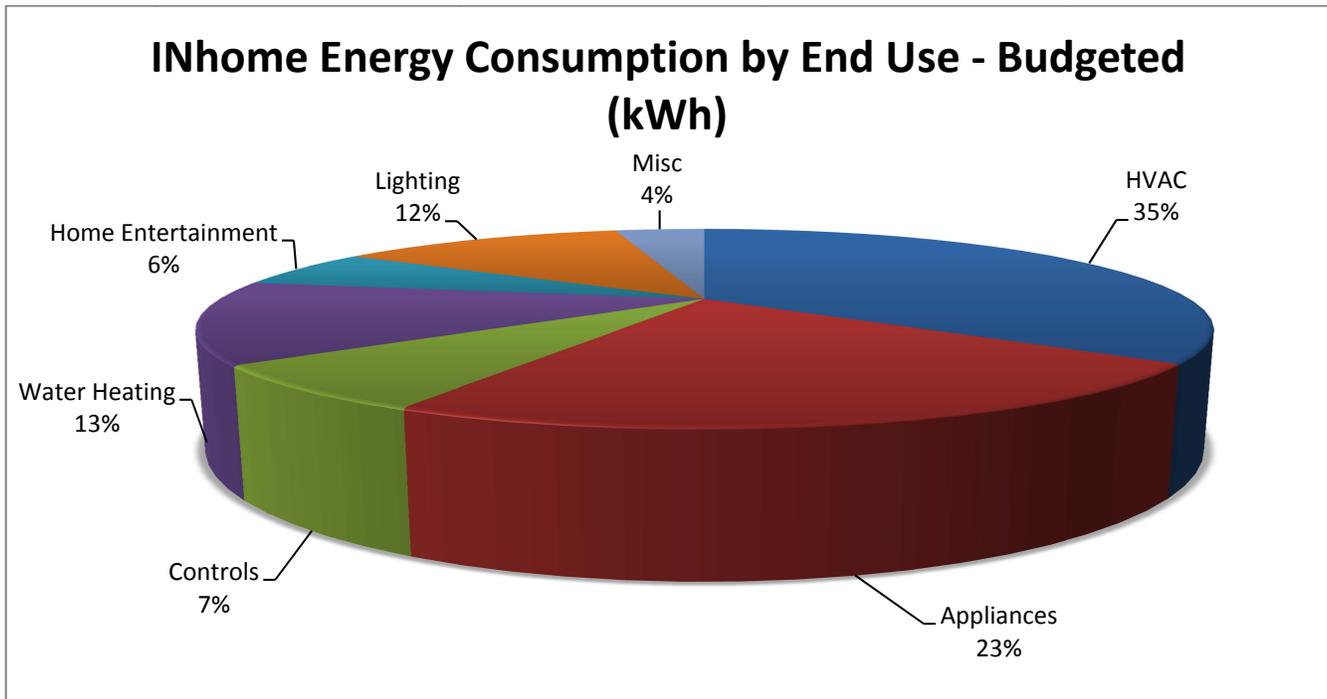


Figure 14. INhome Budgeted Energy Consumption During Competition Week

Figure 14 above demonstrates the importance of incorporating specific aspects of the home’s energy consumption into an actual energy budget. Control systems are not commonly found in a typical residence, and therefore need to be accounted for individually in our energy analysis. However, the benefit of having a control system minimizes electricity use elsewhere.

From the results of the energy budget that is shown on the following page, it was found that, during the competition week, the home will use an average of 26.7 kWh/day. Therefore, when assuming an average daily sunshine hours of 4.0 hours, and accounting for a final system efficiency of 79%, the home needed a corrected photovoltaic array of at least 8.48 kW in size. This allows the home to produce more energy than it would consume during the competition week. This calculation can be extrapolated out to the course of the year, as the number of average daily sunshine hours will increase during the summer and decrease during the winter, still providing a net-zero energy balance at the year’s end. For safety and variances in internal loads, the installed photovoltaic array was rated at 8.64 kW and comprised of 36, 240-Watt SunPower SPR-238 panels and a central inverter. The complete calculations and energy budget sheet can be found on the last page of the Energy Analysis.

5. Systems Details

Home Heating and Cooling

Table 2. End-use component electricity consumption and photovoltaic array sizing.

Energy Consuming Device	Demand Power, W	Day - 9		Day - 10		Day - 11		Day - 12		Day - 13		Day - 14		Day - 15		Day - 16		Day - 17	
		(hrs)	Energy																
GE Refrigerator - Freezer	300	6	1800	6	1800	6	1800	6	1800	8	2400	6	1800	8	2400	6	1800	6	1800
GE Clothes Dryer	1500	0	0	0.6	900	0.6	900	0.6	900	0	0	1.2	1800	0	0	1.2	1800	0.6	900
GE Clothes Washer	800	0	0	1	800	1	800	1	800	0	0	2	1600	0	0	2	1600	1	800
GE Dish Washer	400	0	0	1.5	600	0	0	1.5	600	0	0	1.5	600	0	0	1.5	600	1.5	600
Lighting	829	4	3316	4	3316	4	3316	4	3316	4	3316	6	4974	4	3316	4	3316	1	829
Sony Bravia TV	122	0	0	3	366	4	488	4	488	7	854	6	732	6	732	7	854	3	366
Sony Blu-Ray player BDP-S380	20	0	0	3	60	4	80	4	80	7	140	6	120	6	120	7	140	3	60
Sony Sound Bar HT-CT550W	30	0	0	0	0	0	0	0	0	3	90	3	90	3	90	0	0	0	0
Computer	120	0	0	7	840	11	1320	12	1440	9	1080	8	960	9	1080	11	1320	7	840
Data Acquisition	72	24	1728	24	1728	24	1728	24	1728	24	1728	24	1728	24	1728	24	1728	24	1728
Internet Router	5	24	120	24	120	24	120	24	120	24	120	24	120	24	120	24	120	24	120
eMonitor	2	24	48	24	48	24	48	24	48	24	48	24	48	24	48	24	48	24	48
Trane ComfortLinkII	8	24	192	24	192	24	192	24	192	24	192	24	192	24	192	24	192	24	192
GE Oven	2100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GE Induction Cooktop 11"	2275	0	0	1	2275	0	0	1	2275	2	4550	0	0	2	4550	0	0	1	2275
GE Advantium Microwave	1000	0	0	0	0	0	0	0	0	2	2000	0.2	200	2	2000	0	0	0	0
Trane XL20i	1250	5	6250	5	6250	5	6250	5	6250	5	6250	5	6250	5	6250	5	6250	5	6250
Trane AHU	150	5	750	5	750	5	750	5	750	5	750	5	750	5	750	5	750	5	750
Trane Fresh Effects ERV	150	3	450	3	450	3	450	3	450	3	450	3	450	3	450	3	450	3	450
Ducted Dehumidifier	600	2	1200	3	1800	3	1800	3	1800	3	1800	3	1800	3	1800	3	1800	3	1800
GE GeoSpring	500	5	2500	3	1500	3.5	1750	4.5	2250	5	2500	4.5	2250	3.5	1750	4.5	2250	4.5	2250
Zoeller Ejector Pump	450	0.25	112.5	0.25	112.5	0.25	112.5	0.25	112.5	0.25	112.5	0.25	112.5	0.25	112.5	0.25	112.5	0.25	112.5
Main Water Pump	1500	1	1000	2	1500	2	1500	2	1500	1	1000	2	1500	2	1000	2	1500	2	1500
Fire Pump	3000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 Ceiling Fans (60W ea.)	120	8	960	8	960	8	960	8	960	8	960	8	960	8	960	8	960	8	960
Miscellaneous Loads	50	1	50	1	50	1	50	1	50	1	50	1	50	1	50	1	50	1	50
Daily Energy Consumption (Wh)		20477		26418		24415		27910		30391		29087		29499		27641		24681	

Installed PV Size = 8.64 kW
Total Energy Use (Week) = 240.51 kWh
Avg. Daily Energy Req'd = 26.72 kWh/day
Avg. Daily Sunshine Hrs = 4.00 hrs
Required PV Array Size = 6.68 kW
Final Efficiency = 0.79
Corrected PV Size = 8.48 kW
Total Surplus Demand = 0.16 kW

Efficiency Factors	
Mounting Angle PV efficiency reduction	0.90
Central Inverter Efficiency	0.95
Wire loss	0.95
Sky Cleaness Factor	1.00
Dust & Dirt	0.97
Final Efficiency	0.79



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Modulating Heat Pump

The mechanical equipment chosen for the INhome included a high-efficiency heat pump with dual reciprocating compressors. As described in the previous sections of this report, the typical demand of the home in cooling or heating mode will likely not surpass 1.5 tons. The specified system, a Trane XL20i heat pump, is rated for 2-tons (or 24,000 Btu/h), but is well-suited to the INhome for several reasons. The dual compressor heat pump, which is not often seen in residential applications, allows for an adjustment of cooling or heating capacity to better meet the demands of the home. In Stage 1, the heat pump operates at approximately 40% of its rated capacity, saving energy while meeting the demands of milder ambient conditions. When outdoor temperatures or unusual interior loading require further mechanical support, the compressor can operate in Stage 2, providing the pull down necessary to make the house adaptable to even the most rapidly changing climate conditions. Indiana is notorious for its unpredictable and dynamic weather patterns, so forced air systems such as this become quite practical for meeting the immediate needs of the conditioned space.

Separate Sensible and Latent Cooling

In a tightly-sealed space such as the INhome, moisture control is especially critical. Excess moisture can cause mold growth or other building health problems that can lead to occupant sickness or property damage. During the summer months, the dehumidification provided by the central air conditioning unit provides adequate humidity control during the majority of its operation. However, during transitional months, when system runtime is lower, indoor humidity needs to be controlled to ensure proper indoor air quality.

Additionally, while improvements to indoor air quality are critical, a decrease in the energy consumption of the building must also occur to make dehumidification components attractive for practical implementation. Utilizing separate sensible and latent cooling systems has the potential to bring about such energy reductions. In a theoretical study performed by Ling, Hwang, and Radermacher (2009), the properties of separate sensible and latent cooling (SSLC) systems were investigated. Two, parallel vapor compression cycles were modeled in varying configurations, one handling the latent cooling demand from a space, and the other reserved for sensible cooling only. It was found that this configuration allows for energy savings of up to 30% from a traditional baseline air conditioning system. This indicates that a practical solution that helps to alleviate building health issues could potentially result in a reduction of energy consumption in the space also.

Other studies, such as an experiment done by Ling, Kwabara, Hwang, and Radermacher (2011), have utilized heat and mass exchangers to further realize the energy-saving potential of separate systems. This study employed desiccant dehumidification for removal of the latent load, which then relied upon a divided heat exchanger, such as a condenser or gas cooler for regeneration, which eliminated a potential energy use requirement of the system. In this system, the first section of the condenser was used to heat the desiccant to regeneration, while the remaining heat was rejected, lowering the required temperature of this portion of the system. Overall, utilization of this system improved the COP of the equipment by 36%, a significant savings over the baseline.

These studies indicated the potential for energy savings through the implementation of SSLC systems. Furthermore, the benefit to improved indoor air quality from reduction of humidity indoors has been well-documented. A practical approach to implementing these systems was critical in order to fully realize energy savings from all aspects of building operation. Dehumidification strategies such as direct expansion, especially as they are combined with energy recovery, have gained recognition for their efficiency and relative ease of implementation. The National Renewable Energy Laboratory has highlighted one of these units in recent testing for their Build America program, and has developed an energy model of the system to integrate with EnergyPlus, thus furthering the potential transferability of such equipment (Christensen & Winkler, 2009). This is a very similar unit to the one which has been incorporated into the INhome, allowing this project to pave the way for implementation in other building scenarios.

Indoor Air Quality – Living Walls

One of the central features of the INhome is the Biowall, or plant-based regenerative air filtration system. This component is unique to the INhome, as an air filtration system of this nature is rarely seen in a residential application. However, the benefits gained of implementing this technology have been proven through several studies.

Recently, a study by Wang and Zhang (2011) was conducted that tested a biofiltration system's VOC removal efficiency, long-term performance, and estimated energy savings. Unlike the proposed vertical design as is implemented in the INhome, this system was horizontal and used a mixture of activated carbon and shale pebbles as the root bed. The system was also incorporated into the HVAC system on the supply side rather than the return side. The system was first placed into a large environmental chamber that contained a composite wood-based office workstation to simulate a VOC emission source and then eventually incorporated into the HVAC system of a newly constructed office building.

The system was operated long-term while the outdoor ventilation air was kept at 5% of the total supply air rate. The initial formaldehyde and toluene concentration were 17 ppb and 2 ppb, respectively. After the system had been running for 10 days, the concentrations had decreased to 10 ppb and 1 ppb. The concentrations remained at around those values, which showed that the filtration system was removing the continuously emitted VOCs. The contaminant removal performance of the 5% outdoor ventilation air plus the biofiltration system is equivalent to 20% outdoor ventilation air that is traditionally used in buildings to control indoor contaminants. The author estimated through energy modeling that the biofiltration system would save around 15% of the heating energy for the space.

These potential energy savings, along with the substantial reduction in VOCs, shows that the biowall is a viable and economical solution for improving indoor air quality while reducing energy consumption in the INhome.

Water Heating

Hot water was generated using a GE GeoSpring heat pump water heater. The heat pump water heater consumed very little electricity, and still kept hot water at a constant temperature of 120°F. Furthermore, the water heater was reasonably affordable and easy to install.

A solar thermal system was not installed due to the fact that roof space was more valuable for electricity production, rather than hot water production. Being able to quickly assemble and disable the solar thermal system would have been a problematic issue as well. Another key reason was the cost of solar thermal installations. In a cost – benefit analysis, the GeoSpring was definitely the best system to install.

Controls and Automation

The main purpose of automating a home is to simplify complicated tasks, which can be as simple or as complicated as one may desire. From basic light switches to voice activated commands, there are many ways to control and monitor a smart home. The easiest of home control starts with the heating/air conditioning and lighting within the home. This control most commonly involves a thermostat, which was the basis of the INhome control.

Although the INhome's thermostat was not really that different from most, it had a slight advantage; it was web enabled and linked with other devices in the home to allow for more than just changing the temperature. The thermostat was designed to facilitate easy scheduling of the indoor environment, predict future weather, and view trends of conditioning. In addition to these features, the thermostat had the ability to be controlled from most web enabled phones and tablet devices via a service known as Schlage LiNK

The scheduling contributed to a reduction of air handler runtime, while the web enabled weather tracking allowed the user to change these schedules as desired to meet the demands of the upcoming coming days. Lastly, the trend analysis allowed the user to make educated decisions based on their daily, weekly, and monthly usage. If these features are used to their potential, the user has the opportunity to save money and more importantly, learn about their habits that can be costly.

Schlage LiNK is a subscription service that operated within the home by utilizing the Z-Wave protocol. The door locks, security cameras, lighting, and thermostat were linked, displayed, and controlled on a single website that encouraged users to make educated decisions about reducing their energy consumption.

While a Trane thermostat was the user interface and handled the basic heating and air conditioning operations, it was also necessary to operate several other specialized pieces of equipment. A secondary control and monitoring system operated independently of the thermostat and the end users input to control the energy recovery ventilator (ERV) and ducted dehumidifier. Both of these pieces of equipment were in place solely to reduce energy consumption while maintaining the indoor environmental quality.

The secondary control system consisted of an Automated Logic controller, temperature sensors, CO₂ sensors, volatile organic compound (VOC) sensors, relative humidity sensors, relays, and current switches. While most of the equipment was for monitoring purposes, the relays on the output side of the controller determined when the ERV, ducted dehumidifier, and ducted dehumidifier fan operated. Each sensor collected data at five-minute intervals, and recorded data to the server within the home. This data was used to refine home operation, by slightly adjusting the temperature and humidity set points and relocating sensors to locations that provide more consistent readings, allowing for further energy savings through optimal equipment use.

Given that the home is constructed out of air tight structurally insulated panels, controlled air changes were a necessary event for the INhome. Reducing the outdoor air that needed to be conditioned was the primary reason the ERV and ducted dehumidifier exist in the INhome. Both of these pieces of equipment were monitored before and after air passed through them to determine the necessary runtime for each.

The ERV was controlled by monitoring the zone temperature, relative humidity, and CO₂. All three of these parameters were given set points that initiated the ERV operation, with a hysteresis point that turned it off again. Rather than running the ERV continuously, it ran as needed to maintain the set parameters. This controlled runtime was proven to be less than that of a percentage timer that is commonly used and provided with this equipment. This reduced runtime directly related to a reduced cost of home operation.

The ducted dehumidifier was controlled by monitoring the relative humidity post-Biowall and pre-ducted dehumidifier. When the Biowall saturated the air with moisture, the controller acted accordingly and began the dehumidification process. On a side note, the water extracted from the air was directed to the basin for the Biowall. This dehumidifier was shown to consume less energy than that of the air handler when needed strictly for dehumidification purposes.

The dehumidifier was also used to circulate air throughout the home while the air handler is not running. Although the air could still be moved through the home through continual fan operation of the primary air handling unit, it was determined that running only the fan on the dehumidifier consumed less energy. The dehumidifier fan moved approximately 150cfm, which was sufficient to ensure proper function of the Biowall, as well as to maintain circulation within the home. This was accomplished in the controls by locking out the air handler fan unless a call for heating or cooling was received.

6. Performance Comparison to Standard Construction

Understanding the energy consumption and performance of the INhome was critical. However, without practical implications, this information would be irrelevant. In order to better demonstrate the energy-saving characteristics of the home, a comparison of the INhome construction to an identically-sized home of standard

construction was completed through EnergyPlus modeling. This comparative structure incorporated a number of common building techniques, which are detailed in Table 2 below.

Table 2. Comparative Analysis of Standard and INhome Construction – Evaluation Metrics

	Standard Construction			INhome Construction		
<i>Ceiling</i>	2x6	R-19	16" oc	8" SIPS	R-56	
<i>Walls</i>	2x4	R-13	16" oc	4" SIPS	R-26	
<i>Windows</i>	DbI Pane	Low e	Argon	Triple Pane	Low e	Argon
<i>Furnace</i>	(electric)	self-size:	9645 W	(electric)	self-size:	4040 W
<i>A/C</i>	SEER 14			SEER 19		
<i>ERV</i>	no ERV			150 CFM ERV		

From this information, a side-by-side consumption comparison was completed for each month of a given year. It can be seen in Figure 15 below that the anticipated energy consumption of the INhome is less than 50% of a typical home of the same size, configuration, and location.

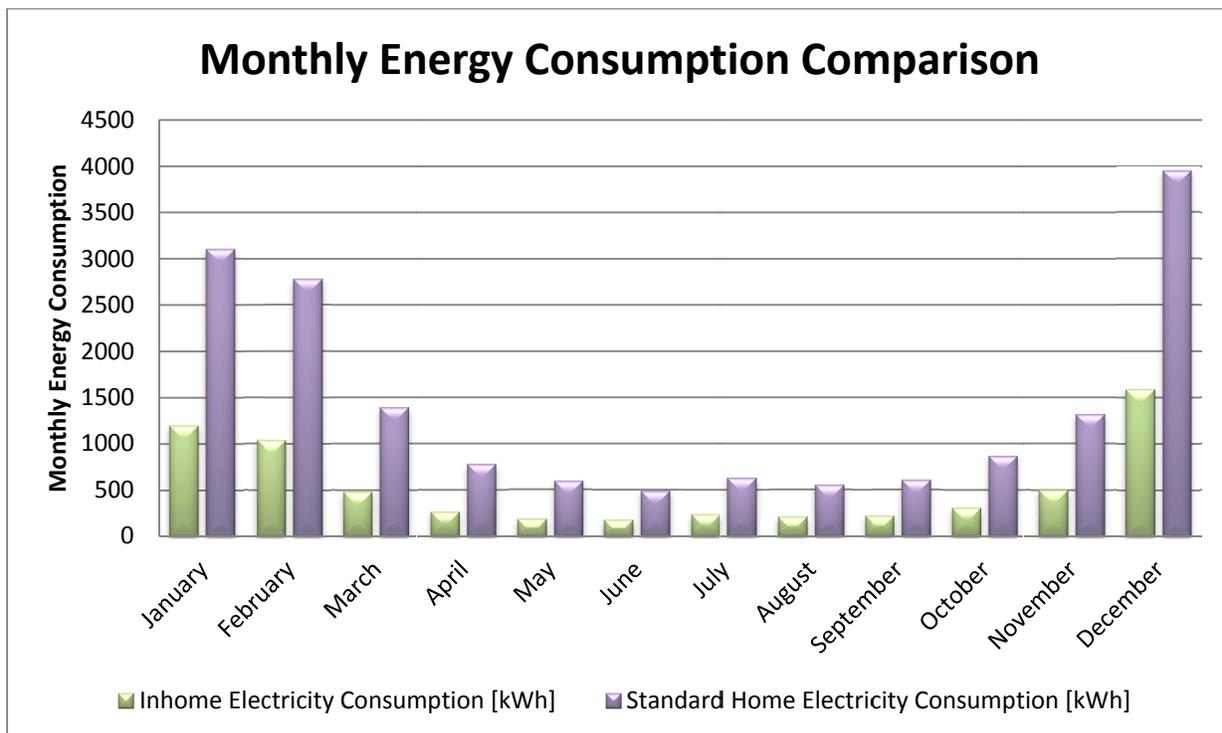


Figure 15. Monthly Energy Consumption Comparison of Standard Home Construction to the INhome

The anticipated energy savings of the INhome can be clearly seen in Figure 15. During the winter months, the energy consumption of the INhome was approximately 60% less than that of a standard home. These savings can result in energy and monetary savings to the homeowner, but also allow for implementation of solar photovoltaic power for the house.

7. Conclusions

Through energy modeling, direct verification, and engineering analyses, Team Purdue was able to develop and refine the engineering design of the INhome. Through the use of technologies such as EnergyPlus and Fluent, we were able to predict the performance of our home, and iterate design decisions to ensure optimum performance. Through careful construction scheduling, time was allotted for thorough testing, commissioning, and validation, which have confirmed these predictions.

At the core of the home, passive design strategies have been implemented to drive the home to net-zero energy use. These actions have been quite successful in the past, both in Solar Decathlon and across the world, in significantly reducing building energy consumption. Through strategic integration of these features, along with careful allocation of energy resources within the home, the INhome sets the standard for efficient, affordable, and practical design.

References

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INhome Commissioning Systems Manual

Executive Summary

The goal of this commissioning systems manual is to provide methodology for and documentation of the design and testing procedures that were implemented in the construction of the INhome. Beginning nearly one year prior to the start of the construction phase of this project, the Owner's Project Requirements outlined a set of regulations for the design of home. These were utilized in every aspect of design, and testing procedures were created to ensure that all metrics set forth by the OPR were met. These testing procedures and individual component commissioning results can be found in this manual. Additionally, due to the final placement of the INhome in an actual community, to be inhabited by a family, it was necessary to provide maintenance and scheduling information for the homeowner, which will be used for educational purposes and as a training guide for those individuals.

Owner's Project Requirements

Project Schedule:

a. Design Phase:

- 9/15/2010: 1st Round (80% Design) Complete for Review
- 10/25/2010: Building Specifications Complete for Review
- 11/01/2010: 1st Round (80% Design) Due
- 03/22/2011: 2nd Round (100% Design) Due

b. Construction Phase:

- 04/12/2011: Groundbreaking
- 05/09/2011: Mechanical Rough-in
- 06/08/2011: Mechanical Finish
- 08/31/2011: Home Disassembly
- 09/13/2011 – 10/05/2011: Competition in Washington, D.C.
- 10/05/2011: Return to Indiana for Permanent Siting

Budget:

c. Total Home Budget:

- i. \$250,000

d. Mechanical Component Budget:

- i. \$15,000

Commissioning Process:

e. Scope:

- i. The commissioning process for the IN Home will span from project conception through implementation and testing in the final site.
- ii. Pre-construction Phase:

1. Prior to construction, a set of procedures will be developed to ensure the mechanical systems of the home meet the requirements of the building owner, adhering to comfort, energy use, and budgetary guidelines.
- iii. Construction Phase:
 1. Testing of all mechanical components, individually and as an entire system, will take place to ensure adherence to the established design.
 2. Adjustments to system configurations will be made, as needed.
- iv. Post-Construction Phase:
 1. Continual monitoring of the home will take place to ensure that the home continues to meet building owner requirements, and to collect data regarding home performance characteristics.

Project Documentation:

- f. Documentation as required by the Solar Decathlon Competition Guidelines will comprise the requirements for submittals.
- g. Training materials will be developed for the end user of the home. These documents will include owners guides for specific equipment components, as well as overall process assistance. Reports to both green building raters, as well as to the Department of Energy will be generated to provide documentation of system performance and safety.

Owner Directives:

- h. Solar Decathlon Competition Guidelines, as provided by the US Department of Energy Solar Decathlon Rules, shall serve as guiding owner directives throughout the scope of building commissioning.

User Requirements and Limitations:

- i. The comfort zone, hot water, and appliance standards, as set by the US Department of Energy are as follows:
- j. The time-averaged interior dry-bulb temperature of the home is required to be maintained between 71.0°F and 76.0°F.
- k. The temperature will be measured in at least two temperature zones within the home to obtain these measurements.
- l. Time-averaged interior relative humidity must remain below 60%.
- m. Hot water shall be delivered at a minimum rate of 45 gal/30 min, with an average temperature of at least 110°F.
- n. Time-averaged interior temperature of a refrigerator should be between 34.0°F and 40°F, and the minimum volume of the refrigerator should be 6.0 ft³.
- o. Time-averaged interior temperature of a freezer should be between -20.0°F and 5.0°F, and the minimum volume of the refrigerator should be 2.0 ft³.
- p. A dishwasher should be provided that, during normal operation, reaches an interior temperature of 120°F.

Occupancy Requirements and Schedules:

- q. The occupancy of the home will be based on residential standards and of ASHRAE 90.2. All additional schedule requirements are addressed in specific appliance/equipment requirements.

Warranty Requirements:

- r. All warranty qualifications as provided by the equipment manufacturers should be adhered to during construction, transport, and implementation.

Benchmarking Requirements:

- s. For benchmarking purposes, the home will be comparatively analyzed for performance against the other homes participating in the 2011 Solar Decathlon. As these particular building designs differ from other homes of similar size, comparisons with standard home construction is not entirely practical. The nature of the competition will allow for benchmarking against the other homes through monitoring and juried contests.

Facility Operation and Maintenance Criteria:

- t. The mechanical systems in the home should be maintained on the schedule set forth by the manufacturers of the individual equipment components.

Equipment and System Maintainability Expectations:

- u. It is expected that the system will be able to be completely maintained by a largely untrained building user.
- v. The end user of the home will be able to periodically maintain the filtration systems in the home, including but not limited to:
 - i. CleanEffects filtration system
 - ii. Living wall components
- w. The end user of the home will not perform certain/specific repairs and maintenance, including but not limited to:
 - i. Repairs to air handling or condensing units, rigid or flexible duct, or ventilation systems. These repairs will be performed by an authorized Trane representative.
- x. Basic operations of the central control system should be completed by the building user.

Allowable Tolerance in Facility System Operations :

- y. The facility system should operate within the parameters set forth by the Competition Guidelines, as provided by the US Department of Energy Solar Decathlon Rules.

Energy Efficiency Goals:

- z. To achieve net-zero home operation, the energy efficiency of the HVAC system and related components will be closely metered.
- aa. The budgeted energy allowance for operation of zone heating, cooling, and ventilation is approximately 2.5 kW.
- bb. The budgeted energy allowance for operation of water heating to the home is approximately 0.55 kW.
- cc. The budgeted energy allowance for operation of home appliances is approximately 2.6 kW.

Environmental and Sustainability Goals:

- dd. The building, in addition to achieving a net-zero energy balance, should combine energy-efficient construction methods with renewable energy systems that serve as a model for sustainability in home design.

Community Requirements:

- ee. The building should meet all lot requirements and solar envelope constraints, as provided by the Department of Energy, for the duration of the Solar Decathlon competition.
- ff. After a final site has been established, the building should be fully integrated into a community in Lafayette, Indiana, and meet all building codes and community expectations as set forth by this community.

Adaptability for Future Facility Changes and Expansion:

- gg. The home should be adaptable to the changing needs of the end user, and meet requirements of its inhabitant over the course of years to come.

Health, Hygiene, and Indoor Environment Requirements:

- hh. The home shall meet or exceed all existing building codes for both the State of Indiana and as provided by the US Department of Energy for the Solar Decathlon.
- ii. Furthermore, indoor environmental quality will be based upon ASHRAE Standard 62.2, creating a high standard for indoor air quality.
- jj. Dual filtration methods will be provided, including living wall filtration for chemical contaminants, and Trane CleanEffects filtration for both particulate and non-particulate filtration.

Acoustical requirements:

- kk. Design of mechanical components should be meet accepted SMACNA and ANSI standards, and be approved through user testing after implementation.

Aesthetics Requirements:

- ll. Interior mechanical equipment should be concealed within the equipment space, as determined by the project architect. Exterior equipment should be located behind the building, as to not be visible from the South façade of the home. Additionally any mechanical components extending into the living space, including but not limited to duct, should be concealed within approved materials by the project architect.

Constructability Requirements:

- mm. All mechanical components should be constructed for rapid assembly and disassembly, and be approved for long-distance transport.

Applicable Codes and Standards:

- nn. All systems within the home should adhere to existing building codes for the State of Indiana and codes as provided by the US Department of Energy for the Solar Decathlon.

Basis of Design – Mechanical System

Performance Criteria

As defined in the Owner’s Project Requirements, this system was designed to meet the following performance criteria:

- Comfort zone requirements
- Net-zero energy consumption
- Appliance operation
- Transport of home

Statement of Operation

Under normal operating conditions, the facility is intended to operate as a single-family dwelling, with a net energy consumption of zero or less (surplus production). The facility should provide for all of the basic needs of the occupants, which are intended to be two full-time occupants. Additionally, the facility should meet the demands of all climate conditions to which it is exposed for the given location (West Lafayette, Indiana), including extreme weather conditions. Auxiliary heating and surplus cooling capacity ensure comfort requirements will be met in all feasible weather conditions. In the event of an emergency, facility egress requirements are more than required by building codes, with four separate exterior exits from the 984 square-foot space.

Statement of Design

Through the use of current, applicable standards, including ventilation, thermal gain, and occupancy guidelines, combined with sheet metal and other equipment standards, combined with modern computational technologies, the performance criteria could be met in this design.

Location Design Considerations

While the INhome is designed for long-term placement in West Lafayette, Indiana, the home is to be tested during the Solar Decathlon Competition in Washington, D.C. Equipment sizing and home performance was determined through analysis at both locations. The results ultimately demonstrated that Lafayette, Indiana and Washington, D.C. ultimately have quite similar climates, and few adjustments needed to be made in order to comply with building requirements at these locations. The Purdue INhome was designed as being in a suburban type terrain, with a south-facing orientation and primary façade.

Design Technologies and Assumptions

Design Software Used:

EnergyPlus Version 6.0

This was the most current version of EnergyPlus available during the engineering process. The model was originally constructed in version 5.0, and then converted when the newer version was released.

Fluent

For computational fluid dynamics modeling, Fluent was used to predict temperature distribution throughout the home, and to better anticipate the thermal comfort balance of the space.

Microsoft Excel

In order to achieve a net-zero energy balance, calculations were completed to ensure proper solar photovoltaic sizing and other internal gains information.

Building End Use Considerations

Occupant Schedule and Design:

The INhome is anticipated to be occupied by two full-time residents, and occupancy schedules were established by standard residential occupancy included in the EnergyPlus database, with internal equipment heat gain profiles based on table 8.8.1 of ASHRAE standard 90.2. The loads gained from these individuals were modeled based on standards set forth from the ASHRAE Handbook of Fundamentals (2005).

Competition End Use

The INhome will compete in a variety of competition metrics during the 2011 Solar Decathlon. These particular contests will demand certain characteristics of the home, including, but not limited to: hot water draws, solar energy production, appliance use, and comfort zone requirements. These end-use metrics were assessed in a predicted energy consumption budget, then validated through testing. This allowed for verification of system performance during the Solar Decathlon measured contests.

HVAC and Building Energy Use Design Assumptions:

HVAC Unitary System

The packaged HVAC system being installed in the home was set to be available at any time for the entire year, and was linked to the thermostat for temperature control. The system fan was allowed to cycle as necessary as a blow through system with no economizer, no lockout, and no humidification or dehumidification.

A supply fan total efficiency of 70% and supply fan motor efficiency of 90% were assumed. Since the HVAC supplier was known, a single speed, direct expansion cooling coil COP of 5 and an electric heating coil efficiency of 85% were used to model the system chosen. EnergyPlus was then allowed to size the system needed based on the calculated heating and cooling loads.

The final piece of the HVAC unitary system model was the energy recovery ventilator, or ERV. Since the model used was also known, the recovery type was set as "enthalpy" and the sensible heat recovery effectiveness and latent heat recovery effectiveness were set to 72% and 55% respectively.

HVAC Ventilation Requirements

HVAC system minimum supply air flow rates for fresh air requirements were based on ASHRAE 62.2-2003 ventilation standards of 3 CFM/1000ft² of conditioned space plus 7.5 CFM/person.

$$981 \text{ ft}^2 * 3\text{cfm}/1000\text{ft}^2 + 3 \text{ persons} * 7.5 \text{ CFM}/\text{person} = 25.4 \text{ CFM}.$$

There are several important things to note with this design minimum flow rate. First, this is the occupied rate, however when the home is unoccupied this flow rate is even less than 3 CFM. The other thing to note is that this does not take into account the filtration and fresh air generated by the bio-wall being installed within the home. This bio-wall is a natural plant media air filter found in the main living space of the home that a portion of the return air is drawn through. This should theoretically reduce the fresh air requirements even further.

Lights

Lighting loads were based on the total design load of about 500W. This resulted in a power density of 0.5W/ft². The lighting was taken as 0.4 fraction radiant which is based on the Lighting Handbook: Reference & Application, 8th Edition, Illuminating Engineering Society of North America, New York, 1993, p. 355.

Electric Equipment

Electrical equipment loads were the final internal gains modeled within the home. Two main electrical gains were modeled. The first was the electric induction cooking range. The cooking range is to be vented and was therefore modeled separately to attempt to gain as accurate a model as possible. A best guess operating wattage of 4 kW was used as each heating element has different rated wattages and could be used in various combinations. It was assumed that half of heat coming off of the cook top would be vented out of the space. Since no suggested schedules exist for a single appliance like a stove, a schedule was developed around mealtimes to reasonably estimate usage times.

The second equipment load modeled was the general equipment gain load based on the before mentioned ASHRAE 90.2 Table 8.8.1 Low-Rise Residential Single Zone Internal Heat Gain Profile. This includes all residential plug loads such as TV's, task lighting, fans, small appliances, computers, etc. This resulted in a load of 3.8 W/m² based on the ASHRAE 90.2 standard.

Mechanical Equipment and Components

Final mechanical equipment was selected based upon the aforementioned modeled requirements. Due to a restriction in manufacturer options, the following design decisions were made from the range of options listed below.

System Assembly Options (Original Design Options):

- Heat pumps:
 - XL20i – 19 SEER [Ultra High Efficiency], Dual Compressor
 - XL16i – 17 SEER [Ultra High Efficiency], One Compressor, Dual-Staged
 - XL15i – 16 SEER [Super High Efficiency], Single Stage
 - XR15i – 16.5 SEER [High Efficiency], Single Stage
- Air Handlers:
 - Hyperion Family 7 – Varied Cooling Sizes available [24 kBtu-hr to 48 kBtu-hr]
 - Hyperion Family 8 – Varied Cooling Sizes available [24 kBtu-hr to 48 kBtu-hr]

Final Equipment Selection:

- Trane XL950 Thermostat
- Trane CleanEffects Whole House Air Cleaner (TFD235ALAH000C)
- Trane FreshEffects Energy Recovery Ventilator (TERVR100A9P00A)
- Trane Hyperion Variable Speed Modular Multi-position Air Handler (TAM8A0C36H21SA)
- Trane XL20i 2-Ton Heat Pump (4TWZ0024-SUB-100.03)
- Ultra-Aire 70H Ventilating Dehumidifier (4029870)

System Operation and Maintenance

The system will be maintained through by homeowner, thus training manuals must be implemented. Training information and home ownership manuals will be provided to the homeowner through the compilation of manufacturer data and other information, as well as standard operating procedures.

Codes, Standards, Guidelines and References for Design

The following metrics were used during the design of this mechanical system for optimal efficiency and compliance with set standards:

Solar Decathlon Rules

- Rule 08 (Energy), Contest 03 (Engineering), Contest 06 (Comfort Zone), Contest 07 (Hot Water), Contest 08 (Appliances), Contest 09 (Home Entertainment), and Contest 10 (Energy Balance)
- Solar Decathlon Rules dictate home performance and have been used to determine the requirements for comfort zone and other parameters of the home design.

Solar Decathlon Building Code - Section 07 (Mechanical)

- Solar Decathlon Building Code is modeled after the International Residential Code (IRC), with additional guidelines and specifications. Those directly impacting the INhome are as follows:
 - Section 7-2: Return Air
 - Section 7-3: Outside Air (Subsections a. and b.)
 - Section 7-4: Bathroom Ventilation

ASHRAE Guideline 1.1 – 2007

ASHRAE Standards 62.2 – 2007

ANSI/ASHRAE Stanard 90.2 – 2007

ASHRAE Handbook of Fundamentals (2005)

SMACNA HVAC Air Duct Leakage Test Manual

Commissioning and Testing Results

The following checklists detail the commissioning procedures as designated during mechanical equipment and distribution systems installation. The following systems were commissioned using this process:

- Biowall Hydronic Pump

Equipment / Component

- Trane CleanEffects
- Sheet Metal Ductwork
- Trane Hyperion Air Handling Unit
- Ultra-Aire 70H Ducted Dehumidifier
- GE GeoSpring Hybrid Heat Pump Water Heater
- Trane XL20i Heat Pump (2-Ton)

1. MODEL VERIFICATION				
	Item: Make, Model, Size, ...etc	Specified	Submitted	Installed
	Hydronic Pump (TotalPond, 210 gph)	X	X	X
2. PRE-INSTALLATION VERIFICATIONS				
		Contractor	Initial	CxA
2A	Physical Checks			
	Return venting already installed	Yes / No	KLR	
	Water supply is installed in local proximity	Yes / No	KLR	
	Drainage piping is stalled in local proximity	Yes / No	KLR	
	All components are free from damage	Yes / No	KLR	
	All components are clean	Yes / No	KLR	
	Ductwork is clean and free of debris	Yes / No	KLR	
	Growth medium is at correct angle	Yes / No	KLR	
2B	Component Verification			
	Water basin	Yes / No	KLR	
	Water filter	Yes / No	KLR	
	Tubing	Yes / No	KLR	
	Emitters	Yes / No	KLR	
	Pump	Yes / No	KLR	
	End cap	Yes / No	KLR	
	Duct	Yes / No	KLR	
	Plants	Yes / No	KLR	
	Cover wall	Yes / No	KLR	
	Float valve	Yes / No	KLR	
	CO2 Sensors	Yes / No	KLR	
3. INSTALLATION VERIFICATIONS				
		Contractor	Initial	CxA
3A	Basin Installation			
	Basin is in correct location	Yes / No	KLR	JPW
	Basin is secure	Yes / No	KLR	JPW
3B	Install Air Plenum			
	Air plenum is in correct location	Yes / No	KLR	JPW
	Supports are installed per plans and plenum is secure	Yes / No	KLR	JPW
	CO2 Sensors installed	Yes / No	KLR	JPW
3C	Drainage System Install			
	All piping has been installed as required by detail drawings	Yes / No	KLR	JPW
	Piping is supported as required by specifications	Yes / No	KLR	JPW
	Valves are easily accessible	Yes / No	KLR	JPW
	Penetrations into basin are sealed properly	Yes / No	KLR	JPW
3D	Install Pump			
	Pump is accessible for maintenance	Yes / No	KLR	JPW
	Pressure gauges installed	Yes / No	KLR	JPW
	Pump secured in place	Yes / No	KLR	JPW
	Pump not leaking	Yes / No	KLR	JPW
3E	Install Irrigation Piping			
	All piping has been installed as required by detail drawings	Yes / No	KLR	JPW

	Piping is supported as required by specifications	Yes / No	KLR	JPW
	End cap installed and not leaking	Yes / No	KLR	JPW
	Piping not leaking	Yes / No	KLR	JPW
	Emitter spacing verified	Yes / No	KLR	JPW
	Bleed piping installed	Yes / No	KLR	JPW
	Bleed piping valve installed	Yes / No	KLR	JPW
3F	Install Water Supply			
	All piping has been installed as required by detail drawings	Yes / No	KLR	JPW
	Piping is properly secured to basin	Yes / No	KLR	JPW
	Piping is supported as required by specifications	Yes / No	KLR	JPW
	Piping not leaking	Yes / No	KLR	JPW
	Float valve installed	Yes / No	KLR	JPW

4. NEGATIVE RESPONSES

Item	Item Reason for negative response	Resolution



As-Built Project Manual		Equipment / Component		
1. MODEL VERIFICATION				
	Item: Make, Model, Size, ...etc	Specified	Submitted	Installed
	Trane CleanEffects	X	X	X
2. PRE-INSTALLATION VERIFICATIONS				
		Contractor	Initial	CxA
2A	Physical Checks			
	Pre-filter is new and clean	Yes / No	MLS	
	Both collection cells are new and clean	Yes / No	MLS	
	AHU is installed	Yes / No	MLS	
	Components are free from damage	Yes / No	MLS	
2B	Component Verification			
	Cabinet	Yes / No	MLS	
	Collection Cells (2)	Yes /No	MLS	
	Field Charger	Yes /No	MLS	
	Pre-filter	Yes /No	MLS	
	Power Door	Yes /No	MLS	
	24V Power Cable	Yes /No	MLS	
3. INSTALLATION VERIFICATIONS				
		Contractor	Initial	CxA
3A	Cabinet Installation			
	Correct direction of flow	Yes	MLS	KM
	Flush fit against AHU and return duct	Yes	MLS	KM
	Properly secured	Yes	MLS	KM
3C	Collection Cells Installation			
	Both cells are present	Yes	MLS	KM
	Cells are securely locked in place	Yes	MLS	KM
	Adequate maintenance access	Yes	MLS	KM
3D	Pre-Filter Installation			
	Securely locked in place	Yes	MLS	KM
	Adequate maintenance access	No	MLS	KM
3E	Power Door Installation			
	Adequate door clearance	Yes	MLS	KM
	Adequate power cable access	Yes	MLS	KM
	Latches secure	Yes	MLS	KM
3F	Power Cable Installation			
	Cable plugged into power door	Yes	MLS	KM
	Cable plugged into power source	Yes	MLS	KM
3G	System Start-Up			
	Power On	Yes	MLS	KM
	Verify no "Fault Indicator"	Yes	MLS	KM
	Verify Pre-filter cleaning interval setting	Yes	MLS	KM
	Verify collection cells cleaning interval setting	Yes	MLS	KM
	Verify field charger power level setting	Yes	MLS	KM
	No unusual noise/vibration	Yes / No	MLS	KM
4. NEGATIVE RESPONSES				

Item	Item Reason for negative response	Resolution
3D	Door to mechanical closet must be removed for complete unit removal	N/A; filter access still accessible



As-Built Project Manual		Ductwork Checklist		
1. MODEL VERIFICATION				
Item: Make, Model, Size, ...etc	Specified	Submitted	Installed	
(#) - 14"x14" Flat Rectangular	X	X	X	
(#) - 14" \emptyset Single-Wall Spiral Round	X	X	X	
(#) - 14" \emptyset Single-Wall Spiral Round	X	X	X	
(#) - 10"x4" Flat Rectangular	X	X	X	
(#) - 8" \emptyset Single-Wall Spiral Round	X	X	X	
(#) - 7"x3" Flat Rectangular	X	X	X	
(#) - 7"x3" Flat Rectangular	X	X	X	
(#) - 6" \emptyset Single-Wall Spiral Round	X	X	X	
(#) - 6" \emptyset Single-Wall Spiral Round	X	X	X	
(#) - 6" \emptyset Single-Wall Spiral Round	X	X	X	
(#) - 6" \emptyset Single-Wall Spiral Round	X	X	X	
(#) - 6" \emptyset Single-Wall Spiral Round	X	X	X	
(#) - 6"x7" Flat Rectangular	X	X	X	
(#) - 6"x6" Flat Rectangular	X	X	X	
(#) - 6" \emptyset Single-Wall Spiral Round	X	X	X	
(#) - 6" \emptyset Single-Wall Spiral Round	X	X	X	
2. PRE-INSTALLATION VERIFICATIONS				
		Contractor	Initial	CxA
2A	Physical Checks			
	1. Ductwork is to be installed in compliance with ASHRAE Guideline 1, Checklist 9. Ductwork: Installation. 2. Ductwork insulation is to be installed in compliance with ASHRAE Guideline 1, Checklist 10. Ductwork: Insulation.	Yes	MLS	
2B	Component Verification			
	1. Ensure that all duct location, sizing, and length matches plan callouts.	Yes	MLS	
3. INSTALLATION VERIFICATIONS				
		Contractor	Initial	CxA
3A	1. Ductwork is to be installed in compliance with ASHRAE Guideline 1, Checklist 9. Ductwork: Installation. 2. Ductwork is to be installed in compliance with ASHRAE Guideline 1, Checklist 10. Ductwork: Insulation.	Yes	MLS	JPW
4. NEGATIVE RESPONSES				
Item	Item Reason for negative response	Resolution		



As-Built Project Manual		Air Handling Unit – Trane Hyperion		
1. MODEL VERIFICATION				
	Item: Make, Model, Size, ...etc	Specified	Submitted	Installed
	Trane Hyperion Family 8 – TAM8A0B30H21SA	x	x	x
	55-11/16 x 21-3/4 x 21-5/16 inches (H x W x D)			
2. PRE-INSTALLATION VERIFICATIONS				
		Contractor	Initial	CxA
2A	Physical Checks			
	Unit is free from physical damage	No*	MLS	
	Coil surface areas are free of damage	Yes	MLS	
	The air openings are sealed with plastic	Yes	MLS	
	All access doors are operable	Yes	MLS	
	Installation and startup manual provided	Yes	MLS	
	Unit tags affixed	Yes	MLS	
2B	Component Verification			
	Auxiliary heat accessory included: 5 kW size (BAYEVAAC05BK1AA)	Yes	MLS	
3. INSTALLATION VERIFICATIONS				
		Contractor	Initial	CxA
3A	AHU Installation			
	Minimum clearance is met around unit	Yes	MLS	JPW
	Access panel is completely accessible from utility room door	Yes	MLS	JPW
	Pull-out compartment on blower is completely accessible	Yes	MLS	JPW
3B	Ductwork Connection			
	Adequate locations for testing and balancing of unit	Yes	MLS	JPW
	Outdoor air intake is far from coil/will not cause freezing	Yes	MLS	JPW
	Ductwork is clean and full of debris	Yes	MLS	JPW
	AHU supply flange opens into plenum prior to entering supply duct	Yes	MLS	JPW
3C	Electrical Connection			
	Local disconnect accessible	Yes	MLS	JPW
	All electrical connections are tight	Yes	MLS	JPW
	All electrical components are grounded	Yes	MLS	JPW
3D	Controls Connection			
	Sensors (as controlled by XL90) are installed	Yes	MLS	JPW
	Safety items installed and verified	Yes	MLS	JPW
4. MECHANICAL & CONTROLS VERIFICATIONS				
		Contractor	Initial	CxA
3A	Startup			
	Fans and motors aligned and lubricated	Yes	MLS	JPW
	Fan belts in good condition, proper tension	Yes	MLS	JPW
	Filter connection tight (no bypass air)	Yes	MLS	JPW
	System starts without any unusual noise or vibration	Yes	MLS	JPW
	Manufacturers startup checklist completed/attached	Yes	MLS	JPW
	Cooling controls verified	Yes	MLS	JPW
	Heating controls verified	Yes	MLS	JPW

3E	Testing and Balancing			
	Filters and coils are clean	Yes	MLS	JPW
	Motor rotation verified	Yes	MLS	JPW

5. NEGATIVE RESPONSES

Item	Item Reason for negative response	Resolution
2A	Denting/damage to back right corner	Not affecting inner components/visible from standard installation; no action needed



As-Built Project Manual		Dehumidifier Checklist – Ultra-Aire 70		
1. MODEL VERIFICATION				
	Item: Make, Model, Size, ...etc	Specified	Submitted	Installed
	Ultra-Aire 70H, 5.5 Amp	X	X	X
2. PRE-INSTALLATION VERIFICATIONS				
		Contractor	Initial	CxA
2A	Physical Checks			
	Unit is free from physical damage	Yes	MLS	
	Coil surface areas are free of damage	Yes	MLS	
	Installation and startup manual provided	Yes	MLS	
	Unit tags affixed	Yes	MLS	
3. INSTALLATION VERIFICATIONS				
		Contractor	Initial	CxA
3A	Outdoor Heat Pump Installation			
	Minimum clearance is met around unit	Yes	MLS	LMC
3B	Connection to AHU			
	Condensate piping collection system for reuse to Biowall	Yes	MLS	LMC
	Refrigerant line connection does not have any 90-degree angles	Yes	MLS	LMC
3C	Electrical Connection			
	Local disconnect accessible	Yes	MLS	LMC
	All electrical connections are tight	Yes	MLS	LMC
	All electrical components are grounded	Yes	MLS	LMC
3D	Controls Connection			
	Sensors are installed	Yes	MLS	LMC
	Relay connection verified	Yes	MLS	LMC
4. MECHANICAL & CONTROLS VERIFICATIONS				
		Contractor	Initial	CxA
3A	Startup			
	Fans and motors aligned and lubricated	Yes	MLS	LMC
	Fan belts in good condition, proper tension	Yes	MLS	LMC
	System starts without any unusual noise or vibration	Yes	MLS	LMC
	Manufacturers startup checklist completed/attached	Yes	MLS	LMC
3E	Testing and Balancing			
	Filters and coils are clean	Yes	MLS	LMC
	Motor rotation verified	Yes	MLS	LMC
	Fan RPM verified	Yes	MLS	LMC
5. NEGATIVE RESPONSES				
Item	Item Reason for negative response	Resolution		



As-Built Project Manual		Water Heater Checklist		
1. MODEL VERIFICATION				
	Item: Make, Model, Size, etc...	Specified	Submitted	Installed
	General Electric, GEH50DNSRSA, Geospring Heat Pump Water Heater			
2. PRE-INSTALLATION VERIFICATIONS				
		Contractor	Initial	CxA
2A	Physical Checks			
	1. Unit is free from Physical Damage	Yes	JPW	
	2. All components/accessories present	Yes	JPW	
	3. Installation manual provided	Yes	JPW	
2B	Component Verification			
	1. Manufacturer, Model	Yes	JPW	
3. INSTALLATION VERIFICATIONS				
		Contractor	Initial	CxA
3A	Installation			
	1. Unit is to be installed in accordance with construction documents	Yes	JPW	MLS
	2. Unit is to be installed in accordance with Owner's Manual & Installation Instructions pg. 14-18	Yes	JPW	MLS
	3. Unit is functioning properly without issue	Yes	JPW	MLS
4. NEGATIVE RESPONSES				
Item	Item Reason for negative response	Resolution		



As-Built Project Manual		Heat Pump Checklist – Trane xL20i		
1. MODEL VERIFICATION				
	Item: Make, Model, Size, ...etc	Specified	Submitted	Installed
	Trane XL20I WEATHERTRON – 4TWZ0024A1	X	X	X
	24000 Btuh Cooling Capacity			
2. PRE-INSTALLATION VERIFICATIONS				
		Contractor	Initial	CxA
2A	Physical Checks			
	Unit is free from physical damage	Yes	MLS	
	Coil surface areas are free of damage	Yes	MLS	
	Installation and startup manual provided	Yes	MLS	
	Unit tags affixed	Yes	MLS	
3. INSTALLATION VERIFICATIONS				
		Contractor	Initial	CxA
3A	Outdoor Heat Pump Installation			
	Minimum clearance is met around unit	Yes	MLS	JWP
	Measure refrigerant charge	Yes	MLS	JWP
	Outdoor thermostat accessible	Yes	MLS	JWP
3B	Connection to AHU			
	Condensate piping collection system for reuse	Yes	MLS	JWP
	Refrigerant line connection does not have any 90-degree angles	Yes	MLS	JWP
3C	Electrical Connection			
	Local disconnect accessible	Yes	MLS	JWP
	All electrical connections are tight	Yes	MLS	JWP
	All electrical components are grounded	Yes	MLS	JWP
3D	Controls Connection			
	Sensors (as controlled by XL90) are installed	Yes	MLS	JWP
	Safety items installed and verified	Yes	MLS	JWP
4. MECHANICAL & CONTROLS VERIFICATIONS				
		Contractor	Initial	CxA
3A	Startup			
	Fans and motors aligned and lubricated	Yes	MLS	JWP
	Fan belts in good condition, proper tension	Yes	MLS	JWP
	System starts without any unusual noise or vibration	Yes	MLS	JWP
	Manufacturers startup checklist completed/attached	Yes	MLS	JWP
	Cooling controls verified	Yes	MLS	JWP
	Heating controls verified	Yes	MLS	JWP
3E	Testing and Balancing			
	Filters and coils are clean	Yes	MLS	JWP
	Fan rotation verified	Yes	MLS	JWP
5. NEGATIVE RESPONSES				
Item	Item Reason for negative response	Resolution		

Following completion of the individual component checklists, several other testing procedures were implemented to ensure proper building performance. These included, but were not limited to:

- Thermal imaging
- Blower door testing
 - o Before and after drywall
- Duct airtightness testing (“duct blaster”) testing
 - o Before and after home disassembly
- Smoke seal testing
- Competition metric simulation
 - o Hot water draws
 - o Appliance performance monitoring
 - Cooktop
 - Refrigerator
 - Oven/Microwave Oven
 - Dishwasher
 - Clothes Washer
 - Clothes Dryer
- Comfort zone (thermocouple measuring) monitoring
- Photovoltaic
 - o Power consumption monitoring

The results of these tests are described in the following summaries:

- Thermal imaging – June 15, 2011:
 - o Due to the moderate temperature experienced during this testing (no winter days available), the temperature band utilized by the thermal imaging camera was quite narrow (4°F).
 - o Slight variances were found around windows and doors that had recently been installed (prior to drywall).
 - o These variances were mitigated through the use of expanded polyurethane spray foam to eliminate leakage and improve airtightness.
- Blower door testing
 - o Performed by third party green building rater
 - John Milligan
 - o Test One (before disassembly) – July 1, 2011:
 - Overall home leakage was found to be 525 CFM@50
 - o Test Two (after disassembly) – to be completed August 28, 2011
- Duct airtightness testing
 - o Test One (before disassembly) – July 1, 2011:
 - 583 CFM@25
 - The high leakage rate is likely due to lack of sealant between home sections. This will be mitigated during the practice disassembly and re-build, at which time the duct connections will be accessible and sealed. Should be re-evaluated and re-tested after this occurs.
 - o Test Two – To be completed August 28, 2011

- Smoke seal testing – July 1, 2011
 - o Home was pressured and filled with theatrical fog
 - Leaks were visually inspected and filled with expanded polyurethane foam.
 - o Duct (supply and return) were filled with theatrical fog and visually inspected for leaks
 - Leaks were found at duct connections to in-wall return segments.
 - Oil-based duct sealant was added to these sections to mitigate losses through ductwork to the outdoors.
- Comfort zone monitoring
 - o Thermocouples were located throughout the space, strategically placed in all living spaces at the occupied level.
 - Temperature readings were measured with LabView software in order to record minute fluctuations in temperature.
 - The ambient temperature was found to vary by approximately 2°F between the Private Core and Public Cores of the home.
 - Temperatures were well within the regulations set forth by the Solar Decathlon Rules
- Photovoltaic (power consumption) monitoring
 - o Through the use of both SunPower and eMonitor digital monitoring systems, the power production of the solar photovoltaic system was monitored.
 - o The production of the installed (8.6 kW) system varied with daylight and outdoor temperature, but performed consistently during summer months, producing on average 45 kWh per day, which is more than adequate for the budgeted 27 kWh per day requirements, as predicted through energy modeling.

The tests as previously described offer a validation of the performance characteristics of the INhome. The home's structural system and HVAC components are designed to be virtually leakage-free. This has been tested and proven through the metrics set forth in these commissioning procedures.

Systems Operating Procedures and Limitations

Advantium Microwave Oven:

Metal filters:

Basis of care: Once a month, or as necessary

To remove, slide them to the rear using the tabs. Pull down and out. To clean the vent filters, soak them and then swish around in hot water and detergent. Don't use ammonia or ammonia products because they will darken the metal. Light brushing can be used to remove embedded dirt.

Optional charcoal filter:

Basis of care: 6-12 months

Clothes Dryer:

Dryer Vent:

Basis of care: Every 3 months

Check the dryer vent to make sure there is no hazardous lint buildup. Remove lint if necessary.

Clothes Washer:

Basis of care: Every 6 months

Make sure the washer (and dryer) are level and sturdy. Adjust feet if necessary.

Cooktop:

Basis of care: As necessary

Use CERAMABRYTE® Ceramic Cooktop Cleaner on the glass cooktop. To maintain and protect the surface of your glass cooktop, spread a few drops of CERAMABRYTE on the burned residue area and clean as needed.

Water Heater:

Clean Air Filter.

Basis of care: Every 12 months (minimum)

Leave power on to remove filter from top of unit. Wipe clean with a damp rag, or rinse with warm water. Once the clean filter has been reinstalled, press the FILTER button and then press Enter.

Check condensate drain line periodically as well. Clean any debris.

Air Handler:

Clean Effects Filter:

Basis of care: Every month or as indicated.

Outdoor Heat Pump (XL20i):

Basis of care: Every 6 months or as needed.

Maintain free outdoor coil airflow. Ensure that nothing is restricting airflow around the outdoor unit. Remove debris as necessary.

Clean outdoor unit with warm water and soap to keep the system looking new.

Ultra-Aire Dehumidier:

Basis of care: Every 3 months.

The Ultra-Aire 70H is equipped with a MERV 11 media filter. A unit with a dirty filter will reduce

dehumidifier capacity and efficiency and may cause the compressor to cycle off and on unnecessarily on the defrost control. To replace the filter, remove the filter door from one of the sides of the UA70 by pushing the snap button in and gently pulling to door away from the body of the unit, then pulling up to disengage the door flange from the slot, removing the door.

ERV:

Merv Filter:

Basis of care: Every 3 months.

Release cam latches and carefully swing access door open. The access door may be removed for ease of service by sliding the access door off. Use caution when removing door. Remove the filter retainer springs. Pull the filters

out. Vacuum filters off with a hose attachment. Re-install filters and retainer spring. Re-install cover, and fasten cam latches.

Heat Transfer Core:

Basis of care: Every 12 months.

Remove filter retainer spring and the filters. Vacuum the exposed faces of the heat transfer core with a soft brush attachment. After servicing the filters, re-install them and the filter retainer spring. Vacuum out dust from the rest of the unit case. Do not wash heat transfer core.

Photovoltaic Modules:

Basis of Care: Every 3 months

Clean panels with warm water and biodegradable detergent. Use a long soft brush to remove dust, debris, and stubborn stains. Use care when cleaning panels.

INhome

SPECIFICATIONS



Heavy Construction Equipment Specifications

Terex RT340-XL1 Truck Crane

- **Boom Specifications:**
 - 30-94' (9.23-28.49 m), four section full power, mechanically synchronized boom
- **Engine Specifications:**
 - Make and Model, Cummins ISC 300 (300 hp)
 - Type 6 cylinder
 - Bore and Stroke 4.49 x 5.32" (114 x 135 mm)
 - Displacement 504.5 in³ (8.27 L)
 - Max. Gross Horsepower 300 hp (224 kw) @ 2000 rpm
 - Max. Gross Torque 860 lb/ft (1166 N•m)/1300 rpm
 - Net Horsepower 242 hp (180 kw) @ 2000 rpm
 - Aspiration Turbocharged
 - Electrical System 12 volt
 - Alternator 100 amp
 - Battery (2) 12V-950 C.C.A. @ 0°F (-18°C)
 - Fuel Capacity 60 gal (227 L)
- **Carrier Chassis:**
 - Chassis is Terex designed and built with a 6 x 4 drive.
 - Triple box construction frame is fabricated from high strength allow steel
 - Full aluminum deck
 - Aluminum engine housing with sliding cover optimizes engine access while reducing weight and improving corrosion resistance.

Generator Specifications

1. Generator Honda

EM5000iSAB<http://www.hondapowerequipment.com/products/modeldetail.aspx?page=modeldetail§ion=P2GG&modelname=EM5000iS&modelid=EM5000ISAN>

EM5000iS	Specifications
Engine	Honda GX340
Displacement	337cc
AC Output	120/240V 5000W max. (41.7/20.8A) 4500W (37.5/18.8A)
Receptacles Plug	20A 125V Duplex, 30A 125V Locking Plug, 30A 125/250V Locking
DC Output	N/A
Starting System	Recoil, electric
Fuel Tank Capacity	4.5 gals.
Run Time per Tankful	5.7 hrs. @ rated load, 15.2 hrs. @ 1/4 load
Dimensions (L x W x H)	31.9" x 26.4" x 27.2"
Noise Level	68 dB @ rated load, 62 dB @ 1/4 load
Dry Weight	223
Residential Warranty	3 Years
Commercial Warranty	3 Years

Generator Sound Calculations per Rule 4-5

Given: 68 dB at rated load at 3 ft

Find: Equivalent sound pressure level (dB) at 50 ft

Solution:

$$\text{Drop} = 20 * \log\left(\frac{\text{new distance}}{\text{original distance}}\right)$$

$$\text{Drop} = 20 * \log\left(\frac{50 \text{ ft}}{3 \text{ ft}}\right)$$

$$\text{Drop} = 24.437 \text{ dB}$$

$$dB_{50} = 68 \text{ dB} - 24.437 \text{ dB}$$

$$dB_{50} = 44 \text{ dB}$$

Meets NPS 36CFR2.12

Construction Specifications

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Division 06 – Wood, Plastics, and Composites

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[06 17 53 Shop-Fabricated Wood Trusses](#)

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Division 07 – Thermal and Moisture Protection

[07 25 00 Weather Barriers](#)

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Division 08 – Openings

[08 10 00 Doors and Frames](#)

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Division 22 – Plumbing

[22 05 00 Common Work Results for Plumbing](#)

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[22 13 42 Facility Packaged Sewage Pumping Stations](#)

[22 33 30 Residential, Electric Domestic Water Heaters](#)

[22 41 00 Residential Plumbing Fixtures](#)

Division 23 – Heating, Ventilating, and Air-Conditioning (HVAC)

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Division 25 – Integrated Automation

[25 50 00 Integrated Automation Facility Controls](#)

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Division 28 – Electronic Safety and Security

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Division 32 – Exterior Improvements

32 80 00 Irrigation

32 93 00 Plants

32 94 33 Planters

Division 48 – Electric Power Generation

48 14 13 Solar Energy Collectors

SECTION 01 30 00 -- ADMINISTRATIVE REQUIREMENTS

PART 1 – GENERAL

1.1 PROJECT MANAGEMENT AND COORDINATION

- A. Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work.
- B. Requests for Information (RFIs): On discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI. Use AIA Document G716-2004.
- C. Schedule and conduct progress meetings at Project site at weekly intervals. Notify Owner and Architect of meeting dates and times. Require attendance of each subcontractor or other entity concerned with current progress or involved in planning, coordination, or performance of future activities. Architect will record minutes and distribute to everyone concerned, including Owner and Architect.

1.2 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 1. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 2. Submit three copies of each action submittal. Architect will return two copies.
 - 3. Submit two copies of each informational submittal. Architect will not return copies.
 - 4. Architect will return submittals, without review received from sources other than Contractor.
- B. Place a permanent label or title block on each submittal for identification. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect. Include the following information on the label:
 - 1. Project name.
 - 2. Date.
 - 3. Name and address of Contractor.
 - 4. Name and address of subcontractor or supplier.
 - 5. Number and title of appropriate Specification Section.
- C. Identify deviations from the Contract Documents on submittals.
- D. Contractor's Construction Schedule Submittal Procedure: Submit two copies of schedule within 5 days after date established for Commencement of the Work.

PART 2 – PRODUCTS

2.1 BASIS OF DESIGN PRODUCTS

- A. Products listed as “basis of design” shall be used for construction of the INhome. In the event that a substitution be necessary, the new product must be submitted to the architect and/or applicable engineer for approval before product is ordered or installed.

PART 3 – EXECUTION

NOT USED

END OF SECTION 01 30 00

[Return to Specification TOC](#)

SECTION 06 10 00 -- ROUGH CARPENTRY

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Framing with dimension lumber.
 2. Framing with timber.
 3. Framing with engineered wood products.
 4. Wood blocking and nailers.
 5. Plywood backing panels.
 6. Wood Sheathing

1.2 DEFINITIONS

- A. Exposed Framing: Framing not concealed by other construction.
- B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.
- C. Timber: Lumber of 5 inches nominal (114 mm actual) or greater in least dimension.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 – PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Certified Wood: Materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship", where available.
1. Dimension lumber framing.
 2. Timber.
 3. Laminated-veneer lumber.
 4. Parallel-strand lumber.
 5. Prefabricated wood I-joists.
 6. Wood Sheathing
 7. Miscellaneous lumber.
- B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified

by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
3. Provide dressed lumber, S4S, unless otherwise indicated.
4. Maximum Moisture Content of Lumber: 15 percent.

- C. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2[for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground].
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 2. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 4. Wood framing members that are less than 6 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions: Standard, Stud, or No. 3 grade.
1. Species:
 - a. Hem-fir (north); NLGA.
 - b. Spruce-pine-fir; NLGA.
 - c. Hem-fir; WCLIB or WWPA.
 - d. Western woods; WCLIB or WWPA.
- B. Load-Bearing Partitions: No. 2.
1. Species:

- a. Hem-fir (north); NLGA.
- b. Douglas fir-larch; WCLIB or WWPA.
- c. Spruce-pine-fir; NLGA.
- d. Hem-fir; WCLIB or WWPA.
- e. Douglas fir-larch (north); NLGA.

C. Ceiling Joists: Construction or No. 2 grade.

- 1. Species:
 - a. Hem-fir (north); NLGA.
 - b. Douglas fir-larch; WCLIB or WWPA.
 - c. Douglas fir-larch (north); NLGA.
 - d. Spruce-pine-fir; NLGA.
 - e. Hem-fir; WCLIB or WWPA.
 - f. Western woods; WCLIB or WWPA.

2.4 TIMBER FRAMING

A. Provide timber framing complying with the following requirements, according to grading rules of grading agency indicated:

- 1. Species and Grade: Douglas fir-larch, Douglas fir-larch (north), or Douglas fir-south; No. 1 grade; NLGA, WCLIB, or WWPA.
- 2. Maximum Moisture Content: 20 percent.

2.5 ENGINEERED WOOD PRODUCTS

A. Engineered Wood Products, General: Products shall contain no urea formaldehyde.

B. Laminated Veneer Lumber:

- 1. Basis of design: Provide laminated beams equal or equivalent to:
 - a. [iLevel Microllam LVL](#)

C. Parallel-Strand Lumber: Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.

D. Wood I-Joists: Prefabricated units, I-shaped in cross section, made with solid or structural composite lumber flanges and wood-based structural panel webs, let into and bonded to flanges. Provide units complying with material requirements of and with structural capacities established and monitored according to ASTM D 5055.

- 1. Web Material: Either oriented strand board or plywood, complying with DOC PS 1 or DOC PS 2, Exposure
- 2. Structural Properties: Provide units with depths and design values not less than those indicated.
- 3. Basis of design: Provide wood I-joists equal or equivalent to:
 - a. [Trus Joist TJI 210](#).

- E. Rim Boards: Product designed to be used as a load-bearing member and to brace wood I-joists at bearing ends, complying with research/evaluation report for I-joists.

2.6 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Cants.
 - 4. Furring.
- B. For items of dimension lumber size, provide Standard, Stud, or No. 3 grade lumber of any species.
- C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.7 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.
 - 1. Plywood shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.8 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).

- F. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels.
- E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- H. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, with adjacent rows staggered, and use finishing nails unless otherwise indicated by the drawings.

END OF SECTION 06 10 00

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SECTION 06 12 00 – STRUCTURAL INSULATED PANELS

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes: Structural Insulated Panels (SIPs).
- B. Related Sections:
 - 1. Section 06 10 00 Rough Carpentry

1.2 SYSTEM DESCRIPTION

- A. Structural Insulated Panels (SIPs) framing system consist of oriented strand board (OSB), structural lumber and polyurethane foam, connectors and fasteners supplied by manufacturer, all as shown on drawings, specified herein, and or described in manufacturers architectural detail binder.

1.3 REFERENCES

- A. ICC ES AC04 – Acceptance Criteria for Sandwich Panels.
- B. ICC ES AC04 – Acceptance Criteria for Sandwich Panels Adhesives.
- C. EPA - Registered products listing
- D. Greenguard Environmental Institute (GEI) - Standard for Low-Emitting Products.

1.4 SUBMITTALS

- A. Product Data: Submit product data for specified products.
 - 1. Manufacturers product sheet, evidence of code compliance, including current test data and listing report, calculations by an architect or professional engineer.
 - 2. Manufacture to provide complete panel shop drawings, showing all panel sizes, electrical layout, door and window openings and any other structural elements
 - 3. Manufacturer's Instructions: SIP Manufacturer's construction detail book and load design charts.
- B. Calculations: Provide structural calculations by a registered architect or professional engineer [in the state of] qualified to perform such work.
- C. Quality Assurance Submittals: Submit the following:
 - 1. Certificate: Product certificate showing compliance to Third Party Quality Control program
- D. Warranty: Warranty documents specified herein.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Installer should be experienced in performing work of this section and should have specialized in installation of work similar to that required for this project.

- B. Source Limitations: Obtain all SIPs through one source. All accessories to be as furnished or recommended by the SIP manufacturer.

1.6 REGULATORY REQUIREMENTS

- A. SIPs shall be recognized for compliance with [International Building Code, International Residential Code, or specify] in a current third party listing report.

1.7 DELIVERY, STORAGE, & HANDLING

- A. Ordering: Comply with SIP manufacturer's ordering instructions and lead-time requirements to avoid construction delays.
- B. Delivery: Deliver materials from SIP manufacturer with identification labels or markings intact.
- C. Off-load SIPs from truck and handle using forklift or other means to prevent damage to SIPs.
- D. SIPs shall be fully supported in storage and prevented from contact with the ground.
- E. SIPs shall be fully protected from weather. Protect against exposure to rain, water, dirt, mud, and other residue that may affect SIP performance. Cover stored SIPs with breathable protective wraps. SIPs shall be stored in a protected area.

1.8 WARRANTY

- A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
- B. Manufacturer's Warranty: Submit SIP manufacturer's standard warranty document. SIP Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.
 - 1. Warranty Period: [Specify term.] years commencing on Date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURERS:

- A. Thermocore Panel System, 1801 Hancel Parkway, Mooresville, IN 46158

2.2 MATERIALS:

- A. SIPs consisting of the following:
 - 1. 4" (Walls) or 8-1/4" (Roof) foam core panels with 7/16" OSB/OSB (interior/exterior) skins. Each panel has a foam core of class 1/A polyurethane foam at a minimum density of 2.2 lbs.
 - 2. OSB identified with APA or PFS performance mark with Exposure I durability rating and performance in accordance with DOC PS-2 span rating 24/16 or greater.
 - 3. Core is a Class 1/A fire rated polyurethane foam with a minimum density of 2.2 lbs.
 - 4. All panels are manufactured to a thickness tolerance of +/- 3/32"
 - 5. All lumber used in panel manufacturing shall be #2 or better SPF.

2.3 ACCESSORIES

- A. Fasteners: corrosion resistant SIP screws compatible with SIP system shall be provided by the SIPs manufacturer.
 - 1. Wood Screws for attachment to wood members
 - 2. Heavy Duty Metal Screws for attachment to metal members (16 gauge to 3/16")
 - 3. Light Duty Metal Screws for attachment to metal decks (18 gauge or thinner)
- B. SIP Gasket. Foam Gasket shall be provided by the SIP manufacturer.
- C. Dimensional Lumber: SPF, #2 or better.

2.4 FABRICATION

- A. Sizes: SIPs shall be fabricated in accordance with approved Shop Drawings.
- B. Thermal Resistance, R-value
 - 1. 4 " thick SIP with R-value of 24
 - 2. 8 1/4" thick SIP with R-value of 50
- C. Electrical raceways and boxes: Refer to section 25 05 33 Raceways and Boxes for Electrical Systems.

2.5 RELATED MATERIALS

- A. Related Materials: Refer to other sections for related materials as follows:
 - 1. Dimensional Lumber: SPF #2 or better. Refer to Division 6 Carpentry Sections.

2.6 SOURCE QUALITY

- A. Source Quality Assurance: Each SIP component required shall be supplied by SIP manufacturer and shall be obtained from selected SIP manufacturer or its approved supplier.
 - 1. Each SIP shall be labeled indicating Third Party certification.
 - 2. Provide evidence of Third Party inspection and labeling of all insulation used in manufacture of SIPs
 - 3. Dimensional Tolerance - shall comply with values listed in the manufacturer's Quality Control Manual.
- B. Source Quality: Obtain SIPs from a single manufacturer.

PART 3 – EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's listing report, Load Design Charts, Detail Book, Shop Drawings, and product data. for installation.

- B. Plans shall be reviewed by a qualified architect/engineer and shall be signed and/or sealed. Deviations from standard detail and load design values shall be calculated and signed and/or sealed by a qualified architect/engineer.

3.2 EXAMINATION

- A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions.
 - 1. Verify conditions of foundation/structural system/substrate and other conditions that affect installation of SIPs. Any adverse conditions shall be reported in writing. Do not proceed with installation until adverse conditions are corrected.

3.3 INSTALLATION

- A. SIP Installation:
 - 1. SIP Supports: Provide level and square foundation/structural system/substrate that support wall and/or roof SIPs. For wall SIPs, hold sill plate back from edge of rim board 7/16" (11 mm) to allow full bearing of OSB skins. Provide 1 1/2" (38 mm) diameter access holes in plating to align with electrical conduit SIPs. Provide adequate bracing of SIPs during erection. Remove debris from plate area prior to SIP placement.
 - 2. SIP Fastening: Connect SIPs by nails or staples as shown on drawings. Screws of equal strength may be substituted for nails and staples as specified by engineer. SIP sealant gasket must be used together with each fastening techniques. Where SIP Screw Fasteners are used, provide a minimum of 1" (25.4 mm) penetration into support. Join SIPs using tongue and groove. Secure attachment with nails, staples, or screws. Apply foam sealant gasket as per SIP manufacturer recommendations.
 - 3. Thermal Barriers: Interior surfaces of SIPs shall be finished with a minimum 15-minute thermal barrier, such as 1/4" (4 mm) gypsum wallboard, nominal 1" (25 mm) wood paneling, or other approved materials. Apply code approved thermal barriers according to SIP manufacturer's recommendations.
 - 4. Restrictions: Do not install SIPs directly on concrete. Do not cut or alter SIPs without consulting SIP manufacturer. SIPs shall be protected from exposure UV light and moisture.
 - 5. Remove and replace insulated wall or roof SIPs that have become excessively wet or damaged before proceeding with installation of additional SIPs or other work.

3.4 PROTECTION

- A. Protection: Protect installed product and finish surfaces from damage during construction.
 - 1. Roof SIPs: Protect roof SIPs from weather at all times. Provide temporary protection at the end of the day or when rain or snow is imminent.
 - 2. After installation, cover SIPs to prevent contact with water on each exposed SIP edges and faces. Failure to do so can result in edge swelling.

END OF SECTION 06 12 00

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SECTION 06 15 00 – WOOD DECKING

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes:
 - 1. Wood decking
 - 2. Attachments

1.2 RELATED SECTIONS

- A. Section 06 10 00 ROUGH CARPENTRY

1.3 REFERENCES

- A. ASTM International (ASTM):
 - 1. A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Lumber: Seasoned, Pressure treated No. 2 grade prime above ground MCA preservative treated yellow pine decking. Kiln dry to 15 percent maximum moisture content for 38 mm deck to 19 percent maximum content.
- B. Decking sizes: 2 in. x 6 in.
- C. Stain: to match interior wood flooring.

2.2 ACCESSORIES

- A. Fasteners
 - 1. Type: Flathead countersunk decking screws for use with pressure treated wood.
 - 2. Material: Hot-dip galvanized steel, ASTM A153/A153M
 - 3. Length: To provide minimum $\frac{3}{4}$ inch penetration into framing.
- B. Splines: galvanized metal, as recommended by decking manufacturer

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Join butt ends with splines to ensure a tight square fit.

- B. Single and double spans: End joints shall be over support.
- C. Cut, drill, and rout wood using carbide tipped blades and bits.
- D. Cut ends square and true. Sand cut ends and edges where exposed.
- E. Join butt ends with splines to ensure a tight square fit.
- F. Do not exceed maximum spans recommended by manufacturer.
- G. Place decking to pattern indicated on Drawings.
- H. Leave 1/8-inch spaces between adjacent decking boards and between decking and adjacent construction.
- I. Place each decking board to span three or more supports.
- J. Fasten each decking board to each support with two fasteners.
- K. Drive screws through pilot hole and countersink. Pre-drill screw holes located closer than 1/2 inch from edges.

3.2 DELIVERY STORAGE AND HANDLING

- A. Keep materials under cover and dry. Protect from weather and contact with damp surfaces. Provide for air circulation within and around stacks and under temporary coverings.

END OF SECTION 06 15 00

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SECTION 06 17 53 -- SHOP FABRICATED WOOD TRUSSES

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Prefabricated wood trusses where shown on the Drawings

1.2 SUBMITTALS

A. Shop drawings that have been signed and stamped by a qualified professional engineer indicating:

1. Species, species group, sizes, and stress grades of lumber to be used
2. Pitch, span, camber, configuration, and spacing for each type of truss required
3. Type, size, material, finish, design values, and location of metal connector plates
4. Bearing details.
5. To the extent engineering design considerations are indicated as fabricator's responsibility, include design analysis indicating loading, assumed allowable stress, stress diagrams and calculations, and other information needed for review that have been Signed and sealed by a qualified professional engineer responsible for their preparation.

PART 2 – PRODUCTS

2.1 LUMBER

- ##### A. Lumber Standards: Refer to Section 06 10 00 ROUGH CARPENTRY.

2.2 METAL CONNECTOR PLATES

- ##### A. Hot-Dip Galvanized Steel Sheet: Structural (physical) quality steel sheet complying with ASTM A 653, Grade A; Designation G60; minimum coated metal thickness indicated but not less than 0.036 inch.

2.3 FASTENERS

- ##### A. General: Provide fasteners of size and type indicated that comply with requirements specified in Section 06 10 00 – “Rough Carpentry”, unless otherwise recommended by manufacturer or otherwise indicated in drawings.

PART 3 – EXECUTION

3.1 INSTALLATION

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- A. General: Erect and brace trusses to comply with applicable requirements of referenced TPI standards.
- B. Where trusses do not fit, return them to fabricator and replace with trusses of correct size; do not alter trusses in the field.
- C. Erect trusses with plane of truss webs vertical (plumb) and parallel to each other, located accurately at design spacing indicated.
- D. Hoist trusses in place by means of lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- E. Anchor trusses securely at all bearing points to comply with methods and details indicated.

END OF SECTION 06 17 53

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SECTION 06 22 00 – MILLWORK

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes baseboard and casing molding.

1.2 REFERENCES

1.3 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

Tolerances. Finished surfaces shall not vary more than 1/8 inch in 10 feet (3 mm in 3.05 m) when tested with a straight edge and shall be free from cracks, pits, chips, voids, depressions, bumps, ridges waves, scratches, discoloration or other defacements.

PART 2 – PRODUCTS

2.1 BASEBOARDS

- A. Material: MDF or Finger Jointed SPF Primed
- B. Dimensions: 9/16" x 4-1/4" - 16'
- C. Finish: Paint, Refer to Room Finish Schedule in Drawings
- D. Basis of Design: Provide baseboard equal or equivalent to:
 - a. [Moulding & Millwork Colonial Baseboard Profile. Model no. 620](#)

2.2 CASINGS

- A. Material: MDF or Finger Jointed SPF Primed
- B. Dimensions: 11/16" x 2-1/4" – 14'
- C. Finish: Paint, Refer to Room Finish Schedule in Drawings
- D. Basis of Design: Provide casing equal or equivalent to:

a. [Moulding & Millwork Colonial/CSG Casing Profile. Model no. 356](#)

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install all moldings in accordance with manufacturer's printed instructions.
- B. Mark the distance on the wall to be covered by the first piece of molding. Oversize and cut the molding, adding 1/8 inch (3.2 mm) for every 60 inches (1524 mm) of molding required.
- C. Run a bead of urethane adhesive along the top and bottom edge of the molding where it will meet the backing.
- D. Use galvanized screws and fasten one end of the molding at the starting point. Pull the center of the molding away from the wall, which will draw the free end of the molding back to the ending mark. Secure the free end with galvanized screws.
- E. Push the center of the molding flat to the surface. Secure with galvanized screws spaced 16 inches.

3.4 PROTECTION

- A. Clean surfaces of moldings; comply with manufacturer's instructions. Repair or replace areas damaged during installation.
- B. Protect moldings from damage or deterioration until acceptance of the work. Touch-up, repair or replace damaged products before Substantial Completion.
- C. Clean and properly dispose of misplaced adhesives, shavings, and trimmings from the area.

END OF SECTION 06 22 00

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SECTION 06 61 16 – SOLID SURFACING FABRICATIONS

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Solid surfacing fabrications.

1.2 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Countertops for Kitchen.
 - 2. Countertops for Bathroom.

PART 2 – PRODUCTS

2.1 KITCHEN COUNTERTOPS

- A. Solid surface countertop
 - 1. Edge Detail: Ogee.
 - 2. Color: As indicated in Color and Material Legend on Drawings
 - 3. Finish: Polished only.
 - 4. Thickness: 1/2 inch
 - 5. Basis of design: Provide solid surfacing countertops equal or equivalent to:
 - a. [LG Hausys Hi-MAC Eden Plus, Pecan color. Product no. G515R.](#)

2.2 BATH COUNTERTOPS

- A. Solid surface countertop
 - 1. Edge Detail: Ogee.
 - 2. Color: As indicated in Color and Material Legend on Drawings
 - 3. Finish: Polished only.
 - 4. Thickness: 1/2 inch
 - 5. Basis of design: Provide solid surfacing countertops equal or equivalent to:
 - a. [LG Hausys Hi-MAC Eden Plus, Birch Bark color. Product no. G514R.](#)

2.3 MATERIALS

- A. Composition: Non-porous blend of polyester resin and natural quartz filler formed into flat slabs.
- B. Material Characteristics:
 - 1. Flexural Strength (ASTM C880): 78.77 Mpa.
 - 2. Coefficient of Linear Thermal Expansion (COLE) (ASTM E228-95): 2.12 x 10⁻⁵ in/in/ degree F (1.1 x 10⁻⁵ in/in/ degree C).
 - 3. Radiant Heat Resistance (NEMA LD3-3.10): 600+ seconds
 - 4. Flexural Modulus (ASTM D 790-99): 9239 Mpa

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5. Barcol Hardness (ASTM D 2583): 65
6. Impact Resistance (ISSFA SST 6.1-00): Pass at 1525 mm (50in.), Thickness 0.46450 in.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation, both finished and unfinished face.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the Project conditions.

3.3 INSTALLATION

- A. Install components plumb and level, in accordance with approved shop drawings and product installation details. Use manufacturer's recommended matching adhesives.
- B. Tops:
 1. Flat and true to within 1/8 inch (3 mm) of a flat surface over a 10 feet (3 m) length.
 2. Allow a minimum of 1/16 inch (1.6 mm) to a maximum of 1/8 inch (3 mm) clearance between surface and each wall.
 3. Form field joints using manufacturer's recommended adhesive, with joint widths no greater than 1/8 inch (3 mm) in finished work.
- C. Sinks:
 1. Adhere under mount sinks/bowls to countertops using proper adhesive and mounting hardware.
 2. Adhere drop-in sinks/bowls to countertops using proper adhesives and color-matched silicone sealant.
 3. Provide backsplashes and endsplashes as indicated on the drawings.
 4. Adhere to countertops using manufacturer's standard color-matched silicone sealant.
 5. Keep components and hands clean during installation.
 6. Remove excess adhesives and other stains.
 7. Components shall be clean on date of substantial completion.

3.4 CLEANING AND PROTECTION

- A. Keep components clean during installation.

- B. Remove adhesives, sealants and other stains.
- C. Do not seal surface of finished product.
- D. Protect surfaces from damage until date of substantial completion.
- E. Replace damaged work.

END OF SECTION 06 61 16

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SECTION 07 21 29 – SPRAYED INSULATION

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes spray applied rigid foam insulation.

1.2 SUBMITTALS

- A. Product data.

1.3 QUALITY ASSURANCE

- A. Single Source Responsibility: Single source product from one manufacturer.
- B. Installer Qualification: Installer must be trained and certified in sprayed polyurethane foam.

PART 2 – PRODUCTS

2.1 SPRAY FOAM INSULATION

- A. Product description: two component spray applied rigid polyurethane foam
 - 1. R-value: 7.2 per 1", initial.
 - 2. Install in thickness and location per drawings to obtain desired R-value
- B. Basis of design: provide spray foam insulation equal or equivalent to:
 - 1. [HeatLok Soy Rigid, Spray-applied Polyurethane Foam Insulation, Class I ASTM](#)

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, under which work is to be performed. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates and cavities of loose capable of interfering with insulation placement.

3.3 APPLICATION

- A. Site mix all components
- B. Apply insulation to substrates in compliance with manufacturer's written recommendations and instructions.
- C. Apply insulation to produce thickness required for indicated R-value.

END OF SECTION 07 21 29

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SECTION 07 25 00 – WEATHER BARRIERS

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes:
1. Weather barrier membrane (TYPAR® HouseWrap or equivalent)
 2. Seam Tape (TYPAR® Construction Tape or equivalent)
 3. Flashing

1.2 REFERENCES

- A. ASTM International
1. ASTM C920; Standard Specification for Elastomeric Joint Sealants
 2. ASTM C1193; Standard Guide for Use of Joint Sealants
 3. ASTM D882; Test Method for Tensile Properties of Thin Plastic Sheeting
 4. ASTM D1117; Standard Guide for Evaluating Non-woven Fabrics
 5. ASTM E84; Test Method for Surface Burning Characteristics of Building Materials
 6. ASTM E96; Test Method for Water Vapor Transmission of Materials
 7. ASTM E1677; Specification for Air Retarder Material or System for Framed Building Walls
 8. ASTM E2178; Test Method for Air Permeance of Building Materials
- B. AATCC – American Association of Textile Chemists and Colorists
1. Test Method 127 Water Resistance: Hydrostatic Pressure Test
- C. TAPPI
1. Test Method T-410; Grams of Paper and Paperboard (Weight per Unit Area)
 2. Test Method T-460; Air Resistance (Gurley Hill Method)

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer current technical literature for each component.
- B. Samples: Weather Barrier membrane, minimum 8-1/2 inches by 11 inch.
- C. Quality Assurance Submittals
1. Manufacturer Instructions: Provide manufacturer's written installation instructions.

1.4 QUALITY ASSURANCE

- A. Qualifications
1. Installer shall have experience with installation of similar weather barrier assemblies under similar conditions.
 2. Installation shall be in accordance with manufacturer's installation guidelines and recommendations.

3. Source Limitations: Provide weather barrier and accessory materials produced by single manufacturer.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Refer to Section 01 60 00 Product Requirements
- B. Deliver weather barrier materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Store weather barrier materials as recommended by system manufacturer.

1.6 SCHEDULING

- A. Review requirements for sequencing of installation of weather barrier assembly with installation of windows, doors, louvers and flashings to provide a weather-tight barrier assembly.

PART 2 – PRODUCTS

2.1 MANUFACTURER

- A. Fiberweb, 70 Old Hickory Blvd, Old Hickory, TN 37138; 800-284-2780; www.TYPAR.com

2.2 MATERIALS

- A. [Tylar HouseWrap or equivalent](#): Spunbonded Polypropylene Weather Membrane with a microporous coating, Non-woven, Nonperforated.

- B. Self-adhering/straight flashing

2.3 Performance Characteristics:

- A. Gurley Hill [TAPPI T-460] [sec/100cc] >2500.
- B. Water Vapor Transmission 9-15 perms as tested by ASTM E-96-90, Method A.
- C. Water penetration resistance of 865 cm on hydrostatic head in accordance with AATCC-127.
- D. Trapezoidal Test of 30/33 in accordance with ASTM D-5733-9.
- E. Air-Ins < .02L/S·M2 @ 75 PA.
- F. Dry Indicator Method ASTM D-779 = to 24 hour rating.

2.4 ACCESSORIES

- A. Seam Tape: [2] [or] [3] inch wide, TYPAR® Construction Tape.
- B. Fasteners:
 - 1. #4 nails with large 1-inch plastic cap fasteners, or 1-inch plastic cap staples with leg length sufficient to achieve a minimum penetration of 5/8-inch into the wood stud.
- C. Sealants
 - 1. Provide sealants that comply with ASTM C 920, elastomeric polymer sealant to maintain watertight conditions.
- D. Adhesive:
 - 1. Provide adhesive recommended by weather barrier manufacturer.
 - 2. Products:
 - a. Liquid Nails® LN-109
 - b. Denso Butyl Liquid
 - c. 3M High Strength 90
 - d. SIA 655
 - e. Adhesives recommend by the weather barrier manufacturer.
- E. Primer:
 - 1. Provide flashing manufacturer recommended primer to assist in adhesion between substrate and flashing.
 - 2. Products:
 - a. 3M High Strength 90
 - b. Denso Butyl Spray
 - c. SIA 655
 - d. Permagrip 105
 - e. ITW TACC Sta' Put SPH
 - f. Primers recommended by the flashing manufacturer

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.

3.2 INSTALLATION – WEATHER BARRIER

- A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations.
- B. Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap.

- C. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface. Maintain weather barrier plumb and level.
- D. Extend bottom roll edge over sill plate interface 2" to 3" minimum. Seal weather barrier with sealant or tape. Shingle weather barrier over back edge of thru-wall flashings and seal weather barrier with sealant or tape. Ensure weeps are not blocked.
- E. Subsequent layers shall overlap lower layers a minimum of 6 inches horizontally in a shingling manner.
- F. Window and Door Openings: Extend weather barrier completely over openings.
- G. Weather Barrier Attachment:
 1. Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommended fasteners, spaced 12 -18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.
 2. Apply 4 inch by 7 inch piece of DuPont™ StraightFlash™ or weather barrier manufacturer approved alternate to weather barrier membrane prior to the installation cladding anchors.

3.3 SEAMING

- A. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.
- B. Seal any tears or cuts as recommended by weather barrier manufacturer.

3.4 OPENING PREPARATION (for use with flanged windows)

- A. Cut weather barrier in an "T-cut" pattern. A modified T-cut is also acceptable.
- B. Cut weather barrier horizontally along the bottom and top of the window opening.
- C. From the top center of the window opening, cut weather barrier vertically down to the sill.
- D. Fold side and bottom weather barrier flaps into window opening and fasten.
- E. Cut a head flap at 45-degree angle in the weather barrier membrane at window head to expose 8 inches of sheathing. Temporarily secure weather barrier membrane flap away from sheathing with tape.

3.5 FLASHING

- A. Cut [7-inch] [9-inch] wide a minimum of 12 inches longer than width of sill rough opening. Apply primer as recommended by the manufacturer.

- B. Cover horizontal sill by aligning edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.
- C. Fan at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges. Mechanical fastening is not required.
- D. On exterior, apply continuous bead of sealant to wall or backside of window mounting flange across jambs and head. Do not apply sealant across sill.
- E. Install window according to manufacturer's instructions.
- F. Apply 4-inch wide strips at jambs overlapping entire mounting flange. Extend jamb flashing 1-inch above top of rough opening and below bottom edge of sill flashing.
- G. Apply 4-inch wide strip as head flashing overlapping the mounting flange. Head flashing should extend beyond outside edges of both jamb flashings.'
- H. Position weather barrier head flap across head flashing. Adhere over the 45-degree seams.
- I. Tape head flap in accordance with manufacturer recommendations.
- J. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C1193.

3.6 THRU-WALL FLASHING INSTALLATION

- A. Apply primer per manufacturer's written instructions.
- B. Install preformed corners and end dams bedded in sealant in appropriate locations along wall.
- C. Starting at a corner, remove release sheet and apply membrane to primed surfaces in lengths of 8 to 10 feet.
- D. Extend membrane through wall and leave ¼ inch minimum exposed to form drip edge.
- E. Roll flashing into place. Ensure continuous and direct contact with substrate.
- F. Lap ends and overlap preformed corners 4 inches minimum. Seal all laps with sealant.
- G. Trim exterior edge of membrane 1-inch and secure metal drip edge per manufacturer's written instructions.
- H. Terminate membrane on vertical wall. [Terminate into reglet, counterflashing or with termination bar.]

I. Apply sealant bead at each termination.

3.7 PROTECTION

A. Protect installed weather barrier from damage.

END OF SECTION 07 25 00

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SECTION 07 31 00 – SHINGLES

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes:
1. Asphalt roofing shingles
 2. Leak barrier and roof deck protection
 3. Metal flashing associated with shingle roofing
 4. Attic ventilation

1.2 SUBMITTALS

- A. Product Data for each type of roofing product.
- B. Roofing details and shop drawings.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide all primary roofing products, including shingles, underlayment, leak barrier, and ventilation, by a single manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store all products in manufacturer's unopened, labeled packaging until they are ready for installation
- B. Store products in a covered, ventilated area, at temperature not more than 110 degrees F; do not store near steam pipes, radiators, or in direct sunlight.

1.5 WEATHER CONDITIONS

- A. Proceed with work only when existing and forecasted weather conditions will permit work to be performed in accordance with manufacturer's recommendations.

PART 2 – PRODUCTS

2.1 SHINGLES

- A. Basis of design: Owens [Corning Premium Cool Energy Star Shingles](#).
1. Heavyweight, granule surfaced, self sealing asphalt shingle with a strong fiberglass reinforced core and a mineral granule surfacing. Architectural laminate styling provides a wood shake appearance with a 5" or 5 5/8" exposure. Features highly reflective roofing granules that bounce back the sun's rays and more effectively release absorbed heat. Rated by the Cool Roof Rating Council (CRRC) and meets initial Energy Star® performance levels. UL 790 Class A rated with UL 997 Wind Resistance Label; ASTM D 7158, Class H; ASTM D 3161, Type 1; ASTM D 3018, Type 1; ASTM D 3462;

CSA 123.5-98; Dade County Approved, Florida Building Code Approved, Texas Dept of Insurance Approved, ICC Report Approval. Timberline® Prestique® Cool Series Energy-Saving Architectural Shingles, by GAF-Elk.

2. Color: Harbor Fog

2.2 ROOFING CEMENT

- A. Asphalt Plastic Roofing Cement meeting the requirements of ASTM D 4586, Type I or II.

2.3 NAILS

- A. Standard round wire, zinc-coated steel or aluminum; 10 to 12 gauge, smooth, barbed or deformed shank, with heads 3/8 inch (9mm) to 7/16 inch (11mm) in diameter. Length must be sufficient to penetrate into solid wood at least 3/4 inch (19mm) or through plywood or oriented strand board by at least 1/8 inch (3.18mm).

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until the roof deck has been properly prepared.
- B. If roof deck preparation is the responsibility of another installer, notify the architect or building owner of unsatisfactory preparation before proceeding.

3.2 INSTALLATION

- A. Install roofing system according to all manufacturer's recommendations and instructions.
- B. Abide by all local building codes.

3.3 DELIVERY, STORAGE, AND HANDLING

- A. Store all products in manufacturer's unopened, labeled packaging until they are ready for installation
- B. Store products in a covered, ventilated area, at temperature not more than 110 degrees F; do not store near steam pipes, radiators, or in direct sunlight.

END OF SECTION 07 31 00

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SECTION 07 46 46 – FIBER-CEMENT SIDING

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Factory-finished fiber cement lap siding, panels, single, trim, fascia, moulding and accessories, James Hardie HZ5 Engineered for Climate Siding.

1.2 RELATED SECTIONS

- A. Section 06 10 00 - Rough Carpentry: Sheathing.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Provide detailed drawings of atypical non-standard applications of cementitious siding materials which are outside the scope of the standard details and specifications provided by the manufacturer.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 4 by 6 inches (100 by 150 mm), representing actual product, color, and patterns.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store siding on edge or lay flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.5 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits

recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.6 WARRANTY

- A. Product Warranty: Limited, non-pro-rated product warranty.
 - 1. HardiePlank HZ5 lap siding for 30 years.
- B. Product Warranty: Limited, product warranty.
- C. Finish Warranty: Limited product warranty against manufacturing finish defects.
 - 1. When used for its intended purpose, properly installed and maintained according to James Hardie's published installation instructions, James Hardie's ColorPlus finish with ColorPlus Technology, for a period of 15 years from the date of purchase: will not peel; will not crack; and will not chip. Finish warranty includes the coverage for labor and material.
- D. Workmanship Warranty: Application limited warranty for 2 years.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: James Hardie Building Products, Inc., which is located at: 26300 La Alameda Suite 400 ; Mission Viejo, CA 92691; Toll Free Tel: 866-274-3464; Tel: 949-367-4980; Email: [request info \(info@jameshardie.com\)](mailto:requestinfo@jameshardie.com); Web: www.jameshardiecommercial.com
- B. Substitutions: permitted.
- C. Requests for approval of equal substitutions will be considered in accordance with provisions of Section 01600.

2.2 SIDING

- A. [HardiePlank HZ5 lap siding, HardiPanel HZ5 vertical siding, HardieSoffit HZ5 panels and HardieShingle HZ5 siding requirement for Materials:](#)
 - 1. Fiber-cement Siding - complies with ASTM C 1186 Type A Grade II.
 - 2. Fiber-cement Siding - complies with ASTM E 136 as a noncombustible material.
 - 3. Fiber-cement Siding - complies with ASTM E 84 Flame Spread Index = 0, Smoke Developed Index = 5.
 - 4. CAL-FIRE, Fire Engineering Division Building Materials Listing - Wildland Urban Interface (WUI) Listed Product.
 - 5. National Evaluation Report No. NER 405 (BOCA, ICBO, SBCCI, IBC, IRC).
 - 6. City of Los Angeles, Research Report No. 24862.
 - 7. Miami Dade County, Florida Notice of Acceptance 07-0418.04.
 - 8. US Department of Housing and Urban Development Materials Release 1263d.
 - 9. California DSA PA-019.
 - 10. City of New York M EA 223-93-M.

11. Florida State Product Approval FL889.
12. Texas Department of Insurance Product Evaluation EC-23.

B. Lap Siding: HardiePlank HZ5 Lap siding with a sloped top, beveled drip edge and nailing line as manufactured by James Hardie Building Products, Inc.

1. Type: Smooth 8-1/4 inches (210 mm) with 7 inches (178 mm) exposure.

C. Trim:

1. HardieTrim HZ5 boards and HardieTrim HZ boards as manufactured by James Hardie Building Products, Inc.
2. HardieTrim HZ5 Fascia boards as manufactured by James Hardie Building Products, Inc.

2.3 FASTENERS

A. Wood Framing Fasteners:

1. Wood Framing: 6d common corrosion resistant nails.
2. Wood Framing: 8d box ring common corrosion resistant nails.

2.4 FINISHES

A. Factory Primer: Provide factory applied universal primer.

1. Primer: Factory primed by James Hardie.
2. Topcoat: Refer to Section 09900 and Exterior Finish Schedule.
3. Factory Finish: Refer to Exterior Finish Schedule.
4. Product: ColorPlus Technology by James Hardie.
5. Definition: Factory applied finish; defined as a finish applied in the same facility and company that manufactures the siding substrate.
6. Process:
 - a. Factory applied finish by fiber cement manufacturer in a controlled environment within the fiber cement manufacturer's own facility utilizing a multi-coat, heat cured finish within one manufacturing process.
 - b. Each finish color must have documented color match to delta E of 0.5 or better between product lines, manufacturing lots or production runs as measured by photospectrometer and verified by third party.
7. Protection: Factory applied finish protection such as plastic laminate that is removed once siding is installed
8. Accessories: Complete finishing system includes pre-packaged touch-up kit provided by fiber cement manufacturer. Provide quantities as recommended by manufacturer.

B. Factory Finish Color for Trim, Soffit and Siding Colors:

1. Boothbay Blue JH70-20.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

- B. If framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Nominal 2 inch by 4 inch (51 mm by 102 mm) wood framing selected for minimal shrinkage and complying with local building codes, including the use of water-resistive barriers or vapor barriers where required. Minimum 1-1/2 inches (38 mm) face and straight, true, of uniform dimensions and properly aligned.
 - 1. Install water-resistive barriers and claddings to dry surfaces.
 - 2. Repair any punctures or tears in the water-resistive barrier prior to the installation of the siding.
 - 3. Protect siding from other trades.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Install a water-resistive barrier is required in accordance with local building code requirements.
- D. The water-resistive barrier must be appropriately installed with penetration and junction flashing in accordance with local building code requirements.
- E. Install Engineered for Climate™ HardieWrap™ weather barrier in accordance with local building code requirements.
- F. Use HardieWrap™ Seam Tape and joint and laps.
- G. Install HardieWrap™ flashing, and HardieWrap™ Flex Flashing

3.3 INSTALLATION - HARDIEPLANK HZ5 LAP SIDING AND ARTISAN HZ5 LAP SIDING

- A. Install materials in strict accordance with manufacturer's installation instructions.
- B. Starting: Install a minimum 1/4 inch (6 mm) thick lath starter strip at the bottom course of the wall. Apply planks horizontally with minimum 1-1/4 inches (32 mm) wide laps at the top. The bottom edge of the first plank overlaps the starter strip.
- C. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.
- D. Align vertical joints of the planks over framing members.
- E. Maintain clearance between siding and adjacent finished grade.

- F. Locate splices at least one stud cavity away from window and door openings.
- G. Wind Resistance: Where a specified level of wind resistance is required Hardieplank lap siding is installed to framing members and secured with fasteners described in Table No. 2 in National Evaluation Service Report No. NER-405.
- H. Locate splices at least 12 inches (305 mm) away from window and door openings.
- I. Factory Finish Touch Up: Apply touch up paint to cut edges in accordance with manufacturer's printed instructions.
 1. Touch-up nicks, scrapes, and nail heads in pre-finished siding using the manufacturer's touch-up kit pen.
 2. Touch-up of nails shall be performed after application, but before plastic protection wrap is removed to prevent spotting of touch-up finish.
 3. Use touch-up paint sparingly. If large areas require touch-up, replace the damaged area with new pre-finished siding. Match touch up color to siding color through use of manufacturer's branded touch-up kits.

3.4 INSTALLATION - HARDIETRIM HZ5 BOARDS

- A. Install materials in strict accordance with manufacturer's installation instructions. Install flashing around all wall openings.
- B. Fasten through trim into structural framing or code complying sheathing. Fasteners must penetrate minimum 3/4 inch (19 mm) or full thickness of sheathing. Additional fasteners may be required to ensure adequate security.
- C. Place fasteners no closer than 3/4 inch (19 mm) and no further than 2 inches (51 mm) from side edge of trim board and no closer than 1 inch (25 mm) from end. Fasten maximum 16 inches (406 mm) on center.
- D. Maintain clearance between trim and adjacent finished grade.
- E. Trim inside corner with a single board trim both side of corner.
- F. Outside Corner Board Attach Trim on both sides of corner with 16 gage corrosion resistant finish nail 1/2 inch (13 mm) from edge spaced 16 inches (406 mm) apart, weather cut each end spaced minimum 12 inches (305 mm) apart.
- G. Allow 1/8 inch gap between trim and siding.
- H. Seal gap with high quality, paint-able caulk.
- I. Shim frieze board as required to align with corner trim.

- J. Fasten through overlapping boards. Do not nail between lap joints.
- K. Overlay siding with single board of outside corner board then align second corner board to outside edge of first corner board. Do not fasten HardieTrim boards to HardieTrim boards.
- L. Shim frieze board as required to align with corner trim.
- M. Install HardieTrim Fascia boards to rafter tails or to sub fascia.

3.5 FINISHING

- A. Finish unprimed siding with a minimum one coat high quality, alkali resistant primer and one coat of either, 100 percent acrylic or latex or oil based, exterior grade topcoats or two coats high quality alkali resistant 100 percent acrylic or latex, exterior grade topcoat within 90 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.
- B. Finish factory primed siding with a minimum of one coat of high quality 100 percent acrylic or latex or oil based exterior grade paint within 180 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.

3.6 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 07 46 46

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SECTION 07 50 00—MEMBRANE ROOFING

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes:
1. Roof underlayment
 2. Ice barrier/severe climate underlayment

1.2 REFERENCES

- A. Compliance with the following codes:
1. 2006 International Building Code® (IBC)
 2. 2006 International Residential Code® (IRC)
 3. 1997 Uniform Building Code TM (UBC)
 4. BOCA® National Building Code/1999 (BNBC)
 5. 1999 Standard Building Code© (SBC)

1.3 USES

- A. WinterGuardIM Series underlayments are self-adhering membranes used as a roofing underlayment and a barrier to leaks caused by ice dams, for use beneath asphalt shingles, wood shingles and shakes, slate and slate-type shingles, clay and concrete tiles (mechanically fastened), metal shingles and metal panels.

PART 2 – PRODUCTS

2.1 MANUFACTURER:

- A. CERTAINTEED CORPORATION
1. 1400 UNION MEETING ROAD
 2. BLUE BELL, PENNSYLVANIA 19422 (610) 341-7000
 3. www.certainteed.com

2.2 DESCRIPTION

- A. General: WinterGuardIM Series underlayments are self-adhering membranes manufactured in a fiberglass substrate coated with a modified bitumen compound, and are supplied in three varieties, each having a different top exposed surface. The underside of each membrane is provided with a siliconized release film which is removed prior to application of the membrane to the roof deck.
- B. Product Series:
1. [WinterGuardim HT](#): This underlayment is surfaced with a plastic film and is supplied in rolls 36 inches (914 mm) wide, 32.5 feet (10 m) or 65 feet (20 m) long, and nominally 45 mils (1.13 mm) thick.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. General: Installation of the WinterGuard™ Series underlayments shall comply with the applicable code, this report and the manufacturer's published installation instructions. The installation instructions shall be available at the jobsite at all times during installation. The instructions within this report govern if there are any conflicts between the manufacturer's instructions and this report.
- B. Application: Roof decks shall be dry, and free of dust, dirt, loose nails, or other protrusions to assure a clean surface for good adhesion. Installation is limited to solid sheathed decks of plywood or oriented strand board (OSB) substrates. Use of a primer is not required. The membrane is applied by peeling back the siliconized backer 1 to 2 feet (300 to 600 mm) to align the membrane on the lower edge of the roof, and then applying the remainder of the membrane directly to the roof deck by removing the backer and pressing the membrane into place. The WinterGuard HT membranes shall be lapped a minimum of 4 inches (100 mm) on sides and 6 inches (150 mm) on ends. If the membrane becomes misaligned, the roll should be cut and restarted, overlapping the ends a minimum of 6 inches (150 mm). Installation of the roof covering can proceed immediately following application of the membrane. The membrane should be covered by an approved roof covering as soon as possible. For reroofing application, the same procedures apply after removal of the existing roof covering and roofing felts to expose the roof deck.
- C. Ice Barrier:
 - 1. One layer of WinterGuardIM underlayment (anyone in the series) may be used when an ice barrier membrane (IBC and IRC), ice shield (SBC, BNBC), or severe climate underlayment (UBC) is required. The number of courses used shall be sufficient to cover from the eave's edge to a minimum distance of 24 inches (610 mm) inside the exterior wall line of the building.

END OF SECTION 07 50 00

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SECTION 07 71 23 – MANUFACTURED GUTTERS AND DOWNSPOUTS

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes:
 - 1. Aluminum gutters and accessories.

1.2 RELATED SECTIONS

- A. Section 07 31 00 – SHINGLES.

1.3 DESIGN REQUIREMENTS

- A. Conform to applicable code for size and method of rain water discharge.

1.4 SUBMITTALS

- A. Product Data: Manufacturer's catalog data, detail sheets, and specifications.
- B. Shop Drawings: Prepared specifically for this project; showing dimensions of metal gutters and accessories, fastening details and connections and interface with other products.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store to avoid twisting, bending, abrasion and other permanent damage.
- C. Avoid contact with materials causing discoloration, staining or other damage

PART 2 – PRODUCTS

2.1 GUTTERS AND ACCESSORIES

- A. Gutters: Aluminum seamless gutters
 - 1. Size: 6 inch (127 mm), thickness .026 inch (0.65 mm), Code 47228.
- B. Gutter Bracket Bender: For use with forming gutter brackets to maintain horizontal position on pitched fascia, Code 60001 Gutter Bracket Bender.
- C. End Caps: Aluminum; For gutter profile:
 - 1. Size: 6 inch (127 mm), thickness .024 inch (0.65 mm), Code 43003.
- D. Inside Gutter Corners: Aluminum, cold rolled style for gutter profile:

1. Size: 6 inch (127 mm), thickness .024 inch (0.6 mm), Code 44203.

E. Outside Gutter Corners: Aluminum, cold rolled style for gutter profile:

1. Size: 6 inch (127 mm), thickness .024 inch (0.6 mm), Code 44303.

2.2 GUTTER OUTLETS

A. Gutter Outlets: Aluminum, cold rolled style for gutter profile.

1. Size: 6 inches (127 mm) by 3 inch (76 mm), thickness .024 inch (0.6 mm), Code 30066.

2.3 DOWNSPOUTS AND ACCESSORIES

A. Downspouts: Aluminum, cold rolled style for gutter profile:

1. Size: 4 inch (76 mm), thickness .024 inch (0.6 mm), Code 50005.

B. Downspout Elbows 40 degree radius: Aluminum:

1. Size: 4 inch (76 mm), thickness .024 inch (0.6 mm), Code 50005.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

1. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to minimum dry film thickness of 15 mil (0.4 mm).

3.3 INSTALLATION

A. Perform Work in accordance with CDA Handbook and the Drawings.

B. Connect downspouts to storm sewer system as indicated. Seal connection watertight

C. Set splash pans or pads under downspouts. Secure in place

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 07 71 23

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SECTION 08 10 00 – DOORS AND FRAMES

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes:
1. Fiberglass doors and frames.
 2. Metal doors and frames.
 3. Wood doors and frames.

1.2 SUBMITTALS

- A. Product data.

PART 2 – PRODUCTS

2.1 EXTERIOR DOORS

- A. Front Entry Door: Front entry door shall be a single door of fiberglass construction with top-lite, glass windows.
1. Dimensions:
 - a. Door Width: 3'-0"
 - b. Door Height: 6'-8"
 - c. Door Backset: 2-3/8"
 - d. Jamb depth: 4-9/16"
 2. Door Glass Design: Insulated clear glass, Low-E, tempered and double-paned
 3. Handling/Swing: Left-Inswing
 4. Provide compression weather strip
 5. Frame: Fiberglass, ADA compliant
 6. U-value: 0.21
 7. SHGC: 0.10
 8. Basis of design:
 - a. [Thermatru Clasic-Craft American systems, 2 Panel 3 Top Lite. Style ID: CCA230.](#)
- B. Garage Entry and Back Door: Garage entry, connecting the mechanical room to the garage, shall be a single door of steel construction.
1. Dimensions:
 - a. Door Width: 3'-0"
 - b. Door Height: 6'-8"
 - c. Door Backset: 2-3/8"
 - d. Jamb Depth: 4-9/16"
 2. Core: Polyurethane foam
 3. Surface: 25-gauge smooth steel
 4. Handling/Swing: Left-inswing
 5. Provide compression weather strip

6. Frame material: Primed pine
7. Fire rating: 20 minute
8. U-value: 0.14
9. SHGC: 0
10. Basis of design:
 - a. [Thermatru Traditions door system, 6 Panel. Style ID: TS210.](#)

C. Master Bedroom/Office Entry Doors: Entry doors in office and bedroom shall be a single door of fiberglass construction.

1. Dimensions:
 - a. Door Width: 3'-0"
 - b. Door Height: 6'-8"
 - c. Door Backset: 2-3/8"
 - d. Jamb Depth: 4-9/16"
2. Handling/Swing: Left-inswing
3. Door Glass Design: Insulated clear glass, Low-E, tempered and double-paned
4. Provide compression weather strip
5. Frame material: Fiberglass
6. U-value: 0.26
7. SHGC: 0.17
8. Basis of design:
 - a. [Thermatru Classic-Craft Canvas Full Lite system, 6 Panel. Style ID: CCV10020.](#)

2.1 INTERIOR WOODEN PANEL DOORS

A. Door Panels: Masonite[®] Molded Panel doors shall be fabricated using loose lay-up assembly that includes hardboard facing, special composite stiles, composite rails and mineral core. Door facings are to be bonded to stiles, rails and core forming a 3-ply structural attachment. Door panel construction may vary per fire endurance duration.

1. Recommended Products:
 - a. [Masonite Molded Panel Series or equivalent](#)

B. Hinge preparations to be machined to accept 4" or 4-1/2" hinges. Face bores for cylindrical lock and deadbolts are to be 2-1/8" diameter at 2-3/8" or 2-3/4" backset and optional mortise or card lock.

C. Vertical edge of door to be square, beveled both sides or lock side only. Edge preparations should be clearly noted when the product is ordered.

PART 3 – EXECUTION

3.1 INSTALLATION – EXTERIOR DOORS

A. Install in accordance with manufacturer's written instructions as well as WDMA I.S.1-A and NFPA 80 for fire-rated doors.

3.2 INSTALLATION – INTERIOR DOORS

- A. Remove protective packaging just prior to installation. Installer shall be experienced in performing work required and shall be specialized in the installation of work similar to that required for this project. Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product packaging instructions for installation.

3.3 DELIVERY, HANDLING, AND STORAGE

- A. Delivery: Reasonable care shall be exercised during shipping and handling in keeping with the decorative nature of product.
- B. Storage and Protection: Store upright in a dry, well-ventilated building or shelter at a constant temperature. Do not store in damp, freshly plastered, drywall or concrete areas until materials have completely dried. Doors should be stored at least 10' away from any heat source to help prevent uneven drying. Doors must be sealed with an oil-based sealer or primer if stored for long periods.

END OF SECTION 08 10 00

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SECTION 08 36 13 – SECTIONAL DOORS

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Residential Steel Doors.
 - 2. Track and Framing
 - 3. Hardware.

1.2 REFERENCES

- A. ASTM A 653/A 653M - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- B. ASTM B 209/209M - Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- C. ASTM B 221/221M - Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
- D. ANSI/DASMA 102-2004.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Operation and maintenance data.
- C. Shop Drawings: Include opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.

1.4 WIND PERFORMANCE REQUIREMENTS

- A. Design doors to withstand positive and negative wind loads as calculated in accordance with applicable governing building codes.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the types of doors specified in this section with minimum five years documented experience.

- B. Installer Qualifications: Installation to be by qualified dealer in accordance with the manufacturer's installation instructions.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

- A. Paint finish: 10-year warranty against film integrity (peeling) and against color performance (fading) and chalking.
- B. Hardware: 2-year warranty.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Clopay Garage Doors, 8585 Duke Boulevard
Mason, OH 45040, www.clopaydoor.com
- B. Substitutions: permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 OVERHEAD DOORS – GENERAL

- A. Provide each door with door sections, brackets, tracks, counterbalance mechanisms and hardware to suit the opening and headroom available.
- B. Hardware:
 1. Minimum of 14 gauge galvanized steel hinges and 13 gauge galvanized steel track brackets.
 2. Rollers have 10 ball bearings with casehardened inner and outer races.
 3. Sliding end stile locking device provided with spring-loaded bolt for inside operation only.
 4. Doors 16 feet (5 m) and wider provided with double end hinges and stiles and long stem rollers.
- C. Tracks: 2 inches (51 mm) or 3 inches (76 mm) as required.

1. Vertical track 17 or 19-gauge minimum galvanized steel, inclined using adjustable brackets to assure weather tight closure at the jambs.
 2. Horizontal tracks 16-gauge minimum galvanized steel, reinforced with 13 gauge galvanized steel angles as required by door size and weight.
- D. Spring Counterbalance: Torsion springs for door counter-balance mounted on a continuous cross header shaft. Springs to be oil tempered, helical wound and custom computed for each door. Cable drums to be die cast aluminum. Galvanized lift cable to provide minimum safety factor of five to one. Springs to comply with ANSI/DASMA 102 as follows:
1. Standard Cycle Spring: 10,000 cycles.
- E. Handle: Galvanized steel step plate/lift handle provided on inside and outside of bottom section.
- F. Lock: Standard interior sliding end stile lock with hole to receive padlock.
- G. Lock: 5 pin cylinder lock interior lock bar and outside key.
- H. Weatherstripping: 3-3/4 inches (95 mm) Bulb shaped EPDM rubber bottom seal in a full-length 0.030 inch (0.76 mm) galvanized steel retainer.
- I. Weatherstripping: Perimeter seal for header and jambs.
- J. Mounting: Bracket mounting for wood jambs.

2.3 RESIDENTIAL STEEL DOORS

- A. [Clopay Premium series, model 4050 Classic Line](#), 2 inches (51 mm) heavy duty, single layer doors.
1. Door Styles:
 - a. Raised Panel:
 2. Size:
 - a. 8 feet by 7 feet (2.74 m by 2.13 m).
 3. Top Section style:
 - a. Closed Square style.
 4. Door Sections: 2 inches (51 mm) thick, single layer construction consisting of 24 gauge steel skin.
 - a. End stiles 20 gauge galvanized steel.
 - b. Stiles galvanized steel and engineered for quick hardware attachment through pre-punched extruded holes.
 - c. Stiles fastened to the section using the TOG-L-LOC joining system.
 - d. Provide 18 gauge galvanized primed steel support plates 2-5/8 by 4-3/8 inches (67 by 111 mm) located under each hinge location, pre-punched for hinge attachment.
 - e. Section joint formed to a weather tight seal.
 5. Finish: Exterior skin has a wood grain embossed texture. Exterior pre-painted steel consisting of a hot dipped galvanized coating applied to the base metal, a 0.2 mil baked prime coat and a 0.8 mil baked polyester top coat. Interior coat 0.2 mil primer with a 0.3 mil white top coat.
 - a. Exterior Color: White.

6. Hardware: Lock and handle

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions. Doors to be interior face mounted on a prepared surface.
- B. Anchor assembly to wall construction and building framing without distortion.
- C. Securely brace door tracks suspended from structure. Secure tracks to structural members or solid backing only.
- D. Fit and align door assembly, tracks and operating hardware.
- E. Install perimeter weatherstripping.
- F. Adjust door assembly to smooth operation and in full contact with weatherstripping.

3.4 CLEANING

- A. Clean doors, frames and glass.
- B. Remove labels and visible markings.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 08 36 13

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SECTION 08 51 13 – ALUMINUM WINDOWS

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes:
1. Fiberglass doors and frames.
 2. Metal doors and frames.
 3. Wood doors and frames.

1.2 SUBMITTALS

- A. Product data.

PART 2 – PRODUCTS

2.1 Manufacturer:

- A. Provide products from the following manufacturer:
1. Kolbe-Kolbe Windows & Doors
 2. www.kolbe-kolbe.com
 3. Local Contact: Jeff Delonay, 715-842-5666

2.2 CLERESTROY WINDOWS

- A. Automatically operable, triple pane, awning clerestory windows.
- B. Dimensions:
1. Rough opening: 48" x 17".
 2. Frame size: 47-1/2" x 16-1/2"
 3. Jamb size: 4 9/16"
- C. Glazing: H-K LoE 179 #2 / LoE 179 #5
1. U-value: 0.22
 2. SHGC: 0.38
 3. VT: 0.46
 4. CR: 54
 5. Stainless steel spacer
- D. Hardware Accessories:
1. Electric Marvel Operator. See 08 51 13 2.7
 2. Standard with Euro hinges
 3. Awning Multi-point hardware
 4. Multi-point lock
 5. BetterVue fiberglass screen

E. Frame finish: Ultra Pure White

F. Basis of design:

1. Kolbe-Kolbe Ultra series

2.3 SOUTH LIVING ROOM CASEMENT

A. Crank operable, triple-pane, casement windows.

B. Dimensions:

1. Rough opening: 36-1/2" x 48-1/2"
2. Frame size: 36" x 48"
3. Jamb size: 4 9/16"

C. Glazing: Triple glazed, H-K LoE 179 #2/LoE 179 #5

1. U-value: 0.19
2. SHGC: 0.44
3. VT: 0.54
4. CR: 70
5. Stainless steel spacer

D. Hardware Accessories

1. Standard with Euro hinges
2. Multi-point lock
3. BetterVue fiberglass screen

E. Frame finish: Ultra Pure White

F. Basis of design:

1. Kolbe-Kolbe Ultra series

2.4 SOUTH LIVING ROOM AWNING

A. Crank operable, triple-pane, awning windows.

B. Dimensions:

1. Rough opening: 36-1/2" x 24-1/2"
2. Frame size: 36" x 24"
3. Jamb size: 4 9/16"

C. Glazing: Triple glazed, H-K LoE 179 #2/LoE 179 #5

1. U-value: 0.22
2. SHGC: 0.38
3. VT: 0.45
4. CR: 70
5. Stainless steel spacer

- D. Hardware Accessories
 - 1. Standard with Euro hinges
 - 2. Awning Multi-point hardware
 - 3. Multi-point lock
 - 4. BetterVue fiberglass screen

E. Frame finish: Ultra Pure White

- F. Basis of design:
 - 1. Kolbe-Kolbe Ultra series

2.5 UTILITY ROOM SOUTH

A. Crank operable, triple-pane, awning windows.

- B. Dimensions:
 - 1. Rough opening: 24-1/2" x 24-1/2"
 - 2. Frame size: 24" x 24"
 - 3. Jamb size: 4 9/16"

- C. Glazing: Triple glazed, H-K LoE 179 #2/LoE 179 #5
 - 1. U-value: 0.22
 - 2. SHGC: 0.38
 - 3. VT: 0.45
 - 4. CR: 70
 - 5. Stainless steel spacer

- D. Hardware Accessories
 - 1. Standard with Euro hinges
 - 2. Awning Multi-point hardware
 - 3. Multi-point lock
 - 4. BetterVue fiberglass screen

E. Frame finish: Ultra Pure White

- F. Basis of design:
 - 1. Kolbe-Kolbe Ultra series

2.6 EAST AND NORTH WINDOWS

A. Crank operable, triple-pane, casement windows.

- B. Dimensions:
 - 1. Rough opening: 36-1/2" x 48-1/2"
 - 2. Frame size: 36" x 48"

3. Jamb size: 4 9/16"

C. Glazing: Triple glazed, H-K LoE 270 #2/LoE 179 #5

1. U-value: 0.21
2. SHGC: 0.22
3. VT: 0.40
4. CR: 71
5. Stainless steel spacer

D. Hardware Accessories

1. Standard with Euro hinges
2. Multi-point lock
3. BetterVue fiberglass screen

E. Frame finish: Ultra Pure White

F. Basis of design:

1. Kolbe-Kolbe Ultra series

2.7 ELECTRIC MARVEL OPERATOR

A. Installed in clerestory windows.

1. 120V, 60HZ, 0.12A
2. Input voltage range: 80V-260V
3. ANSI/UL 325-2003 certified
4. AN/CSA C22.2 No. 68-92 certified
5. Basis of design: Provide Operable awning motorized unit equal or equivalent to:
 - a. [Truth Marvel Operator](#)

PART 3 – EXECUTION

3.1 INSTALLATION

A. Adhere to manufacturer's written instructions and recommendations.

END OF SECTION 08 51 13

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SECTION 08 71 00 – DOOR HARDWARE

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes all non-controlled and controlled door hardware.

1.2 RELATED SECTIONS

- A. 25 50 00 Integrated Automation Facility Controls
- B. 25 90 00 Integrated Automation Sequence of Operations

1.3 SUBMITTALS

- A. Product data.

PART 2 – PRODUCTS

2.1 KEYED HARDWARE

A. Door Lever

1. Keying: 5-pin tumbler C keyway with two keys
2. Certifications: ANSI A156.2, 1996, Series 4000 Grade 2
3. Door thickness range: 1-3/8" to 1-3/4" (35mm-44mm) standard
4. Backset: Universal latch standard, fits either 2-3/8" (60mm) or 2-3/4" (70mm) backsets. 5" (127mm) backset available.
5. Finish: Satin Nickel
6. Basis of design: Provide keyed door lever equal or equivalent to:
 - a. Schlage Accent Single Cylinder Lever. Model no. F51 ACC 619.

B. Deadbolt

1. Keying: 5-pin, C keyway with 2 keys
2. Certifications: Meets ANSI Grade 3
3. Door thickness range: 1-3/8" to 1-3/4" standard
4. Backset: Universal deadbolts fit 2-3/8" or 2-3/4" backset
5. Finish: Satin Nickel
6. Basis of design: Provide keyed deadbolt equal or equivalent to:
 - a. Schlage Dexter Satin Nickel Deadbolt. Model no. JD60619.

2.2 PRIVACY HARDWARE

A. Privacy locking door lever

1. Certifications: ANSI A156.2, 1996, Series 4000 Grade 2
2. U.L. Listed: Locks for up to three-hour fire doors available

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3. Door thickness range: 1-3/8" to 1-3/4" (35mm-44mm) standard
4. Backset: Universal latch standard, fits either 2-3/8" (60mm) or 2-3/4" (70mm) backsets. 5" (127mm) backset available
5. Finish: Satin Nickel
6. Basis of design: Provide privacy door lever equal or equivalent to:
 - a. Schlage Accent Door Lever. Model no. F40 ACC 619.

2.3 LATCHSET HARDWARE

A. Non-locking door lever

1. Certifications: ANSI A156.2, 1996, Series 4000 Grade 2
2. U.L. Listed: Locks for up to three-hour fire doors available
3. Door thickness range: 1-3/8" to 1-3/4" (35mm-44mm) standard
4. Backset: Universal latch standard, fits either 2-3/8" (60mm) or 2-3/4" (70mm) backsets. 5" (127mm) backset available
5. Finish: Satin Nickel
6. Basis of design: Provide non-locking door lever equal or equivalent to:
 - a. Schlage Accent Door Lever. Model no. F10 ACC 619.

2.4 NON-LATCHING HARDWARE

A. Non-locking door lever

1. Certifications: ANSI A156.2, 1996, Series 4000 Grade 2
2. U.L. Listed: Locks for up to three-hour fire doors available
3. Door thickness range: 1-3/8" to 1-3/4" (35mm-44mm) standard
4. Backset: Universal latch standard, fits either 2-3/8" (60mm) or 2-3/4" (70mm) backsets. 5" (127mm) backset available
5. Finish: Satin Nickel
6. Basis of design: Provide non-locking door lever equal or equivalent to:
 - a. Schlage Accent Door Lever. Model no. F10 ACC 619.

2.5 ADDITIONAL DOOR ACCESSORIES

A. Door Knocker

1. Dimensions: 5-15/16" L x 3" W
2. Projection: 1-1/16"
3. Mounting Hole Center-to-Center: 3-15/16"
4. Construction: Solid brass
5. Finish: Satin Nickel
6. Basis of design: Provide door knocker equal or equivalent to:
 - a. Schlage Door Knocker. Model no. 3125-619.

B. KICKPLATE

1. Dimensions: 8" H x 34" W
2. Construction: Aluminum
3. Finish: Satin Nickel

4. Basis of design: Provide kickplate equal or equivalent to:
 - a. Schlage Aluminum Kickplate. Model no. 8400-8x34-619.

2.6 CONTROLLED HARDWARE

- A. General: A programmable code access system shall be provided on exterior front and garage entry doors. The minimum operability requirement is a consistent code between both exterior entry doors that communicates to a wireless security router which enables unlocking upon correct code input. A programmable code access system manufacturer's representative shall install all hardware and software necessary for the operation of the system and program all locksets. Upon necessary code adjustment, a programmable code access system manufacturer's representative shall re-program all locksets on site.
- B. Controls Kit
 1. Refer to Controls Specification [25 50 00/2.5H Wireless Security Equipment]
 2. Basis of Design: Schlage LiNK Starter Kit with Wireless Deadbolt
- C. Entry Handleset
 1. Door thickness range: 1-5/8" to 2" thick (41mm-51mm) standard
 2. Backset: Universal latches and deadbolts fit 2-3/8" (60mm) or 2-3/4" (70mm) backsets
 3. Finish: Satin Nickel
 4. Basis of design:
 - a. Schlage Camelot Front Entry Handleset. Model no. F60 CAM 619
- D. Keyed Entrance Lock
 1. Keying: Keying: 5-pin tumbler C keyway with two nickel silver keys
 2. Certifications: ANSI A156.2, 1996, Series 4000 Grade 2
 3. U.L. Listed: Locks for up to three-hour fire doors available
 4. Door thickness range: 1-3/8" to 1-3/4" (35mm-44mm) standard
 5. Backset: Universal latch standard, fits either 2-3/8" (60mm) or 2-3/4" (70mm) backsets. 5" (127mm) backset available
 6. Finish: Satin Nickel
 7. Basis of design:
 - a. Schlage Andover Door Knob. Model no. FA51 AND 619.
- E. Dead Bolts
 1. Keying: 5-pin tumbler C keyway with two nickel silver keys
 2. Door range: 1-3/8" to 1-3/4" (35mm-44mm) standard
 3. Certifications: Grade 2 ANSI/BHMA certified
 4. Backset: Universal latches and deadbolts fit 2-3/8" (60mm) or 2-3/4" (70mm) backset
 5. Finish: Satin Nickel
 6. Basis of design:
 - a. Schlage Camelot Keypad Deadbolt. Model no. BE365 CAM 619

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install each door hardware item to comply with manufacturer's written instructions. Do not install surface-mounted items until finishes have been completed on substrates involved.
- B. Mounting heights:
 - 1. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

3.2 INSPECTION

- A. Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

END OF SECTION 08 71 00

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SECTION 09 29 00– GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Rated Gypsum Board

1.2 SUBMITTALS

- A. Product Certificate for GREENGUARD [Indoor Air Quality]: For products and materials required to comply with requirements for minimum chemical emissions

PART 2 – PRODUCTS

2.1 MANUFACTURER / PRODUCTS

- A. Basis of Design: Products of National Gypsum Company

2.2 FIRE-RESISTANCE RATED GYPSUM BOARD

- A. Basis of Design: [Gold Bond® BRAND Gypsum Board](#)
- B. Panel Physical Characteristics
 - 1. Core gypsum core
 - 2. Surface paper: 100% recycled content paper on front, back and long edges
 - 3. Long Edges: Tapered
 - 4. Overall thickness: 1/2 inch
 - 5. Panel complies with ASTM C 1396 Standard Specification for Gypsum Board

2.3 ACCESSORY PRODUCTS

- A. Joint Treatment
 - 1. Tape:
 - a. Paper Tape: 2-1/16 inches wide or
 - b. Fiberglass Tape: Nominal 2 inches wide self adhering tape
 - 2. Drying Type Compound:
 - a. Ready Mix vinyl base compound
 - 3. Ceiling Texture
 - a. Knocked down finish with joint compound or equivalent.

PART 3 - EXECUTION

3.1 INSTALLATION, GYPSUM SHEATHING

A. General

1. Install in accordance with manufacturer recommendations and ASTM C1280
2. Stagger end joints on horizontal applications

END OF SECTION 09 29 00

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SECTION 09 30 00 – TILING

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Ceramic tiles.
 2. Transitional metal edge strips.

1.2 STANDARDS AND CODES

- A. ANSI Ceramic Tile Standard: Provide Standard grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
- B. ASTM American Society for Testing and Materials International
1. ASTM C373: Standard Test Method for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products
 2. ASTM C482: Standard Test Method for Bond Strength of Ceramic Tile to Portland Cement
 3. ASTM C648: Standard Test Method for Breaking Strength of Ceramic Tile
 4. ASTM C1028 Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method
 5. ASTM C1027 Standard Test Method for Determining Visible Abrasion Resistance of Glazed Ceramic Tile
 6. ASTM C650 Standard Test Method for Resistance of Ceramic Tile to Chemical Substances
 7. ASTM C424 Standard Test Method for Craze Resistance of Fired Glazed Whitewares by Autoclave Treatment
- C. CSA B79-94: Floor, Area, and Shower Drains, and Cleanouts for Residential Construction
- D. IAPMO IGC 195: Interim Guide Criteria for Floor Drain with Integrated Bonding Flange
- E. Tile Council of North America (TCNA) Handbook for Ceramic Tile Installation
- F. Terrazzo, Tile and Marble Association of Canada (TTMAC) Specification Guide 09300 Tile Installation Manual
- G. American National Standard Specifications for the installation of ceramic tile A108 / A118 / A136.1
- H. TCA – Tile Council of America
1. Handbook for Ceramic Tile Installation

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.

B. Samples:

1. Each type and composition tile and for each color and finish required.
2. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, and junctions with dissimilar materials, thresholds, and setting details. Locate and detail expansion and control joints.

PART 2 – PRODUCTS

2.1 TILE PRODUCTS

A. Tile Types CT1: Glazed Ceramic Floor Tile.

1. Module Size: 12" x 12"
2. Thickness: 5/16"
3. Face: Plain with modified square edges.
4. Tile Color and Pattern: As indicated in Color and Material Legend on Drawings.
5. Water absorption (C373): <3%
6. Breaking strength (C648): >250 lbs
7. Scratch hardness (MOHS): 8.0
8. Chemical resistance (C650): Resistant
9. Coefficient of friction (C1028): Wet- > 0.60, Dry >0.65
10. Grout: Sanded Grout
 - a. Width: 3/16"
 - b. Color: As indicated in Color and Material Legend on Drawings.
11. Basis of design: Provide ceramic floor tile equal or equivalent to:
 - a. [American Olean Pozzalo Ceramic Tile, Coastal Beige color \(PZ92\).](#)

B. Tile Types CT2: Glazed Ceramic Wall Tile.

1. Module Size: 12" x 12"
2. Thickness: 5/16"
3. Face: Plain with modified square edges.
4. Tile Color and Pattern: As indicated in Color and Material Legend on Drawings.
5. Water absorption (C373): <20%
6. Breaking strength (C648): 100-230 lbs
7. Scratch hardness (MOHS): 4.0-6.5
8. Chemical resistance (C650): Resistant
9. Coefficient of friction (C1028): Wet- > 0.50, Dry >0.80
10. Grout: Sanded Grout
 - a. Width: 1/16"
 - b. Color: As indicated in Color and Material Legend on Drawings.
11. Basis of design: Provide ceramic floor tile equal or equivalent to:
 - a. [American Olean Pozzalo Ceramic Tile, Coastal Beige color \(PZ92\).](#)

C. Tile Types CT3: Porcelain Tile.

1. Module Size: 12" x 12"
2. Thickness: 5/16"

3. Face: Plain with modified square edges.
4. Tile Color and Pattern: As indicated in Color and Material Legend on Drawings.
5. Grout: Sanded Grout
 - a. Width: 1/16"
 - b. Color: As indicated in Color and Material Legend on Drawings.
6. Basis of design: Provide ceramic floor tile equal or equivalent to:
 - a. [Style Selections Jackson Ridge, Grotto Black \(S52\)](#).

D. Tile Types GT1: Glass Tile Backsplash

1. Module size: 1-1/2" x 6"
2. Thickness: 5/16"
3. Connecting type: Brick Joint
4. Mounting: Mesh
5. Grout: Unsanded Grout
 - a. Width: 1/8"
 - b. Color: As indicated in Color and Material Legend on Drawings.
6. Tile Color and Pattern: As indicated in Color and Material Legend on Drawings.
7. Basis of design: Provide glass tile backsplash equal or equivalent:
 - a. [American Olean Candalara Glass Brick Joint Tile, English Ivy Color \(CL52\)](#).

E. Tile Type GT2: Glass Wall Tile.

1. Module Size: 1"x1"
2. Thickness: 5/16"
3. Mounting: Mesh
4. Tile Color and Pattern: As indicated in Color and Material Legend on Drawings.
5. Grout: Sanded Grout
 - a. Width: 1/8"
 - b. Color: As indicated in Color and Material Legend on Drawings.
6. Basis of design: Provide ceramic floor tile equal or equivalent to:
 - a. [American Olean Legacy Glass Tile, Pewter color \(LG28\)](#).

2.2 FINISHING AND EDGE PROTECTION PROFILES

A. Schluter RONDEC

1. Description: Bullnose-type profile with symmetrically rounded visible surface with ¼ inch (6mm) radius, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
2. Material and Finish: Brushed Nickel Anodized Aluminum.

2.3 SETTING MATERIALS

A. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. MAPEI Corporation
2. Prepackaged, dry-mortar mix combined with liquid-latex additive.

B. Organic Adhesive: ANSI A136.1, Type I.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. MAPEI Corporation

2.4 GROUT MATERIALS

A. Polymer-Modified Tile Grout: ANSI A118.7

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. MAPEI Corporation

B. Polymer Type: Dry, redispersible form, prepackaged with other dry ingredients, or liquid-latex form for addition to prepackaged dry-grout mix.

2.5 WATERPROOFING MEMBRANE

A. Manufacturer:

1. Schluter Systems, L.P., 194 Pleasant Ridge Road, Plattsburgh, NY 12901- 5841. Tel: (800) 472-4588. Fax (800) 477-9783. [E-mail: specassist@schluter.com](mailto:specassist@schluter.com). Internet: www.schluter.com.

B. Polyethylene Membrane

1. 0.008 inch (0.2 mm) thick, orange polyethylene membrane, with polypropylene fleece laminated on both sides, which meet or exceed the requirements of the "American national standard specifications for load bearing, bonded, waterproof membranes for thin-set ceramic tile and dimension stone installation A118.10," and is listed by cUPC®, and is evaluated by ICC-ES (see Report No. ESR-2467).

2. Basis of design: provide waterproofing membrane equal or equivalent to:

- a. [Schluter Kerdi Product no. K-SH-M-10](#).

2.6 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, Portland cement-based formulation provided or approved by manufacturer of tile-sealing materials for installations indicated.

B. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.

1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. MAPEI Corporation

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of

installed tile.

B. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A 108 Series of tile installation standards for installations indicated.

C. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.

D. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

3.2 PREPARATION

A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

B. Provide concrete substrates for tile floors installed with thin-set mortar that comply with flatness tolerances specified in referenced ANSI A 108 Series of tile installation standards.

C. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions. Use product specifically recommended by tile-setting material manufacturer.

D. Remove protrusions, bumps, and ridges by sanding or grinding.

E. Scarify concrete substrates with blast track equipment if necessary to completely remove curing compounds or other substances that would interfere with proper bond of setting materials. Clean and maintain substrate in condition required by setting material manufacturer.

F. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

G. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 INSTALLATION GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A 108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA

installation methods indicated in ceramic tile installation schedules.

C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.

F. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

G. Locate joints in tile surfaces directly above joints in concrete substrates.

H. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

I. Grout tile to comply with Manufacturer recommendation in accordance with TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.

3.4 CLEANING

A. On completion of placement and grouting, clean all ceramic tile surfaces in accordance with manufacturer's written instructions so they are free of foreign Matter.

B. Remove grout residue from tile as soon as possible.

C. Clean grout smears and haze from tile according to grout manufacturer's written instructions. Use only cleaners recommended by grout manufacturer and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

D. If applicable, remove temporary protective coating by method recommended by coating manufacturer. Trap and remove coating to prevent it from clogging drains.

3.5 PROTECTION

- A. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION 09 30 00

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SECTION 09 64 19 – WOOD COMPOSITION FLOORING

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes laminate wood flooring and underlayment.

1.2 SUBMITTALS

- A. Product data.

PART 2 – PRODUCTS

2.1 PLANK-STYLE FLOORING

- A. Construction: Solid Hardwood with 9-Ply Plywood Birch core.
- B. Color: Hickory with Saddle Finish.
- C. Janka Hardness Scale Rating: 1820.
- D. Thickness: 5/8"
- E. Width: 5"
- F. Basis of design: Provide wood plank flooring equal or equivalent to:
 - 1. [Shamrock Enviroeered Plank Flooring.](#)

2.2 UNDERLAYMENT

- A. Multi-use comfort, sound and moisture barrier
 - 1. High density PE/PP foam
 - 2. Thickness: 1mm
 - 3. Basis of design: provide underlayment equal or equivalent to:
 - a. Carpet Cushions and Supplies, Laminate Solutions Acoustical Underlayment with Moisture Barrier

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install according to manufacturer's written instructions.

3.2 DELIVERY STORAGE AND HANDLING

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- A. Always store cartons horizontally on a fully supported flat surface.
- B. Do not stack pallets more than two high.
- C. Protect package from forklift or other traffic.
- D. Carefully protect package corners and lay boxes horizontally

END OF SECTION 09 64 19

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SECTION 09 91 00 – PAINTING

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on interior substrates.
 - 1. Paint exposed surfaces, except where Contract Documents indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
 - 2. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
 - a. Labels: Do not paint over UL, FMG, or other code required labels or equipment name, identification, performance rating, or nomenclature plates.

1.2 DEFINITIONS

- A. Temperature: Latex should not be applied when the room temperature is below 50°F. Do not apply any type of paint in a closed room. Open the windows at the top.

1.3 SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. The surface must be clean, dry and free of grease or polish.
 - 2. Apply drywall sealer and wait at least 2 hours before applying the finish coat.
- B. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
- C. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.

PART 2 – PRODUCTS

2.1 PAINT, GENERAL

A. Products:

1. Pure Performance Primer for interior surfaces
 - a. Color to be chosen from Manufacturer's Full Line
 - b. MPI Standards: Provide product that comply with MPI standards indicated and that are listed in its "MPI Approved Products List"
 - c. Color: As indicated in Color and Material Legend on Drawings.

2.2 PAINT TYPE PT1, PT2, PT3, PT4

A. Interior Latex Paint

1. Type: 100% Acrylic Latex
2. Gloss: Flat
3. Basis of design: Provide interior latex paint equal or equivalent to:
 - a. [Porter Pure Performance 9-110 Series Paint](#)

2.3 PAINT TYPE: PT5, PT6

1. Type: 100% Acrylic Latex
2. Gloss: Semi-Gloss
3. Basis of design: Provide interior latex paint equal or equivalent to:
 - a. [Porter Pure Performance 9-510 Series Paint](#)

2.4 PRIMER

A. Interior Latex Primer

1. Type: 100% Acrylic Latex
2. Gloss: Flat
3. Basis of design: Provide interior latex paint equal or equivalent to:
 - a. [Porter Pure Performance 9-900 Series Primer](#)

2.5 SEALANT

A. Interior Stain

1. Type: Water-Based Polyurethane
2. Gloss: Satin
3. Basis of design: Provide water-based polyurethane equal or equivalent to:
 - a. [Porter Olympic Premium Water-Based Polyurethane](#)

PART 3 – EXECUTION

3.1 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, lighting fixtures, and similar items that are not to be painted. Mask items that cannot be removed. Reinstall items in each area after painting is complete.

C. Clean and prepare surfaces in an area before beginning painting in that area. Schedule painting so cleaning operations will not damage newly painted surfaces.

3.2 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in the "MPI Manual".
1. Use brushes only for exterior painting and where the use of other applicators is not practical.
 2. Use rollers for finish coat on interior walls and ceilings.
 3. Apply at approximately 400 sq. ft/gal.
- B. Paint exposed surfaces, unless otherwise indicated.
1. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces.
 2. Paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Paint the back side of access panels.
 4. Color code mechanical piping in accessible ceiling spaces.
 5. Do not paint prefinished items, items with integral finish, operating parts, and labels unless otherwise indicated.
- C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
1. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

END OF SECTION 09 91 00

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SECTION 10 44 16 – FIRE EXTINGUISHERS

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes fire extinguisher and mounting

1.2 SUBMITTALS

- A. Product Data

PART 2 – PRODUCTS

2.1 FIRE EXTINGUISHERS

- A. Portable Fire Extinguisher: NFPA 10, listed and labeled for the type, rating, and classification of extinguisher.
 - 1. Multipurpose Dry-Chemical Type: Monoammonium Phosphate,
 - a. UL-rated 3-A:40-B:C, 5.5-lb nominal capacity
 - 2. Basis of design: provide fire extinguisher equal or equivalent to:
 - a. [Kidde Full Home Fire Extinguisher 21006704](#)
- B. Mounting Brackets: Manufacturer's standard steel, secures fire extinguisher to wall for sizes of fire extinguishers listed. UL approved with plated or enamel finish.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install mounting brackets indicated locations at heights acceptable by governing building code and authority.
- B. Install fire extinguishers in manufacturer's mounting brackets where indicated.

END OF SECTION 10 44 16

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SECTION 11 30 00 – RESIDENTIAL EQUIPMENT

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes residential equipment of the following types:
1. Television
 2. Computer
 3. Surround Sound

1.2 SUBMITTALS

- A. Submit under provisions of Section 01300.
1. Product Data: Manufacturer's data sheets on each product to be used, including:
 - a. Model number and selected options for each component.

PART 2 – PRODUCTS

2.1 TELEVISION

- A. Sony 40" HD LCD TV.
1. Energy Star Compliant.
 2. Basis of design: Provide television equal or equivalent to:
 - a. [Sony 40" Internet TV NSX-40GT1.](#)

2.2 BLU-RAY DISC PLAYER

- A. Sony Blue ray Disc Player
1. Energy Star compliant.
 2. Basis of design: Provide Blu-ray Disc Player equal or equivalent to:
 - a. [Sony Blu-ray Disc Player BDP-S380](#)

2.3 SURROUND SOUND

- A. Sony Surround Sound System
1. Basis of design: Provide surround sound system equal or equivalent to:
 - a. [Sony 40" 3D Sound Bar System, model no. HT-CT550W.](#)

2.4 COMPUTER

- A. Home Computer
1. Processor: Pentium 4/M or equivalent.
 2. RAM: 4GB
 3. Screen: 17inch, resolution 1024 x 768 pixel

4. Operating System: Windows 7/Vista/XP/Windows Server 2003 R2 (32-bit)/Windows Server 2008 R2 (64-bit)

5. Disk Space: 500GB

2.5 ROUTER

A. Wireless Router

1. Wireless Standard: Wireless B+G+N

2. LAN Connection: Ethernet

PART 3 – EXECUTION

3.1 INSTALLATION

A. Assemble and install in accordance with manufacturer's instructions and the following:

1. Securely mount to substrate.

2. Install equipment plumb and level and in proper relationship to adjacent construction.

3.2 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 11 30 00

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SECTION 11 31 00 – RESIDENTIAL APPLIANCES

PART 1 – GENERAL

1.3 SUMMARY

- A. This section includes residential appliances of the following types:
1. Garbage disposals.
 2. Clothes care.
 3. Ovens.
 4. Dishwashers.
 5. Refrigerators.
 6. Ice makers.
 7. Ranges.
 8. Microwave ovens.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
1. Product Data: Manufacturer's data sheets on each product to be used, including:
 - a. Model number and selected options for each appliance.
 - b. Preparation instructions and recommendations.
 - c. Storage and handling requirements and recommendations.
 - d. Installation methods.
 - e. List of maintenance parts.
 2. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

PART 2 – PRODUCTS

2.4 GARBAGE DISPOSALS

- A. Continuous feed disposers.
1. Basis of design: Provide freezer-refrigerator equal or equivalent to:
 - a. [GE ½ Horsepower Continuous Feed Disposer, model no. GFC535T.](#)

2.5 CLOTHES CARE

- A. Washers.
1. Energy Star compliant.
 2. Basis of design: Provide Energy Star frontload washer equal or equivalent to:
 - a. [GE 4.3 IEC Cu. Ft. Frontload Washer, Energy Star, model no. PFWS4600LWW.](#)
- B. Dryers.
1. Basis of design: Provide electric dryer equal or equivalent to:
 - a. [7.5cf Capacity Electric Dryer, model no. PFDS450ELWW](#)

B. Accessories

1. Basis of design: Provide clothes washer and dryer pedestals equal or equivalent to:
 - a. [GE SmartDispense Pedestal, model no. SPBD880JWW.](#)
 - b. [GE storage pedestal, model no. SPSD157JWW.](#)

2.6 OVEN

A. Built-In ovens.

1. Basis of design: Provide built-in oven equal or equivalent to:
 - a. [GE 30" Built-In Single Wall Oven, model no. JTS10SPSS.](#)

2.7 DISHWASHERS

A. Built-In Dishwashers.

1. Basis of design: Provide built-in dishwasher equal or equivalent to:
 - a. [GE Built-In Dishwasher with Hidden Controls, model no. GLD5768VSS](#)

2.8 REFRIDGERATORS

A. Top-Freezer Refrigerators.

1. Energy Star compliant.
2. Basis of design: Provide Energy Star top-freezer refrigerator equal or equivalent to:
 - a. [GE ENERGY STAR 18.0 Cu. Ft. Top-Freezer Refrigerator, model no. GTH18ISXSS.](#)

2.9 ICE MAKERS

A. Electronic icemakers.

1. Basis of design: provide electric icemaker equal or equivalent to:
 - a. [GE Electronic icemaker, model no. IM4A](#)

2.10 RANGES

A. Induction Cooktops.

1. Basis of design: Provide electric induction cooktop equal or equivalent to:
 - a. [GE Profile 30" Electric Induction Cooktop, model no. PHP900SMSS.](#)

2.11 MICROWAVE OVENS

A. Above the cooktop ovens.

1. Basis of design: Provide above the cooktop microwave oven equal or equivalent to:
 - a. [GE Profile Advantium 120 Above-the-Cooktop Oven, model no. PSA1201RSS.](#)

PART 3 – EXECUTION

3.3 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared. Coordinate rough-in with appliance sizes and utility requirements.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.4 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.5 INSTALLATION

- B. Assemble appliances and trim and install in accordance with manufacturer's instructions and the following:
 - 1. Securely mount to substrate.
 - 2. Install appliances plumb and level and in proper relationship to adjacent construction.
 - 3. Connect appliances to building utility, supply and waste systems as applicable.
 - 4. Test for proper operation and drainage. Adjust until proper operation is achieved.

3.6 PROTECTION

- C. Protect installed products until completion of project.
- D. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 11 31 00

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SECTION 12 35 00 – RESIDENTIAL CASEWORK

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Kitchen cabinets, where indicated.
 2. Bathroom cabinets, where indicated.

1.2 SUBMITTALS

- A. Product Data: For the following:
1. Cabinets.
 2. Cabinet hardware.
- B. Shop drawings: For cabinets and countertops. Include plans, elevations, details, and attachments to other work. Show materials, finishes, filler panels, hardware, edge and backsplash profiles, methods of joining countertops, and cutouts for plumbing fixtures.

PART 2 – PRODUCTS

2.1 CABINET MATERIALS

- A. General:
1. Cabinet Box Components: Sides, bottoms, tops: $\frac{3}{4}$ " Veneer core plywood – certified as C.A.R.B.; Back: $\frac{1}{2}$ " Veneer core plywood – Certified as C.A.R.B. Phase 2
 2. Cabinet Door material: Plywood with MDF Core – EPP/CPA 3-08, C.A.R.B. Phase 2 Certified

2.2 CABINET TYPES

- A. Kitchen and Laundry Cabinet:
1. Basis-of-Design Product: The design for cabinets is based on Grabill Cabinetry: "Benchmark" series, Frameless Construction
 2. Door Style: "CD 105"
 3. Wood Type: White Oak Reconstituted Rift-cut
 4. Finish: Natural-with no hand rubbing.
- B. Bathroom Cabinets
1. Basis-of-Design Product: The design for cabinets is based on Grabill Cabinetry: "Benchmark" series, Frameless Construction
 2. Door Style: "CD 105"
 3. Wood Type: Quarter Sawn Reconstituted Cherry Veneer,
 4. Color Finish: Natural Finish-No Hand Rubbing.

C. Exposed Materials for all Cabinetry:

1. Doors: ¾" thick MDF core with reconstituted veneer on front and back with .6 mm edge banding. Grain is horizontally oriented on door drawer front; not grain matched
2. Case Materials and Shelves: ¾" Veneer core Plywood with Hard Rock Maple TECHOFOIL overlay on interior of cabinet case and shelving.
3. Drawer Materials: ¾" thick Maple Harwood lumber sides and 3/8" thick Veneer core Plywood bottoms.
4. Drawer Construction: Dovetail
5. Cabinet Finish: Crosslink conversion varnish top coat

D. Cabinet Hardware:

1. Pulls: Stainless Steel Rail Handles: Pull #200128-SS for all areas.
2. Hinges: Blum Concealed 120 Degree European-style self-closing, soft-close hinges.
 - a. Drawer Guides: Blum Tandem under-mount Full extension with soft close feature.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install cabinets with no variations in flushness of adjoining surfaces; use concealed shims. Where cabinets abut other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, and moldings in finish to match cabinet face. Coordinate connections to plumbing fixtures with MEP contractor.
- B. Install cabinets without distortion so doors and drawers fit openings, are aligned, and are uniformly spaced. Complete installation of hardware and accessories as indicated.
- C. Install cabinets and countertop level and plumb to a tolerance of 1/8 inch and 8 feet.
- D. Fasten cabinets to adjacent units and to backing
 1. Fasten wall cabinets through back, near top and bottom, at ends and not less than 24 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration.
- E. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Form seams using splines to align adjacent surfaces, and secure with glue and concealed clamping devices designed for this purpose.
- F. Adjust cabinets and hardware so doors and drawers are centered in openings and operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

END OF SECTION 12 35 30

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SECTION 21 10 00 – WATER-BASED FIRE-SUPPRESSION SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes fire-suppression system and its components.

1.2 DESCRIPTION

- A. Work to be performed by the contractor

1. Provide all material and labor and perform all engineering and operations necessary for the installation of complete and operating fire protection systems as shown on Drawings and as specified herein.
2. Be completely responsible for the design, layout, installation, testing and certification of the fire protection system and for acceptance of the system by the Indiana Division of Fire and Building Safety and the local fire department.
3. Furnish and install equipment and materials including pipe, valves, fittings, sprinklers and accessories necessary to provide a complete and approved fire protection system
4. Wiring: Wiring shall be provided under the Electrical Division, unless otherwise indicated.
5. Permits and Fees: Apply and pay for all permits and fees required for work under this Section.

1.3 QUALITY OF WORK

- A. Regulatory Requirements:

1. Where applicable, comply in both design and installation with the following regulating agencies, organizations and publications, which include, but are not limited to the following:
 - a. National Fire Protection Association (NFPA 13-D) Standards
 - b. Indiana Department of Fire and Building Services

1.4 SUBMITTALS

- A. Product Data:

1. Submit manufacturer's data sheets for all equipment and materials including valves, hangers, sprinklers, hose cabinets, specialties, accessories, etc., proposed for use in the system.

1.5 AS-BUILT DRAWINGS

- A. Maintain an accurate record of all changes made to the system layout from that shown on the approved shop drawings. At completion of the work, and before final acceptance, one set of corrected reproducible drawings, hydraulic calculations, and maintenance manuals shall be delivered to the Owner.

PART 2 – PRODUCTS

2.1 GENERAL

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[WATER-BASED FIRE-SUPPRESSION SYSTEMS]

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- A. An equipment submittal shall be sent and approved before installation.
- B. All equipment shall be installed in accordance to NFPA and Manufacturer requirements.

2.2 PUMP

- A. [Legend I 13D Fire Suppression Pump, 3 HP, 40 psi.](#)
- B. SA listed, LS 38324

2.3 PRESSURE GAUGE

- A. [ARGO Fire Sprinkler pressure gauge. 0-300 psi. Type 110.10sp](#)

2.4 PIPE

- A. All enclosed piping shall be 1" diameter CPVC.
- B. All exposed piping shall be 1" diameter galvanized steel.
- C. Exposed sprinklers located less than 7 ft A.F.F. to be installed with head guard.

2.5 SPRINKLER

- A. [Reliable F1 Residential Recessed pendent ½" orifice.](#)
- B. [Reliable F1 Residential Horizontal Sidewall ½" orifice.](#)
- C. [Reliable F1 Residential Pendent ½" orifice.](#)

2.6 Valves

- A. [Wilkins 1" Double Check Valve. 950XL.](#)
- B. [1" Globe Valve. 175 PSI. NIBCO KT-65-UL](#)

2.7 FIRESTOPPING

- A. [HILTI FS-ONE High Performance Intumescent Firesop Sealant](#)

PART 3 – EXECUTION

3.1 GENERAL

- A. Inspect preceding work. Verify all dimensions before proceeding with work and coordinate all work and placement of components with other trades.

- B. Be responsible for all measurements, fitting and assembly of all work.

3.2 INSTALLATION

- A. Drawings indicate general intent and location. Piping shall be installed in the most direct and straight manner as possible.
- B. Provide sleeves for pipe passing through building walls and floors above grade. The annular spaces between pipe and sleeves shall be packed tight with caulking or fire barrier material. Provide chrome plated escutcheon plates large enough to cover the pipe sleeve in finished areas.
- C. All welding to be in accordance with NFPA standards.
- D. Coordinate exact pipe locations with drawings and other trades before design approval and fabrication of piping. This Contractor shall be responsible for any redesign and fabrication required to fit system into allowable space.
- E. All piping in finished areas shall be concealed unless shown otherwise.
- F. All vertical lines shall be plumb and horizontal lines shall run parallel to building lines.
- G. Install horizontal piping graded to low points and in manner to make it possible to test and empty entire system. Provide valves at low points to facilitate system drainage.
- H. Pipe drains to terminate at floor drains or outside the building as shown on the Drawings or as specified. Location of drains to the building exterior shall be approved by the Owner.
- I. Pipe and fittings shall be inspected for soundness and cleaned of all dirt and other foreign matter prior to being installed. All damaged pipe and fittings will be rejected.
- J. Protect open pipe ends whenever work is suspended during construction to prevent foreign material from entering.
- K. Piping passing through non-sprinkler areas shall be adequately protected by fire resistive construction as approved by the owner and as required by code.

END OF SECTION 21 10 00

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SECTION 22 05 00 – COMMON WORK RESULTS FOR PLUMBING

PART 1 – GENERAL

1.1 SUMMARY

- A. This section Includes:
 - 1. Plumbing hangers and supports
 - 2. Cleanouts

1.2 SUBMITTALS

- A. Product Data.

PART 2 – PRODUCTS

2.1 HANGERS AND SUPPORTS

- C. Hanger and Pipe Attachments: Factory fabricated with galvanized coatings; nonmetallic plastic bend support for PEX tubing.
 - 1. PEX Wall Support Brackets 1/2". Watts P667100.

2.2 CLEANOUTS

- A. ABS Cleanout Fitting. 2".

PART 3 – EXECUTION

3.1 GENERAL PIPING INSTALLATIONS

- A. Install Piping free of sags and bends.
- B. Install fittings for changes in directions and branch connections.
- C. Install sleeves for pipes passing through walls, concrete floors, and roof slabs.
- D. Exterior Wall, Pipe Penetrations: Mechanical sleeve seals installed in steel or cast-iron pipes for wall sleeves.
- E. Comply with requirements in Division 07 Section "Penetration Firestopping" for sealing pipe penetrations in fire-rated construction.
- F. Install unions at final connection to each piece of equipment.

3.2 GENERAL EQUIPMENT INSTALLATIONS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components, unless otherwise indicated.
- C. Install mechanical equipment to facilitate service, maintenance, repair, and replacement of components. Connect equipment for ease of disconnecting with minimum interference to other installations.
- D. Install equipment to allow right of way for piping installed at required pitch.

3.3 GENERAL METERS AND GAUGES INSTALLATIONS

- A. General: Comply with the PHCC National Standard Plumbing Code and manufacturer's recommendations.

END OF SECTION 22 05 00

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SECTION 22 11 16 – DOMESTIC WATER PIPING

PART 1 – GENERAL

1.1 SUMMARY

- A. This section Includes:
1. Domestic water piping
 2. Domestic water pipe fittings
 3. Domestic water pipe sleeves
 4. Domestic water manifold
 5. Special duty valves for domestic water

1.2 REFERENCES

- A. Comply with NSF 14 for plastic, potable domestic water piping and components.
- B. Comply with NSF 61 for potable domestic water piping and components.

PART 2 – PRODUCTS

2.1 PIPING

- A. PEX Tubing
1. Shall conform to ASTM F876, International Plumbing Code (IPC) and meet standard grade hydrostatic pressure ratings from Plastic Pipe Institute in accordance with TR-4/03.
 2. Sizes: ½", 3/8".
 3. Basis of design: Provide PEX tubing equal or equivalent to:
 - a. [Zero Lead Viega PEXCoils](#).

2.2 FITTINGS

- A. Lav Adapter
1. Connects 3/8" PEX tubing directly to lavatory faucets
 2. Materials: Bronze construction
 3. Nut: Metal construction
 4. Basis of design: Provide lav adapter equal or equivalent to:
 - a. Viega Bronze PEX Press Lav Adapter. Stock code: 57002.
- B. Water Closet Adapter
1. Connects 1/2" PEX tubing directly to water closets
 2. Materials: Bronze construction
 3. Nut: Plastic construction
 4. Basis of design: Provide closet adapter equal or equivalent to:
 - a. Viega Bronze PEX Press Closet Adapter. Stock code: 57004.

C. Pipe Sleeves

1. Shall provide press fit for PEX tubing.
2. Material: Stainless steel construction
3. Pipe size: For 3/8" and 1/2" PEX. ASTM F1960, NSF, ASTM F877.
4. Basis of design: Provide pipe sleeves equal or equivalent to:
 - a. Viega PEX Press Sleeves. Stock codes- 61000 (3/8"), 61040 (3/4").

D. Manifold

1. ASTM F 877 plastic or corrosion-resistant-metal assembly, with a plastic corrosion-resistant-metal valve for each outlet.
2. (14) x 1/2" ports
3. Basis of design:
 - a. [PureFlow MANABLOC Parallel Water Distribution System, model no. 37142.](#)

E. Special-Duty Valves

1. 1/2" PEX Angle Stop (1/4 Turn): Complies with ASTM F 1087.
2. Union Ball Valves: MSS SP-122, with full-port ball, socket, or threaded detachable end connectors, and pressure rating not less than 125 psi at 73°.
3. 1/2" PEX Straight Stop: Complies with ASTM F 1087.1 1/2" threaded check valve, 150 psi
4. 3/4" threaded check valve, 150 psi: Complies with ANSI B1.20
5. 3/4" PROFLOW 10-D hose bib.

F. Transition Fittings: Manufactured piping coupling or specified piping system fitting. Same size as pipes to be joined and pressure rating at least equal to pipes to be joined. IAPMO 3558; ANSI/NSF 14- and 61-certified; HUD MR 1269; ICC ESR 1099.

1. [1/2" PEX x 1/2" NPT Brass Male Adapter: Connects PEX tubing to NPT thread.](#)
2. [1/2" PEX x 1/2" NPT Brass Female Adapter: Use with ring for connection.](#)
3. [3/4" NPT Viega Pro Press Copper Male Adapter: Viega 79230](#)
4. [90° 3/4" Copper Elbow: Viega 77322](#)
5. [3/4" Dielectric unions, Viega 79160: Complies with ASME B 16.18, ASME B 16.22](#)

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install Viega PEX tubing in accordance with the tubing manufacturer's recommendations and as indicated in the installation handbook.
- B. Do not install PEX tubing within 6 inches of gas appliance vents or within 12 inches of any recessed light fixtures.
- C. Do not solder within 18 inches of PEX tubing in the same waterline. Make sweat connections prior to making PEX connections.
- D. Do not expose PEX tubing to direct sunlight for more than 30 days.

- E. Ensure no glues, solvents, sealants or chemicals come in contact with the tubing without prior permission from the tubing manufacturer.
- F. Protect PEX tubing with sleeves where abrasion may occur.
- G. Use strike protectors where PEX tubing penetrates a stud or joist and has the potential for being struck with a screw or nail.
- H. Use tubing manufacturer-supplied bend supports where bends are less than six times the outside tubing diameter.
- I. Minimum horizontal supports are installed not less than 32 inches between hangers in accordance with model plumbing codes and the installation handbook.
- J. Minimum vertical supports are installed not less than 10 ft between hangers in accordance with model plumbing codes and the installation handbook.
- K. Maximum length of individual runs is 60 ft.
- L. Allow 1/8" in slack per foot of tubing to allow for thermal expansion.

3.2 CLEANING

- A. Clean and disinfect potable domestic water piping by filling system with water/chlorine solution with at least 50 mg/L of chlorine. Isolate with valves and allow standing for 24 hours. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.

3.3 PIPING SCHEDULE

- A. Above ground Distribution Piping: PEX Piping.

3.4 VALVE SCHEDULE

- A. Drawings indicate valve types to be used.
- B. Install gate valves close to main on each branch and riser serving two or more plumbing fixtures or equipment connections and where indicated.
- C. Install gate or ball valves on inlet to each plumbing equipment item, on each supply to each plumbing fixture not having stops on supplies, and elsewhere as indicated.
- D. Ball, butterfly, and check valves may be used in matching piping materials.
- E. Install drain valve at base of each riser, at low points of horizontal runs, and where required to drain water distribution piping system.

- F. Install swing check valve on discharge side of each pump and elsewhere as indicated.
- G. Install ball valves in each hot-water circulating loop and discharge side of each pump.

END OF SECTION 22 11 16

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SECTION 22 11 19 – DOMESTIC WATER PIPING SPECIALTIES

PART 1 – GENERAL

1.1 SUMMARY

- A. This section Includes:
1. Backflow prevention
 2. Clothes washer outlet boxes
 3. Expansion tank

1.2 SUBMITTALS

- A. Product Data.

PART 2 – MANUFACTURED UNITS

2.1 BACKFLOW PREVENTION

- A. 1 ½" Brass Check valve. WATTS 150S.

2.2 CLOTHES WASHER OUTLET BOXES:

- A. Washing machine outlet Box with 1/2" Press Valves.
- B. Complies with ASTM F 877 and ASTM F1960.
- C. Basis of design: provide outlet box equal or equivalent to:
1. [Viega Pureflow Washing Machine Box. Model no. 57001.](#)

2.3 ICE-MAKER OUTLET BOXES

- A. Ice-maker outlet box with 3/8" Press Valves.
- B. Complies with ASTM F 877 and ASTM F1960.
- C. Basis of design: provide outlet box equal or equivalent to:
1. [Viega Pureflow Ice-Maker Box. Model no. 57010.](#)

2.4 EXPANSION TANK

- A. Capacity: 20 gallon
- B. Finish: High UV powder coat
- C. Basis of design: Provide pump tank equal or equivalent to:

1. Wellsaver 20-Gallon Pump Tank. Model no. LPT-20.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Follow installation instructions outlines in 22 11 16 DOMESTIC WATER PIPING.
- B. Adhere to manufacturer’s recommendation and installation instructions.

END OF SECTION 22 11 19

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SECTION 22 11 23 – DOMESTIC WATER PUMPS

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes:
 - 1. Domestic water pump.

1.2 SUBMITTALS

- A. Product Data. Include performance curves with operating points plotted on curves, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1.3 REFERENCES

- A. Comply with UL 778 for motor-operated water pumps.

PART 2 – PRODUCTS

2.1 DOMESTIC WATER PUMPS

- A. In-Line, Centrifugal Pumps: Factory-assembled and –tested, in-line, close-coupled, canned-motor, centrifugal pumps. Motor and impeller on common shaft and designed for installation with pump and motor shaft horizontal. Rated for 80 psi maximum working pressure and 140° F maximum operating temperature.
 - 1. Basis of design: provide outlet box equal or equivalent to:
 - a. [Dayton 1D876, Automatic Demand Pump \(120VAC, 1/2HP, single phase\)](#).

2.2 MOTORS

- A. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 26 Sections.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Comply with HI 1.4.
- B. Install pumps with access for periodic maintenance, including removal of motors, impellers, couplings, and accessories.
- C. Support pumps and piping so weight of piping is not supported by pump volute.
- D. Install electrical connections for power, controls, and devices.

- E. Suspend in-line pumps independent from piping. Use continuous-thread hanger rods and vibration isolation hangers. Fabricate brackets or supports as required for pumps.
- F. Install vertical in-line pumps on concrete bases.
- G. Connect piping with valves that are at least the same size as piping connecting to pumps.
- H. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.
- I. Install shutoff valve(s) and strainer on suction side of pumps.
- J. Install non-slam check valve(s) and throttling valve(s) on discharge side of pumps.
- K. Install pressure sensor in buffer tank outlet piping.
- L. Install pressure gages on suction and discharge of each pump. Install at integral pressure gage tapings where provided.

END OF SECTION 22 11 23

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SECTION 22 12 00 – FACILITY POTABLE-WATER STORAGE

PART 1 – GENERAL

1.1 SUMMARY

- A. This section Includes:
 - 1. Potable water storage tank.

1.2 SUBMITTALS

- A. Storage tank product data.
- B. Shop drawings.

PART 2 – PRODUCTS

2.1 POTABLE-WATER SUPPLY STORAGE TANK

- A. Polyethylene Potable-Water Storage Tank: One single-chamber, molded, all polyethylene, fabricated for potable-water storage tank application.
 - 1. Capacity: 1050 gal.
 - 2. Medium duty (1.5 S.G.)
 - 3. Dimensions: 85" Height x 72" Diameter, 16"Ø opening
 - 4. Basis of design: Provide potable-water storage tank equivalent or equal to:
 - a. [ChemTainer 1050 Gallon Conical Bottom Bulk Storage Tank, Part number: TN7285JP](#)

2.2 POTABLE-WATER WASTE STORAGE TANK

- A. Polyethylene Potable-Water Storage Tank: One single-chamber, molded, polyethylene, flat bottomed, fabricated for potable-water storage tank application
 - 1. Capacity: 1050 gal.
 - 2. NSF/ANSI Standard 61
 - 3. Dimensions: 54" Height, 86" Diameter, 16"Ø opening
 - 4. Basis of design: Provide potable-water storage tank equivalent or equal to:
 - a. [Ace Roto-Mold Vertical Tank. Part no. VT1050-86.](#)

PART 3 – EXECUTION

3.1 FACILITY POTABLE-WATER STORAGE TANK INSTALLATION

- A. Install potable-water storage tanks level.
- B. Install polyethylene potable-water storage tanks according to guidelines.
 - 1. Accessibility, ease of maintenance, and removal should be taken into consideration when installing tanks.
 - 2. Adequately support all pipes and valves. Do not apply excess weight on water tanks.

3. Tanks are not designed for storage of fluid in vacuum conditions or higher pressure above atmospheric.
 4. Use caution when handling all tanks.
- C. Fill potable-water supply storage tank with potable water.

END OF SECTION 22 12 00

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SECTION 22 13 16 – SANITARY WASTE AND VENT PIPING

PART 1 – GENERAL

1.1 SUMMARY

- A. This section Includes:
 - 1. Sanitary waste piping

1.2 SECTION REQUIREMENTS

- A. Minimum Pressure Requirement for Soil, Waste, and Vent: 4.5 psi.
- B. Comply with NSF 14, "Plastic Piping Components and Related Materials," for plastic piping components.

PART 2 – PRODUCTS

2.1 PIPING

- A. ABS Pipe and Fittings: ASTM D 2665, Schedule 40, plain ends.
 - 1. 1-1/2" diameter, ABS Pipe
 - 2. 2" diameter, ABS Pipe
 - 3. 3" diameter, ABS Pipe

2.2 FITTINGS

- A. Air admittance valve
 - 1. 2" NPT Threads
 - 2. Tensions membrane: Neoprene
 - 3. Sensitivity: -0.1psi
 - 4. Basis of design:
 - a. [Oatey 20 DFU Sure-Vent Air Admittance Valve with Schedule 40 Adapter. Product no. 39016.](#)
- B. ABS P-Trap
 - 1. ASTM D 2665, Schedule 40
 - 2. 1.5"

PART 3 – EXECUTION

3.1 PIPING INSTALLATION

- A. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for basic piping installation requirements.

- B. Install wall penetration system at each pipe penetration through foundation wall. Make installation watertight. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for wall penetration systems.
- C. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- D. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated.
- E. Horizontal Sanitary Drain: 1/4" per ft slope downward in direction of flow for piping NPS 2" and smaller; 1/8" per ft slope downward in direction of flow for piping NPS 4" and larger.
- F. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- G. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.
- H. Install underground PVC soil and waste drainage piping according to ASTM D 2321.
- I. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- J. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for basic piping joint construction.
- K. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure unless otherwise indicated.
- L. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for pipe hanger and support devices.

3.2 PIPE SCHEDULE

- A. Aboveground Applications: ABS plastic, DWV pipe and fittings with solvent-cemented joints.
- B. Belowground Applications: ABS plastic, DWV pipe and fittings with solvent-cemented joints.

END OF SECTION 22 13 16

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SECTION 22 13 42 – FACILITY PACKAGED SEWAGE PUMPING STATIONS

PART 1 – GENERAL

1.1 SUMMARY

- A. This section Includes:
 - 1. Sewage pumping kit.

1.2 SECTION REQUIREMENTS

- A. Submittals: Product Data
- B. Pump performance curve.

PART 2 – PRODUCTS

2.1 PACKAGED SEWAGE PUMPING STATION

- A. BASIN: Poly molded 24" x 24" basin
 - 1. Cover: On-piece molded PSF cover with integrated molded foam seal
 - 2. Capacity: 41 gallon.
 - 3. 4" inlet, predrilled.
 - 4. Threaded, 2" vent and 2" discharge piping connections
- B. PUMP: [Cast iron/thermoplastic] construction sewage pump
 - 1. Full 2" solids capacity
 - 2. [0.4 HP/0.5HP]
 - 3. 115 Volts
- C. Basis of design: Provide sewage pumping kit equivalent or equal to:
 - 1. [Zoeller Preassembled 24" x 24" Sewage System, Model \[211/264/266\]](#).

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install basin level.
- B. Install close to main drain.
- C. Follow manufacturer's assembly instructions.
- D. Fill pit with a little water, to ensure it doesn't move.
- E. Connect and hang all piping in accordance with Section 22 05 00.

END OF SECTION 22 13 42

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SECTION 22 33 00 – RESIDENTIAL ELECTRIC DOMESTIC WATER HEATERS

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes:
1. Water heaters

1.2 SUBMITTALS

- A. Product Data. Including capacity, temperature setting range, control type, dimensions, and power ratings.

PART 2 – PRODUCTS

2.1 ELECTRIC WATER HEATERS

- A. Electrical Requirements
1. Dedicated 30 Amp min. required
 2. 240V
 3. 4,500 Watts max.
- B. Energy factor (hybrid mode): 2.35
- C. Unit capacity: 50 Gallons
- D. Dimensions:
1. Depth: 21 $\frac{3}{4}$ in.
 2. Height: 60 $\frac{1}{2}$ in.
 3. Width 21 $\frac{3}{4}$ in.
- E. Operating pressure: 20-125 PSI
- F. ENERGY STAR qualified.
- G. Basis of design: Provide hybrid electric-heat pump water heater equal or equivalent to:
1. [GE Geospring Hybrid, model no. GEH50DNSRSA.](#)

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Water heaters shall be installed level and plumb.

- B. Water heaters shall be installed and connected in accordance with manufacturer's written instructions.
- C. Water heaters shall be set at 120 degrees F.

END OF SECTION 22 33 30

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SECTION 22 41 00 – RESIDENTIAL PLUMBING FIXTURES

PART 1 – GENERAL

1.1 SUMMARY

- A. This section Includes:
1. Water closets
 2. Baths and Showers and accessories
 3. Faucets
 4. Sinks

1.2 SUBMITTALS

- A. Product Data for each type of plumbing fixture, including trim, fittings, accessories, appliances, appurtenances, equipment, and supports.

1.3 REFERENCES

- A. Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities" for plumbing fixtures for people with disabilities.
- B. Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
- C. Comply with NSF 61, "Drinking Water System Components - Health Effects," for fixture materials that will be in contact with potable water.

PART 2 – PRODUCTS

2.1 WATER CLOSETS

- A. PF4. Round front, elongated bowl water closet.
1. Material: Vitreous china construction.
 2. Trapway: 2-1/8" glazed.
 3. Dimensions: 27-1/2" L x 19-5/8" W x 28-1/4" H
 4. 12" rough-in less supply.
 5. 1.28 GPF
 6. Polished chrome trip lever
 7. Basis of design: provide water closet equal or equivalent to:
 - a. [Kohler Wellworth Class Five Toilet, Model K3577.](#)

2.2 BATH AND SHOWER

- A. PF2: Alcove-style, one-person, rectangular bathtub.
1. Material: Cast-iron construction with slip resistant surface finish in tub.

AS-BUILT

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2. Dimensions: 60" L x 34-1/4" W x 14" H.
 3. Finish: White
 4. Extra 4" ledge
 5. Left drain.
 6. Basis of design: Provide bathtub equal or equivalent to:
 - a. [Kohler Villager Bath, Model K-713.](#)
- B. PF3: Bath and shower trim to include showerhead, handle, and bath faucet.
1. Material: Brass construction
 2. Handle: lever handle
 3. Diverter: Push-button
 4. Finish: Polished chrome
 5. Also provide all necessary valves and stops as required by manufacturer
 6. Basis of design: Provide bath and shower trim equal or equivalent to:
 - a. [Kohler Marguax Rite-Temp Bath and Shower Trim. Model K-T16233-4.](#)
- C. PF8: Diverter Spout
1. Material: Polished Chrome
 2. Basis of design: Provide diverter spout equal or equivalent to:
 - a. [Kohler Memoirs Diverter Spout. Model K-496.](#)
- D. PF9: Bath and Shower Valve
1. Material: Brass and Plastic
 2. Basis of design: Provide bath and shower valve equal or equivalent to:
 - a. [Kohler Rite-Temp Valve. Model K-304.](#)
- E. PF8: Through-the-floor bath drain.
1. Material: Brass construction
 2. Finish: Polished chrome
 3. Includes adjustable trip lever drain
 4. 1-1/2" Connection
 5. Removable grid strainer
 6. Product shall be intended for 14" deep bath installations.
 7. Basis of design: Provide bath drain equal or equivalent to:
 - a. [Kohler Swiftflo bath drain. Model K-11660.](#)

2.3 FAUCETS

- A. PF6: Single-control lavatory faucet.
1. Material: Brass construction
 2. Finish: Polished chrome
 3. Flow rate: 1.5 gallon per minute
 4. Spout reach: 4-3/8"
 5. Valve: One-piece, self-contained ceramic disc valve, which allows both volume and temperature control and temperature memory
 6. Product shall include pop-up drain with lift rod and tailpiece

7. Basis of design: Provide single-control lavatory faucet equal or equivalent to:

a. [Kohler Panache Single-Control Lavatory Faucet. Model K-18140.](#)

B. PF5: Pull-down kitchen sink faucet.

1. Material: Metal construction

2. Finish: Polished Chrome.

3. Flow rate: 2.2 gallons per minute

4. Spout: 9" reach, 360 degree rotation

5. Valve: remote, one-piece, self-contained ceramic disc valve, allowing volume and temperature control and temperature memory

6. Product shall include high-temperature limit setting, aerated flow, and pause function.

7. Basis of design: Provide pull-down kitchen sink faucet equal or equivalent to:

a. [Kohler Simplice Pull-Down Kitchen Sink Faucet. Model K-647.](#)

2.4 SINKS

A. PF1: Double (equal) compartment under counter sink.

1. Material: 18 gauge stainless steel construction

2. Finish: Stainless steel

3. Dimensions: 28-3/4" L x 15" W x 7-5/8" H

4. Basis of design: Provide under counter sink equal or equivalent to:

a. [Kohler Undertone Undercounter Sink. Model K-3180.](#)

B. PF7: Under counter lavatory sink.

1. Body Material: Vitreous China

2. Finish: White.

3. Product shall include overflow protection and without faucet holes.

4. Basis of design: Provide under counter lavatory sink equal or equivalent to:

a. [Kohler Verticyl Undercounter Lavatory. Model K-2882.](#)

PART 3 – EXECUTION

3.1 INSTALLATIONS

A. Install fitting insulation kits on fixtures for people with disabilities.

B. Install fixtures with flanges and gasket seals.

C. Install flushometer valves for accessible water closets with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.

D. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.

E. Fasten wall-hanging plumbing fixtures securely to supports attached to building substrate when supports are specified, and to building wall construction where no support is indicated.

- F. Fasten floor-mounted fixtures to substrate. Fasten fixtures having holes for securing fixture to wall construction, to reinforcement built into walls.
- G. Fasten wall-mounted fittings to reinforcement built into walls.
- H. Fasten counter-mounting plumbing fixtures to casework.
- I. Secure supplies to supports or substrate within pipe space behind fixture.
- J. Set shower receptors and mop basins in leveling bed of cement grout.
- K. Install individual supply inlets, supply stops, supply risers, and tubular brass traps with cleanouts at fixture.
- L. Install water-supply stop valves in accessible locations.
- M. Install traps on fixture outlets.
- N. Fixtures having integral traps. Omit traps on indirect wastes unless otherwise indicated.
- O. Install disposers in sink outlets. Install switch where indicated, or in wall adjacent to sink if location is not indicated.
- P. Install hot-water dispensers in back top surface of sink or in counter with spout over sink.
- Q. Install escutcheons at wall, floor, and ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons where required to conceal protruding pipe fittings.
- R. Seal joints between fixtures and walls, floors, and counters using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color.
- S. Install piping connections between plumbing fixtures and piping systems and plumbing equipment. Install insulation on supplies and drains of fixtures for people with disabilities.
- T. Ground equipment.

END OF SECTION 22 41 00

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SECTION 23 07 00 – HVAC INSULATION

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes:
 - 1. Blanket-type duct insulation material.
 - 2. Self-adhesive foam and foil duct insulation.

1.2 RELATED SECTIONS

- A. Section 23 31 00 – HVAC DUCT & CASING
- B. Section 23 33 00 – DUCT ACCESSORIES

PART 2 – PRODUCTS

2.1 BLANKET-TYPE DUCT INSULATION MATERIAL

- A. Fiberglass thermal duct insulation with stapling/taping tab along one edge, foil covered.
- B. Basis of design; provide insulation equal or equivalent to:
 - 1. [CertainTeed QuickWrap Insulation](#).
 - a. 2" thick fiberglass, 24" wide.
 - b. R-6.9.

2.2 SELF-ADHESIVE FOAM AND FOIL DUCT INSULATION

- A. Self-adhesive foam and foil duct insulation, 12" width, 1/8" thickness, thermal insulation rating of R-6.
- B. Basis of design; provide insulation equal or equivalent to:
 - 1. Frost King Foam & Foil Duct Insulation
 - a. 12" x 1/8" x 15'

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install according to manufacturer's written instructions and recommendations
- B. Seal all ducts prior to installation of insulative materials.
- C. Ensure sheet metal is clean, and dry prior to insulation of product.
- D. An overlap (taping flap) of 2" is required to connect sections of blanket-type duct insulation.

- E. A self-adhered overlap of 1" is required for connections of sections of self-adhesive foam and foil insulation.
- F. Utilize self-adhesive foam and foil duct insulation on all supply ducts of diameter less than ten inches.
- G. Utilize blanket-type duct insulation material on all supply ducts of diameter greater than ten inches.

END OF SECTION 23 07 00

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SECTION 23 09 00 – INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 – GENERAL

1.3 SUMMARY

- A. This section includes programmable thermostat.

1.4 RELATED SECTIONS

- A. Section 25 50 00 - INTEGRATED AUTOMATION FACILITY CONTROLS
- B. Section 25 90 00 - INTEGRATED AUTOMATION SEQUENCE OF OPERATIONS

1.5 SUBMITTALS

- A. Product data.

PART 2 – PRODUCTS

2.3 THERMOSTAT

- A. Programmable, 7" high definition, color touch screen with wireless connectivity to gather and display weather data, including forecasts, radar images and weather alerts and monitor energy-efficiency.
- B. Basis of design: provide thermostat equal or equivalent to:
 - 1. [Trane ComfortLink II XL950](#)

PART 3 – EXECUTION

3.2 INSTALLATION

- A. Install according to manufacturer's written instructions and recommendations
- B. Program according to DIV 25.

END OF SECTION 23 09 00

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SECTION 23 31 00 – HVAC DUCTS AND CASINGS

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Duct materials.
 - 2. Insulated flexible round duct.
 - 3. Double-wall, insulated round ducts.
 - 4. Flat rectangular ducts.
 - 5. Single wall spiral round ducts.

1.2 RELATED SECTIONS

- A. Section 23 07 00 – HVAC Insulation
- B. Section 23 23 00 – Duct Accessories

1.3 SUBMITTALS

- A. Product data.
- B. Shop drawings: detailed supply and return layout of entire system with applicable details to be submitted for engineer's approval.

PART 2 – PRODUCTS

2.1 DUCT MATERIALS

- A. Fasteners: Rivets, bolts, or sheet metal screws.
- B. Hanger rod: ASTM A36/A36M galvanized steel, threaded both ends, threaded one end, or continuously threaded.

2.2 FLAT RECTANGULAR DUCTS

- A. Galvanized steel duct: ASTM A653 galvanized steel sheet, lock-forming quality, having G60 zinc coating in conformance with ASTM A90/A90M.

2.3 SINGLE-WALL SPIRAL ROUND DUCTS

- A. Galvanized steel duct: ASTM A653 galvanized steel sheet, lock-forming quality, having G60 zinc coating in conformance with ASTM A90/A90M.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards – Metal and Flexible.
- B. During construction, install temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- C. Use crimp joints with or without bead or beaded sleeve couplings for joining round duct sizes 8 inch and smaller.
- D. Use double nuts and lock washers on threaded rod supports.
- E. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.
- F. Set plenum doors 6 to 12 inches above floor. Arrange door swing so fan static pressure holds door in closed position.
- G. Casings: Install floor mounted casings on 4 inch high concrete curbs. At floor, rivet panels on 8 inch centers to angles.
- H. Use remote linkage dampers above gypsum ceilings or where not accessible.

END SECTION 23 31 00

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SECTION 23 33 00 – DUCT ACCESSORIES

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Back-draft dampers.
 - 2. Duct access doors.
 - 3. Flexible duct connections.
 - 4. Self-sealing, round fittings.

1.2 RELATED SECTIONS

- A. Section 23 07 00 – HVAC Insulation
- B. Section 23 31 00 – HVAC Ducts and Casings

1.3 SUBMITTALS

- A. Product data.

PART 2 – PRODUCTS

2.1 BACK-DRAFT DAMPERS

- A. Product Description: Multi-Blade, back-draft dampers.
- B. Parallel-action, gravity-balanced or counter-balanced as indicated.
- C. Fabrication: Galvanized 16 gage thick steel. Blades, maximum 6 inch width, with felt or flexible vinyl sealed edges. Blades linked together in rattlefree manner with 90-degree stop, steel ball bearings, and plated steel pivot pin.
- D. Furnish dampers with adjustment device to permit setting for varying differential static pressure.

2.2 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Connector: Woven Fiberglass.
 - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric conforming to NFPA 90A, minimum density 24 oz per sq yd.
 - 2. Temperature rating -40 degrees F to 250 degrees F, .024" thick.
 - 3. Dura Dyne Durolon or approved equal.

2.3 SELF-SEALING GASKETS

A. Product Description:

1. Self-sealing adhesive rubber gasket tape for non-sealed duct flanges between house "cores."
2. Constructed of pre-formed expanded rubber with an adhesive backing strip.
3. Size: 14 mm x 6 mm.

2.4 INSULATED FLEXIBLE DUCTS

A. Product Description: Two ply vinyl film supported by helical wound spring steel wire; fiberglass insulation; polyethylene vapor barrier film.

1. Pressure Rating: 10 inches wg positive and 1.0 inches wg negative.
2. Maximum Velocity: 4000 fpm.
3. Temperature Range: -10 degrees F to 160 degrees F.
4. Thermal Resistance: 4.2 square feet-hour-degree F per BTU.
5. Diameter: 6".

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Before installation, verify ducts and equipment installations are ready for accessories.
- B. Check location of air outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

3.2 INSTALLATION

- A. Install in accordance with NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Install permanent duct test holes where required for testing and balancing purpose.
- C. Limit flexible duct lengths to a maximum of 5 feet on low pressure duct and 1 foot on medium pressure duct.

END SECTION 23 33 00

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SECTION 23 37 00 – AIR INLETS AND OUTLETS

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Diffusers
 - 2. Grilles

1.2 RELATED SECTIONS

- A. Section 23 31 00 – HVAC Ducts and Casings

1.3 SUBMITTALS

- A. Manufacturer literature and data.

PART 2 – PRODUCTS

2.1 TWO-WAY SUPPLY DIFFUSER

- A. 6" X 6" Neck size:
 - a. [Model #:ABSWWH466](#)
 - b. Material: Galvanized Steel
 - c. 4-way Air Deflection
 - d. Manufacturer: Accord
- B. 8" X 8" Neck size:
 - a. [Model #:ABSWWH488](#)
 - b. Material: Galvanized Steel
 - c. 4-way Air Deflection
 - d. Manufacturer: Accord
- C. 10" X 8" Neck size:
 - a. [Model #:ABSWWH3108](#)
 - b. Material: Galvanized Steel
 - c. 3-way Air Deflection
- D. Noise Criteria: NC < 30

2.2 RETURN AIR GRILLE

- A. 6" x 6" Neck Size
 - a. [Model #: ABRGWH66](#)
 - b. Material: Galvanized Steel

- c. White Finish
 - d. Manufacturer: Accord
- B. 8" x 6" Neck Size
 - a. [Model #: ABRGW86](#)
 - b. Material: Galvanized Steel
 - c. White Finish
 - d. Manufacturer: Accord
- C. 8" x 8" Neck Size
 - a. [Model #: ABRGW88](#)
 - b. Material: Galvanized Steel
 - c. White Finish
 - d. Manufacturer: Accord
- D. 18" x 3" Neck Size
 - a. Material: Solid Oak
 - b. Clear Coat Finish
- E. Noise Criteria: NC < 30

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Protection and Cleaning: Protect equipment and materials against physical damage.
- B. All ducts, if exposed to view, must be painted to match adjacent wall or ceiling.

3.2 OPERATION AND PERFORMANCE TESTS

- A. Ensure required airflow and distribution throughout space per volumetric requirements after installation.

END SECTION 23 37 00

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SECTION 23 40 00 – HVAC AIR-CLEANING DEVICES

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes whole-house combined particulate and electronic air filtration system.

1.2 RELATED SECTIONS

- A. INDOOR CENTRAL-STATION AIR-HANDLING UNITS – 23 73 00

1.3 SUBMITTALS

- A. Product Data, Including:
 - 1. Published literature: indicate capacities, ratings, gages, and finishes of materials, and electrical characteristics and connection requirements.

PART 2 – PRODUCTS

2.1 [TRANE CLEANEFFECTS WHOLE HOUSE AIR CLEANER](#)

- A. Model Number: TFD235ALAH000C
- B. Overall Dimensions: 7-1/2" X 23-1/2" X 21"
- C. Clean air delivery rate: 1200
- D. Airflow range: 350-1600 CFM
- E. Input power: 24-volt

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Follow the equipment manufacturer's instructions for handling and installation.
- B. Install units with adequate spacing and access for cleaning and maintenance of filters.

END OF SECTION 23 40 00

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SECTION 23 42 00 – GAS-PHASE AIR FILTRATION

PART 1 – GENERAL

1.1 SUMMARY

- A. This specification describes a living wall system, which was designed and built at Purdue University to provide air filtration in the environment.
- B. System includes:
 - 1. Matrix material
 - 2. Water basin
 - 3. Irrigation System
 - 4. Air plenum
 - 5. Sump pump
 - 6. Vegetation
 - 7. Edging details

1.2 RELATED SECTIONS

- A. Section 23 31 00 - HVAC Ducts and Casings
- B. Section 26 51 00 – Interior Lighting

1.3 SUBMITTALS

- A. Product Data
- B. Shop Drawings

PART 2 – PRODUCTS

2.1 MANUFACTURER

- A. Custom

2.2 Biowall

- A. Product Description: The Biowall is installed within the home and consists of various plant species and their associated root microorganisms, which are embedded into a vertical porous matrix. The biological system is maintained by a pump, which feeds nutrients and water to the top of the wall and flows downward toward a collection basin. The unit is made up of the matrix material, water basin, sump pump, vegetation, and an air plenum connecting the unit into the central return of the HVAC system. The HVAC system draws air through the Biowall. Domestic water supply and drainage should be located nearby as well as electric power. The supply water line must be provided with a shut-off valve installed by others.

- B. Matrix material: The matrix material provides the support structure for the plant material. The matrix material must be air-permeable and porous enough to allow the roots of the plants to intertwine.
1. Basis of design: provide HVAC filter and trellis support equal or equivalent to:
 - a. [Flanders Naturaleire Cut-to-Fit 24"x36"](#)
 - b. 2'x6' composite trellis
- C. Water basin and gutter system: The gutter collects any water discharge from the plants and discharges it into tubing and then into a water basin that sits below the Biowall.
1. Basis of design: provide gutter system and water basin equal or equivalent to:
 - a. 2"H x 2"D x 24"W stainless steel gutter
 - b. 9"H x 12"D x 16"W stainless steel basin with 5" tall legs
- D. Irrigation System: The irrigation system involves supply water to the wall with a connection to a float valve in the basin, pumping water through hose to the top of the wall, discharging the majority of the water through a PVC manifold, pumping some water back down to a discharge drain to keep the water from becoming contaminated, collecting condensate from the ducted-dehumidifier, and an overflow connection to a discharge drain
1. Basis of design: provide an irrigation system equal or equivalent to:
 - a. [Kerick ¼" adjustable mini float valve, Model: MAB22 with 4" float](#)
 - b. TotalPond ½" ID flexible tubing to run from sump pump to manifold
 - c. ½" PVC pipe with holes drilled across length to allow water to discharge evenly and appropriate connections to attach to flexible tubing
 - d. TotalPond ½" ID flexible tubing to run from manifold into overflow with PVC ball valve inline to control how much water is discharged down the drain
 - e. Make any required modifications to route the condensate line from the ducted-dehumidifier into the water basin
 - f. 1 ½" PVC pipe to 1" PVC pipe, connected into basin and routed to nearby waste drain
- E. Air plenum: The plenum must meet or exceed the following: made of aluminum or stainless steel unless otherwise noted, class "A" fire rating, UV resistant, and temperature range -40°F to 176°F+
1. Basis of design: provide an air plenum equal or equivalent to:
 - a. 73" H x 20" D x 24" W stainless steel plenum with a slight angle on the bottom to allow water to run into the front gutter system, and 18" tall legs. The plenum should have a 6 inch duct connection in the top.
- F. Sump pump: The pump circulates the water from the bottom of the wall to the top of the wall and is sized based on the width and height of the wall.
1. Basis of design: provide a sump pump equal or equivalent to:
 - a. [TotalPond Pond Pump 210 GPH](http://www.total-pond.com/pond-supplies/pumps/pond-pump-210-gph-pump-dd11210): <http://www.total-pond.com/pond-supplies/pumps/pond-pump-210-gph-pump-dd11210>
- G. Vegetation: The wall can be composed of a many different types of plants, but there are some considerations that need to be made. Plants should be chosen based on their effective removal rates of volatile organic compounds and need to be able to survive indoors.
1. Basis of design: provide vegetation equal or equivalent to:
 - a. Heartleaf Philodendron, 3", QTY: 30

b. Golden Pothos, 3", QTY:30

- H. Edging details: The Biowall and any lighting may be edged with wood, metal, plastic or other materials to match the proposed or existing facade of the building. A cover should also be built to conceal the bottom of the wall where the plumbing and water basin is.

PART 3 – EXECUTION

3.1 STORAGE

- A. Vegetation materials must be stored in a secure, cool shady environment out of direct sunlight prior to installation. Vegetation must be protected from rapid temperature changes of more than 30°F per hour. All vegetation is to be installed within 1 day of being delivered.
- B. All other materials (non-living) should be stored in a dry location out of direct sunlight with original packaging and documentation left intact prior to installation.

3.2 EXAMINATION

- A. Verify ductwork is ready for Living Wall installation.
- B. Verify domestic water lines (supply and drain) are ready for Living Wall installation.
- C. Verify electricity is nearby for pump and outlets are in working order.

3.3 INSTALLATION

- A. The NauralAire filter should be assembled with other filters to match the size of the wall. It would be assembled with an equally sized filter, one on top of the other, to allow more depth for the plant roots to attach.
- B. The filter should be attached to the trellis with green zip ties.
- C. A slot should be cut into the filter and the vegetation placed within the slot and wrapped with rockwool.
- D. The wall surface must be free and cleared of any obstructions prior to the installation of the Living Wall brackets or support structure.
- E. Waterproofing or vapor barrier that may have been specified should be applied or installed prior to any mounting brackets or stand off structure being installed
- F. The brackets or support structure must be mounted to the wall using appropriate fasteners to support the load of the Living Wall when fully saturated. All brackets or structures must be perfectly level.

- G. Connect supply line and drain lines
- H. Connect float valve to main water line and to electricity per manufacturer instructions
- I. Route condensate into basin
- J. Connect required ductwork in accordance with Section 23 31 00.
- K. Place growth medium with attached vegetation into the plenum
- L. Irrigation controllers, check valves, pressure reducers and evacuation ports should be installed once main water lines are connected on the wall
- M. An irrigation test must be preformed after installation to check that the system is functioning properly.

END OF SECTION 23 42 00

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SECTION 23 72 23 – PACKAGED AIR-TO-AIR ENERGY RECOVERY UNITS

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes packaged static plate enthalpic-energy recovery ventilator and related parts.

1.2 RELATED SECTIONS

- A. HVAC DUCTS AND CASING – 23 33 00

1.3 SUBMITTALS

- A. Product Data, Including:
 - 1. Published literature: indicate airflow range and directions, ratings, ventilation and energy performance data, dimensions, and electrical characteristics and connection requirements.

1.4 REFERENCES

- A. Underwriters Laboratories 1812
- B. Home Ventilating Institute: CSA 439

PART 2 – PRODUCTS

2.1 [TRANE FRESHEFFECTS ENERGY RECOVERY VENTILATOR \(ERV\)](#)

- A. Model Number: TERVR100A9P00A
- B. Blower Assembly:
 - a. Two blower wheels, with one operating speed. One, 0.09 HP motor with an nominal motor speed of 1750 RPM.
- C. Filter:
 - a. Cleanable polyester filter, furnished with equipment.
- D. Electrical Requirements:
 - a. 120 Volts, 1.3 Amps
- E. Ventilation:
 - a. Continuous or intermittent ventilation, with passive defrost.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Follow the equipment manufacturer's instructions for handling and installation, and setting up of ductwork for maximum efficiency.
- B. Seal ductwork tightly to avoid air leakage.
- C. Insulate ductwork to outdoor exhaust and fresh air intake.
- D. Ensure spacing of at least 10' between outdoor exhaust and fresh air intake.
- E. Do not locate fresh air intake within 10' of any exhaust or potential contaminant sources.

Install units with adequate spacing and access for cleaning and maintenance of filters.

END SECTION 23 72 23

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SECTION 23 73 00 – INDOOR CENTRAL-STATION AIR-HANDLING UNITS

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes modular factory fabricated air-handling units and accessories.

1.2 RELATED SECTIONS

- A. Section 23 31 00 – HVAC DUCTS AND CASING
- B. Section 23 33 00 – DUCT ACCESSORIES
- C. Section 23 40 00 – HVAC AIR-CLEANING DEVICES

1.3 SUBMITTALS

- A. Product Data, Including:
 - 1. Published literature: indicate capacities, ratings, gages, and finishes of materials, and electrical characteristics and connection requirements.

PART 2 – PRODUCTS

2.1 [TRANE HYPERION VARIABLE SPEED MODULAR MULTI-POSITION AIR HANDLER](#)

- A. Model Number: TAM8A0C36H31SA
- B. Cabinet:
 - a. Composite outside and inside casing and floor plate.
 - b. Insulation: Foam-filled double wall, R-4.2 insulating value.
 - c. Overall Dimensions: 57-1/4" X 23-1/2" X 21-1/4"
- C. Indoor Fan: centrifugal , variable speed, ½ HP, with slide-out construction.
- D. Indoor Coil: plate fin, EEV refrigerant control, all-aluminum construction.
- E. Filter Size: Trane CleanEffects air cleaner. See HVAC AIR-CLEANING DEVICES – 23 40 00.
- F. Auxiliary Heat: Electric resistance attachment, Trane BAYEVAC05BK1AA.
 - a. Minimum airflow: 720 CFM (with heat pump)
 - b. Capacity: 4.8 kW (16392 BTUH)

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Follow the equipment manufacturer's instructions for handling and installation.

- B. Seal ductwork tightly to avoid air leakage.
- C. Install units with adequate spacing and access for cleaning and maintenance of filters.
- D. Attach to supply and return duct with a flexible duct connection to attenuate sound and vibration. See SECTION 23 33 00 – DUCT ACCESSORIES

END SECTION 23 73 00

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SECTION 23 81 43 – AIR SOURCE UNITARY HEAT PUMPS

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes packaged outdoor unit heat pump/air conditioner and related equipment.

1.2 RELATED SECTIONS

- A. INDOOR CENTRAL-STATION AIR-HANDLING UNITS – 23 73 00

1.3 REFERENCES

- A. ARI Standard 210/240, 270
- B. National Electric Codes
- C. AHRI Standard 270-2008

1.4 SUBMITTALS

- A. Product Data, Including:
 - 1. Published literature: indicate capacities, ratings, gages, and finishes of materials, and electrical characteristics and connection requirements.

PART 2 – PRODUCTS

2.1 [TRANE XL20i HEAT PUMP \(2 TON\)](#)

- A. Model Number: 4TWZ0024-SUB-100.03
- B. Compressor – Climatuff:
 - 1. Two-stage compressor, with start components, insulation blanket, and compressor heat.
- C. Fan:
 - 1. One – 27.6” dia. direct drive, two speed fan (759/493 RPM), with one - 1/3 HP motor.
- D. Coil – Spine Fin:
 - 1. EEV refrigerant control, 3/8” tube size.
- E. Refrigerant:
 - 1. R-410A, 10 lbs, factory supplied.
- F. Sound Power Level:
 - 1. Low stage: 62 dB(A)

2. High stage overall: 70 dB(A)

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.
- B. All installation shall be in accordance with manufacturer's published instructions.

END SECTION 23 81 43

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SECTION 23 84 16 – DEHUMIDIFIERS

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes packaged inline dehumidification units and related connections and accessories.

1.2 RELATED SECTIONS

- A. Section 23 84 16 – HVAC DUCTS AND CASINGS

1.3 SUBMITTALS

- A. Product Data, Including:
 - 1. Published literature: indicate capacities, ratings, gages, and finishes of materials, and electrical characteristics and connection requirements.

PART 2 – PRODUCTS

2.1 [ULTRA-AIRE 70H VENTILATING DEHUMIDIFIER](#)

- A. Part Number: 4029870
- B. References:
 - a. National Electric Codes
 - b. ASHRAE Standard
- C. Blower: 160 CFM
- D. Overall Dimensions: 28" X 12" X 12"
- E. Filter: MERV 11, meets or exceeds ASHRAE Dust Spot Test at 65% Efficiency.
- F. Moisture Removal: 70 pints/day at 4.9 pints/kWh
- G. Energy factor: 2.32 L/kWh
- H. Supply Voltage: 110-120VAC-1 phase- 60 Hz

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.
- C. Include section of flexible duct between rigid supply/return duct and dehumidification unit.
- D. All installation shall be in accordance with manufacturer's published instructions for "UltraAire 70H Attic Installation."

END SECTION 23 84 16

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SECTION 25 50 00 – INTEGRATED AUTOMATION FACILITY CONTROLS

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes:
1. Integrated controls.

1.2 DESCRIPTION

- A. General: The control system shall consist of a high-speed, peer-to-peer network of DDC controllers and a web-based operator interface. Depict each mechanical system and building floor plan by a point-and-click graphic. A web server with a network interface card shall gather data from this system and generate web pages accessible through a conventional web browser on each PC connected to the network. Operators shall be able to perform all normal operator functions through the web browser interface

1.3 CODES AND STANDARDS

- A. Work, materials, and equipment shall comply with the most restrictive of local, state, and federal authorities' codes and ordinances or these plans and specifications. These include but are not limited to the following:
1. National Electric Code (NEC)
 2. International Building Code (IBC)
 3. International Mechanical Code (IMC)

1.4 SYSTEM PERFORMANCE

Table 1
Reporting Accuracy

Measured Variable	Reported Accuracy
Temperature	±2°F
Relative Humidity	±5% RH
Total Volatile Organic Compounds (TVOC)	±5% ppm
Carbon Dioxide (CO ₂)	±3% ppm

PART 2 – PRODUCTS

2.1 COMMUNICATION

- A. Control products, communication media, connectors, repeaters, hubs, and routers shall comprise a BACnet internetwork.

- B. Controllers with real-time clocks shall use the BACnet Time Synchronization service. System shall automatically synchronize system clocks daily from an operator-designated controller via the internetwork. If applicable, system shall automatically adjust for daylight saving and standard time.
- C. System shall support Web services data exchange with any other system that complies with XML (extensible markup language) and SOAP (simple object access protocol) standards specified by the Web Services Interoperability Organization (WS-I) Basic Profile 1.0 or higher. Web services support shall as a minimum be provided at the workstation or web server level and shall enable data to be read from or written to the system.
 - 1. System shall support Web services read data requests by retrieving requested trend data or point values (I/O hardware points, analog value software points, or binary value software points) from any system controller or from the trend history database.
 - 2. System shall support Web services write data request to each analog and binary object that can be edited through the system operator interface by downloading a numeric value to the specified object.
 - 3. For read or write requests, the system shall require user name and password authentication and shall support SSL (Secure Socket Layer) or equivalent data encryption.
 - 4. System shall support discovery through a Web services connection or shall provide a tool available through the Operator Interface that will reveal the path/identifier needed to allow a third party Web services device to read data from or write data to any object in the system which supports this service.
- D. Basis of design: Provide local controller/router and expanders equal or equivalent to:
 - 1. [Automated Logic Controls model ME812uLGR & MEx816u.](#)

2.2 OPERATOR INTERFACE

- A. Operator Interface. Web server shall reside on high-speed network with building controllers. Each standard browser connected to server shall be able to access all system information. In addition to the primary operator interface, the system shall include a secondary interface compatible with a locally available commercial wireless network and viewable on a commercially available wireless device such as a Wireless Access Protocol (WAP) enabled cellular telephone or personal digital assistant (PDA). This secondary interface may be text-based and shall provide a summary of the most important data.
- B. Operator Functions. Operator interface shall allow each authorized operator to execute the following functions as a minimum:
 - 1. Log In and Log Out. System shall require user name and password to log in to operator interface.
 - 2. Point-and-click Navigation. Operator interface shall be graphically based and shall allow operators to access graphics for equipment and geographic areas using point-and-click navigation.
 - 3. View and Adjust Equipment Properties. Operators shall be able to view controlled equipment status and to adjust operating parameters such as set points, PID gains, on and off controls, and sensor calibration.
 - 4. View and Adjust Operating Schedules. Operators shall be able to view scheduled operating hours of each schedulable piece of equipment on a weekly or monthly calendar-based graphical schedule display, to select and adjust each schedule and time period, and to simultaneously schedule

related equipment. System shall clearly show exception schedules and holidays on the schedule display.

5. View and Respond to Alarms. Operators shall be able to view a list of currently active system alarms, to acknowledge each alarm, and to clear (delete) unneeded alarms.

6. View and Configure Trends. Operators shall be able to view a trend graph of each trended point and to edit graph configuration to display a specific time period or data range. Operator shall be able to create custom trend graphs to display on the same page data from multiple trended points.

7. View and Configure Reports. Operators shall be able to run preconfigured reports, to view report results, and to customize report configuration to show data of interest.

8. Manage Control System Hardware. Operators shall be able to view controller status, to restart (reboot) each controller.

C. System Software.

1. Operating System. Web server shall have an industry-standard professional-grade operating system. Acceptable systems include Microsoft Windows 7, Vista, Windows XP Pro, Red Hat Linux, or Sun Solaris.

2. System Graphics. Operator interface shall be graphically based and shall include at least one graphic per piece of equipment or occupied zone, graphics for each chilled water and hot water system, and graphics that summarize conditions on each floor of each building included in this contract.

D. Energy Reporting. System shall include an easily configured energy reporting tool that provides the capabilities described in this section.

1. The energy reporting tool shall be accessible through the same user interface (Web browser or operator workstation software) as is used to manage the BAS.

2. The energy reporting tool shall be preconfigured by the Contractor to gather and store energy demand and consumption data from each energy source that provides metered data to the BAS.

3. The energy reporting tool shall allow the operator to select an energy source and a time period of interest (day, week, month, year, or date range) and shall provide options to view the data in a table, line graph, bar graph, or pie chart.

4. The energy reporting tool shall allow the operator to select an energy source and two time periods of interest (day, week, month, year, or date range) and display a graph that compares the energy use over the two time periods in any of the graph formats listed in the previous paragraph. The tool shall also allow the operator to select multiple energy sources and display a graph that compares the total energy used by these sources over the two time periods.

2.3 CONTROLLER SOFTWARE

A. Building and energy management application software shall reside and operate in system controllers. Applications shall be editable through operator workstation, web browser interface, or engineering workstation.

B. Basis of design: Provide controller software equal or equivalent to:

1. [WebCtrl Softwareversion WEB500.](#)

2.4 INPUT AND OUTPUT DEVICES

- A. General. Hard-wire input and output points to BCs, AACs, ASCs, or SAs.
- B. Protection. Shorting an input or output point to itself, to another point, or to ground shall cause no controller damage. Input or output point contact with up to 24 V for any duration shall cause no controller damage.
- C. Binary Inputs. Binary inputs shall monitor the on and off signal from a remote device. Binary inputs shall provide a wetting current of at least 12 mA and shall be protected against contact bounce and noise. Binary inputs shall sense dry contact closure without application of power external to the controller.
- D. Analog Inputs. Analog inputs shall monitor low-voltage (0-10 VDC), current (4-20 mA), or resistance (thermistor or RTD) signals. Analog inputs shall be compatible with and field configurable to commonly available sensing devices.
- E. Binary Outputs. Binary outputs shall send an on-or-off signal for on and off control. Building Controller binary outputs shall have three-position (on-off-auto) override switches and status lights. Outputs shall be selectable for normally open or normally closed operation.
- F. Analog Outputs. Analog outputs shall send a modulating 0-10 VDC or 4-20 mA signal as required to properly control output devices. Each Building Controller analog output shall have a two-position (auto-manual) switch, a manually adjustable potentiometer, and status lights. Analog outputs shall not drift more than 0.4% of range annually.
- G. Universal Inputs and Outputs. Inputs and outputs that can be designated as either binary or analog in software shall conform to the provisions of this section that are appropriate for their designated use.

2.5 AUXILLARY CONTROL DEVICES

- A. Local Control Panel Enclosure.
 - 1. Indoor control panels shall be fully enclosed NEMA 1 construction with hinged door latch and removable sub-panels.
 - 2. Pre-wire internal and face-mounted device connections with color-coded stranded conductors tie-wrapped or neatly installed in plastic troughs.
 - 3. Each local panel shall have a control power source power switch (on-off) with overcurrent protection.
 - 4. Basis of design: control panel enclosure equal or equivalent to:
 - a. [Hoffman model A36N24MPP](#).
- B. Transformer Panel.
 - 1. Output voltage shall be between 15 and 24VDC.
 - 2. Input voltage shall be 120VAC.
 - 3. Power supply shall have circuit breaker for circuit protection.

4. Basis of design: Provide transformer equal or equivalent to:
 - a. [Functional Devices model PSH300A](#).
- C. Combo Humidity & Temperature Sensors, (duct, wall, and outdoor).
1. Type. Temperature sensors shall be Resistance Temperature Device (RTD) or thermistor.
 2. Duct Sensors. Duct sensors shall be single point or averaging as shown.
 3. Space Sensors. Space sensors shall have set point adjustment and communication port as shown.
 4. Output voltage for Temperature sensors shall be of 0-10VDC
 5. Duct and room humidity sensors shall have a sensing range of 0%-100%.
 6. Duct sensors shall have a sampling chamber.
 7. Outdoor air humidity sensors shall have a sensing range of 0%-100% RH and shall be suitable for ambient conditions of -40°C-100°C (-40°F-212°F).
 8. Output voltage of humidity sensors shall be between 0-10V, 0-5V or 4-20mA
 9. Input voltage of humidity sensors shall be 24 VAC/VDC.
 10. Basis of design: Provide sensor equal or equivalent to:
 - a. [BAPI model ALC/10K-2-H300-R, BA/10K-2-H300-D-BB, BA/10K-2-H300-O-BB](#).
- D. CO2 Sensors (duct and wall).
1. Output voltage shall be between 0-10V, 0-5V or 4-20mA
 2. Input voltage shall be 24 VAC/VDC.
 3. Basis of design: Provide sensor equal or equivalent to:
 - a. [Airstest model TR9294-A-L and TR9292-A-L](#).
- E. VOC(duct and wall).
1. Output voltage shall be between 0-10VDC.
 2. Input voltage shall be between 15-35VDC.
 3. VOC sensors shall have a sensing range of 0%-100%.
 4. Basis of design: Provide sensor equal or equivalent to:
 - a. [BAPI model BA/BS3X-VOC10-BNK and BA/VOC10-D-BB](#).
- F. Control Relay.
1. Input signal shall be between 10-30VDC.
 2. Relay shall be capable of handling 120VAC.
 3. Relay shall be a normally open type.
 4. Basis of design: Provide power control equal or equivalent to:
 - a. [Functional Devices model RIBU1C](#).
- G. Current Switches.
1. Current-operated switches shall be self-powered, solid-state with adjustable trip current.
 2. Current trip shall be between .25-200A
 3. Output shall be a binary signal from a normally open solid state source.
 4. Basis of design: Provide current switch equal or equivalent to:
 - a. [Hawkeye model H800](#).
- H. Wireless Security and Lighting Equipment.

1. Wireless equipment shall operate on the Z-wave protocol.
2. Minimum operability requirement is a consistent code between exterior entry doors that communicates to a wireless security router which enables unlocking upon correct code input.
3. Lights shall retain manual functionality.
4. Manufacturer's instructions shall be followed to install all hardware and software necessary for the operation of the system and program all locksets.
5. Basis of design: Provide wireless system security system equal or equivalent to:
 - a. [SchalgeLiNK Starter Kit](#).

2.6 WIRING AND RACEWAYS

- A. General. Provide copper wiring, plenum cable, and raceways as specified in applicable sections of Division 26.
- B. Insulated wire shall use copper conductors and shall be UL listed for 90°C (200°F) minimum service.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install all equipment according to manufacturer's written instructions.
- B. Provide sufficient slack and flexible connections to allow for piping and equipment vibration isolation.
- C. Install equipment in readily accessible locations.
- D. Mount sensors rigidly and adequately for operating environment.
- E. Provide adequate labeling on all wiring, cabling, control panels, sensors, and all other labels provided by manufacturer.

END SECTION 25 50 00

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SECTION 25 90 00 – INTEGRATED AUTOMATION SEQUENCE OF OPERATIONS

PART 1 – GENERAL

1.1 TRANE AIR SOURCE HEAT PUMP

- A. Trane Air source heat pump will be controlled in accordance with the Trane XL950 thermostat installed in the home.

1.2 TRANE FAN COIL UNIT

- A. Trane fan coil unit will be controlled in accordance with the Trane XL950 thermostat installed in the home.

1.3 ERV

- A. Trane ERV will be activated when one of the following conditions is met: post living wall CO₂ ≥ 1000ppm, bathroom relative humidity ≥55%.
- B. The unit will be deactivated once CO₂ ≥ 800ppm, bathroom relative humidity ≥53%

1.4 DUCTED DEHUMIDIFIER

- A. The Ultra Aire ducted dehumidifier will operate when the relative humidity prior to the dehumidifier is ≥ 55%.
- B. The unit will be deactivated once the relative humidity ≤53%
- C. When the Trane heat pump unit is not running, a fan within the dehumidifier will run to circulate air throughout the home.
- D.

1.5 HOT WATER LOOP PUMP

- A. GE water heater will be controlled in accordance with the built in GE water heater controller.

1.6 CLERESTORY WINDOWS

- A. The windows will open/close with a single pole, double throw, center off, momentary contact switch.

1.7 Wireless Security

- A. Door locks will operate with both a manual and wireless command.

- B. Wireless commands will post from either the Schlage LiNK website or a wireless device such as a web enabled cellular or tablet device.

1.8 Wireless Lighting

- A. Controlled lighting will operate with both a manual and wireless command.
- B. Wireless commands will post from either the Schlage LiNK website or a wireless device such as a web enabled cellular or tablet device.

1.9 PV PANELS

- A. The power generated and consumed as it relates to the PV panels shall be monitored continuously via the eMonitor system and will be posted to both the Schlage LiNK website as well as the eMonitor website.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION 25 90 00

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SECTION 26 05 10 – LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 – GENERAL

1.1 SUMMARY

- A. This section specifies conductors and cables used for power, lighting, and receptacle.
 - 1. 3/0 THHN or THWN-2
 - 2. 4AWG THHN or THWN-2
 - 3. 6AWG EGC Bare Copper Wire
 - 4. 6AWG THHN or THWN-2
 - 5. 8AWG THHN or THWN-2
 - 6. 10AWG USE-2
 - 7. 10AWG THHN/ THWN
 - 8. 12AWG THHN/ THWN
 - 9. 14AWG THHN/ THWN

1.2 STANDARDS AND CODES

- A. According to NEC 690.64(B)(2)
- B. NFPA 70 National Electric Code

1.3 SUBMITTALS

- A. Wiring Diagram or Connection Schematic: Includes all of the devices in a system and shows their physical relationship to each other, including terminals and interconnecting wiring in assembly. This diagram shall be (a) in a form showing interconnecting wiring only by terminal designation (wireless diagram), or (b) a panel layout diagram showing the physical location of devices plus the elementary diagram.

PART 2 – PRODUCTS

2.1 SINGLE CONDUCTOR BUILDING WIRE POWER CIRCUIT CONDUCTORS

- A. 8AWG, 10AWG, 12AWG, and 14AWG AC WIRE:
 - 1. #8, #10, #12, and #14 Gauge Stranded Copper Wire
 - 2. THHN-THWN AWM rated (#8 rated at THHN/THWN-2)
 - 3. UL Standard 83, 1581, and 1063(MTW)
 - 4. Federal Specification A-A-59544
 - 5. Basis of design: Provide AC wire equal or equivalent to:
 - a. [SouthwireSIMpull THHN or THWN-2](#)
 - b. [SouthwireSIMpull THHN or THWN](#)
 - 6.

2.2 POWER CIRCUIT CONDUCTORS

- A. Photovoltaic Production Conductors
 - 1. 10AWG USE-2 cable is rated at 600V. PER ASTM B-3, B-8. Conductor runs from module to soladec junction box on roof.
 - 2. 6AWG EGC Bare Copper Solid Conductor. Used to ground each module.
 - 3. 10AWG THHN/THWN conductor from soladec junction boxes to central inverter.
 - 4. 6AWG THHN/THWN-2 conductor out from central inverter to breaker feed.
 - 7. UL Standard 83, 1581, and 1063(MTW), UL Standard 854 (for USE-2)
 - 8. Federal Specification A-A-59544
 - 9. Basis of design: Provide AC wire equal or equivalent to:
 - a. [SouthwireType USE-2](#)
 - b. [Southwire Bare Copper](#)
 - c. SouthwireSIMPull THHN or THWN-2

- B. Main Service Conductors
 - 1. 3/0 stranded copper conductor feeds main breaker with 240VAC.
 - 2. 4AWG stranded copper conductor used for grounding conductor to 8' grounding rod.
 - 3. 8' copper grounding rod.
 - 4. Basis of design: Provide grounding rod equal or equivalent to:
 - a. [Eriteh 615880](#).

- C.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install according to all manufacturer's written instructions and recommendations.
- B. Install all wiring according to plans and drawings.
- C. Slack shall be provided at all terminals and connections.
- D. Install all equipment so it shall be readily accessible for maintenance. Installations shall have electrical clearances in accordance with NEC and shall be installed in locations that will provide adequate cooling.
- E. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- F. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- G. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.
- H. Terminate conductors so that conductor information is easily visible on at least one termination per feeder or within panel or switchboard pulling space.

- I. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

END OF SECTION 26 05 19

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SECTION 26 05 33 – RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes:
 - 1. Electrical Metallic Tubing
 - 2. Flexible Metal Conduit
 - 3. Flexible Nonmetallic conduit
 - 4. Fittings for conduit
 - 5. Electrical boxes
 - 6. Conduit supports
 - 7. Raceways and boxes in SIPs

1.2 RELATED SECTIONS

- A. Section 06 12 00 STRUCTURAL INSULATED PANELS
- B. Section 26 05 19 LOW VOLTAGE ELECTRICAL CONDUCTORS AND CABLES

1.3 SUBMITTALS

- A. Product Data

PART 2 – PRODUCTS

2.1 [ELECTRICAL METALLIC TUBING \(EMT\)](#)

- A. EMT shall be UL 797 and ANSI C80.3, steel tubing, hot-dip galvanized. EMT fittings shall be ANSI/NEMA FB 1, steel, insulated throat, compression type.
- B. Size: 3/8", 1/2", 3/4", 1"

2.2 [FLEXIBLE METAL CONDUIT](#)

- A. Flexible metal conduit shall be UL Type Green Field flexible metal conduit. UL1 Listed. Reduced Wall Flexible Steel Conduit, Hot dipped zinc galvanized low carbon steel, Corrosion Resistant.
- B. Size: 1/2", 3/4"

2.3 [FLEXIBLE NONMETALLIC CONDUIT](#)

- A. Flexible nonmetallic conduit shall be UL listed.
- B. Size: 3/4"

2.4 FITTINGS

A. Unions

1. All unions of the type designated as UNF and UNY and shall be suitable for use in moist atmospheres. Unions shall be of cast ferrous alloy, electroplated with zinc.

B. Bushings

1. All bushings shall be steel or malleable iron threaded type electroplated with zinc or hot-dip galvanized. Bushings shall have a molded-phenolic or nylon insulating collar.

C. Liquidtight Flexible Metallic Conduit Connectors

1. Connectors for liquidtight flexible metallic conduit shall be electroplated zinc malleable iron. An O-ring gasket and an approved grounding insert shall be part of the unit. Where applicable, 45 degree and 90 degree fittings may be used.

D. Locknuts

1. All locknuts used in general purpose areas shall be extra heavy steel electroplated with zinc for sizes 3/4 inch to 2 inches. Locknuts larger than 2 inches shall be of malleable iron, electroplated with zinc. Locknuts used in damp and outdoor areas shall be stainless steel. Locknuts in corrosive areas shall be FRP.

2.5 BOXES

A. Junction Boxes

1. Junction boxes, device boxes, fixture support boxes, oblong, round and rectangular conduit fittings (condulets) shall be of the same material as required by the area classification for the raceway. Junction boxes for use in general purpose areas shall be steel. Exterior boxes shall be Crouse-Hinds type FS, FD, or approved equal.

2. Cover plates shall be of similar material and finish. Full body neoprene gaskets shall be provided with all covers and shall fastened with stainless steel screws in exterior locations.

3. NEMA 12 boxes shall be of heavy gauge sheet steel, or cast metal. All NEMA 12 boxes shall be provided with a 5 mil thick light gray thermo-epoxy finish, and designed so that moisture will drain away from the gasketed cover joint. Covers for sheet steel boxes shall have turned edges, ground smooth to form a tight seal against the gasket when the cover is closed.

2.6 CONDUIT SUPPORTS

A. Hot-dip galvanized framing channel shall be used to support groups of conduit. Individual conduit supports shall be one-hole pipe straps. Conduit supports for PVC or epoxy coated rigid steel and PVC conduit systems shall be one hole PVC or epoxy coated clamps or PVC conduit wall hangers.

B. Conduit supports in all exterior and corrosive areas shall be stainless steel, or as shown on the plans. All hardware shall be stainless steel.

2.7 RACEWAYS AND BOXES IN STRUCTURALLY INSULATED PANELS (SIPS)

A. CONDUIT

1. ¾" flexible type conduit will be fabricated with SIPs where indicated per electrical drawings.
2. Conduit is run both horizontally and vertically as needed in the panel layout drawings.

B. BOXES

1. SIPs will include 4" x 4" x 2" plastic electric boxes where indicated per electrical drawings.

PART 3 – EXECUTION

3.1 INSTALLATION

A. SIPS

1. All rough-in wiring should be done after wall panel installation.

B. Bends and offsets in conduit shall be avoided where possible but, where necessary, shall be made without flattening or kinking, or shall be factory preformed bends.

C. Turns shall be made with case metal fittings or conduit bends.

D. Welding, brazing or otherwise heating of conduit is not acceptable.

E. Where required for pulling cable and as necessary to meet the requirements of the previous Paragraph, the Contractor shall provide junction or pull boxes. Pull boxes used for multiple conduit runs shall not combine circuits fed from different panel boards.

F. Conduit entering NEMA 1 type sheet steel boxes or cabinets shall be secured by locknuts on both the interior and exterior of the box or cabinet and shall have an insulating grounding or bonding bushing constructed over the conduit end. Joints shall be made with standard couplings or threaded unions. Metal parts of nonmetallic boxes and plastic coated boxes shall be bonded to the conduit system. Running threads shall not be used in lieu of conduit nipples, nor shall excessive thread be used on any conduit. The ends of conduit shall be cut square, reamed and threaded with straight threads.

END OF SECTION 26 05 33

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SECTION 26 24 00 – SWITCHBOARDS AND PANELBOARDS

PART 1 – GENERAL

1.1 SUMMARY

A. This section includes the following utilized for lighting and power distribution:

1. Main Distribution Panel
2. PV Sub Panel (Roof)
3. Disconnects
4. Breakers
5. Meter Box

B.

1.4 STANDARDS AND CODES

A. Comply with NEC 2008.

1.5 DEFINITIONS

A. Photovoltaic (PV): A solar cell made up of semiconducting material that absorbs sunlight and produces electricity.

B. AFCI: Arc-Fault Circuit Interrupter

1.6 SUBMITTALS

A. Product Data

PART 2 – PRODUCTS

2.1 DISTRIBUTION PANELS

A. Main Distribution Panel (200A, 120/240V): distributes 120/240V for lighting and power to the home.

1. Rating: NEMA1
2. Distribution Capacity: 200A, GE THQMV200D
3. Short Circuit Current Rating: 22kAIC
4. Max Single Pole Circuits: 40
5. Max Tandem Circuit Breakers: 20
6. Phase: 1
7. Wire Configuration: 3-Wire
8. Enclosure: Indoor
9. Wire Size: #4 – 250 AWG/kcmil (Al/Cu)
10. Recommended Products:
 - a. [GE TLM4020CCU PowerMark Gold](#)

2.2 PV SUB PANELS

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[SWITCHBOARDS AND PANELBOARDS]

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- A. PV Sub-Panel Junction Box
 - 1. 600V
 - 2. UL50 3R
 - 3. NEMA 3R
 - 4. 12A LittleFuse circuit fuses for each negative string.
 - 5. Recommended Products:
 - a. [Soladec 0876-3R](#)
- B. PV Junction Box: Organizer Access for PV monitoring
 - 1. NEMA1
 - 2. Recommended Products:
 - a. [8"x8"x4" WIEGMANN 4KP28](#)

2.3 DISCONNECTS

- A. PV AC disconnect: Shall be provided near the utility meter as required by the standards.
 - 1. UL Listed
 - 2. 600Vdc disconnect
 - 3. 60A
 - 4. NEMA3R enclosures
 - 5. Non fused disconnect switch
 - 6. L/O T/O
 - 7. Recommended Product:
 - a. [GE TNA60R1CP](#)
- B. PV DC Disconnect: Installed with PV Central Inverter. See section 48 14 13 2.2.

2.4 BREAKERS (General Purpose & AFCI)

- A. AFCI breakers shall provide protection to circuits as required by the NEC 2008 210.12(B). These AFCI breakers shall be mounted at the main distribution Panel. General Purpose breakers shall be at 15A, 20A (120V), 20A, 30A, and 40A (240V).
- B. General Circuit Breakers
 - 1. 1 Pole
 - a. Ampere Ratings: 15, 20
 - b. Voltage: 120
 - c. Recommended Products: [GE HACR Type E-11592, Issue No. RT-690 and RT-692, Type THQL](#)
- C. AFCI Circuit Breakers
 - 1. 1 Pole
 - a. Ampere Ratings: 15
 - b. Voltage: 120
 - c. Recommended Products: [GE 1115AFP2, Type THQL](#)

2.5 METER BOXES

A. Meter Box

1. 200 A
2. 4 Terminal
3. UL LISTED METER SOCKET
4. ISSUE NO: E-7373
5. Ringless type
6. Recommended product:
 - a. [Landis & Gyr / SIEMENS UAT417-XPQG](#)

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturers written instructions and recommendations.
- B. Install in accordance with 26 05 19.

END OF SECTION 26 24 00

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SECTION 26 27 26 – WIRING DEVICES

PART 1 – GENERAL

1.1 SUMMARY

- A. This section covers furnishing and installing all receptacles, switches and other wiring devices indicated on the drawings.

1.2 STANDARDS AND CODES

- A. NFPA

PART 2 – PRODUCTS

2.1 RECEPTACLES AND PLUGS

- A. General:
 - 1. All outlets and switches shall be grounding type.

2.2 GFCI OUTLETS

- A. General-purpose switches shall be quiet AC type, specification grade, and shall be provided in accordance with rated capacities as required. Switches shall match receptacles in color. Outdoor GFCI receptacles shall be enclosed with a weather resistant cover according to NEC406.8(1).
 - 1. Class A, meets UL 943
 - 2. 125VAC/15A and 20A
 - 3. Back, Side Wire
 - 4. Trip Range 5mA +/- 1mA
 - 5. Tamper Resistant
 - 6. White Decora style
 - 7. Recommended products
 - a. [Cooper Wiring Devices, TRVGF15, TRVGF20](#)
- B. Outdoor GFCI receptacle covers.
 - 1. Universal Metal Weatherproof Cover
 - 2. GFCI, Duplex, Switch or single receptacle
 - 3. Complies with NEC406.8(1)
 - 4. Recommended Product:
 - a. [Thomas & Betts, Red dot CKMU](#)
- C.

2.3 HIGH POWER RECEPTACLE

- A. Straight Blade Power Receptacle, grounded, UL/CSA certified.
 - 1. 50A
 - 2. 125/250 V

3. NEMA: 14-50R
4. Poles: 3
5. Wire: 4
6. Termination: Side
7. Face/Body Material: Nylon
8. Strap Material: Steel
9. Recommended products: Cooper Wiring Devices
 - a. [Wiring Devices 50A,1258, 5754N, 1212, 58](#)

2.4 120V RECEPTACLE

- A. Straight Blade Power Receptacle, tamper resistant, grounded, UL/CSA certified.
 1. 15A
 2. 125 V
 3. NEMA/EEMAC: 5-15R
 4. Poles: 2
 5. Wire: 3
 6. Wiring: Side
 7. Face/Body Material: Nylon
 8. White Decorator Style
 9. Complies to 2008 NEC 406.11
 10. Recommended products:
 - a. [Cooper Wiring Devices, TR1107.](#)

2.5 SWITCHES

- A. General purpose, non-wireless, Single Pole switch
 1. General purpose switches shall be quiet AC type, specification grade, and shall be provided in accordance with rated capacities as required. Switches shall match receptacles in color.
 2. 15A
 3. 125/277V
 4. Single Pole
 5. Wires: 3
 6. White Decorator Style
 7. Recommended products:
 - a. [Cooper Wiring Devices, 7501W.](#)
- B. General purpose, non-wireless, 3-way switch
 1. General purpose switches shall be quiet AC type, specification grade, and shall be provided in accordance with rated capacities as required. Switches shall match receptacles in color.
 2. 15A
 3. 125/277V
 4. Single Pole
 5. Wires: 4
 6. White Decorator Style
 7. Recommended products:

a. [Cooper Wiring Devices, 7503W.](#)

C. Wireless ON/OFF Lighting Control

1. Wireless ON/OFF control shall provide both Z-Wave wireless and manual control, be capable of controlling fluorescent lighting, and contain LED indicator light for locating in a dark room.
2. 600W incandescent load, 1/2HP motor load, 1800W resistive load
3. 120VAC
4. Single Pole
5. Wires: 4
6. White Decorator Style
7. Recommended products:
 - a. [GE Z-Wave 45614/45609](#)

D. Toggle Switch – Used for clerestory operation

1. 15A, 120/277V, toggle double-throw center-OFF momentary contact single-pole AC quiet switch
2. Recommended products:
 - a. [Leviton, 1256-W](#)

E. Dimmable Fan/Light switch

1. 3-Speed, 300W, single phase
2. 120/240V
3. Recommended products:
 - a. [Lutron 300-Watt S2-LFSQH-WH](#)

PART 3 – EXECUTION

3.1 GENERAL

- A. Coordinate device locations with architectural features.
- B. Wiring devices shall be tested for correct connections.

3.2 POSITION OF OUTLETS

- A. All outlets shall be provided where indicated on drawings. Outlets shall be centered with regard to building lines, furring and trim, symmetrically arranged in the room. Set outlets shall be set plumb and extend flush outlets to the finished surface of the wall, ceiling or floor without projecting beyond same. All receptacles, switches and outlets shown on the drawings shall be installed symmetrically along trim and where necessary, set the long dimension of the plate horizontal or gang in tandem.

3.3 MOUNTING HEIGHTS

- A. Unless otherwise noted, wall mounted outlet devices shall generally be 24 inches above the floor, 18 inches in architecturally treated areas. Switches shall be 48 inches above the floor. All measurements are to centerline of device.

3.4 INSTALLATION

- A. Install according to manufacturer's instructions and recommendations.

END OF SECTION 26 27 26

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SECTION 26 28 00 – PRIMARY AND SECONDARY BATTERIES

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. AA Battery
2. AAA Battery

1.2 DEFINITIONS

- ##### A. NiMH: Nickel-Metal Hydride

PART 2 – PRODUCTS

2.1 9V Alkaline Battery

A. Industry Standard Dimensions 9V battery

1. No added mercury or cadmium
2. Standard: ANSI 1604A
3. Stored at temperatures of -18°C to 55°C
4. Jacket: metal
5. Basis of design: provide 9V batter equal or equivalent to:
 - a. [Energizer 522](#)

2.2 AA Battery

A. AABattery

1. Capacity: 2300mAh
2. Voltage: 1.5V
3. Standard: ANSI 15A, IEC-LR6
4. Jacket: Plastic label
5. Basis of design: provide AA battery equal or equivalent to:
 - a. [Energizer E91 AA](#)

2.3 AAA Battery

1. Capacity: 1200mAh
2. Voltage: 1.5V
3. Standard: ANSI 24A, IEC-LR03
4. Jacket: Plastic label
5. Basis of design: provide AAA battery equal or equivalent to:
 - a. [Energizer E92](#)

PART 3 – EXECUTION

3.1 INSTALLATION

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Published 08/11/2011

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A. Install according to manufacturer's instructions and recommendations.

END OF SECTION 26 28 00

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SECTION 26 51 00 – INTERIOR LIGHTING

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Ceiling-mounted light fixtures.
 2. Pendant light fixtures.
 3. Wall-mounted light fixtures.
 4. Ceiling Fans.
 5. Cove strip light fixtures.
 6. Biowall Lights

1.2 SUBMITTALS

- A. Product Data for each luminaire, including lamps.

PART 2 – PRODUCTS

2.1 LIGHTING FIXTURES AND COMPONENTS

- A. Fixture: C1.
1. Semi-flush, 2-light ceiling light with white etched glass shade.
 2. Finish: Brushed Nickel
 3. Dimensions: 13.5"W x 7.5"H
 4. Lamping: GE Helical 13W Compact Fluorescent
 5. Basis of design: Provide semi-flush ceiling light equal or equivalent to:
 - a. [Kichler Semi Flush 2Lt. Product no. 3620NI.](#)
- B. Fixture: C2
1. Garage Utility Light
 2. Finish: White
 3. Dimensions: 6.5"W x 2.75"H x 49.5"L
 4. Lamping: T8 Electronic Ballast
 5. Basis of design: Provide semi-flush ceiling light equal or equivalent to:
 - a. [American Fluorescent Corporation, 48" Performance Utility Light.](#)
- C. Fixture: P1
1. 4 Light Pendant.
 2. Finish: Satin Nickel, Sand
 3. Dimensions: 16 ½" W x 10 ½" H
 4. Basis of design: Provide pendant light equal or equivalent to:
 - a. [Forecast Pacifica pendant. Product model: F1930-36.](#)
- D. Fixture: P2

1. Pendant light
 2. Finish: Satin Nickel, Sand
 3. Dimensions: 10 ½" H x 6" W
 4. Lamping: GE Helical 13W Compact Fluorescent
 5. Basis of design: Provide pendant light equal or equivalent to:
 - a. [Forecast Pacifica pendant. Product model: F1932-36.](#)
- E. Fixture: P3
1. 3 Light Pendant
 2. Finish: Brushed Nickel & Satin Etched White glass
 3. Number: 2752N1
 4. Description: Pendant, 3 Lt, Brushed Nickel & Satin Etched white
 5. Dimensions: 17 ½" D, 22" H
 6. Lamping: GE Helical 13W Compact Fluorescent
 7. Basis of design: Provide pendant light equal or equivalent to:
 - a. [Kichler Family Space Pendant 3Lt. Product no. 2752N1](#)
- F. Fixture: W1
1. Wall sconce
 2. Lamping: GE Helical 13W Compact Fluorescent
 3. Finish: Satin Nickel, Sand on Clear Glass
 4. Dimensions: 14 3/8" H x 6" W
 5. Basis of design: Provide wall sconce equal or equivalent to:
 - a. [Forecast Pacifica Edge Bow Wall Sconce. Model no. F5467-36U.](#)
- G. Fixture: W2
1. Closet LED Light Bar
 2. Lamping: 3.5W/12V LED
 3. Dimensions: 0.94"W x .0.39"H x 9.8"L
 4. Basis of design: Provide LED light bar equal or equivalent to:
 - a. [LED Lighting Inc. Versa Bar. Model no. V10WW12V.](#)
- H. Fixture: W3
1. Bath Vanity
 2. Lamping: 39W T5
 3. Finish: Brushed Aluminum
 4. Dimensions: 3.62"H x 3.82W x 36.75L
 5. Basis of design: Provide wall sconce equal or equivalent to:
 - a. [KichlerPira Bath Vanity, Model no. 10424BAW.](#)
- I. Fixture: CF1
1. Ceiling Fan
 2. Light Kit: Craftmade Light Kit 2020 CFL-BN
 3. Lamping: Netpun Lighting 14W Dimmable, 2700K Spiral Bulb
 4. Finish: Satin Nickel, Maple Blade
 5. Dimensions: 11-1/4" H x 11" W

6. Basis of design: Provide ceiling fan equal or equivalent to:
 - a. [Craftmade Ceiling Fan with Five Blades. Product no. 225705.](#)

J. Fixture: CV1

1. Cove Strip Light
2. Lamping: LED, 120V/1.45W
3. LED Quantity: 22 pcs.
4. Dimensions: 16”L
5. Basis of design: Provide cove strip light equal or equivalent to:
 - a. [Zilotek 120V LED Strip, Model 0014-0002.](#)

K. Fixture: BI1

1. Biowall Grow/Decorative Light
2. Lamping: LED 120V/2.6 W
3. LED Quantity: 12 pcs.
4. Dimensions:
 - a. Biowall Sides: 61”
 - b. Biowall Top: 24”
5. Basis of design: Provide steel raceway, lamp holders, and LED lighting equal or equivalent to:
 - a. [LegrandWiremold 2400B Steel Raceway](#)
 - b. [LegrandWiremold 2426 Lamp Holder](#)
 - c. [2.6 W Array LED R16](#)

2.2 SPECIAL ACCESSORIES

- A. Accessories such as junction boxes, plastic frames, stem, hangers, canopies, couplings, cords, toggle bolts, etc. shall be provided as necessary to mount fixture in a proper and approved method.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Set units level, plumb, and square with ceiling and walls, and secure.
- B. Adjust aimable lighting fixtures to provide required light intensities.
- C. Lamping: Where specific lamp designations are not indicated, lamp units according to manufacturer’s written instructions.

END OF SECTION 26 51 00

[Return to Specification TOC](#)

SECTION 26 56 00 – EXTERIOR LIGHTING

PART 1 – GENERAL

1.1 SUMMARY

- B. Section Includes:
1. Exterior wall-mounted light fixtures.
 2. Landscape lighting fixtures.

1.2 SUBMITTALS

- B. Product Data for each luminaire, including lamps.

PART 2 – PRODUCTS

2.1 LIGHTING FIXTURES AND COMPONENTS

A. Fixture: W4

1. Outdoor wall light with white diffuser
2. Lamping: GE Helical 13W Compact Fluorescent
3. Dimensions: 11" H x 5 ½" W x 5" D
4. Basis of design: provide outdoor wall light equal or equivalent to:
 - a. [Forecast Hollywood Hills Outdoor Wall, 1-Lt Med, Deep Bronze. Catalog no. F8491-68NV.](#)

B. Fixture: LA1

1. Step Light
2. Lamping: 10WBIP1
3. Dimensions: 2"H x 4"W
4. Basis of design: provide outdoor wall light equal or equivalent to:
 - a. [Kichler Deck Light, 12V 1-Lt. Catalog no. 15064AZT.](#)

C. Fixture: LA2

1. Accent Light
2. Lamping: 35W BIP1
3. Dimensions: 6"L x 2.5"W x 6"H
4. Basis of design: provide outdoor wall light equal or equivalent to:
 - a. [Kichler Accent Light, 12V 1-Lt. Catalog no. 15384BKT](#)

2.2 SPECIAL ACCESSORIES

- A. Accessories such as junction boxes, plastic frames, stem, hangers, canopies, couplings, cords, toggle bolts, etc. shall be provided as necessary to mount fixture in a proper and approved method.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Set units level, plumb, and square with ceiling and walls, and secure.
- B. Lamping: Where specific lamp designations are not indicated, lamp units according to manufacturer's written instructions.

END OF SECTION 26 56 00

[Return to Specification TOC](#)

SECTION 28 31 00 – FIRE DETECTION AND ALARM

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Smoke Detectors and wiring.

1.2 SECTION REQUIREMENTS

- A. System Description: Non-coded, conventional, hardwired, zoned, 120V AC loop system.
 - 1. Initiating Device Circuits: NFPA 72, Class B,
 - 2. Notification Appliance Circuits: NFPA 72, Class B, Style Y
- B. Submittals: Product Data and system operation
- C. Comply with NFPA 72.
- D. UL listed and labeled.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 72, by a qualified testing agency, and marked for intended location and application.

PART 2 – PRODUCTS

2.1 ALARM – INITIATING DEVICES

- A. Smoke Detectors: UL2034, 120V AC with 9V DC battery backup, Ionization and Electrochemical type, plug-in arrangement.
 - 1. Basis of design: Kiddie Dual Sensor, 120V AC with Battery Backup Smoke and CO Alarm.
 - a. Part No. 21006377, Model No. KN-COSM-IB.

2.2 WIRE AND CABLE

- A. General: 18AWG or larger, UL listed and labeled as complying with NFPA 72, Article 760.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install and test fire detections systems according to NFPA 72.
Comply with NECA 1.

- B. Wiring Method: Install wiring where indicated. All alarms are wired to a single, continuous (non-switched) power line, which is not protected by a ground fault interrupter.

END OF SECTION 28 31 00

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SECTION 32 80 00 – IRRIGATION

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes the rain barrel systems.

1.2 SUBMITTALS

- A. Product Data.
- B. Piping/drainage schematic and/or drawings

PART 2 – PRODUCTS

2.1 RAIN BARREL SYSTEM WITH DIVERTER

- A. Rain barrel system must be outdoor grade and able to be integrated with downspouts and channel overflow away from the foundation.
- B. Spigot must provide easy garden hose connection.
- C. Basis of design:
 - 1. Provide rain barrel system with diverter equal or equivalent to:
 - a. [Fiskars Tuscany Rain Barrel System.](#)

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install on level, solid ground per manufacturer's recommendations and instruction.

3.2 WEATHERIZATION

- A. Weatherize according to manufacturer's recommendations if outside temperature falls below 41°F.

END OF SECTION 32 80 00

[Return to Specification TOC](#)

SECTION 32 93 00 – PLANTS

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes:
 - 1. Plant Material
 - 2. Planter Soils

1.2 RELATED SECTIONS

- A. Section 32 94 33 - PLANTERS

1.3 SUBMITTALS

- A. Product data

PART 2 – PRODUCTS

2.1 PLANT MATERIAL

- A. General: Furnish nursery-grown plants true to genus, species, variety, and other features indicated on the Plant Materials Schedules and Planting Diagrams. Healthy root systems shall be developed by transplanting or root pruning. Provide well shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, and defects such as sun scald, injuries, abrasions and disfigurement.
- B. Substitutions: No substitutions will be accepted except with written permission given by the Landscape Designer. Oversize or exceptionally heavy plants are acceptable if the size of the ball or spread of the roots is proportionally increased to satisfaction of the Designer. Broken, loose, or manufactured balls will be rejected.
- C. Quality: All plants shall be typical of the species or variety. All plants shall have normal, well-developed branches and vigorous root systems with no signs of being root-bound. They shall be undamaged, healthy, vigorous, free from defects, disfiguring knots, abrasions of the bark, sunscald injuries, plant diseases, insect eggs, borers, and all other forms of infection. Nursery grown specifications requires that the plant conform to the following: Plants collected from wild or native strands may be considered nursery grown when they have been successfully re-established in the nursery and grown under regular certifiable nursery cultural practices for a minimum of seven growing seasons and have attained adequate root and top growth to indicate full recovery from transplanting into the nursery row.
- D. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare. Root flare shall be visible before planting.

2.2 PLANTER SOILS

- A. Well composted, stable, and weed-free organic matter, pH range of 5.5 – 8; moisture content 35 to 55 percent by weight; 100 percent passing through ¾-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to planting. Formulated from forest products compost, sphagnum peat, perlite, a wetting agent hydrolyzed corn starch and plant food. Nitrogen 0.07%, phosphate 0.01%, soluble potash 0.03%.
- B. Planter soils not to exceed 12in. depth

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Carefully remove root ball from fabric bag without damaging root ball or plant. Do not use planting stock if root ball is cracked or broken before or during planting operation.
- B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- C. Before planting, verify that root flare is visible at top of root ball.
- D. Set out and space ground cover and plants other than trees, shrubs, and vines in even rows with triangular spacing or as indicated on drawings.
- E. Dig holes large enough to allow spreading of roots.
- F. Use planting soil for backfill.
- G. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill.
- H. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- I. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- J. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.2 DELIVERY STORAGE AND HANDLING

- A. Protect plant material from injury and desiccation. Plants coming from out-of-state certified growers and/or suppliers shall be certified by Federal authorities to be free from disease and infestation. Any

inspection certificates required by law to this effect shall accompany each shipment invoiced or order of stock, and shall be filed with the Designer.

- B. No plant material shall be planted by the Contractor until it is inspected and approved by the Landscape Designer prior to planting. All rejected material shall be immediately removed from the site and replaced with approved material at no additional cost to Owner.
- C. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- D. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

END OF SECTION 32 93 00

[Return to Specification TOC](#)

SECTION 32 94 33 – PLANTERS

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes:
1. Planter Material
 2. Water Proofing
 3. Sealing

1.2 RELATED SECTIONS

- A. Section 32 93 00 - Plants

1.3 SUBMITTALS

- A. Product data

PART 2 – PRODUCTS

2.1 Planter Material

- A. Wood
1. 2x6-10ft. STD/BTR KD-HT SPF
 2. 2x6-96in. PREMIUM KD WW STUD
 3. 15/32 4x8 RTD SHEATHING-3 PLY
- B. Hardware
1. DECKMATE SCREWS, GREEN, 1-5/8in.
- C. Dimensions
1. Planter dimensions per plan

2.2 Water Proofing

1. 3.5 MIL 10x25 PLASTIC CLEAR or BLACK
2. 5/4x6-12 PT PREM-WEATHERSHIELD

2.3 Sealing

1. E/O WATERPROOFER CEDARTONE 1 GAL

PART 3 – EXECUTION

3.1 INSTALLATION

1. See Landscape Plan Planter Detail

2. All planter containers will be plugged to contain all liquids at any point during the event.

3.2 DELIVERY STORAGE AND HANDLING

- A. Protect planters from injury. Any inspection certificates required by law to this effect shall accompany each shipment invoiced or order of stock, and shall be filed with the Designer.
- B. No planters shall be placed by the Contractor until it is inspected and approved by the Landscape Designer prior to installation. All rejected material shall be immediately removed from the site and replaced with approved material at no additional cost to Owner.
- C. Cover all plants in planters during transportation as not to damage planting materials.
- D. Protect planters from damage due to transportation operations and other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged planters.

END OF SECTION 32 94 33

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SECTION 48 14 13 – SOLAR ENERGY COLLECTORS

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes:
1. Photovoltaic modules
 2. Central Inverter
 3. Roof mounting
 4. Monitoring equipment

1.2 SUBMITTALS

- A. Product data.
- B. One-line diagrams per 26 05 19 Low Voltage Electrical Conductors

PART 2 – PRODUCTS

2.1 PHOTOVOLTAIC (PV) MODULES

- A. Single PV Panels
1. Maximum Power : 240 W
 2. Maximum Power Voltage: 40.5 V
 3. Open Circuit Voltage: 48.6 V
 4. Short Circuit Current: 6.30 A
 5. Module Efficiency: 19.3%
 6. Basis of design: Provide PV module equal or equivalent to:
 - a. [SunPower E19 238W, SPR-238-WHT-E](#)

2.2 CENTRAL INVERTER

- A. Central Inverter: Complies with IEEE-929, 1547, UL 1741, 1998, and FCC Part 15 A & B
1. Nominal AC Power: 7680W @ 240V
 2. AC Max Output Current: 32A
 3. AC Nominal Voltage: 211-264V
 4. Peak Inverter Efficiency: 96.5%
 5. Recommended Max PV Power: 10000W
 6. DC Input Voltage: 300-600V
 7. DC Max Input Current: 30A
 8. DC Disconnect is internal
 9. Provide central inverter equal or equivalent to:
 - a. [SunPower SPR-8000m](#)

2.3 MOUNTING

- A. Flush and tilted PV mounts
 - 1. Provide system including rails, attachments, legs, and clips from single manufacturer
 - 2. Material: 6105-T5 aluminum construction
 - 3. System shall accommodate both flush-mounting as well as tilt-mounting
 - 4. Provide tilt angle as indicated on construction drawings
 - 5. Mounting system shall be compatible with selected PV panels
 - 6. Basis of design: provide flush mounting equal or equivalent to:
 - a. [UNIRAC Solarmount system](#)
 - b. [Smart Mount Residential Mounting System](#)

2.4 Electricity Monitoring System

- A. Electricity Monitoring System
 - 1. 120VAC
 - 2. TCP-IP via Ethernet (802.3) 10/100base-T
 - 3. Wireless Zigbee*(802.15) mesh networking
 - 4. (2) 150A CT's, (10) 50A CT's, (32) 20A CT's
 - 5. Basis of design: provide energy monitoring equipment equal or equivalent to:
 - a. [eMonitor-44r](#)

2.5 DC Lightning Arrestor

- A. DC Lightning Arrestor
 - 1. 120VAC
 - 2. TCP-IP via Ethernet (802.3) 10/100base-T
 - 3. Basis of design: provide energy monitoring equipment equal or equivalent to:
 - a. [DELTA LA-602 DC](#)

PART 3 – EXECUTION

3.1 MOUNTING INSTALLATION

- A. Install per manufacturer's instructions and recommendations.
- B. Remove no more roofing material than required for mounting and flashing to be installed properly
- C. Install and seal roof flashing and vapor barrier around standoffs as required by roofing manufacturer to maintain roofing warranty.

3.2 PV PANEL INSTALLATION

- A. Install per manufacturer's instructions and recommendations.

END OF SECTION 48 14 13

[Return to Specification TOC](#)

INhome

PRODUCT DATA SHEETS





BEAMS, HEADERS, AND COLUMNS

Featuring Trus Joist® TimberStrand® LSL,
Microllam® LVL, and Parallam® PSL

- Uniform and Predictable
- Minimal Bowing, Twisting, and Shrinking
- Strong and Straight
- Limited Product Warranty



FLOOR SOLUTIONS

ROOF SOLUTIONS

WALL SOLUTIONS



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About This Guide

iLevel provides products for use in residential, multi-family, and light commercial construction. The products in this guide are readily available through our nationwide network of distributors and dealers. For more information on other applications or iLevel products, contact your iLevel representative.

Why Choose iLevel® Trus Joist® Beams, Columns, and Headers?

- Dependable performance
- Consistent quality and dependable uniformity
- Flexible solutions for your beam and header needs

Using advanced technology, iLevel manufactures engineered lumber that is consistently straight and strong, and that resists bowing, twisting, and shrinking.

That means less waste, easier installation, and higher design values for starters; plus fewer callbacks, shorter cycle times, more design flexibility, and lower overall installed cost in the end. iLevel® Trus Joist® TimberStrand® LSL, Microllam® LVL, and Parallam® PSL are structural solutions you can count on—guaranteed.

Available Widths and Depths for iLevel® Trus Joist® Engineered Lumber

▪ TimberStrand® LSL

1.55E TimberStrand® LSL is available in the following sizes:

Widths: 1¾" and 3½"
 Depths: 9¼", 9½", 11¼", 11⅞", 14", and 16"

1.3E TimberStrand® LSL headers are available in the following sizes:

Width: 3½"
 Depths: 4⅜", 5½", 7¼", 8⅝", 9¼", and 11¼"

1.3E TimberStrand® LSL columns and posts are available in the following sizes:

3½" x 3½" 3½" x 4⅜" 3½" x 5½" 3½" x 7¼" 3½" x 8⅝"

▪ Microllam® LVL

1.9E Microllam® LVL headers and beams are available in the following sizes:

Width: 1¾"
 Depths: 5½", 7¼", 9¼", 9½", 11¼", 11⅞", 14", 16", 18", and 20"

▪ Parallam® PSL

2.0E Parallam® PSL headers and beams are available in the following sizes:

Widths: 3½", 5¼", and 7"
 Depths: 9¼", 9½", 11¼", 11⅞", 14", 16", and 18"

1.8E Parallam® PSL columns and posts are available in the following sizes:

3½" x 3½" 3½" x 5¼" 3½" x 7" 5¼" x 5¼" 5¼" x 7" 7" x 7"

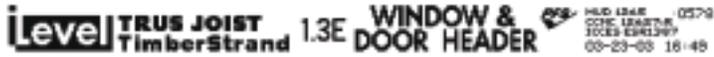
Some sizes may not be available in your region.

iLevel® Trus Joist® TimberStrand® Laminated Strand Lumber (LSL)

- One-piece members reduce labor time
- Every piece is straight and strong
- Unique properties allow you to drill larger holes through 1.55E TimberStrand® LSL. See **Allowable Holes** on page 36.

TimberStrand® LSL Grade Verification

TimberStrand® LSL is available in more than one grade. The product is stamped with its grade information, as shown in the examples below. With 1.55E TimberStrand® LSL, larger holes can be drilled through the beam.



Actual stamps shown.

Code Evaluations: See ICC ES ESR-1387 and HUD MR 1265



iLevel® Trus Joist® Microllam® Laminated Veneer Lumber (LVL)

- Can easily be built up on site to reduce heavy lifting
- Offers reliable and economical solutions for beam and header applications
- Manufacturing process minimizes many of the natural inconsistencies found in wood
- Available in some regions with a Watershed™ overlay for on-site weather protection

Code Evaluations: See ICC ES ESR-1387 and HUD MR 925



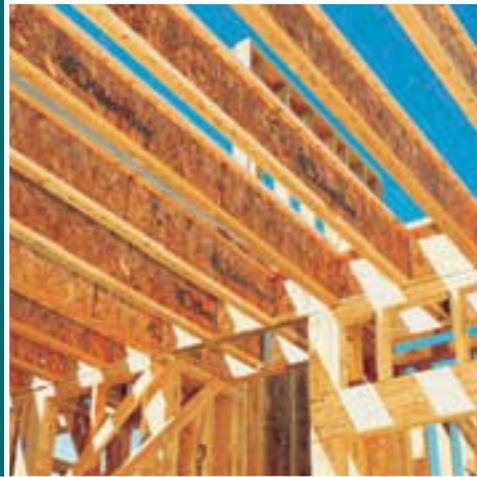
iLevel® Trus Joist® Parallam® Parallel Strand Lumber (PSL)

- Allows long spans for open floor plans without intermediate posts or columns
- Has warm, unique grain that is perfect for applications with exposed beams
- Provides ideal solutions for cantilever and multi-span applications
- Solid sections save time on site assembly
- Available in some regions with preservative treatment for exterior applications

Code Evaluations: See ICC ES ESR-1387 and HUD MR 1303



**TJI® 110 · TJI® 210 · TJI® 230
TJI® 360 · TJI® 560 Joists**



*Featuring Silent Floor® Joists
for Residential Applications*

- ▶ Environmentally Responsible
- ▶ Uniform and Predictable
- ▶ Resists Bowing, Twisting, and Shrinking
- ▶ Lightweight for Fast Installation
- ▶ Significantly Reduces Callbacks
- ▶ Available in Long Lengths
- ▶ Product Warranty



Why choose the Silent Floor® joist? Here's why so many specifiers and builders do:



EASY INSTALLATION— no surprises on the job or later on.

The same precision engineering that keeps a floor strong and quiet also makes it easier to install. The natural defects found in sawn lumber are engineered out, and dimensional stability is manufactured in.

And, at about half the weight of ordinary lumber joists, TJI® joists can be installed in a fraction of the time.

PRODUCT AVAILABILITY— our nation-wide distribution system ensures on-time delivery.

With seven TJI® joist manufacturing plants and over 70 distribution centers located strategically across North America, we make specifying, purchasing, and installing Silent Floor® joists a hassle-free experience.

DESIGN FLEXIBILITY— longer lengths for endless design options.

Silent Floor® joists are not limited by the dimensions or inconsistencies of ordinary sawn lumber. Longer uninterrupted spans with joists that won't bow, twist, or shrink means you have more design freedom than ever before.

INTEGRITY— guaranteed for the lifetime of the structure.

Builders appreciate our lifetime guarantee as much as home-owners do. After 30 years and more than three million homes, we at Trus Joist have so much confidence in our Silent Floor® joists that we guarantee them for the life of the home.

The residential products in this guide are intended for use in single-family dwellings and are readily available through our nation-wide network of distributors and dealers. For information on using these products in multi-family dwellings, refer to *TJI® Joists for Multi-Family Applications* (Reorder 2040).

For commercial applications such as retail stores, office buildings, schools, restaurants, hotels, nursing homes, etc., please refer to the *Commercial Product Manual* (Reorder 1900) or our *Structural Product Design Manual* (Reorder 1000). Commercial products are typically designed, manufactured, and sold by Trus Joist for each specific job.

For more information on any Trus Joist product, please call **1-800-628-3997**.

**Code Evaluations: ICC-ES Legacy Report ER-4979
and ICC ESR-1153**



HOMEBUYER'S GUARANTEE

We guarantee that the Trus Joist products used in your home have been manufactured to precise tolerances and are free from defects in materials and workmanship. In the unlikely event that your Silent Floor® joist develops squeaks or any other problem caused by such defects, and provided that your floor joists have been properly installed, we will promptly remedy that problem at no cost to you.

In addition, if you call us with a problem that you believe may be caused by our products, our representative will contact you within one business day to evaluate the problem and help solve it. Guaranteed.

This guarantee is effective for the life of your home.

1-800-628-3997



Understanding and Preventing Floor Noise

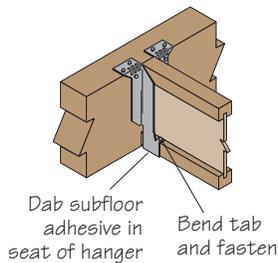
A specifier or builder who uses the Silent Floor® joist is making a significant effort to eliminate annoying floor squeaks. Here's why:

The most common cause of floor noise (squeaks) comes from using ordinary sawn lumber joists. Even when kiln dried, these joists can warp, twist, and shrink, leaving gaps around nails between the joist and floor panel—causing a squeak with every step.

Silent Floor® joists are structurally uniform, dimensionally stable, and have a consistent moisture content. They resist shrinking and twisting, which means no gaps—and no squeaks.

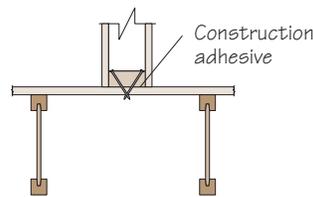
Using Silent Floor® joists can ensure a quieter floor, but only if the system is properly installed. This is because other components—like hangers, connectors, nails, etc.—can also cause floor noise. To help you get the best possible performance from your Silent Floor® joists, we recommend the following installation tips:

Properly seat each joist in hanger



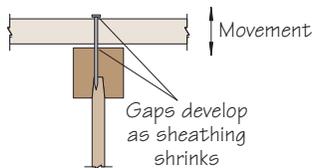
- *Seat the joist tight to the bottom of the hanger. When using hangers with tabs, bend the flange tabs over and nail to the TJI® joist bottom flange.*
- *Placing a dab of subfloor adhesive in the seat of the hanger prior to installing the joist can reduce squeaks.*

Use adhesive and special nailing when needed



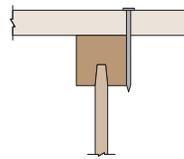
- *Nail interior partitions to the joists when possible. If the wall can only be nailed to the floor panel, run a bead of adhesive under the wall and either cross nail, nail through and clinch tight, or screw into the wall from below.*

Prevent shrinkage



- *Keep building materials dry, and properly glue floor panels to the joists. Panels that become excessively wet during construction shrink as they dry. This shrinkage may leave gaps that allow the panel to move when stepped on.*

Avoid "shiners"



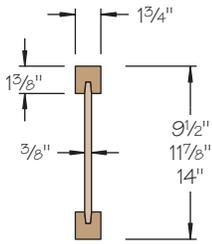
- *Exercise care when nailing. Nails that barely hit the joists (shiners) do not hold the panel tight to the joist and should be removed. If left in, the nails will rub against the side of the joist when the panel deflects.*

For more information and tips on how to prevent floor noise, refer to *The Silent Floor® Field Guide for Prevention and Repair of Squeaks (Reorder 2065)*.

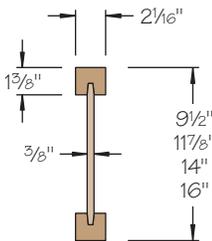
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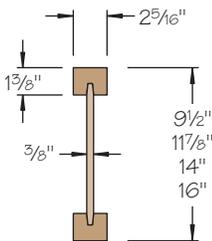
Not all products are available in all markets. Contact your Trus Joist representative for information.



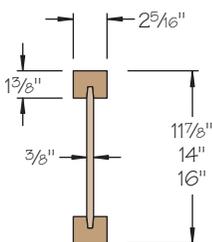
TJI® 110 joists



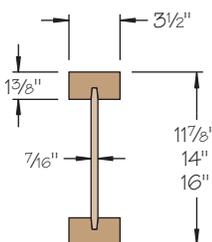
TJI® 210 joists



TJI® 230 joists



TJI® 360 joists



TJI® 560 joists

L/480 Live Load Deflection

Depth	TJI®	40 PSF Live Load / 10 PSF Dead Load				40 PSF Live Load / 20 PSF Dead Load			
		12" o.c.	16" o.c.	19.2" o.c.	24" o.c.	12" o.c.	16" o.c.	19.2" o.c.	24" o.c.
9 1/2"	110	16'-5"	15'-0"	14'-2"	13'-2"	16'-5"	15'-0"	13'-11"	12'-5"
	210	17'-3"	15'-9"	14'-10"	13'-10"	17'-3"	15'-9"	14'-10"	13'-8"
	230	17'-8"	16'-2"	15'-3"	14'-2"	17'-8"	16'-2"	15'-3"	14'-2"
11 7/8"	110	19'-6"	17'-10"	16'-10"	15'-5" ⁽¹⁾	19'-6"	17'-3"	15'-8"	14'-0" ⁽¹⁾
	210	20'-6"	18'-8"	17'-8"	16'-5"	20'-6"	18'-8"	17'-3"	15'-5" ⁽¹⁾
	230	21'-0"	19'-2"	18'-1"	16'-10"	21'-0"	19'-2"	18'-1"	16'-3" ⁽¹⁾
	360	22'-11"	20'-11"	19'-8"	18'-4"	22'-11"	20'-11"	19'-8"	17'-10" ⁽¹⁾
14"	560	26'-1"	23'-8"	22'-4"	20'-9"	26'-1"	23'-8"	22'-4"	20'-9" ⁽¹⁾
	110	22'-2"	20'-3"	18'-9"	16'-9" ⁽¹⁾	21'-8"	18'-9"	17'-1" ⁽¹⁾	14'-7" ⁽¹⁾
	210	23'-3"	21'-3"	20'-0"	18'-4" ⁽¹⁾	23'-3"	20'-7"	18'-9" ⁽¹⁾	16'-2" ⁽¹⁾
	230	23'-10"	21'-9"	20'-6"	19'-1"	23'-10"	21'-8"	19'-9"	17'-1" ⁽¹⁾
	360	26'-0"	23'-8"	22'-4"	20'-9" ⁽¹⁾	26'-0"	23'-8"	22'-4" ⁽¹⁾	17'-10" ⁽¹⁾
16"	560	29'-6"	26'-10"	25'-4"	23'-6"	29'-6"	26'-10"	25'-4" ⁽¹⁾	20'-11" ⁽¹⁾
	210	25'-9"	23'-6"	22'-0" ⁽¹⁾	19'-5" ⁽¹⁾	25'-5"	22'-0" ⁽¹⁾	20'-1" ⁽¹⁾	16'-2" ⁽¹⁾
	230	26'-5"	24'-1"	22'-9"	20'-7" ⁽¹⁾	26'-5"	23'-2"	21'-2" ⁽¹⁾	17'-1" ⁽¹⁾
	360	28'-9"	26'-3"	24'-8" ⁽¹⁾	21'-5" ⁽¹⁾	28'-9"	26'-3" ⁽¹⁾	22'-4" ⁽¹⁾	17'-10" ⁽¹⁾
	560	32'-8"	29'-8"	28'-0"	25'-2" ⁽¹⁾	32'-8"	29'-8"	26'-3" ⁽¹⁾	20'-11" ⁽¹⁾

L/360 Live Load Deflection (Minimum Criteria per Code)

Depth	TJI®	40 PSF Live Load / 10 PSF Dead Load				40 PSF Live Load / 20 PSF Dead Load			
		12" o.c.	16" o.c.	19.2" o.c.	24" o.c.	12" o.c.	16" o.c.	19.2" o.c.	24" o.c.
9 1/2"	110	18'-2"	16'-7"	15'-3"	13'-8"	17'-8"	15'-3"	13'-11"	12'-5"
	210	19'-1"	17'-5"	16'-6"	15'-0"	19'-1"	16'-9"	15'-4"	13'-8"
	230	19'-7"	17'-11"	16'-11"	15'-9"	19'-7"	17'-8"	16'-1"	14'-5"
11 7/8"	110	21'-7"	18'-11"	17'-3"	15'-5" ⁽¹⁾	19'-11"	17'-3"	15'-8"	14'-0" ⁽¹⁾
	210	22'-8"	20'-8"	18'-11"	16'-10"	21'-10"	18'-11"	17'-3"	15'-5" ⁽¹⁾
	230	23'-3"	21'-3"	19'-11"	17'-9"	23'-0"	19'-11"	18'-2"	16'-3" ⁽¹⁾
	360	25'-4"	23'-2"	21'-10"	20'-4" ⁽¹⁾	25'-4"	23'-2"	21'-10"⁽¹⁾	17'-10" ⁽¹⁾
14"	560	28'-10"	26'-3"	24'-9"	23'-0"	28'-10"	26'-3"	24'-9"	20'-11" ⁽¹⁾
	110	23'-9"	20'-6"	18'-9"	16'-9" ⁽¹⁾	21'-8"	18'-9"	17'-1" ⁽¹⁾	14'-7" ⁽¹⁾
	210	25'-8"	22'-6"	20'-7"	18'-4" ⁽¹⁾	23'-9"	20'-7"	18'-9" ⁽¹⁾	16'-2" ⁽¹⁾
	230	26'-4"	23'-9"	21'-8"	19'-4" ⁽¹⁾	25'-0"	21'-8"	19'-9"	17'-1" ⁽¹⁾
	360	28'-9"	26'-3"	24'-9" ⁽¹⁾	21'-5" ⁽¹⁾	28'-9"	26'-3"⁽¹⁾	22'-4" ⁽¹⁾	17'-10" ⁽¹⁾
16"	560	32'-8"	29'-9"	28'-0"	25'-2" ⁽¹⁾	32'-8"	29'-9"	26'-3"⁽¹⁾	20'-11" ⁽¹⁾
	210	27'-10"	24'-1"	22'-0" ⁽¹⁾	19'-5" ⁽¹⁾	25'-5"	22'-0" ⁽¹⁾	20'-1" ⁽¹⁾	16'-2" ⁽¹⁾
	230	29'-2"	25'-5"	23'-2"	20'-7" ⁽¹⁾	26'-9"	23'-2"	21'-2" ⁽¹⁾	17'-1" ⁽¹⁾
	360	31'-10"	29'-0"	26'-10" ⁽¹⁾	21'-5" ⁽¹⁾	31'-10"	26'-10"⁽¹⁾	22'-4" ⁽¹⁾	17'-10" ⁽¹⁾
560	36'-1"	32'-11"	31'-0" ⁽¹⁾	25'-2" ⁽¹⁾	36'-1"	31'-6"⁽¹⁾	26'-3" ⁽¹⁾	20'-11" ⁽¹⁾	

Long term deflection under dead load, which includes the effect of creep, has not been considered. **Bold italic** spans reflect initial dead load deflection exceeding 0.33".

(1) Web stiffeners are required at intermediate supports of continuous span joists when the intermediate bearing length is less than 5/4" and the span on either side of the intermediate bearing is greater than the following spans:

TJI®	40 PSF Live Load / 10 PSF Dead Load				40 PSF Live Load / 20 PSF Dead Load			
	12" o.c.	16" o.c.	19.2" o.c.	24" o.c.	12" o.c.	16" o.c.	19.2" o.c.	24" o.c.
110	N.A.	N.A.	N.A.	15'-4"	N.A.	N.A.	16'-0"	12'-9"
210	N.A.	N.A.	21'-4"	17'-0"	N.A.	21'-4"	17'-9"	14'-2"
230	N.A.	N.A.	N.A.	19'-2"	N.A.	N.A.	19'-11"	15'-11"
360	N.A.	N.A.	24'-5"	19'-6"	N.A.	24'-5"	20'-4"	16'-3"
560	N.A.	N.A.	29'-10"	23'-10"	N.A.	29'-10"	24'-10"	19'-10"

How to Use These Tables

1. Determine the appropriate live load deflection criteria.
2. Identify the live and dead load condition.
3. Select on-center spacing.
4. Scan down the column until you meet or exceed the span of your application.
5. Select TJI® joist and depth.

General Notes

- Tables are based on:
 - Uniform loads.
 - More restrictive of simple or continuous span.
 - Clear distance between supports (1 3/4" minimum end bearing).
- Assumed composite action with a single layer of 24" on-center span-rated, glue-nailed floor panels for deflection only. **Spans shall be reduced 6" when floor panels are nailed only.**
- Spans generated from Trus Joist software may exceed the spans shown in these tables because software reflects actual design conditions.
- For loading conditions not shown, refer to software or to load tables on page 15.

Live load deflection is not the only factor that affects how a floor will perform. To more accurately predict floor performance, use our TJI-Pro™ Rating system.

Design Properties (100% Load Duration)

Depth	TJI®	Basic Properties				Reaction Properties		
		Joist Weight (lbs/ft)	Maximum Resistive Moment ⁽¹⁾ (ft-lbs)	Joist Only EI x 10 ⁶ (in. ² -lbs)	Maximum Vertical Shear (lbs)	1¾" End Reaction (lbs)	3½" Intermediate Reaction (lbs)	
						No Web Stiffeners	With Web Stiffeners	
9½"	110	2.3	2,380	140	1,220	885	1,935	N.A.
	210	2.6	2,860	167	1,330	980	2,145	N.A.
	230	2.7	3,175	183	1,330	1,035	2,410	N.A.
11½"	110	2.5	3,015	238	1,560	885	1,935	2,295
	210	2.8	3,620	283	1,655	980	2,145	2,505
	230	3.0	4,015	310	1,655	1,035	2,410	2,765
	360	3.0	6,180	419	1,705	1,080	2,460	2,815
	560	4.0	9,500	636	2,050	1,265	3,000	3,475
14"	110	2.8	3,565	351	1,860	885	1,935	2,295
	210	3.1	4,280	415	1,945	980	2,145	2,505
	230	3.3	4,755	454	1,945	1,035	2,410	2,765
	360	3.3	7,335	612	1,955	1,080	2,460	2,815
	560	4.2	11,275	926	2,390	1,265	3,000	3,475
16"	210	3.3	4,895	566	2,190	980	2,145	2,505
	230	3.5	5,440	618	2,190	1,035	2,410	2,765
	360	3.5	8,405	830	2,190	1,080	2,460	2,815
	560	4.5	12,925	1,252	2,710	1,265	3,000	3,475

(1) **Caution:** Do **not** increase joist moment design properties by a repetitive member use factor.

General Notes

- Design reaction includes all loads on the joist. Design shear is computed at the face of supports including all loads on the span(s). Allowable shear may sometimes be increased at interior supports in accordance with pending ICC ESR-1153 and these increases are reflected in span tables.
- The following formulas approximate the uniform load deflection of Δ (inches):

<p>For TJI® 110, 210, 230, and 360 Joists</p> $\Delta = \frac{22.5 wL^4}{EI} + \frac{2.67 wL^2}{d \times 10^5}$	<p>For TJI® 560 Joists</p> $\Delta = \frac{22.5 wL^4}{EI} + \frac{2.29 wL^2}{d \times 10^5}$
<p>w = uniform load in pounds per linear foot L = span in feet d = out-to-out depth of the joist in inches EI = value from table above</p>	

TJI® joists are intended for dry-use applications

Material Weights

(Include TJI® weights in dead load calculations—see Design Properties table at left for joist weights)

Floor Panels

Southern Pine

½" plywood	1.7 psf
⅝" plywood	2.0 psf
¾" plywood	2.5 psf
1½" plywood	3.8 psf
½" OSB	1.8 psf
⅝" OSB	2.2 psf
¾" OSB	2.7 psf
⅞" OSB	3.1 psf
1½" OSB	4.1 psf

Based on: Southern pine – 40 pcf for plywood, 44 pcf for OSB

Roofing

Asphalt shingles	2.5 psf
Wood shingles	2.0 psf
Clay tile	9.0 to 14.0 psf
Slate (⅜" thick)	15.0 psf

Roll or Batt Insulation (1" thick):

Rock wool	0.2 psf
Glass wool	0.1 psf

Floor Finishes

Hardwood (nominal 1")	4.0 psf
Sheet vinyl	0.5 psf
Carpet and pad	1.0 psf
¾" ceramic or quarry tile	10.0 psf

Concrete:

Regular (1")	12.0 psf
Lightweight (1")	8.0 to 10.0 psf
Gypsum concrete (¾")	6.5 psf

Ceilings

Acoustical fiber tile	1.0 psf
½" gypsum board	2.2 psf
⅝" gypsum board	2.8 psf
Plaster (1" thick)	8.0 psf



DO NOT allow workers to walk on joists until braced. INJURY MAY RESULT.



DO NOT stack building materials on unbraced joists. Stack only over beams or walls.

WARNING

Joists are unstable until braced laterally

Bracing Includes:

- Blocking
- Hangers
- Rim Board
- Sheathing
- Rim Joist
- Strut Lines

WARNING NOTES: Lack of concern for proper bracing during construction can result in serious accidents. Under normal conditions if the following guidelines are observed, accidents will be avoided.

1. All blocking, hangers, rim boards, and rim joists at the end supports of the TJI® joists must be completely installed and properly nailed.
2. Lateral strength, like a braced end wall or an existing deck, must be established at the ends of the bay. This can also be accomplished by a temporary or permanent deck (sheathing) fastened to the first 4 feet of joists at the end of the bay.
3. Safety bracing lines of 1x4 (minimum) must be nailed to a braced end wall or sheathed area as in note 2 and to each joist. Without this bracing, buckling sideways or rollover is highly probable under light construction loads—like a worker or one layer of unnailed sheathing.
4. Sheathing must be totally attached to each TJI® joist before additional loads can be placed on the system.
5. Ends of cantilevers require safety bracing on both the top and bottom flanges.
6. The flanges must remain straight within a tolerance of ½" from true alignment.

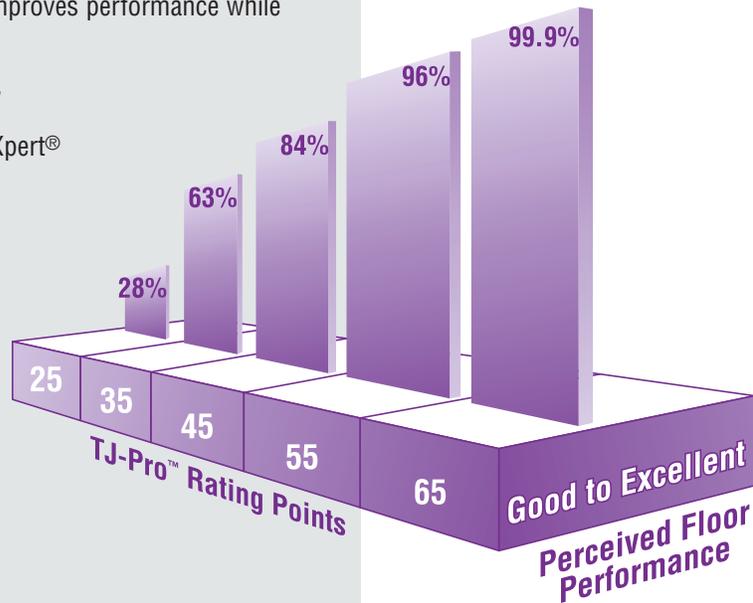
IT'S ABOUT CHOICE—

The TJ-Pro™ Rating System is a sophisticated computer model for predicting floor performance and evaluating the relationship between the cost and the “feel” of any given floor system. Its methodology is based on extensive laboratory research, more than one million installations, and the combined expertise of the best engineers in the field. TJ-Pro™ Rating goes beyond deflection criteria to consider job-specific needs and expectations. In many cases, TJ-Pro™ Rating will offer a system that improves performance while actually reducing costs!

How do most people perceive a floor assembly with a TJ-Pro™ Rating of 45 points? 84% find it good to excellent and 16% find it marginal to unacceptable.

TJ-PRO™ RATING SYSTEM FEATURES:

- Works as part of Trus Joist's TJ-Beam® and TJ-Xpert® software.
- Provides a new method for accurately predicting floor performance.
- Takes perceptions of the homeowner into account.
- Provides cost comparison.



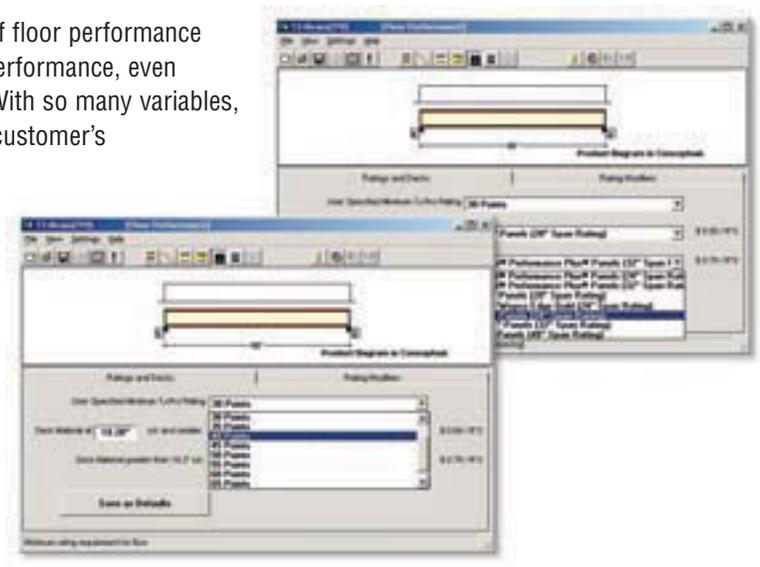
DESIGN SMARTER—DON'T OVER-SPECIFY

The traditional way to specify a floor system is to use live load deflection criteria, but deflection only explains part of how a floor performs. Depending on factors unique to the structure and its use, the code minimum of L/360 (or even the more restrictive limits of L/480) may disappoint many customers.

The TJ-Pro™ Rating System is a much better predictor of floor performance because it considers the many factors that affect floor performance, even taking into account the perceptions of the homeowner. With so many variables, you can deliver an economical solution tailored to your customer's expectations.

Factors that affect floor performance:

- TJI® joist series, depth, and spacing
- Deck thickness and quality
- Directly applied ceilings
- Location of partitions on floor
- Use of blocking
- Bearing conditions for the TJI® joists



GET THE SUPPORT YOU NEED—

We're here to help you make the most of the TJ-Pro™ Rating System, whether it's help with setup, tips and tricks, or selecting the best rating for your project. Call your Trus Joist representative today.

THE FRAMEWORKS® FLOOR SYSTEM

THE PREMIUM FLOOR SYSTEM FROM TRUS JOIST

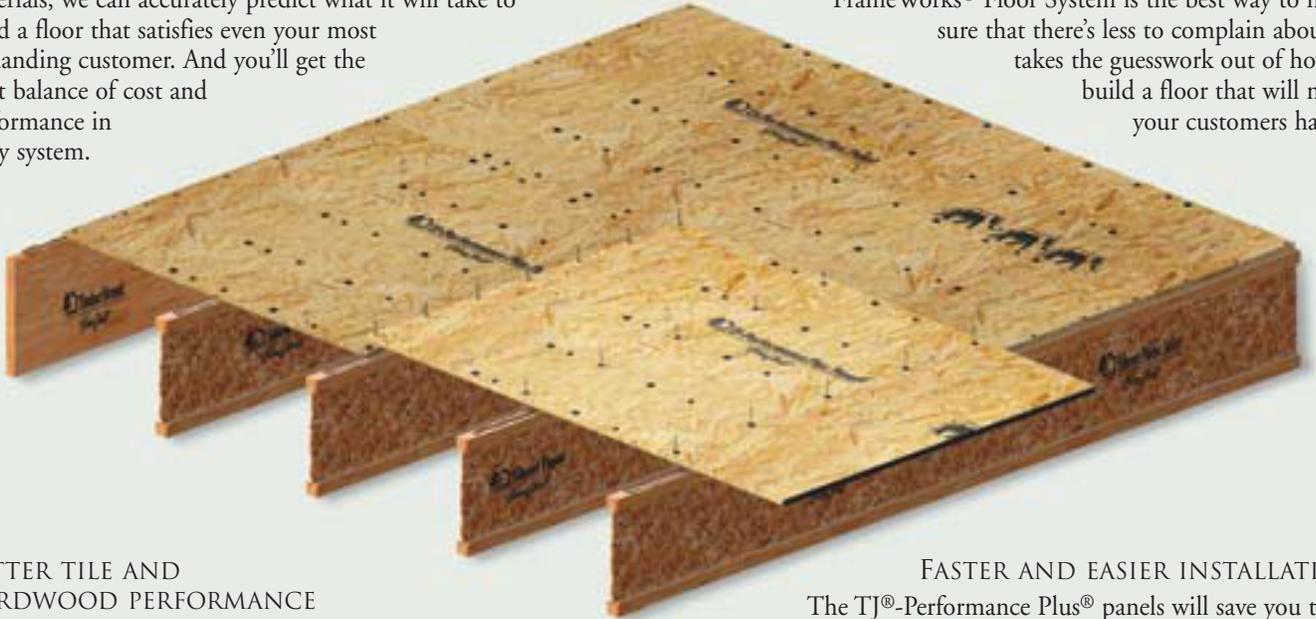
YOU'LL LIKE THE WAY IT BUILDS.
YOUR CUSTOMERS WILL LOVE THE WAY IT FEELS.

DESIGN YOUR FLOORS TO SUIT EACH CUSTOMER

With the TJ-Pro® Rating System and Trus Joist's proprietary materials, we can accurately predict what it will take to build a floor that satisfies even your most demanding customer. And you'll get the right balance of cost and performance in every system.

FEWER CALLBACKS AND MORE REFERRALS

Satisfied customers mean more referrals. And the FrameWorks® Floor System is the best way to make sure that there's less to complain about. It takes the guesswork out of how to build a floor that will make your customers happy.



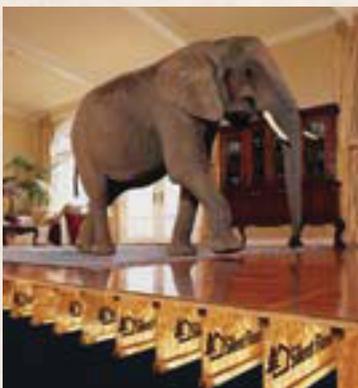
BETTER TILE AND HARDWOOD PERFORMANCE

Our unique panel provides increased stiffness, better fastener holding, and lower edge swell than commodity panels, so it's ideal for hardwood and ceramic tile applications.

FASTER AND EASIER INSTALLATION

The TJ®-Performance Plus® panels will save you time. The precise fastening grid makes it easy to get it right the first time, and the self-gapping tongue and groove lets your crews slide the panels into place quickly.

NOW YOU CAN BUILD A STRONG AND STABLE FLOOR—WITHOUT OVERBUILDING.



The performance of most commodity building products is unpredictable. But since we know the precise strength of every component in the FrameWorks® Floor System, we can comfortably build to your specifications while making sure that you don't use more material than you need.

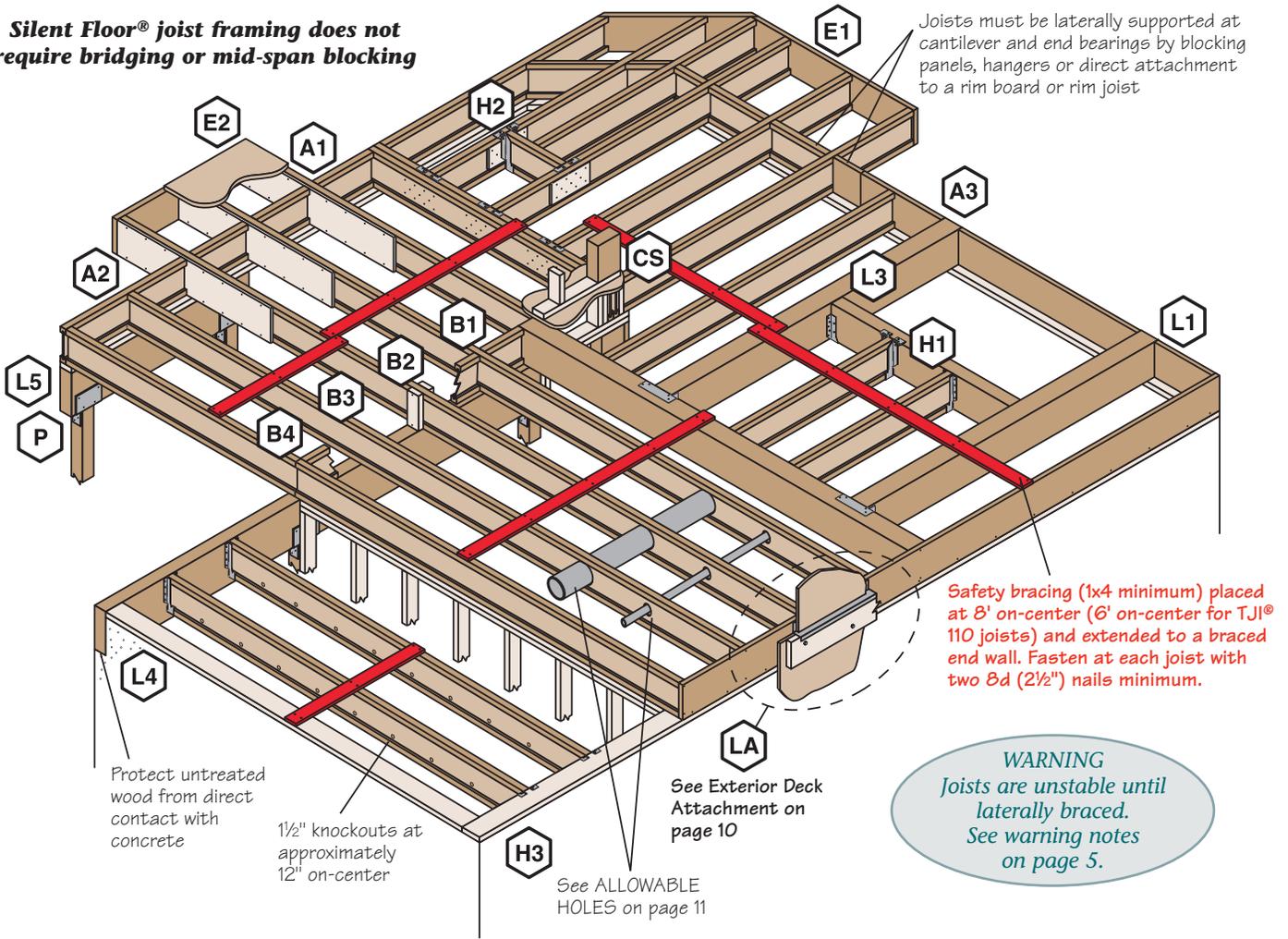
Silent Floor® joists have very specific performance characteristics. TJ®-Performance Plus® panels are made with a proprietary formula, meet precise thickness tolerances, and have a top-quality edge seal—making them more stable and consistent than other structural panels. Add rim board,

beams, and columns made of TimberStrand® LSL, Parallam® PSL, and Microllam® LVL, as well as our helpful installation guidelines, and you get more control, more strength, and more reliability than you could with a package made up of typical framing materials.

So next time you're building someone's dream home, don't rely on guesswork. Bring your plans to any Trus Joist or Weyerhaeuser location and we'll show you how to make the most of both your framing material and the labor it takes to turn it into a home.

For projects that demand quality, performance, and customer satisfaction, upgrade to the FrameWorks® Floor System. Contact your Trus Joist representative or call 800-338-0515 for more information.

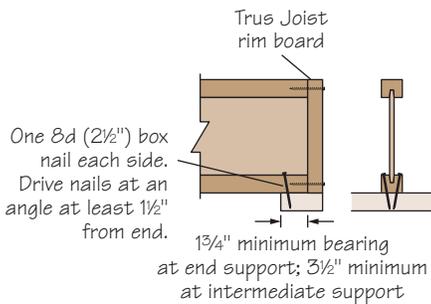
Silent Floor® joist framing does not require bridging or mid-span blocking



WARNING
Joists are unstable until laterally braced. See warning notes on page 5.

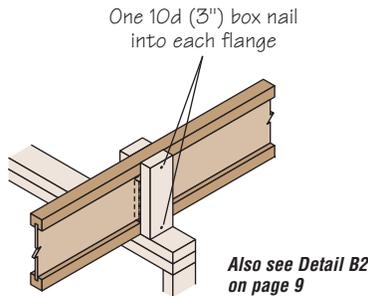
TJI® Joist Nailing Requirements at Bearing

TJI® Joist to Bearing Plate

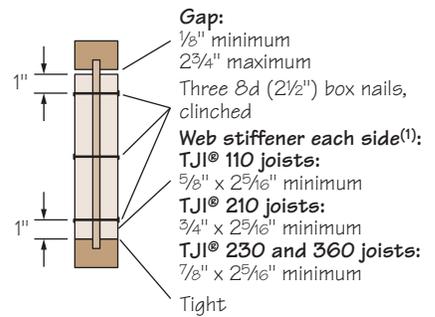


Shear transfer: Connections equivalent to floor panel nailing schedule

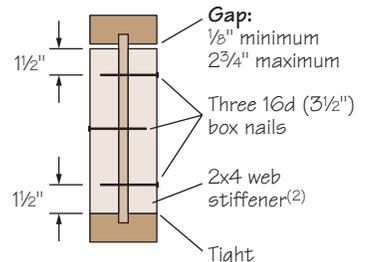
Squash Blocks to TJI® Joist (Load bearing wall above)



Web Stiffener Attachment



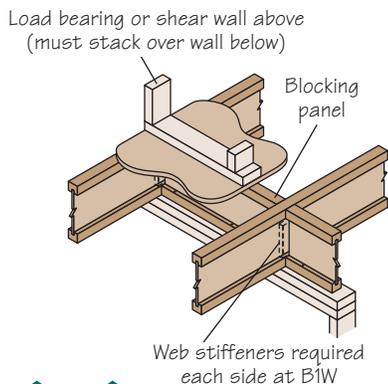
TJI® 560 joists only



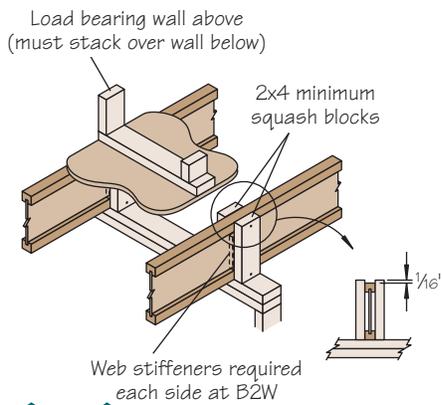
Rim to TJI® Joist



W (1) Web stiffener material shall be PS1 or PS2 sheathing, face grain vertical
(2) 2x4 construction grade or better

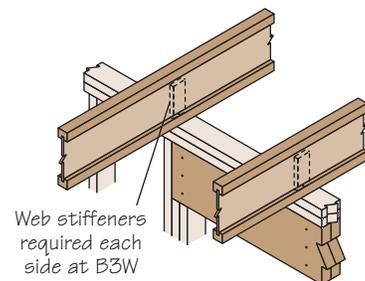


B1 **B1W**

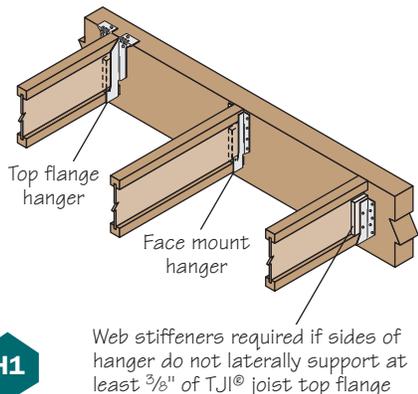


B2 **B2W** *Blocking panels may be required with shear walls above or below—see detail B1*

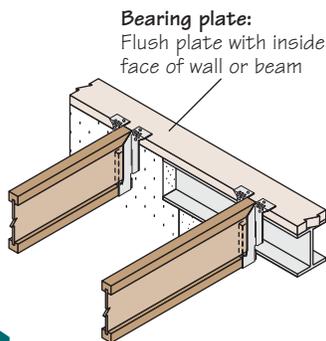
Intermediate Bearing – No Load Bearing Wall Above



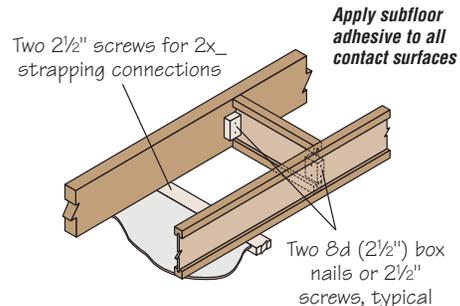
B3 **B3W** *Blocking panels may be required with shear walls above or below—see detail B1*



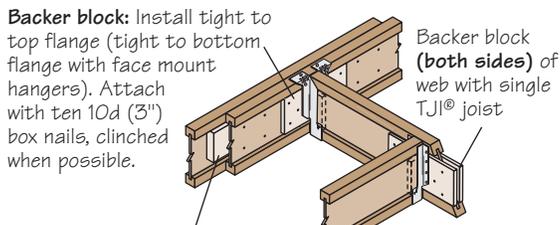
H1



H3



PB1 *Applications shown in this guide do not require blocking, strapping, or a directly applied ceiling; however, backspan bracing of cantilever applications is required when specified by software*



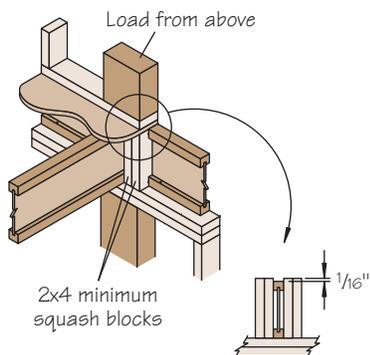
Filler block: Nail with ten 10d (3") box nails, clinched. Use ten 16d (3 1/2") box nails from each side with TJI® 560 joists.

H2 *With top flange hangers, backer block required only for downward loads exceeding 250 lbs or for uplift conditions*

Filler and Backer Block Sizes

TJI®	110		210		230 or 360		560	
	Depth	9 1/2" or 11 7/8" 14"	9 1/2" or 11 7/8" 14" or 16"	9 1/2" or 11 7/8" 14" or 16"	11 7/8" 14" or 16"	11 7/8" 14" or 16"	11 7/8" 14" or 16"	11 7/8" 14" or 16"
Filler Block* (Detail H2)	2x6	2x8	2x6 + 3/8" sheathing	2x8 + 3/8" sheathing	2x6 + 1/2" sheathing	2x8 + 1/2" sheathing	Two 2x6	Two 2x8
Cantilever Filler (Detail E4)	2x6 4'-0" long	2x10 6'-0" long	2x6 + 3/8" sheathing 4'-0" long	2x10 + 3/8" sheathing 6'-0" long	2x6 + 1/2" sheathing 4'-0" long	2x10 + 1/2" sheathing 6'-0" long	Not applicable	
Backer Block* (Detail F1 or H2)	5/8" or 3/4"		3/4" or 7/8"		1" net		2x6	2x8

* If necessary, increase filler and backer block height for face mount hangers. Maintain 1/8" gap at top of joist; see detail W. Filler and backer block dimensions should accommodate required nailing without splitting.



CS *Use 2x4 minimum squash blocks to transfer load around TJI® joist*

Fastening of Floor Panels to TJI® Joist Flanges and Trus Joist Rim Board

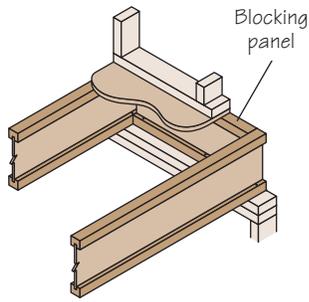
Nail Size	Closest On-Center Spacing per Row	
	TJI® 110 and 210	Trus Joist Rim Board
8d (2 1/2") box	2 1/2"	1" 1 1/4"
8d (2 1/2") common	3 1/2"	6" 4"
10d (3"), 12d (3 1/4") box	3"	6" 4"
10d (3"), 12d (3 1/4") common	4 1/2"	6" 4"
16d (3 1/2") common	N.A.	16" 6" (1)

(1) Can be reduced to 4" on-center with maximum nail penetration of 1 3/8" into the narrow edge.

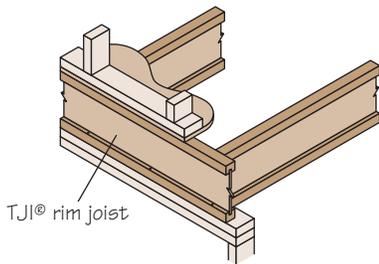
General Notes

- Maximum spacing of nails is 18" on-center for TJI® 110 joists, and 24" on-center for TJI® 210, 230, 360, and 560 joists.
- If more than one row of nails is used, the rows must be offset at least 1/2" and staggered.
- 14 ga. staples may be substituted for 8d (2 1/2") nails if minimum penetration of 1" is achieved.
- Table also applies for the attachment of TJI® rim joists and blocking panels to the wall plate.

Also see nailing requirements on page 8

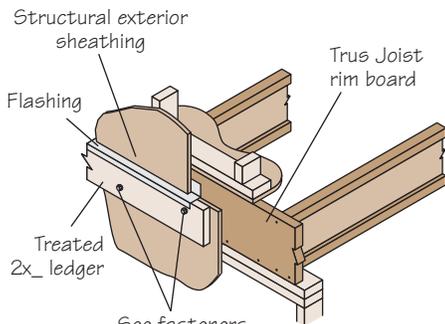


A1



A2

Exterior Deck Attachment



See fasteners below. Maintain 2" distance (minimum) from edge of ledger to fastener.

LA

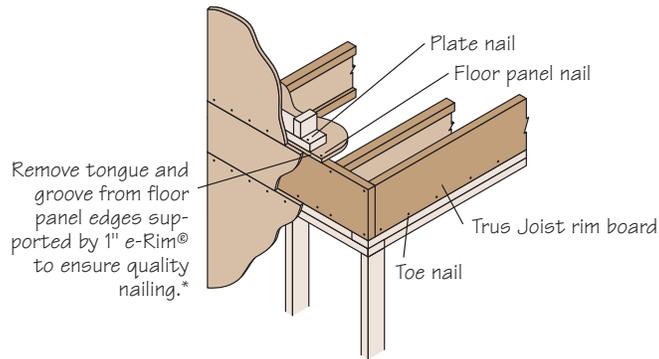
Fastener	Allowable Load (lbs) ⁽¹⁾	
	1 1/4" Rim Board	1" e-Rim®
3/8" lag bolt	400	N.A.
1/2" lag bolt	475	325

(1) Allowable load determined in accordance with AC 124.

• Corrosion-resistant fasteners required for wet-service applications.

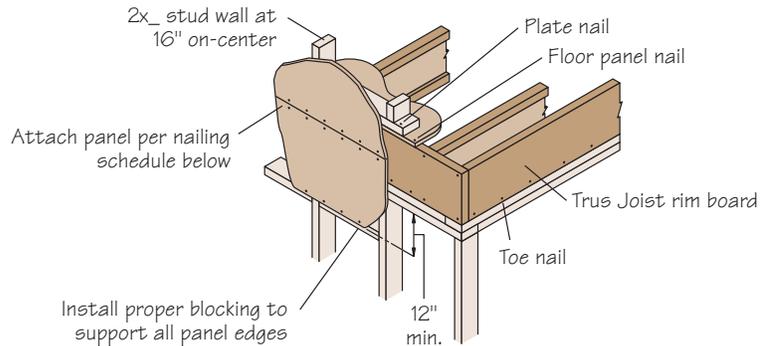
Rim board is often the critical structural link in the ability of a home to resist lateral wind loads. It also transfers vertical load around the TJI® joists.

Rim board Detail A3 (shown below) satisfies conventional construction requirements. But if your project requires a designed solution, see our Trus Joist **Rim Board Selection and Installation Guide for Lateral Wind Loads (Reorder 2109)**. This easy to use design guide for specifiers and code officials goes beyond conventional construction guidelines—which were based on the smaller, simpler homes of the past—and provides design information that considers today's larger, more complex homes.



A3 A3.1 A3.2 A3.3

*According to ICBO Evaluation Services, Inc., it is necessary to trim the panel edges when using 1 1/8" or thinner rim board.



A3.4

Rim Board Installation

Specifications	A3 Conventional Construction, Code Minimum	A3.1, A3.2, A3.3, A3.4 Designed Solution
Rim Board Thickness	1" or 1 1/4"	See the <i>Trus Joist Rim Board Selection and Installation Guide for Lateral Wind Loads (Reorder 2109)</i>
Plate Nail—16d (3 1/2") box	16" o.c.	
Floor Panel Nail—8d (2 1/2") common	6" o.c.	
Toe Nail—10d (3") box	6" o.c.	
Sill Plate Anchor Bolt	1/2" dia. at 6' o.c.	

Vertical Load Transfer at Bearing

Allowable Uniform Vertical Loads (PLF)	
TJI® rim joist or blocking	2,100
Trus Joist rim board or blocking	4,250

• Loads may not be increased for duration of load.

Also see nailing requirements on page 8

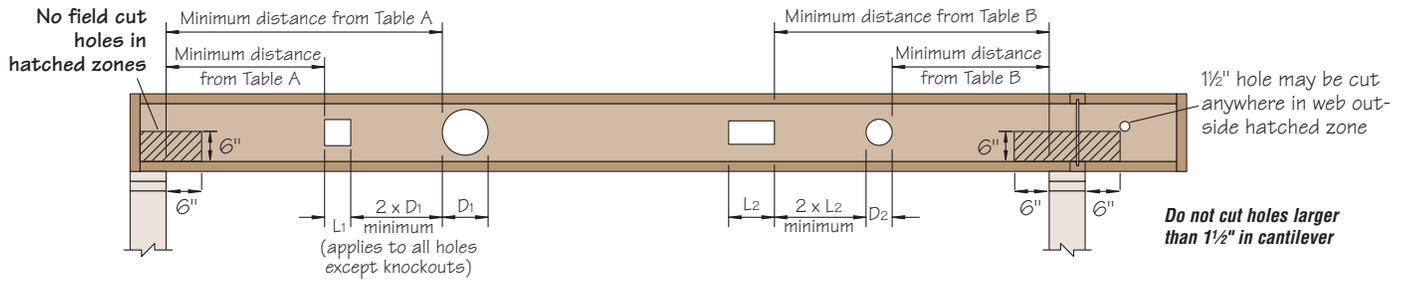


Table A—End Support
Minimum distance from edge of hole to inside face of nearest end support

Depth	TJI®	● Round Hole Size						■ Square or Rectangular Hole Size							
		2"	3"	4"	6½"	8⅞"	11"	13"	2"	3"	4"	6½"	8⅞"	11"	13"
9½"	110	1'-0"	1'-6"	2'-0"	5'-0"				1'-0"	1'-6"	2'-6"	4'-6"			
	210	1'-0"	1'-6"	2'-0"	5'-0"				1'-0"	2'-0"	2'-6"	5'-0"			
	230	1'-0"	2'-0"	2'-6"	5'-6"				1'-0"	2'-0"	3'-0"	5'-0"			
11⅞"	110	1'-0"	1'-0"	1'-0"	2'-6"	5'-0"			1'-0"	1'-0"	1'-6"	4'-6"	6'-0"		
	210	1'-0"	1'-0"	1'-0"	2'-6"	5'-6"			1'-0"	1'-0"	2'-0"	5'-0"	6'-6"		
	230	1'-0"	1'-0"	1'-0"	3'-0"	6'-0"			1'-0"	1'-0"	2'-0"	5'-6"	7'-0"		
	360	1'-0"	1'-0"	1'-6"	4'-6"	7'-0"			1'-0"	1'-0"	2'-6"	6'-6"	7'-6"		
14"	560	1'-0"	1'-0"	1'-6"	5'-0"	8'-0"			1'-0"	2'-0"	3'-6"	7'-0"	8'-0"		
	110	1'-0"	1'-0"	1'-0"	1'-0"	2'-6"	5'-0"		1'-0"	1'-0"	1'-0"	3'-6"	6'-0"	8'-0"	
	210	1'-0"	1'-0"	1'-0"	1'-0"	3'-0"	6'-0"		1'-0"	1'-0"	1'-0"	4'-0"	6'-6"	8'-6"	
	230	1'-0"	1'-0"	1'-0"	1'-6"	3'-6"	6'-6"		1'-0"	1'-0"	1'-0"	4'-0"	7'-0"	9'-0"	
16"	360	1'-0"	1'-0"	1'-0"	2'-6"	5'-6"	8'-0"		1'-0"	1'-0"	1'-0"	5'-6"	8'-0"	9'-6"	
	560	1'-0"	1'-0"	1'-0"	2'-6"	6'-0"	9'-0"		1'-0"	1'-0"	1'-6"	6'-6"	9'-0"	10'-0"	
	210	1'-0"	1'-0"	1'-0"	1'-0"	1'-6"	3'-6"	6'-0"	1'-0"	1'-0"	1'-0"	2'-6"	6'-6"	8'-0"	10'-6"
	230	1'-0"	1'-0"	1'-0"	1'-0"	2'-0"	4'-0"	6'-6"	1'-0"	1'-0"	1'-0"	3'-0"	7'-0"	9'-0"	11'-0"
16"	360	1'-0"	1'-0"	1'-0"	1'-0"	3'-0"	6'-0"	9'-0"	1'-0"	1'-0"	1'-0"	4'-0"	9'-0"	10'-0"	11'-6"
	560	1'-0"	1'-0"	1'-0"	1'-0"	3'-0"	6'-6"	10'-0"	1'-0"	1'-0"	1'-0"	5'-0"	10'-0"	11'-0"	12'-0"

Table B—Intermediate or Cantilever Support
Minimum distance from edge of hole to inside face of nearest intermediate or cantilever support

Depth	TJI®	● Round Hole Size						■ Square or Rectangular Hole Size							
		2"	3"	4"	6½"	8⅞"	11"	13"	2"	3"	4"	6½"	8⅞"	11"	13"
9½"	110	1'-6"	2'-6"	3'-0"	7'-6"				1'-6"	2'-6"	3'-6"	6'-6"			
	210	2'-0"	2'-6"	3'-6"	7'-6"				2'-0"	3'-0"	4'-0"	7'-0"			
	230	2'-6"	3'-0"	4'-0"	8'-0"				2'-6"	3'-0"	4'-6"	7'-6"			
11⅞"	110	1'-0"	1'-0"	1'-6"	4'-0"	8'-0"			1'-0"	1'-6"	2'-6"	6'-6"	9'-0"		
	210	1'-0"	1'-0"	2'-0"	4'-6"	9'-0"			1'-0"	2'-0"	3'-0"	7'-6"	10'-0"		
	230	1'-0"	2'-0"	2'-6"	5'-0"	9'-6"			1'-0"	2'-6"	3'-6"	8'-0"	10'-0"		
	360	2'-0"	3'-0"	4'-0"	7'-0"	11'-0"			2'-0"	3'-6"	5'-0"	9'-6"	11'-0"		
14"	560	1'-6"	3'-0"	4'-6"	8'-0"	12'-0"			3'-0"	4'-6"	6'-0"	10'-6"	12'-0"		
	110	1'-0"	1'-0"	1'-0"	2'-0"	4'-6"	8'-0"		1'-0"	1'-0"	1'-0"	5'-0"	9'-0"	12'-0"	
	210	1'-0"	1'-0"	1'-0"	2'-6"	5'-0"	9'-0"		1'-0"	1'-0"	2'-0"	6'-0"	10'-0"	12'-6"	
	230	1'-0"	1'-0"	1'-0"	3'-0"	5'-6"	10'-0"		1'-0"	1'-0"	2'-6"	6'-0"	10'-6"	13'-0"	
16"	360	1'-0"	1'-0"	2'-0"	5'-6"	8'-6"	12'-6"		1'-0"	2'-0"	4'-0"	9'-0"	12'-0"	14'-0"	
	560	1'-0"	1'-0"	1'-6"	5'-6"	9'-6"	13'-6"		1'-0"	3'-0"	5'-0"	10'-0"	13'-6"	15'-0"	
	210	1'-0"	1'-0"	1'-0"	1'-0"	3'-0"	5'-6"	9'-6"	1'-0"	1'-0"	1'-0"	4'-6"	9'-6"	12'-6"	15'-6"
	230	1'-0"	1'-0"	1'-0"	1'-6"	4'-0"	6'-6"	10'-6"	1'-0"	1'-0"	1'-0"	5'-0"	10'-6"	13'-0"	16'-0"
16"	360	1'-0"	1'-0"	1'-0"	3'-0"	6'-6"	10'-0"	13'-6"	1'-0"	1'-0"	2'-0"	7'-6"	13'-0"	14'-6"	17'-0"
	560	1'-0"	1'-0"	1'-0"	2'-6"	7'-0"	11'-0"	15'-0"	1'-0"	1'-0"	3'-6"	9'-0"	14'-6"	16'-0"	18'-0"

Rectangular holes based on measurement of longest side.

How to Use These Tables

- Using Table A (end support) and/or Table B (intermediate or cantilever support), determine the hole shape/size and select the TJI® joist and depth.
- Scan horizontally until you intersect the the correct hole size column.
- Measurement shown is minimum distance from edge of hole to support.
- Place the hole so that the required minimum distance from the end and the intermediate or cantilever support is maintained.

General Notes

- Holes may be located vertically anywhere within the web. Leave ⅛" of web (minimum) at top and bottom of hole.
- Knockouts are located in web at approximately 12" on-center; they do not affect hole placement.
- For simple span (5' minimum) uniformly loaded joists meeting the requirements of this guide, one maximum size round hole may be located at the center of the joist span provided no other holes occur in the joist.
- Distances are based on the maximum uniform loads shown in this guide. For other load conditions or hole configurations use TJ-Beam® software or contact your Trus Joist representative.

DO NOT
cut or notch flange.

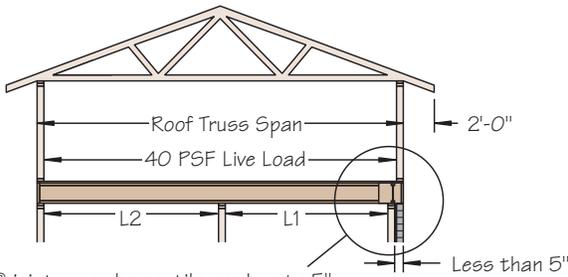


DO NOT
cut holes in cantilever reinforcement.



Cantilevers less than 5" (Brick Ledge)

(See Section A of Cantilever Table on page 13)

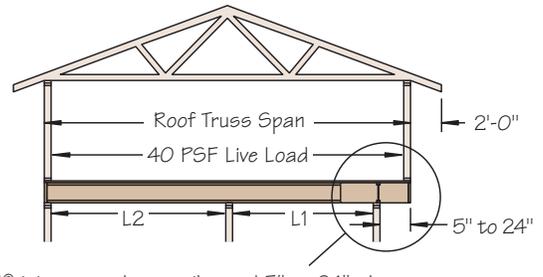


TJI® joists may be cantilevered up to 5" when supporting roof load, assuming:

- simple or continuous span
- $L1 \leq L2$

Cantilevers 5" to 24"

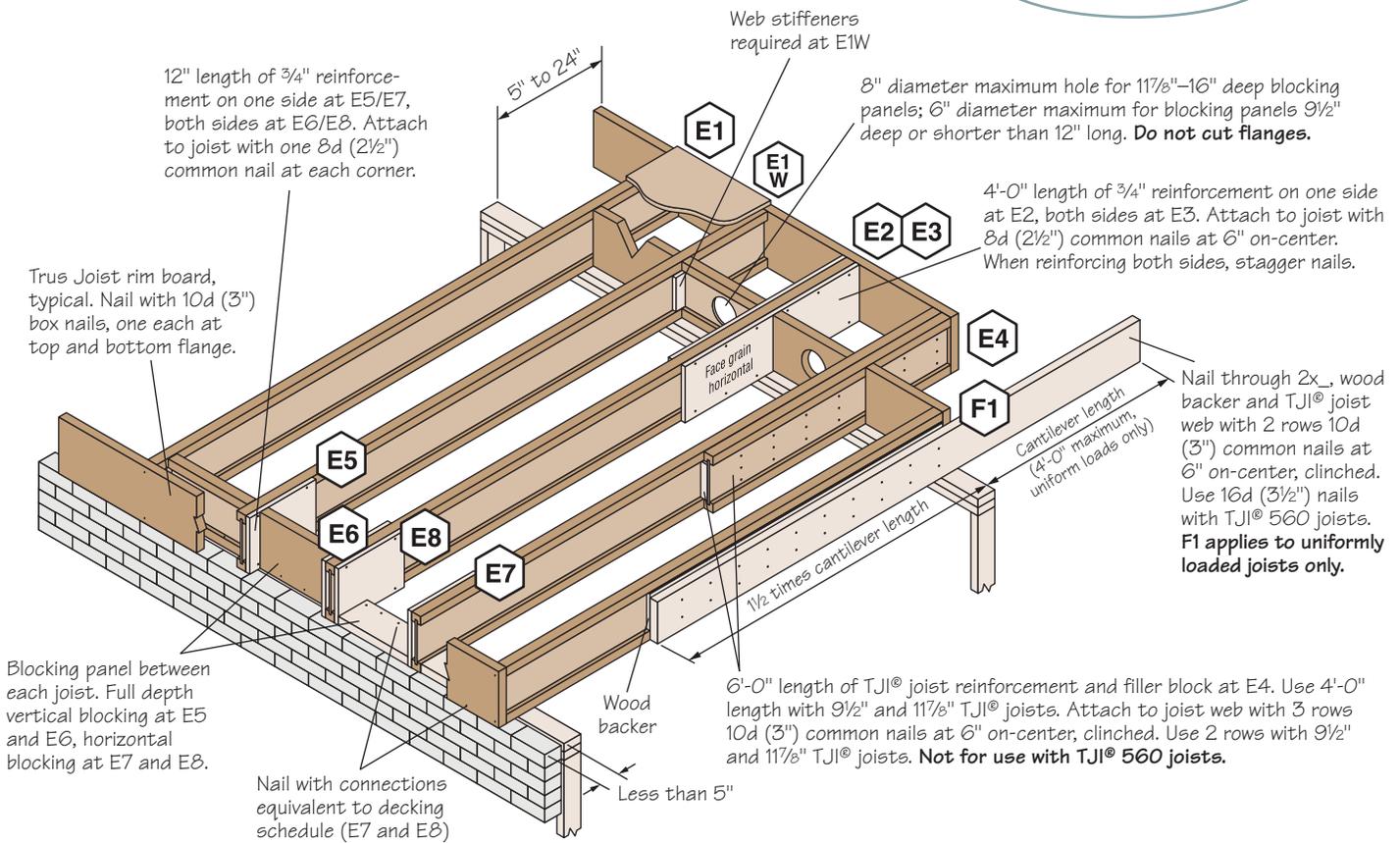
(See Section B of Cantilever Table on page 13)



TJI® joists may be cantilevered 5" to 24" when supporting roof load, assuming:

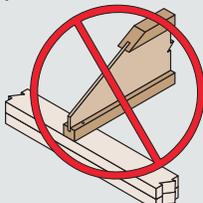
- simple or continuous span
- $L1 \leq L2$

TJI® joists are intended for dry-use applications



These Conditions Are NOT Permitted

DO NOT bevel cut joist beyond inside face of wall.



DO NOT use sawn lumber for rim board or blocking.



Sawn lumber may shrink after installation.

DO NOT install hanger overhanging face of plate or beam.



Flush bearing plate with inside face of wall or beam.

Cantilever Reinforcement

Depth	TJI®	Roof Truss Span	Section A: Cantilevers less than 5" (Brick Ledge)									Section B: Cantilevers 5" to 24"														
			Roof Total Load									Roof Total Load														
			35 PSF			45 PSF			55 PSF			35 PSF			45 PSF			55 PSF								
			On-center Joist Spacing									On-center Joist Spacing														
16"			19.2"			24"			16"			19.2"			24"			16"			19.2"			24"		
9½" 11⅞" 14"	110	20'	E5			E5			E5						X			X								
		22'	E5			E5			E5						X			X			X					
		24'	E5	E5	E5	E5	E5	E5	E5	E5	E5				X			X			X					
		26'	E5	E5	E5	E5	E5	E5	E5	E5	E6				X			E2			X					
		28'	E5	X	E5	E5	X	E5	E5	X	E5				E2			X			X					
		30'	E5	E5	X	E5	E5	X	E5	E5	X				E3			X			X					
		32'	E5	X	X	E5	X	X	E5	X	X	E2	X	X	X	X	X	X	X	X	X	X	X	X		
9½" 11⅞" 14" 16"	210	20'	E5			E5			E5												X					
		22'	E5			E5			E5						E2						X					
		24'	E5			E5			E5						E2						X					
		26'	E5	E5	E5	E5	E5	E5	E5	E5	E5				X			E2			X					
		28'	E5	E5	E5	E5	E5	E5	E5	E5	E6				E2			E2			X					
		30'	E5	E5	E5	E5	E5	E5	E5	E5	E6				E3			E2			E3					
		32'	E5	E5	X	E5	E5	X	E5	E5	X	E2	X	E3	X	X	X	X	X	X	X	X	X	X		
9½" 11⅞" 14" 16"	230	24'	E5			E5			E5						E2						X					
		26'	E5	E5	E5	E5	E5	E5	E5	E5				E2						E2						
		28'	E5	E5	E5	E5	E5	E5	E5	E5				E2			E3			E2						
		30'	E5	E5	E5	E5	E5	E5	E5	E5				E2			E2			X						
		32'	E5	E5	X	E5	E5	X	E5	E5	X	E2	E3	E2	E3	X	E3	X	E3	X	X	X	X			
		34'	E5	E5	X	E5	E5	X	E5	E5	X	E3	X	E3	X	X	X	X	X	X	X	X	X			
		40'	E5	E5	E5	E5	E5	E5	E5	E5	E6				E1W						E2					
11⅞" 14" 16"	360	28'	E5			E5			E5												E2					
		30'	E5	E5	E5	E5	E5	E5	E5	E5				E1W						E2						
		32'	E5	E5	E5	E5	E5	E5	E5	E5				E2						E2						
		34'	E5	E5	E5	E5	E5	E5	E5	E5				E2			E1W			E3						
		36'	E5	E5	E5	E5	E5	E5	E5	E6				E1W			E2			E2						
		38'	E5	E5	E5	E5	E5	E5	E5	E6				E1W			E2			E2						
		40'	E5	E5	E5	E5	E5	E5	E5	E6				E1W			E1W			E2						
11⅞" 14" 16"	560	30'	E5			E5			E5																	
		32'	E5			E5			E5																	
		34'	E5			E5			E5												E2					
		36'	E5	E5	E5	E5	E5	E5	E5	E6										E2						
		38'	E5	E5	E5	E5	E5	E5	E5	E6										E2						
		40'	E5	E5	E5	E5	E5	E5	E5	E6							E1W			E2						
		40'	E5	E5	E5	E5	E5	E5	E5	E6							E1W			E2						

How to Use This Table

1. Identify TJI® joist and depth.
2. Locate the ROOF TRUSS SPAN (horizontal) that meets or exceeds your condition.
3. Identify the cantilever condition (less than 5" or 5" to 24") and locate the ROOF TOTAL LOAD and ON-CENTER JOIST SPACING for your application.
4. Scan down to find the appropriate cantilever detail and refer to drawing on page 12:
 - Blank cells indicate no reinforcement is required
 - E4 may be used in place of E2 or E3 except when using TJI® 560 joists
 - X indicates cantilever will not work. Use TJ-Beam® or TJ-Xpert® software or reduce spacing of joists and recheck table.

General Notes

- Tables are based on:
 - 15 psf roof dead load on a horizontal projection.
 - 80 plf exterior wall load with 3'-0" maximum width window or door openings. For larger openings, or multiple 3'-0" width openings spaced less than 6'-0" on-center, additional joists beneath the opening's trimmers may be required.
 - More restrictive of simple or continuous span.
 - Roof truss with 24" soffits.
- ¾" reinforcement refers to ¾" Exposure 1 plywood or other ¾" Exposure 1, 48/24-rated sheathing that is cut to match the full depth of the TJI® joist. Install with face grain horizontal. Reinforcing member must bear fully on the wall plate.
- Designed for 2x4 and 2x6 plate widths.
- For conditions beyond the scope of this table, including cantilevers longer than 24", use our TJ-Beam® or TJ-Xpert® software.

Fire-safe construction and life safety are major concerns for everyone in the building materials and construction industry. The 2002 statistics on residential fire in the U.S. alone include 2,695 fire fatalities and \$6.1 billion in property damage. These numbers underscore the seriousness of the issue and the need for fire-safe construction.

Over the past 30 years, prefabricated wood I-joists have established a record of safe and reliable performance in millions of structures. Many of these structures, such as one- or two-family residential dwellings, do not require specific fire-endurance ratings per the building codes. The following information is intended to help you specify and install Trus Joist products with fire safety in mind.

Active Fire Suppression

Trus Joist supports the position that homeowners, firefighters, insurers and the community at large benefit from the use of properly installed fire sprinkler systems. Automatic residential fire sprinkler systems have an excellent record of performance and offer the best available protection to occupants and their property. Today's modern systems are inconspicuous and efficient and can be installed for less cost than the typical homeowner will spend to carpet their floors. This type of fire suppression system will:

- Provide early and unsupervised fire suppression
- Reduce smoke development
- Enhance life safety
- Reduce potential for significant property damage

Smoke Detectors

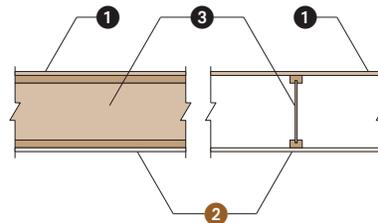
Smoke detectors are universally recognized as the most cost-effective life-saving devices. While smoke detectors do not provide protection to the structure or to the contents in a home, they do alert occupants to potential fire hazards and allow them time to escape.

Passive Fire Protection

Independent tests have proven that unprotected, lightweight framing systems—whether combustible or non-combustible—suffer serious and rapid structural degradation when exposed to heat and fire. All floor framing materials—sawn lumber, wood I-joists, trusses, and light gauge steel—succumb quickly to fire if not protected. In fire scenarios, a protective membrane such as gypsum ceiling board will provide additional protection to the structural framing members. Passive fire-suppression methods will:

- Delay fire growth
- Reduce potential for significant property damage
- Enhance the market value of the home

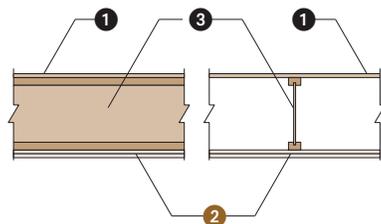
Suggested Minimum Membrane Construction



Trus Joist supports the idea that all floor/ceiling and roof/ceiling assemblies in habitable areas be protected by a minimum membrane protection consisting of 1/2" gypsum board (or equivalent)

- ① 48/24 tongue-and-groove, span-rated floor panels (Exposure 1)
- ② Single layer of 1/2" thick gypsum board
- ③ TJI® joists

One-Hour Rated Assembly



- ① 48/24 tongue-and-groove, span-rated floor panels (Exposure 1)
- ② Two layers of 1/2" thick Type X gypsum board
- ③ TJI® joists

Note:

- Resilient channels (not shown) may be installed between the joists and gypsum board if improved STC and IIC sound ratings are desired.
- Resilient channels are required when optional 3 1/2" thick glass fiber batt insulation is being installed.

Reference: ICC ESR-1153

For more information on fire assemblies and fire-safe construction, please refer to Trus Joist's Fire Facts Guide (Reorder 5003) or visit www.trusjoist.com and www.i-joist.com

Floor—100% (PLF)

Depth	TJI®	Joist Clear Span																	
		8'		10'		12'		14'		16'		18'		20'		22'		24'	
		Live Load L/480	Total Load	Live Load L/480	Total Load	Live Load L/480	Total Load	Live Load L/480	Total Load	Live Load L/480	Total Load	Live Load L/480	Total Load	Live Load L/480	Total Load	Live Load L/480	Total Load	Live Load L/480	Total Load
9½"	110	*	190	127	152	77	127	50	95										
	210	*	210	147	169	90	141	59	114	40	81								
	230	*	236	159	190	98	158	64	126	44	88								
11½"	110	*	190	*	152	*	127	83	109	57	92								
	210	*	210	*	169	*	141	97	121	67	106	48	87						
	230	*	236	*	190	*	158	105	136	73	119	52	97	39	78				
	360	*	241	*	193	*	162	136	139	95	121	69	108	51	97	39	78		
14"	560	*	294	*	236	*	197	*	169	138	148	101	132	76	119	58	108	45	91
	110	*	190	*	152	*	127	*	109	83	95	59	85						
	210	*	210	*	169	*	141	*	121	96	106	69	94	51	84				
	230	*	236	*	190	*	158	*	136	104	119	75	106	56	93	43	77		
	360	*	241	*	193	*	162	*	139	*	121	98	108	73	97	56	88	44	81
16"	560	*	294	*	236	*	197	*	169	*	148	*	132	107	119	83	108	65	99
	210	*	210	*	169	*	141	*	121	*	106	93	94	69	85	53	77		
	230	*	236	*	190	*	158	*	136	*	119	100	106	75	95	57	87		
	360	*	241	*	193	*	162	*	139	*	121	*	108	*	97	75	88	59	81
16"	560	*	294	*	236	*	197	*	169	*	148	*	132	*	119	*	108	86	99

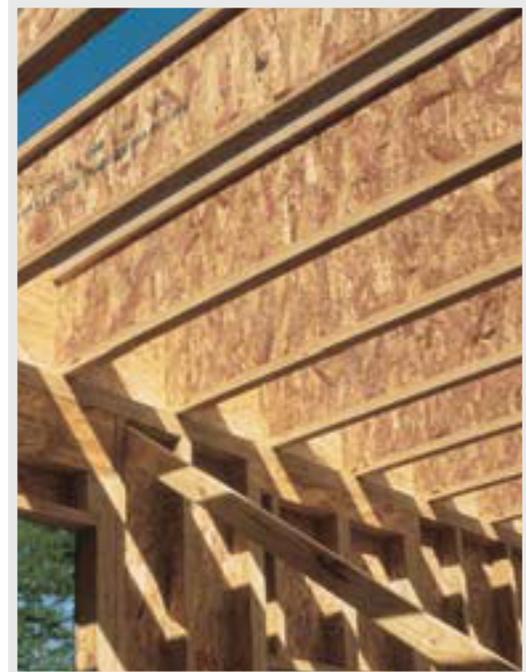
*Indicates TOTAL LOAD value controls.

How to Use This Table

1. Calculate actual total and live load in pounds per linear foot (plf).
2. Select appropriate JOIST CLEAR SPAN.
3. Scan down the column to find a TJI® joist that meets or exceeds actual total and live loads.

General Notes

- Tables are based on:
 - Uniform loads.
 - No composite action provided by sheathing.
 - More restrictive of simple or continuous span.
- TOTAL LOAD limits joist deflection to L/240.
- LIVE LOAD is based on joist deflection of L/480.
- If a live load deflection limit of L/360 is desired, multiply value in LIVE LOAD column by 1.33. The resulting live load shall not exceed the TOTAL LOAD shown.



PSF to PLF Conversions

O.C. Spacing	Load in Pounds Per Square Foot (PSF)								
	20	25	30	35	40	45	50	55	60
12"	20	25	30	35	40	45	50	55	60
16"	27	34	40	47	54	60	67	74	80
19.2"	32	40	48	56	64	72	80	88	96
24"	40	50	60	70	80	90	100	110	120

Maximum Horizontal Clear Spans—Roof

O.C. Spacing	Depth	TJI®	Design Live Load (LL) and Dead Load (DL) in PSF												
			Non-Snow (125%)				Snow Load Area (115%)								
			20LL + 15DL		20LL + 20DL		25LL + 15DL		30LL + 15DL		40LL + 15DL		50LL + 15DL		
			Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	
16"	9½"	110	19'-3"	17'-2"	18'-4"	16'-3"	18'-5"	16'-6"	17'-9"	15'-11"	16'-7"	15'-0"	15'-6"	14'-3"	
		210	20'-5"	18'-2"	19'-5"	17'-3"	19'-6"	17'-6"	18'-9"	16'-11"	17'-7"	15'-11"	16'-7"	15'-1"	
		230	21'-0"	18'-9"	20'-0"	17'-9"	20'-2"	18'-0"	19'-4"	17'-5"	18'-1"	16'-4"	17'-1"	15'-6"	
	11⅞"	110	23'-0"	20'-6"	21'-11"	19'-5"	22'-0"	19'-9"	20'-11"	19'-1"	19'-0"	17'-11"	17'-6"	16'-11"	
		210	24'-4"	21'-9"	23'-3"	20'-7"	23'-4"	20'-11"	22'-5"	20'-2"	20'-10"	19'-0"	19'-2"	18'-0"	
		230	25'-1"	22'-5"	23'-11"	21'-3"	24'-1"	21'-7"	23'-1"	20'-10"	21'-7"	19'-7"	20'-3"	18'-7"	
		360	27'-9"	24'-9"	26'-5"	23'-5"	26'-7"	23'-10"	25'-6"	23'-0"	23'-11"	21'-7"	22'-7"	20'-6"	
		560	31'-11"	28'-6"	30'-5"	27'-0"	30'-7"	27'-5"	29'-5"	26'-5"	27'-6"	24'-10"	26'-0"	23'-7"	
		110	26'-3"	23'-5"	25'-0"	22'-2"	24'-1"	22'-6"	22'-9"	21'-9"	20'-8"	19'-11"	19'-1"	18'-5"	
	14"	210	27'-9"	24'-9"	26'-5"	23'-5"	26'-5"	23'-9"	25'-0"	22'-11"	22'-8"	21'-7"	20'-11"	20'-3"	
		230	28'-7"	25'-6"	27'-2"	24'-2"	27'-4"	24'-6"	26'-4"	23'-8"	23'-11"	22'-3"	22'-0"	21'-1"	
		360	31'-6"	28'-2"	30'-0"	26'-8"	30'-2"	27'-1"	29'-0"	26'-1"	27'-2"	24'-7"	25'-8"	23'-4"	
560		36'-3"	32'-4"	34'-6"	30'-7"	34'-8"	31'-1"	33'-4"	30'-0"	31'-2"	28'-3"	29'-6"	26'-9"		
210		30'-9"	27'-5"	29'-4"	26'-0"	28'-3"	26'-5"	26'-9"	25'-6"	24'-3"	23'-4"	22'-4"	21'-8"		
230		31'-8"	28'-3"	30'-2"	26'-9"	29'-10"	27'-2"	28'-2"	26'-3"	25'-7"	24'-7"	23'-7"	22'-10"		
16"	360	34'-11"	31'-2"	33'-3"	29'-6"	33'-5"	30'-0"	32'-2"	28'-11"	30'-1"	27'-2"	26'-0"	25'-10"		
	560	40'-1"	35'-9"	38'-2"	33'-11"	38'-4"	34'-5"	36'-11"	33'-2"	34'-6"	31'-3"	31'-8"	29'-8"		
	19.2"	9½"	110	18'-1"	16'-1"	17'-3"	15'-3"	17'-4"	15'-6"	16'-8"	15'-0"	15'-5"	14'-1"	14'-2"	13'-4"
			210	19'-2"	17'-1"	18'-3"	16'-2"	18'-4"	16'-5"	17'-8"	15'-10"	16'-6"	14'-11"	15'-7"	14'-2"
			230	19'-9"	17'-7"	18'-10"	16'-8"	18'-11"	16'-11"	18'-2"	16'-4"	17'-0"	15'-4"	16'-1"	14'-7"
		11⅞"	110	21'-7"	19'-3"	20'-7"	18'-3"	20'-3"	18'-6"	19'-1"	17'-11"	17'-4"	16'-8"	16'-0"	15'-5"
210			22'-11"	20'-5"	21'-10"	19'-4"	21'-11"	19'-8"	20'-11"	18'-11"	19'-0"	17'-10"	17'-6"	16'-11"	
230			23'-7"	21'-1"	22'-6"	19'-11"	22'-7"	20'-3"	21'-8"	19'-6"	20'-0"	18'-4"	18'-5"	17'-5"	
360			26'-1"	23'-3"	24'-10"	22'-0"	24'-11"	22'-4"	24'-0"	21'-7"	22'-5"	20'-3"	21'-2"	19'-3"	
560			30'-0"	26'-9"	28'-7"	25'-4"	28'-8"	25'-9"	27'-7"	24'-10"	25'-9"	23'-4"	24'-4"	22'-2"	
110			24'-6"	22'-0"	22'-9"	20'-10"	22'-0"	20'-11"	20'-9"	19'-10"	18'-10"	18'-2"	17'-0"	16'-10"	
14"		210	26'-0"	23'-3"	24'-10"	22'-0"	24'-2"	22'-4"	22'-10"	21'-7"	20'-8"	19'-11"	18'-10"	18'-5"	
		230	26'-10"	23'-11"	25'-7"	22'-8"	25'-5"	23'-0"	24'-0"	22'-3"	21'-10"	20'-11"	20'-1"	19'-5"	
		360	29'-7"	26'-5"	28'-2"	25'-0"	28'-4"	25'-5"	27'-3"	24'-6"	25'-6"	23'-1"	21'-7"	21'-8"	
	560	34'-0"	30'-4"	32'-5"	28'-9"	32'-7"	29'-2"	31'-4"	28'-2"	29'-3"	26'-6"	26'-5"	25'-2"		
	210	28'-8"	25'-9"	26'-9"	24'-5"	25'-10"	24'-6"	24'-5"	23'-4"	22'-1"	21'-4"	18'-10"	19'-8"		
	230	29'-9"	26'-7"	28'-2"	25'-2"	27'-3"	25'-6"	25'-9"	24'-7"	23'-4"	22'-6"	21'-2"	20'-9"		
16"	360	32'-10"	29'-3"	31'-3"	27'-9"	31'-5"	28'-2"	30'-2"	27'-2"	25'-7"	25'-3"	21'-7"	21'-8"		
	560	37'-8"	33'-7"	35'-10"	31'-10"	36'-0"	32'-4"	34'-8"	31'-2"	31'-3"	29'-4"	26'-5"	25'-5"		
	24"	9½"	110	16'-9"	14'-11"	15'-11"	14'-2"	16'-0"	14'-4"	15'-2"	13'-10"	13'-9"	13'-0"	12'-8"	12'-3"
			210	17'-9"	15'-10"	16'-11"	15'-0"	17'-0"	15'-3"	16'-4"	14'-8"	15'-1"	13'-10"	13'-11"	13'-1"
			230	18'-3"	16'-4"	17'-5"	15'-5"	17'-6"	15'-8"	16'-10"	15'-2"	15'-8"	14'-3"	14'-8"	13'-6"
		11⅞"	110	20'-0"	17'-10"	18'-9"	16'-11"	18'-1"	17'-2"	17'-1"	16'-4"	15'-6"	14'-11"	13'-7"	13'-10"
210			21'-2"	18'-11"	20'-2"	17'-11"	19'-10"	18'-2"	18'-9"	17'-7"	17'-0"	16'-4"	15'-0"	15'-2"	
230			21'-10"	19'-6"	20'-10"	18'-5"	20'-11"	18'-9"	19'-9"	18'-1"	17'-11"	17'-0"	16'-6"	16'-0"	
360			24'-1"	21'-6"	23'-0"	20'-5"	23'-1"	20'-8"	22'-2"	20'-0"	20'-5"	18'-9"	17'-3"	17'-4"	
560			27'-9"	24'-9"	26'-5"	23'-6"	26'-7"	23'-10"	25'-6"	23'-0"	23'-10"	21'-7"	21'-1"	20'-3"	
110			21'-10"	20'-4"	20'-4"	19'-1"	19'-8"	18'-8"	18'-7"	17'-9"	16'-0"	16'-3"	13'-7"	14'-2"	
14"		210	24'-0"	21'-6"	22'-4"	20'-5"	21'-7"	20'-6"	20'-4"	19'-6"	17'-10"	17'-9"	15'-0"	15'-8"	
		230	24'-10"	22'-2"	23'-7"	21'-0"	22'-9"	21'-4"	21'-6"	20'-6"	19'-6"	18'-9"	16'-11"	16'-7"	
		360	27'-5"	24'-6"	26'-1"	23'-2"	26'-3"	23'-6"	25'-0"	22'-8"	20'-5"	20'-2"	17'-3"	17'-4"	
	560	31'-6"	28'-1"	30'-0"	26'-8"	30'-2"	27'-0"	29'-0"	26'-1"	24'-11"	23'-7"	21'-1"	20'-3"		
	210	25'-8"	23'-11"	23'-11"	22'-4"	23'-1"	21'-11"	21'-9"	20'-10"	17'-10"	18'-3"	15'-0"	15'-8"		
	230	27'-1"	24'-7"	25'-2"	23'-3"	24'-4"	23'-1"	23'-0"	22'-0"	20'-0"	19'-4"	16'-11"	16'-7"		
16"	360	30'-4"	27'-1"	28'-11"	25'-8"	28'-2"	26'-1"	25'-0"	24'-1"	20'-5"	20'-2"	17'-3"	17'-4"		
	560	34'-10"	31'-2"	33'-2"	29'-6"	33'-4"	29'-11"	30'-6"	28'-3"	24'-11"	23'-7"	21'-1"	20'-3"		

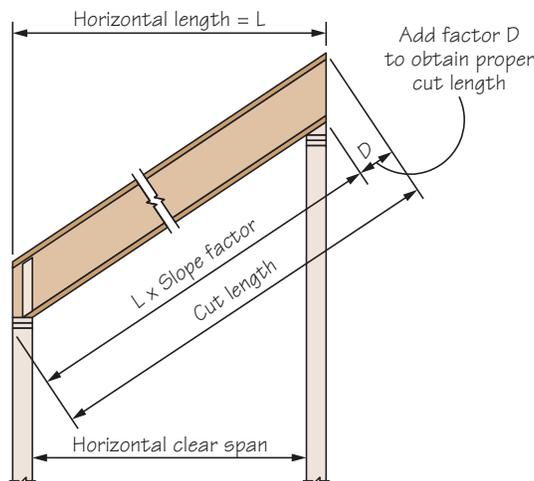
See page 17 for General Notes and information on how to use this table

How to Use Roof Span Table on page 16

1. Determine appropriate live and dead load, and the load duration factor.
2. If your slope is 6/12 or less use the LOW slope column. If it is between 6/12 and 12/12 use the HIGH column.
3. Scan down the column until you find a span that meets or exceeds the span of your application.
4. Select TJI® joist and on-center spacing.

General Notes

- Table is based on:
 - Uniform loads.
 - More restrictive of simple or continuous span.
 - Minimum roof surface slope of 1/4" in 12".
 - 1¾" minimum end bearing and 3½" minimum intermediate bearing.
- Total load limits joist deflection to L/180.
- Live load is based on joist deflection of L/240.
- A support beam or wall at the high end is required (ridge board applications do not provide adequate support).
- Spans shown assume no web stiffeners at intermediate bearings.



Actual cut length can be approximated by multiplying the horizontal length by the slope factor and adding the D factor.

D Factors

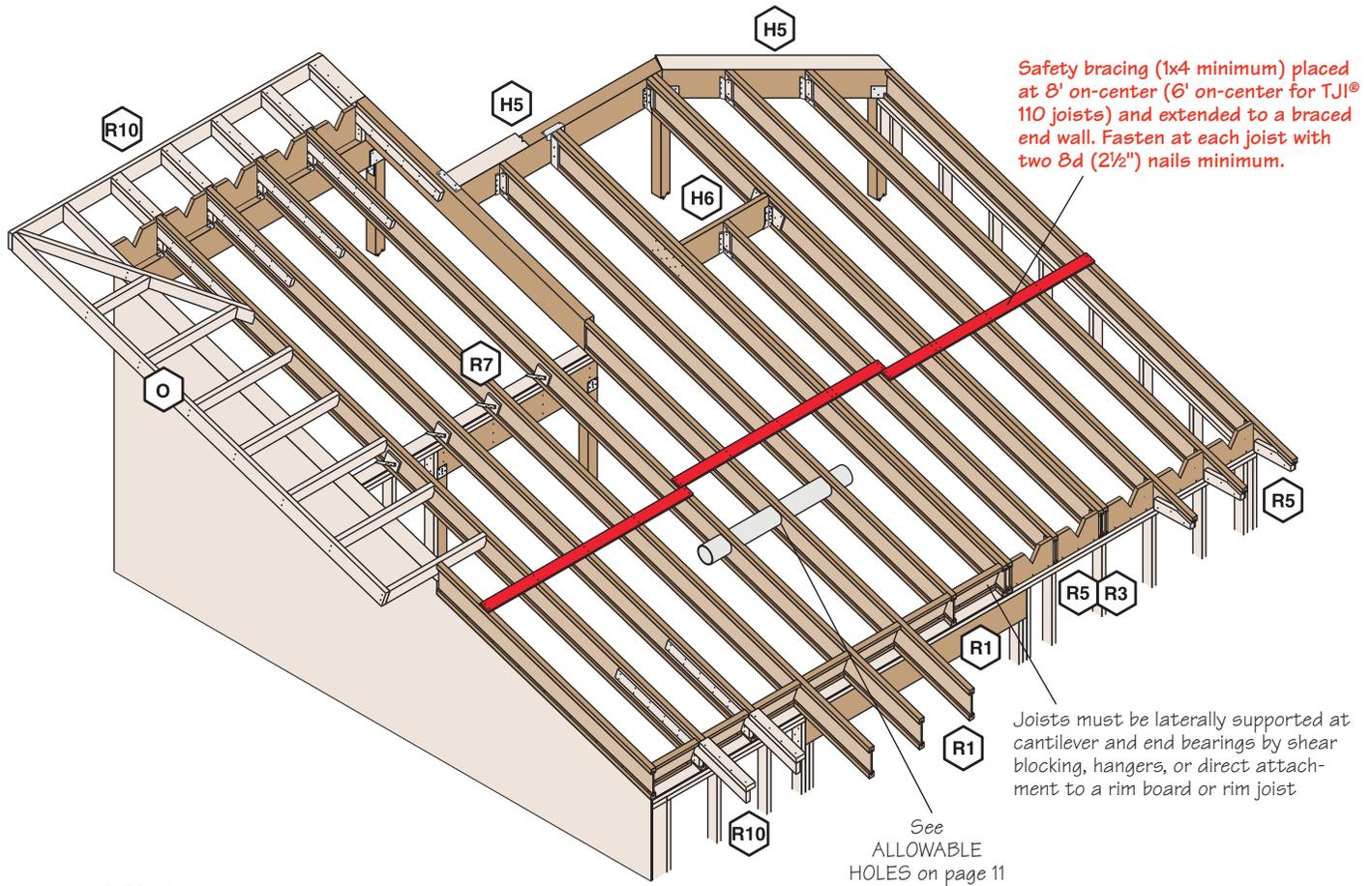
Depth	Slope												
	2½ in 12	3 in 12	3½ in 12	4 in 12	4½ in 12	5 in 12	6 in 12	7 in 12	8 in 12	9 in 12	10 in 12	11 in 12	12 in 12
9½"	2"	2¾"	2⅞"	3¼"	3⅝"	4"	4¾"	5⅝"	6⅝"	7⅞"	8"	8¾"	9½"
11⅞"	2½"	3"	3½"	4"	4½"	5"	6"	7"	8"	9"	10"	11"	11⅞"
14"	3"	3½"	4⅛"	4¾"	5¼"	5⅞"	7"	8¼"	9¾"	10½"	11¾"	12⅞"	14"
16"	3⅝"	4"	4¾"	5⅝"	6"	6¾"	8"	9⅝"	10¾"	12"	13⅝"	14¾"	16"

Slope Factors

Slope Factor	2½ in 12	3 in 12	3½ in 12	4 in 12	4½ in 12	5 in 12	6 in 12	7 in 12	8 in 12	9 in 12	10 in 12	11 in 12	12 in 12
	1.021	1.031	1.042	1.054	1.068	1.083	1.118	1.158	1.202	1.250	1.302	1.357	1.414



WARNING
Joists are unstable until laterally braced. See warning notes on page 5.



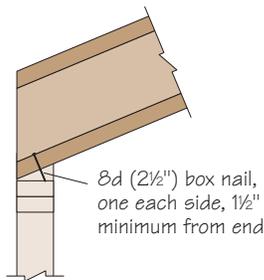
General Notes

- Unless otherwise noted, all details are valid to a maximum slope of 12/12.
- Web stiffeners are required if the sides of the hanger do not laterally support at least ¾" of the TJI® joist top flange.

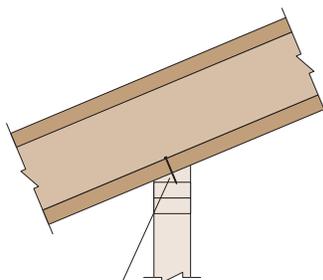
TJI® Joist Nailing Requirements at Bearing

TJI® Joist to Bearing Plate

End Bearing
(1¾" minimum bearing required)



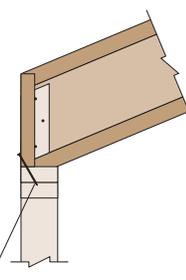
Intermediate Bearing
(3½" minimum bearing required)



Slopes 3/12 or less:
One 8d (2½") box nail each side (see Detail R7)

Slopes greater than 3/12:
Two 8d (2½") box nails each side, plus a twist strap and backer block. See Detail R7S.

Blocking to Bearing Plate

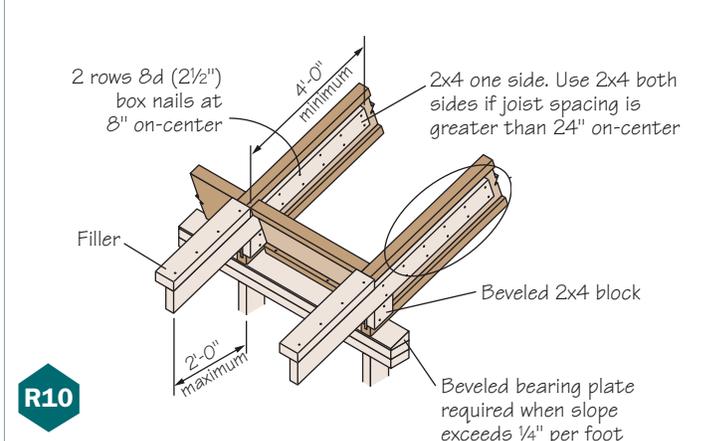
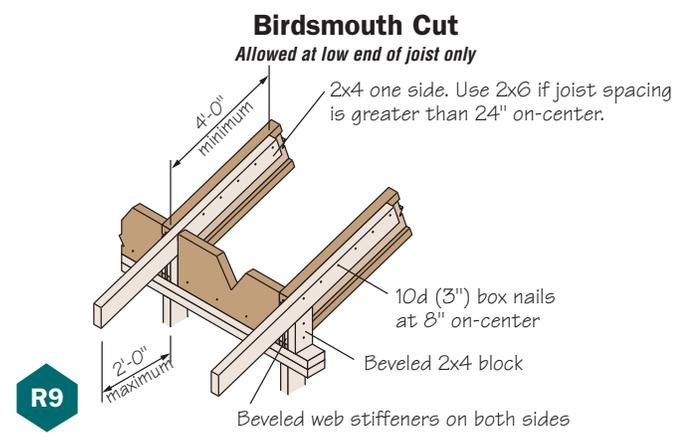
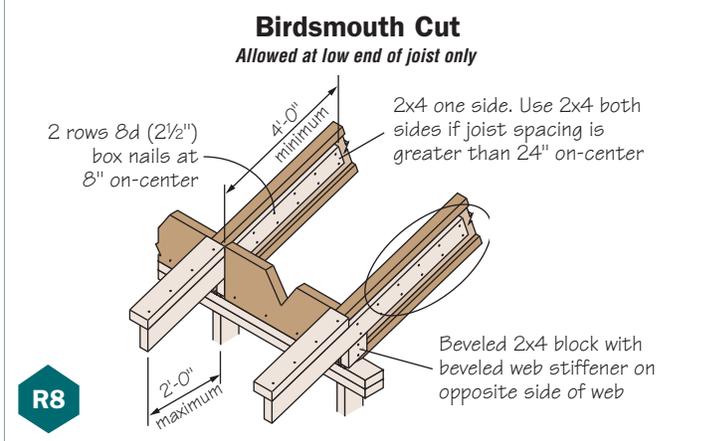
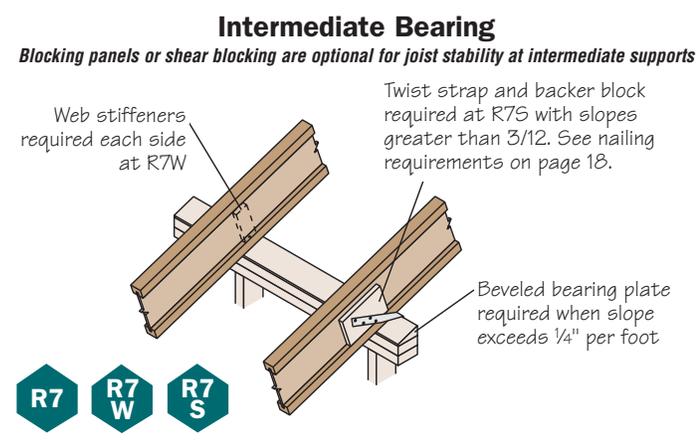
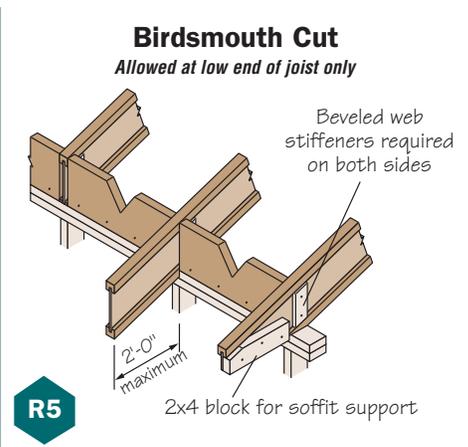
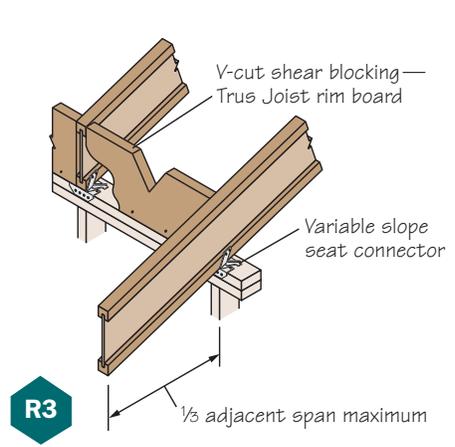
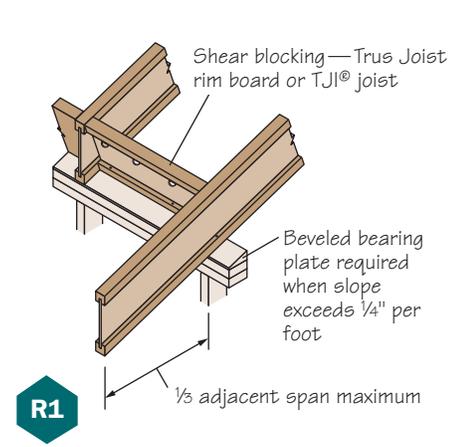


Trus Joist rim board:
Toenail with 10d (3") box nails at 6" on-center or 16d (3½") box nails at 12" on-center

TJI® joist blocking:
10d (3") box nails at 6" on-center

Shear transfer nailing:
Use connections equivalent to sheathing nail schedule

When slope exceeds ¼" per foot, a beveled bearing plate, variable slope seat connector, or birdsmouth cut (at low end of joist only) is required

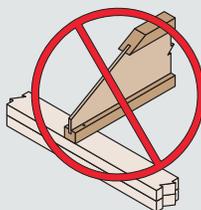


These Conditions Are NOT Permitted

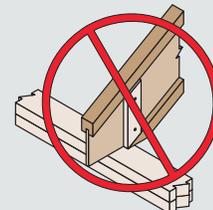
DO NOT cut holes too close to support.



DO NOT bevel cut joist beyond inside face of wall.



DO NOT overhang birdsmouth cut from inside face of plate.



Refer to ALLOWABLE HOLES on page 11 for minimum distance from support.

TJI® joist flange must bear fully on the plate. See detail BC on page 20.

LSTA18 (Simpson or USP) strap with twelve 10d x 1½" nails

Additional blocking may be required for shear transfer

Strap nails: Leave 2⅜" minimum end distance

R14 Double beveled bearing plate when slope exceeds ¼" per foot

Double joist may be required when L exceeds joist spacing

End wall

Blocking as required

2x_ overhang. Notch around TJI® joist top flange.

O

Birdsmouth Cut
Allowed at low end of joist only

Beveled web stiffener each side of TJI® joist web

TJI® joist flange must bear fully on plate. Birdsmouth cut must not overhang inside face of plate.

BC

LSTA24 (Simpson or USP) strap with twelve 10d x 1½" nails required at H5S with slopes greater than 3/12

Additional blocking may be required for shear transfer

Strap nails: Leave 2⅜" minimum end distance

Variable slope joist hanger, see pages 22 and 23. Beveled web stiffener required each side.

H5 H5S

Filler block: Attach with ten 10d (3") box nails, clinched. Use ten 16d (3½") box nails from each side with TJI® 560 joists.

Backer block: Install tight to bottom flange (tight to top flange with top flange hangers). Attach with ten 10d (3") box nails, clinched when possible.

LSTA18 strap nails at H6S with slopes greater than 3/12

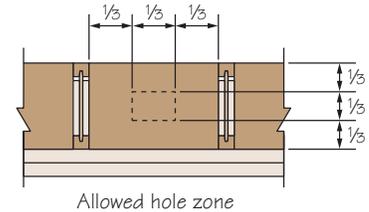
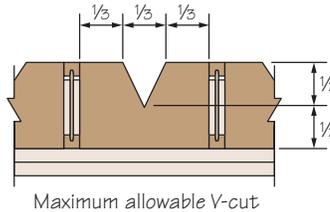
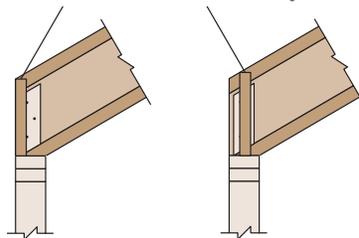
Strap nails: Leave 2⅜" minimum end distance, typical

Variable slope joist hanger, see pages 22 and 23. Beveled web stiffener required each side.

H6 H6S

Shear Blocking and Ventilation Holes (Roof Only)

Field trim to match joist depth at outer edge of wall or locate on wall to match joist depth



SB For TJI® joists with slopes of 10/12 to 12/12, the vertical depth at bearing will require Trus Joist rim board (for shear blocking) that is one size deeper than the TJI® joist

Filler and Backer Block Sizes

TJI®	110		210		230 or 360		560	
Depth	9½" or 11⅞"	14"	9½" or 11⅞"	14" or 16"	9½" or 11⅞"	14" or 16"	11⅞"	14" or 16"
Filler Block (Detail H6)	2x6	2x8	2x6 + ⅜" sheathing	2x8 + ⅜" sheathing	2x6 + ½" sheathing	2x8 + ½" sheathing	Two 2x6	Two 2x8
Backer Block (Detail H6)	⅝" or ¾"		¾" or 7⁄8"		1" net		2x6	2x8

If necessary, increase filler and backer block height for face mount hangers and maintain ⅛" gap at top of joist; see Detail W. Filler and backer block dimensions should accommodate required nailing without splitting.

Roof—115% and 125% Load Duration (PLF)

Depth	TJI®	Roof Joist Horizontal Clear Span																	
		6'			8'			10'			12'			14'			16'		
		Total Load	Defl.		Total Load	Defl.		Total Load	Defl.		Total Load	Defl.		Total Load	Defl.		Total Load	Defl.	
		Snow 115%	Non-Snow 125%	Live Load L/240	Snow 115%	Non-Snow 125%	Live Load L/240	Snow 115%	Non-Snow 125%	Live Load L/240	Snow 115%	Non-Snow 125%	Live Load L/240	Snow 115%	Non-Snow 125%	Live Load L/240	Snow 115%	Non-Snow 125%	Live Load L/240
9½"	110	289	314	*	218	237	*	175	190	*	146	159	155	109	118	101	83	91	69
	210	321	349	*	242	263	*	194	211	*	162	176	*	131	142	118	100	108	81
	230	360	392	*	272	295	*	218	237	*	182	198	196	145	158	128	112	118	88
11⅞"	110	289	314	*	218	237	*	175	190	*	146	159	*	125	136	*	106	115	*
	210	321	349	*	242	263	*	194	211	*	162	176	*	139	151	*	122	132	*
	230	360	392	*	272	295	*	218	237	*	182	198	*	156	170	*	137	149	146
	360	368	400	*	277	301	*	223	242	*	186	202	*	159	173	*	140	152	*
	560	449	488	*	338	368	*	272	295	*	227	246	*	195	212	*	170	185	*
14"	110	289	314	*	218	237	*	175	190	*	146	159	*	125	136	*	110	119	*
	210	321	349	*	242	263	*	194	211	*	162	176	*	139	151	*	122	132	*
	230	360	392	*	272	295	*	218	237	*	182	198	*	156	170	*	137	149	*
	360	368	400	*	277	301	*	223	242	*	186	202	*	159	173	*	140	152	*
	560	449	488	*	338	368	*	272	295	*	227	246	*	195	212	*	170	185	*
16"	210	321	349	*	242	263	*	194	211	*	162	176	*	139	151	*	122	132	*
	230	360	392	*	272	295	*	218	237	*	182	198	*	156	170	*	137	149	*
	360	368	400	*	277	301	*	223	242	*	186	202	*	159	173	*	140	152	*
	560	449	488	*	338	368	*	272	295	*	227	246	*	195	212	*	170	185	*

Depth	TJI®	Roof Joist Horizontal Clear Span																	
		18'			20'			22'			24'			26'			28'		
		Total Load	Defl.		Total Load	Defl.		Total Load	Defl.		Total Load	Defl.		Total Load	Defl.		Total Load	Defl.	
		Snow 115%	Non-Snow 125%	Live Load L/240	Snow 115%	Non-Snow 125%	Live Load L/240	Snow 115%	Non-Snow 125%	Live Load L/240	Snow 115%	Non-Snow 125%	Live Load L/240	Snow 115%	Non-Snow 125%	Live Load L/240	Snow 115%	Non-Snow 125%	Live Load L/240
9½"	110																		
	210	77	77	58															
	230	84	84	63															
11⅞"	110	84	91	82															
	210	101	109	96	82	89	71												
	230	112	121	105	91	98	78	75	79	59									
	360	124	135	*	112	122	103	102	105	78	82	82	61						
	560	152	165	*	137	148	*	124	135	117	114	122	91	97	97	73	79	79	59
14"	110	98	106	*	80	87	*												
	210	108	118	*	97	105	103	80	87	79									
	230	122	132	*	107	117	112	89	96	86	75	81	67						
	360	124	135	*	112	122	*	102	111	*	93	101	88	86	94	70	76	76	57
	560	152	165	*	137	148	*	124	135	*	114	124	*	105	114	104	98	106	85
16"	210	108	118	*	97	106	*	89	96	*	77	83	*						
	230	122	132	*	110	119	*	100	108	*	85	93	90		79	72			
	360	124	135	*	112	122	*	102	111	*	93	101	*	86	94	*	80	87	76
	560	152	165	*	137	148	*	124	135	*	114	124	*	105	114	*	98	106	*

* Indicates TOTAL LOAD value controls.

Slope Factors

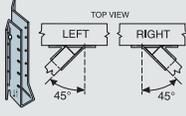
Slope Factor	2½ in 12	3 in 12	3½ in 12	4 in 12	4½ in 12	5 in 12	6 in 12	7 in 12	8 in 12	9 in 12	10 in 12	11 in 12	12 in 12
	1.021	1.031	1.042	1.054	1.068	1.083	1.118	1.158	1.202	1.250	1.302	1.357	1.414

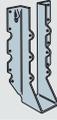
How to Use These Tables

1. Calculate actual total load in pounds per linear foot (plf).
2. Select appropriate ROOF JOIST HORIZONTAL CLEAR SPAN. For slopes greater than 2" per foot, approximate the increased dead load by multiplying the joist horizontal clear span by the SLOPE FACTOR above.
3. Scan down the column to find a TJI® joist that meets or exceeds actual total load. TOTAL LOAD values are limited to deflection of L/180. For stiffer deflection criteria, use the LIVE LOAD L/240 values.

General Notes

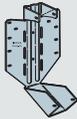
- Tables are based on:
 - Uniform loads.
 - No composite action provided by sheathing.
 - More restrictive of simple or continuous span.
 - Minimum roof surface slope of ¼" in 12".
- TOTAL LOAD limits joist deflection to L/180.

Single Joist—Top Flange						Single Joist—Face Mount ⁽¹⁾				Face Mount Skewed 45° Joist Hanger ⁽¹⁾			
													
Depth	TJI®	Hanger	Capacity (lbs)	Nailing		Hanger	Capacity (lbs)	Nailing		Hanger	Capacity (lbs)	Nailing	
				Header	Joist			Header	Joist			Header	Joist
9½"	110	ITT9.5	935	10d	10d x 1½"	IUS1.81/9.5	935	10d	N.A.	<i>SUR/L1.81/9</i>	1,125	16d	10d x 1½"
	210	ITT2.1/9.5	1,030	10d	10d x 1½"	IUS2.06/9.5	935	10d	N.A.	<i>SUR/L2.1/9</i>	1,230	16d	10d x 1½"
	230	ITT359.5	1,075	10d	10d x 1½"	IUS2.37/9.5	935	10d	N.A.	<i>SURI/LI3510/12</i>	1,225	16d	10d x 1½"
11⅞"	110	ITT11.88	950	10d	10d x 1½"	IUS1.81/11.88	950	10d	N.A.	<i>SUR/L1.81/11</i>	1,215	16d	10d x 1½"
	210	ITT2.1/11.88	1,045	10d	10d x 1½"	IUS2.06/11.88	1,045	10d	N.A.	<i>SUR/L2.1/11</i>	1,305	16d	10d x 1½"
	230	ITT3511.88	1,095	10d	10d x 1½"	IUS2.37/11.88	1,095	10d	N.A.	<i>SURI/LI3510/12</i>	1,310	16d	10d x 1½"
	360	ITT3511.88	1,140	10d	10d x 1½"	IUS2.37/11.88	1,140	10d	N.A.	<i>SURI/LI3510/12</i>	1,355	16d	10d x 1½"
14"	560	ITT411.88	1,300	10d	10d x 1½"	IUS3.56/11.88	1,330	10d	N.A.	<i>SUR/L410</i>	1,495	16d	10d x 1½"
	110	ITT14	950	10d	10d x 1½"	IUS1.81/14	950	10d	N.A.	<i>SUR/L1.81/11</i>	1,215	16d	10d x 1½"
	210	ITT2.1/14	1,045	10d	10d x 1½"	IUS2.06/14	1,045	10d	N.A.	<i>SUR/L2.1/11</i>	1,305	16d	10d x 1½"
	230	ITT3514	1,095	10d	10d x 1½"	IUS2.37/14	1,095	10d	N.A.	<i>SUR/LI3514/20</i>	1,310	16d	10d x 1½"
16"	360	ITT3514	1,140	10d	10d x 1½"	IUS2.37/14	1,140	10d	N.A.	<i>SURI/LI3514/20</i>	1,355	16d	10d x 1½"
	560	ITT414	1,300	10d	10d x 1½"	IUS3.56/14	1,330	10d	N.A.	<i>SUR/L414</i>	1,460	16d	10d x 1½"
	210	ITT2.1/16	1,045	10d	10d x 1½"	IUS2.06/16	1,045	10d	N.A.	<i>SUR/L2.1/11</i>	1,045	16d	10d x 1½"
	230	MIT3516	1,215	10d	10d x 1½"	IUS2.37/16	1,095	10d	N.A.	<i>SURI/LI3514/20</i>	1,310	16d	10d x 1½"
560	MIT3516	1,260	10d	10d x 1½"	IUS2.37/16	1,140	10d	N.A.	<i>SURI/LI3514/20</i>	1,355	16d	10d x 1½"	
560	MIT416	1,460	10d	10d x 1½"	IUS3.56/16	1,330	10d	N.A.	<i>SUR/L414</i>	1,460	16d	10d x 1½"	

Double Joist—Top Flange						Double Joist—Face Mount ⁽¹⁾			
									
Depth	TJI®	Hanger	Capacity (lbs)	Nailing		Hanger	Capacity (lbs)	Nailing	
				Header	Joist			Header	Joist
9½"	110	MIT49.5	2,000	16d	10d x 1½"	MIU49	1,860	16d	10d x 1½"
	210	MIT4.28/9.5	2,000	16d	10d x 1½"	MIU4.28/9	1,860	16d	10d x 1½"
	230	MIT359.5-2	2,000	16d	10d x 1½"	MIU4.75/9	1,860	16d	10d x 1½"
11⅞"	110	MIT411.88	2,000	16d	10d x 1½"	MIU411	2,130	16d	10d x 1½"
	210	MIT4.28/11.88	2,000	16d	10d x 1½"	MIU4.28/11	2,130	16d	10d x 1½"
	230	MIT3511.88-2	2,000	16d	10d x 1½"	MIU4.75/11	2,130	16d	10d x 1½"
	360	MIT3511.88-2	2,000	16d	10d x 1½"	MIU4.75/11	2,130	16d	10d x 1½"
14"	560	<i>WPI411.88-2</i>	2,925	16d	10d x 1½"	<i>HU412-2</i>	2,145	16d	10d x 1½"
	110	MIT414	2,000	16d	10d x 1½"	MIU414	2,170	16d	10d x 1½"
	210	MIT4.28/14	2,000	16d	10d x 1½"	MIU4.28/14	2,350	16d	10d x 1½"
	230	MIT3514-2	2,000	16d	10d x 1½"	MIU4.75/14	2,395	16d	10d x 1½"
16"	360	MIT3514-2	2,000	16d	10d x 1½"	MIU4.75/14	2,395	16d	10d x 1½"
	560	<i>WPI414-2</i>	2,925	16d	10d x 1½"	<i>HU414-2</i>	2,680	16d	10d x 1½"
	210	LBV4.28/16	2,035	16d	10d x 1½"	MIU4.28/16	2,350	16d	10d x 1½"
	230	LBV3516-2	2,035	16d	10d x 1½"	MIU4.75/16	2,435	16d	10d x 1½"
360	LBV3516-2	2,035	16d	10d x 1½"	MIU4.75/16	2,525	16d	10d x 1½"	
560	<i>WPI416-2</i>	2,925	16d	10d x 1½"	<i>HU414-2</i>	2,680	16d	10d x 1½"	

Variable Slope Seat Connector ⁽²⁾					
					
TJI®	Hanger	Capacity (lbs)	Nailing		
			Header	Joist	
110	VPA25	1,050	10d	10d x 1½"	
210	VPA2.1	1,230	10d	10d x 1½"	
230	VPA35	1,230	10d	10d x 1½"	
360	VPA35	1,230	10d	10d x 1½"	
560	VPA4	1,230	10d	10d x 1½"	

Hanger information on these two pages was provided by either Simpson Strong-Tie™ or USP Structural Connectors™. For additional information, please refer to their literature.

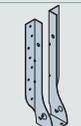
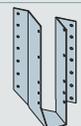
Variable Slope Seat Joist Hanger ⁽¹⁾⁽³⁾					
					
TJI®	Hanger	Capacity (lbs)		Nailing	
		Sloped Only	Sloped and Skewed	Header	Joist
110	<i>LSSUI25</i>	1,110	995	10d	10d x 1½"
210	<i>LSSU2.1</i>	1,110	995	10d	10d x 1½"
230	<i>LSSUI35</i>	1,110	995	10d	10d x 1½"
360	<i>LSSUI35</i>	1,110	995	10d	10d x 1½"
560	<i>LSSU410</i>	1,725	1,625	16d	10d x 1½"

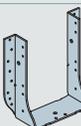
General Notes

Bold italic hangers require web stiffeners.

Capacities will vary with different nailing criteria or other support conditions; contact your Trus Joist representative for assistance.

- Hanger capacities shown are either joist bearing capacity or hanger capacity— whichever is less. Joist end reaction must be checked to ensure it does not exceed the capacity shown in the tables.
- All capacities are for downward loads at 100% duration of load.
- Fill all round, dimple, and positive angle nail holes.
- Use sloped seat hangers and beveled web stiffeners when TJI® joist slope exceeds ¼" per foot.
- Leave ⅛" clearance (⅛" maximum) between the end of the supported joist and the header or hanger.

Single Joist—Top Flange						Single Joist—Face Mount ⁽¹⁾				Face Mount Skewed 45° Joist Hanger ⁽¹⁾⁽⁴⁾			
													
Depth	TJI®	Hanger	Capacity (lbs)	Nailing		Hanger	Capacity (lbs)	Nailing		Hanger	Capacity (lbs)	Nailing	
				Header	Joist			Header	Joist			Header	Joist
9½"	110	THO17950	935	10d	10d x 1½"	THF17925	895	10d	10d x 1½"	SKH1720L/R	910	10d	10d x 1½"
	210	THO20950	1,030	10d	10d x 1½"	THF20925	895	10d	10d x 1½"	SKH2020L/R	1,005	10d	10d x 1½"
	230	THO23950	1,140	10d	10d x 1½"	THF23925	1,160	10d	10d x 1½"	SKH2320L/R	1,055	10d	10d x 1½"
11⅞"	110	THO17118	950	10d	10d x 1½"	THF17112	895	10d	10d x 1½"	SKH1720L/R	920	10d	10d x 1½"
	210	THO20118	1,030	10d	10d x 1½"	THF20112	895	10d	10d x 1½"	SKH2020L/R	1,015	10d	10d x 1½"
	230	THO23118	1,185	10d	10d x 1½"	THF23118	1,215	10d	10d x 1½"	SKH2320L/R	1,065	10d	10d x 1½"
	360	THO23118	1,230	10d	10d x 1½"	THF23118	1,260	10d	10d x 1½"	SKH2320L/R	1,110	10d	10d x 1½"
	560	THO35118	1,430	10d	10d x 1½"	THF17112-2	1,460	10d	10d	SKH410L/R1	1,460	16d	16d
14"	110	THO17140	1,215	10d	10d x 1½"	THF17140	950	10d	10d x 1½"	SKH1720L/R	920	10d	10d x 1½"
	210	THO20140	1,080	10d	10d x 1½"	THF20140	1,045	10d	10d x 1½"	SKH2020L/R	1,015	10d	10d x 1½"
	230	THO23140	1,185	10d	10d x 1½"	THF23140	1,215	10d	10d x 1½"	SKH2324L/R	1,065	10d	10d x 1½"
	360	THO23140	1,230	10d	10d x 1½"	THF23140	1,260	10d	10d x 1½"	SKH2324L/R	1,110	10d	10d x 1½"
	560	THO35140	1,430	10d	10d x 1½"	THF17140-2	1,460	10d	10d	SKH414L/R1	1,460	16d	16d
16"	210	THO20160	1,080	10d	10d x 1½"	THF20157	1,045	10d	10d x 1½"	SKH2024L/R	1,015	10d	10d x 1½"
	230	THO23160	1,185	10d	10d x 1½"	THF23160	1,215	10d	10d x 1½"	SKH2324L/R	1,065	10d	10d x 1½"
	360	THO23160	1,230	10d	10d x 1½"	THF23160	1,260	10d	10d x 1½"	SKH2324L/R	1,110	10d	10d x 1½"
	560	THO35160	1,430	10d	10d x 1½"	THF17157-2	1,460	10d	10d	SKH414L/R1	1,460	16d	16d

Double Joist—Top Flange						Double Joist—Face Mount ⁽¹⁾			
									
Depth	TJI®	Hanger	Capacity (lbs)	Nailing		Hanger	Capacity (lbs)	Nailing	
				Header	Joist			Header	Joist
9½"	110	THO35950	2,010	10d	10d x 1½"	THF17925-2	1,350	10d	10d
	210	THO20950-2	2,330	16d	10d	THF20925-2	1,350	10d	10d
	230	THO23950-2	2,490	16d	10d	THF23925-2	1,575	10d	10d
11⅞"	110	THO35118	2,050	10d	10d x 1½"	THF17112-2	1,575	10d	10d
	210	THO20118-2	2,610	16d	10d	THF20112-2	1,575	10d	10d
	230	THO23118-2	2,675	16d	10d	THF23118-2	1,800	10d	10d
	360	THO23118-2	2,765	16d	10d	THF23118-2	1,800	10d	10d
	560	BPH71118	3,185	16d	10d	HD7120	2,175	16d	10d
	110	THO35140	2,100	10d	10d x 1½"	THF17140-2	2,170	10d	10d
14"	210	THO20140-2	2,330	16d	10d	THF20140-2	2,250	10d	10d
	230	THO23140-2	2,675	16d	10d	THF23140-2	2,370	10d	10d
	360	THO23140-2	2,765	16d	10d	THF23140-2	2,370	10d	10d
	560	BPH7114	3,185	16d	10d	HD7140	2,720	16d	10d
	210	THO20160-2	2,330	16d	10d	—	—	—	—
16"	230	THO23160-2	2,675	16d	10d	THF23160-2	2,430	10d	10d
	360	THO23160-2	2,765	16d	10d	THF23160-2	2,520	10d	10d
	560	BPH7116	3,185	16d	10d	HD7160	2,925	16d	10d

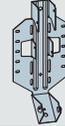
Variable Slope Seat Connector ⁽⁵⁾					
					
TJI®	Hanger	Capacity (lbs)	Nailing		
			Header	Joist	
110	TMP175	1,150	10d	10d x 1½"	
	TMPH175	1,945	10d	10d x 1½"	
210	—	—	—	—	
230	TMP23	1,785	10d	10d x 1½"	
	TMPH23	1,945	10d	10d x 1½"	
360	TMP23	1,785	10d	10d x 1½"	
	TMPH23	1,945	10d	10d x 1½"	
560	TMP4	1,970	10d	10d x 1½"	
	TMPH4	1,945	10d	10d x 1½"	

Support Requirements

- Support material assumed to be Trus Joist structural composite lumber or sawn lumber (Douglas fir or southern pine species).
- Minimum support width for single- and double-joist top mount hangers is 3" (1½" for ITT hangers).
- Minimum support width for face mount hangers with 10d and 16d nails is 1¾" and 2", respectively.

Footnotes:

1. Face mount hanger capacities may be increased up to 15% for snow roofs or 25% for non-snow roofs. Maximum increase for LSSU, LSSUI, and LSSH hangers is 15%.
2. VPA connectors are allowed on slopes of 3/12 through 12/12 only.
3. LSSU, LSSUI and LSSH hangers can be field adjusted for slopes and skews of up to 45 degrees. Additional lateral restraints are required for 16" deep TJI® joists.
4. Miter cut is required at end of joist.
5. TMP connectors are allowed on slopes of 1/12 through 6/12 only, and TMPH connectors are allowed on slopes of 6/12 through 12/12 only.

Variable Slope Seat Joist Hanger ⁽¹⁾⁽³⁾					
					
TJI®	Hanger	Capacity (lbs)		Nailing	
		Sloped Only	Sloped and Skewed	Header	Joist
110	LSSH179	1,120	1,120	10d	10d x 1½"
210	LSSH20	1,120	1,120	10d	10d x 1½"
230	LSSH23	1,120	1,120	10d	10d x 1½"
360	LSSH23	1,120	1,120	10d	10d x 1½"
560	LSSH35	1,595	1,595	16d	10d x 1½"

Service You Can Count On

Unparalleled Technical Support

Our goal is to help you build solid, durable, and comfortable homes by providing strong technical support to specifiers, dealers, and builders located throughout North America. With a staff of over 175 Trus Joist technical representatives, we are uniquely prepared to train our partners in providing comprehensive specification and installation. We enhance our training with cutting edge automation tools; these products include:

TJ-Beam® software

produces single-member sizing options in floor and roof applications for TJI® joists, Microllam® LVL, TimberStrand® LSL and Parallam® PSL beams, headers, and columns.

TJ-Xpert® software

tracks vertical loads throughout the structure and develops sizing solutions, material lists, framing plans, and installation details.

TJ-YardMate™ software

produces inventory solutions and cut lists for each home package with the least amount of cutting and waste.

Our support doesn't stop there. Our skilled team of Trus Joist representatives—the industry's largest—isn't afraid to get involved and make things happen. If you call us with a problem that you believe may be caused by our products, our representative will contact you within one business day to evaluate the problem and help solve it—GUARANTEED.

Products You Can Trust



TJI® Joists



Rim Board,
Headers, Columns, and
Wall Framing



Beams and
Columns



Headers and
Beams

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Product Warranty

Trus Joist warrants that its products will be free from manufacturing errors or defects in workmanship and material. In addition, provided the product is correctly installed and used, the company warrants the adequacy of its design for the normal and expected life of the building.



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Tom Dettig, President

200 E. Mallard Drive (83706) • P.O. Box 60 • Boise, ID 83707 • 208-364-1200



March 2004 NW/40M
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Baseboards

Baseboards run along the wall at the floor. Baseboards should be chosen to work in harmony with your casings to finish and tie the room together. Baseboards are usually thinner than the casing.

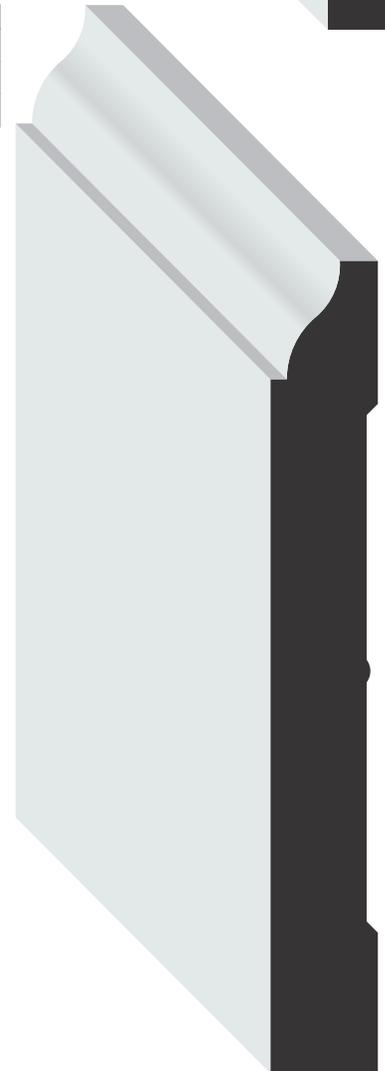
ALL SIZES NOMINAL

M&M#	WM#	Colonial	
623	623	9/16" x 3-1/4" - RDM	Solid Pine
623-8	623	9/16" x 3-1/4" - 8'	Solid Pine
623P	623	9/16" x 3-1/4" - 16'	Primed FJ
623P-8	623	9/16" x 3-1/4" - 8'	Primed FJ
623MR	623	9/16" x 3-1/4" - 16'	Ultralite MDF
623MR-8	623	9/16" x 3-1/4" - 8'	Ultralite MDF
623D	623	9/16" x 3-1/4" - RDM	Solid Domestic



M&M#	WM#	Colonial	
618P	618	9/16" x 5-1/4" - 16'	Primed FJ
618P-8	618	9/16" x 5-1/4" - 8'	Primed FJ
618M	618	12mm x 5-1/4" - 16'	Ultralite MDF
618M-8	618	12mm x 5-1/4" - 8'	Ultralite MDF

M&M#	WM#	Colonial	
620	620	9/16" x 4-1/4" - RDM	Solid Pine
620MR	620	9/16" x 4-1/4" - 16'	Ultralite MDF
620MR-8	620	9/16" x 4-1/4" - 8'	Ultralite MDF



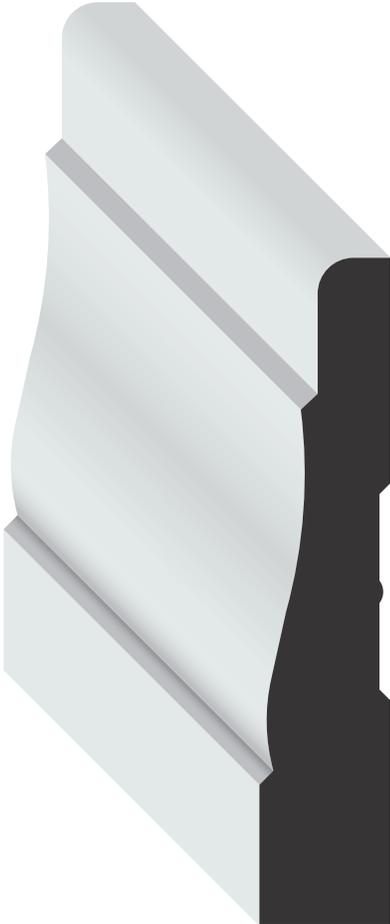
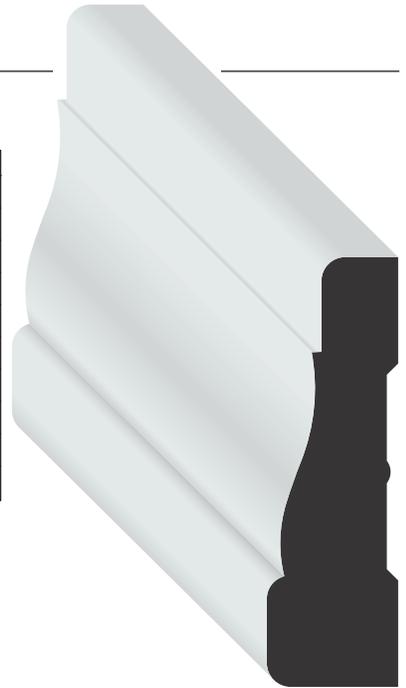
M&M#	WM#	Colonial / Colonial Base	
624	624	9/16" x 3" - RDM	Solid Pine
624-8	624	9/16" x 3" - 8'	Solid Pine
624O		1/2" x 3" - RDM	Oak

Casings

Casings define the overall character of a room and are often the most visible part of the trim. Casings are used primarily to cover the gap between drywall and the door or window frame. Casings are generally thicker than the base mouldings.

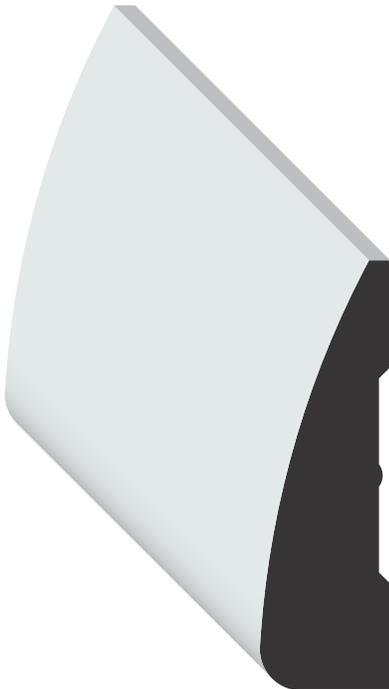
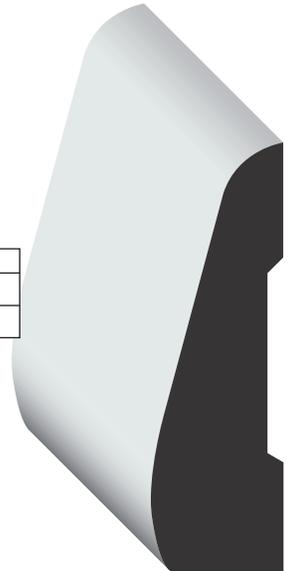
ALL SIZES NOMINAL

M&M#	WM#	Colonial / CSG
356	356	11/16" x 2-1/4" - RDM Solid Pine
356-7	356	11/16" x 2-1/4" - 7' Solid Pine
356O	356	11/16" x 2-1/4" - RDM Oak
356O-7	356	11/16" x 2-1/4" - 7' Oak
356P	356	11/16" x 2-1/4" - 14' Primed FJ
356P-7	356	11/16" x 2-1/4" - 7' Primed FJ
356FJD	356	11/16" x 2-1/4" - 14' FJ Domestic
356M	356	11/16" x 2-1/4" - 14' Ultralite MDF
356M-7	356	11/16" x 2-1/4" - 7' Ultralite MDF
356D	356	11/16" x 2-1/4" - RDM Solid Domestic



M&M#	WM#	Colonial / CSG Domestic
444	444	11/16" x 3-1/2" - RDM Solid Pine
444-76	444	11/16" x 3-1/2" - 76" Solid Pine
444FJD	444	11/16" x 3-1/2" - 15' FJ Domestic
444P	444	11/16" x 3-1/2" - 16' Primed FJ
444P-8	444	11/16" x 3-1/2" - 8' Primed FJ

M&M#	WM#	
306	306	11/16" x 2-1/4" - RDM Solid Pine
306-7	306	11/16" x 2-1/4" - 7' Solid Pine



M&M#	WM#	Ranch / Ranch Casing
327	327	11/16" x 2-1/4" - RDM Solid Pine
327-7	327	11/16" x 2-1/4" - 7' Solid Pine
327O	327	5/8" x 2-1/4" - RDM Oak
327O-7	327	5/8" x 2-1/4" - 7' Oak
327P	327	11/16" x 2-1/4" - 14' Primed FJ
327P-7	327	11/16" x 2-1/4" - 7' Primed FJ
327D	327	11/16" x 2-1/4" - RDM Solid Domestic

9. Physical & Chemical Properties

- a. **Appearance** Solid
- b. **Odor** Odorless
- c. **pH** Not applicable
- d. **Specific Gravity** 1.75
- e. **Evaporation Rate** Not available
- f. **Vapor Pressure** Not available
- g. **Solubility in Water** Insoluble
- h. **Solubility in Solvents** Insoluble in methanol, diethyl ether, n-octanol, acetone

10. Stability & Reactivity Data

- a. **Stability** The product is stable
- b. **Chemical Instability/Materials to Avoid** Not considered to be reactive according to our database
- c. **Corrosivity** Not considered to be corrosive for metals and glass according to our database
- d. **Hazardous Decomposition** Not available
- e. **Hazardous Polymerization** Yes

11. Potential Chronic Health Effects

The product is NOT toxic to blood, kidneys, lungs, the nervous system, the reproductive system, liver, or mucous membranes.

- a. **Chronic Effects** Not available
- b. **Mutagenic Effects** Not available
- c. **Teratogenic Effects** Not available

12. Ecological Information

- a. **Ecotoxicity** Not available
- b. **BOD5 and COD** Not available
- c. **Toxicity of the Products of Biodegradation** Not available

13. Federal Regulations

- a. **TSCA (Toxic Substance Control Act)**
All components of this product are listed on the TSCA inventory
- b. **HMIS (Hazardous Material Information System)**
Health Hazard : 1
Fire Hazard : 0
Reactivity : 0
Personal Protection : A
- c. **National Fire Protection Association (USA)**
Hazard Rating : 4 = Extreme, 3 = High,
2 = Moderate, 1 = Slight, 0 = Minimal (Insignificant)

14. Other Information

The data contained in this MSDS and recommendations presented herein are based upon information considered to be accurate, as of this date. However, LG Hausys makes no guarantee or warranty, either expressed or implied, of the completeness of this data and recommendations, and assumes no liability in connection with any use of this information.



Storage

Horizontal storage

Store same size sheets in the same pallet if possible. If the sizes are different, store longer sheets under the shorter sheets.

Vertical storage

If the base is not leveled, upright the sheets vertically with limited way to eliminate the possibility of warping.

Storage environment

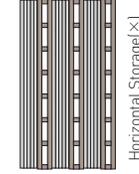
Storage of HI-MACS outdoors should be limited to time and temperature. The range of temperature should be 15-25°C and not in direct sunlight. Direct sunlight and environmental pollutants may discolor the sheet and temper the peel coat over time. Sheets should be stored flat or in approved horizontal racks.

Examples of storage

Correct



Wrong



Handling of sheets

- HI-MACS sheets weigh approximately 60kg, so do not move these sheets by hand alone. Workers should wear leather work gloves for better grip and ease. Two workers should tip the sheet along the width from horizontal to vertical. The sheet should then be transported to the fabrication area vertically with the edge of the long ends of the sheets parallel to the ground.
- A fork lift is an essential tool for a safe work environment. A forklift is an efficient method and must be used when moving or transporting multiple sheets. It is best suited to have a fork lift that has adequate capacity to move an entire skid of material at once (approximately 4630kg) of material. It is further recommended to purchase fork boots comprised of steel that fit over the standard forks. They are approximately 240cm in length and can pick up the pallet from the end rather than the side.



Adhesive

Adhesive Characteristics

Be sure to use an adhesive color selection chart to review the properly coded adhesives for respective HI-MACS sheet color selected. ● It is important to “adhere” to the recommendations set forth by HI-MACS. This will ensure proper color match and the finished glue lines. ●

- Bulk adhesive cartridges typically provide 1000mm of seaming.
- Normal cure time is about 40 minutes in 21 degrees C. If hotter, your working time is greatly reduced and, if cooler, your working time is greatly enhanced. Consider this as you begin assembly. You do not want to get too far ahead of yourself if it is warm. You will end up with a mess.
- Remember to consider scuff-sanding joints for better bonding using 60 grit sand paper.
- Before applying the adhesive, clean all areas being bonded with denatured alcohol and a clean white rag. Be sure to look for dirt, pencil marks, and oily fingerprints on all bonding surfaces and remove them.
- Assemble the cartridge in the seaming gun with a fresh disposable mixing tip. After each use, remove and replace this tip. The adhesive in the tip will set up just as the seams do on your materials. To ensure the best bond, remember to keep up the maintenance of your mixing tip. If you are finished gluing for the day, you can leave the tip on and place it in your storage refrigerator. The next time you use it you only need to change the tip.

- As you get ready to apply adhesive and begin assembly of your HI-MACS top, remember to purge the tip. This is done by squeezing out a bead of approximately the length of the tip. This ensures trapped air has worked itself from the mixing tip and that the catalyst and adhesive have properly mixed and are ready.

Gun Type



Tube Type



Assembly Adhesives

Process

Main Component + Hardener

Inject main component into hardener tube

Details

- ① Cutting Position
- ② Cutting angle



Curing Time (Recommended)
 - 20°C - : 30Min
 - 10°C - : 50Min
 - 10°C below : hour
 - 10g Use 10g every 1m
 - Discard top 1-2g of adhesive to avoid yellowish change.

Mix

CAP Cutting

Apply

2010 HI-MACS Adhesive Color List

HI-MACS		SOLID		ADHESIVE	
NO	COLOR	NO	COLOR	NO	COLOR
S81	SATIN WHITE	H01	SATIN WHITE		
S82	ALMOND	H04	PEARL		
S83	ROSE	H06	PINK		
S84	SPARKLE	H07	GRAY		
S85	GRAY	H08	GRAY		
S86	ARCTIC WHITE	H02	A WHITE		
S87	SAGE GREEN	H11	SAGE GREEN		
S88	CREAM	H20	CREAM		
S89	IVORY	H21	IVORY		
S90	PERLA WHITE	H22	PERLA WHITE		
S91	PERLA GRAY	H23	PERLA GRAY		
S92	MULTI STONE	H10	CREAM		
S93	HERY RED	H18	RED		
S94	BANANA	H19	ORANGE		
S95	ORANGE	H20	ORANGE		
S96	IVORY WHITE	H02	IVORY		
S97	SILVER GRAY	H03	GRAY		
S98	SILVER GRAY	H03	GRAY		
S99	SILVER GRAY	H03	GRAY		
S100	COFFEE BROWN	H22	MOKY		
S101	JASMIN GREEN	H23	MOKY		
S102	JASMIN GREEN	H23	MOKY		
S103	CONCRETE GRAY	H51	CONCRETE GRAY		
S104	TOPFE BROWN	H54	TOPFE BROWN		
S201	MUGA CREAM	H20	CREAM		
S202	RAIN GRAY	H01	RAIN GRAY		
S203	WALIS GREEN	H01	WALIS GREEN		
S204	WALIS GREEN	H01	WALIS GREEN		
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S413	WALIS GREEN				

Tools for HI-MACS Fabrication

Particle Board

- Generally particle board of 15mm with melamine layered on one side of the board.
- However, for quality fabrication and to prevent sheet warping, it is recommended to use at least 18mm particle board with both side melamine layered. This will cause stable quality for shrink and expansion caused by heat and moisture.
- If you use one side layered particle board, it is very weak for moisture, this will cause bad fabrication quality.



One layered



Double layered

Grinder

- Grinder is used to eliminate the residue of glue when the glue gets hard.
- It is not appropriate to cut HI-MACS, and only used for sanding the tough surface of the sheets.



Jig Saw

- It is used for cutting sheets at installation field.
- The height of blades should be 5-10mm higher than the sheet and do not put two sheets together to cut.



Clamp

- It is used to hold sheet to sheet while hardening the adhesive between HI-MACS.
- A basic fabrication shop will need 500 to 1000 hand-spring clamps in order to work on multiple projects at one time and provide the installation crew with their requirements. Specifically, you will need one clamp placed every 5cm along the leading edge of the build-up edge perimeter.



- You can also use spring clamp for more comfortable work. It is more convenient to use because it has its one pressure power to hold the sheets.

Orbital Sander

- The process of fabrication has a great deal to do with sanding. Good sanding/finishing takes a great deal of skill and time. Quality procedures need to be put in place, and quality training, sanders, and papers must be used.
- Orbital sanders are essential for quality gloss finish and sand papers are used numbers from #120 → #240 → #320 → #400 → #600 → #1000 (very glossy)



Sand Paper

- You need to adjust proper sand paper according to its glossy grade.
- Generally, Use 3,000-4,000 rpm speed.



Router

- A router is a must have piece of equipment for through cuts, profiles and general fabrication. The power and RPM speed minimize chipping and provide precision high quality cuts.



Sliding table saw

- When cutting sheets into length and width directions, it offer better result than jig saw and more comfortable.
- Easily work with apron and back splash.



Computer Numerical Control

- This machinery processes the materials efficiently and quickly on large jobs. It offers the consistent ability to manufacture components while maximizing material yields.
- Can work with 3dimensional fabrication like sculpture, art crafts.



V-Grooving Machinery

- When making sink counter, it makes groove on the joint and makes it easier for back splash and apron.

Others



Hot-Melt



Compound



Gun Type Cartridge



Jig Saw-Blade



Router Bite

Tools for HI-MACS Fabrication

The list of suggested materials suppliers

Tools	Source	Model#
#240	3M	5" disk
#500	3M	5" disk
#1000	3M	5" disk
#2000	3M	5" disk
compounding liquid	3M	77340
Finesse-It compounding liquid	DuPont	600S
Medium-duty compound		
Finish liquid	3M	13084
Finesse-It finishing liquid	DuPont	3000S
Highlighting glaze		
Random Orbital Sanders	Porter Cable	7336
	Bosch	1370DEVS
	Fair	MSI 636-1
	Makita	B05000
Polishers	Porter Cable	661
	Bosch	1328
	Black & Decker	4138
	Sears	(1500-2000 RPM)
	3M	5717
	3M	5712
	3M	5713
Polisher hook and loop pad	DuPont Final Glaze	
Compounding pad	Hope's Counterop Polish	
Polishing pad		
Use & care liquid		



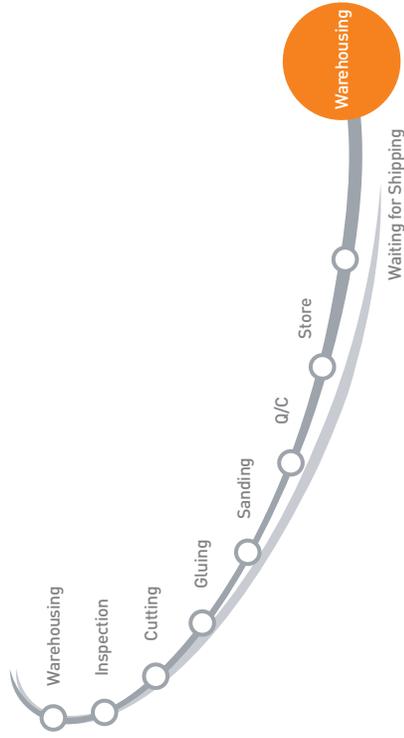
HI-MACS® Acrylic Solid Surface

General Fabrication Principles

- Layout
- Cutting and Staging Overview
- Cutting and Staging Overview
- Seam Locations and Cutout Positioning
- Using the Following Procedures Will Ensure a Great Seam
- Clamping Tips
- Reinforcement Typical Standards

Before cutting the sheets you have ordered and received from your HI-MACS distributor, calculate the number, lengths, widths and elevation to double check the amount of material you will need to finish the entire project. ● If you calculate too closely, you may create yield problems and dye lot concerns if more material must be ordered. ● You must also remember to consider cutouts, backsplash materials and buildup strips. As you look at all of these factors consider the cutout sizes and locations, substructure requirements, seam locations, possible inlay issues and specialty fabrication, such as a cove back-splash or thermoformed surface requirement. ●

Layout of HI-MACS Fabrication



Material Review

- Place materials on the work benches. Inspect dye lots and run numbers.
- Remove peel coat and inspect for color variation, match and defects.
- Review cuts and dry fit seams when applicable before cutting! Remember that this is a review and inspection process. Wet the edges between sheets to be seamed to help determine color match.
- Review all safety and shop procedures before cutting and machining the HI-MACS sheet materials.

Cutout Optimizing

When making a cutout, remember to make them larger than the recommendations provided by the manufacturer. The recommendation is a 6mm gap around the countertop cutout and a 1/8" around the sink cutout. Do not make them too large.

Cutting and Staging Overview

- Remember to avoid handling materials alone. Use two people to move the sheet into position for cutting.
- Cut the HI-MACS sheet materials for your job specifications. If you are using a table saw, make sure it has out feed supports. If using a vertical panel saw, remember to watch for errant materials after cutting.
- Place cut materials on your workbench and create the 13mm inside corner with the appropriate router and template. Remember that a 13mm bit creates only a 6mm radius.
- Stage your components and assemblies on a flat, rigid plane surface. If using more than one bench to stage your project, make certain these benches are of the same height! Your supporting work tables should have supports every 610mm. This will ensure a flat and safe working area as you assemble your tops.
- Save any extra materials or out falls for buildup strips, cutting boards and repair materials. Remember to leave a good size piece of color matched material at the jobsite in case of repair. A good spot to place this is under the sink cabinet. Pre-drill two holes in the material at your shop. During installation, place a screw into the drilled holes and position the piece to the side wall of the cabinet.

Seam Locations and Cutout Positioning

- Keep seams 76-100mm from any inside or outside corners and 76-100mm from any cutout for stove, sink or other consideration of cutout.
- When having to layout and fabricate a countertop, remember to maintain the seam 76-100mm from the inside corners.

Traditionally, solid seams are the hardest and leave the least amount for error. It is very important when seaming solids that you thoroughly clean the seams and prepare a precise mirror cut. Seaming with matrix colors, whether it be Sands, Pearls, Quartz or Granite series HI-MACS, are more forgiving, by virtue of the many colors of particulate.

- Your best seam will typically be 2mm thick or less. Anything up to about 5mm is acceptable, but may be more visible depending on color used. Any seam greater than 5mm will be visible and produce a line the same color as the adhesive used. Since the adhesive is solid in color, it becomes very visible with colors containing particulate.

Cutting and Staging

Using the Following Procedures Will Ensure a Great Seam

- Industry standards suggest that two acceptable methods will ensure a great seam.
- Mirror cut the two pieces to be seamed together and do so at the same time. This is performed by setting a straight edge in place on one of the pieces to be seamed and also clamping down the two pieces to be seamed. Maintain a gap approximately 6mm greater than the shank of the bit. It will take approximately 3mm off each of the pieces that will be seamed. A square base router will help the accuracy. With one controlled pass of the router, you will make these two "mirror" edges simultaneously. The two pieces will fit together exactly.
- You can also achieve extremely accurate cuts by using C.N.C., Vertical Panel Saws, or Auto "V" Groovers.
- If you scuff-sand the edges with a 90 degree block plane or right angle block and 60 grit sand paper, you will ensure a greater bonding surface than if you do not.
- Make sure to clean the joining edges with denatured alcohol and a clean white rag.
- Apply a strip of box tape or packing tape to the underside of the area to be joined, half on each side of the two pieces. This will create a bridge. Leave about 3mm between pieces before applying the tape.

Clamping Tips

- Remember clamping pressures. You do not want to use excessive pressure. If you do, you will create a dry seam. This is when you squeeze all the glue from the seam joint.
- Clamp pressures should be tight enough to allow a bead of adhesive to squeeze out.
- The adhesive will shrink slightly, so do not completely clean off the joint of excess adhesive.
- Look for glue voids and air pockets. Take care of this before the seam adhesive sets up.
- Inspect the seam to ensure a tight fit.
- Let the adhesive cure for a minimum of 40 minutes in normal conditions or until hard to your fingernail touch.
- Remove the excess adhesive by "leveling" the seam with a router with a set of skis and a small leveling bit. Do not use a belt sander to perform this operation. Excessive heat will weaken the integrity or fail the seam all together.
- Finish sanding all surfaces to specified finish.



Reinforcement Typical Standards

- Seam reinforcement materials should be comprised of 13mm HI-MACS materials.
- The reinforcement must be continuous along the entire seam. This 3"± reinforcement strip must be beveled to 45 degrees and sanded smooth to reduce the stress riser.
- Avoid stress risers. A stress riser is a sharp or rough cut or corner that weakens over time as the top expands and contracts. This weakening effect will eventually fail the top and a crack in the countertop will occur.
- Locate reinforced seams where full support is available. Reinforcements can sometimes get in the way of the overall support structure.
- Keep the nearest edge of the seam support a minimum of 3"± from inside corners.

Note Do not place a seam over a dishwasher. Do not place a seam through a sink.

Designed by Ron Arad. Fabricated by Kessops & Partner AG. Photographed by www.designdesigner.de

HI-MACS®

Acrylic Solid Surface

Sink Mounting

When Top Mounting
Lavatory Bowls
Under mounting Sinks from Dissimilar Materials

Thermoforming

Thermoforming Process per Thickness of Product
Cooling
Process of thermoforming

Sanding

Finish Considerations
Matte Finish, Satin Finish, Gloss Finish
Polishing Procedures

Sink Mounting

You can either bevel mount or under mount your HI-MACS sink or vanity to your HI-MACS countertop or vanity to create a monolithic appearance smooth to the touch and crisp and clean to the appearance. ●



Sinks and Bowls to HI-MACS® Sheet Materials.

Mounting Sinks from Dissimilar Materials

The most typical dissimilar sink or vanity will be comprised of Stainless Steel, Porcelain, Cast Iron, Ceramic or Glass. These sinks can be top mount, self rimming or under mount.

When Top Mounting

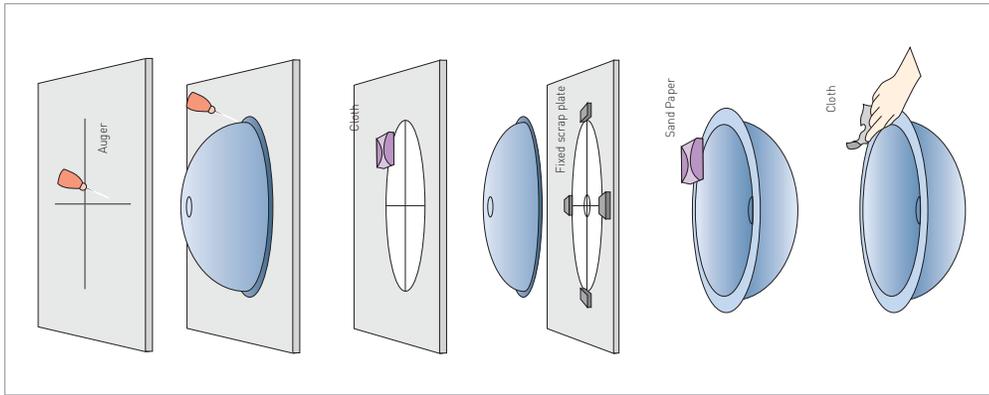
- Cut the opening in the countertop approximately 2.5cm larger in length and width than the sink is to be mounted. Make this cutout with a router only! This opening should then be sanded to remove chatter to a smooth finish.
- Apply a 6mm bead of 100% silicone to the bottom edge of the self rimming sink flange and also to the edge of the routed cutout.
- Position the sink into the cutout so that the flange rests on the deck. Make certain to install the clips or clamps supplied, but remember not to screw anything directly into or onto the HI-MACS materials. Use a wooden block or shim block when necessary. Your distributor has or will direct you to the approved sources for sink clips that are appropriate to mount into the HI-MACS sheet materials.

When Under Mounting Sinks from Dissimilar Materials

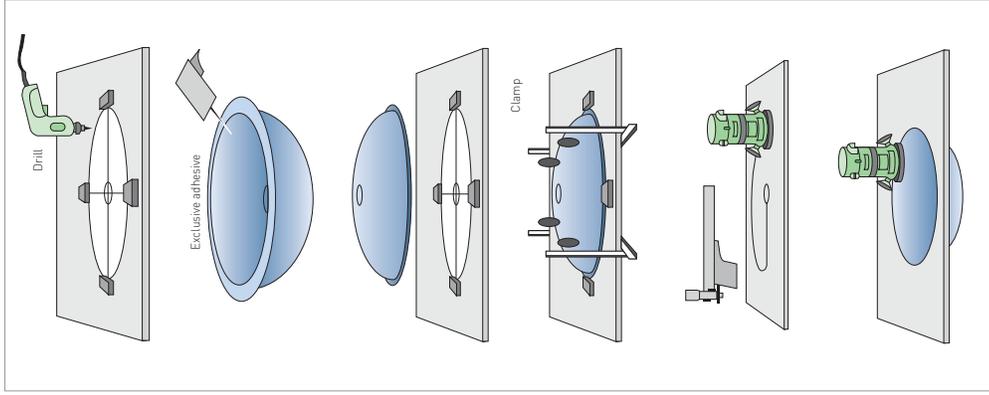
- Make a template if one is not provided of the required size for the cutout.
 - Sand and finish the routed edges and chatter to provide a smooth surface.
 - Invert or flip your HI-MACS countertop. Make certain your bench is flat and level.
 - Leave enough room at the back of the countertop for the faucet assembly, edge buildup backsplash, and respective sink flange.
 - Apply a 6mm bead of 100% silicone to the top of the sink flange and to the bottom of the HI-MACS counter top at the flange perimeter edge.
 - Position the sink equally around the cutout and install sink clips or clamps supplied, but remember not to screw anything directly into or onto the HI-MACS materials. Use a wood block or shim block when necessary. Your distributor has or will direct you to the approved sources for sink clips appropriate to mount into the HI-MACS sheet materials.
- A seam mount in solid surfacing is gluing the top of the sink flange with adhesive to the bottom of HI-MACS sheet materials. For this reason, all typical bonding steps are performed on an inverted or flipped sheet, thus exposing the bottom of your countertop.
 - Most fabricators will perform all steps in an inverted fashion, with the exception of final trimming with the router and finish sanding.
 - It may be helpful to make sure you have a work table/bench that is open or wide enough in the center to flip the top into once the sink is installed for final trimming and finishing. Such a table/bench will provide proper support all around the sink and countertop.
 - Mark the center location of the bottom of the sheet where the sink will also be centered in the sink base cabinet. Use an auger to scribe these marks.
 - Once you dry fit the bowl into final position, use the same auger to draw an outline around the sink/bowl.
 - Completely sand and then clean the surface of the sink flange and the area on the bottom of the sheet inside the auger outline that will have adhesive placed on it.
 - Place the sink/bowl back into position inside your auger outline.
 - Attach blocks made of wood or scrap HI-MACS material with hot melt glue against the outside edge of the flange. Once the glue has dried the sink will remain in position.
 - At this point you can place a bead of adhesive on the flange of the sink or bowl and on the auger outline on the sheet.
 - Place the bowl inside the positioning blocks and attach clamps or weights to ensure adequate and equal pressures as the adhesive is setting up. Depending on the bowl, it may be necessary or required to install sink clips or brackets to aid in the sink support. It can be noted that if you notch the positioning blocks to produce an "L" block, you can create your own support bracket.
 - Once the adhesive is dry, carefully flip the top upright. Place your router in the center of the bowl and plunge an approximate 2.5cm hole through the sheet. Make sure you now put a bearing guide on the bit and follow the perimeter of the bowl as a guide. The bearing will follow it and the excess cutout material will be removed.
 - Change your bit to a finish profile bit with a bearing guide and finish routing the final profile to the deck and bowl. It can be a smooth transition appearing as a monolithic top and bowl or a small bullnose to provide a transition lip.

Sink Mounting

Lavatory Bowl (Under Mount Type)



- Step 1**
Mark the center of product to install the bowl.
- Step 2**
Take the bowl and mark its circumference with auger. (Pencil or marker not recommended)
- Step 3**
Completely clean surface around circumference with denatured alcohol.
- Step 4**
Attach blocks as shown with quick-drying or hot melt adhesive in order to prevent the bowl from moving.
- Step 5**
Lightly sand the flange part of bowl with sand paper.
- Step 6**
Apply denatured alcohol and clean the flange.



- Step 7**
Plunge a hole near the center of where the bowl is to be mounted, using router.
- Step 8**
Apply the adhesive to the bowl flange.
- Step 9**
Place and attach the bowl as shown.
- Step 10**
Attach with clamps until the adhesive has hardened.
- Step 11**
Remove clamps after adhesive has hardened. Turn assembly over and route sink hole as shown.
- Step 12**



Various shapes are obtainable according to bit selection.

Thermoforming

CAUTION / The Volcanics Series is Not Thermoformable!

- Template to the shape required using plywood.
- Since materials other than plywood have inappropriate cooling times, it is recommended that only plywood be used.
- HI-MACS can be formed to tight radius by means of heating.
The oven must heat the entire sheet for successful thermoforming operations.
- The sheets need to be heated to a temperature of 160-180°C, but should never exceed 200°C.
- Remove the protective film prior to heating.
- The minimum forming radius of 12 mm HI-MACS is 45 mm for Solids, Pearls and Sands and a minimum forming radius by 12 mm HI-MACS Quartz and Granite is 100 mm till 120 mm.
But always be aware: the darker the colour, the smaller the radius will be, the more whitening there may be.
- The sheets should normally be heated for 15 to 30 minutes, depending on batch (manufacture date), heating temperature and pre-heated oven. Re-bating the reverse side in the area to be formed can result in shorter heating times and smaller radius.
- Once heated to the required temperature remove workpiece with heat resistance gloves from the oven and place directly into a mould. Male and female mould are required. Allow heated material to shrink in the mould.
- Leave the sheet in the mould until the sheet has cooled down, ca. 60°C at least, typically 20-40 minutes, depending on the material of the mould. Always wear heat-protection gloves for this operation.
- Never attempt any shock cooling as this can cause stress to the material.
- Attempting to bend HI-MACS at lower temperatures or shortening the heating cycles will often result in "whitening" or cracking of the edge.
- Normal sanding and finishing of the formed edge can be carried out once the sheet is fully rigid.

Thermoforming Process per Thickness of Product

Thickness of Product(mm)	6	12
Oven Temperature(°C)	160-190	160-190
Heating Time(Minute)	20	40
Minimum Curve Radius(mm)	R50	R100

Cooling

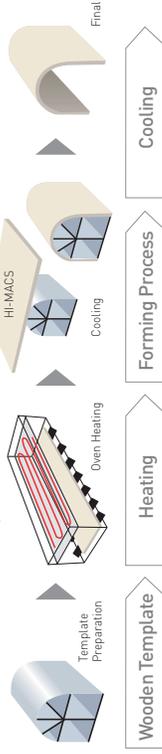
Never take out the product from the template before the temperature reaches 80°C. The shape of product is maintained at temperatures below 80°C, even if the product is not supported by the template.

Thickness of Product(mm)	6	12
Cooling Time(Minute)	10-20	20-40

Note

1. Peel off the protective sheet, which is attached to the surface of product.
2. Be careful that the oven temperature does not exceed 200°C.
3. Heat 10-20 minutes, or more if you need the product with minimum curve R.
4. Please note with caution that a whitening effect can be generated on the surface of the product if the temperature is too high or the heating is prolonged.

Process of thermoforming



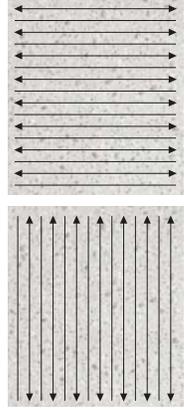
Sanding

Finish Considerations

- HI-MACS sheet materials are factory sanded prior to peel coat application. The result of this superior quality factory finish offer fabricators less final sanding time in the shop or on the jobsite.
- Sanding is a very important part of the fabrication process.
- Be very sure to sell a finish that is right for the color and lifestyle of the customer.
- Do not oversell the performance of a specific finish, especially in a darker color selection and in a satin or gloss finish selection.
- Be forthright, in clearly expressing the performance of a finish option.
- The sanding and finishing process can also be the most time consuming and frustrating experience to the fabricator in the process of fabrication.
- HI-MACS would like to simplify the process as you take your countertop finish from a standard matte to satin to high gloss finish.
- Additionally, it can be confusing to the fabricator because of the multitude of sanding equipment, systems and sand paper companies available to the fabricator.
- As you decide the best equipment and sanding papers to incorporate into your fabrication process, remember to purchase good quality sanding equipment and sandpapers.

Sanding Process

- The final process of manufacture of all HI-MACS elements is to sand (and/or to polish for special applications).
- Under normal circumstances, begin by sanding the entire element with 120 grit paper. In instances where there has been no prior fabrication of the sheet, it is possible to start with 280 or 320 grit.
- Always use dust extraction systems at all times when sanding, this will help pick-up loose particles of grit and prevent unwanted scratches.
- Build up to finer and finer levels of grit size, taking care to clean down between each change with a damp cloth.
- Finish a 320 grit paper and then followed by Superpad S/G 1200 from Jost to reach a recommended semi-gloss level.
- To improve the gloss level of the surface use 1200/1500/1800 wet or dry, Scotch Brite pads, or polishing pastes available from 3M or other manufacturers.
- High-gloss finish level is very sensitive in maintenance and not recommended for normal use, but for art subjects acceptable.
- High-gloss finish level is NOT covered under the 10-year limited installed warranty program. Insure to use proper equipment, like a random orbital sander with a flat pad.
- For straight surfaces use a hard pad always.
- Soft or super-soft pads are recommended for curved surfaces.
- Never concentrate on one specific area, particularly near seam, as this can lead to dipping.
- After each sanding step, wipe off dust, then start with the next step.
- Be aware that some dark colours need more careful sanding than some other lighter colours.



Sanding

Matte Finish

- To achieve a matte finish, you can either use a grit or a micron system. Remember the numbering system or grades of papers between grit and micron systems are opposite to one another.
- First, use a 120 Grit or 100 micron abrasive. Once this step has been completed, remember to clean the top and switch papers to a 180 or 220 Grit or 60 Micron paper.
- Finally, clean the top once again and surface the top with a #7447 Scotch-Brite pad.
- If you are working with a dark or black color, you may have to add an additional third step in sanding. This will require a 320-400 Grit or 30 micron paper. If this is done, you will then want to clean the top and then surface the top with a #7448 Ultra Fine Scotchbrite pad.

Satin Finish

- If you wish to achieve a satin finish follow the same steps expressed to achieve a Matte Finish on a dark color. Use a 120 Grit/100 Micron, then switch to a 180-220 Grit/60 Micron. Remember to clean the top between steps.
- You will want sand the top using 320-400 Grit/30 Micron paper. Clean the top.
- Finally, you will surface the top with a #7448 Ultra Fine Scotch-Brite pad. Clean the top once again and examine the final finish.

Gloss Finish

- Follow the steps to the Satin Finish specification, but do not use the #7448 pad yet. As you reach the 320-400 Grit/30 Micron step, you will need to add a few additional steps.
- Sand the top using 600-900 Grit/15 Micron paper. Thoroughly clean the top. Remember to check the loading of your paper during the process and replace it frequently as necessary to maintain a consistent finish.
- Make sure to remove excess adhesives with a surfacing router equipped with a system of skis. Avoid use of a belt sander as it generates a great deal of heat and can fail a seam. Furthermore, the belt sanding equipment is very aggressive and can remove material quickly. That being said you can create more problems for your countertop fabrication if more material is removed than is supposed to be. You want to maintain control in the sanding process. It is the final step of showcasing your work.
- An important step in the process of sanding is to thoroughly clean the top between steps or grit changes. You can do so with a spray bottle of water or preferably denatured alcohol and a clean white rag. Cleaning off sanding dust between steps allow for a more consistent and high quality finish.
- Apply equal pressure and overlapping coverage in both directions of the top. For example, left to right and front to back. Complete one direction before starting the other.
- Change or clean your sandpaper as you sand as it will get loaded and become less efficient. As you get to a more detailed finish the sandpapers will load more quickly. If care is not taken to keep the sandpaper loading to a minimum, it will impair your ability to achieve a high quality, consistent finish. In a gloss situation, you may never achieve it.



HI-MACS® Acrylic Solid Surface

Installation Overview

Transporting Pre-Fabricated Materials
Substructures
Key Reminders to a Successful Installation
Post-Installation Overview

Kitchen Countertop Installation

Troubleshooting

Consumer Cleaning, Care & Repair

HI-MACS Certificates



Technical Data Sheet

Rigid, Spray-applied Polyurethane Foam Insulation Zero Ozone Depletion Substance, Class I ASTM

HEATLOK SOY® is two component spray applied rigid polyurethane foam, green in color, having a nominal density 2lbs/ft³. This spray foam has been specially formulated to meet the intent of the International Code Council (ICC) building codes and is used primarily as a vapor barrier, air barrier and thermal insulation on above and below grade interior and exterior applications. Complies with FEMA requirements as a Class 4 insulation.

HEATLOK SOY® is environmentally-friendly foam developed from recycled plastic materials and renewable soy oils, while the blowing agent is the HFC 245fa. Certified Insulation Material approved by California Department of Consumer Affairs. *GREENGUARD* and *GREENGUARD Children and Schools* certified.

Physical Properties			
Method	Description	Imperial units	Metric units
ASTM D 1622	Density (core)	2.1-2.3 lb/ft ³	34-37 Kg/m ³
ASTM C 518 (R-Value)	Initial Thermal Resistance, 1" Aged Thermal Resistance, 180 days @ 23°C, 1"	7.2 ft ² h°F/BTU 6.6 ft ² h°F/BTU	1.26 m ² °C/W 1.17 m ² °C/W
ASTM D 1621	Compressive Strength (10%)	28.3 psi	195 kPa
ASTM D 1623	Tensile Strength	51.5 psi	355 kPa
ASTM D 2126	Dimensional Stability (28 days) (sample without any substrate) -4°F (-20°C), ambient RH 176°F (80°C), ambient R.H. 158°F (70°C), 97% R.H.	% Volume Change	
			-0.03 + 2.9 + 9.8
ASTM D 2842	Water Absorption (Serves as moisture barrier)	0.8% Volume	
ASTM E 96	Water Vapor Permeance, 1" (Note: Is a vapor barrier of 1 perm or less at thicknesses greater than 1.2" per IBC Section 202, Definitions)	1.2 perms, 69ng/Pasm² @ 1"	
ASTM E 283-04 ASTM E2178-03	Air Permeance @ 75Pa, 1" (Note: Air Barrier Association of America approved air barrier)	0.001L/sm² @ 1" 0.000L/sm² @ 1.5"	
ASTM E 84-05	Surface Burning Characteristics, 3"thick • Flame spread index • Smoke development	20 450	
CAN/ULC S774	VOC Emissions from Polyurethane Foam	Pass (1 day)	
ASTM C 1338	Fungi Resistance	No fungal growth	
ASTM D 2856	Closed Cell Content	> 92%	
ASTM D 6866	Bio-based Content	5%	

Liquid Components Properties

Property	Isocyanate A 100	Resin B 217-0
Color	Brown	Greenish
Specific gravity	1.20 – 1.24	1.20 – 1.24
Shelf life*	6 months	6 months
Mixing ratio (volume)	100	100
Vapor pressure @ 25°C	10 ⁻⁷ psi	7 – 9 psi

* See MSDS for more information.

Note: Store the resin at temperatures 59 - 77°F (15 – 25°C). Keep away from direct sunlight.

Processing Parameters

	Imperial units	Metric units
Type of machine	Graco® Reactor E-30 with Fusion gun and O2 Mixing Chamber	
Components A & B temperature	100°F	38°C
Components A & B pressure	850 – 1000 psi	5860 – 6900 kPa
Ambient temperature	73°F	23°C
Thickness per pass	1 ¼ inches	30 mm
Number of passes	2	
Substrate	Polyethylene Board	

Reactivity Profile

Cream time (s)	Gel time (s)	Tack free time (s)	End of rise (s)
0-1	2	4-5	4

Recommended Processing Conditions

	Imperial units	Metric units
Mixing ration A:B	1:1	
Mixing temperature	100 – 120°F	38 – 49°C
Mixing pressure	800 psi	5516 kPa
Substrate & Ambient temperature	>14°F	>(-10)°C
Curing temperature	>14°F	>(-10)°C
Maximum thickness per pass	2 in.	50 mm

General Information: It is recommended that the foam is covered with an approved thermal barrier in accordance to the local and national building codes when used in buildings and a protective coating when used outside. This product should not be used when the continuous service temperature of the substrate is outside the range of -76°F (-60°C) to 176°F (80°C). Spraying too thick sections too fast may result in charring of the foam, or in extreme conditions a fire may result.



Disclaimer: The information herein is to assist customers in determining whether our products are suitable for their applications. We request that customers inspect and test our products before use and satisfy themselves as to contents and suitability. Nothing herein shall constitute a warranty, express or implied, including any warranty of merchantability or fitness, nor is protection from any law or patent infringement. All patent rights are reserved. The foam product is combustible and must be covered by an approved thermal barrier. Protect from direct flame and sparks contact. The exclusive remedy for all proven claims is replacement of our materials.

Typar® HouseWrap

FOR RESIDENTIAL APPLICATIONS TYPICAL CHARACTERISTICS

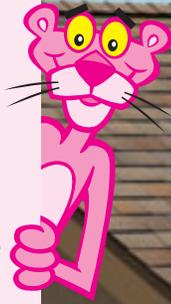
Basis Weight	(ASTM D-5261)	nominal 2.8 osy 21.0 lbs/1000ft ²
Thickness	(ASTM D-1777)	12.9 mils
Bursting Strength	(ASTM D-3786)	66 psi
Dry Tensile Strength	(ASTM D-5034)	80 lbs md 87 lbs xd
Trapezoidal Tear	(ASTM D-1117/ ASTM D-5733)	30 lbs md 33 lbs xd
Pliability	(AC-38)	PASS
Hydrostatic Pressure Resistance	(AATCC 127-1995)	865 cm
Gurley Hill Porosity	(TAPPI T-460)	> 2500 sec/100cc
Moisture Vapor Transmission Rate	(ASTM E-96-95, procedure A)	11.7 U.S. perms
Ultra Violet Light Exposure Resistance (UV)		6 months
“Air-Ins” (Air Leakage Test)	(CCMC Technical Guide MF-07273)	.0032L/(S·M ²) @ 75 pascals
Water Resistance Test (Boat Test)	(ASTM D-779)	PASS
Water Ponding Test	(CCMC Technical Guide MF-07193)	PASS
	(ASTM-E-84-00a)	
Surface Burning Characteristics		
Flame Spread Index		Class A
Smoke Developed Index		PASS

Roll sizes: 3 ft x 100 ft, 4.5 ft x 200 ft, 9 ft x 100 ft
9.5 ft x 95 ft, 9 ft x 150 ft, 9 ft x 195 ft, 10 ft x 100 ft, 10 ft x 150 ft
ICC #ESR-1404, CCMC #12892-R, CCMC #12894-R

The information contained herein is to the best of our knowledge accurate and reliable and is provided for the user’s assessment and verification. However, since the circumstances and conditions under which such information and the products discussed can be used may vary and are beyond our control, we make no warranty, expressed or implied, of merchantability, fitness or otherwise, or of the results to be obtained, or against patent infringement, and we disclaim all liability from any resulting damage or loss.

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Fiberweb, Inc., 70 Old Hickory Blvd., Old Hickory, TN 37138 USA, 1-800-284-2780 •
Fax: 615-847-7068, www.typar.com



Duration® Premium Cool Shingles

with SureNail® Technology



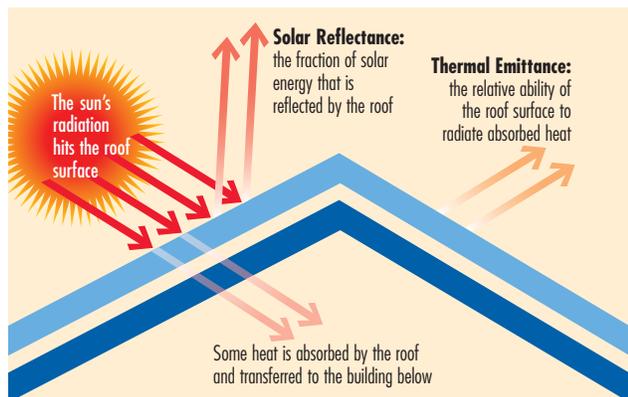
ENERGY STAR® RATED



Your Cool Roof solution

Duration® Premium Cool shingles are unique in color and have highly reflective granules. These granules bounce back the sun's rays, helping result in:

- Cooler roof temperatures
- Less wear and tear on air conditioning systems
- More energy savings
- Lower carbon dioxide emissions
- Reduced heat island effect and smog



Cool Roof Rating Council (coolroofs.org)

Duration® Premium Cool shingles feature solar-reflecting granules that help lower energy bills by keeping roofs cool.™

ENERGY STAR® is for roofs too



Similar to the energy-efficient appliances in your home, roofing products can provide energy-saving qualities.

Owens Corning™ Duration Premium Cool roofing shingles can help reduce your energy bills when installed properly. These shingles reflect solar energy, decreasing the amount of heat transferred to a home's interior—and the amount of air conditioning needed to keep it comfortable. Actual savings will vary based on geographic location and individual building characteristics. Call 1-800-GET-PINK® or 1-888-STAR-YES for more information.

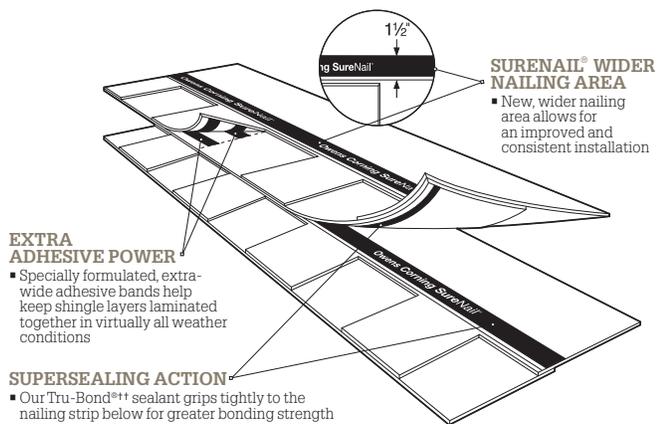


Meet energy standards with Duration® Premium Cool shingles

- Help reduce environmental impact by keeping roofs cool**—less energy needed to cool a home means less energy consumption
- Extend the life of the roof—thanks to solar-reflecting granules that reduce shingle temperature and subsequently slow asphalt aging
- Include a Limited Lifetime Warranty† and 130-MPH Wind Resistance Limited Warranty†
- Backed by an Algae Resistance Limited Warranty† **NEW**
- Meet 2009 California Title 24, Part 6, requirements which call for a Cool Roof or equivalent improvement. For more information, visit www.roofing.owenscorning.com
- Are rated by the Cool Roof Rating Council (CRRC)

Provide greater bonding strength

As part of the Duration Series shingle line, Duration Premium Cool shingles also come with SureNail® Technology, offering:



Offer a new color palette

Duration Premium Cool shingles feature unique lighter colors—that correspond with Owens Corning™ Hip & Ridge shingles—and have a three-dimensional look for maximum curb appeal.



Harbor Fog†



Frosted Oak†



Sunrise†



Sage†

* See actual warranty for complete details, limitations and requirements.

** Estimated roof surface temperature reduction based on 1998 NIST study, *Analytical Study of Residential Buildings with Reflective Roofs*. A temperature reduction is representative of a change from a typical roof to a Cool Roof (solar reflectance 10 to 25) in most climates.

† Owens Corning strives to accurately reproduce photographs of shingles. Due to manufacturing variances, the limitations of the printing process and the variations in natural lighting, actual shingle colors and granule blends may vary from the photo. The pitch of your roof can also impact how a shingle looks on your home. We suggest that you view a roofing display or several shingles to get a better idea of the actual color. To accurately judge your shingle and color choice, we recommend that you view it on an actual roof with a pitch similar to your own roof prior to making your final selection. Color availability subject to change without notice. Ask your professional roofing contractor for samples of colors available in your area.

†† Tru-Bond is a proprietary premium weathering-grade asphalt sealant that is blended by Owens Corning Roofing & Asphalt, LLC.

ENERGY STAR and the ENERGY STAR mark are registered trademarks of the U.S. Environmental Protection Agency.

SureNail Technology Patents Pending.

Pub. No. 10011012-A. Printed in U.S.A. May 2010. THE PINK PANTHER™ & © 1964–2010 Metro-Goldwyn-Mayer Studios Inc. All Rights Reserved. The color PINK is a registered trademark of Owens Corning. ©2010 Owens Corning Roofing & Asphalt, LLC.



The HardieZone™ System: HZ5™ Care and Maintenance Guide

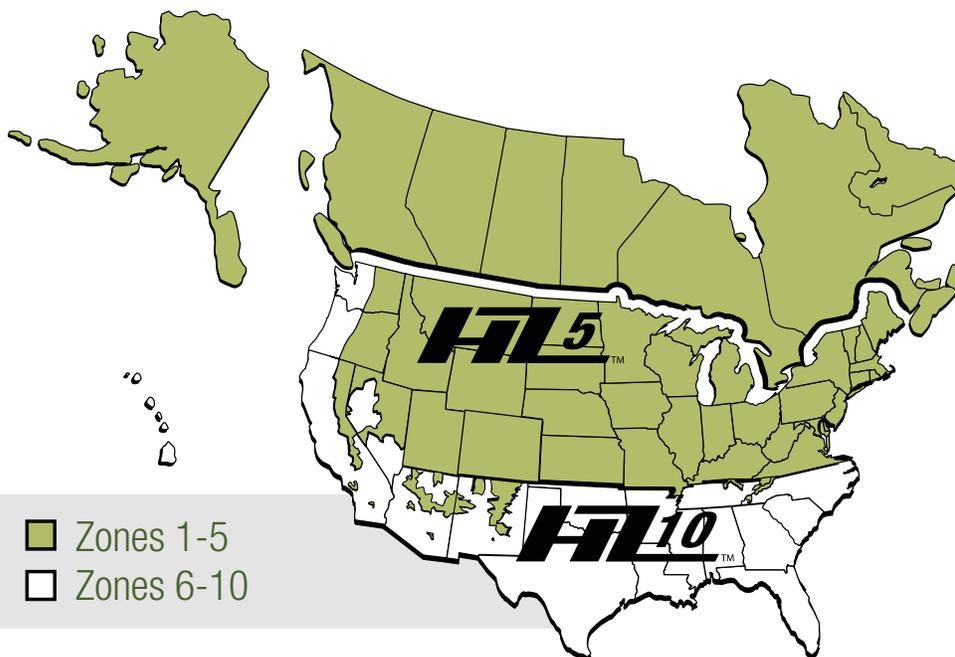
Congratulations on having James Hardie products on your home! We would like to share with you some basic information about the products and how to care and maintain them. James Hardie strongly recommends that the Homeowner understand how proper storage, installation and maintenance of James Hardie products will allow their beauty to last for many years to come.

The HardieZone™ System

Your home's exterior says a lot about you. Unfortunately, Mother Nature doesn't care. Whether it's sheets of rain, dry heat, freezing temperatures, ice and snow, or hurricane force winds, siding is under constant attack. That's why for more than three decades, James Hardie has continued to push back on everything Mother Nature could dish out.

Four million beautiful homes stand as a testament to our persistence. And as the most trusted brand of siding in America, James Hardie has taken that level of defense to an even higher level, with siding that's engineered for climate. We call it The HardieZone™ System.

We based The HardieZone™ System on the eight individual climatic variables that primarily affect long-term performance of siding. Using these factors we arrived at ten distinct climatic zones. Though different, we found common variables in certain regions, allowing us to engineer the HZ5 product line for zones 1 through 5 and the HZ10 product line for zones 6 through 10.



HZ5™ Products

The HZ5™ product line is right at home in climates with freezing temperatures, seasonal temperature variations, and snow and ice. It is the result of our generational evolution of our time tested products. To ensure that its beauty matches its performance we have engineered the surface, giving it superior paint adhesion and moisture resistance. In addition we have added a 15 degree drip edge to the HardiePlank® HZ5 lap siding product to provide improved water management in conditions specific to HZ5 product climates.

- Resists damage from freezing temperatures
- Superior paint adhesion
- Noncombustible*

For additional HardieZone information, visit www.jameshardie.com .

*HardiePlank®, HardiePanel®, HardieShingle®, HardieSoffit®, Artisan® Lap products comply with ASTM E136.

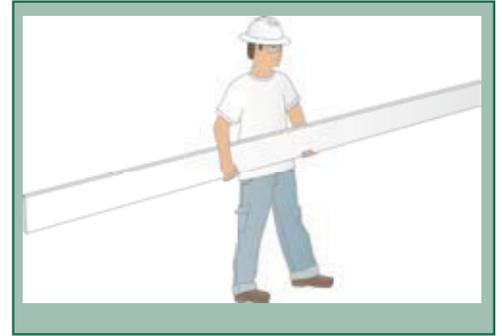
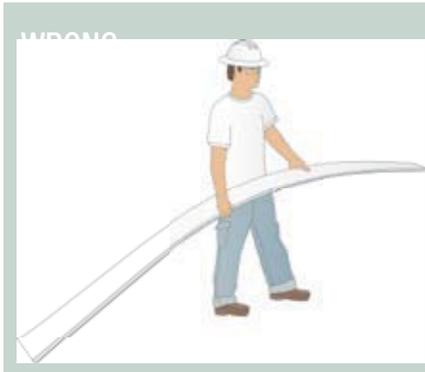
Storage and Handling

Storage and Handling

If you have hired a contractor to re-model your home with new siding or have the opportunity to watch your new home being built, it's important for you to understand how James Hardie siding should be stored and handled during construction. In general, the product needs to be kept dry before installing it on your home. Our installation instructions and this Best Practice Guide provide the installation crew and builder with clear directions on how to properly store and handle all of our products. These instructions and guide can be found on our website at www.jameshardie.com.



Carrying James Hardie® siding products with ColorPlus® Technology flat may cause excessive bending, which can damage the finish.



One person should hold planks on edge in the middle with arms spread apart for maximum support of the product.



Two people should always carry panel products.



If stored outside protect with an additional waterproof covering.



James Hardie products stored in their original packaging.

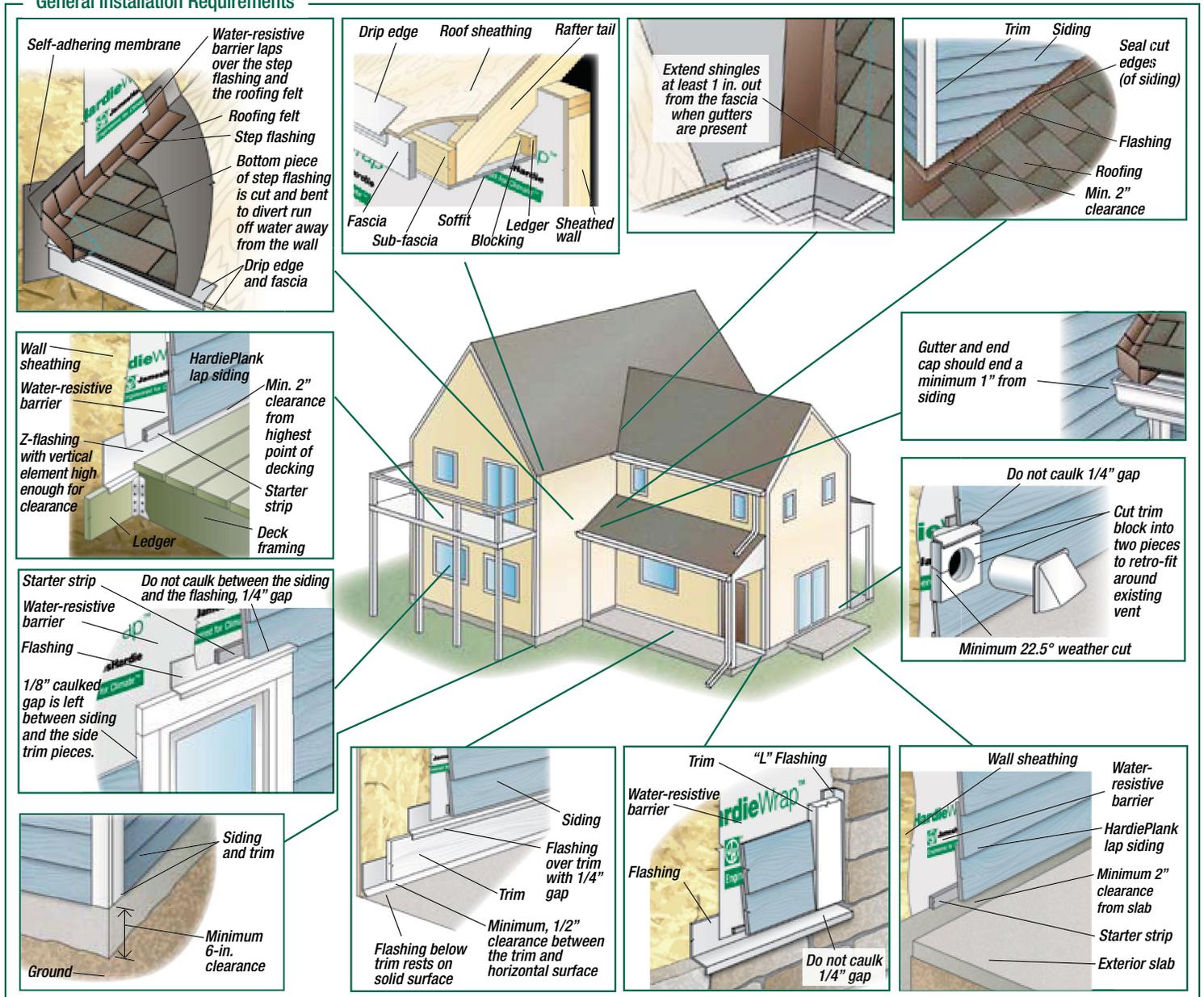
Installation

Installation

Homeowners are encouraged to take an active role during the installation of the product and work with the builder to ensure the product is installed correctly. Our installation instructions and Best Practice Guide can be found on our website at www.jameshardie.com. If the instructions are not followed when installing the products, the product only warranty could be voided. You should ask the product installer questions and bring up any areas that do not seem consistent with installation instructions. The earlier these concerns are brought up, the sooner they can be corrected.

The general installation requirements for critical areas of the house are highlighted below. For complete details on what is required to install the product, please refer to the specific installation instructions or the Best Practice guide where these construction details are discussed in greater detail.

General Installation Requirements



Cleaning and Maintenance

Water Management and Gutters

Whether you live in an area with high amounts of rainfall or an occasional thunderstorm, it is important to effectively manage the flow of water from these events for your entire home. James Hardie recommends that you have gutters and downspouts installed on your home if they were not already present when you purchased the home.

Cleaning and Maintenance

Cleaning and maintaining the exterior of your home is an important part of sustaining the beauty and value of your home. The extent and nature of maintenance will depend on the geographic location and exposure of the building. As a guide, it is recommended that normal care and maintenance tasks shall include but not be limited to:

- Washing down the exterior surfaces every 6 to 12 months with a garden hose or low pressure water spray to remove dirt and debris.
 - James Hardie Products with ColorPlus® Technology can be cleaned using water and a soft brush or rag. For stubborn dirt or stains, a mild detergent and a soft brush may be used.
 - For paint applied in the field, refer to your paint manufacturer for washing and maintenance requirements related to paint performance.
- Clean out your gutters, blocked pipes, and overflows as required.



High Pressure water blasts (e.g. pressure washers and sand blasting) will damage the surface of fiber-cement. James Hardie does not recommend these methods of cleaning. Low pressure water spray, or a soft brush are more suitable for cleaning fiber cement products.



- It is important to re-apply caulking when it has begun to show signs of wear. This can help keep moisture from getting into the wall cavity. These areas include but are not limited to penetrations, flashings, plank and trim connections and in some cases between plank joints.
 - James Hardie recommends the use of caulks and sealants that remain permanently flexible. Look for the words “permanently flexible” written clearly on the label or in the accompanying literature. For best results use an Elastomeric Joint Sealant complying with ASTM C920 Grade NS, Class 25 or higher, or a Latex Joint Sealant complying with ASTM C834. Caulking/sealant must be applied in accordance with the caulking/sealant manufacturer’s written instructions or ASTM C1193.
- It is a good practice to keep vegetation such as shrubs, bushes, and small trees trimmed back and away from the home and siding. This will also help to ensure that sprinkler systems do not saturate areas near the building.
- Ensure required external ground clearances (typically 6”) and drainage slopes are maintained. Do not in fill landscaping up to the siding.



It is a good practice to keep vegetation such as shrubs, bushes and small trees trimmed back away from home and siding.

Re-Painting/Repair

Re-Painting Siding

ColorPlus Products

- James Hardie ColorPlus® products can refresh their look by washing down dirt and debris from the siding. Note: Repainting over the top of James Hardie ColorPlus® before the 15 year limited ColorPlus warranty is expired, will void the finish warranty. However if repainting is desired, refer to our Technical Bulletin S-100 located on our website for painting tips.
- ColorPlus® touch up is used to cover nicks, scrapes and nail holes that may occur during installation. ColorPlus® touch up comes in bottles tailored to be edge coaters or touch up pens. If the touch up area is larger than the size of a dime the use of touch up is NOT recommended. Installers are advised to replace the damage siding with a new section of ColorPlus plank or panel.

PrimePlus Products

- If your James Hardie siding was originally painted after it was installed on your home, then check the original paint manufacturer recommendations for reapplication of paint.
- Do not use stain on James Hardie Products.

Repair or Patching

Dents, chips, cracks and other minor surface damage in James Hardie siding and trim products can be filled with cementitious patching compound. Refer to manufacturer recommendations for products that are compatible with fiber cement.

Use of Deicing Salts

James Hardie siding products should not come in direct contact with deicing salts. The salts may prematurely damage the finished look of the siding. James Hardie recommends the use of sand or gravel to manage snow loads near siding.



Edge Coaters or Touch-up Pens should not be used to touch-up any area that is larger than a dime.

Technical Data Sheet

WinterGuard™ HT Waterproofing Underlayment WinterGuard™ Sand Waterproofing Shingle Underlayment WinterGuard™ Granular Waterproofing Shingle Underlayment



NOTE: Reference to “WinterGuard” without specific reference to HT, Sand or Granular relates to all three products.

PRODUCT INFORMATION

WinterGuard products are most commonly used in critical areas such as roof eaves, valleys, and as a waterproofing underlayment for low-slope shingle, metal, slate, and mechanically-fastened tile roofing applications. WinterGuard HT (High Tack, High Temperature) is an advanced waterproofing underlayment for shingle, metal, slate and tile roofs. It is specially formulated to resist high roof temperatures under metal roofs. WinterGuard Sand and Granular underlayments are designed for use on roof decks as a waterproofing barrier beneath shingle, slate and tile roofs to prevent leakage due to water back-up from ice dams or wind-driven rain.

Limitations:

- Do not expose WinterGuard permanently to sunlight. Cover WinterGuard as soon as possible with a permanent roof surface. The maximum exposure time is six (6) months.
- WinterGuard will not adhere to wet or cold surfaces. Refer to instructions on the carton for additional nailing and sealing instructions.
- Do not apply WinterGuard over shingles or underlayment of any sort.
- WinterGuard is a vapor barrier. Therefore, if WinterGuard is applied over a majority of the roof deck, proper deck ventilation must be provided.
- If WinterGuard must contact sealants or cements, use solvent-based products sparingly, following manufacturer’s instructions carefully. Excessive use of solvent-based adhesives can damage WinterGuard’s polymer modified asphalt coating. Do not use silicone-based sealants, as they do not maintain adequate long-term adhesion to asphalt.
- Low-slope application: WinterGuard HT can be applied beneath shingles, slate and mechanically-fastened tile to acceptable decks with slopes of 2”/12” or greater and beneath metal to acceptable decks with slopes of 0.5”/12” or greater. WinterGuard Sand and Granular products can be applied beneath shingles, slate and mechanically-fastened tile to acceptable roof decks with slopes of 2”/12” or greater. See grid below for minimum allowable slopes.
- WinterGuard HT is specially designed to withstand temperatures up to 250°F.
- WinterGuard may become slippery under certain weather conditions. When this occurs, avoid walking or crawling on the product.

WINTERGUARD – MINIMUM ALLOWABLE APPLICATION SLOPES

Applied Beneath	WinterGuard HT	WinterGuard Sand	WinterGuard Granular
SHINGLES	2”/12”	2”/12”	2”/12”
METAL	0.5”/12”	Not Recommended	Not Recommended
TILE	2”/12”	2”/12”	2”/12”
SLATE	2”/12”	2”/12”	2”/12”

Product Composition:

WinterGuard is a self-adhering waterproofing membrane composed of a tough reinforcement that is impregnated and coated with SBS-modified asphalt. WinterGuard is available in three finishes: sand, granular, and film. WinterGuard Sand and Granular have top surfaces consisting of mineral matter (sand or granules) to enhance traction during application. WinterGuard HT has a tough, tear resistant film on its top surface that won’t scratch metal roofing applied over it. The adhesive bottom surface of all WinterGuard products is protected with a disposable silicone-coated release film, which is split longitudinally down the middle for easier application.

Applicable Standards:

ASTM D 1970

ICC ESR-1492

UL 790: Classified for use as underlayment beneath Class A, B, or C fire rated shingle systems

Florida Product Approval # FL3455

Miami-Dade Product Control Approved

TECHNICAL DATA

WinterGuard Products by Surface Finish

	Sand (short)	Sand	Granular	HT film
Roll Area (sq.ft.)	97.5	195	195	195
Roll Length (ft.)	32.5	65	65	65
Roll Width (ft.)	3	3	3	3
Thickness (mils. typical)	60	60	60	45
Side Laps (in.)	6	6	4	4
End Laps (in.)	6	6	6	6
Shipping Weight (approx. lb/roll)	36	68	68	51
Packaging (cartons/pallet)	30	20	20	20

INSTALLATION

Storage: Store WinterGuard rolls in their packaging in a dry, protected area at a temperature not exceeding 110°F.

Deck Preparation: Clean the roof deck until it is free of dirt, dust, nails, and other materials. Providing a clean, dry and smooth deck surface is important to assure proper adhesion of the WinterGuard to the deck. Before application to existing roofs, remove all roofing materials including the roofing felt and nails.

Priming: Priming is not necessary for clean and dry wood decks. Concrete and masonry deck surfaces and oily metal surfaces require priming with an asphalt primer meeting ASTM D 41 standards, such as CertainTeed's FlintPrime™, or equivalent. Before WinterGuard is applied, primer must be dry. Follow manufacturer's instructions for the application of the primer.

Membrane Application at the Eaves for Ice Dam Protection: WinterGuard can be applied in any length convenient to the applicator. First, align unrolled material with lower edge of roof and hold in place. Lift starting end of material approximately 1 foot, peel back and fold under at least 6 inches of both sheets of protective release film. Carefully return the exposed adhesive surface to the deck and press firmly in place. If, at lower temperatures, the material does not adhere immediately, tack it in place with roofing nails or staples. Reroll material from the other end until the peeled and folded back film is exposed. Beginning with the folded back film, peel both sheets of the remaining film from the roll, pulling parallel to the eave. Be sure all material lays flat without wrinkling and is well adhered.

Alternatively, apply by the "peel and flop" method, utilizing the two-piece split-sheet release film feature to adhere longitudinal halves, one at a time. It is best to cut the product into manageable lengths of about 10 feet when applying WinterGuard by this method.

Applying WinterGuard is strongly recommended wherever there is a possibility of ice build-up. Many building codes require that the upper edge of ice dam protection extend no less than 24 inches beyond the interior wall line of the exterior walls. In areas of severe icing, it is recommended that WinterGuard be applied at least up to the highest water level expected to occur from ice dams. In order to assure waterproofing, overlap all membrane side laps and end laps per Technical Data table above, press all overlaps firmly with a membrane seam roller, and offset end laps at least 2 feet from course to course.

Application of Drip Edge at Rakes and Eaves: At the rake, the drip edge may be installed under or over WinterGuard. At the eaves, when the WinterGuard does not overlap the gutter or fascia, the drip edge should be installed under WinterGuard. At the rake or eaves, when WinterGuard overlaps the gutter or fascia, drip edge or other metal must be installed over the WinterGuard to protect it against damage from exposure.

Low-Slope Shingle, Metal, Shake, or Tile Application: WinterGuard can be applied under these roofing materials to provide protection against the infiltration of wind-driven rain on low-slope applications. If applied to cover the entire roof, ensure sufficient ventilation to avoid condensation. WinterGuard HT can be applied beneath shingles, slate and mechanically-fastened tile to acceptable decks with slopes of 2"/12" or greater and beneath metal to acceptable decks with slopes of 0.5"/12" or greater. WinterGuard Sand and Granular products can be applied beneath shingles, slate and mechanically-fastened tile to acceptable roof decks with slopes of 2"/12" or greater.

Application at Valleys and Ridges: In the valleys, the width of the WinterGuard must be 36 inches minimum, and on the ridges, 12 inches minimum. Cut WinterGuard to convenient premeasured lengths (4 to 6 feet recommended). Peel off the release film and drape the sheet into place, allowing the membrane to locate and adhere in the valley centerline or ridge peak first, working outward toward the edges. In valleys, start the application at the low point and work upwards. To assure waterproofing, overlap all sheets 6 inches at lap joints. Do not use WinterGuard as a permanent weathering surface (such as in an open valley).

MAINTENANCE

WinterGuard requires no maintenance when installed according to manufacturer's application instructions.

WARRANTY

WinterGuard is warranted against manufacturing defects and to remain watertight for the same period as the warranty duration carried by the roofing product applied above it – up to a maximum of 50 years. For specific warranty details and limitations, refer to the warranty itself.

FOR MORE INFORMATION

Sales Support Group: 800-233-8990

Web site: www.certainteed.com

See us in Sweets and ARCAT printed and electronic publications

CertainTeed Roofing

P.O. Box 860

Valley Forge, PA 19482



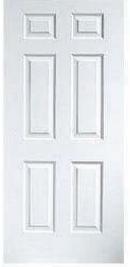
Norandex #57
 4673 Dale Drive
 Lafayette, IN 47905
 United States



Quote ID SQDBLR000184
Prepared by Mike Marpoe

Quote Name PURDUE WALLPE

Line	Label	Qty	Family/Part Number	Unit	Extended
1	GARAGE	1	Traditions	140.56	140.56



Entry Door Sys Shape	Single Door
System Size	3-0 x 6-8
System Style	TS210
Handing/Swing	Left Inswing
Door Style	TS210
Door Width	3-0
Door Height	6-8
Door Boring	Single
Door Backset	2 3/8" Backset
Frame Material	Primed Pine
Jamb Depth	4-9/16"
Sill	Mill_Public Access
Hinges	Zinc DichromateStandard Inswing Hinge
Weatherstrip	Compression Weather Strip

2 **FRONT** 1

Classic Craft American Collection **766.96** **766.96**



Entry Door Sys Shape	Single Door
System Size	3-0 x 6-8
System Style	CCA230-LE
Handing/Swing	Left Inswing
Door Style	CCA230-LE
Door Width	3-0
Door Height	6-8
Door Glass Design	Clear
Door Caming	NONE
Door Boring	Single
Door Backset	2 3/8" Backset
Dentil Shelf	4 Block Dentil Shelf
Door Low E	YES
Frame Material	Lifetime (Fiberglass)
Jamb Depth	4-9/16"
Sill	Mill_Public Access
Sill Cover	Sill Cover included
Hinges	Zinc DichromateClassic Craft Ball Bearing
Weatherstrip	Compression Weather Strip



Norandex #57
 4673 Dale Drive
 Lafayette, IN 47905
 United States



Quote ID SQDBLR000184

Quote Name PURDUE WALLPE

Prepared by Mike Marpoe

Line	Label	Qty	Family/Part Number	Unit	Extended
3	BACK BEDROOMS	2	Classic Craft Canvas Collection	825.99	1,651.98



Entry Door Sys Shape	Single Door
System Size	x 6-8
System Style	CCV10020-LE
Handing/Swing	Left Inswing
Door Style	CCV10020-LE
Door Height	6-8
Door Glass Design	Clear
Door Caming	NONE
Door Boring	Double
Door Backset	2 3/8" Backset
Door Low E	YES
Frame Material	Lifetime (Fiberglass)
Jamb Depth	4-9/16"
Sill	Mill_Public Access
Hinges	Zinc Dichromate Classic Craft Inswing Hinge
Weatherstrip	Compression Weather Strip

A classic choice that speaks for itself.



CCA220 door with 4-block detail shelf CCA340SL, sidelite & 19220T transom stained English Walnut

www.thermatru.com

Low-E glass



CCA219 (LE)
30" x 6'8"



CCA220 (LE)
30" x 6'8"



CCA230 (LE)
30" x 6'8"



CCA240 (LE)
30" x 6'8"



CCA260 (LE)
30" x 6'8"



CCA340SL (LE)
12' x 6'8"
14' x 6'8"



CCA346SL (LE)
12' x 6'8"
14' x 6'8"



19220T (LE)
30" door + (2) 14" sidelites
30" door + (2) 14" sidelites
CONTINUOUS SILL SYSTEMS ONLY



19220T (LE)
30" DOOR ONLY

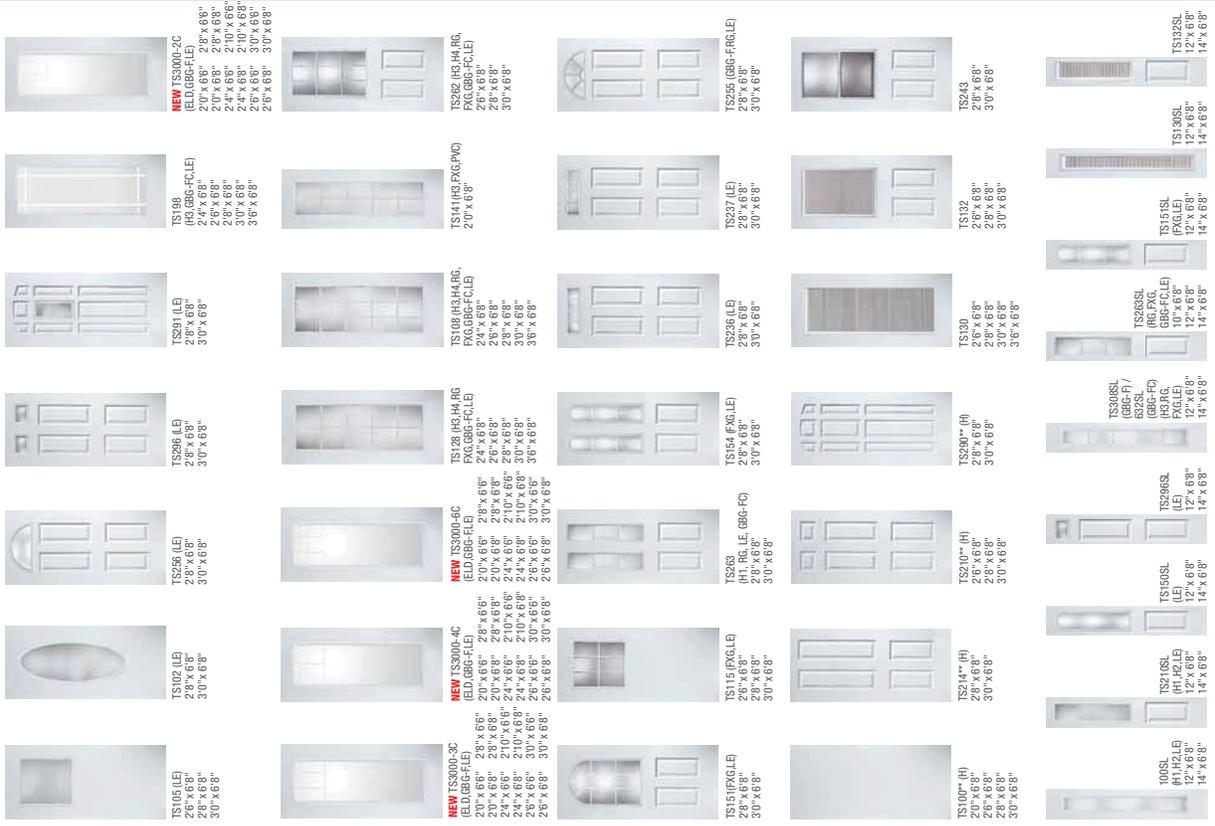


4-block detail shelf



16-block detail shelf

Note: Colors may vary from an actual application due to fluctuations in staining or the printing process of this catalog.



Traditions

Steel Entry Door Systems

Featuring smooth steel and a polyurethane foam core, Traditions doors provide an affordable yet attractive entryway.

Collection Features:

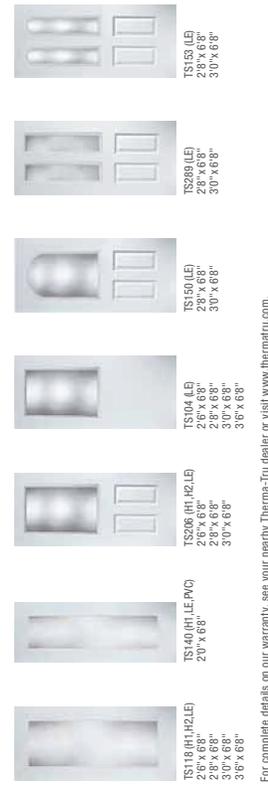
- Excellent value-priced entry door option
- Features 25-gauge steel that is primed white and ready-to-paint
- Reinforced solid wood lock block and rot-resistant top and bottom rails for added durability
- Solid polyurethane foam core offers increased energy efficiency
- 20-minute fire rating on opaque doors without glass, a great solution for house-to-garage applications

Decorative glass also available

Contact your local Thermo-Tru® dealer or distributor for details.

See pages 116 & 119 for transom options.

options	impact rated options
E.L.D. external lite dividers	H1 solid panel
F.X.G. fixed grilles	H1 clear glass
F.G. flush-glazed	H2 clear with Low-E glass
G.B.G. white grilles seated between glass - F (flat profile only) - FC (flat or contoured profile)	H3 white GBG
LE Low-E glass	H4 white GBG with Low-E glass
PVC PVC door/trim frame*	** 20-minute positive pressure fire rated (wood edge)
FG removable wood grilles	



*PVC Door/trim not recommended for use behind storm doors or painted with dark colors.

interior doors

Palazzo[™]
Safe 'N Sound[®]
Masonite[®] Molded Panel Series

Environmentally...

Beautiful[™]

featuring
the all new
Saddlebrook[™]



PALAZZO SERIES



MASONITE. THE BEAUTIFUL DOOR.

Our dedication to producing products that you can trust and rely on for performance and beauty started over 80 years ago when a researcher, engineer and inventor by the name of William H. Mason made a revolutionary discovery. He found that post-industrial wood chips could be recycled to create building products, making the environment an integral part of the foundation on which Masonite was built.

We remain relentlessly committed to delivering product, service and design innovations that enhance beauty and functionality. These innovations make your home more beautiful and create greater value for our customers throughout the world.

index

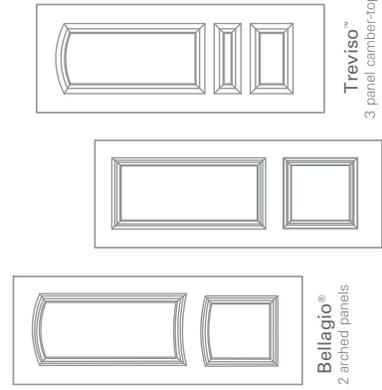
- Palazzo Series 2
- Anniversary Collection 4
- Molded Panel Series 6
- Safe 'N Sound, Safe 'N Sound Emerald & Hollow Core Emerald 8
- Green Association & Certification 10
- Design & Size Options 12

PALAZZO FEATURES

- Distinct raised moulding combined with unique, high-definition panel profiles
- Exceptionally smooth surface, ideal for painting and decorating
- Masonite's unique Engineered Component Construction – Core reinforcements are strategically positioned throughout the door in the stiles, rails and panels to maximize performance, designed to have the weight*, feel and richness of stile & rail wood doors, along with the performance benefits of a composite wood product.
- Three architectural designs available in both 1-3/8" and 1-3/4" doors
- Also available with a 20-minute fire rating
- United States Patent #6,588,162, other patents pending

Note: * Core reinforcements are made from composite wood substrates.

* Weight comparison is based on matching or exceeding the weight of a domestic pine, stile & rail, 2 panel wood door.



Bellagio[®]
2 arched panels

Capri[®]
2 square panels

Treviso[™]
3 panel camber-top

transforming

interiors

Masonite's Palazzo Series[®] Molded Panel Doors feature distinct raised moulding combined with unique, high-definition, European-style panel profiles like no other door. Three extraordinary architectural designs with the feel and richness of stile & rail wood doors include: the 2 panel arched Bellagio[®], the 2 panel square top Capri[®] and the 3 panel camber top Treviso[™]. All three Palazzo designs make a grand impression, adding elegance and sophistication to any room.

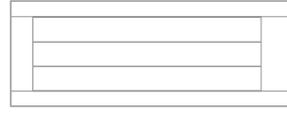
Presenting the Palazzo Series[®]

exceptional definition & elegance

Anniversary Collection

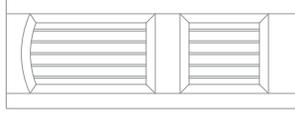


NEW



Saddlebrook™ features

- Saddlebrook™ 1 panel plank
- New, unique v-groove plank design
 - 80" and 96" heights available
 - Also available in 45- and 60-minute fire rating
 - Coordinates with Barrington® Flagstaff™ plank fiberglass entry doors



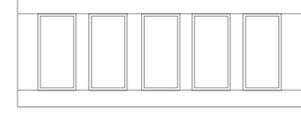
Cheyenne® features

- Cheyenne® 2 panel camber-top plank smooth
- New, unique panel/sticking profile
 - Beautiful, beaded plank design
 - 80" and 96" heights available
 - Coordinates with Barrington® Sierra™ fiberglass entry doors



Glenview™ features

- Glenview™ 3 panel Craftsman smooth
- Craftsman / Mission style architectural design
 - 80" height available
 - Coordinates with our Barrington® or Belleville® Craftsman Fiberglass Entry Doors



Riverside™ features

- Riverside™ 5 panel equal smooth
- Molded shaker panel profile
 - 80", 84" and 96" heights available (96" Riverside features 6 panels)



honoring over 80 years of innovation



Anniversary Collection

Designed to commemorate our 80th year, these four beautiful timeless designs offer the ultimate in wood door authenticity with the benefits of a composite wood product.

- Saddlebrook – Country-inspired 1 panel v-groove plank design
- Cheyenne – Features unique beaded planks with a custom panel profile
- Glenview – Architecturally designed in Craftsman/Mission style
- Riverside – Versatile design featuring molded shaker panel profile

Anniversary Collection Doors Feature:

- Feature lines distinguish architectural correctness of authentic stile & rail wood doors
- Smooth surface, perfect for painting and decorating
- Optional Safe 'N Sound® / Emerald™ "green" specification offered for all styles
- Full range of passage door and bifold widths available
- 20 minute fire rating doors available in select sizes (1-3/4")

beautifully engineered doors



Molded Panel Doors from Masonite are more durable, resist warping, shrinking, and cracking better than solid wood doors. These beautifully engineered doors suit any décor and are available in either smooth or textured finish with matching bifolds. All doors come primed for easy finishing in a variety of widths and heights.

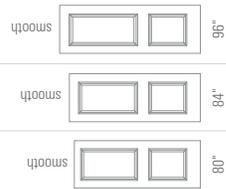
Best of all, no old growth timber is harvested solely for the production of Molded Panel Doors from Masonite. By-product wood chips and timber from sustainably managed forests are used by facilities with a commitment to environmental excellence in every step of the door manufacturing process.

Our commitment to engineer the best products in an environmentally responsible way results in a product that is both beautiful and durable.

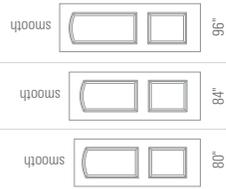
Masonite Classic Molded Panel Doors are available in a variety of construction options:

- Standard hollow core and Hollow Core Emerald® construction
- Safe 'N Sound® and Safe 'N Sound® Emerald® solid core construction
- 20-, 45- and 60-minute fire doors in select heights and designs (1'-3/4" only)

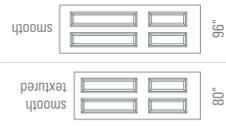
2 panel



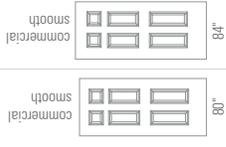
2 panel roman



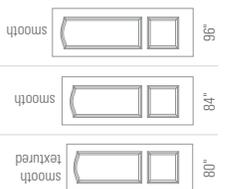
4 panel



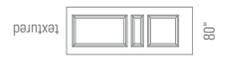
6 panel commercial



2 panel arch-top



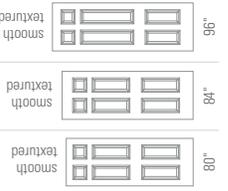
3 panel



4 panel arch-top



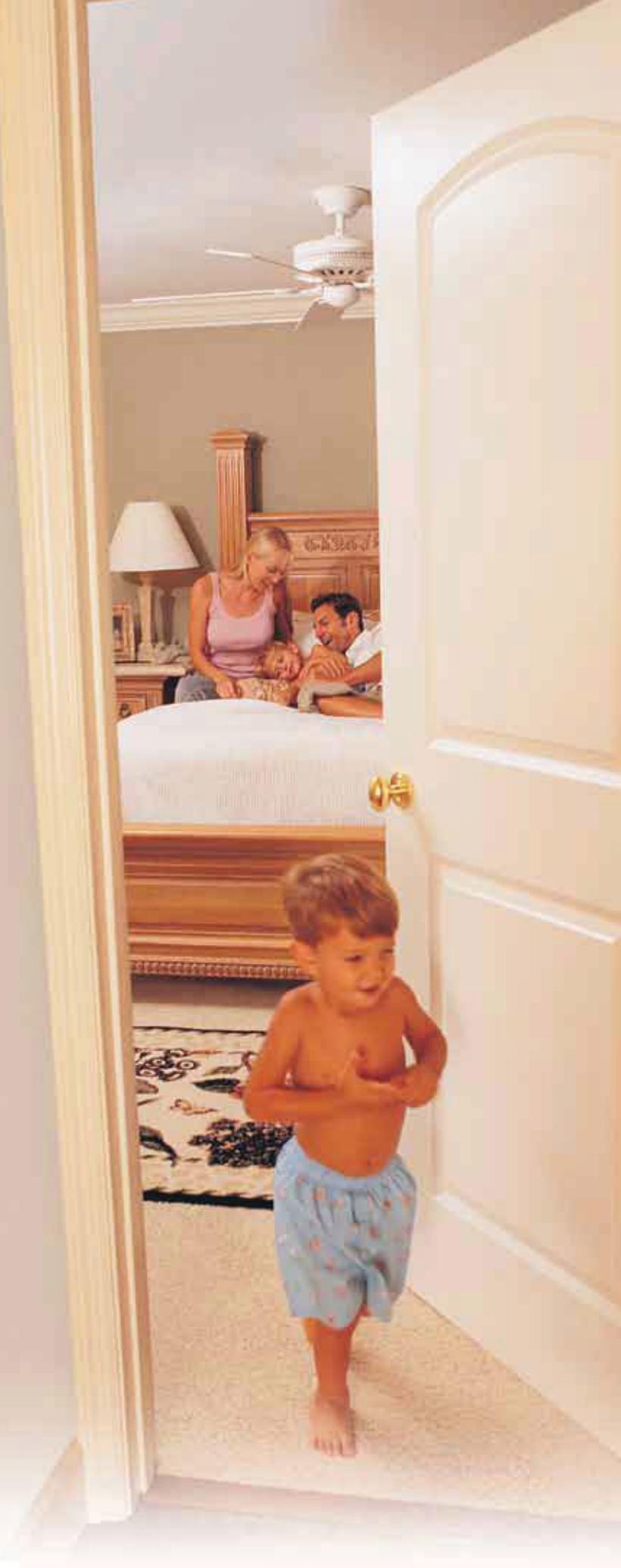
6 panel



Masonite's Commitment to Environmental Responsibility

From the environmentally conscious homeowner to the professional architect designing projects to achieve a "Green" industry certification, Masonite has the solution with Safe 'N Sound®, Safe 'N Sound® Emerald™ and our new Hollow Core Emerald™ Molded Panel Doors.

With Safe 'N Sound and Emerald Series construction, you never have to sacrifice design or quality for environmental stewardship. Safe 'N Sound and Emerald doors continue to satisfy virtually any design or application requirement and continue to maintain the high quality characteristics that Masonite customers have come to expect.



design & size options

MOLDED PANEL SERIES

	12"	14"	15"	16"	18"	20"	24"	26"	28"	30"	32"	34"	36"	42"	16"	18"	24"	28"	30"	32"	36"	48"	60"	72"	
PASSAGE																									
2 panel arch-top	smooth 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	textured 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 84"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
2 panel roman smooth	smooth 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 84"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 96"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
2 panel	smooth 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 84"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 96"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
3 panel	textured 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 84"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
4 panel arch-top	textured 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 84"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
4 panel	smooth 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	textured 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 84"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
6 panel	smooth 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	textured 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 84"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
6 panel Pre-Finished	smooth 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	textured 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 84"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
6 panel commercial	smooth 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 84"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Please note that some sizes are only available as a result of being trimmed from a larger facing. The trimming process may result in a stile width that is too narrow to accommodate a standard bore. To machine a standard bore with a 2-3/8" backset on the lock hole and a 2-1/8" diameter bore, the outer stile measurements must be no less than 3-7/16" wide. Many facings have a lockrail that will accommodate a standard bore even when the stile width is too narrow. Please refer to Masonite Molded Door Facing Dimensional Specifications to verify the outer stile measurements or contact your Masonite Interior Door servicing plant. Textured refers to embossed wood-grain. Pre-finish white is available textured only. Not all molded panel designs and sizes are available in all regions as stock products. Please check for special order availability. *Actually measures 17"-13/16"

ANNIVERSARY COLLECTION

	12"	14"	15"	16"	18"	20"	24"	26"	28"	30"	32"	34"	36"	BIFOLDS												
PASSAGE																										
Cheyenne	smooth 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	smooth 96"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Smooth 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Glenview	Smooth 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Smooth 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Smooth 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Riverside	smooth 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 84"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 96"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Saddlebrook	smooth 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 96"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Please note that some sizes are only available as a result of being trimmed from a larger facing. The trimming process may result in a stile width that is too narrow to accommodate a standard bore. To machine a standard bore with a 2-3/8" backset on the lock hole and a 2-1/8" diameter bore, the outer stile measurements must be no less than 3-7/16" wide. Many facings have a lockrail that will accommodate a standard bore even when the stile width is too narrow. Please refer to Masonite Molded Door Facing Dimensional Specifications to verify the outer stile measurements or contact your Masonite Interior Door servicing plant. Not all molded panel designs and sizes are available in all regions as stock products. Please check for special order availability.

PALAZZO SERIES™

	12"	14"	15"	16"	18"	20"	24"	26"	28"	30"	32"	34"	36"	BIFOLDS													
PASSAGE																											
Bellagio (2 arched panels)	smooth 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	smooth 84"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 96"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Capri (2 square panels)	smooth 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 84"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 96"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Treviso (3 panels)	smooth 80"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 84"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	smooth 96"	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

All Palazzo® passage doors available in 68", 70" and 80" heights. All Palazzo bifold doors available in 68", 70", 72" and 80" heights. *These Palazzo bifolds are shipped as two 2-door units.



masonite's commitment

At Masonite, employees from all parts of the Company – sales, marketing, research and development, customer service and manufacturing – understand that people love their homes. In the past, homes were purchased to meet functional needs. Today, homes are purchased to meet specific lifestyles and to satisfy the need to create multiple living environments within a single home. To meet these lifestyle needs, Masonite is continually creating new and innovative products that will make every home more beautiful, more valuable and more enjoyable. With the ultimate goal of adding beauty and value to every home, Masonite's products are designed and constructed to exacting standards and specifications. All materials – wood, fiberglass, steel or composites – are engineered and carefully selected to ensure lasting durability and timeless performance. For individuals who are building, renovating or redecorating, Masonite products are certain to beautify and accentuate a wide array of architectural home styles.



Masonite Helpline: 1-800-663-DOOR (1-800-663-3667)
9 a.m. to 9 p.m. Monday through Saturday, 10 a.m. to 4 p.m. Sunday, EST



PREMIUM SERIES

4050/4051/4053

CLASSIC™ LINE



America's Favorite Garage Doors®



Model 4050 Short Elegant Panel with Optional Colonial 509 Window Design

With a three-layer construction and three beautiful panel designs in seven color options, the Models 4050, 4051 and 4053 Series doors are the right choice for your home's design. The Premium Series' three-layer construction provides exceptional strength, insulation, dent resistance and security, as well as uncommonly quiet operation and a beautiful appearance outside and inside. No other manufacturer offers more styles, colors and windows than Clopay.



Calculated door section R-value is in accordance with DASMA TDS-163.



PREMIUM SERIES

4050/4051/4053



Model 4053 Long Elegant Panel with Optional Sunset 601 Window Design

DETAIL



Decorative panel edging and natural embossed woodgrain texture improve appearance close-up and from the curb.

STYLE



4050 Elegant Short
Complements homes with traditional styling.



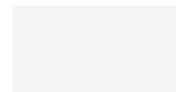
4053 Elegant Long
Ideal for ranch style homes.



4051 Flush
Perfect for contemporary and some transitional styles.



COLOR



White



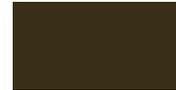
Almond



Desert Tan



Sandtone



Chocolate



Hunter Green



Gray

Due to the printing process colors may vary.

Model 4051 Flush Panel
Woodgrain Design

3-LAYER | STEEL + 1-3/8" INSULATION + STEEL

- 1-3/8" thick expanded polystyrene insulation bonded to exterior and interior steel skins helps make these doors extremely strong while providing an R-value of 6.5 for energy efficiency and comfort.
- Patented Safe-T-Bracket® cannot, under normal circumstances, be removed while door is under tension.
- Aluminum bottom weatherseal retainer system is the highest-quality rust-proof design to effectively seal out the elements.
- Weather-tight tongue-and-groove joint helps seal out wind, rain and snow.
- Galvanized steel hinges are durable, reliable and secure.



- Top quality nylon rollers provide durability and quiet operation.
- White finish painted galvanized end stiles for finished interior.
- Step plates, inside and outside, make door easy and safe to close.

Four spring options available:

Galvanized torsion, EZ-SET® torsion springs (galvanized), extension springs with containment cables, and EZ-SET® extension springs.

WINDCODE®: Doors available to meet many regional wind load requirements. Consult your local dealer for specific information.

Illustration is for component location purposes only. Actual product has pilot holes on end stiles.

Galvanized Torsion Spring

Corrosion-resistant, galvanized torsion springs look better and last up to 50% longer than industry standard springs.



Due to some height and weight restrictions, not all product offerings include galvanized torsion spring.

Step Plate/Lift Handle

Color matched exterior step plate/grip handles are durable, attractive and allow for safe opening and closing of your door.



Rust-Prevention System

Steel skins are protected through a tough, layered coating system, including a hot-dipped galvanizing layer, a protective metal oxide pretreatment, and a baked-on primer and top coat.



A FOCUS ON *green*

Clopay is committed to designing, manufacturing and distributing garage doors that enhance the beauty, safety and value of your home while minimizing the impact on the environment.

The 4050 Series helps conserve natural resources by providing a durable, reliable, low-maintenance, energy efficient door insulated with environmentally safe polystyrene. Steel doors and hardware are impervious to moisture and will not rot, warp, crack or fade, and the steel used in Clopay's doors is made from over 75% recycled content. All Clopay doors are made in the U.S., minimizing shipping, damage and handling.

Visit our website for more details on Clopay's green practices.

clopaydoor.com/cgreen.aspx





WINDOW OPTIONS

Inspired by current architectural trends, our windows add natural light to your garage while adding curb appeal to your home. All Clopay window frames are UV-protected and are color matched to our prefinished door colors. Window frames screw in from the inside for easy glass replacement or to change designs.

Designer Collection Windows

Available in short or long panel designs, Clopay's Designer Collection Windows are created to complement many home styles.

Wrought Iron Series (Acrylic)



Tuscany



Orleans



Tuscany



Orleans

Studio™ Series (Acrylic)



Art Deco I



Art Deco II



Living Tree



Mission



Art Deco I



Art Deco II



Living Tree



Mission

Leaded Series (Acrylic)



Brass Radiance



Brass Elegance



Brass Sun Burst
(8', 9', 16', 17', 18' widths only)



Brass Majesty

Leaded Series (Glass)



Ashford®



Carlisle®



Kristin®



Roselle®



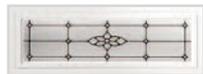
Trenton®



Ashford®



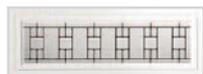
Carlisle®



Kristin®



Roselle®



Trenton®

Brilliance® Series (Glass)



Solitaire



Marquise



Trillian



Solitaire



Marquise



Trillian

Classic Collection Windows

UV-protected cellular plastic insert designs snap into either the inside or outside of the window frame for easy cleaning or to change designs. Windows are offered in insulated, single strength, double strength, acrylic or obscure glass.



Cathedral 507



Charleston 508



Colonial 509



Prairie 510



Plain Window†



Sunset 501
(8', 9', 12', 16', 17', 18' widths only)



Sunset 502
(7', 7'6", 12' widths only)



Sunset 503
(8', 9', 16', 17', 18' widths only)



Sunset 504
(14', 15', 15'6" widths only)



Sunset 505
(16', 17', 18' widths only)



Sunset 506
(10', 20' widths only)



Cathedral 607



Charleston 608



Colonial 609



Prairie 610



Madison 611



Plain Window†



Sunset 601



Sunset 603
(Not available in 12' and 14' widths)



Sunset 605

* Panel emboss may not align on long window with short panels. Some size limitations apply.

† Shown with clear glass. Insulated, acrylic and obscure glass optional.

Visit clopay.com or call 1-800-2CLOPAY (800-225-6729) for more information on Clopay,

America's Favorite Garage Doors. Follow us on

**MARVEL™ ELECTRONIC
SKYLIGHT / WINDOW OPERATOR**

Truth Hardware's new Marvel™ power operator system for windows and skylights proves that simpler can be better. Challenged by window and skylight manufacturers with providing a small and sleek motorized system that is simple to install, easy to operate and above all affordable – Truth is confident that the Marvel System is the answer.

EASY TO INSTALL & OPERATE

With easy to install mounting brackets used to help secure the Marvel Operator in the center of your window or Skylight, this system can be installed in a matter of minutes.

- Three styles of mounting brackets accompany this product to allow for easy mounting the unit (see Fig. # for details).
- Can be face-mounted or mounted to applications with sills.
- No transformer required. Operates from 110 volt household current.
- Controlled manually using a standard, single pole / double throw, center off momentary contact switch (ordered separately), or with optional RF Receiver and Remote.
- Durable double link chain produces 9.5" of chain travel
- Electronic limit switch controls the opening position while the closing position is controlled through an internal current sensing feature.
- Users can operate multiple units from one manual control switch.
- Rain Sensor (Remote Receiver Required)

**MARVEL OPERATOR CAPACITY
& RATINGS**

- With 45 lbs. of lifting load at the chain the Marvel System is rated to lift skylight sashes that weigh up to 90 lbs.
- When used on awning windows, the Marvel System is designed to work on awning windows with a properly sized counter-balance hinge (See Truth Tips).
- Marvel Operators are ANSI/UL 325 Certified and CAN/CSA C22.2 Certified.

**OPTIONAL ACCESSORIES
AVAILABLE:**

Hand held RF remote -with 80 feet of range, incorporates rolling code security and is capable of controlling up to 4 individual motors. Includes a magnetic wall mount (must be used with RF Receiver Pack).

Rain sensor - connects directly to the RF receiver for added security, is designed not to react to fog or dew and is "heated" to prevent the formation of ice or condensation and allows the sensor to dry itself after the rain has stopped

WARRANTY: Truth Hardware's Marvel Motorized Operator System is warranted for one year against defects in materials and workmanship on all electronic and mechanical components.

**PRODUCT APPLICATION
ASSISTANCE:**

If you need assistance with product configurations to meet your needs, please visit our website at www.truth.com. Under the "Technical Support" tab you will find all of the technical information needed to properly configure and specify all elements of an automated window installation, including installation instructions, pre-wiring and proper hardware requirements. You can also contact Truth's highly trained Technical Service Staff who can assist you with the selection of the appropriate hardware. These individuals are available during normal business hours (CST) at 800-324-4487.

ORDERING INFORMATION:

Ordering of the Marvel System is quite simple. All hardware necessary for mounting the system on either a window or skylight is now included in the same kit.

1. Order item number 42.90.XX.100
2. Specify color: .03 Bronze or .38 White
3. Optional accessories
 - Remote Control
 - 45580 Manual Switch
 - 42.90.00.200 RF Receiver Pack
 - 42.90.00.201 Hand held remote with wall mount (must be used with receiver pack)
 - 42.90.00.202 Rain Sensor (must be used with receiver pack)

TRUTH TIPS:

1. Awning windows must be equipped with a properly sized counter balance hinge such as Truth Hardware's 13 series or 34 series 4-bar hinges. All hardware and motor system warranties are void if these guidelines are not followed. (See Tech Notes).
2. Unless otherwise specified, the Marvel Motorized Window and Skylight System is designed to operate any properly sized window or skylight utilizing a hinge system manufactured by Truth Hardware. Use of the Marvel motor system on windows or skylights with hardware manufactured by companies other than Truth Hardware is at your own risk. For verification, look for the Truth logo/name stamped on the hinge or consult with the window manufacturer. If your hardware is not manufactured by Truth Hardware, contact Truth's Technical Service Department for available options at 800-324-4487.
3. The Truth Hardware Marvel Motorized Operator is rated for use in indoor applications only.
4. The Marvel Motorized Operator system is designed to be used on sky-

MARVEL™ POWER WINDOW SYSTEM

light operators that lift to open and pull to close in the center of the skylight. Therefore, the stiles of the skylight panel must be rigid enough in the closed position to ensure proper corner pull-in for a weather tight seal and rigid enough in the open position to provide proper skylight stability when supported at a single center point. The wider the skylight is the more significant this issue can become. For more assistance, contact Truth Hardware Technical Services.

5. Marvel Motor also available with standard Truth skylight chain bracket. Contact Technical Service for future information.

6. For vinyl window applications, mounting screws should pass through two PVC walls, or one PVC wall and one insert wall. For this reason, it may be necessary to use a longer screw than is recommended.

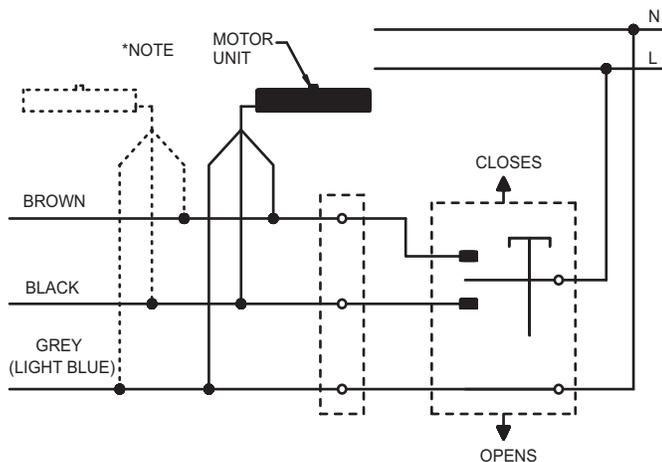
INCLUDE TRUTH SPECS IN YOUR NEXT MOTORIZED WINDOW/SKYLIGHT PROJECT

Motorized system for windows or skylights (not exceeding 45 lbs of weight measured at the chain). Motor uses a double link chain providing 9.5" of chain stroke. Mounting should accommodate wood, PVC or metal skylights and windows. Mounting hardware to be provided to accommodate a wide

range of window profile shapes and materials. Motor system should run off of 110 volt current and utilize a standard single pole / double throw, center off momentary contact switch or with remote control & rain sensor. Motor system to be ANSI/UL 325 certified and CAN/CSA C22.2 certified. This motor system shall be "Marvel Electronic Window/Skylight" series as offered by Truth Hardware, Owatonna, MN.

Manual Switch Installation & Wiring Diagram

- It is recommended that the Marvel unit be controlled with a single pole, double throw (SPDT) center off momentary contact switch. These switches are typically available through local electrical supply stores or by ordering from Truth P/N 45580. Please see the diagram below for how the unit is to be connected.
- The advantage of the center off momentary contact switch is that as soon as your finger is removed from the switch the switch will return to the center, off position and the motor unit will stop at the desired position.
- Please contact Truth's Technical Support Department for application help when it is desired to control the Marvel with something other than a single pole, double throw (SPDT) center off momentary contact switch.



*Additional Marvel units can be controlled by one SPDT momentary contact switch.

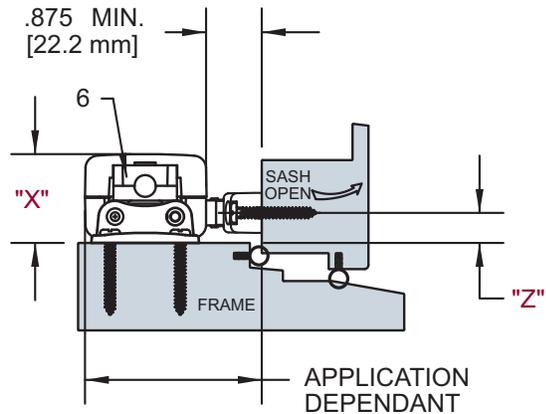
General Electrical Specification

- The Marvel has double electrical insulation.
- An internal electronic limit switch controls the opening position.
- The closing position is controlled by current sensing.
- The amperage draw of a single Marvel unit at 120 V-60 HZ is .12 amps at a 45 pound load. The amperage draw at no load is .040 amps.
- It is recommended that the circuit be capable of providing 1 amp at 120 VAC of power per window.
- The input voltage for the unit can range from 80 V to 260 V for both 50 HZ and 60 HZ.

Product Certification

- The Marvel has been certified to the following standards:
 - △ ANSI/UL 325 - 2003 which is the standard for Door, Drapery, Gate, Louver and Window Operators and Systems.
 - △ AN/CSA C22.2 No. 68-92 which is the standard for Motor Operated Appliances (Household and Commercial)

FIG. 1 SILL MOUNT APPLICATION
(MARVEL 42.90.XX.100 KIT)



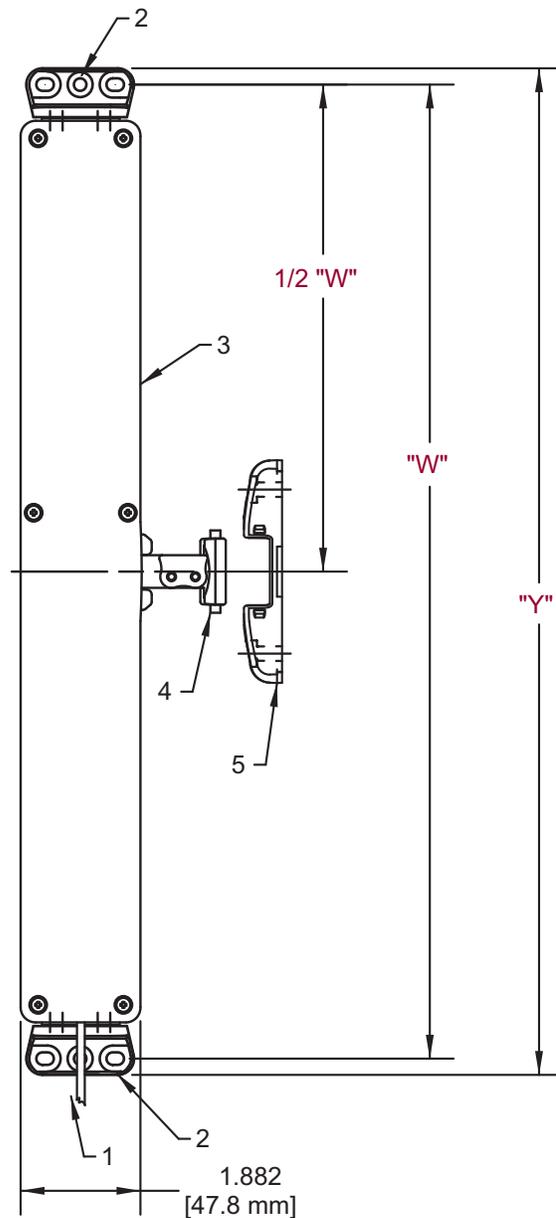
- 1) POWER SUPPLY CABLE
- 2) SILL MOUNT FRAME BRACKETS ("A" OR "B")
- 3) MOTOR UNIT
- 4) CHAIN CONNECTOR
- 5) SASH BRACKET
- 6) ELECTRIC CONNECTOR

RECOMMENDED SCREWS FOR BRACKETS:

(INCLUDED IN 42.90.XX.100 KIT)
QTY 2 - 4.5 X 35mm PHILLIPS PAN HEAD WOOD SCREWS

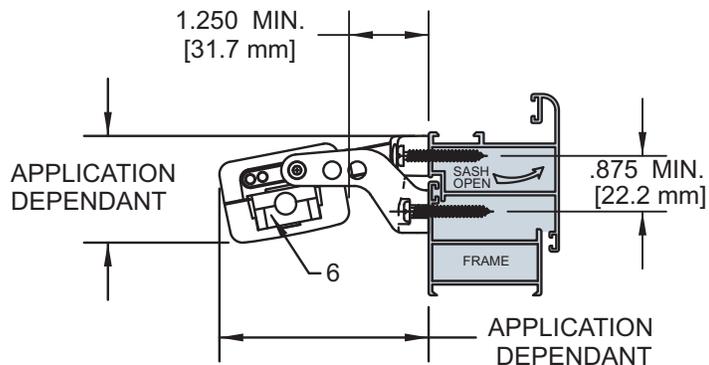
OPTIONAL SCREWS: (NOT INCLUDED IN KIT)
QTY 2 - #10 PHILLIPS PAN HEAD SHEET METAL SCREWS
(LENGTH AND THREAD TYPE DETERMINED BY PROFILE)

FRAME BRACKET	"W"	"X"	"Y"	"Z"
"A"	15.31" [389mm]	1.38" [35mm]	15.82" [402mm]	.482" [12mm]
"B"	15.19" [386mm]	1.63" [41mm]	15.86" [403mm]	.728" [18.5mm]



**MARVEL™
POWER WINDOW
SYSTEM**
(Snap Bracket Kit)

FIG. 2 FACE MOUNT APPLICATION
(MARVEL 42.90.XX.100 KIT)

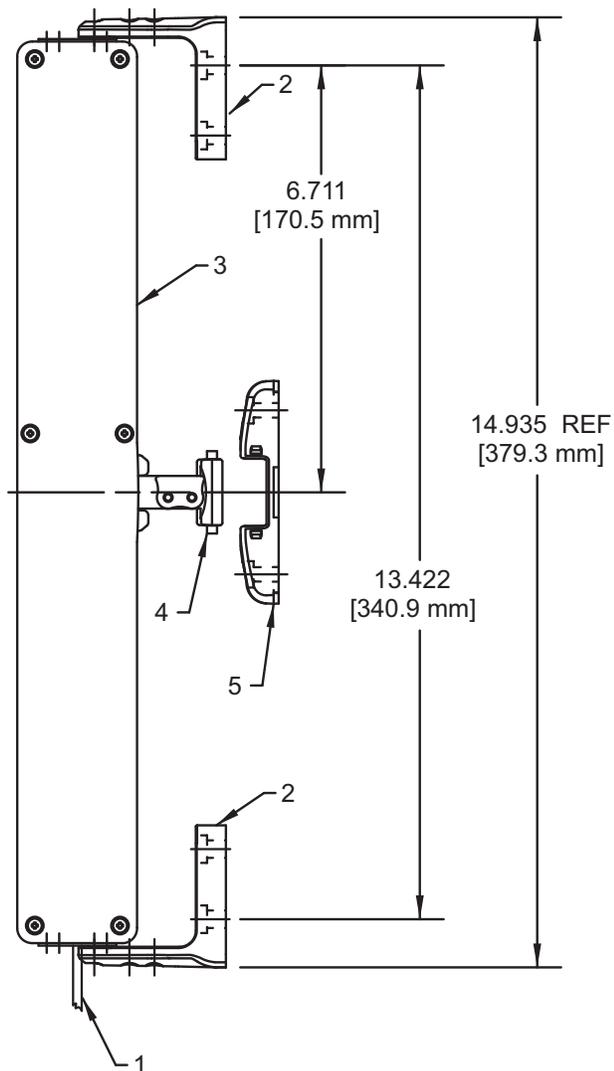


- 1) POWER SUPPLY CABLE
- 2) FACE MOUNT FRAME BRACKETS "F"
- 3) MOTOR UNIT
- 4) CHAIN CONNECTOR
- 5) SASH BRACKET
- 6) ELECTRIC CONNECTOR

RECOMMENDED SCREWS FOR BRACKETS:
(INCLUDED IN 42.90.XX.100 KIT)

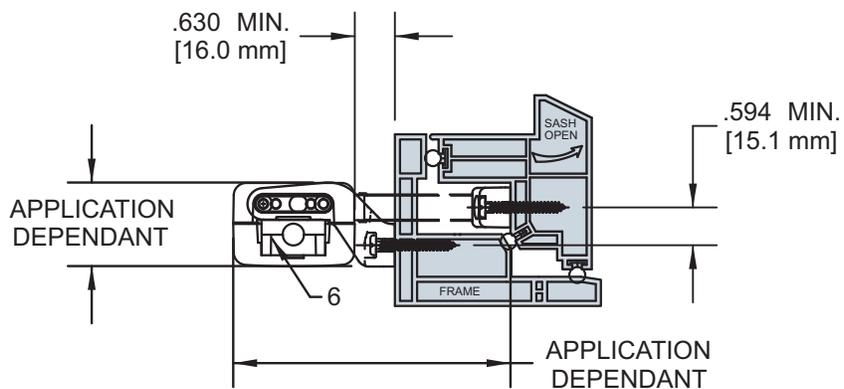
QTY 2 - 4.5 X 35mm PHILLIPS PAN HEAD WOOD SCREWS

OPTIONAL SCREWS: (NOT INCLUDED IN KIT)
QTY 2 - #10 PHILLIPS PAN HEAD SHEET METAL SCREWS
(LENGTH AND THREAD TYPE DETERMINED BY PROFILE)



**MARVEL™
POWER WINDOW
SYSTEM**
(Snap Bracket Kit)

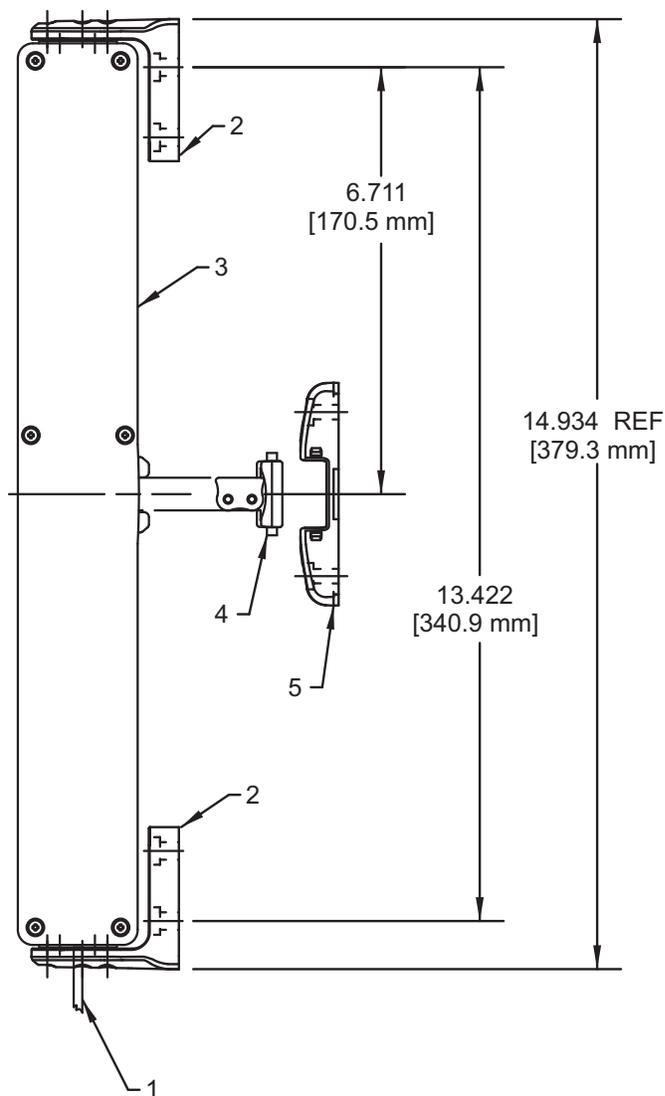
FIG. 3 FACE MOUNT APPLICATION
(MARVEL 42.90.XX.100 KIT)



- 1) POWER SUPPLY CABLE
- 2) FACE MOUNT FRAME BRACKETS "F"
- 3) MOTOR UNIT
- 4) CHAIN CONNECTOR
- 5) SASH BRACKET
- 6) ELECTRIC CONNECTOR

RECOMMENDED SCREWS FOR BRACKETS:
(INCLUDED IN 42.90.XX.100 KIT)
QTY 2 - 4.5 X 35mm PHILLIPS PAN HEAD WOOD SCREWS

OPTIONAL SCREWS: (NOT INCLUDED IN KIT)
QTY 2 - #10 PHILLIPS PAN HEAD SHEET METAL SCREWS
(LENGTH AND THREAD TYPE DETERMINED BY PROFILE)



**MARVEL™
POWER WINDOW
SYSTEM**
(Snap Bracket Kit)

FIG. 4 MOTOR UNIT OVERALL DIMENSIONS
(MARVEL 42.90.XX.100 KIT)

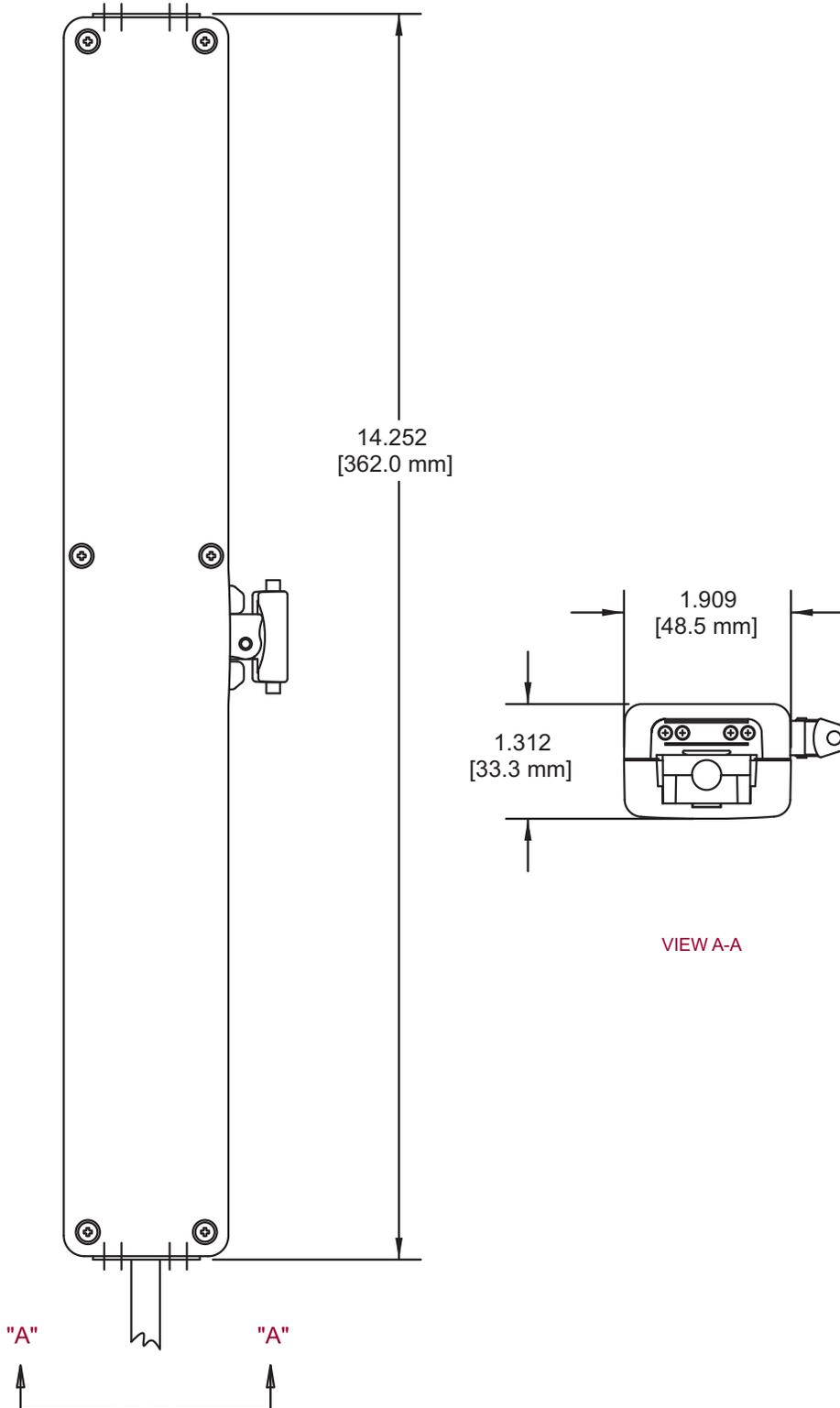
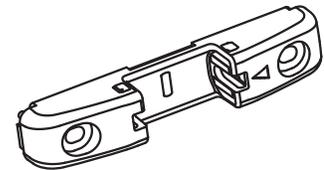
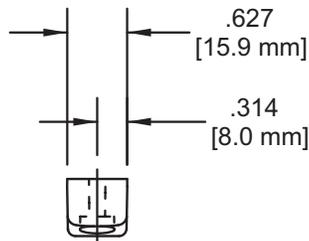
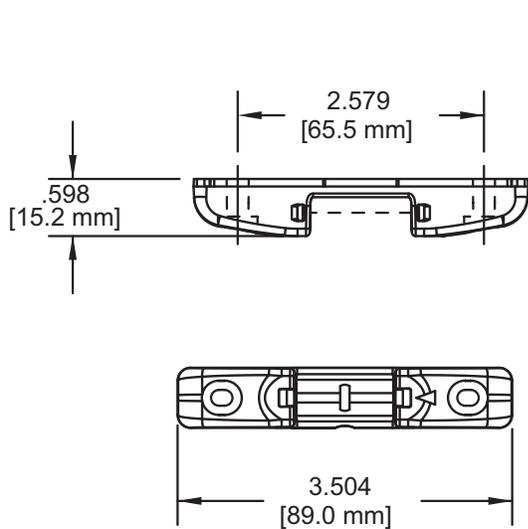


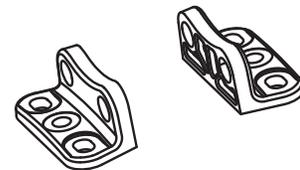
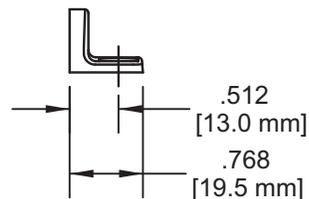
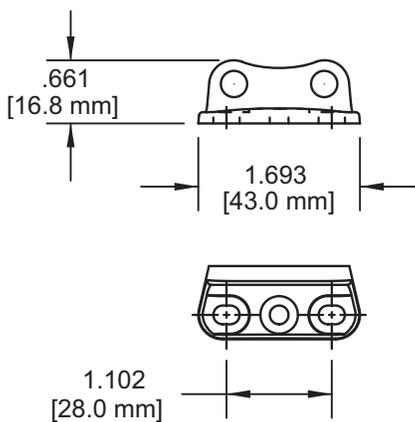
FIG. 5 SNAP SASH BRACKET
(INCLUDED IN 42.90.XX.100 KIT)



RECOMMENDED SCREWS:
(INCLUDED IN 42.90.XX.100 KIT)
QTY 2 - 4.5 X 35mm PHILLIPS PAN HEAD WOOD SCREWS

OPTIONAL SCREWS: (NOT INCLUDED IN KIT)
QTY 2 - #10 PHILLIPS PAN HEAD SHEET METAL SCREWS
(LENGTH AND THREAD TYPE DETERMINED BY PROFILE)

FIG. 6 NON-HANDED SILL MOUNT BRACKET "A"
(INCLUDED IN 42.90.XX.100 KIT)

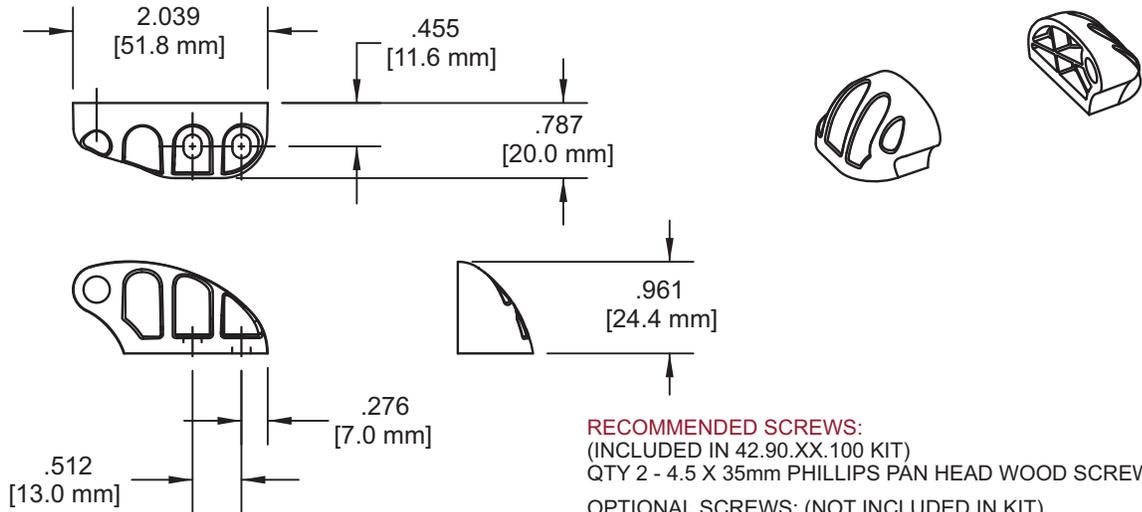


RECOMMENDED SCREWS:
(INCLUDED IN 42.90.XX.100 KIT)
QTY 2 - 4.5 X 35mm PHILLIPS PAN HEAD WOOD SCREWS

OPTIONAL SCREWS: (NOT INCLUDED IN KIT)
QTY 2 - #10 PHILLIPS PAN HEAD SHEET METAL SCREWS
(LENGTH AND THREAD TYPE DETERMINED BY PROFILE)

**MARVEL™
POWER WINDOW
SYSTEM**
(Pull Pin Bracket Kit)

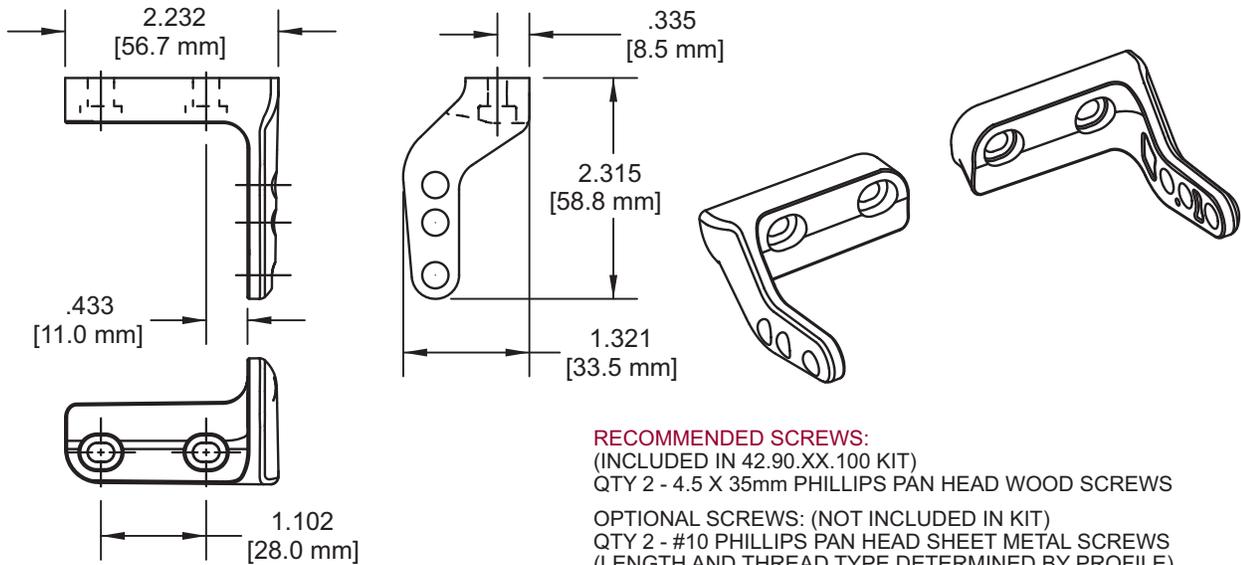
FIG. 7 HANDED SILL MOUNT BRACKET "B"
(INCLUDED IN 42.90.XX.100 KIT)



RECOMMENDED SCREWS:
(INCLUDED IN 42.90.XX.100 KIT)
QTY 2 - 4.5 X 35mm PHILLIPS PAN HEAD WOOD SCREWS

OPTIONAL SCREWS: (NOT INCLUDED IN KIT)
QTY 2 - #10 PHILLIPS PAN HEAD SHEET METAL SCREWS
(LENGTH AND THREAD TYPE DETERMINED BY PROFILE)

FIG. 8 HANDED FACE MOUNT BRACKET "F"
(INCLUDED IN 42.90.XX.100 KIT)



RECOMMENDED SCREWS:
(INCLUDED IN 42.90.XX.100 KIT)
QTY 2 - 4.5 X 35mm PHILLIPS PAN HEAD WOOD SCREWS

OPTIONAL SCREWS: (NOT INCLUDED IN KIT)
QTY 2 - #10 PHILLIPS PAN HEAD SHEET METAL SCREWS
(LENGTH AND THREAD TYPE DETERMINED BY PROFILE)

GOLD BOND® BRAND GYPSUM SHEATHING

MANUFACTURER

National Gypsum Company
2001 Rexford Road
Charlotte, NC 28211
(704) 365-7300

Technical Information:
1-800-NATIONAL
(1-800-628-4662)

Fax: 1-800-FAX NGC1
(1-800-329-6421)

Internet Home Page:
nationalgypsum.com
nationalgypsum.com/espanol
06 16 43/NGC BuyLine: 1100

DESCRIPTION

Gold Bond® BRAND Gypsum Sheathing is a water-resistant panel product designed for attachment to the outside of side-wall framing as a water-resistant underlayment for various exterior siding materials. The sheathing is manufactured with a moisture-resistant core faced with 100% recycled water-repellent paper on both face and back surfaces and on both long edges. Fire-Shield® (Type X) Sheathing has special additives in the core to enhance its fire-resistive properties.

BASIC USES

Gypsum Sheathing is designed for attachment to the outside of exterior wall framing as a water-resistant underlayment for various siding materials. Gypsum Sheathing can be used as a sheathing for wood-framed residential construction to provide fire resistance, weather protection and to add to structural strength when used under exterior finishes such as vinyl siding, clapboard, paneling, masonry veneer, stucco and shingles.

It can also serve as a sheathing for steel-stud commercial construction and as a component in curtainwall systems and exterior insulation systems and finishes.

Gypsum Sheathing can also be used as a sheathing for use in fire-rated exterior wall assemblies. Manufactured with square edges, Gypsum Sheathing requires no tape

or compound in the joints of fire-rated wall construction.

ADVANTAGES

- Low material and application costs.
 - The noncombustible gypsum core of the sheathing protects framing elements even when the siding or finish material is combustible.
 - Gypsum Sheathing's moisture-resistant core and water-repellent surfaces provide a barrier that resists passage of wind and water.
 - Gypsum Sheathing can be scored and snapped to exact size without cutting or sawing.
 - Many building codes allow the use of 4' wide panels of 1/2" Gypsum Sheathing applied vertically to be used in place of 1" by 4" wood let-in bracing, provided the shear values for Gypsum Sheathing listed in the code meet the requirements for the local wind and seismic design loads.
- ## LIMITATIONS
- Gypsum Sheathing is not a finished surface nor is it a substrate for the direct application of joint compound, stucco, paint or textures.
 - The sheathing should not be used as a nailing base.
 - Exterior Insulation Finish Systems (EIFS): Exterior Insulation Finish Systems incorporating Gypsum Sheathing should use mechanical fasteners. The performance of these systems and recommendation of the proper method of attachment are the sole responsibility of the EIFS manufacturer.
 - Application of Gypsum Sheathing to framing by adhesive only is not recommended.
 - Stud spacing must not exceed 24" o.c.
 - Gypsum Sheathing is not recommended for application to exterior ceilings, soffits or sills. Exterior Soffit board is recommended in these conditions.
 - Gypsum Sheathing should be spaced not less than 1/4" from abutting masonry to minimize wicking.
 - Neatly stack Gypsum Sheathing flat, taking care to prevent sagging or damage to the ends, edges and surfaces.
 - Gypsum Sheathing may be stored outside for up to one month if stacked off the ground under protective covering.

- Gypsum Sheathing is designed for use as a substrate that is covered by an exterior cladding or other weather barrier and is not intended for long-term exposure. After it has been installed, it shall not be exposed to the elements for more than 30 days. The Gypsum Sheathing shall be covered with building felt or equivalent within 30 days.

COMPOSITION & MATERIALS

Gypsum Sheathing is a manufactured panel with a moisture-resistant gypsum core encased in water-repellent paper. Available with a Type X (Fire-Shield) water-resistant core. Fire-Shield core gypsum board also contains various aggregates such as fiberglass to enhance the fire-resistive qualities. Gypsum Sheathing contains no asbestos.

(Continued next page)

Job Name _____

Contractor _____ Date _____

Submittal Approvals: (Stamps or Signatures)

ACCESSORIES

Nails should be galvanized, 11 gauge, 7/16" head, 1 1/2" long for 1/2" sheathing and 1 1/3" long for 5/8" sheathing.

Screws should be 1 1/4" Type W for wood framing and 1" Type S-12 for metal framing.

Staples should be galvanized 16 gauge, 7/16" crown x 1 1/2" long for 1/2" sheathing and 1 5/8" long for 5/8" sheathing.

TECHNICAL DATA

PHYSICAL PROPERTIES

Thickness, nominal	1/2" Regular (12.7mm)
Thickness, nominal	5/8" Type X (15.9mm)
Width, nominal	4' (1219mm)
Length, standard	8' through 10' (2438 - 3048mm)
Weight, lbs./sq.ft., nominal	1/2" Regular - 1.75
Weight, lbs./sq.ft., nominal	5/8" Type X - 2.3
Edges	Square
Surface Burning Characteristics (per ASTM E 84)	Flame Spread: 20 Smoke Developed: 0
Permeability (per ASTM E 96)	20*

*Not classified a vapor barrier

APPLICABLE STANDARDS AND REFERENCES

ASTM C 1396
ASTM C 1280
Gypsum Association GA-253
Federal Specification SS-L-30D Type II (Grade R)
Federal Specification SS-L-30D Type II (Grade X)
National Gypsum Company, <i>Gypsum Construction Guide</i>

FIRE RESISTANCE RATINGS

Fire resistance ratings represent the results of tests on assemblies made up of specific materials in a specific configuration. When selecting construction designs to meet certain fire resistance requirements, caution must be used to insure that each component of the assembly is the one specified in the test. Further, precaution should be taken that assembly procedures are in accordance with those of the tested assembly. (For copies of specific tests, call 1-800-NATIONAL. For fire safety information, see www.nationalgypsum.com)

UL CORE DESIGNATION

5/8" Gypsum Sheathing: FSW-3

STRUCTURAL

In tests conducted for the Gypsum Association by an independent laboratory according to ASTM E 72, average ultimate racking load values were as follows:

	Shear Load (lbs. per linear ft.) (kg. per .3M)	
	Dry	Wet*
1/2" x 4' (12.7 mm x 1219 mm) wide sheathing	540 (243)	332 (149)
5/8" x 4' (15.9 mm x 1219 mm) wide type X	654 (294)	522 (234)

*Treated core only

Studs spaced 16" o.c., fasteners galvanized 11 ga. nails 7/16" head, 1 1/2" long for 1/2" sheathing and 1 3/4" long for 5/8"; 7" o.c. in the field and

4" o.c. on edges and ends for 5/8" Gypsum Sheathing; 8" o.c. in the field and 4" o.c. on edges and ends for 1/2" Gypsum Sheathing.

Shear walls: Where wind or seismic forces require shear walls to resist these lateral forces, most building codes provide allowable shear values for walls having Gypsum Sheathing applied to wood framing. Specific values with construction requirements and limitations are contained in the major model building codes.

INSTALLATION

RECOMMENDATIONS

Installation of Gold Bond Gypsum Sheathing should be consistent with methods described in the noted standards and references as indicated below.

Fasteners (nail or screw heads or the crown of staples) should bear tightly against the face of the sheathing but should not cut into the face paper. Staples should be driven with the crown parallel to the framing.

Fasteners should be no less than 3/8" from the edges and ends of the sheathing.

Apply Gypsum Sheathing vertically with vertical edges butting over the center of framing members. Fit sheathing snugly around all openings. Attach sheathing with nails or screws spaced not over 4" o.c. around perimeter and 8" to intermediate studs (space staples not over 3" and 6" o.c. respectively). Horizontally applied square edge Gypsum Sheathing shall be covered with building felt or equivalent, or horizontal joints shall be sealed at time of application. Horizontal Gypsum Sheathing joints do not require back blocking.

DECORATION

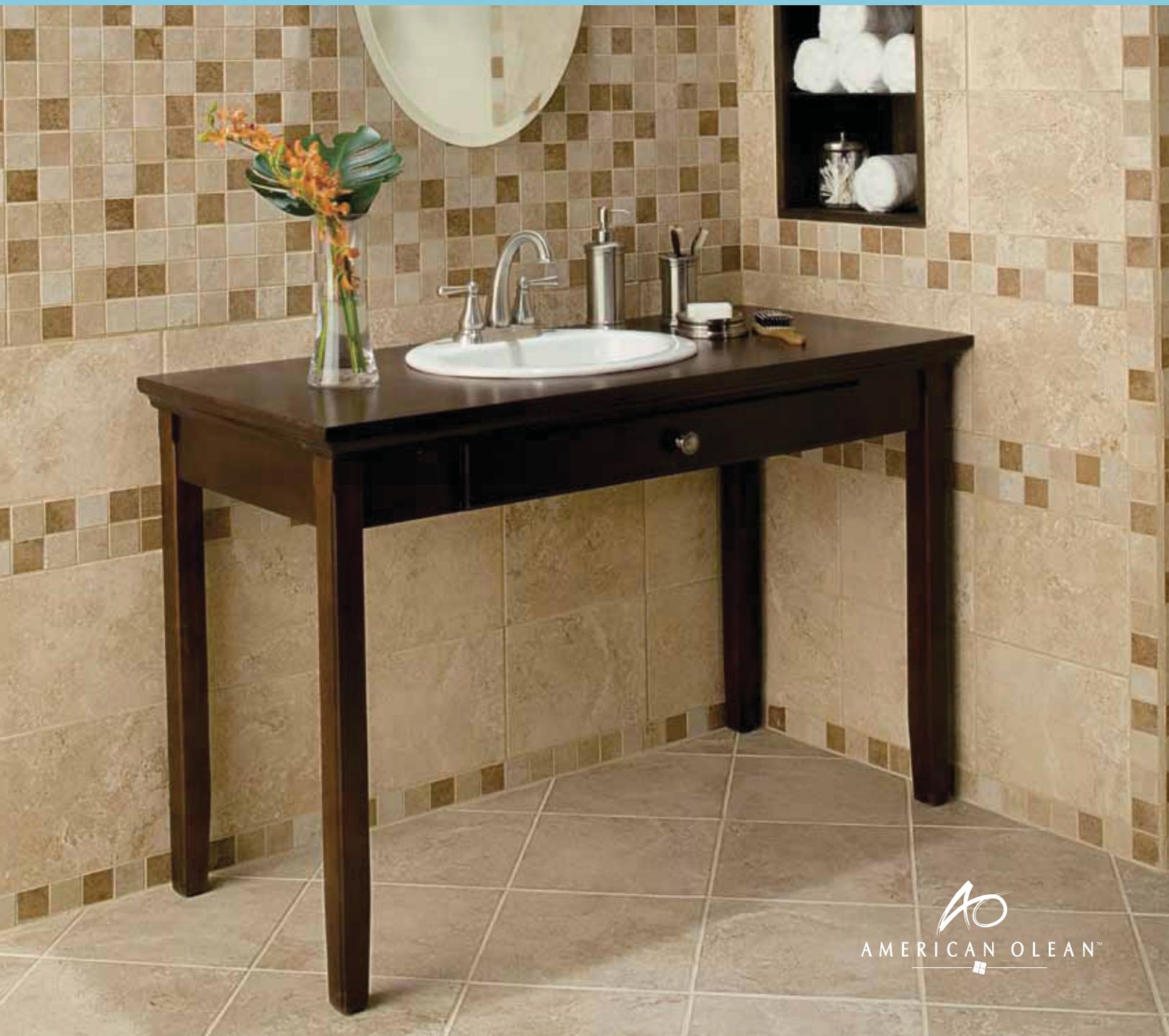
Gypsum Sheathing is not a finished surface nor is it a substrate for the direct application of joint compound, stucco, paint or textures for exterior finishes.

National 
Gypsum®



pozzalo™

GLAZED CERAMIC TILE





GLAZED CERAMIC TILE

pozzalo™

Let the earthy tones of Pozzalo glazed ceramic tile envelop you with a sense of radiating warmth.

With Pozzalo, you'll capture the classic ambience of a distant travertine courtyard, anyplace you desire.

- Travertine look
- Available in five colors
- Ideal for floors and walls alike

FIELD TILE



Sail White PZ91



Coastal Beige PZ92



Weathered Noce PZ93



Manor Gray PZ94

MOSAIC TILE



Universal Mosaic Blend PZ99

DECORATIVE ACCENTS



Universal PZ99

SIZES, SHADE VARIATION & PRICING



18 x 18 Floor Tile
(17 7/8" x 17 7/8")
(45.2 cm x 45.2 cm)



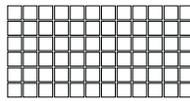
12 x 12 Floor Tile
(11 13/16" x 11 13/16")
(30 cm x 30 cm)



9 x 12 Wall Tile
(8 15/16" x 11 15/16")
(22.7 cm x 30.3 cm)



6 x 6 Wall Tile
(6" x 6")
(15.2 cm x 15.2 cm)



2 x 2 Mosaic Tile
(2" x 2")
(12" x 24" sheet)
(30.48 cm x 60.96 cm sheet)



High
(V3)

Tile Thickness: 5/16" Wall & Floor, 1/4" Mosaics
Recommended Grout Joint: 3/16" Floor, 1/8" Mosaics, 1/16" Wall
Relative Pricing: Low

TRIM



Floor Bullnose
P43C9 3 x 12



Bullnose
S4309 3 x 9



Bullnose Corner
SN4309 3 x 3



Quarter Round
A106 1 x 6



Quarter Round Corner
UC106 1 x 1



Surface Bullnose
S4269 2 x 6



Surface Bullnose Outcorner
SN4269 2 x 2



Bullnose
S4669 6 x 6



Bullnose Corner
SCRL4669 6 x 6



Radius Bullnose
A4200 2 x 6



Radius Bullnose Outcorner
AN4200 2 x 2



Counter Rail
26CRWL 2 x 6



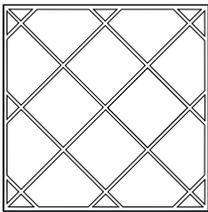
Counter Rail Corner
22CRCN 2 x 2



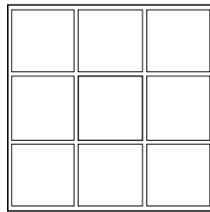
Mosaic Bullnose
S886MS 2 x 2



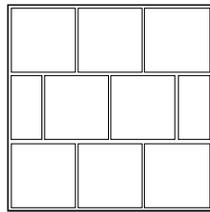
PATTERN IDEAS



Diamond Pattern
100 pcs. per 100 s/f
12 x 12 100%



Grid Pattern
100 pcs. per 100 s/f
12 x 12 100%



Brick Pattern
100 pcs. per 100 s/f
12 x 12 100%
OR
400 pcs. per 100 s/f
6 x 6 100%

PERFORMANCE CHARACTERISTICS

	C.O.F.		Moisture Absorption	Breaking Strength	MOH's	Abrasion Resistance	Chemical Resistance
	Wet	Dry					
FLOOR	≥0.60	≥0.65	<3%	>250 lbs.	8.0	4	Resistant
WALL	≥0.50	≥0.80	<20%	100-230 lbs.	4.0-6.5	N/A	Resistant
MOSAICS	≥0.60	≥0.65	<3%	>250 lbs.	8.0	N/A	Resistant

Cleaning Procedures

- Remove loose dust and dirt with a damp cloth or sponge
- Use a neutral, non-abrasive cleaner suitable for ceramic tile
- Remove cleaning solution with a clean, damp sponge or mop

Installation Methods

Backing Materials

- Concrete
- Mortar bed
- Cementitious backer board

Setting

- Latex modified thin-set
- Epoxy

Grouting

- Sanded grout
- Recommended grout joint: 3/16" Floor, 1/8" Mosaics and 1/16" Wall

APPLICATION

FLOOR & MOSAICS

RES	LT COM	HVY COM	EXT	
<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	Floors †
<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	Walls/Backsplashes
<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	Countertops
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Pool Decking
<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	Pool Lining

WALL

RES	LT COM	HVY COM	EXT	
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Floors †
<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	Walls/Backsplashes
<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	Countertops
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Pool Decking
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Pool Lining

APPLICATION NOTES:

† Water, oil, grease etc. create slippery conditions. Floor applications with exposure to these conditions require extra caution in product selection. Suitable for exterior walls only in non-freezing climates when proper installation methods are followed.

Floor field tile suitable for pool linings in non-freezing climates only.

Not for use on ramps.

For additional information, refer to Factors to Consider at www.americanolean.com/CommercialFactors.

NOTES

Since there are variations in all fired ceramic products, the tile and trim supplied for your particular installation may not match these samples. Final selection should be made from actual tiles and trim and not from tile and trim samples or color reproductions. Manufactured in accordance with ANSI A137.1 standards.



S I G N A T U R E C L A S S I C S

Candalara Glass™



Wall Tile



Candalara Glass™

Features

- Made of impervious glass
- Broad range of decorative accents
- Unique texture and iridescent finish
- Multiple color options

Field Tile



Glacier Mist CL50



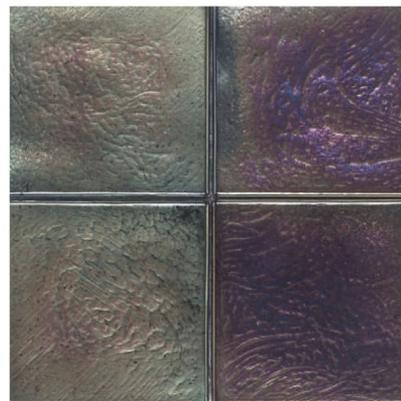
Silver Lake CL51



English Ivy CL52



Cinnamon Spice CL53



Black Pearl CL54

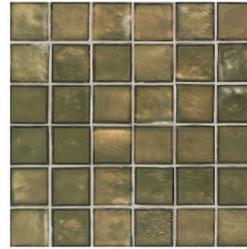
Field Tile



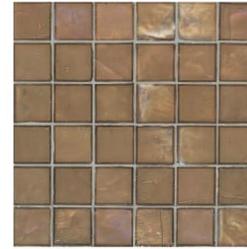
Glacier Mist CL50



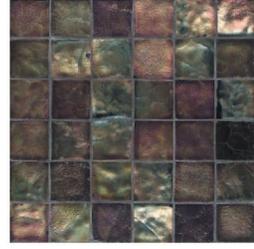
Silver Lake CL51



English Ivy CL52



Cinnamon Spice CL53



Black Pearl CL54



Glacier Mist CL50



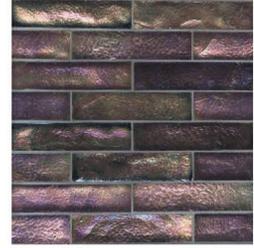
Silver Lake CL51



English Ivy CL52



Cinnamon Spice CL53



Black Pearl CL54

Decorative Accents



Silver Lake CL51 3" x 8" Acanthus Accent



Silver Lake CL51 3" x 8" Chair Rail



Silver Lake CL51 1" x 8" Flute Accent



Silver Lake CL51 1" x 8" Pyramid Accent



Silver Lake CL51 2" x 8" Leaf Accent



Silver Lake CL51
2" x 2"
Acanthus Dot



Silver Lake CL51
2" x 2"
Leaf Dot



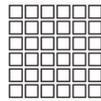
Silver Lake CL51 1" x 8" Torello

Decorative accents are available in all colors.

SIZES



4" x 4" Field Tile
(3 13/16" x 3 13/16" nominal)
(9.7 cm x 9.7 cm nominal)



2" x 2" Field Tile
(2 1/16" x 2 1/16" nominal)
(5.2 cm x 5.2 cm nominal)
Paper Face Mounted in
1.1 s/f sheets



1 1/2" x 6" Brick Joint
(1 3/8" x 5 3/4" nominal)
(3.5 cm x 14.6 cm nominal)
Paper Face Mounted in
0.7 s/f sheets



3" x 8" Acanthus Accent
(2 5/8" x 7 3/4" nominal)
(5.9 cm x 20.8 cm nominal)



2" x 8" Leaf Accent
(1 3/4" x 7 7/8" nominal)
(4.4 cm x 20.0 cm nominal)



2" x 2" Acanthus Dot
(1 13/16" x 1 13/16" nominal)
(4.6 cm x 4.6 cm nominal)



2" x 2" Leaf Dot
(1 7/8" x 1 7/8" nominal)
(4.7 cm x 4.7 cm nominal)



3" x 8" Chair Rail
(2 3/4" x 7 7/8" nominal)
(7.1 cm x 20.0 cm nominal)



1" x 8" Flute
(1 5/16" x 7 7/8" nominal)
(3.3 cm x 20.1 cm nominal)



1" x 8" Pyramid Accent
(1 1/4" x 7 15/16" nominal)
(3.2 cm x 20.2 cm nominal)



1" x 8" Torello
(15/16" x 7 7/8" nominal)
(2.3 cm x 20.0 cm nominal)

Tile Thickness: 4" x 4" and 1 1/2" x 6" - 3/8", 2" x 2" - 1/4", Accents vary

Recommended Grout Joint: 1/8"



Shade Variation: Medium

information

applications

	Residential	Light Commercial	Commercial
Floors †	X	X♦	X♦
Walls/Backsplashes	X	X	X
Countertops*	X		
Pool Linings	X	X	X

† Water, oil, grease, etc. create slippery conditions. Floor applications with exposure to these conditions require extra caution in product selection and proper maintenance. For additional information, refer to "Factors to Consider" at www.americanolean.com/ResidentialFactors.

- * May show scratching
- ♦ May be used as accents and borders only in commercial applications
- Suitable for exterior walls in freezing and non-freezing climates when proper installation methods are followed.
- Not for use on ramps.

price structure

Prestige

Preferred

Stylish and elegant looks. Each tile is created through traditional firing processes and glaze techniques.

Premium

Sophisticated visuals and detailed surfacing. A process of multiple glazes results in an attractive, cultured surface.

Premier

Inherent visual color and depth. A complex process of design brings out the rich, more upscale texture and look of elegant porcelain as well as a variety of other tiles.

Prestige

Natural characteristics and realistic attributes. Captures the inherent beauty of natural stone. Highly complex design techniques are also applied to rich porcelains, unique glasses and other materials to create surfaces with distinctive physical and natural qualities.

performance characteristics

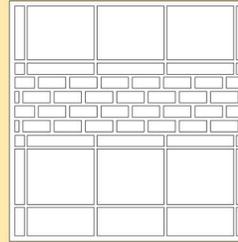
Wet	C.O.F.		Moisture Absorption	Breaking Strength	MOH's	Chemical Resistance
	Dry					
≥0.60	≥0.70		<0.5%	>915 lbs.	4.0	Resistant

This tile meets or exceeds ANSI A137.1 standards

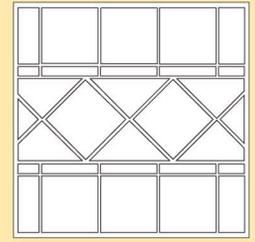
TRIM

No trim available

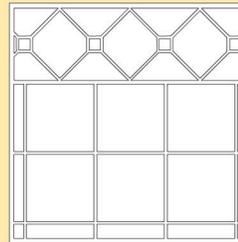
patterns



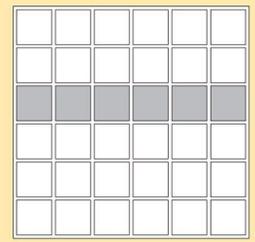
Grid with Liner and Border



Grid with Diamond Border and Liners



Grid with Diamonds & Dots



Grid with Accent

* Dark lines indicate repeat

cleaning procedures

- Remove loose dust and dirt with a damp cloth or a sponge
- Use a neutral, non-abrasive cleaner suitable for ceramic tile
- Remove cleaning solution with a clean, damp sponge or mop

special notes

Since there are variations in all fired ceramic products, the tile and trim supplied for your particular installation may not match these samples. Final selection should be made from actual tiles and trim and not from tile and trim samples or color reproductions. Manufactured in accordance with ANSI A137.1 standards.

2" x 2" Mosaics and 1 1/2" x 6" Brick-joint are paper faced on the front side for ease of installation

Legacy Glass™



Glass wall tile

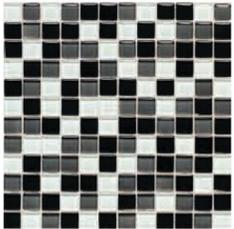


Legacy Glass™

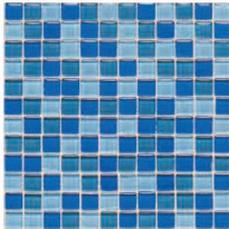
Nothing says style and sophistication quite like colored glass tiles. Legacy Glass boasts a rare look that is equally at home in both contemporary and Old World settings. From 1" x 1" squares to 2" x 4" brick joints, this stunning tile features a truly unique array of sizes and colors. And while at first glance, it may seem as if this tile is suited ideally for today's contemporary designs, don't be quick to discount its use in perhaps more unexpected applications.

Blends

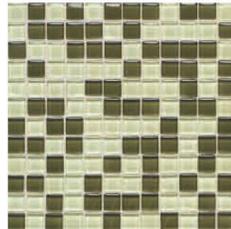
1" x 1" Mosaic Blends



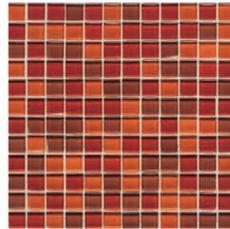
Black Blend LG22 ■



Blue Blend LG20 ■



Green Blend LG21 ■



Red Blend LG23 ■



Sand Blend LG43 ■



Desert Blend LG40 ■

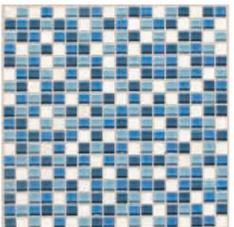


Earth Blend LG41 ■

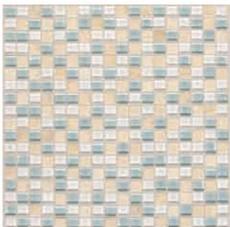


Smokey Blend LG42 ■

5/8" x 5/8" Glass & Natural Stone Mosaic Blends



Ocean Blend LG44 ●



Arctic Blend LG45 ●



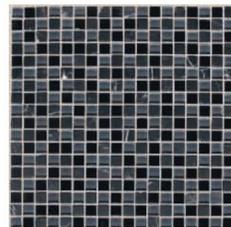
Tannery Blend LG46 ●



Wheat Field Blend LG47 ●



Jungle Blend LG49 ●



Mountain Blend LG48 ●

Field Tile



Blend Components

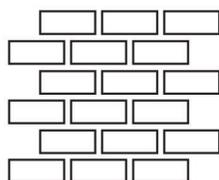
Blend	Components / Usage
Black Blend LG22 1" x 1"	Pearl LG01, 33%; Flint LG09, 33%; Slate LG10, 34%
Blue Blend LG20 1" x 1"	Powder LG06, 33%; Wedgewood LG07, 33%; Cobalt LG08, 34%
Green Blend LG21 1" x 1"	Cyprus LG03, 50%; Celedon LG03, 50%
Red Blend LG23 1" x 1"	Coral LG13, 33%; Auburn LG14, 33%; Copper LG12, 34%
Sand Blend LG43 1" x 1"	Willow LG24, 33%; Chamois LG27, 33%; Dune LG25, 34%
Desert Blend LG40 1" x 1"	Maple LG36, 25%; Leather LG32, 25%; Camel LG26, 25%; Willow LG24, 25%
Earth Blend LG41 1" x 1"	Cyprus LG04, 25%; Chamois LG27, 25%; Sable LG05, 25%; Sage LG35, 25%

Blend	Components / Usage
Smokey Blend LG42 1" x 1"	Carbon LG31, 25%; Mink LG37, 25%; Pewter LG28, 25%; Cyprus LG04, 25%
Ocean Blend LG44 5/8" x 5/8"	Dusk LG34, 25%; Powder LG06, 25%; Wedgewood LG07, 25%; Volakas Stone, 25%
Arctic Blend LG45 5/8" x 5/8"	Pearl LG01, 33%; Moonlight LG15, 33%; Creme Mix Stone, 34%
Tannery Blend LG46 5/8" x 5/8"	Willow LG24, 20%; Emperador Dark, 40%; Emperador Light, 40%
Wheat Field Blend LG47 5/8" x 5/8"	Maple LG36, 25%; Dune LG25, 25%; Leather LG32, 25%; Noce Travertino, 25%
Jungle Blend LG49 5/8" x 5/8"	Mink LG37, 25%; Willow LG24, 25%; Sage LG35, 25%; Emperador Dark & Light, 25%
Mountain Blend LG48 5/8" x 5/8"	Slate LG10, 33%; Flint LG09, 33%; Nero Marquina Marble, 34%

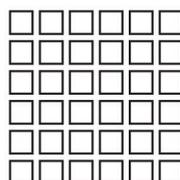
SIZES


1/2" x 6" Liner
(1/2" x 6" nominal)
(1.3 cm x 15.2 cm nominal)

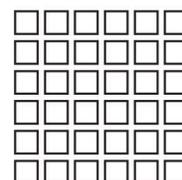

4 1/4" x 4 1/4" Field Tile
(4 1/4" x 4 1/4" nominal)
(10.8 cm x 10.8 cm nominal)



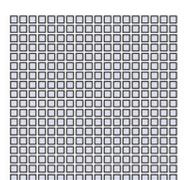
2" x 4 1/4" Field Tile
(mesh-mounted)
(2 1/8" x 4 1/4" nominal)
(5.5 cm x 10.8 cm nominal)



2" x 2" Field Tile
(mesh-mounted in 1 sq. ft. sheets)
(1 7/8" x 1 7/8" nominal)
(4.8 cm x 4.8 cm nominal)



1" x 1" Field Tile
(mesh-mounted in 1 sq. ft. sheets)
(15/16" x 15/16" nominal)
(2.4 cm x 2.4 cm nominal)



5/8" x 5/8" Glass and
Natural Stone Blend Tile+
(mesh-mounted 1 sq. ft. sheets)
(9/16" x 9/16" nominal)
(1.4 cm x 1.4 cm nominal)

TRIM

No trim available

Tile Thickness: 3/16" Recommended grout joint: 1/8"

■ Shade Variation: Low

information

applications

	Residential	Light Commercial	Commercial
Floors†			
Walls/Backsplashes	X	X	X
Countertops			
Pool Linings*	X	X	X

- Suitable for exterior walls in freezing and non-freezing climates when proper installation methods are followed.
- Not for use on ramps.

* 5/8" x 5/8" Glass and Stone Blends are not suitable for pool linings.

For additional information, refer to "Factors to Consider" at www.americanolean.com/ResidentialFactors

price structure

Prestige

Preferred

Stylish and elegant looks. Each tile is created through traditional firing processes and glaze techniques.

Premium

Sophisticated visuals and detailed surfacing. A process of multiple glazes results in an attractive, cultured surface.

Premier

Inherent visual color and depth. A complex process of design brings out the rich, more upscale texture and look of elegant porcelain as well as a variety of other tiles.

Prestige

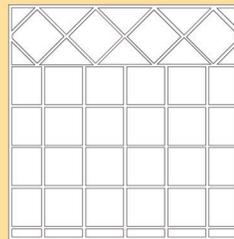
Natural characteristics and realistic attributes. Captures the inherent beauty of natural stone. Highly complex design techniques are also applied to rich porcelains, unique glasses and other materials to create surfaces with distinctive physical and natural qualities.

performance characteristics

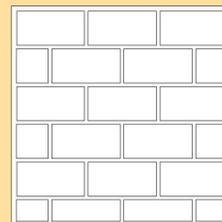
Wet	C.O.F. Dry	Moisture Absorption	Breaking Strength	MOH's	Chemical Resistance
n/a	n/a	<0.01%	>100 lbs.	4.0	Resistant

This tile meets or exceeds ANSI A137.1 standards

patterns



Grid pattern with diamond border



Brick pattern

cleaning procedures

- Remove loose dust and dirt with a damp cloth or a sponge
- Use a neutral, non-abrasive cleaner suitable for glass tile
- Remove cleaning solution with a clean, damp sponge or mop
- Do not use scouring pads, steel wool, sandpaper or other abrasive products as scratching may occur.

special notes

Since there is shade variation in all fired products, the tile and trim supplied for your particular installation may not match these samples. Final selection should be made from actual tiles and trim and not from tile and trim samples or color reproductions.

Gloss and Stone Blends are factory pre-sealed, but should be re-sealed regularly as part of normal maintenance.

Legacy Glass in Sable 2" x 4 1/4" Brick and 1/2" x 6" Liner shown on wall. Sable 1" x 1" and 1/2" x 6" Liner shown with Tumbled Stone Botticino 4 1/4" x 4 1/4" in shower and on floor.

Mortar base

K-SH-M-10

Areas of application

- ▲ Interior showers
- ▲ Over wood or concrete subfloors
- ▲ Areas requiring disabled access/ barrier-free applications; see page 18

Limitations

- ▲ Certain glass tiles may not be compatible with bonded waterproof membranes and/or may require special setting materials. Consult glass tile manufacturer and Schluter®-Systems for more information.
- ▲ Certain moisture-sensitive stones, e.g., green marble, or resin-backed tiles, may not be appropriate for use in wet areas such as showers or may require special setting materials. Consult stone supplier and Schluter®-Systems for more information.
- ▲ Do not use sawn lumber curbs on concrete subfloors subject to moisture migration.

Requirements

- ▲ Plywood, OSB, or concrete subfloor must be clean, even, and load bearing.
- ▲ Solid backing – gypsum wallboard, cementitious backer unit, fiber-cement underlayment, fiber-reinforced water-resistant gypsum backerboard/underlayment, coated glass mat water-resistant gypsum backerboard, portland cement mortar bed, concrete, or masonry
- ▲ Curb – Schluter®-KERDI-SHOWER-SC, concrete, masonry block, or sawn lumber sheathed with solid backing (see above)
- 10** ▲ Bench – Schluter®-KERDI-SHOWER-SB, concrete, masonry block, or sawn lumber sheathed with solid backing (see above)
- ▲ Schluter®-KERDI-DRAIN shall be properly supported.
- ▲ Schluter®-KERDI-DRAIN shall be connected to the waste line; use ABS cement for ABS drains, PVC cement for PVC drains, and a flexible or no-hub connector for stainless steel drains.
- ▲ Schluter®-KERDI waterproofing membrane shall be installed up to the height of the showerhead at minimum.
- ▲ Any protrusions through the KERDI membrane (e.g., showerhead, mixing valve, etc.) must be treated with Schluter®-KERDI-SEAL-PS and Schluter®-KERDI-SEAL-MV seals, Schluter®-KERDI-FIX, or equivalent sealant.
- ▲ When using the stainless steel Schluter®-KERDI-DRAIN casing, use Schluter®-KERDI-FIX to bond Schluter®-KERDI to the integrated bonding flange.

Substrate Preparation

- ▲ Verify that subfloor panels and solid backing are properly fastened to framing members.
- ▲ Any leveling of the subfloor must be done prior to installing Schluter®-KERDI-SHOWER-SC/-SR/-SB.

Solid Backing Materials

- ▲ Gypsum wallboard – ASTM C1396/C1396M
- ▲ Cementitious backer unit – ANSI A118.9 or ASTM C1325
- ▲ Fiber-cement underlayment – ASTM C1288
- ▲ Fiber-reinforced water-resistant gypsum backerboard/underlayment – ASTM C1278
- ▲ Coated glass mat water-resistant gypsum backerboard – ASTM C1178
- ▲ Portland cement mortar – ANSI A108.1B
- ▲ Concrete
- ▲ Masonry

Setting and Grouting Materials

- ▲ Unmodified thin-set mortar – ANSI A118.1
- ▲ Grout – ANSI A118.3, A118.6, A118.7

Installation Specifications

- ▲ Solid backing panels – follow manufacturer's instructions
- ▲ Portland cement mortar bed – ANSI A108.1B
- ▲ Tile – ANSI A108.5
- ▲ Grout – ANSI A108.6, A108.10

Other Considerations

- ▲ When Schluter®-KERDI and tile are installed on the ceiling, the solid backing and fasteners must be able to support the load of the tile and setting/grouting materials.
- ▲ Prior to setting tile, wait 24 hours minimum before water testing to allow for final set of thin-set mortar and ensure waterproof performance at seams and connections.
- ▲ Schluter®-Systems profiles may be used to finish and protect outside corners and eliminate the use of sealant at inside corners; see pages 21-22.



SHOWN: HICKORY NATURAL GRADE WITH CLEAR FINISH

Hickory

Hickory is commonly known to be hard as stone, heavy as lead, and strong as an ox. It is these unique characteristics that make Hickory such a durable and tough wood for any application. Hickory is also uncommonly known as America's first hardwood species.

Shamrock is one of only a few flooring manufacturers specializing in the making of Hickory plank flooring. Whether it is Premium or Natural Hickory plank flooring, the product is certain to please the most discriminating tastes.

Hickory with SADDLE finish



Hickory with CLEAR finish



PRODUCT INFORMATION

- Offered in both 3/4" SOLID and 5/8" Enviroeneered precision milled flooring
- Colors: Saddle & Clear with Satin Finish
- Our Solid & Enviroeneered prefinished flooring is packaged in 7' boxes

SOLID PRODUCT INFORMATION

- Available in both Premium and Natural Grades
- Slowly Air dried & Kiln dried for maximum stability
- Side matched and end matched for easy, precise installation
- Install At or Above Grade Only
- Nail or Glue Only

Enviroeneered PRODUCT INFORMATION

- Install At or Above Grade Only
- Nail, Glue or Float
- 36" average length on Premium
- 30" average length on Natural
- 5/8" Thick - One of the thickest Enviroeneered products in the industry
- 3/16" Dry sawn wear layer adds longer life and maintains value
- 9 Ply Birch Core - Maximum dimensional stability

INSTALLATION

- Solid Flooring may be stapled or nailed At or Above grade only
- Enviroeneered Flooring may be Stapled, Glued or Floated - At or Above grade for Hickory

ACCESSORIES

- Shamrock Plank Flooring offers a variety of Mouldings and Trim to complete your project. We have reducers, T-moulds, quarter rounds and more to enhance your Shamrock Wood Floor.

COMPLETE CARE

- Wood is a beautifully natural flooring choice and very easy to care for. With proper Care and Maintenance your floor will last the test of time. Should your floor show signs of wear or slight scratches, you have several options to revive your investment. The most common technique is called a "Screen & Coat". An experienced flooring refinisher can lightly abrade your floor, smoothing out slight wear and refinish with several new coats of sealer to protect your floor. If your floor appears to need more than just surface attention, your experienced refinisher can fully sand and coat your floor and even add a new stain if your color preference has changed. Please refer to NWFPA for all refinishing and sanding guidelines.

WARRANTY

- We offer a Lifetime Structural Warranty and 35 Year Finish Warranty featuring our Extreme Wear - 7 coat Aluminum Oxide Finish.

ARCHITECTURAL SERIES FOUR-SIDED BEVEL

Grade	Color	Solid Widths in Stock	Additional Widths	Engineered Widths in Stock	Additional Widths
Premium	Clear	3", 5"	Special Order	3", 5"	Special Order
Natural	Clear	3", 5"	Special Order	3", 5"	Special Order
Natural	Saddle	3", 5"	Special Order	3", 5"	Special Order

We are Proud to create verified sustainable products.



Corporate Office & Production Facility
P.O. Box 16929 • Memphis, TN 38186
• 866.473.3765 •
www.shamrockplankflooring.com





Architectural Coatings

Pure Performance® Interior Flat Latex

GENERAL DESCRIPTION

Our premium low odor, zero VOC (volatile organic compounds) flat latex is designed to meet the performance requirements of the institutional, commercial and residential markets. Pure Performance® Interior Flat Latex is formulated to provide excellent hiding and application properties in addition to minimal odor, zero VOC's, and anti-microbial properties - a mold/mildew resisting compound has been incorporated in this paint to make the dry paint film mildew resistant. Ideal for use in occupied areas such as: hotel/motel resort properties, nursing homes, homes, schools, government facilities, retail space, office buildings, hospitals, and apartments.

RECOMMENDED USES

- Concrete/Masonry Block
Ferrous Metal
Gypsum Wallboard-Drywall
Plaster
Wood

CONFORMANCE STANDARDS

- Meets MPI #143, Institutional Low Odor/VOC Interior Latex Flat
Can earn LEED NC Version 2.2 Credits
Meets the Collaborative for High Performance Schools (CHPS) Low-Emitting Materials criteria section 01350

APPLICATION INFORMATION

Stir thoroughly. Apply with a high quality brush, roller, paint pad or by spray equipment. Read all label and Material Safety Data Sheet (MSDS) information prior to use. MSDS are available through our website or by calling 1-800-441-9695.

Airless Spray: Pressure 2000 psi, tip 0.015" - 0.021"

Spray equipment must be handled with due care and in accordance with manufacturer's recommendation. High-pressure injection of coatings into the skin by airless equipment may cause serious injury.

Brush: Polyester/Nylon Brush
Roller: 3/8" - 3/4" nap roller cover

Thinning: No thinning is required. If necessary, up to 1/4 pt. (118 mL) of water per gallon (3.78L) of paint may be added.

Permissible temperatures during application:

Table with 3 rows: Material (50 to 90°F / 10 to 32°C), Ambient (50 to 100°F / 10 to 38°C), Substrate (50 to 100°F / 10 to 38°C)

TINTING AND BASE INFORMATION

Refer to the appropriate color formula book, automatic tinting equipment, and or computer color matching system for color formulas and tinting instructions.

Table with 2 columns: Color Code (9-100 to 9-140) and Base Name (Pure White, Pastel Base*, Midtone Base*, Ultra Deep Base*)

*Must be tinted.

Some colors, drastic color changes, or porous substrates may require more than one coat to achieve a uniform finish.

PRODUCT DATA

Table with 2 columns: Property (PRODUCT TYPE, GLOSS, VOLUME SOLIDS*, WEIGHT SOLIDS*, VOC*, WEIGHT/GALLON*) and Value (100% Acrylic Latex, Flat: 1 to 4 (60° Gloss Meter), 39% +/- 2%, 54% +/- 2%, 0 lbs./gal (0 g/L), 11.2 lbs. (5.2 kg) +/- 0.2 lbs. (91 g))

*Product data calculated on product 9-100.

Zero VOC is exclusive of colorant added for tinting.

COVERAGE*: Approximately 400 sq. ft./gal. (37 sq. m/3.78L) per U.S. gallon (3.78 L) on nonporous surfaces.

Table with 2 columns: Property (Wet Film Thickness, Wet Microns, Dry Film Thickness, Dry Microns) and Value (4.0 mils, 102, 1.6 mils, 41)

Coverage does not include variation due to application methods, surface porosity, and/or mixing.

DRYING TIME: Dry time @77°F (25°C); 50% relative humidity. To Touch: 1 hour, To Recoat: 4 hours. Drying times listed may vary depending on temperature, humidity, film build, color, and air movement.

WASHING INSTRUCTIONS: Wait at least 14 days after painting before cleaning the surface with a non-abrasive mild cleaner.

CLEAN UP: Clean tools with warm soapy water.

DISPOSAL: Contact your local environmental regulatory agency for guidance on disposal of unused product. Do not pour down a drain or storm sewer.

FLASH POINT: Over 200°F (93°C)

FEATURES / BENEFITS

Features

- 100% acrylic latex
Zero VOC
Low spatter
Antimicrobial properties

Benefits

- Excellent durability, washable finish
Low odor/minimizes detrimental impact on air quality
Easy to work with, less mess
Resists mold and mildew on the paint film

GENERAL SURFACE PREPARATION

Surfaces to be coated must be dry, clean, sound, and free from all contamination including loose and peeling paint, dirt, grease, oil, wax, concrete curing agents and bond breakers, chalk, efflorescence, mildew, rust, product fines, and dust. Remove loose paint, chalk, and efflorescence by wire brushing, scraping, sanding, and/or pressure washing. Putty all nail holes and caulk all cracks and open seams. Sand all glossy, rough, and patched surfaces. Feather back all rough edges to sound surface by sanding. Prime all bare and porous substrates with an appropriate primer. **WARNING!** If you scrape, sand, or remove old paint, you may release lead dust or fumes. **LEAD IS TOXIC. EXPOSURE TO LEAD DUST OR FUMES CAN CAUSE SERIOUS ILLNESS, SUCH AS BRAIN DAMAGE, ESPECIALLY IN CHILDREN. PREGNANT WOMEN SHOULD ALSO AVOID EXPOSURE.** Wear a properly fitted NIOSH-approved respirator and prevent skin contact to control lead exposure. Clean up carefully with a HEPA vacuum and a wet mop. Before you start, find out how to protect yourself and your family by contacting the USEPA National Lead Information Hotline at 1-800-424-LEAD or log on to www.epa.gov/lead. In Canada contact a regional Health Canada office. Follow these instructions to control exposure to other hazardous substances that may be released during surface preparation.

CONCRETE/MASONRY BLOCK: Mortar should cure for at least 30 days and preferably 90 days prior to priming. Fill block with an appropriate block filler. Surfaces previously coated with water thinned cement-based paint must be prepared with extra care. If the material appears to be adhering tightly, a masonry sealer may be applied to seal the surface. Check adhesion by applying a piece of masking tape. If the sealer peels off and has loose particles, remove all chalking or crumbling material, re-seal and re-check adhesion.

FERROUS METAL: The surface must be cleaned thoroughly to remove any dust, rust, and surface contaminants, and then primed.

GYPSUM WALLBOARD-DRYWALL: Nails or screws should be countersunk, and they along with any indentations should be mudded flush with the surface, sanded smooth and cleaned to remove any dust, then prime prior to painting the substrate.

PLASTER: Plaster, hardcoat, skim coat, or other alkaline surfaces should be allowed to cure for at least 30 days prior to priming with an alkali resistant primer.

WOOD: Unpainted wood or wood in poor condition should be sanded smooth, wiped clean, then primed. Any knots or resinous areas must be primed before painting. Countersink all nails, putty flush with surface, then prime.

RECOMMENDED PRIMERS

Concrete/Masonry Block (Block Fillers)	6-7, 6-15
Concrete, Masonry (Primers, Sealers)	4-603, 17-921
Gypsum Drywall-Wallboard	5-2, 6-2, 6-4, 9-900
Ferrous Metal	90-712
Plaster	4-603, 9-900, 17-921
Wood	6-2, 17-921, 9-900

Apply when air, surface and product temperatures are above 50°F (10°C).

Not recommended for use on floors. **PROTECT FROM FREEZING.**

While this product provides a mildew resistant coating, growth may still occur if the substrate is not properly prepared prior to painting and/or if the substrate is consistently exposed to conditions conducive to mold, mildew, and algae. Examples of these conditions include, but are not limited to areas that are consistently damp with little to no direct sunlight.

PACKAGING

1-Gallon (3.78 L)
5-Gallon (18.9 L)
Quart (946 mL)

Not all products are available in all sizes.

PPG Architectural Finishes, Inc. believes the technical data presented is currently accurate; however, no guarantee of accuracy, comprehensiveness, or performance is given or implied. Improvements in coatings technology may cause future technical data to vary from what is in this bulletin. For complete, up-to-date technical information, visit our web site or call 1-800-441-9695.



PPG Industries, Inc.
Architectural Coatings
One PPG Place
Pittsburgh, PA 15272
www.pittsburghpaints.com

Technical Services
1-800-441-9695
1-888-807-5123 fax

Architect/Specifier
1-888-PPG-IDEA

PPG Canada, Inc.
Architectural Coatings
4 Kenview Blvd
Brampton, ON L6T 5E4

A2.18 5/2010
(Supersedes 4/2009)



Architectural Coatings

Pure Performance® Interior Semi-Gloss Latex

GENERAL DESCRIPTION

Our premium low odor, zero VOC (volatile organic compounds) semi-gloss latex is designed to meet the performance requirements of the institutional, commercial and residential markets. Pure Performance® Interior Semi-Gloss Latex is formulated to provide excellent hiding and application properties in addition to minimal odor, zero VOC's, and anti-microbial properties - a mold/mildew resisting compound has been incorporated in this paint to make the dry paint film mildew resistant. Ideal for use in occupied areas such as: hotel/motel resort properties, nursing homes, homes, schools, government facilities, retail space, office buildings, hospitals, and apartments.

RECOMMENDED USES

- Concrete/Masonry Block
- Ferrous Metal
- Gypsum Wallboard-Drywall
- Plaster
- Wood

CONFORMANCE STANDARDS

- Meets MPI #147, Institutional Low Odor/VOC Interior Latex Semi-Gloss (Gloss Level 5)
- Can earn LEED NC Version 2.2 Credits
- Meets the Collaborative for High Performance Schools (CHPS) Low-Emitting Materials criteria section 01350

APPLICATION INFORMATION

Stir thoroughly. Apply with a high quality brush, roller, paint pad or by spray equipment. Read all label and Material Safety Data Sheet (MSDS) information prior to use. MSDS are available through our website or by calling 800-441-9695.

Airless Spray: Pressure 2000 psi, tip 0.015" - 0.021"

Spray equipment must be handled with due care and in accordance with manufacturer's recommendation. High-pressure injection of coatings into the skin by airless equipment may cause serious injury.

Brush: Polyester/Nylon Brush
Roller: 3/8" - 3/4" nap roller cover

Thinning: No thinning is required. If necessary, thin with up to 1/4 pt. (118 mL) of water per U.S. gallon (3.78 L) of paint may be added.

Permissible temperatures during application:

Material:	50 to 90°F	10 to 32°C
Ambient:	50 to 100°F	10 to 38°C
Substrate:	50 to 100°F	10 to 38°C

FEATURES / BENEFITS

Features

- 100% acrylic latex
- Zero VOC
- Low spatter
- Antimicrobial properties

TINTING AND BASE INFORMATION

Refer to the appropriate color formula book, automatic tinting equipment, and or computer color matching system for color formulas and tinting instructions.

9-500	Pure White
9-510	Pastel Base*
9-520	Midtone Base*
9-540	Ultra Deep Base*

*Must be tinted.

Some colors, drastic color changes, or porous substrates may require more than one coat to achieve a uniform finish.

PRODUCT DATA

PRODUCT TYPE:	100% Acrylic Latex
GLOSS:	Semi-Gloss: 35 to 55 (60° Gloss Meter)
VOLUME SOLIDS*:	36% +/- 2%
WEIGHT SOLIDS*:	47% +/- 2%
VOC*:	0 lbs./gal (0 g/L)
WEIGHT/GALLON*:	10.3 lbs. (4.7 kg) +/- 0.2 lbs. (91 g)

*Product data calculated on product 9-500.

Zero VOC is exclusive of colorant added for tinting.

COVERAGE*: Approximately 400 sq. ft./gal. (37 sq. m/3.78L) per U.S. gallon (3.78 L) on nonporous surfaces.

Wet Film Thickness:	4.0 mils
Wet Microns:	102
Dry Film Thickness:	1.4 mils
Dry Microns:	36

Coverage does not include variation due to application methods, surface porosity, and/or mixing.

DRYING TIME: Dry time @77°F (25°C); 50% relative humidity.
To Touch: 1 hour
To Recoat: 4 hours

Drying times listed may vary depending on temperature, humidity, film build, color, and air movement.

WASHING INSTRUCTIONS: Wait at least 14 days after painting before cleaning the surface with a non-abrasive mild cleaner.

CLEAN UP: Clean tools with warm soapy water.

DISPOSAL: Contact your local environmental regulatory agency for guidance on disposal of unused product. Do not pour down a drain or storm sewer.

FLASH POINT: Over 200°F (93°C)

Pure Performance® Interior Semi-Gloss Latex

Architectural Coatings

GENERAL SURFACE PREPARATION

Surfaces to be coated must be dry, clean, sound, and free from all contamination including loose and peeling paint, dirt, grease, oil, wax, concrete curing agents and bond breakers, chalk, efflorescence, mildew, rust, product fines, and dust. Remove loose paint, chalk, and efflorescence by wire brushing, scraping, sanding, and/or pressure washing. Putty all nail holes and caulk all cracks and open seams. Sand all glossy, rough, and patched surfaces. Feather back all rough edges to sound surface by sanding. Prime all bare and porous substrates with an appropriate primer. **WARNING!** If you scrape, sand, or remove old paint, you may release lead dust or fumes. **LEAD IS TOXIC. EXPOSURE TO LEAD DUST OR FUMES CAN CAUSE SERIOUS ILLNESS, SUCH AS BRAIN DAMAGE, ESPECIALLY IN CHILDREN. PREGNANT WOMEN SHOULD ALSO AVOID EXPOSURE.** Wear a properly fitted NIOSH-approved respirator and prevent skin contact to control lead exposure. Clean up carefully with a HEPA vacuum and a wet mop. Before you start, find out how to protect yourself and your family by contacting the USEPA National Lead Information Hotline at 1-800-424-LEAD or log on to www.epa.gov/lead. In Canada contact a regional Health Canada office. Follow these instructions to control exposure to other hazardous substances that may be released during surface preparation.

CONCRETE/MASONRY BLOCK: Mortar should cure for at least 30 days and preferably 90 days prior to priming. Fill block with an appropriate block filler. Surfaces previously coated with water thinned cement-based paint must be prepared with extra care. If the material appears to be adhering tightly, a masonry sealer may be applied to seal the surface. Check adhesion by applying a piece of masking tape. If the sealer peels off and has loose particles, remove all chalking or crumbling material, re-seal and re-check adhesion.

FERROUS METAL: The surface must be cleaned thoroughly to remove any dust, rust, and surface contaminants, and then primed.

GYPSUM WALLBOARD-DRYWALL: Nails or screws should be countersunk, and they along with any indentations should be mudded flush with the surface, sanded smooth and cleaned to remove any dust, then prime prior to painting the substrate.

PLASTER: Plaster, hardcoat, skim coat, or other alkaline surfaces should be allowed to cure for at least 30 days prior to priming with an alkali resistant primer.

WOOD: Unpainted wood or wood in poor condition should be sanded smooth, wiped clean, then primed. Any knots or resinous areas must be primed before painting. Countersink all nails, putty flush with surface, then prime.

RECOMMENDED PRIMERS

Concrete/Masonry Block (Block Fillers)	6-7, 6-15
Concrete, Masonry (Primers, Sealers)	4-603, 17-921
Gypsum Drywall-Wallboard	5-2, 6-2, 6-4, 9-900
Ferrous Metal	90-712
Plaster	4-603, 9-900, 17-921
Wood	6-2, 17-921, 9-900

Apply when air, surface and product temperatures are above 50°F (10°C).

Not recommended for use on floors. **PROTECT FROM FREEZING.**

While this product provides a mildew resistant coating, growth may still occur if the substrate is not properly prepared prior to painting and/or if the substrate is consistently exposed to conditions conducive to mold, mildew, and algae. Examples of these conditions include, but are not limited to areas that are consistently damp with little to no direct sunlight.

PACKAGING

1-Gallon (3.78 L)
5-Gallon (18.9 L)
Quart (946 mL)

Not all products are available in all sizes.

PPG Architectural Finishes, Inc. believes the technical data presented is currently accurate; however, no guarantee of accuracy, comprehensiveness, or performance is given or implied. Improvements in coatings technology may cause future technical data to vary from what is in this bulletin. For complete, up-to-date technical information, visit our web site or call 1-800-441-9695.



PPG Industries, Inc.
Architectural Coatings
One PPG Place
Pittsburgh, PA 15272
www.pittsburghpaints.com

Technical Services
1-800-441-9695
1-888-807-5123 fax

Architect/Specifier
1-888-PPG-IDEA

PPG Canada, Inc.
Architectural Coatings
4 Kenview Blvd
Brampton, ON L6T 5E4

A3.39 5/2010
(Supersedes 4/2009)



Architectural Coatings

Pure Performance® Interior Latex Primer

GENERAL DESCRIPTION

Our premium low odor, zero VOC (volatile organic compounds) primer is designed to meet the performance requirements of the institutional, commercial and residential markets. Pure Performance® Interior Latex Primer is formulated to provide excellent sealing, hiding and application with minimal odor and zero VOC properties. Ideal for use in occupied areas such as: hotel/motel resort properties, nursing homes, homes, schools, government facilities, retail space, office buildings, hospitals, and apartments.

TINTING AND BASE INFORMATION

May be tinted to approximate color of the topcoat. Refer to the appropriate color formula book, automatic tinting equipment, and or computer color matching system for color formulas and tinting instructions.

9-900 White

Some colors, or drastic color changes, may require more than one coat to achieve a uniform finish.

RECOMMENDED USES

- Gypsum Wallboard-Drywall
Plaster
Wood

CONFORMANCE STANDARDS

- Can earn LEED NC Version 2.2 Credits
Meets the Collaborative for High Performance Schools (CHPS) Low-Emitting Materials criteria section 01350

APPLICATION INFORMATION

Stir thoroughly. Apply with a high quality brush, roller, paint pad or by spray equipment. Read all label and Material Safety Data Sheet (MSDS) information prior to use. MSDS are available through our website or by calling 1-800-441-9695.

Airless Spray: Pressure 2000 psi, tip 0.015" - 0.021"

Spray equipment must be handled with due care and in accordance with manufacturer's recommendation. High-pressure injection of coatings into the skin by airless equipment may cause serious injury.

Brush: Polyester/Nylon Brush
Roller: 3/8" - 3/4" nap roller cover

Thinning: No thinning is required. If necessary, thin with up to 1/4 pt. (118 mL) of water per U.S. gallon (3.78 L) of primer may be added.

Permissible temperatures during application:

Table with 3 columns: Material, Ambient, Substrate and 2 columns of temperature ranges (50 to 90°F and 10 to 32°C).

PRODUCT DATA

Table with 2 columns: Product Type, Gloss, Volume Solids, Weight Solids, VOC, Weight/Gallon and their corresponding values.

Zero VOC is exclusive of colorant added for tinting.

Coverage: Approximately 400 sq. ft./gal. (37 sq. m/3.78L) per U.S. gallon (3.78 L) on nonporous surfaces.

Table with 2 columns: Wet Film Thickness, Wet Microns, Dry Film Thickness, Dry Microns and their corresponding values.

Coverage does not include variation due to application methods, surface porosity, and/or mixing.

Table with 2 columns: Drying Time (Dry time @77°F (25°C); 50% relative humidity), To Touch, To Recoat and their corresponding values.

Drying times listed may vary depending on temperature, humidity, film build, color, and air movement.

Washing Instructions: Wait at least 14 days after painting before cleaning the surface with a non-abrasive mild cleaner.

Clean Up: Clean tools with warm soapy water.

Disposal: Contact your local environmental regulatory agency for guidance on disposal of unused product. Do not pour down a drain or storm sewer.

Flash Point: Over 200°F (93°C)

FEATURES / BENEFITS

Features

- 100% acrylic latex
Zero VOC
Low spatter
Moisture resistant
Superior adhesion
Excellent enamel holdout

Benefits

- Excellent durability, washable finish
Low odor/minimizes detrimental impact on air quality
Easy to work with, less mess
Minimizes water streaking
Adheres to difficult substrates
Provides topcoat uniformity

Pure Performance® Interior Latex Primer

Architectural Coatings

GENERAL SURFACE PREPARATION

Surfaces to be coated must be dry, clean, sound, and free from all contamination including loose and peeling paint, dirt, grease, oil, wax, concrete curing agents and bond breakers, chalk, efflorescence, mildew, rust, product fines, and dust. Remove loose paint, chalk, and efflorescence by wire brushing, scraping, sanding, and/or pressure washing. Putty all nail holes and caulk all cracks and open seams. Sand all glossy, rough, and patched surfaces. Feather back all rough edges to sound surface by sanding. Prime all bare and porous substrates with an appropriate primer. **WARNING!** If you scrape, sand, or remove old paint, you may release lead dust or fumes. **LEAD IS TOXIC. EXPOSURE TO LEAD DUST OR FUMES CAN CAUSE SERIOUS ILLNESS, SUCH AS BRAIN DAMAGE, ESPECIALLY IN CHILDREN. PREGNANT WOMEN SHOULD ALSO AVOID EXPOSURE.** Wear a properly fitted NIOSH-approved respirator and prevent skin contact to control lead exposure. Clean up carefully with a HEPA vacuum and a wet mop. Before you start, find out how to protect yourself and your family by contacting the USEPA National Lead Information Hotline at 1-800-424-LEAD or log on to www.epa.gov/lead. In Canada contact a regional Health Canada office. Follow these instructions to control exposure to other hazardous substances that may be released during surface preparation.

GYPHUM WALLBOARD-DRYWALL: Nails or screws should be countersunk, and they along with any indentations should be mudded flush with the surface, sanded smooth and cleaned to remove any dust, then prime prior to painting the substrate.

PLASTER: Plaster, hardcoat, skim coat, or other alkaline surfaces should be allowed to cure for at least 30 days prior to priming with an alkali resistant primer.

WOOD: Unpainted wood or wood in poor condition should be sanded smooth, wiped clean, then primed. Any knots or resinous areas must be primed before painting. Countersink all nails, putty flush with surface, then prime.

PACKAGING

FOR INTERIOR USE ONLY. Apply when air, surface and product temperatures are between 50°F (10°C) and 90°F (32°C).

1-Gallon (3.78 L)
Quart (946 mL)

Not recommended for use on floors. **PROTECT FROM FREEZING.**

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A1.23 5/2010
(Supersedes 4/2009)



POLYURETHANE

— PREMIUM —

INTERIOR



Crystal Clear Finish

- Unique Smooth Flow™ Formula helps make smooth, even application easier
- Crystal clear, to let wood's natural beauty show through
- Fast drying, completes projects in one day
- Soap and water clean up
- Can be applied over stained, sealed, or bare wood of all types
- Available in two sheens: satin and gloss

OLYMPIC® PREMIUM INTERIOR WATER BASED POLYURETHANE



PRODUCT OVERVIEW

Olympic Premium Water Based Polyurethane is a specially developed crystal clear formula that captures wood's natural beauty.

APPLICATION TECHNIQUES

Olympic Premium Water Based Polyurethane should be applied with a quality synthetic bristle brush or foam applicator. Its unique Smooth Flow™ Formula helps make smooth, even application easier than ever. However, a few simple tips will help ensure a professional finish:

- Never shake the can. Stir slowly to avoid creating air bubbles.
- Slowly work the finish into the wood with light, even strokes.
- The last stroke should be at a 45° angle with the brush and run the entire length of the work surface.

ADDITIONAL INFORMATION

Dry time: Allow 3 hours before general use and 72 hours for flooring

Recoat: After 2 hours

Clean-up: Warm soap and water

Coverage: 500 sq. ft. per gallon

For use on: Stained, sealed, or bare wood

Ideal for: Furniture, cabinets, doors, paneling, trim, and crafts

Sheens: Satin and gloss

PRODUCTS

Product	Code	Available Size
Satin	42786	Quart & Gallon
Gloss	42784	Quart & Gallon

COMMONLY ASKED QUESTIONS

What advantage does Olympic Premium Water Based Polyurethane offer over oil based finishes? Unlike oil based finishes, Olympic Premium Water Based Polyurethane dries crystal clear to show off all the fine beauty of a woodworking project. Since it will not change the color of the wood, it's perfect for light woods or stain colors. Additionally, our Olympic Premium Water Based Polyurethane features easy soap and water clean up.

Can water damage Olympic Premium Water Based Polyurethane after it has dried? Not at all. Once its resins have cured, they can't be washed off or redissolved with water.

Can Olympic Premium Water Based Polyurethane be used over Olympic Premium Oil Based Polyurethane? Certainly, as long as Olympic Premium Oil Based Polyurethane has dried completely, which takes about five hours. For best adhesion, sand the surface lightly with #220 or finer sandpaper.

How many coats will be needed? The number of coats of Olympic Premium Water Based Polyurethane required will depend on the wood type, its absorbency, and how much abuse the surface will take. Three to four coats are generally used to obtain a professional finish.

Once a coat has dried, examine the surface under bright, direct light. If dry spots are visible, an additional coat is necessary for maximum wood protection and beauty.



VISIT OUR WEBSITE AT WWW.OLYMPIC.COM

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PPG Architectural Finishes, Inc., One PPG Place, Pittsburgh, PA 15272

Full Home Fire Extinguisher

Part number 21006704

Full Home use

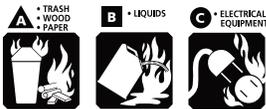
Single use

UL Rated 3-A, 40-B:C



Meets NFPA recommendations for the home, garage and workshop

For use on the following types of fire:



Description

The Full Home extinguisher offers exceptional fire fighting protection and value. The multipurpose unit meets NFPA requirements for living areas, as well as the garage and workshop.

The Full Home unit is the #1 choice for all round home protection and came top in a recent consumer survey.

Fights fires common to the home, garage and workshop such as textiles, paint, wood, gasoline & energized electrical equipment. This unit is easy to use and has a 10 year warranty.

Features bilingual nameplate and carton

At a Glance

- Model FX340GW
- Multipurpose Dry Chemical
- UL listed
- UL rated 3-A, 40-B:C
- Supplied with wall hanger
- Monoammonium Phosphate
- 10 year limited warranty

Features

- Pressure gauge allows for immediate pressure status check
- Easy-to-pull safety pin
- Rust and impact resistant nylon handle
- 5.5 lb. of fire extinguishing agent (Average)
- 10 year limited warranty
- UL approved wall hanger
- Powder coated cylinder for corrosion protection



Product Specification

Net agent weight (Average)	5.5 lb.
Unit weight (Average)	8.25 lb.
Diameter	4.5 inches
Height	16.07 inches
Discharge time	13-15 seconds
Discharge range	12-18 feet
Operating pressure	195 psi
Cylinder	Seamless aluminum
Valve, handle, lever	Nylon
Wall hanger	UL Listed

Kidde Residential and Commercial Division
1016 Corporate Park Drive, Mebane, NC 27302 • Tel. 919.563.2711 • www.kidde.com



SONY[®]

Internet TV

Reference Guide

NSX-24GT1/NSX-32GT1/NSX-40GT1/NSX-46GT1

Owner's Record

The model and serial numbers are located on the side and rear of the TV. For NSX-GT1 series models, they can be found by removing the cable cover. Record these numbers in the spaces provided below. Refer to them whenever you call upon your Sony dealer regarding this TV.

Model No. _____

Serial No. _____

Location of the identification label

Labels for Model No. and Power Supply rating (in accordance with applicable safety regulation) are located on the rear of the TV. For NSX-GT1 series models, they can be found by removing the cable cover.

WARNING

To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

Batteries or batteries installed apparatus shall not be exposed to excessive heat such as sunshine, fire or the like.

The TV must never be exposed to dripping, splashing, or spilling liquids of any kind.

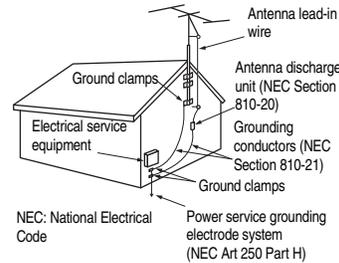


This symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the TV's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the TV.

Outdoor Antenna Grounding



CAUTION

To prevent electric shock and blade exposure, do not use this polarized AC plug with an extension cord, receptacle or other outlet unless the blades can be fully inserted.

- Operate the TV only on 120 V AC
- Avoid operating the TV at temperatures below 41°F (5°C).

Declaration of Conformity

Trade Name: SONY
 Model: NSX-24GT1/NSX-32GT1/
 NSX-40GT1/NSX-46GT1
 Responsible Party: Sony Electronics Inc.
 Address: 16530 Via Esprillo,
 San Diego, CA 92127 U.S.A.
 Telephone Number: 858-942-2230

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Related Information

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Pursuant to FCC regulations, you are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.

Safety and Regulatory

To prevent radio interference to the licensed service, this device is intended to be operated indoors and away from windows to provide maximum shielding. Equipment (or its transmit antenna) that is installed outdoors is subject to licensing. Only use Wireless LAN indoors when using it with IEEE 802.11a/n (5 GHz). High power radars are allocated as primary users (meaning they have priority) of 5250-5350 MHz and 5650-5850 MHz and these radars could cause interference and/or damage to this device.

This device uses 5 GHz band for wireless LAN communication and the maximum gain of the antenna in this device is 6 dBi. This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body (excluding extremities: hands, wrists and feet). This device and its antenna(s) must not be co-located or operating with any other antenna or transmitter except Grant condition.

Note

This television includes a QAM demodulator which should allow you to receive unscrambled digital cable television programming via subscription service to a cable service provider. Availability of digital cable television programming in your area depends on the type of programming and signal provided by your cable service provider.

Compatible Wall-Mount Bracket Information

Use the following Sony Wall-Mount Bracket with your TV model.

	Sony Model No.	
NSX-	24GT1	32GT1/40GT1/46GT1
Sony Wall-Mount Bracket Model No.	SU-WL100	SU-WL500

Use with other Wall-Mount Brackets* may cause instability and could result in property damages or injury.

* For instructions on using the Wall-Mount bracket with your TV please go to <http://esupport.sony.com> for your TV model and download "Additional Information for Using Sony Wall-Mount Bracket".

To Customers

Sufficient expertise is required for TV installations. Be sure to subcontract the installation to a Sony dealer or licensed contractor and pay adequate attention to safety during the installation.

Important Safety Instructions

- 1) Read these instructions.
- 2) Keep these instructions.
- 3) Heed all warnings.
- 4) Follow all instructions.
- 5) Do not use this apparatus near water.
- 6) Clean only with dry cloth.
- 7) Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- 8) Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- 9) Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- 10) Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- 11) Only use attachments/accessories specified by the manufacturer.
- 12) Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
- 13) Unplug this apparatus during lightning storms or when unused for long periods of time.
- 14) Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.



Additional Safety DOs and DON'Ts

MOISTURE

- Do not place liquid filled objects such as a vase or potted plant on the TV.
- Do not use a power line operated TV set near water; for example, near a bathtub, washbowl, kitchen sink, laundry tub, wet basement or near a swimming pool, etc.



CLEANING

When cleaning, be sure to unplug the power cord to avoid any chance of electric shock.

- Clean the cabinet of the TV with a dry soft cloth.



- Wipe the LCD screen gently with a soft cloth.
- Stubborn stains may be removed with a cloth slightly moistened with a solution of mild soap and warm water.
- Do not spray water or detergent directly on the TV set. It may drip to the bottom of the screen or exterior parts, and may cause a malfunction.
- If using a chemically pretreated cloth, please follow the instruction provided on the package.
- Never use strong solvents such as a thinner, alcohol or benzene for cleaning.
- Periodic vacuuming of the ventilation openings is recommended to ensure to proper ventilation.

VENTILATION

The ventilation openings in the TV are necessary to ensure reliable operation of the TV and to protect it from overheating.

- Do not block or cover the ventilation openings with cloth or other materials.



- Never place the TV on a bed, sofa, rug or other similar surface where ventilation openings may be blocked.



- Unless proper ventilation is provided, the TV may accumulate dust and cause damage.
- Never allow liquid or solid objects to fall into the ventilation openings.



- If any liquid or solid object falls inside the TV, unplug the TV immediately and have it checked by qualified service personnel before operating it further.
- Never push objects of any kind into the TV through the ventilation openings as they may come in contact with dangerous voltage points or short out parts that could result in a fire or an electric shock.

Allow adequate space around the TV set to ensure proper air circulation.

- Never place the TV in a confined space, such as a bookcase or built-in cabinet, unless proper ventilation is provided.



- There should be a clearance of at least 11 7/8 inches (30 cm) above the TV set and 4 inches (10 cm) on each side. If mounted on the wall, allow at least 4 inches (10 cm) of clearance at the bottom of the screen (see page 8).

INSTALLATION

The TV should be installed near an easily accessible AC power outlet.

- Do not install the TV face up or down, upside down or on its side.
- Do not install the TV in hot, oily, humid, or excessively dusty places.
- Do not install the TV in places subject to extreme temperature, such as in direct sunlight, near a radiator or a heating vent. The TV may overheat in such conditions which can cause

deformation of the enclosure and/or TV malfunction.



- Do not install the TV in a place exposed to direct air conditioning; moisture may condense inside and may cause TV malfunction.



- Do not install the TV where it may be exposed to mechanical vibration.
- Do not install the TV where insects may enter.
- Do not install the TV in a location where it may protrude, such as on or behind a pillar, or any place you might bump your head or receive bodily injury.
- To prevent fire keep flammable objects or open flame (e.g. candles) away from the TV.
- Do not place optional equipment on top of the TV.

Prevent the TV from toppling over

Take measures to prevent the TV from toppling over and causing injury or damage to the TV and property.



- Secure the TV to a wall and/or stand.
- Never install the TV on unstable and/or uneven surfaces.
- Do not allow children to climb on or play with furniture and TV sets.
- Do not install the TV on furniture that can easily be used as steps, such as a chest of drawers.
- Care should be taken to install the TV where it cannot be pushed, pulled over, or knocked down.
- Care should be taken to route all AC power cords and connecting cables so that they cannot be pulled or grabbed by curious children.

Medical institutions

Do not place this TV in a place where medical equipment is in use. It may cause a medical equipment malfunction.



Outdoor use

Do not install this TV outdoors. The TV should not be exposed to rain or direct sunlight in order to avoid damage and possible fire or electric shock.

Do not install this TV in a vehicle, ship or other vessel

- Excessive bumping motion of a moving vehicle or continuous swaying motion on a boat may cause the TV to fall down and cause injury.



- Exposing the TV to seawater may cause a fire, electric shock or damage to your TV.



Magnetic influence

- This TV contains a strong magnet in the speaker unit that generates a magnetic field. Keep any items susceptible to magnetic fields away from the speaker.
- Electro-magnetic radiation emitted from optional equipment installed too close to the TV may cause picture distortion and/or noisy sound.

Wall-mount use

- Wall-mount installation requires the use of a Wall-Mount Bracket. When installing or removing the TV and the Wall-Mount Bracket, be sure to use qualified contractors. If not properly secured during installation or removal from the Wall-Mount Bracket, the TV may fall and cause serious injury.



- Be sure to follow the installation guide supplied with the Wall-Mount Bracket when installing the TV.
- Be sure to attach the brackets with the specified parts supplied with the Wall-Mount Bracket.
- Do not hang the TV from the ceiling. It may fall and cause serious injury.
- Do not hang anything on the TV.
- Do not allow children to climb on the TV.



AC POWER CORD

- Do not touch the AC power cord and its plug with wet hands as it may cause electric shock.
- When disconnecting the AC power cord, grasp the plug and disconnect from the wall outlet first. Do not pull by the cord.
- Keep the power cord away from heat sources.

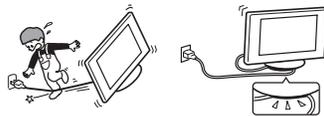


A TV set with a three-wire grounding type AC power cord plug must be connected to an AC power outlet with a protective earthing connection.

- Do not convert or damage the AC power cord.
- Consult your electrician to have the outlet changed to suit your TV.

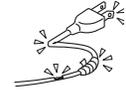
Subjecting the AC power cord to wear and/or abuse can damage the AC power cord and your TV.

- Do not place the TV where the power cord can be easily pinched, bent, twisted, or catch your feet.



- Do not allow anything to rest on or roll over the cord.
- Before connecting cables, be sure to unplug the AC power cord for your safety.
- Do not move the TV with the AC power cord (or other cables such as audio and video) connected.
- Use only an original Sony AC power cord with your TV; no brand substitution is allowed (except NSX-24GT1).

- Do not use AC power cord supplied with the TV with any other equipment.
- Never use a damaged AC power cord. A damaged AC power cord can cause a short-circuit, which may result in a fire or electric shock.



Do not use a damaged or poorly fitting AC power outlet as your TV's power source.



- Insert the plug fully into the outlet. If it is loose, it may cause arcing and result in a fire.



- Do not overload the same AC power outlet.



Unplugging the AC power cord from the wall outlet will completely remove power from the TV.

- During lightning storms or when the TV is left unattended and unused for extended periods of time, the AC power cord should be unplugged from the wall outlet. This will avoid possible damage to your TV. Also unplug the antenna to prevent damage to the TV.



- For energy conservation and safety reasons, practice unplugging the AC power cord from the AC power outlet.

Clean the AC power plug

Unplug the AC power plug and clean it



occasionally to avoid dust from accumulating. While cleaning, look for signs of damage. A damaged AC power cord should never be used.

ACCESSORIES

Keep small accessories out of children's reach. Use only the specified accessories with this TV.

Volume Adjustment

- When using headphones, adjust the volume to avoid excessive audio levels from causing possible hearing loss.



BATTERIES

Your remote control batteries are consumables.

- To preserve our environment, dispose of used batteries according to your local laws or regulations.
- Do not dispose of batteries in a fire.
- Do not short-circuit, disassemble or overheat the batteries.
- Replace only with the same or equivalent type of batteries. Using incorrect replacement batteries can lead to an explosion.
- Do not place the remote in a location near a heat source, a place subject to direct sunlight, or a damp room.

LCD SCREEN

- Although the LCD screen is made with high-precision technology and has effective pixels of 99.99% or more, black dots or bright points of light (red, blue, or green) may appear constantly on the LCD screen. This is a structural property of the LCD panel and is not a malfunction.
- The LCD screen is made with high-precision technology and to achieve a high level of performance and picture quality, this TV's backlight setting is set to maximize the brightness of the TV. However, uneven brightness may be observed when the LCD TV is viewed in a dark ambient without an input source or with a blank screen. This condition is normal and not a malfunction of the TV. Changing the Picture mode, Backlight setting, enabling the Light Sensor (if applicable), or turning on the Power Management will improve this condition.
- To avoid damaging the LCD panel, do not expose the LCD screen to direct sunlight.
- Do not push or scratch the LCD screen, or place objects on top of the TV. The images may be uneven or the LCD panel may be damaged.
- If the TV is used in a cold place, the picture may smear or become dark. This does not indicate a failure. These phenomena improve as the temperature rises.

- Ghosting may occur when still pictures are displayed continuously. It should disappear after a few moments.
- The LCD screen and enclosure get warm when the TV is in use. This is not a malfunction.
- Avoid spraying insect repellent with volatile material on the LCD screen.
- Avoid prolonged contact with rubber or plastic material to the LCD screen.

Broken screen panel

Do not throw anything at the TV as the impact can cause the LCD screen glass to crack, break or scatter.



- If damage occurs to the LCD panel, small traces of liquid crystal sandwiched between the glass may be found on scattered broken glass.
- Do not touch the broken glass with bare hands. As with any broken glass pieces, avoid skin contact and exposure to your eyes or mouth. Avoid direct contact with liquid or damp surfaces of the glass as these may have an adverse effect on some people. The contacted area should be rinsed thoroughly with water. If conditions persist, see your doctor.
- If the surface of the TV cracks, do not touch the TV until you have unplugged the AC power cord. Otherwise electric shock may result.

SERVICING

Do not use the TV if you suspect the TV is damaged or if the TV is damaged.



- Do not attempt to service the TV yourself since opening the cabinet may expose you to dangerous voltage levels or other hazards. Refer all servicing to qualified service personnel.
- If replacement parts are required, acquire a written certification from the service technician which states that adequate replacement parts with the same or similar characteristics as the original parts have been used. Unauthorized



substitutions may result in a fire, an electric shock or other hazards.

Safety check

- Upon completion of any TV servicing or repair, ask the service technician to perform routine safety checks as specified by Sony and to certify that the TV is safe to operate. Have a qualified service technician dispose of the TV if it is not safe to operate.

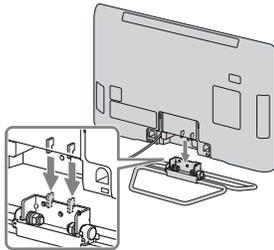


Attaching the Table-Top Stand

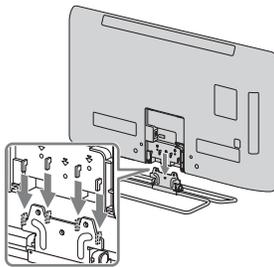
Refer to the supplied Table-Top Stand leaflet for proper attachment.

- 1 Gently slide the TV onto the Table-Top Stand and align the screw holes.

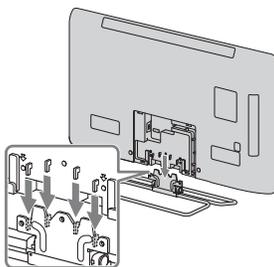
NSX-24GT1



NSX-32GT1



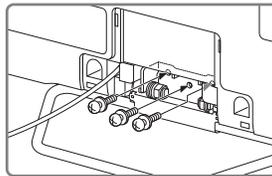
NSX-40GT1/NSX-46GT1



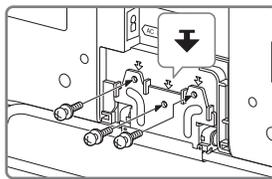
- Do not put stress on the LCD panel or the frame around the screen.
- Be careful to not pinch your hands or the AC power cord when you install the TV to the Table-Top Stand.

- 2 Use the supplied screws to attach the TV to the Table-Top Stand.

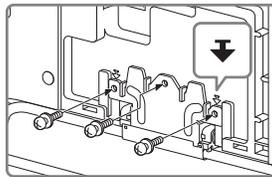
NSX-24GT1



NSX-32GT1



NSX-40GT1/NSX-46GT1



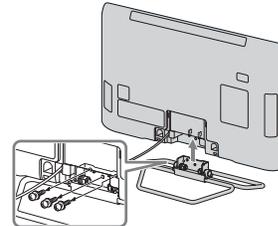
- If you use an electric screwdriver, set the tightening torque at approximately 1.5 N·m {15 kgf·cm}.

- 3 After all the screws are tightened, cover the Table-Top Stand with the supplied Cable cover.

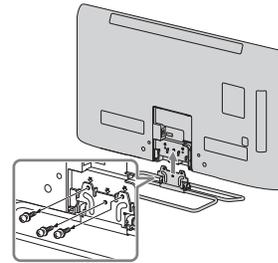
Detaching the Table-Top Stand from the TV

Remove only the screws marked with  on the TV.

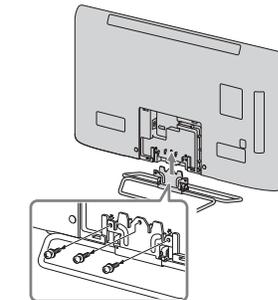
NSX-24GT1



NSX-32GT1



NSX-40GT1/NSX-46GT1



- Remove the Cable cover prior to detaching the Table-Top Stand.
- Do not remove the Table-Top Stand for any reason other than to install corresponding accessories on the TV.
- When installing the TV on a wall, remove the screws from the rear of the TV. (They are fastened in the screw holes for wall mounting.) Be sure to store the removed screws in a safe place, keeping them away from children.

- When attaching the Table-Top Stand again, be sure to fasten the screws (previously removed) to the original holes on the rear of the TV.

Using a Wall-Mount Bracket

Your TV can be mounted on a wall using a Wall-Mount Bracket (not supplied) out of the box as packaged. If the Table-Top Stand is attached to the TV, the TV may require detaching the Table-Top Stand; see “Detaching the Table-Top Stand from the TV” (page 7).

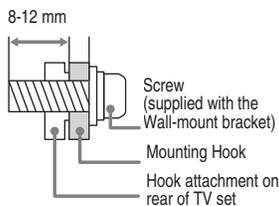
Prepare the TV for the Wall-Mount Bracket before making cable connections.

For product protection and safety reasons, Sony strongly recommends that you use the Wall-Mount Bracket designed for your TV and the installation should be performed by a Sony dealer or licensed contractor.

- Follow the operating instructions supplied with the Wall-Mount Bracket for your model. Sufficient expertise is required in installing this TV, especially to determine the strength of the wall for withstanding the TV's weight.
- Be sure to use the screws supplied with the Wall-mount bracket when attaching the mounting hooks to the TV set.

The supplied screws are designed so that they are 8 mm to 12 mm in length when measured from the attaching surface of the mounting hook.

The diameter and length of the screws differ depending on the Wall-mount bracket model. Use of screws other than those supplied may result in internal damage to the TV set or cause it to fall, etc.

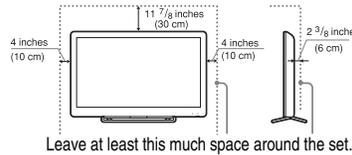


- Be sure to store the unused screws and Table-Top Stand in a safe place until you are ready to attach the Table-Top Stand. Keep the screws away from small children.
- Read page 2 to 6 for additional safety information.

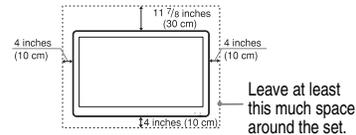
Installing the TV Against a Wall or Enclosed Area

Make sure that your TV has adequate ventilation. Allow enough space around the TV as shown below. Avoid operating the TV at temperatures below 41 °F (5 °C).

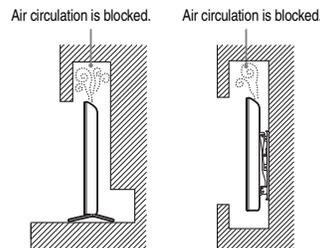
Installed with stand



Installed on the wall



Never install the TV set as follows:



- Inadequate ventilation can lead to overheating of the TV and may cause damage to your TV or cause a fire.

Pairing the keypad with the TV

- 1 Make sure that the batteries are correctly inserted.
- 2 Press the CONNECT button on the TV for two seconds or more to display the pairing screen.
- 3 Hold down the Fn and Enter keys following the instructions on the screen until the pairing screen disappears.

How to Care for Your TV

Safety is very important, please read and follow the safety documentation (page 2 to 6).

Unplug the TV and other connected equipment from the wall outlet before you begin cleaning your TV.



- Wipe the LCD screen gently with a soft cloth.
- Stubborn stains may be removed with a cloth slightly moistened with a solution of mild soap and warm water.
- If using a chemically pretreated cloth, please follow the instruction provided on the package.
- Never use strong solvents such as a thinner, alcohol or benzene for cleaning.
- Do not plug in the TV into the wall outlet until the moisture from cleaning has evaporated.

The TV should also be placed on a stable surface to prevent it from toppling over (see page 4). If you have young children or pets at home, check regularly to insure the TV is securely fastened.

Specifications

Model Name NSX-	46GT1	40GT1	32GT1	24GT1
System				
Television system	NTSC: American TV standard ATSC (8VSB terrestrial): ATSC compliant 8VSB QAM on cable: ANSI/SCTE 07 2000 (Does not include Cable CARD functionality)			
Channel coverage	Analog terrestrial: 2-69 / Digital terrestrial: 2-69 Analog Cable: 1-135 / Digital Cable: 1-135			
Panel system	LCD (Liquid Crystal Display) Panel			
Speaker output	10W + 10W		5W + 5W	
Input/Output jacks				
CABLE/ANTENNA	75-ohm external terminal for RF inputs			
VIDEO IN	VIDEO / AUDIO			
COMPONENT IN	YPBPR (Component Video)/Signal format: 480i, 480p, 720p, 1080i, 1080p AUDIO			
HDMI IN 1/2/3/4	HDMI: Video:480i, 480p, 720p, 1080i, 1080p, 1080/24p Audio: Two channel linear PCM 32, 44.1 and 48KHz, 16, 20 and 24bits, Dolby Digital			
HEADPHONE	Headphones jack			
DIGITAL AUDIO OUT (OPTICAL)	PCM/Dolby Digital optical signal			
LAN	10BASE-T/100BASE-TX/1000BASE-T connector (Connection speed may differ depending on the network environment. 10BASE-T/100BASE-TX/1000BASE-Tconnection rate and communication quality are not guaranteed for this TV.)			
USB	USB jack Type A*1			
IR Blaster	Mini jack (For connecting the IR Blaster cable)			
Power and others				
Power requirements	120 V AC, 60 Hz			
Power consumption				
in use	147 W	122 W	85 W	84 W
in DAM*2	56 Wh/d	34 Wh/d		27 Wh/d
in standby	less than 0.5 W			
Screen size (inches measured diagonally)	46 inches	40 inches	31.5 inches (32 class)	23.5 inches (24 class)
Display resolution	1,920 dots (horizontal) x 1,080 (vertical)			
Speaker				
Full range with speaker (mm)	45 x 130	45 x 130	45 x 130	34 x 105
(inches)	1 13/16 x 5 1/8	1 13/16 x 5 1/8	1 13/16 x 5 1/8	1 3/8 x 4 1/4
Dimensions				
with stand (mm)	1,087 x 694 x 298	954 x 619 x 298	766 x 511 x 194	571 x 381 x 190
(inches)	42 7/8 x 27 3/8 x 11 3/4	37 5/8 x 24 3/8 x 11 3/4	30 1/4 x 20 1/8 x 7 3/4	22 1/2 x 15 x 7 1/2
without stand (mm)	1,087 x 661 x 54	954 x 586 x 53	766 x 481 x 56	571 x 353 x 71
(inches)	42 7/8 x 26 1/8 x 2 1/4	37 5/8 x 23 1/8 x 2 1/8	30 1/4 x 19 x 2 1/4	22 1/2 x 14 x 2 7/8
wall-mount hole pattern (mm)	300 x 300	300 x 300	200 x 200	100 x 100
wall-mount screw size (mm)	M6 x 16	M6 x 16	M6 x 16	M4 x 12
Mass				
with stand (kg)/(lb.)	22.7/50.1	18.8/41.5	13.2/29.2	10.1/22.3
without stand (kg)/(lb.)	21/46.4	17.1/37.7	11.8/26.1	8.7/19.2

Wireless	
Wireless LAN standard	IEEE 802.11a/b/g/n
Frequency range	2.4 GHz band: Channels 1-11 5 GHz band: Channels 36-64, 100-140, 149-165
Modulation	DS-SS Modem and OFDM Modem
Accessories	
Supplied accessories	Keypad (1) / Size AA batteries (2) / AC power cord (except NSX-24GT1) (1) / IR Blaster cable (1) / Table-Top Stand (1) / Screws (M4 x 10, for NSX-GT24)(3), Screws (M5 x 16, for NSX-32GT1/NSX-40GT1/NSX-46GT1)(4) / Cable cover (1) / Quick Setup Guide (1) / Reference Guide (1) / Table-Top Stand leaflet (1) / Attention (1) / End User License Agreement (1) / Warranty card (1)
Optional accessories	Connecting cables / Wall mount bracket

*1 For details on USB devices that can be connected to the TV, see "Help Guide" (<http://esupport.sony.com/internettv/helpguide>).

*2 Download Acquisition Mode (DAM) is used for collecting data for TV Guide On Screen.

- Optional accessories availability depends on its stock.
- Design and specifications are subject to change without notice.

Additional Information

About wireless LAN security

Since communication via the wireless LAN function is established by radio waves, the wireless signal may be susceptible to interception. To protect wireless communication, this TV supports various security functions. Be sure to correctly configure the security settings in accordance with your network environment.

No Security

Although you can easily make settings, anyone can intercept wireless communication or intrude into your wireless network, even without any sophisticated tools. Keep in mind that there is a risk of unauthorized access or interception of data.

WEP

WEP applies security to communications to prevent outsiders from intercepting communications or intruding into your wireless network. WEP is a legacy security technology that enables older devices, which do not support TKIP/AES, to be connected.

WPA-PSK (TKIP), WPA2-PSK (TKIP)

TKIP is a security technology developed to correct for the deficiencies of WEP. TKIP assures a higher security level than WEP.

WPA-PSK (AES), WPA2-PSK (AES)

AES is a security technology that uses an advanced security method that is distinct from WEP and TKIP. AES assures a higher security level than WEP or TKIP.

Trademark Information

HDMI, the HDMI Logo, and High-Definition Multimedia Interface are trademarks or registered trademarks of HDMI Licensing LLC in the United States and other countries.

Ferguson Patent Properties, LLC:
U.S. Patent No. 5,717,422
U.S. Patent No. 6,816,141

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In the United States, TV Guide and TV Guide On Screen are registered trademarks of TV Guide Entertainment Group, Inc. and/or its subsidiaries or affiliates, and are used under a license by Gemstar-TV Guide International, Inc. and/or its subsidiaries. In Canada, TV Guide is a registered mark of Transcontinental Inc., and is used under a license by Gemstar-TV Guide International, Inc. and/or its subsidiaries.

The TV Guide On Screen system is manufactured under license from Gemstar-TV Guide International, Inc. and/or its subsidiaries.

The TV Guide On Screen system is protected by one or more of the following United States patents 6,498,895; 6,850,693; 6,396,546; 5,940,073; 6,239,794 to Gemstar-TV Guide International, Inc. and/or its subsidiaries.

Gemstar-TV Guide International, Inc. and/or its related affiliates are not in any way liable for the accuracy or availability of the program schedule information or other data in the TV Guide On Screen system and cannot guarantee service availability in your area. In no event shall Gemstar-TV Guide International, Inc. and/or its related affiliates be liable for any damages in connection with the accuracy or availability of the program schedule information or other data in the TV Guide On Screen system.

Windows Media is either a registered trademark or trademark of Microsoft Corporation in the United States and/or other countries.

This product contains software which is licensed by Fluendo (<http://www.fluendo.com>).

Your TV is ENERGY STAR[®] qualified in the "Home" mode (NSX-32GT1/NSX-40GT1/NSX-46GT1).



It meets strict energy efficiency guidelines set by the U.S. Environmental Protection Agency and Department of Energy. ENERGY STAR is a joint program of these government agencies, designed to promote energy efficient products and practices.

Changes to certain features, settings, and functionalities of this TV (i.e. TV Guide, Picture/Sound, Light Sensor, Power Savings) can increase or change the power consumption.

Depending upon such changed settings, the power consumption may exceed the limits required for the ENERGY STAR qualification in the "Home" mode.

HDMI



For Your Convenience

The Help Guide gives you detailed information on how to use the Internet TV as follows:

- Basics of the Internet TV
- How to use applications
- Details on how to use the Keypad
- Customizing settings
- Software Updates

From your Internet TV

Select "Help Guide" from the Applications List.

Or, press **Q** (SEARCH) and type "help" in the Quick Search Box. Help Guide appears in the search results.

- The network connection is required for accessing the "Help Guide" from the TV.

From a PC browser

Access the following:

<http://esupport.sony.com/internetv/helpguide/>



MODEL No. **BDP-S380**

BDP-S380 DVD PLAYER

120V 60Hz

18W

1A

38787

APPARATUS

COMPLIES WITH PART 15 OF THE FCC RULES.

IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE UNDESIRABLE INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRABLE OPERATION.

SONY CORPORATION MADE IN MALAYSIA

4-272-153-01



BD



51RA

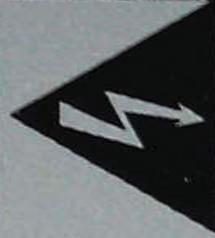
US

LISTED

DVD

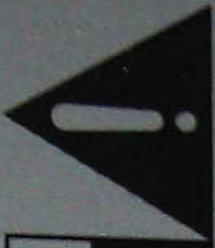


STM



CAUTION

**RISK OF ELECTRIC SHOCK
DO NOT OPEN**



ATTENTION

RISQUE DE CHOC ELECTRIQUE NE PAS OUVRIR



**Energy
Verified**

SONY® MODEL No. STR-CT550WT

V RECEIVER

120V 60Hz 50W



MADE IN MALAYSIA / FABRIQUE EN MALAISIE



CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN



ATTENTION
RISQUE DE CHOC ELECTRIQUE
NE PAS OUVRI

Manufactured under license from Dolby Laboratories.
The double-D symbol and the double-D symbol are trademarks of Dolby Laboratories.

Manufactured under license under U.S. Patent #'s: 5,451,942; 5,674,380; 5,978,762; 6,226,616; 6,487,535; 6,872,333,929; 7,392,195; 7,272,567 & other patents issued and pending.

SONY, HD and the Symbol are registered trademarks & the DTS

SERIAL No. 8801930



FEBRUARY 2011 / MARCH 2011 / APRIL 2011

HT-CT550W



UL US LISTED



Energy
Verifi

AUDIO/VIDEO APPARATUS

51RA

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:

- (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND
- (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRABLE OPERATION.

In case of repairing, please bring the entire system set to the service station.



4 070-2

SONY® MODEL No. SA-WCT550W
ACTIVE SUBWOOFER
~120V 60Hz 30W



MADE IN MALAYSIA / FABRIQUE EN MALAISIE

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN



ATTENTION
RISQUE DE CHOC ELECTRIQUE NE PAS OUVRIR

No. 8801930
SA-WCT550W UC2
FEBRUARY 2011 / MARCH 2011 / APRIL 2011



AUDIO/VIDEO APPARATUS
51RA

In case of repairing, please bring the entire system set to the service station.

4-270-637-01(1) UC2

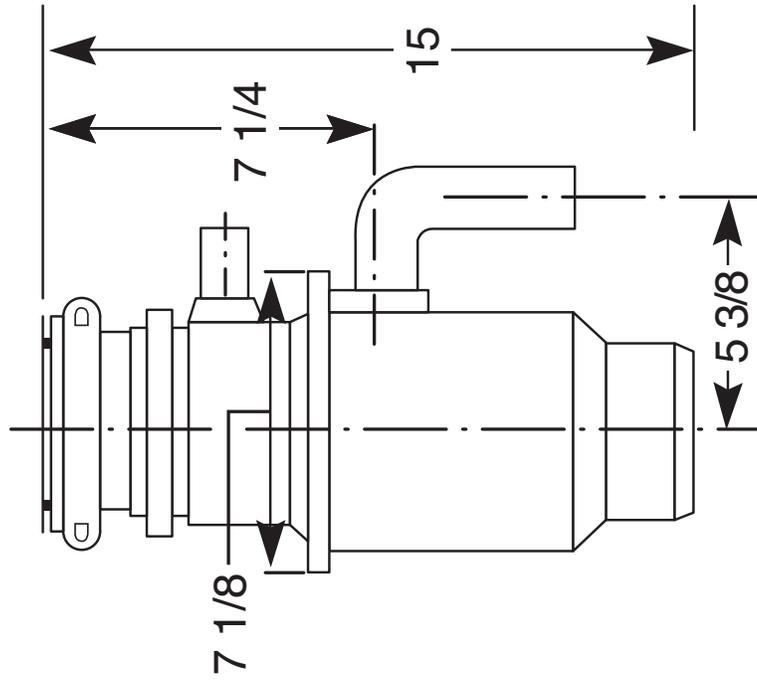




GE Appliances

GFC535T – GE Extra-Large Capacity Continuous Feed Disposer

Disposall® Food Waste Disposer Dimensions (in inches)



Inlet/Outlet Diameters	
Dishwasher inlet diameter (in.)	3/4
Drain outlet diameter (in.)	1-1/2



Listed by
Underwriters
Laboratories

For answers to your Monogram® GE Profile™ or GE appliance questions, visit our website at GEAppliances.com or call GE Answer Center® service, 800.626.2000.



GE Appliances

GFC535T – GE Extra-Large Capacity Continuous Feed Disposer



Features and Benefits

- Extra-Large Capacity Continuous Feed Disposer
- 2600 RPM Grinding Action
- 1/2 Horsepower Motor
- 2 Level Precutter
- Stainless Steel Turntable
- Stainless Steel Jam Resistant, Dual Swivel Impellers
- Line Cord Power Connection
- Stainless Steel Sink Flange
- Dishwasher Drain Connector
- Manual Reset Overload Protector
- Wall Switch with Sink Stopper
- SplashGuard
- Cold-Rolled Carbon Steel Armature Shaft Material
- QuietPower™ | Sound Insulation Package
- EZ Mount Installation
- Model GFC535T

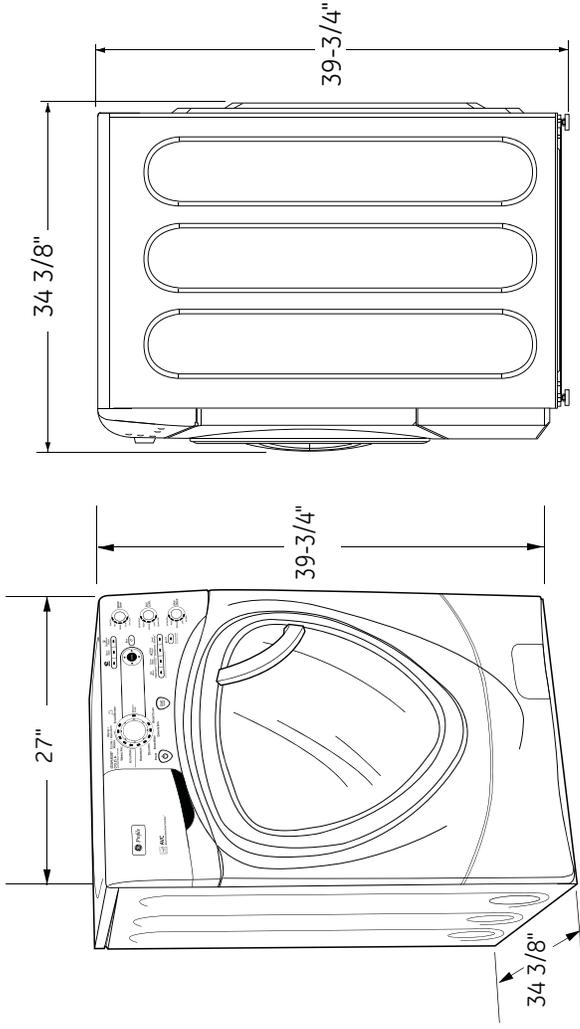
PFWS4600L/PFWS4605L

GE Profile 4.3 DOE cu. ft. stainless steel capacity frontload washer with Steam

Dimensions and Installation Information (in inches)

Electric Rating	
120V	12.0A, 60Hz

Installation Information: For complete information, see installation instructions packed with your washer.



For answers to your Monogram®, GE Profile™ or GE® appliance questions, visit our website at geappliances.com or call GE Answer Center® service, 800.626.2000.



imagination at work



Specification Revised 4/11

260193

PFWS4600L/PFWS4605L

GE Profile 4.3 DOE cu. ft. stainless steel capacity frontload washer with Steam

Special Installation Requirements:

Stacked Installation:

Kit for stacking dryer over washer is not included with the washer. Order GEFLSTACK.

Alcove or Closet Installation:

- If your dryer is approved for installation in an alcove or closet, it will be stated on a label on the dryer back.
- The dryer MUST be exhausted to the outside.
- Minimum clearances between dryer cabinet and adjacent walls or other surfaces are: 0" either side, 3" front and rear
- Minimum vertical space from floor to overhead cabinets, ceilings, etc. is 52".
- Closet doors must be louvered or otherwise ventilated and must contain a minimum of 60 sq. in. of open area equally distributed. If this closet contains both a washer and a dryer, doors must contain a minimum of 120 sq. in. of open area equally distributed.
- No other fuel-burning appliance shall be installed in the same closet with a gas dryer.

Bathroom or Bedroom Installation:

- The dryer MUST be exhausted to the outdoors.
- The installation must conform with the local codes, or in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.

Minimum Clearance other than Alcove or Closet Installations:

- Minimum clearances to combustible surfaces 0" both sides, 3" rear.

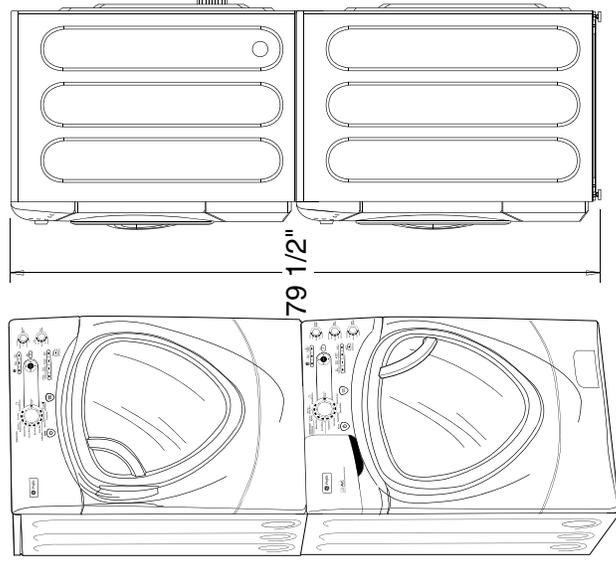
For more information on venting kits and accessories, please call 1-800-GE-CARES.

For answers to your Monogram®, GE Profile™ or GE® appliance questions, visit our website at ge.com or call GE Answer Center® service, 800.626.2000.



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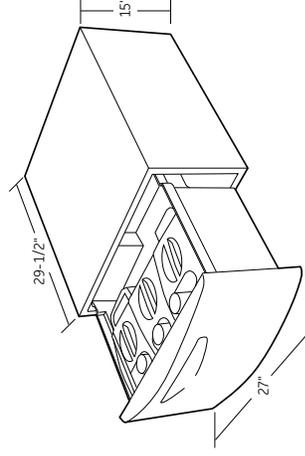
Stacked Dimensions (in inches)



SmartDispense™ Pedestal Dimensions (in inches)

SPBD880JMG - Champagne SPBD880JWW - White

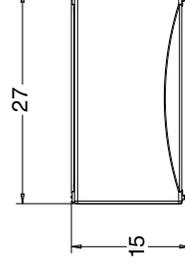
This optional 15" pedestal raises the door opening and height of the washer or dryer. Feet on 15" pedestal allow it to adjust to 15-3/8" height.



Storage Pedestal Dimensions (in inches)

SPSD157JMG - Champagne SPSD157JWW - White

This optional 15" pedestal raises the door opening and height of the washer or dryer. Feet on 15" pedestal allow it to adjust to 15-3/8" height.



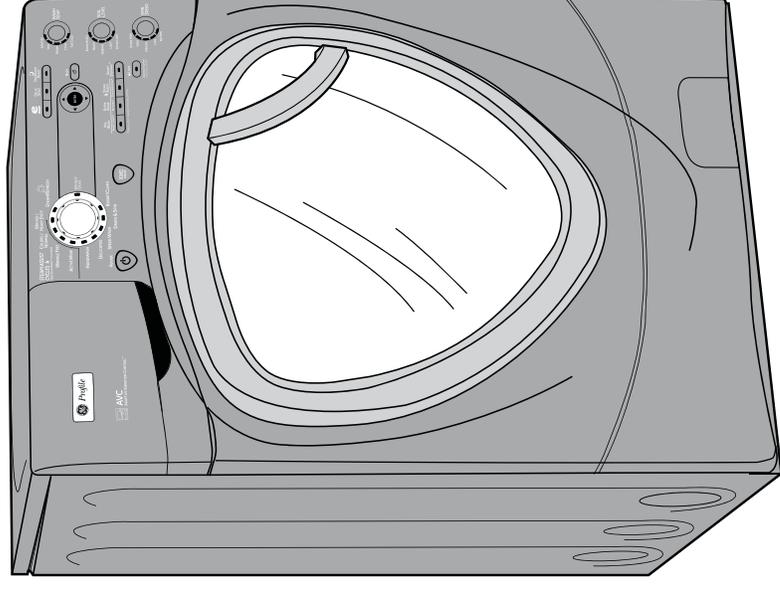
Listed by
Underwriters
Laboratories

PFWS4600L/PFWS4605L

GE Profile 4.3 DOE cu. ft. stainless steel capacity frontload washer with Steam

Features and Benefits

- Overnight Ready - A small load is washed and ready to wear in 8 hours or less without changing the load from the washer to the dryer
- Steam Refresh/Steam Assist - Steam Refresh helps reduce wrinkles and odors and rejuvenates fabrics, while Steam Assist penetrates fabrics to dissolve soils and help remove tough stains
- ENERGY STAR® qualified and CEE Tier III rated - Meets or exceeds federal guidelines for energy efficiency for year-round energy and money savings
- Adaptive Vibration Control (AVC) - Laundry room on the second floor? No problem! AVC adapts and optimizes spin patterns reducing vibration and sound no matter where your laundry room is located
- Specialty cycles - Pre-set cycles take specific care of 24 types of specialty loads including performance fabrics, fleece, pet bedding, and bras and hosiery
- eWash option - Energy-saving option uses a cold water wash on select cycles without sacrificing performance
- SmartDispense™ technology - Pedestal holds up to six months of detergent and fabric softener* and dispenses the right amount at the right time
- Stain Inspector™ system - The most comprehensive stain removal system available treats over 40 common stains, from grass stains to grease
- 1300 RPM spin speed - Fast spin speeds remove water efficiently and minimize dry time
- ADA Compliant
- Model PFWS4605LMG – Champagne
- Model PFWS4600LWW – White



Modified Energy Factor (MEF)	2.69
Water Factor (WF)	3.9



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PFDS450EL/PFDS455EL

GE Profile 7.5 cu. ft. stainless steel capacity frontload dryer with Steam

Dimensions and Installation Information (in inches)

Electric Dryer Rating	
240V	5600W, 24A, 60Hz

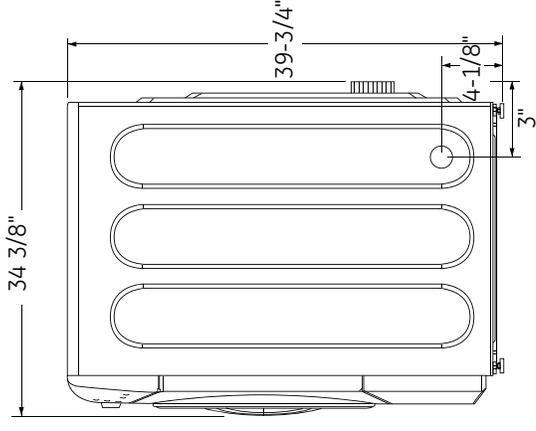
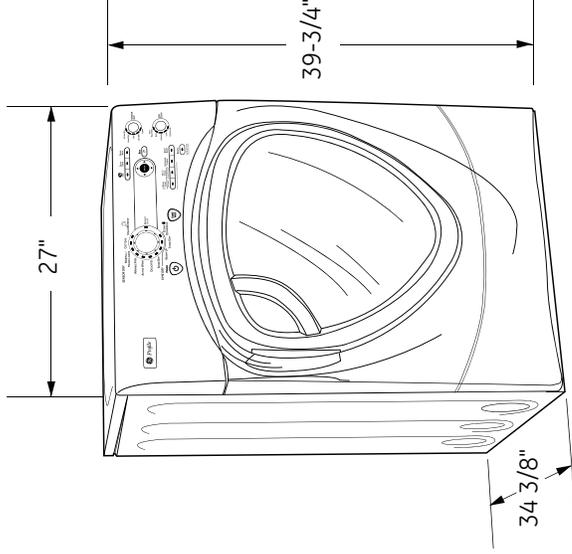
Exhaust Options: 4-way via rear, left, right and bottom.

Circuit Requirements: An individual, properly grounded branch circuit, protected by a 30-amp circuit breaker or a time-delay fuse, is required.

LP Conversion Kit: WE25M46

Note: Dryer wall outlet must be located within 36" of service cord entry and accessible when dryer is mounted in position.

Installation Information: For complete information, see installation instructions packed with your dryer.



For answers to your Monogram®, GE Profile™ or GE® appliance questions, visit our website at ge.com or call GE Answer Center® service, 800.626.2000.



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Specification Revised 10/10

270182

PFDS450EL/PFDS455EL

GE Profile 7.5 cu. ft. stainless steel capacity frontload dryer with Steam

Special Installation Requirements:

Stacked Installation:

- Brackets for stacking dryer over washer are available at an additional cost

Alcove or Closet Installation:

- If your dryer is approved for installation in an alcove or closet, it will be stated on a label on the dryer back.
- The dryer MUST be exhausted to the outside.
- Minimum clearances between dryer cabinet and adjacent walls or other surfaces are: 0" either side, 3" front and rear
- Minimum vertical space from floor to overhead cabinets, ceilings, etc. is 52".
- Closet doors must be louvered or otherwise ventilated and must contain a minimum of 60 sq. in. of open area equally distributed. If this closet contains both a washer and a dryer, doors must contain a minimum of 120 sq. in. of open area equally distributed.
- No other fuel-burning appliance shall be installed in the same closet with a gas dryer.

Bathroom or Bedroom Installation:

- The dryer MUST be exhausted to the outdoors.
- The installation must conform with the local codes, or in the absence of local codes, with the National Electric Code and National Fuel Gas Code, ANSI Z223 for gas dryers.

Minimum Clearance other than Alcove or Closet Installations:

- Minimum clearances to combustible surfaces 0" both sides, 3" rear.

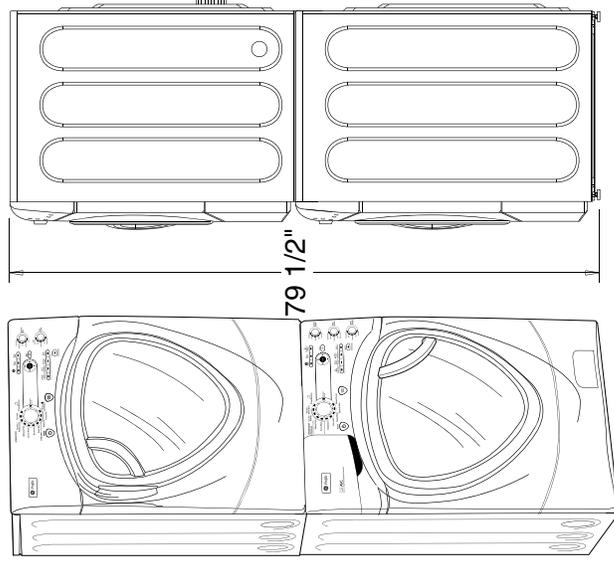
For more information on venting kits and accessories, please call 1-800-GE-CARES.

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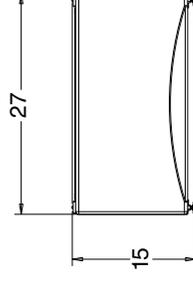
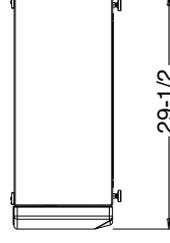
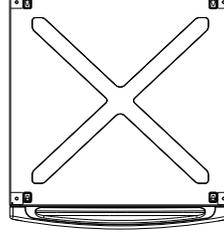
Stacked Dimensions (in inches)



Storage Pedestal Dimensions (in inches)

SPSD157JMG - Champagne SPSD157JWW - White

This optional 15" pedestal raises the door opening and height of the washer or dryer. Feet on 15" pedestal allow it to adjust to 15-3/8" height.



Specification Revised 10/10

270182

PFDS450EL/PFDS455EL

GE Profile 7.5 cu. ft. stainless steel capacity frontload dryer with Steam

Dryer Exhausting Information – Metal Duct Only

For complete information, see installation instructions packed with your dryer.

Ducting Materials: For best performance, this dryer should be vented with 4" diameter all rigid metal exhaust duct. If rigid metal duct cannot be used, then UL-listed flexible metal (semi-rigid) ducting can be used (Kit WX08X10077). In special installations, it may be necessary to connect the dryer to the house vent using a flexible metal (foil-type) duct. A UL-listed flexible metal (foil-type) duct may be used ONLY in installations where rigid metal or flexible metal (semi-rigid) ducting cannot be used AND where a 4" diameter can be maintained throughout the entire length of the transition duct. Please see installation instruction packed with your dryer for complete instructions when using flexible metal (foil type) ducting.

Exhaust Length Calculation:

1. Determine the number of 90° turns needed for your installation. If you exhaust to the side or bottom of dryer, add one turn.
2. The maximum length of 4" rigid (aluminum or galvanized) duct which can be tolerated is shown in the table.

A turn of 45° or less may be ignored. Two 45° turns within the duct length should be treated as a 90° elbow.

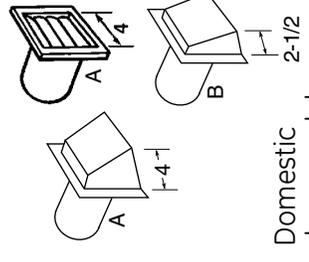
A turn over 45° should be treated as a 90° elbow.

Dryers **must** be exhausted to the outside.

Caution: For personal safety do not terminate exhaust into a chimney, under any enclosed house floor (crawl space), or into an attic, since the accumulated lint could create a fire hazard or moisture could cause damage. Never terminate the exhaust into a common duct or plenum with a kitchen exhaust, since the combination of lint and grease could create a fire hazard.

Exhaust ducts should be terminated in a dampered wall cap to prevent back drafts, bird nesting, etc. The wall cap must also be located at least 12" above the ground or any other obstruction with the opening pointed down.

For more information on venting kits and accessories, please call 1-800-GE-CARES.



	Number of 90° turns	Best performance	
		A 4" opening	B 2-1/2" opening
Domestic dryer models	0	150 ft.	127 ft.
	1	140 ft.	117 ft.
7.5 and 7.3 cu. ft. capacity electric and gas dryers	2	130 ft.	107 ft.
	3	120 ft.	97 ft.
	4	110 ft.	87 ft.



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PFDS450EL/PFDS455EL

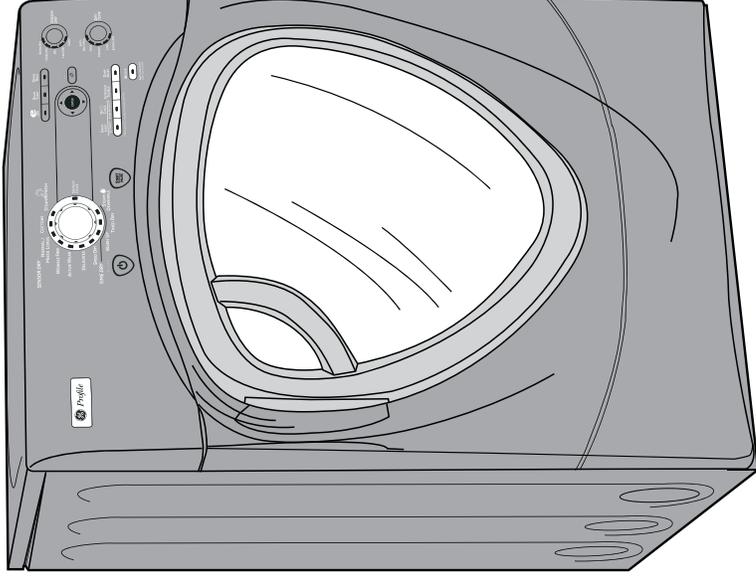
GE Profile 7.5 cu. ft. stainless steel capacity frontload dryer with Steam

Features and Benefits

- Steam Refresh/Steam Dewrinkle - Steam Refresh helps reduce wrinkles, odors and rejuvenates fabrics, while Steam Dewrinkle reduces wrinkles and freshens clean clothes
- DuoDry™ system - Dual motors, dual moisture sensors and dual thermistors continually monitor air temperature to provide even heat for optimal drying performance and a variable heater delivers constant heat, eliminating extreme temperature changes
- eDry option - Energy-saving option reduces dry temperatures on select cycles without sacrificing performance
- Specialty cycles - Pre-set cycles take specific care of 24 types of specialty loads including performance fabrics, fleece, pet bedding, and bras and hosiery
- Baffle Dry system - Built-in dryer rack and hanger clip design adds drying options for hard-to-dry items and delicates
- CleanSpeak™ communication system - The washer communicates electronically with the dryer to preset dry cycles and help save time
- Speed Dry - Quickly dries items and small loads for families on the go
- Up to 150 ft. venting capability - 150 ft. equivalent venting provides flexible installation
- ADA Compliant
- Model PFDS455ELMG – Champagne
- Model PFDS450EL – White



imagination at work



JTS10SP

GE® 30" Built-In Single Wall Oven

Dimensions and Installation Information (in inches)

KW Rating	
240V	2.4
208V	1.8
Breaker Size	
240V	20 Amps
208V	20 Amps

Most 30" Wall Cabinets can be used with this unit.

Note: These ovens are not approved for stackable installations.

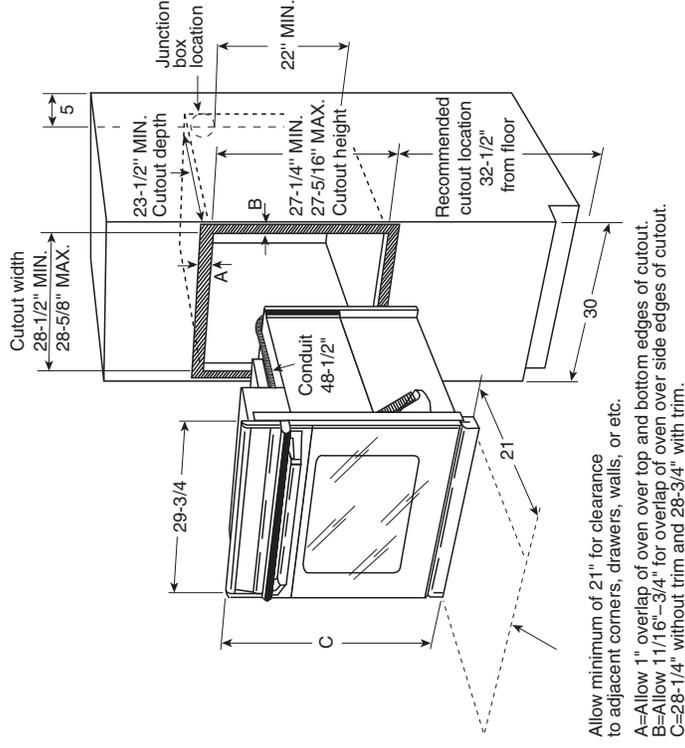
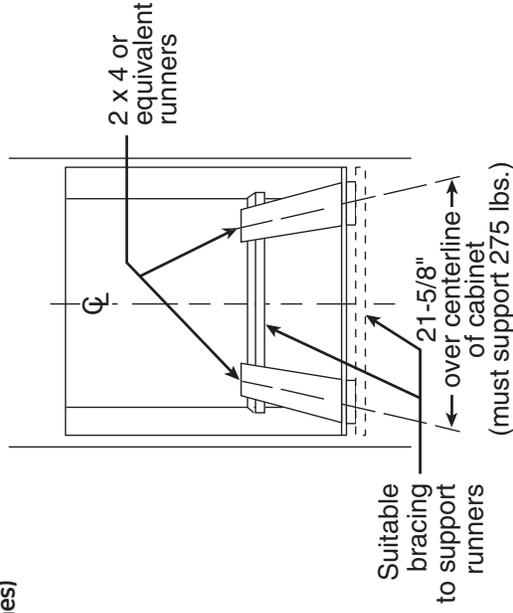
Note: Cabinets installed adjacent to wall ovens must have an adhesion spec of at least a 194°F temperature rating.

Door handle protrudes 3" from door face. Cabinets and drawers on adjacent 45° and 90° walls should be placed to avoid interference with the handle.

Installation Information: Before installing, consult installation instructions packed with product for current dimensional data.

Electric wall ovens are not approved for installation with a plug and receptacle. They must be hard wired in accordance with installation instructions.

Side-by-side installations require at least 2" between cutouts.



Allow minimum of 2 1/4" for clearance to adjacent corners, drawers, walls, or etc.

A=Allow 1" overlap of oven over top and bottom edges of cutout.
B=Allow 1 1/16"-3/4" for overlap of oven over side edges of cutout.
C=28-1/4" without trim and 28-3/4" with trim.



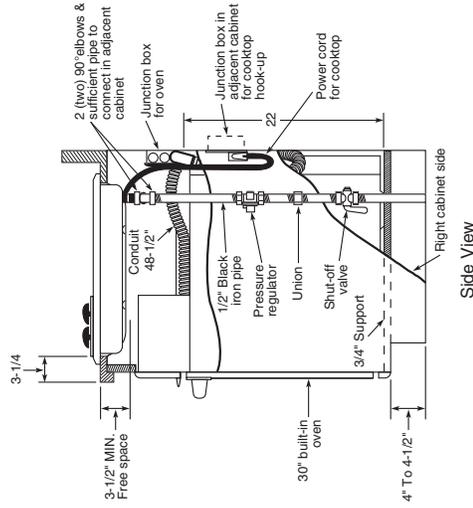
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JTS10SP GE® 30" Built-In Single Wall Oven

Optional Undercounter Installation Dimensions (in inches)



Side View

This installation is to achieve minimum gap between bottom of countertop and control panel.

Note: For this installation, the bottom trim **will not** be flush with a typical 4" toe kick.

Note: Cabinets installed adjacent to wall ovens must have an adhesion spec of at least a 194°F temperature rating.

Note: 36" radiant and induction cooktops are approved for use over GE 30" single wall ovens only. 30" radiant and induction cooktops are approved for use over GE 30" and GE 27" single wall ovens. Refer to cooktop and wall oven installation information packed with products for current dimensional data.

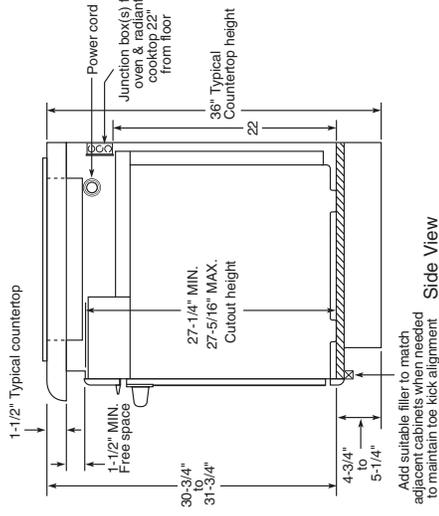
Installation Information: Before installing, consult installation instructions packed with product for current dimensional data.

For answers to your Monogram®, GE Profile™ or GE® appliance questions, visit our website at ge.com or call GE Answer Center® service, 800.626.2000.



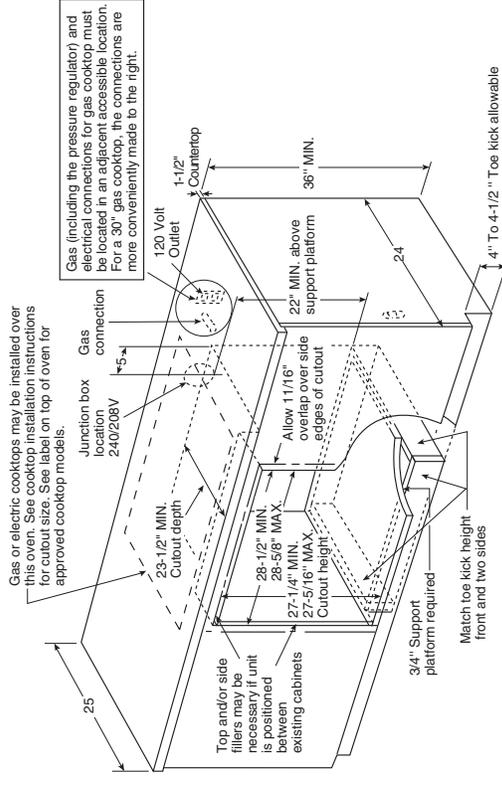
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Optional Undercounter Installation With Electric Cooktop Dimensions (in inches)



Side View

Undercounter Installation

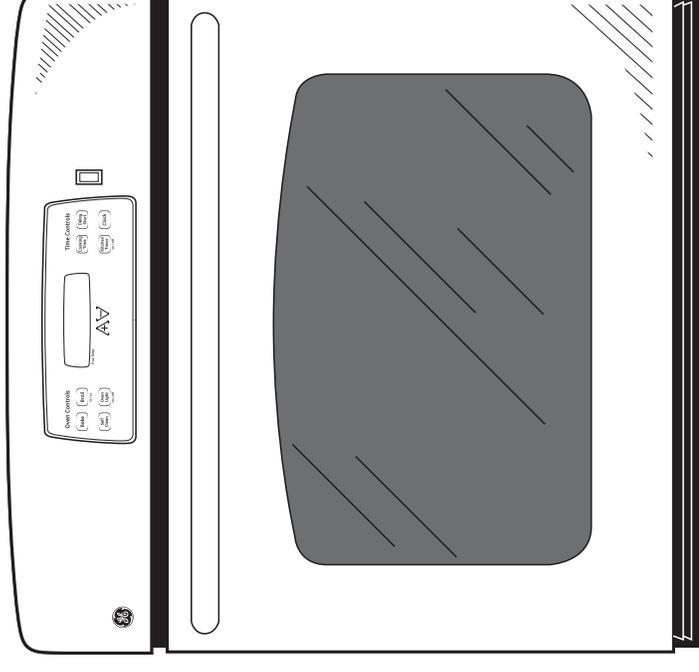


JTS10SP

GE® 30" Built-In Single Wall Oven

Features and Benefits

- Standard Clean Oven - Smooth surface and rounded corners make clean-up quick and easy
 - Super-large Oven Capacity - Remarkably large oven interior is ideal for holidays, dinner parties and everyday family cooking
 - Electronic Oven Controls - Electronic pads on the control panel are easy to operate with just a touch
 - Interior Oven Light - Bright interior light helps you check on the progress of your cooking
 - Hidden Bake Oven Interior - Conceals the lower oven bake element to eliminate hard-to-reach areas that collect food and spills for easy cleaning
 - Heavy-duty Oven Racks - Tough, durable racks include 50% thicker crossbars for extra strength
 - Variable Broil - The choice is yours: High Broil for beef to seal in the juices, or Low Broil for poultry, when it needs to cook more thoroughly.
 - Certified Sabbath Mode - Convenient mode keeps the oven warm in accordance within the restrictions of the kosher kitchen
 - Multiple Oven Rack Positions - Several positions allow you to adjust the oven racks to accommodate any size cookware
 - Audible Preheat Signal - Convenient signal alerts you when the oven reaches your desired temperature
 - Model JTS10SPSS - Stainless steel
- For answers to your Monogram® GE Profile™ or GE® appliance questions, visit our website at ge.com or call GE Answer Center® service, 800.626.2000.



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Specification Created 5/09

320221

GLD5708/5768V GE® Tall Tub Built-In Dishwasher

Dimensions and Installation Information (in inches)

Electrical Rating	
Voltage AC.....	120
Hertz.....	60
Total connected load amperage.....	10
Calrod® heater watts max.....	875

For use on adequately wired 120-volt, 15-amp circuit having 2-wire service with a separate ground wire. This appliance must be grounded for safe operation.

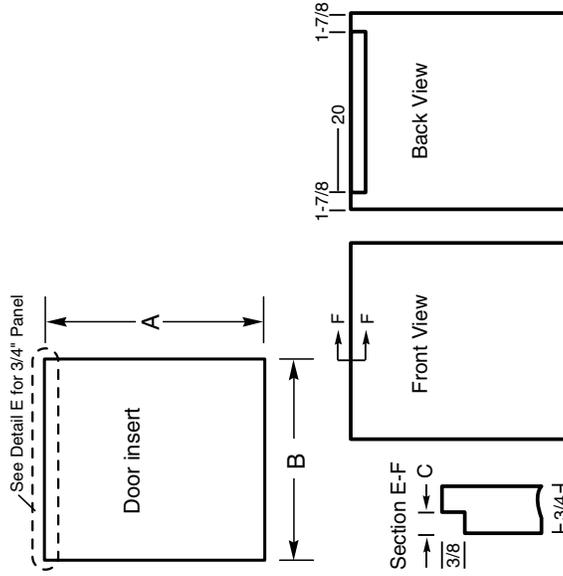
Note: The rough cabinet opening must be at least 24" deep, 24" wide and approximately 34-1/2" high from floor to underside of the countertop. Dishwasher must not be installed more than 10 feet from sink for proper drainage. All plumbing and electrical work must be in accordance with local codes. The power cord and connections must comply with the National Electrical Code Section 422 and/or local codes and ordinances. The cord must be no longer than 6 ft. from the junction box to the receptacle.

Installation Information: Before installing, consult installation instructions packed with product for current dimensional data.

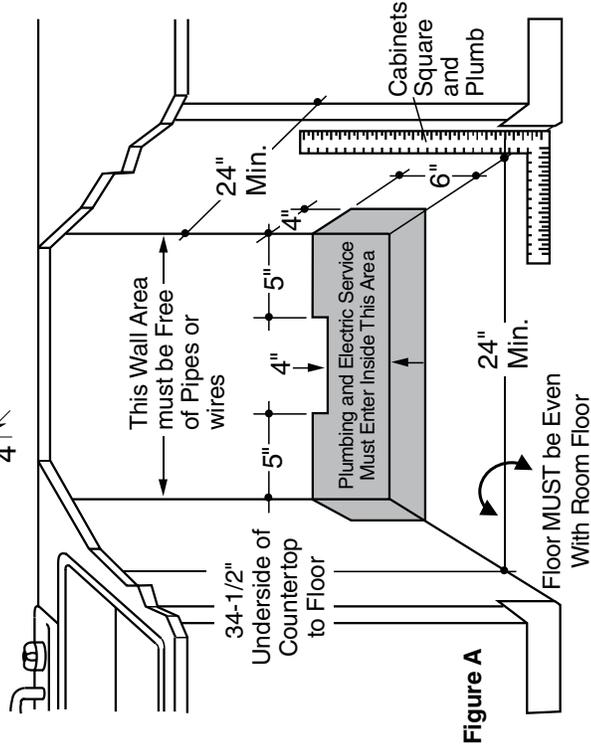
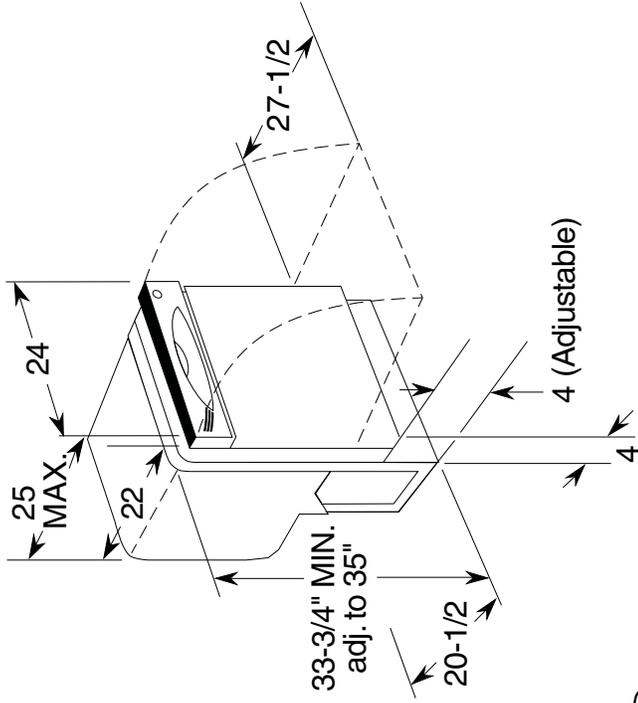
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Kit	A	B	C	Panel Thickness
GPF525	25-1/4"	23-1/2"	N/A	1/4"
GPF575	25-1/2"	23-5/8"	1/4"	3/4"



Listed by Underwriters Laboratories



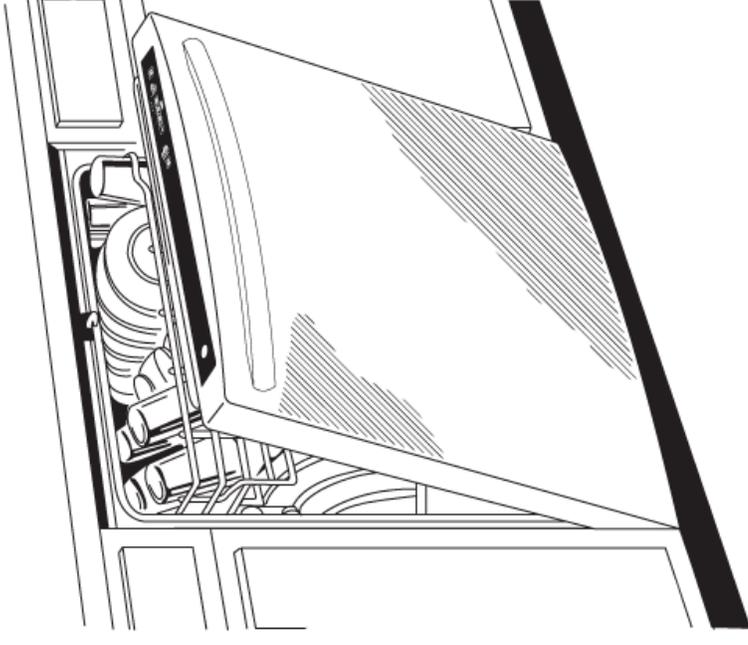
As an ENERGY STAR® partner, GE has determined that this product meets the ENERGY STAR guidelines for energy efficiency.

GLD5708/5768V

GE® Tall Tub Built-In Dishwasher

Features and Benefits

- 5-stage filtration with Piranha™ hard food disposer - 5 self-cleaning filters ensure clean dishes
- Dedicated silverware jets - Highly pressurized spray jets target the silverware area for improved cleaning
- Steam PreWash - Loosens tough soils before any cycle virtually eliminating the need for soaking or pre-rinsing dishes
- Natural convection heated dry option - A drying element effectively dries dishes reducing the need to towel dry after unloading
- Two-pump system - One small pump for washing/rinsing and one small pump to remove soils provides excellent wash performance with reduced sound
- Pearlescent gray nylon deep-tiered rack with StemSafe™ - Long-lasting, durable nylon coated racks resist rust and secure dishes
- ENERGY STAR® qualified and CEE Tier II rated - Meets or exceeds federal guidelines for energy efficiency for year-round energy and money savings
- Model GLD5708VWW - White on white
- Model GLD5708VBB - Black on black
- Model GLD5768VSS - Stainless steel



imagination at work

GTH18ISX GE® ENERGY STAR® 18.0 Cu. Ft. Top-Freezer Refrigerator

Dimensions and Installation Information (in inches)

Overall Dimensions	Height to top of hinge (in.) A	66-5/8
	Height to top of case (in.) B	66-1/8*
	Case depth without door (in.) C	27-1/2
	Case depth less door handle (in.) D	30-1/4
	Case depth with door handle (in.) E	32-1/8
	Depth with fresh food door open 90° (in.) F	58-1/8
	Width (in.) G	29-1/2
Air Clearances	Width with door open 90° inc. door handle (in.) H	32
	Each side (in.)	1/8
	Top (in.)	1
	Back (in.)	1

*Height to mid-freezer (in.): 53-15/16"

Note: All Top-Freezer No-Frost Right-Hand Refrigerator Doors:
As you face the front of the refrigerator, the handle is on your left and the hinges are on your right.

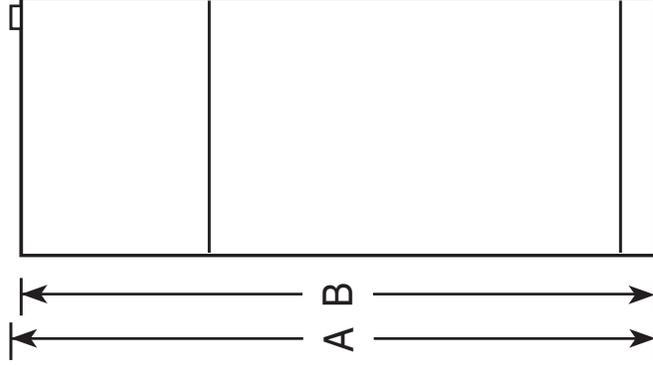
All Top-Freezer No-Frost Left-Hand Refrigerator Doors:
As you face the front of the refrigerator, the handle is on your right and the hinges are on your left.

For answers to your Monogram®, GE Profile™ or GE® appliance questions, visit our website at ge.com or call GE Answer Center® service, 800.626.2000.

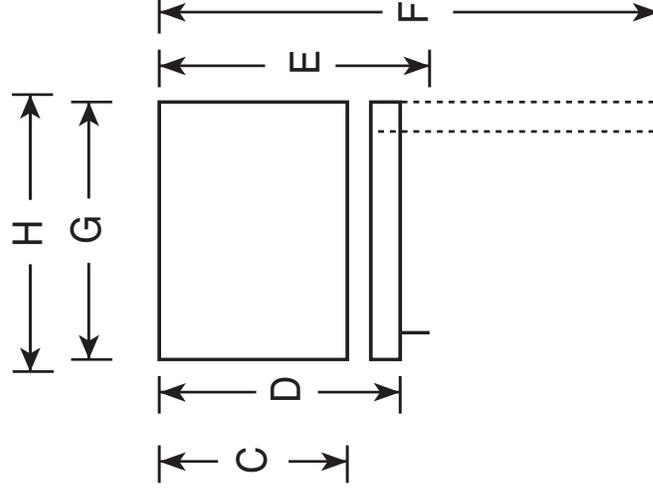


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Front View



Top View



Total volume and shelf area are calculated by the Association of Home Appliance Manufacturers' standards.



Listed by Underwriters Laboratories

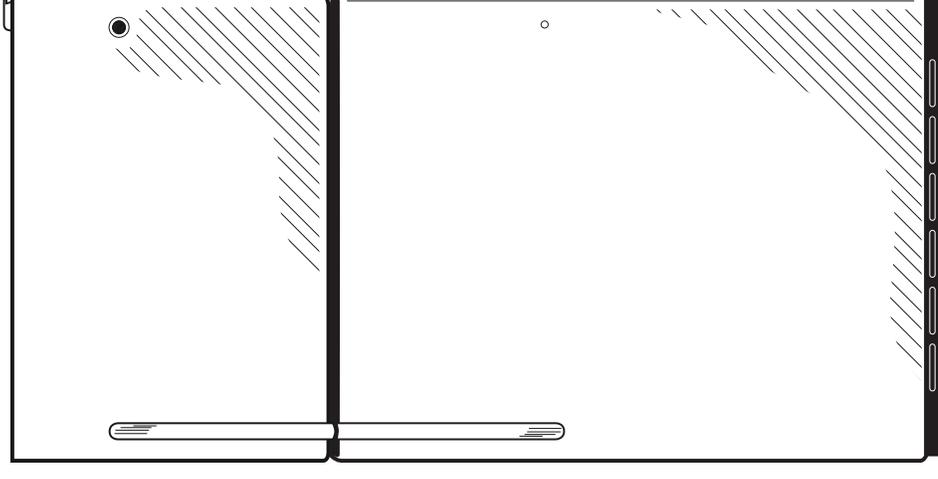


As an ENERGY STAR® partner, GE has determined that this product meets the ENERGY STAR guidelines for energy efficiency.

GTH18ISX GE® ENERGY STAR® 18.0 Cu. Ft. Top-Freezer Refrigerator

Features and Benefits

- Adjustable Glass Shelves - Lets consumers maximize usable storage space
- Upfront Temperature Controls - Easy-to-use controls are located in an easy-to-reach position
- Vegetable/Fruit Crispers - For easy storage of your fruits and vegetables
- Spillproof Freezer Floor - Seamless design offers easy cleanup
- Gallon Door Storage - Makes room for milk and any other gallon size containers
- Contoured Doors - Create a high-fashion look with gently rounded doors and edges
- Model GTH18ISXSS - Stainless steel



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As an ENERGY STAR® partner, GE has determined that this product meets the ENERGY STAR guidelines for energy efficiency.

Specification Created 6/07
310380

ICE MAKER

DR.NO. 197D7636G003

WR30X10093

MODEL CAN27

115V,60HZ, 1.6AMP /100V,50HZ

SA9200

SA[®] US
C

DCL



22ST IH

MADE IN INDONESIA

PHP900SM

GE Profile™ 30" Electric Induction Cooktop

Dimensions and Installation Information (in inches)

KW Rating	
240V	7.7
208V	5.8
Breaker Size	
240V	40 Amps†
208V	40 Amps†

†Note: Check local codes for required breaker size
Important: Allow 12" minimum vertical clearance between the cooktop bottom and any combustible surfaces. Free area not required when installing wall oven underneath cooktop. Refer to installation instructions. Requires a 15" minimum from cooktop to adjacent overhead cabinets. Units are furnished with a 36" flexible armored cable.

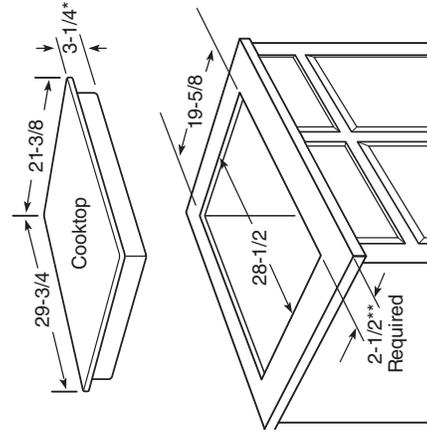
Note: 36" Ribbon cooktops are approved for use over GE 30" Single Wall Ovens and Warming Drawers only. Refer to cooktop and wall oven/warming drawer installation instructions packed with product for current dimensional data. If installed with a GE Profile™ Telescopic Downdraft System, consult both the cooktop and downdraft installation instructions packed with product before installing. Cooktop gas/electric supply may need to be re-routed to install downdraft. The countertop must be at least 26" deep with a flat surface area of 23-1/2" or more, front to back. In addition, other clearances to the front edge of the countertop must be considered, especially on raised bullnose countertops. Consult cabinet and countertop manufacturer's specs for flush mount installation prior to install.

Installation Information: Before installing, consult installation instructions packed with product for current dimensional data.

For answers to your Monogram®, GE Profile™ or GE® appliance questions, visit our website at ge.com or call GE Answer Center® service, 800.626.2000.

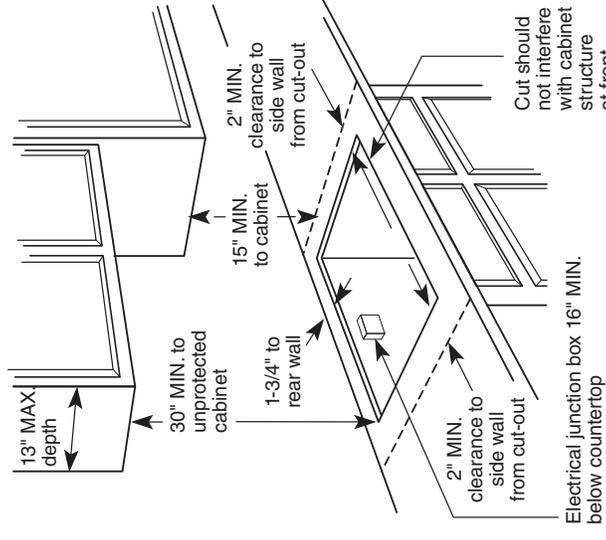


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*Depth of unit at conduit connection location (rear) is 6-1/4" on models PP980/975/950/945 and 4-5/8" on models PHP960/900, PP972/962/942/932/912 and JP6SS/356/346/340.

**Raised bull nose countertops may require up to 3/8" additional clearance to prevent interference with curved front.



Above illustration intended for dimensional reference only. Refer to photograph for actual product appearance.

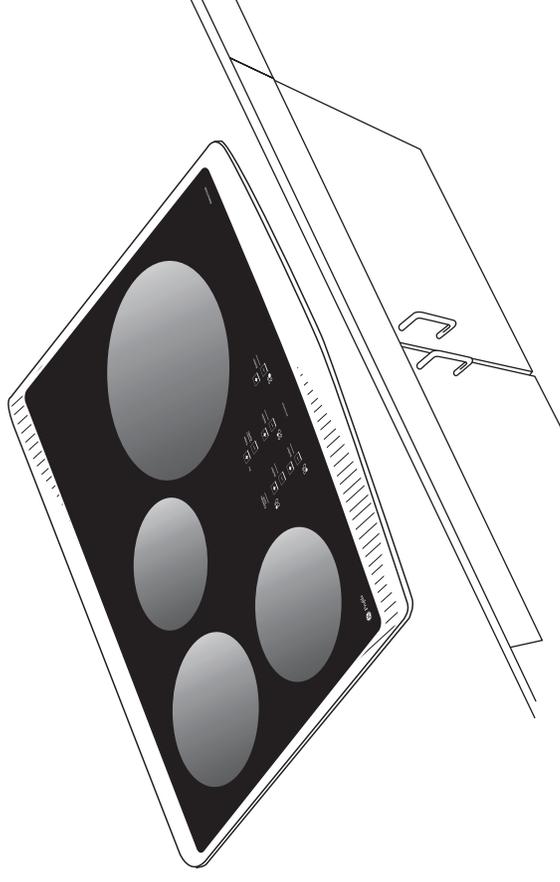


PHP900SM

GE Profile™ 30" Electric Induction Cooktop

Features and Benefits

- Induction Elements - Powerful yet precise induction elements generate heat directly to the cookware leaving the unused portion of the element unheated and easier to clean
- 11" Element - Offers a large 11" surface, wide enough to handle bigger pots and pans and accommodate family meals of any size
- 11" Element - At it's highest setting, the 11" element has 3700 watts of power, providing an incredibly fast time to boil water
- Electronic Touch Controls - Offer easy, point-and-cook convenience
- 19 Control Settings - Choose from 19 different power levels to select the temperature that is perfect for your meal
- Pan Presence Sensor - Detects when a burner element is left "on" and automatically shuts it off when not in use
- Control Lock Capability - Provides the ability to lock the cooktop's controls, helping protect from unintended activation
- Seamless Appearance - Installs nearly flush with countertop for a seamless appearance
- Electronic Kitchen Timer - Provides convenient notification to help coordinate meal preparation and cooking times
- Stainless Steel Frame - Brings an added touch of style to any decor and perfectly complements all other stainless steel appliances in the kitchen
- Frameless Design - A smooth and seamless cooktop surface makes cleaning quick and easy
- Model PHP900SMSS - Stainless steel



imagination at work

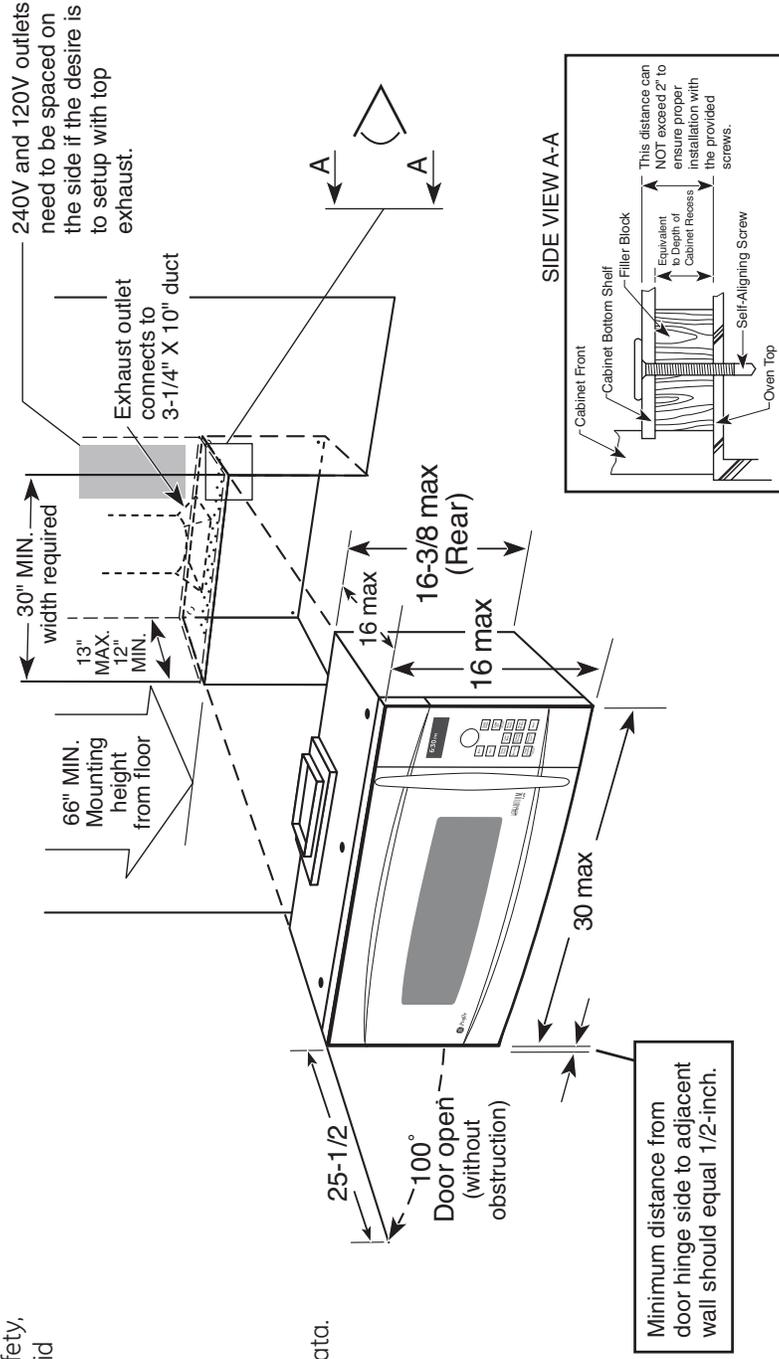
PSA1200R/1201R Advantium® 120 Above-the-Cooktop Oven

Dimension Information (in inches)

Important: Please read carefully. For personal safety, this appliance **must** be properly grounded to avoid severe or fatal shock.

Do not, under any circumstances, cut, deform, or remove any of the prongs from the power cord. Do not use with an extension cord.

Installation Information: This information is not intended to be used for installing unit described. Before installing, consult installation instructions packed with product/kit for current dimensional data.



Note: Outside venting is optional. Vent (duct) can be horizontal or vertical.

For answers to your Monogram®, GE Profile™ or GE® appliance questions, visit our website at geappliances.com or call GE Answer Center® service, 800.626.2000.



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PSA1200R/1201R Advantium® 120 Above-the-Cooktop Oven

Dimension Information (in inches)

Hood Exhaust Duct

Outside ventilation requires a HOOD EXHAUST DUCT. Read the following carefully.

EXHAUST CONNECTION:

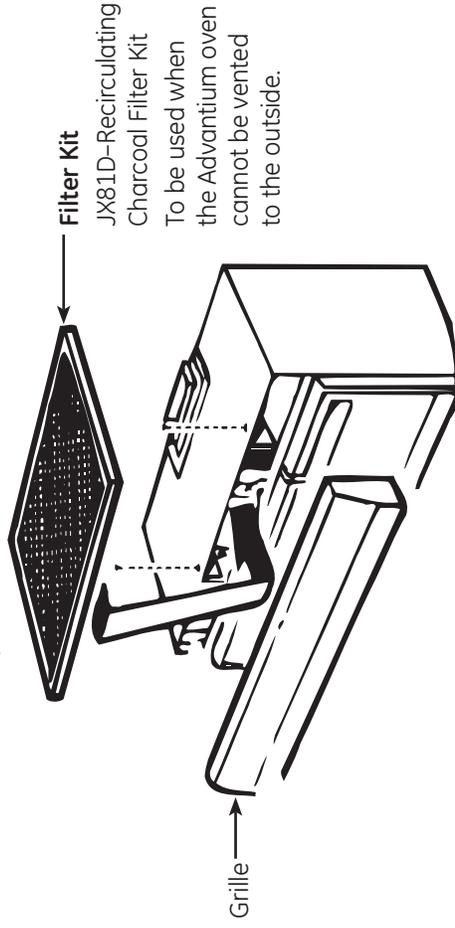
The hood exhaust has been designed to mate with a standard 3-1/4" x 10" rectangular duct.

If a round duct is required, a rectangular-to-round transition adaptor must be used. Do not use less than a 6" diameter duct.

REAR EXHAUST:

If a rear or horizontal exhaust is to be used, care should be taken to align exhaust with the space between studs, or wall should be prepared at the time it is constructed by leaving enough space between the wall studs to accommodate exhaust.

Filter Kit Accessory



For answers to your Monogram®, GE Profile™ or GE® appliance questions, visit our website at geappliances.com or call GE Answer Center® service, 800.626.2000.



imagination at work

MAXIMUM DUCT LENGTH:

For satisfactory air movement, the total duct length of 3-1/4" x 10" rectangular or 6" diameter round duct should not exceed 140 equivalent feet.

ELBOWS, TRANSITIONS, WALL AND ROOF CAPS, etc.,

present additional resistance to airflow and are equivalent to a section of straight duct which is longer than their actual physical size. When calculating the total duct length, add the equivalent length of all transitions and adaptors plus the length of all straight duct sections. The chart below shows the approximate feet of equivalent length of some typical ducts.

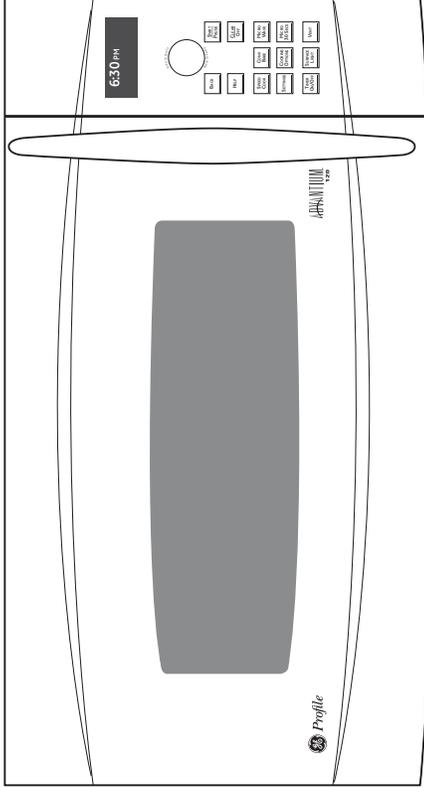
Duct	Equivalent
A. Rectangular-To-Round Transition Adaptor	5 Ft.
B. Wall Cap	40 Ft.
C. 90° Round Elbow	10 Ft.
D. 45° Round Elbow	5 Ft.
E. 90° Rectangular Elbow	25 Ft.
F. 45° Rectangular Elbow	5 Ft.
G. Roof Cap	24 Ft.



PSA1200R/1201R Advantium® 120 Above-the-Cooktop Oven

Features and Benefits

- Speedcook Technology - Cooks up to 4 times faster than a conventional oven
- 4 Ovens In 1 To Meet Your Cooking Needs - Speedcook, True European Convection, Warming/Proofing, Sensor Microwave
- Optimizes cook time for consistent results
- Saves valuable time by eliminating preheating
- Over 175 preprogrammed recipes
- 2 full-width oven racks for multi-level cooking
- Model PSA1200RWW – White on white
- Model PSA1200RBB – Black on black
- Model PSA1201RSS – Stainless steel





Legend I --- 13D Residential Pump Systems

.75 – 3 hp



5 – 7.5 hp



LEGEND I SPECIFICATIONS

Basic System Includes:

- Stainless Steel Pump Components (304L)
- Stainless Steel Sensing Line (316)
- Pressure Switch (pre-wired to motor): factory set at 40psi On & 60 psi Off, cut in setting range 5-60 psi w/ 20-30 psi differential, cut out range 25-80 psi. Call if different range is required.
- Industrial-grade, unidirectional, non-overloading motor
- Discharge Check Valve
- Lockable/Indicating Control Valve (Per NFPA 13D)
- Liquid filled gauge
- Drain
- All piping/valves are bronze/brass
- Stainless-lined Expansion Tank (Pre-charged & re-chargeable to 35 psi, minimizes surges, stored energy acts like jockey pump)

Basic System Specifications:

- Suction Connection: 1.25" / 1.5" / 2" fnpt depending on model
- Discharge Connection: 1¼" fnpt
- 1Ø / 60hz ODP continuous duty unidirectional motors (optional TEFC motors)
- Std voltage 230v (per NFPA 13D)
- 5 hp & 7.5 hp incorporates auxiliary motor starter in addition to the pressure switch
- 5 hp & 7.5 hp includes adjustable overload protection

Service Factor Amps Required at 230V

HP	¾	1	1-½	2	3	5	7.5
Amps Req'd	8.6	8.6	11.1	13.5	15.9	27.6	42.6

* Amps may vary depending on motor manufacturer

Subject to change without notice.

CB Marketing, Inc. 12559 South Laramie Avenue, Alsip IL 60803

Phone 708-202-0033 Fax 708-385-5415

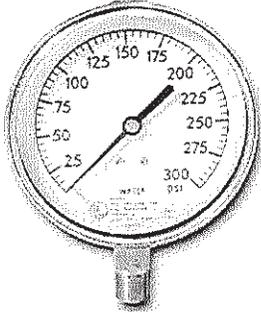
www.cbmarketing.com

data sheet

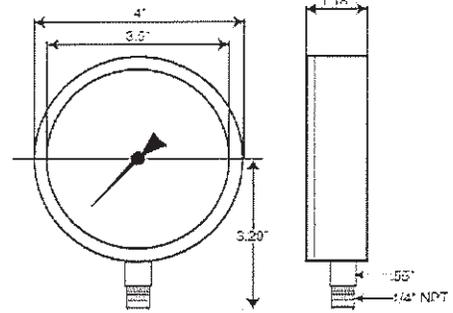
ARGCO



Fire Sprinkler Pressure Gauges



0-300 psi water
0-300 psi air
0-300 psi air/water



Application: Fluid medium which does not clog connection port or corrode copper alloy. Specifically designed for the fire sprinkler industry.

Size: 4" (100 mm)

Accuracy $\pm 3\frac{2}{3}\%$ of span - 1 $\frac{1}{2}$ " (ASME B40.1 Grade B)

Working Range

Steady: 3/4 of full scale value

Fluctuating: 2/3 of full scale value

Short time: full scale value

Operating Temperature

Ambient: -40°F to 140°F (-40°C to 60°C)

Media: max. 140°F (+60°C)

Temperature Error

Additional error when temperature changes from reference temperature of 68°F (20°C) +0.4% for every 18° F (10°C) rising or falling. Percentage of span.

Standard Features

Connection Material: copper alloy

Lower mount (LM) - not available for 1 $\frac{1}{2}$ " size

1/4" NPT limited to wrench flat area

Bourdon Tube: Material: copper alloy C-type

Movement: Copper alloy, silicone dampened

Dia: White plastic with stop pin - black & red lettering

Pointer: Black aluminum

Case: Black polycarbonate

Approvals

UL listed (UL-393)

FM approved

Standard Scale

PSI

Window

Acrylic, ultrasonically welded to case

Standard Series • Type 110.10sp

Order Options

water

air/water

air

The information contained herein is produced in good faith and is believed to be reliable but is for guidance only. ARGCO and its agents cannot assume liability or responsibility for results obtained in the use of its product by persons whose methods are outside or beyond our control. It is the user's responsibility to determine the suitability of any of the products, methods of use, or preparation prior to use, mentioned in our literature. It is the user's responsibility to observe and adapt such precautions as may be advisable for the protection of personnel and property in the handling and use of any of our products.

FOR MORE INFORMATION CALL ARGCO AT 1-800-854-1015
OR LOG ONTO WWW.ARGCO.COM



FlameGuard™ CPVC FIRE SPRINKLER PIPING PRODUCTS

The information contained in this publication is based on current information and Product design at the time of publication and is subject to change without notification. Our ongoing commitment to product improvement may result in some variation. No representations, guarantees or warranties of any kind are made as to its accuracy, suitability for particular applications or results to be obtained therefrom. For verification of technical data or additional information not contained herein, please contact Spears® Technical Services Department [West Coast: (818) 364-1611—East Coast: (717) 938-9006].

General Information

RECOMMENDATIONS FOR INSTALLERS AND USERS:

Plastic piping systems should be ENGINEERED, INSTALLED and OPERATED in accordance with ESTABLISHED DESIGN AND ENGINEERING STANDARDS AND PROCEDURES for plastic piping systems. Suitability for the intended service application should be determined by the installer and/or user prior to installation of a plastic piping system. All Installation and maintenance personnel should be trained in the proper handling and installation requirements and precautions of plastic piping systems. PRIOR TO ASSEMBLY, all piping system components should be inspected for damage or irregularities. Mating components should be checked to assure that tolerances and engagements are compatible. Do not use any components that appear irregular or do not fit properly. Contact the appropriate manufacturer of the component product in question to determine usability. Consult all applicable codes and regulations for compliance prior to installation.

Installation must be made in accordance with Spears® Manufacturing Company
FlameGuard™ CPVC Fire Sprinkler Piping Products Installation Instructions - FG-3

NOTE — Individual or group instruction in correct solvent welding procedures is available by contacting your local distributor or your servicing Spears® Regional Distribution Center.

SOLVENT CEMENT CONNECTIONS — Spears® Manufacturing Company recommends the use of Spears® Two Step FS-1 primer with FS-3 solvent cement OR Spears® FS-5 One Step solvent cement for joining Spears® products. Use of solvent cementing products not approved for CPVC fire sprinkler systems, or failure to follow installation instructions will automatically void the warranty.

THREADED CONNECTION — Spears® Manufacturing Company recommends the use of Spears® BLUE 75™ Thread Sealant. This product has been tested by Spears® and the sealant manufacturer for compatibility with the Spears® CPVC fire sprinkler products. Consult the sprinkler head manufacturer before using this product. **WARNING: OTHER PIPE JOINT COMPOUNDS OR PASTES MAY CONTAIN SUBSTANCES THAT COULD CAUSE STRESS CRACKING IN THE CPVC OR OTHER FITTING COMPONENTS.** Care must be taken to avoid over torquing - generally 1 to 2 turns beyond finger tight is all that is required to make up a threaded connection. Factory testing has indicated 10-25 ft. lbs. of torque is adequate to obtain a leak free seal.

GASKET SEALED THREAD CONNECTIONS — This type of connection can only be made with Spears® TorqueSafe™ style Gasket Sealed Female Sprinkler Adapters. DO NOT USE ANY TYPE OF THREAD SEALANT WHEN INSTALLING THIS TYPE OF ADAPTER. Tape or paste may impair proper sealing and function. Testing has shown that hand tight until snug is all that is needed to seal this special connection.

NOT FOR USE WITH COMPRESSED AIR OR GASES

WARNING: DO NOT USE COMPRESSED AIR OR GAS TO TEST ANY PVC OR CPVC THERMOPLASTIC PIPING PRODUCT OR SYSTEM, AND DO NOT USE DEVICES PROPELLED BY COMPRESSED AIR OR GAS TO CLEAR SYSTEMS. THESE PRACTICES MAY RESULT IN EXPLOSIVE FRAGMENTATION OF SYSTEM PIPING AND COMPONENTS CAUSING SERIOUS OR FATAL BODILY INJURY.

Dimension Reference

G = (LAYING LENGTH) intersection of center lines to bottom of socket/thread; 90° elbows, tees, crosses; ± 1/32 inch.
H = Intersection of center lines to face of fitting; 90° elbows tees, crosses; ± 1/32 inch.
J = Intersection of center lines to bottom of socket/thread; 45° elbows; ± 1/32 inch
L = Overall length of fittings; ± 1/16 inch.

M = Outside diameter of socket/thread hub; ± 1/16 inch.
N = Socket bottom to socket bottom; couplings; ± 1/16 inch.
Q = Width of flats; ± 1/16 inch.
W = Height of cap; ± 1/16 inch.

CPVC FIRE SPRINKLER PIPE SDR 13.5 (ASTM F 442)

Part Number	Nominal Size		Average O.D.		Average I.D.		Approx. Weight Lbs./Ft.
	Inches	(mm)	Inches	(mm)	Inches	(mm)	
CP-007	3/4	(19.1)	1.050	(26.7)	.874	(22.5)	.181
CP-010	1	(25.4)	1.315	(33.4)	1.101	(28.2)	.280
CP-012	1-1/4	(31.8)	1.660	(42.2)	1.394	(35.6)	.418
CP-015	1-1/2	(38.1)	1.900	(48.3)	1.598	(40.7)	.550
CP-020	2	(50.8)	2.375	(60.3)	2.003	(50.9)	.872
CP-025	2-1/2	(63.5)	2.875	(73.0)	2.423	(61.5)	1.260
CP-030	3	(76.2)	3.500	(88.9)	2.950	(75.0)	1.900

Schedule 40

Sprinkler Pipe

Wheatland's Schedule 40 Sprinkler Pipe is a high quality sprinkler pipe offering you the full range of assurances you require. Schedule 40 Sprinkler Pipe has passed some of the toughest lab tests ever created for sprinkler pipe.

Made in the U.S.A. by Wheatland Tube Company means made to the highest standards for consistent quality.

Specifications and Approvals

Wheatland's schedule 40 Sprinkler Pipe is made from the highest quality steel in one of the nation's most modern and most complete pipe manufacturing plants. Our proprietary mill coating offers you a clean, corrosion and heat resistant surface that outlasts and outperforms standard lacquer coatings. Plus, this coating can be quickly and easily painted without special preparation. Or it may be hot-dipped galvanized to meet FM requirements for dry systems in accordance with the zinc coating specification of ASTM A795. Schedule 40 is also available as ASTM A 53 Type F, Grade A in NPS 1 - 6 and is UL Listed and FM Approved.

Wheatland's Schedule 40 Standard Wall Sprinkler Pipe meets or exceeds the following:

- UL Listed
- FM Approved
- ASTM A795, Type E, Grade A

Please refer to appropriate documentation for up-to-date listing and approval information. Specifications and descriptions are accurate as known at time of publication and are subject to change without notice.

Specifications										
NPS	Nominal O.D.		Nominal I.D.		Nominal Wall		Nominal Weight		UL CRR*	Pieces Lift
	in.	mm	in.	mm	in.	mm	lbs./ft.	kg/m		
1"	1.315	33.4	1.049	26.6	.133	3.38	1.68	2.50	1.00	70
1 1/4"	1.660	42.2	1.380	35.1	.140	3.56	2.27	3.39	1.00	51
1 1/2"	1.900	48.3	1.610	40.9	.145	3.68	2.72	4.05	1.00	44
2"	2.375	60.3	2.067	52.5	.154	3.91	3.66	5.45	1.00	30

* Calculated using Standard UL CRR formula, UL Fire Protection Directory, Category VIZY

* The CRR is a ratio value used to measure the ability of a pipe to withstand corrosion. Schedule 40 steel pipe is used as the benchmark (value of 1.0).



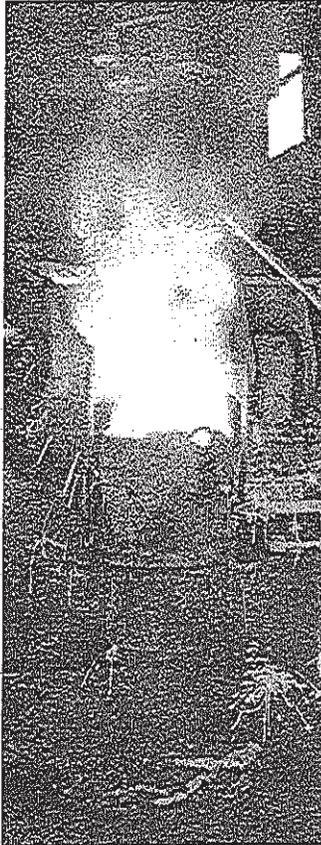
Wheatland Tube Company

1 Council Avenue, P.O. Box 608 Wheatland, PA 16161-0608

Ph 800.257.8182 Fax 724.346.7260

www.wheatland.com

Fittings Specs



MALLEABLE IRON THREADED FITTINGS

Standard Class 150 Specifications:

ANSI B1.20.1, Threads, B 16.3, Dimensions, Pressure Rating

ASTM A197, Material. A153, Galvanizing

Federal Spec: WWP 521

Pressure Ratings: 150 psig – Saturated Stream

300 psig – At 150 Degrees W. O. G.

U.L.C. and U.L. listed where applicable, FM approved

Extra Heavy Class 300 Specifications:

ANSI B1.20.1, Threads, B16.3, Dimensions, Pressure Rating

ASTM A197, Material A153, Galvanizing

Pressure Ratings: 300 psig – Saturated Stream

¼" - 1" – 2000 psig – At 150 Degrees W.O.G.

1 ¼" - 2" – 1500 psig – At 150 Degrees W.O.G.

2 ½" - 3" – 1000 psig – At 150 Degrees W.O.G.

U.L.C. and U.L. listed where applicable, FM approved

Union Specifications:

(Brass to Brass, Brass to Iron, Iron to Iron, Gasket Type, Dielectric Iron to Brass)

ANSI B1.20.1, Threads, B16.39, Dimensions, Pressure Rating

ASTM A197, Material. A153, Galvanizing

Federal Spec: WW-U-531

Pressure Ratings: Class 150: 150 psig – Saturated Stream

300 psig – At 150 Degrees W.O.G.

Class 250: 250 psig – Saturated Stream

500 psig – At 150 Degrees W.O.G.

Class 300: 300 psig – Saturated Stream

600 psig – At 150 Degrees W.O.G.

U.L.C. and U.L. listed where applicable, FM approved

Top Beam & C-Clamp Specifications:

Malleable Iron

ASTM A197, Material. A153, Galvanizing

3/8", 1/2" rod size

Supplied with set screw and lock nut

Clamp Range: Small mouth Beam Clamp & C-Clamp – ¾"
Large mouth Beam Clamp & C-Clamp – 1 ¼"

U.L.C. and U.L. listed where applicable, FM approved

CAST IRON THREADED FITTINGS

Standard Class 125 Specifications:

ANSI B1.20.1, Threads, B 16.4, Dimensions, Pressure Rating

ASTM A126, Material. A153, Galvanizing

Federal Spec: WWP 521

Pressure Ratings: 125 psig – Saturated Stream

175 psig – At 150 Degrees W. O. G.

Federal Spec: WW-P-501

U.L.C. and U.L. Listed Where Applicable

FM Approved Where Applicable

Plug and Bushing Specifications:

ANSI B1.20.1, Threads, B16.14, Dimensions, Pressure Rating

ASTM A197 (Malleable), A126 (Cast), Material A153, Galvanizing

Pressure Ratings: Malleable: 150 psig – Saturated Stream

300 psig – At 150 Degrees W.O.G.

Pressure Ratings: Cast: 125 psig – Saturated Stream

175 psig – At 150 Degrees W.O.G.

Federal Spec: WW-P-471

U.L.C. and U.L. Listed Where Applicable

FM Approved Where Applicable

Drainage Fitting Specifications:

ANSI B1.20.1, Threads, B16.12, Dimensions

ASTM A126, Material. A153, Galvanizing

Federal Spec: WW-F-941

Cast Iron Flange Specifications:

ANSI B1.20.1, Threads, B16.1, Dimensions, Pressure Rating

ASTM A126, Material. A153, Galvanizing

Pressure Ratings: 125 psig – Saturated Stream

175 psig – At 150 Degrees W.O.G.

Federal Spec: WW-F-406

U.L.C. and U.L. Listed Where Applicable

FM Approved Where Applicable

Cast Iron Flange Fitting Specifications:

ANSI B16.1, Pressure Rating

ASTM A126, Material

Pressure Ratings: 125 psig – Saturated Stream
175 psig – At 150 Degrees W.O.G.

Federal Spec: WW-F-406

U.L.C. and U.L. Listed Where Applicable

FM Approved Where Applicable

WARDLOX PLAIN-END FITTING SPECIFICATIONS

Housing: Cast Iron to ASTM A126 Class A
Set Screws: Carbon Steel, Cadmium Plated, Self-Locking
Gaskets: E.P.D.M. to ASTM D-2000 With Temperature Range of -30 to 230 °F
Threaded Outlets: Conform to ANSI B-1.20.1 Specifications
Pressure Ratings: 175 psig
U.L. Listed, FM Approved

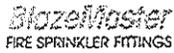
TEE-LOX MECHANICAL BRANCH CONNECTOR SPECIFICATIONS

Housing: Cast Iron to A126 Class A, Ductile to A536
Gasket: E.P.D.M. to ASTM D-2000
Hole Size: 1 3/16"
U-Bolt: Plated High Tensile Steel
Threaded Outlet: Conform to ANSI/ASME B-1.20.1 Specifications
Run Sizes: 1 1/4", 1 1/2", 2", 2 1/2"
Outlet Sizes: 1/2", 3/4", 1"
Pressure Ratings: 175 psig
U.L. Listed, FM Approved

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- [Fire Protection Products](#)
- [Lead-Free Products](#)
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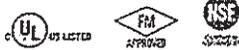
PRODUCTS & SERVICES

Products & Services > Fittings > Plastic > BlazeMaster® CPVC Fittings

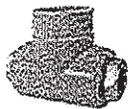


BLAZEMASTER® CPVC FITTINGS

All products on this page meet the following approvals:



(FIRST/PREVIOUS) 1, 2, 3 (NRC/LASIT)



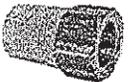
5011-3-3-S-BI-L
BlazeMaster® CPVC Back-to-Back Tee with Metal Thread Inserts

- For use with 5/8" drywall
- Size Range: 1/2" x 1/2" x 1"



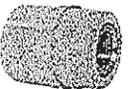
5011-3-3-S-BI-S
BlazeMaster® CPVC Back-to-Back Tee with Metal Thread Inserts

- For use with 1/2" drywall
- Size Range: 1/2" x 1/2" x 1"



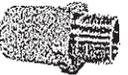
5003-BI
BlazeMaster® CPVC Female Adapter with Metal Threads

- Size Range: 3/4" - 2"



5003-S-BI
BlazeMaster® CPVC Female Sprinkler Head Adapter with Metal Thread Inserts

- Size Range: 3/4" x 1/2", 1" x 1/2" and 1" x 3/4"



5004-BI
BlazeMaster® CPVC Male Adapter with Metal Thread Inserts

- Size Range: 3/4" - 2"



5019-H
BlazeMaster® CPVC Solid Blind Flange

- Size Range: 3/4" - 3"



5051-H
BlazeMaster® CPVC Solid Flange

- Size Range: 3/4" - 3"



5003-2-BI
BlazeMaster® CPVC Spigot Female Adapter with Metal Thread Inserts

- Size Range: 3/4" - 1"



5003-2-S-BI
BlazeMaster® CPVC Spigot Female Sprinkler Head Adapter with Metal Thread Inserts

- Size Range: 1" x 1/2" and 3/4" x 1/2"

ADDITIONAL INFORMATION

To get catalogs, brochures and other information, please visit our Literature Section



Click here for our latest Pricing Info





Model F1 Residential Sprinklers for Design Density of .10 gpm/ft²

Model F1 Res Sprinklers engineered for the lowest flows to meet the minimum design density of .05 gpm/ft²

Types:

1. F1 Res 49 Pendent
2. F1 Res 49 Recessed Pendent/F1
3. F1 Res 49 Recessed Pendent/FP
4. F1 Res 49 CCP Pendent
5. F1 Res 58 Pendent
6. F1 Res 58 Recessed Pendent/F1
7. F1 Res 58 Recessed Pendent/FP
8. F1 Res 58 CCP Pendent
9. F1 Res 44 & 58 HSW
10. F1 Res 44 & 58 HSW Recessed HSW/F2
11. F1 Res 44 SWC
12. F1 Res 76 Pendent
13. F1 Res 76 Recessed Pendent/F1
14. F1 Res 76 Recessed Pendent/FP
15. F1 Res 76 CCP Pendent



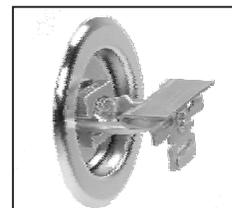
F1 Res 49, 58 & 76
Recessed Pendent / F1



F1 Res 49, 58 & 76
Recessed Pendent / FP



F1 Res 49, 58 & 76
CCP Pendent



F1 Res 44 & 58
Recessed HSW/F2

Listings & Approvals

1. Listed by Underwriters Laboratories Inc. and UL Certified for Canada (cULus)
2. NYC MEA 258-93-E

UL Listing Category

Residential Automatic Sprinkler

UL Guide Number

VKKW

Patents

US Patent No. 6,516,893 applies to the Model F1 Res 49 & 58 Pendent Sprinklers



F1 Res 44 SWC

Product Description

Model F1Res Pendent sprinklers (Figs. 1, 2, 3 & 4) combine excellent durability, high sensitivity glass-bulb and low profile decorative design.

The 3mm glass-bulb pendent sprinklers permit the efficient use of residential water supplies for sprinkler coverage in residential fire protection design.

The low flow F1 Res sprinklers are specially engineered for fast thermal response to meet the sensitive fire protection application needs of the latest residential market standards (UL 1626 Standard *).

Upon fire conditions, rising heat causes a sprinkler's heat-sensitive glass-bulb to shatter, releasing the waterway for water flow onto the deflector, evenly distributing the discharged water to control a fire.

Technical Data:

- Thermal Sensor: Nominal 3mm glass-bulb
- Sprinkler Frame : Brass Casting
- Sprinklers' Pressure Rating : 175 psi
Factory Hydrostatically Tested to 500 psi
- Thread Size: 1/2" NPT (R1/2)
- K-Factor: 4.9 (Actual) - F1 Res 49 Pendent Sprinkler
5.8 (Actual) - F1 Res 58 Pendent & HSW Sprinkler
7.6 (Actual) - F1 Res 76 Pendent Sprinkler
4.4 (Actual) - F1 Res 44 HSW Sprinkler
- Density: Minimum 0.10 gpm/ft²

* Effective date 7/12/02

The Reliable Automatic Sprinkler Co., Inc., 103 Fairview Park Drive, Elmsford, New York 10523

Application

Model F1 Res Sprinklers are used for Residential Fire Protection according to UL 1626 Standard*. Be sure that orifice size, temperature rating, deflector style and sprinkler type are in accordance with the latest published standards of The National Fire Protection Association or the approving authority having jurisdiction.

When using F1 Residential Sprinklers for systems design to NFPA 13D or NFPA 13R, use listed area of coverage and minimum flow and pressure requirements shown in Bulletin 135.

For systems designed to NFPA 13, use information in this bulletin. The number of design sprinklers shall be the most hydraulically demanding sprinklers as required by NFPA 13. Flows and pressures can not be below the baseline flows and pressures.

NFPA 13

For residential sprinkler systems designed to NFPA 13, a minimum density of 0.1 gpm/ft² must be provided over the "design area" that includes the four (4) hydraulically most demanding sprinklers for the actual coverage areas being protected by the 4 sprinklers. The minimum required discharge from each of the four most hydraulically demanding sprinklers shall be the greater of the following:

1. The flow rates given in the Reliable Residential Sprinkler Technical Bulletins referenced in Table A for NFPA 13D and 13R as a function of temperature rating and maximum allowable coverage area (for actual coverage areas less than or between those indicated in the respective technical bulletin, it is required to use the minimum required flow for the next largest coverage area); or
2. A minimum discharge density of 0.1 gpm/ft² applied over the "design area" consisting of the four most hydraulically demanding sprinklers for the actual coverage areas being protected by the four sprinklers. The maximum dimension of the actual coverage area cannot be any greater than the maximum coverage area indicated in the technical bulletins referenced in Table A.

Design Note: Using the $A_s = S \times L$ method to determine the sprinkler protection area of coverage in accordance with NFPA 13, apply the 0.1 gpm/ft² density to this area to determine the minimum required flow. Compare this flow to the minimum 0.05 gpm/ft² cULus Listed flow for the appropriate coverage area in the technical bulletin for the specific residential sprinkler. If the flow stated in the technical bulletin is less than the calculated 0.1 gpm/ft² density flow required, the .1 density flow must then be used in the equation $Q=K\sqrt{P}$, solving for P, to establish the minimum required pressure using the sprinkler K-factor. **Note:** In many cases the listed flow of individual residential sprinklers may exceed the required minimum 0.05 gpm/ft² density. Reliable has available residential sprinklers with larger K-factors (K=5.8 and K=7.6) that will provide lower pressure demands for 0.1 gpm/ft² densities in NFPA 13 residential applications.

Example No. 1

Room Size= 12 ft x 20 ft (3.6 m x 6.1 m)
Coverage Area= 12 x 20 = 240 ft² (22.3 m²)
Flow @ 0.10 gpm/ft² density= 240 x 0.10 = 24 gpm
Using an F1 Res 49 Pendent Sprinkler, K=4.9
Pressure= $(24/4.9)^2 = 24$ psi (1.65 bar)

The baseline flow for a 20 ft x 20 ft (6.1 m x 6.1 m) coverage area using the baseline density of 0.05 gpm/ft² will be 20 gpm @ 16.7 psi (75.7 L/min @ 1.14 bar). Therefore, the minimum flow required is 24 gpm @ 24 psi (90.8 L/min @ 1.65 bar).

Example No. 2

Room Size= 8 ft x 20 ft (2.4 m x 6.1 m)
Coverage Area= 8 x 20 = 160 ft² (14.9 m²)
Flow @ 0.10 gpm/ft² density= 160 x 0.10 = 16 gpm
Using an F1 Res 49 Pendent Sprinkler, K=4.9
Pressure= $(16/4.9)^2 = 10.7$ psi (0.74 bar)

The baseline flow for a 20 ft x 20 ft (6.1 m x 6.1 m) coverage area using the baseline density of 0.05 gpm/ft² will be 20 gpm @ 16.7 psi (75.7 L/min @ 1.14 bar). Therefore, the minimum flow required is 20 gpm @ 16.7 psi (75.7 L/min @ 1.14 bar).

Example No. 3

Room Size= 10 ft x 16 ft (3.0 m x 4.91 m)
Coverage Area= 10 x 16 = 160 ft² (14.9 m²)
Flow @ 0.10 gpm/ft² density= 160 x 0.10 = 16 gpm
Using an F1 Res 76 Pendent Sprinkler, K=7.6

The baseline flow for a 16 ft x 16 ft coverage area is 21 gpm @ 7.6 psi (79.5 L/min @ 0.52 bar). Therefore, the minimum flow and pressure is 21 gpm @ 7.6 psi (79.5 L/min @ 0.52 bar).

Example No. 4

Room Size= 14 ft x 18 ft (4.3 m x 5.5 m)
Coverage Area= 14 x 18 = 252 ft² (23.6 m²)
Flow @ 0.10 gpm/ft² density= 252 x 0.10 = 25.2 gpm (94.6 L/min)

Using an F1 Res 76 Pendent Sprinkler, K=7.6
Pressure= $(25.2/7.6)^2 = 11$ psi (0.76 bar)

The baseline flow and pressure of an 18 ft x 18 ft coverage area is 21 gpm @ 7.6 psi (79.5 L/min @ 0.52 bar). Therefore, the minimum flow and pressure is 25.2 gpm @ 11 psi (94.6 L/min @ 0.76 bar).

In general residential sprinklers require flows and pressures as listed for 0.05 densities to achieve the proper spray pattern so the flows and pressures at 0.05 density are the baseline flows and pressures. Flows and pressures below the listed 0.05 density shall not be used.

Installation

Models F1 Res sprinklers are to be installed as shown. Model F1, F2 and FP Escutcheons, illustrated herewith, are the only recessed escutcheons to be used with Model F1 Res sprinklers. Use of any other recessed escutcheon will void all approvals and warranties. For installing Model F1 Res Pendent sprinklers use only the Model D sprinkler Wrench; for installing Models F1 Res Recessed Pendent, CCP sprinklers use only the Model GFR2 sprinkler wrench; for installing Model F1 Res recessed HSW sprinklers

use only the Model GFR2 Sprinkler wrench. Use of wrenches other than those specified may damage these sprinklers.

Note: A "leak tight" sprinkler joint can be obtained with the following torque:

- 3/4" NPT (R3/4) – 14-20 ft-lbs (19 - 27.1 N-m)
- 1/2" NPT (R1/2) – 8-18 ft-lbs (10.8 – 24.4 N-m)

Do not tighten sprinklers over maximum recommended torque. It may cause leakage or impairment of the sprinklers.

• **Model F1 Res 49, 58 & 76 Pendent**



• **Model F1 Res 49, 58 & 76 Recessed Pendent / F1/F2**



F1 escutcheon, 3/4" (19mm) adjustment

Note: See escutcheon table for dimensions.

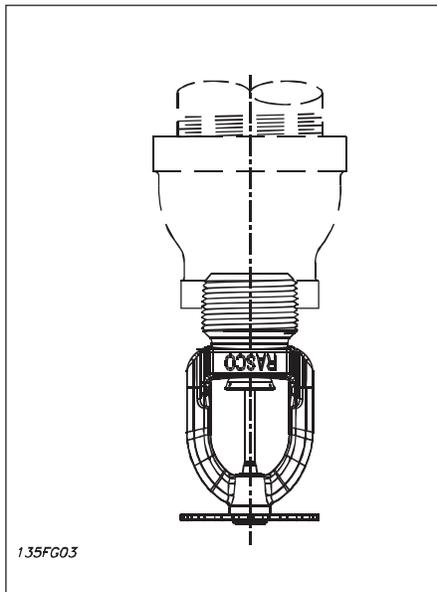


Fig. 1

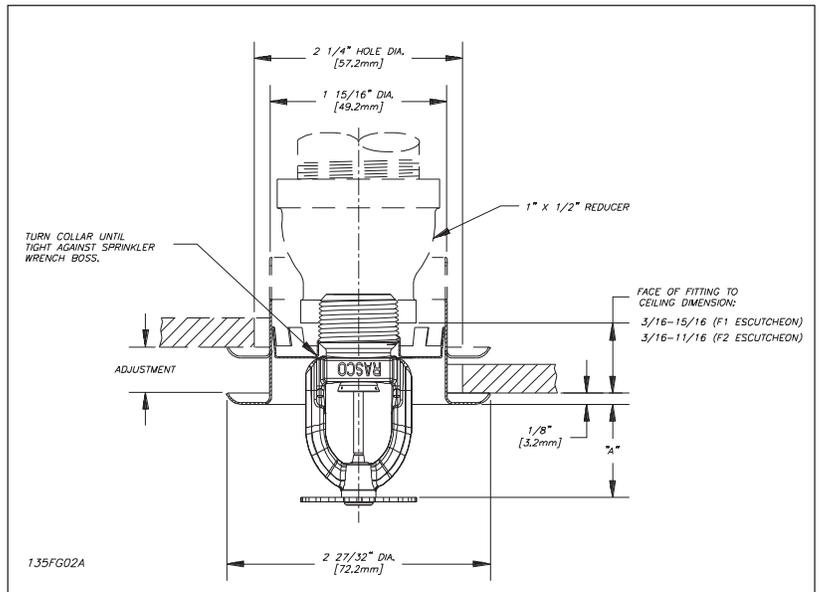


Fig. 2

Technical Data: F1 Res 49 Pendant and Recessed Pendant

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating		Max. Pressure psi (bar)	Max. Ambient Temp.		Actual K Factor	Sprinkler Length Inch (mm)
		°F	°C		°F	°C		
½" NPT (R½)	⅞" (11)	155 175	68 79	175 (12)	100 150	38 66	4.9	2.25 (57)

Escutcheon*, F1 or F2, Data:

Type	Adjustment Inch (mm)	"A" Inch (mm)	Face of fitting to ceiling Inch (mm)
F1	¾ (19.0)	Min. = ¾" (19.1) Max. = 1½" (38.1)	⅜ - 15/16 (4.7 - 24.0)
F2	½ (12.7)	Min. = 15/16" (23.8) Max. = 1½" (38.1)	⅜ - 15/16 (4.7 - 17.4)

* Note: Escutcheons F1 or F2 may be used with Model F1 Res 49 & 58 Recessed Pendant Sprinkler

**Baseline flows and pressures for 0.05 density

Deflector - to - ceiling Maximum 1" (25mm) to 4" (100mm)

Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	13 (49)	7.0 (0.48)	R3516
14 x 14 (4.3x4.3)	13 (49)	7.0 (0.48)	
16 x 16 (4.9x4.9)	13 (49)	7.0 (0.48)	
18 x 18 (5.5x5.5)	17 (64.3)	12.0 (0.83)	
20 x 20 (6.1x6.1)	20 (75.7)	16.7 (1.14)	

*Deflector - to - ceiling Maximum 4" (100mm) to 8" (203mm)

Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	15 (57)	9.4 (0.65)	R3516
14 x 14 (4.3x4.3)	16 (60.5)	10.6 (0.73)	
16 x 16 (4.9x4.9)	17 (64.3)	12.0 (0.83)	
18 x 18 (5.5x5.5)	19 (72)	15.0 (1.0)	
20 x 20 (6.1x6.1)	22 (83.2)	20.2 (1.4)	

*Note: The F1 Res 49 pendant and recessed pendant residential sprinklers can be installed per NFPA 13 in beamed ceilings meeting the following criteria:
 1. Maximum beam depth = 7" (178mm)
 2. Beam spacing at or greater than 7.5 ft. (2.3m) on center.

Technical Data: F1 Res 58 Pendant and Recessed Pendant

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating		Max. Pressure psi (bar)	Max. Ambient Temp.		K Factor	Sprinkler Length Inch (mm)
		°F	°C		°F	°C		
½" NPT (R½)	½" (13)	155 175	68 79	175 (12)	100 150	38 66	5.8	2.25 (57)

**Baseline flows and pressures for 0.05 density

Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Ceiling -to- Deflector Inch (mm)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	16 (61)	7.6 (0.53)	1-4 (25-100)	R3513
14 x 14 (4.3x4.3)	16 (61)	7.6 (0.53)		
16 x 16 (4.9x4.9)	16 (61)	7.6 (0.53)		
18 x 18 (5.5x5.5)	19 (72)	10.8 (0.75)		
20 x 20 (6.1x6.1)	22 (83.3)	14.4 (1.0)		

**Calculate for a .10 density but in no case go below the baseline flows & pressures

Technical Data: F1 Res 76 Pendant and Recessed Pendant

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating		Max. Pressure psi (bar)	Max. Ambient Temp.		K Factor	Sprinkler Length Inch (mm)
		°F	°C		°F	°C		
3/4" NPT (R3/4)	17/32" (13.5)	155 175	68 79	175 (12)	100 150	38 66	7.6	2.25 (57)

Type	Adjustment Inch (mm)	"A" Inch (mm)	Face of fitting to ceiling Inch (mm)
F1	3/4 (19.0)	Min.= 3/4" (19.1) Max.= 1 1/2" (38.1)	3/16 - 15/16 (4.7 - 24.0)
F2	1/2 (12.7)	Min.= 15/16" (23.8) Max.= 1 1/2" (38.1)	3/16 - 1 1/16 (4.7 - 17.4)

*Baseline flows and pressures for 0.05 density

Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	21	7.6 (0.53)	R7618
14 x 14 (4.3x4.3)	21	7.6 (0.53)	
16 x 16 (4.9x4.9)	21	7.6 (0.53)	
18 x 18 (5.5x5.5)	21	7.6 (0.53)	
20 x 20 (6.1x6.1)	23	9.2 (0.63)	

*Calculate for a .10 density but in no case go below the baseline flows & pressures

• Model F1 Res 49, 58 & 76 CCP Pendant



• Model F1 Res 49, 58 & 76 Recessed Pendant / FP



FP push-on/thread-off escutcheon

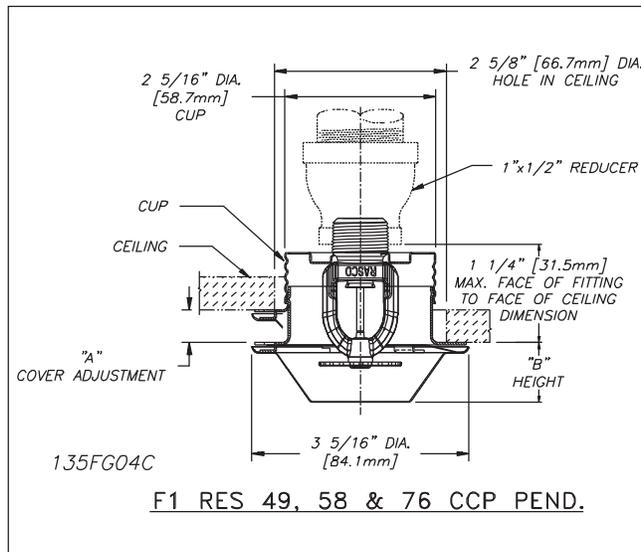


Fig. 3

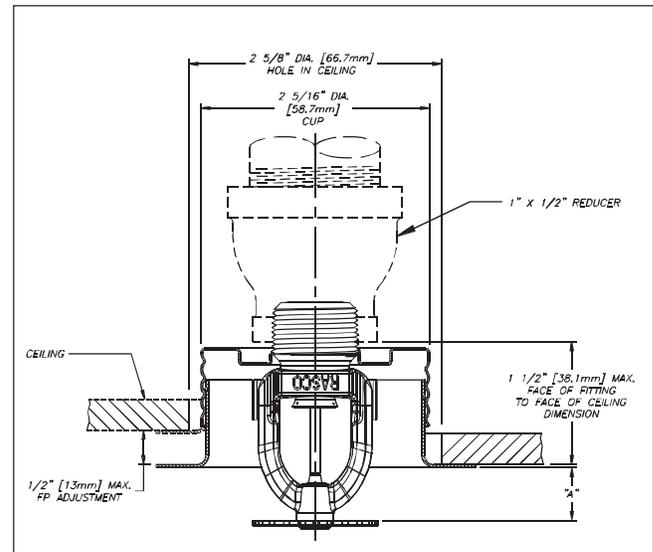


Fig. 4

NOTE: The F1 Res 76 will use a 1" x 3/4" reducer.

Technical Data: F1 Res 49 CCP Pendent and Recessed Pendent / FP

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating		CCP Assembly Temp. Rating		Max. Pressure psi (bar)	Max. Ambient Temp.		K Factor	Sprinkler Length Inch (mm)
		°F	°C	°F	°C		°F	°C		
½" NPT (R½)	⅞" (11)	155	68	135	57	175 (12)	100	38	4.9	2.25 (57)

CCP Options Data:

"A" Cover Adjustment Inch (mm)	"B" CCP Height Inch (mm)
½ (12.7)	1⅝ (24)
⅜ (4.7)	¾ (19)

*Baseline flows and pressures for 0.05 density

Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	13 (49)	7.0 (0.48)	R3516
14 x 14 (4.3x4.3)	13 (49)	7.0 (0.48)	
16 x 16 (4.9x4.9)	14 (53)	8.2 (0.56)	
18 x 18 (5.5x5.5)	18 (68.1)	13.5 (0.93)	
20 x 20 (6.1x6.1)	20 (75.7)	16.7 (1.14)	

FP Data "A":

FP Position	"A" Inch (mm)
Max. Recessed	⅞ (11)
Min. Recessed	1⅝ (24)

Note: Sprinklers shown in Fig. 3 and Fig. 4 are not suitable for installation in ceilings which have positive pressure in the space above.

Technical Data: F1 Res 58 CCP Pendent and Recessed Pendent/FP

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating		CCP Assembly Temp. Rating		Max. Pressure psi (bar)	Max. Ambient Temp.		K Factor	Sprinkler Length Inch (mm)
		°F	°C	°F	°C		°F	°C		
½" NPT (R½)	½" (13)	155	68	135	57	175 (12)	100	38	5.8	2.25 (57)

*Baseline flows and pressures for 0.05 density

Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	16 (61)	7.6 (0.53)	R3513
14 x 14 (4.3x4.3)	16 (61)	7.6 (0.53)	
16 x 16 (4.9x4.9)	16 (61)	7.6 (0.53)	
18 x 18 (5.5x5.5)	19 (72)	10.8 (0.75)	
20 x 20 (6.1x6.1)	22 (83.3)	14.4 (1.0)	

Technical Data: F1 Res 76 CCP Pendent and Recessed Pendent/FP

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating		CCP Assembly Temp. Rating		Max. Pressure psi (bar)	Max. Ambient Temp.		K Factor	Sprinkler Length Inch (mm)
		°F	°C	°F	°C		°F	°C		
¾" NPT (R¾)	1⅜" (13.5)	155	68	135	57	175 (12)	100	38	7.6	2.25 (57)
		175	79				150	66		

*Baseline flows and pressures for 0.05 density

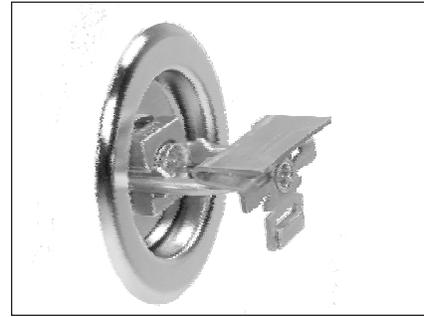
Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	21	7.6 (0.53)	R7618
14 x 14 (4.3x4.3)	21	7.6 (0.53)	
16 x 16 (4.9x4.9)	21	7.6 (0.53)	
18 x 18 (5.5x5.5)	22	8.4 (0.58)	
20 x 20 (6.1x6.1)	25	10.8 (0.74)	

*Calculate for a .10 density but in no case go below the baseline flows & pressures

• **Model F1 Res 44 & 58 HSW**



• **Model F1 Res 44 & 58 Recessed HSW/F2**



F2 escutcheon, 1/2" (13mm) adjustment

Technical Data: F1 Res 44 HSW & HSW/F2

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating		Max. Pressure psi (bar)	Max. Ambient Temp.		K Factor	Sprinkler Length Inch (mm)
		°F	°C		°F	°C		
1/2" NPT (R1/2)	3/8" (10)	155 175	68 79	175 (12)	100 150	38 66	4.4	2.45 (62)

Escutcheon, F2, Data:

Type	Adjustment Inch (mm)	Face of Fitting to wall Inch (mm)
F2	1/2 (13)	3/16 - 1/16 (4.7 - 17.4)

***Baseline flows and pressures for 0.05 density**

Max. Sprinkler Spacing ft (m)	"A" Ceiling -to-Deflector Inch (mm)	Sprinkler Temp. Rating °F (°C)		Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	4 - 6 (101-152)	155 (68)	175 (79)	12 (45.4)	7.5 (0.52)	
14 x 14 (4.3x4.3)		155 (68)	175 (79)	14 (53.0)	10.2 (0.71)	
16 x 16 (4.9x4.9)		155 (68)	175 (79)	16 (60.6)	13.3 (0.92)	
16 x 18 (4.9x5.5)		155 (68)	175 (79)	18 (68.1)	16.8 (1.16)	
18 x 18 (5.5x5.5)		155 (68)	175 (79)	19 (72.0)	18.7 (1.29)	
16 x 20 (4.9x6.1)		155 (68)	175 (79)	23 (87.1)	27.4 (1.89)	
12 x 12 (3.6x3.6)	6 - 12 (152-305)	155 (68)	175 (79)	14 (53.0)	10.2 (0.71)	
14 x 14 (4.3x4.3)		155 (68)	175 (79)	16 (60.6)	13.3 (0.92)	
16 x 16 (4.9x4.9)		155 (68)	175 (79)	17 (64.4)	15.0 (1.04)	
16 x 18 (4.9x5.5)		155 (68)	175 (79)	20 (75.7)	20.7 (1.43)	
16 x 20 (4.9x6.1)		155 (68)	175 (79)	23 (87.1)	27.4 (1.89)	

*Calculate for a .10 density but in no case go below the baseline flows & pressures

• **Model F1 Res 44 SWC**

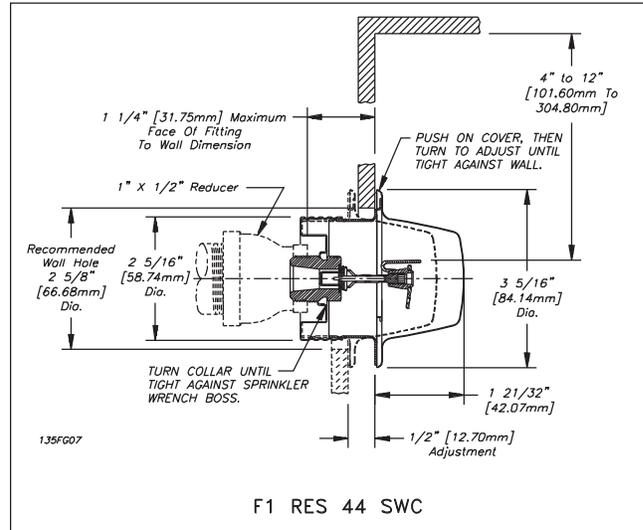


Fig. 5

Technical Data: F1 Res 44 SWC

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating		Cover Temp. Rating		Max. Pressure psi (bar)	Max. Ambient Temp.		K Factor	Sprinkler Length Inch (mm)
		°F	°C	°F	°C		°F	°C		
1/2" NPT (R1/2)	3/8" (10)	155	68	135	57	175 (12)	100	38	4.4	2.45 (62)

***Baseline flows and pressures for 0.05 density**

Max. Sprinkler Spacing ft (m)	"A" Ceiling to-Deflector Inch (mm)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	4 - 6 (101-152)	13 (49.2)	8.7 (0.60)	R3531
14 x 14 (4.3x4.3)		14 (53.0)	10.2 (0.71)	
16 x 16 (4.9x4.9)		17 (64.3)	15.0 (1.1)	
16 x 18 (4.9x5.5)		19 (71.8)	18.7 (1.13)	
16 x 20 (4.9x6.1)		23 (87.1)	27.4 (1.89)	
12 x 12 (3.6x3.6)	6 - 12 (152-305)	14 (52.9)	10.2 (0.71)	
14 x 14 (4.3x4.3)		15 (56.7)	11.7 (0.81)	
16 x 16 (4.9x4.9)		18 (68.1)	16.8 (1.16)	
16 x 18 (4.9x5.5)		20 (75.6)	20.7 (1.43)	

*Calculate for a .10 density but in no case go below the baseline flows & pressures

Technical Data: F1 Res 58 HSW & HSW/F2

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating		Max. Pressure psi (bar)	Max. Ambient Temp.		K Factor	Sprinkler Length Inch (mm)
		°F	°C		°F	°C		
½" NPT (R½)	½" (13)	155	68	175 (12)	100	38	5.8	2.45 (62)
		175	79		150	66		

Escutcheon, F2, Data:

Type	Adjustment Inch (mm)	Face of Fitting to wall Inch (mm)
F2	½ (13)	¾ - 1¼ (4.7 - 17.4)

*Baseline flows and pressures for 0.05 density

Max. Sprinkler Spacing ft (m)	"A" Ceiling-to-Deflector Inch (mm)	Sprinkler Temp. Rating °F (°C)		Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	4 - 6 (101-152)	155 (68)	175 (79)	16 (60.6)	7.6 (0.53)	R3533
14 x 14 (4.3x4.3)		155 (68)	175 (79)	18 (68.2)	9.7 (0.67)	
16 x 16 (4.9x4.9)		155 (68)	175 (79)	21 (79.5)	13.2 (0.91)	
16 x 18 (4.9x5.5)		155 (68)	175 (79)	25 (94.7)	18.6 (1.28)	
16 x 20 (4.9x6.1)		155 (68)	175 (79)	29 (109.8)	25 (1.73)	
12 x 12 (3.6x3.6)	6 - 12 (152-305)	155 (68)	175 (79)	22 (83.3)	14.4 (1.0)	
14 x 14 (4.3x4.3)		155 (68)	175 (79)	22 (83.3)	14.4 (1.0)	
16 x 16 (4.9x4.9)		155 (68)	175 (79)	26 (98.4)	20.1 (1.39)	
16 x 18 (4.9x5.5)		155 (68)	175 (79)	31 (117.4)	28.6 (1.97)	

*Calculate for a .10 density but in no case go below the baseline flows & pressures

Finishes⁽¹⁾

Standard Finishes	
Sprinkler	F1, F2, FP Escutcheons
Bronze Chrome Plated White Polyester Coated	Brass Bright Chrome Plated White Painted
Special Application Finishes	
Sprinkler	F1, F2, Escutcheons
Bright Brass Black Plated Black Paint Off White Satin Chrome	Bright Brass Black Plated Black Paint Off White Satin Chrome

⁽¹⁾ Other finishes and colors are available on special order. Consult factory for details.

Ordering Information Specify:

1. Sprinkler Model
2. Sprinkler Type
3. Temperature Rating
4. Sprinkler Finish
5. Escutcheon Finish

Maintenance

Model F1 Res 49, F1 Res 58 & F1 Res 76 Sprinklers should be inspected quarterly, and the sprinkler system maintained in accordance with NFPA 25, 13, 13D, and 13R. Do not clean sprinkler with soap and water, Ammonia or any other cleaning fluids. Remove dust by using a soft brush or gentle vacuuming. Remove any sprinkler which has been painted (other than factory applied) or damaged in any way. A stock of spare sprinklers should be maintained to allow quick replacement of damaged or operated sprinklers. Prior to installation, sprinklers should remain in the original cartons and packaging until used. This will minimize the potential for damage to sprinklers that could cause improper operation or non-operation.

Model F1RES 49 Residential Sprinkler Specifications

Model F1 Res 49 & 58 Pendent

Sprinklers shall be [cULus Listed] [New York City MEA Approved (258-93-E)] low flow residential pendent sprinklers engineered to provide a minimum design density of 0.10 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Where pendent residential sprinklers are installed under sloped ceilings having a pitch of up to [4/12] [8/12], the sprinklers shall be listed for such use. Deflector-to-ceiling distance listing shall be 1" to 8" maximum. Sprinkler frame and deflector shall be of bronze frame construction having a 1/2" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer and top-loaded extruded cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of [155°F (68°C)] [175°F (79°C)]. Sprinklers shall have a nominal K-factor of 4.9 & 5.8. Standard finish: [Bronze] [Chrome-plated] [White Polyester] [Special finish-specify]. Residential pendent sprinklers shall be Reliable Model F1 Res 49 & 58, SIN R3516 & R3513 (Bulletin 135).

Model F1 Res 49 & 58 Recessed Pendent/F1, Model F1 Res 49 & 58 Recessed Pendent/F2, Model F1 Res 49 & 58 Recessed Pendent/FP

Sprinklers shall be [cULus Listed] [New York City MEA Approved (258-93-E)] low flow residential recessed pendent sprinklers engineered to provide a minimum design density of 0.10 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Where pendent residential sprinklers are installed under sloped ceilings having a pitch of up to [4/12] [8/12], the sprinklers shall be listed for such use. Deflector-to-ceiling distance listing shall be 1" to 8" maximum. Sprinkler frame and deflector shall be of bronze frame construction having a 1/2" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer and top-loaded extruded cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of [155°F (68°C)] [175°F (79°C)]. Sprinklers shall have a nominal K-factor of 4.9 (70). Standard finish: [Bronze] [Chrome-plated] [White Polyester] [Special finish-specify]. Recessed escutcheon assembly shall be a steel, two-piece escutcheon [with 1/2" adjustment (Model F2)] [with 3/4" adjustment (Model F1)] [of push-on and thread off design with 1/2" adjustment (Model FP)]. Standard finish shall be [brass][bright chrome] [white painted]. Residential recessed pendent sprinklers shall be Reliable [Model F1 Res 49 & 58 Recessed Pendent/F1] [Model F1 Res 49 & 58 Recessed Pendent/F2] [Model F1 Res 49 & 58 Recessed Pendent/FP] SIN R3516 & R3513 (Bulletin 135).

Model F1 Res 49 & 58 CCP Pendent (Concealed)

Sprinklers shall be [cULus Listed] [New York City MEA Approved (258-93-E)] low flow residential concealed sprinklers engineered to provide a minimum design density of 0.10 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Where pendent residential sprinklers are installed under sloped ceilings having a pitch of up to [4/12] [8/12], the sprinklers shall be listed for such use. Sprinkler frame and deflector shall be of bronze frame construction having a 1/2" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer and top-loaded extruded cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of 155°F (68°C). Cover plate assembly shall consist of a brass cover plate and copper alloy retainer flange. Method of attaching the cover plate to the sprinkler cup shall be a push-on and thread-off design allowing a 1/2" cover plate adjustment. Cover plate temperature rating shall be 135°F (57°C). A plastic protective cap shall be provided and factory installed inside the sprinkler cup to protect the sprinkler from damage, which could occur during construction before the cover plate is installed. Standard cover plate finish: [White] [Custom Color-specify]. Concealed pendent sprinklers shall be Reliable Model F1 Res 49 & 58 CCP, SIN R3516 & R3513 (Bulletin 135).

Model F1 Res 44 & 58 Horizontal Sidewall Sprinkler

Sprinklers shall be [cULus Listed] [New York City MEA Approved (258-93-E)] low flow residential horizontal sidewall sprinklers engineered to provide a minimum design density of 0.10 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Where horizontal sidewall residential sprinklers are installed under sloped ceilings having a pitch of up to [4/12] [8/12], the sprinklers shall be listed for such use. Sprinkler frame and deflector shall be of bronze frame construction having a ½" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer and top-loaded extruded cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of [155°F (68°C)] [175°F (79°C)]. Sprinklers shall have a nominal K-factor of 5.8. Standard finish: [Bronze] [Chrome-plated] [White Polyester] [Special finish– specify]. Residential horizontal sidewall sprinklers shall be Reliable Model F1 Res 58, SIN R3513 (Bulletin 135).

Model F1 Res 44 & 58 Recessed Horizontal Sidewall Sprinkler

Use description for the Model F1 Res 58 horizontal sidewall sprinkler with the following modifications: Replace "horizontal sidewall sprinkler" with "recessed horizontal sprinkler." Add: Recessed escutcheon assembly shall be a steel, two-piece escutcheon with ½" adjustment (Model F2). Standard finish shall be [brass][bright chrome] [white painted] [Special finish– specify]. Residential recessed horizontal sidewall sprinklers shall be Reliable Model F1 Res 58/F2, SIN R3513 (Bulletin 135).

Model F1 Res 76 Pendent

Sprinklers shall be [cULus Listed] low flow residential pendent sprinklers engineered to provide a minimum design density of 0.10 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Sprinkler frame and deflector shall be of bronze frame construction having a ¾" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer and machined cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of [155°F (68°C)] [175°F (79°C)]. Sprinklers shall have a nominal K-factor of 7.6. Standard finish: [Bronze] [Chrome-plated] [White Polyester] [Special finish– specify]. Residential pendent sprinklers shall be Reliable Model F1 Res 76, SIN R7618 (Bulletin 135).

Model F1 Res 76 Recessed Pendent/F1, Model F1 Res 76 Recessed Pendent/F2, Model F1 Res 76 Recessed Pendent/FP

Sprinklers shall be [cULus Listed] low flow residential recessed pendent sprinklers engineered to provide a minimum design density of 0.10 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Sprinkler frame and deflector shall be of bronze frame construction having a ¾" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer and machined cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of [155°F (68°C)] [175°F (79°C)]. Sprinklers shall have a nominal K-factor of 7.6. Standard finish: [Bronze] [Chrome-plated] [White Polyester] [Special finish– specify]. Recessed escutcheon assembly shall be a steel, two-piece escutcheon [with ½" adjustment (Model F2)] [with ¾" adjustment (Model F1)] [of push-on and thread off design with ½" adjustment (Model FP)]. Standard finish shall be [brass][bright chrome] [white painted]. Residential recessed pendent sprinklers shall be Reliable [Model F1 Res 76 Recessed Pendent/F1] [Model F1 Res 76 Recessed Pendent/F2] [Model F1 Res 76 Recessed Pendent/FP] SIN R7618 (Bulletin 135).

Model F1 Res 76 CCP Pendent (Concealed)

Sprinklers shall be [cULus Listed] low flow residential concealed sprinklers engineered to provide a minimum design density of 0.10 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Sprinkler frame and deflector shall be of bronze frame construction having a ¾" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer and machined cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of 155°F (68°C). Cover plate assembly shall consist of a brass cover plate and copper alloy retainer flange. Method of attaching the cover plate to the sprinkler cup shall be a push-on and thread-off design allowing a ½" cover plate adjustment. Cover plate temperature rating shall be 135°F (57°C). A plastic protective cap shall be provided and factory installed inside the sprinkler cup to protect the sprinkler from damage, which could occur during construction before the cover plate is installed. Standard cover plate finish: [White] [Custom Color– specify]. Concealed pendent sprinklers shall be Reliable Model F1 Res 76 CCP, SIN R7618 (Bulletin 135).

Reliable...For Complete Protection

Reliable offers a wide selection of sprinkler components. Following are some of the many precision-made Reliable products that guard life and property from fire around the clock.

- Automatic sprinklers
- Flush automatic sprinklers
- Recessed automatic sprinklers
- Concealed automatic sprinklers
- Adjustable automatic sprinklers
- Dry automatic sprinklers
- Intermediate level sprinklers
- Open sprinklers
- Spray nozzles
- Alarm valves
- Retarding chambers
- Dry pipe valves
- Accelerators for dry pipe valves
- Mechanical sprinkler alarms
- Electrical sprinkler alarm switches
- Water flow detectors
- Deluge valves
- Detector check valves
- Check valves
- Electrical system
- Sprinkler emergency cabinets
- Sprinkler wrenches
- Sprinkler escutcheons and guards
- Inspectors test connections
- Sight drains
- Ball drips and drum drips
- Control valve seals
- Air maintenance devices
- Air compressors
- Pressure gauges
- Identification signs
- Fire department connection

The equipment presented in this bulletin is to be installed in accordance with the latest pertinent Standards of the National Fire Protection Association, Factory Mutual Research Corporation, or other similar organizations and also with the provisions of governmental codes or ordinances, whenever applicable.

Products manufactured and distributed by RELIABLE have been protecting life and property for over 80 years, and are installed and serviced by the most highly qualified and reputable sprinkler contractors located throughout the United States, Canada and foreign countries.

Manufactured by



The Reliable Automatic Sprinkler Co., Inc.

(800) 431-1588

(800) 848-6051

(914) 829-2042

www.reliablesprinkler.com

Sales Offices

Sales Fax

Corporate Offices

Internet Address



Revision lines indicate updated or new data.
EG. Printed in U.S.A. 05/08 P/N 9999970322

SPECIFICATION SUBMITTAL SHEET



FEATURES

Sizes: 3/4" 1" 1-1/4" 1-1/2" 2"

Maximum working water pressure 175 PSI
 Maximum working water temperature 180°F
 Hydrostatic test pressure 350 PSI
 End connections Threaded ANSI B1.20.1

OPTIONS

(Suffixes can be combined)

- with full port QT ball valves (standard)
- L - less ball valves
- U - with union ball valves
- S - with bronze "Y" type strainer
- TCU - with test cocks "vertical" up
- V - with union swivel elbows (3/4" & 1")
- OSY - with OS & Y gate valves
- FDC - with fire hydrant connection (2" only)
- FT - with integral male 45° flare SAE test fitting

ACCESSORIES

- Repair kit (rubber only)
- Thermal expansion tank (Model WXTP)
- QT-SET Quick Test Fitting Set
- Test Cock Lock (Model TCL24)

APPLICATION

Designed for installation on potable water lines to protect against both backsiphonage and backpressure of polluted water into the potable water supply. Assembly shall provide protection where a potential health hazard does not exist.

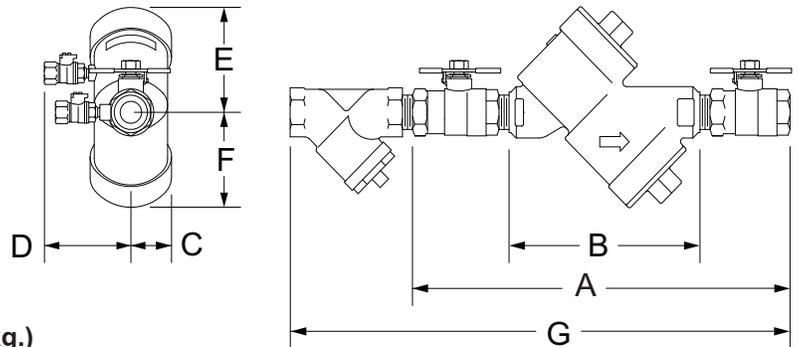
STANDARDS COMPLIANCE

(All sizes approved horizontal. Vertical approvals as listed below.)

- ASSE® Listed 1015 (vertical 3/4", 1 1/4", 1 1/2" & 2")
- IAPMO® Listed (vertical 1 1/4"-2")
- CSA® Listed (vertical 3/4", 1 1/4", 1 1/2" & 2")
- AWWA Compliant C510 (vertical 3/4")
- UL® Classified (less shut-off valves only)
- C-UL® Classified (less shut-off valves only)
- Approved by the Foundation for Cross Connection Control and Hydraulic Research at the University of Southern California (vertical 3/4")
- City of Los Angeles Approved (vertical 1-1/4"-2")
- NYC MEA 426-89-M VOL 3

MATERIALS

Main valve body Cast Bronze ASTM B 584
 Access covers Cast Bronze ASTM B 584
 Internals Stainless Steel, 300 Series
 Elastomers Silicone (FDA approved)
 Buna Nitrile (FDA approved)
 Polymers Noryl™, NSF Listed
 Springs Stainless steel, 300 series



DIMENSIONS & WEIGHTS (do not include pkg.)

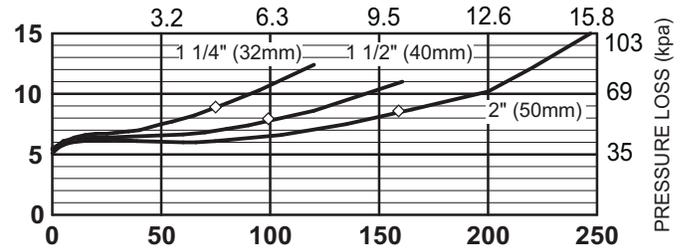
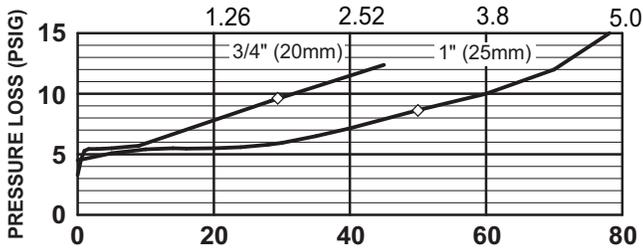
MODEL SIZE	DIMENSIONS (approximate)																WEIGHT				
	A		A UNION BALL VALVES		B LESS BALL VALVES		C		D		E		F		G		LESS BALL VALVES		WITH BALL VALVES		
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg	lbs.	kg	
3/4	20	11 1/4	286	12 1/2	318	7	178	1 1/2	38	3	76	3 1/2	89	3	76	15	381	5	2.3	7	3.2
1	25	12 1/4	311	13 7/8	353	7	178	1 1/2	38	3	76	3 1/2	89	3	76	17 3/4	451	8	3.6	12	5.4
1 1/4	32	15 1/2	419	18 1/2	470	10 9/16	268	2	51	3 1/2	89	4 1/2	114	4 1/2	114	21 1/2	546	16	7.3	22	10
1 1/2	40	17 1/8	435	19 1/8	486	10 9/16	268	2	51	3 1/2	89	4 1/2	114	4 1/2	114	22 3/4	578	16	7.3	22	10
2	50	18 1/4	460	20	508	10 9/16	268	2	51	3 1/2	89	4 1/2	114	4 1/2	114	25 1/8	638	16	7.3	28	12.7

DOCUMENT #: BF-950XL REVISION: 10/10

FLOW CHARACTERISTICS

MODEL 950XL 3/4", 1", 1 1/4", 1 1/2" & 2" (STANDARD & METRIC)

FLOW RATES (l/s)



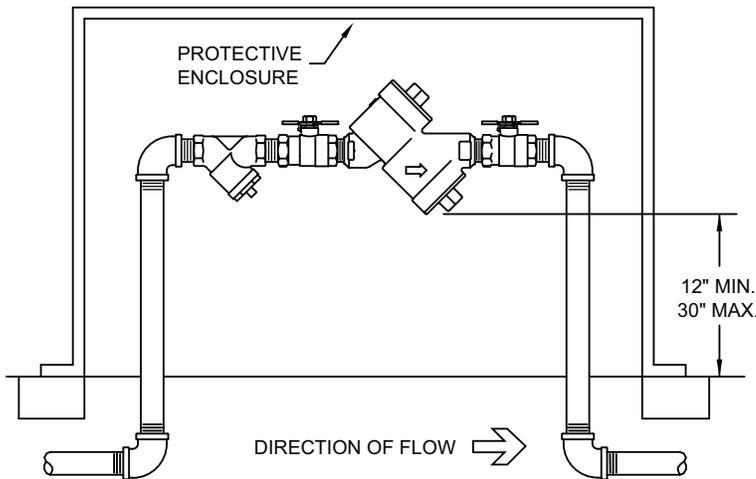
FLOW RATES (GPM)

◇ Rated Flow (Established by approval agencies)

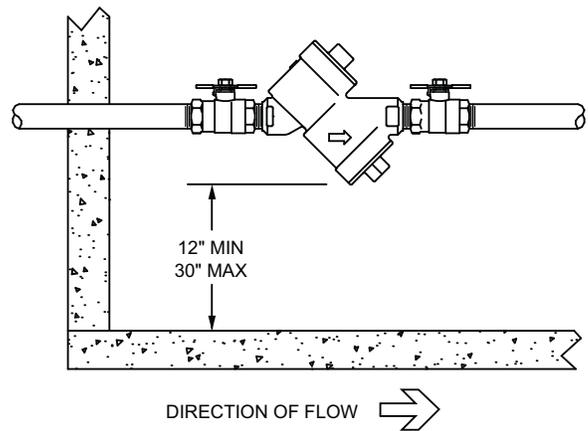
TYPICAL INSTALLATION

Local codes shall govern installation requirements. To be installed in accordance with the manufacturer's instructions and the latest edition of the Uniform Plumbing Code. Unless otherwise specified, the assembly shall be mounted at a minimum of 12" (305mm) and a maximum of 30" (762mm) above adequate drains with sufficient side clearance for testing and maintenance. The installation shall be made so that no part of the unit can be submerged.

Capacity thru Schedule 40 Pipe				
Pipe size	5 ft/sec	7.5 ft/sec	10 ft/sec	15 ft/sec
1/8"	1	1	2	3
1/4"	2	2	3	5
3/8"	3	4	6	9
1/2"	5	7	9	14
3/4"	8	12	17	25
1"	13	20	27	40
1 1/4"	23	35	47	70
1 1/2"	32	48	63	95
2"	52	78	105	167



OUTDOOR INSTALLATION



INDOOR INSTALLATION

SPECIFICATIONS

The Double Check Valve Backflow Preventer shall be ASSE® Listed 1015 approved, and supplied with full port ball valves. The main body and access covers shall be bronze (ASTM B 584), the seat rings and all internal polymers shall be NSF® Listed Noryl™ and the seat disc elastomers shall be silicone. The first and second checks shall be accessible for maintenance without removing the device from the line. The Double Check Valve Backflow Preventer shall be a WILKINS Model 950XL.

175 PSI WWP Bronze Globe Valves

Fire Protection Valve • Threaded Ends • Rubber Disc • Screw Over Bonnet

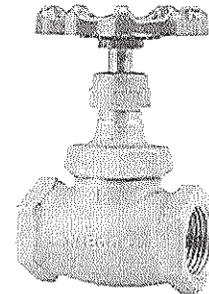


175 PSI/12.1 Bar Non-Shock Cold Water

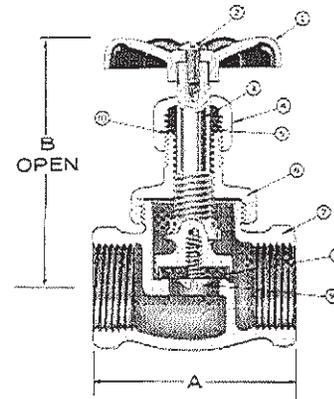
UL LISTED*

MATERIAL LIST

PART	SPECIFICATION
1. Handwheel	Aluminum
2. Handwheel Screw	Carbon Steel Stainless Steel (1")
3. Stem	Bronze ASTM B 584 Alloy C84400 or ASTM B 505 Alloy C84400
4. Packing Nut	Bronze ASTM B 584 Alloy C83600 or ASTM B 16
5. Packing	Graphite Impregnated (Non Asbestos)
6. Bonnet	Bronze ASTM B 584 Alloy C84400
7. Body	Bronze ASTM B 584 Alloy C84400
8. Seat Disc	EPDM Rubber (1/4" - 3/8") Nitrile (1/2" - 1")
9. Seat Screw	Stainless Steel
10. Pack Washer	Sheet Brass



KT-65-UL
Threaded



KT-65-UL
NPT x NPT

DIMENSIONS—WEIGHTS—QUANTITIES

Size	Dimensions				Weight		Box Qty.	Master Ctn. Qty.	
	In.	mm.	In.	mm.	Lbs.	Kg.			
¼	8	2.00	50	2.75	70	.48	.22	10	100
⅜	10	2.00	50	2.75	70	.45	.20	10	100
½	15	2.28	58	3.12	79	.68	.31	10	60
¾	20	2.28	58	3.12	79	.74	.34	10	60
1	25	3.12	79	4.50	114	1.68	.76	5	25

*UL Listed for Trim and Drain use -- sizes ½", ¾", 1".
Size ¼" and ⅜" supplied as KT-65 (Not UL Listed).



FS-ONE High Performance Intumescent Firestop Sealant

Product description

- Intumescent (expands when exposed to fire) firestop sealant that helps protect combustible and non-combustible penetrations for up to 4 hours fire rating

Product features

- Smoke, gas and water resistant after material has cured
- Contains no halogen, solvents or asbestos
- High fire rating properties
- Water based, easy to clean
- Protects most typical firestop penetration applications
- Can be painted
- Single component systems available
- Meets LEED™ requirements for indoor environmental quality credit 4.1 Low Emitting Materials, Sealants and Adhesives and 4.2 Paints and Coatings

Areas of application

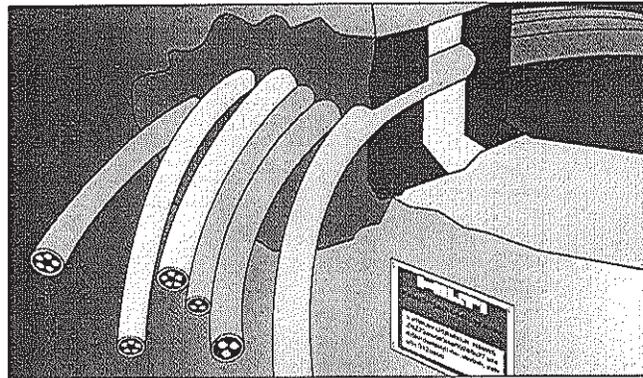
- Steel, copper and EMT pipes
- Insulated steel and copper pipes
- Cable bundles
- Closed or vented plastic pipes
- HVAC penetrations

For use with

- Concrete, masonry, drywall and wood floor assemblies
- Wall and floor assemblies rated up to 4 hours

Examples

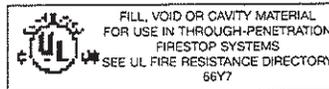
- Sealing around plastic pipe penetrations in fire rated construction
- Sealing around combustible and non-combustible penetrations in fire rated construction



FS-ONE Technical Data

Chemical basis	Water-based intumescent acrylic dispersion
Color	Red
Application temperature	40°F to 104°F (5°C to 40°C)
Skin forming time	Approx. 20-30 min.
Curing time	Approx. 2 mm / 3 days
Movement capability	Approx. 5%
Expansion rate (unrestricted)	Up to 3-5 times original volume
Temperature resistance (cured)	-40°F to 212°F (-40°C to 100°C)
Surface burning characteristics (ASTM E 84-96)	Flame Spread: 0 Smoke Development: 5
Sound transmission classification (ASTM E 90-99)	56 (Relates to specific construction)
Approvals	
California State Fire Marshal	Listing No. 4485-1200:108
City of New York	MEA 326-96-M Vol. IV
Tested in accordance with	• UL 1479 • ASTM E 814 • ASTM E 84

At 73°F (23°C) and 50% relative humidity



Installation instructions for FS-ONE

Notice

- Before handling, read Material Safety DataSheet and product label for safe usage and health information.
- Instructions below are general guidelines — always refer to the applicable drawing in the UL Fire Resistance Directory or Hilti Firestop Systems Guide for complete installation information

Opening

1. Clean the opening. Surfaces to which FS-ONE will be applied should be cleaned of loose debris, dirt, oil, moisture, frost and wax. Structures supporting penetrating items must be installed in compliance with local building and electrical standards.

Application of firestop sealant

2. Install the prescribed backfilling material type and depth to obtain the desired rating (if required). Leave sufficient depth for applying FS-ONE.
3. Application of firestop sealant: Apply FS-ONE to the required depth in order to obtain the desired fire rating. Make sure FS-ONE contacts all surfaces to provide maximum adhesion. For application of FS-ONE use a standard caulking gun, foil pack gun, bulk loader and bulk gun. With FS-ONE buckets, Graco type sealant pumps may be used. (Contact pump manufacturer for proper selection).

4. Smoothing of firestop sealant: To complete the seal, tool immediately to give a smooth appearance. Excess sealant, prior to curing, can be cleaned away from adjacent surfaces and tools with water.
5. Leave completed seal undisturbed for 48 hours.
6. For maintenance reasons, a penetration seal could be permanently marked with an identification plate. In such a case, mark the identification plate and fasten it in a visible position next to the seal.

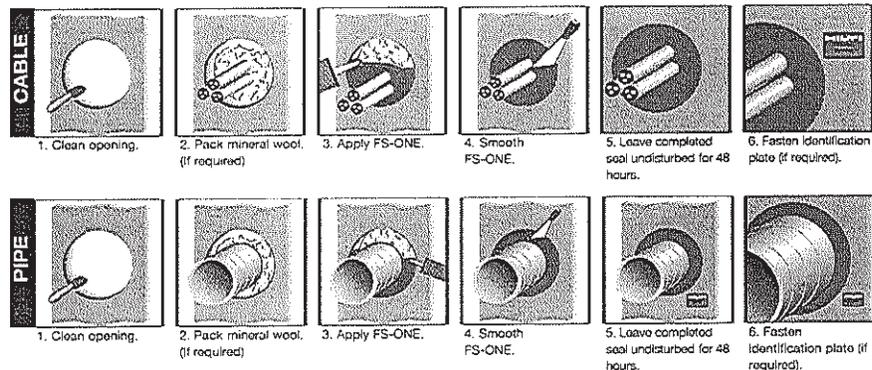
Not for use

- High movement expansion joints
- Underwater

- On materials where oil, plasticizers or solvents may bleed i.e. impregnated wood, oil based seals, green or partially vulcanized rubber
- In any penetration other than those specifically described in this manual or the test reports

Storage

- Store only in the original packaging in a location protected from moisture at temperatures between 40°F (5°C) and 86°F (30°C)
- Observe expiration date on the packaging



Hilti. Outperform. Outlast.

Product name: **FS-ONE High Performance Intumescent Firestop Sealant**
 Description: One-part acrylic-based sealant
 Supplier: Hiiti, Inc. P.O. Box 21148, Tulsa, OK 74121
 Emergency # (Chem-Trec.): 1 800 424 9300 (USA, PR, Virgin Islands, Canada); 001 703 527 3887 (other countries)

INGREDIENTS AND EXPOSURE LIMITS

Ingredients:	CAS Number:	PEL:	TLV:	STEL:
Polyacrylate dispersion	Mixture	NE	NE	NE
Calcium carbonate	001317-65-3	5 mg/m ³ (T)	10 mg/m ³ (T)	NE
Zinc borate	138265-88-0	NE	NE	NE
Ammonium polyphosphate	068333-79-9	NE	NE	NE
Talc	014807-96-6	20 mppcf	2 mg/m ³	NE
Expandable graphite	012777-87-6	5 mg/m ³ (T)	2 mg/m ³ (T)	NE
Ethylene glycol	000107-21-1	NE	C:100 mg/m ³ (A)	NE
Polybutene	009003-29-6	NE	NE	NE
Iron oxide	001309-37-1	10 mg/m ³	5 mg/m ³	NE
Glass filament	065997-17-3	NE	5 mg/m ³ (T)	NE
Silicon dioxide	014808-60-7	0.05 mg/m ³ (T)	0.1 mg/m ³ (T)	NE
Water	007732-18-5	NE	NE	NE

Abbreviations: PEL = OSHA Permissible Exposure Limit. TLV = ACGIH Threshold Limit Value. C = Ceiling. STEL = Short Term Exposure Limit. NE = None Established. NA = Not Applicable. (T) indicates "as total dust". (R) indicates "as respirable fraction". (A) indicates "as an aerosol". mppcf = million particles per cubic foot.

PHYSICAL DATA

Appearance:	Red paste.	Odor:	Odorless.
Vapor Density: (air = 1)	Not determined.	Vapor Pressure:	23mbar @ 20C / 68F
Boiling Point:	Not applicable.	VOC Content:	75.0 g/L.
Evaporation Rate:	Not applicable.	Solubility in Water:	Soluble.
Specific Gravity:	1.5	pH:	Not determined.

FIRE AND EXPLOSION HAZARD DATA

Flash Point:	Non-flammable.	Flammable Limits:	Not applicable.
Extinguishing Media:	Not applicable. Use extinguishing media as appropriate for surrounding fire.		
Special Fire Fighting Procedures:	None known. Use a self-contained breathing apparatus when fighting fires involving chemicals.		
Unusual Fire and Explosion Hazards:	None known. Thermal decomposition products can be formed such as oxides of carbon, sulfur and phosphorous.		

REACTIVITY DATA

Stability:	Stable.	Hazardous Polymerization:	Will not occur.
Incompatibility:	Strong acids, peroxides, and oxidizing agents.		
Decomposition Products:	Thermal decomposition can yield CO and CO ₂ .		
Conditions to Avoid:	None known.		

HEALTH HAZARD DATA

Known Hazards:	None known.
Signs and Symptoms of Exposure:	Possibly irritating upon contact with the eyes or upon repeated contact with the skin.
Medical Conditions	Eye and skin conditions.
Aggravated by Exposure:	
Routes of Exposure:	Dermal.



Hilti Firestop
 Saving Lives
 through innovation
 and education

Hilti. Outperform. Outlast.

Certificate of Compliance

Certificate Number 20060214-R13240E
Report Reference 2006 February 14
Issue Date 2006 February 14

Page 1 of 1



Issued to: **Hilti, Inc.**
5400 S 122ND East Ave
Tulsa, OK 74146 USA

This is to certify that representative samples of **Fill, Void or Cavity Materials**
FS-ONE

Have been investigated by Underwriters Laboratories Inc.® in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: ANSI/UL 1479, ANSI/UL 2079, CAN/ULC-S115-05

Additional Information: FS-ONE Sealant for use in Joint Systems and FS-ONE for use in Through-Penetration Firestop Systems as currently described in the UL Fire Resistance Directory.

Only those products bearing the UL Classification Mark should be considered as being covered by UL's Classification and Follow-Up Service.

The UL Classification Mark includes: UL in a circle symbol:  with the word "CLASSIFIED" (as shown); a control number (may be alphanumeric) assigned by UL; a statement to indicate the extent of UL's evaluation of the product; and, the product category name (product identity) as indicated in the appropriate UL Directory.

Look for the UL Classification Mark on the product

Issued by:

Mona Couloute
Underwriters Laboratories Inc.

Reviewed by: 
Christopher Johnson
Underwriters Laboratories Inc.

ViegaPEX™ Cross-linked Polyethylene (PEX)

Scope

This material specification designates the requirements for ViegaPEX hot and cold water distribution tubing. All ViegaPEX tubing is copper tube size dimension (CTS), SDR-9 wall thickness and meets the respective requirements of ASTM F876 and F877.

Materials

All ViegaPEX tubing is manufactured from a cross-linkable high density polyethylene produced by grafting organo-silanes onto a polyethylene base. A catalyst (accelerator) added to the cross-linkable polyethylene during extrusion initiates the cross-linking process. Cross-linking is completed with hot water or steam (sauna). ViegaPEX tubing is available in red, white, or blue for easy identification of hot and cold lines.

Marking and Certification

All ViegaPEX tubing is marked with the name Viega as the manufacturer, nominal size, plastic tubing material designation code PEX 5006, Chlorine resistance rating NSF-pw (CL5), design pressure and temperature ratings, relevant ASTM standards, manufacturing date and production code, as well as the NSF-pw stamps indicating third-party certification by NSF International for meeting and exceeding performance and toxicological standards, as well as achieving the highest chlorine resistance rating in the PEX industry. NSF conducts random on-site inspections of Viega manufacturing facilities and independently tests ViegaPEX tubing for compliance with physical, performance and toxicological standards. ViegaPEX is also certified to meet the Uniform Plumbing Code, IAPMO UPC®, CSA (Canadian Standards Association) B137.5 (cNSF_{U.S.}) the ICC (International Code Council) Evaluation Service, and HUD (Housing and Urban Development).

Recommended Uses

ViegaPEX tubing is intended and recommended for use in hot and cold potable water distribution systems. Design temperature and pressure ratings for ViegaPEX is 160 psi @ 73°F and 100 psi @ 180°F. ViegaPEX tubing can also be used in “continuously-recirculating” plumbing systems at temperatures of up to 140°F while still maintaining excellent chlorine resistance. For information on the suitability for other hot and cold water applications not listed here, consult with your Viega representative.

Handling and Installation

ViegaPEX cross-linked polyethylene tubing is tough yet flexible. However, it is softer than metals and may be damaged by abrasion or by objects with a cutting edge. Use of these materials in hot and cold water distribution systems must be in accordance with good plumbing practices, applicable code requirements, and current installation practices available from Viega. ViegaPEX is manufactured to meet written national standards. Contact a Viega representative or the applicable code enforcement bureau for information about approvals for specific applications.

Property	ASTM Test Method	Typical Values	
		English Units	SI Units
Density	D 792	–	0.946 g/cc
Melt Index ¹ (190°C/2.16 kg)	D 1238	–	0.7g/10 min
Flexural Modulus ²	D 790	120,000 psi	830 MPa
Tensile Strength @ Yield (2 in/min)	D 638	2,900 psi	20 MPa
Coefficient of Linear Thermal Expansion @ 68°F	D 696	9.2 x 10 ⁻⁵ /°F	15x10 ⁻⁵ /°C
Hydrostatic Design Basis @ 73°F (23°C)	D 2837	1,250 psi	8.6 MPa
Hydrostatic Design Basis @ 180°F (82°C)	D 2837	800 psi	5.5 MPa
Vicat Softening Point	D 696	255°F	124°C
Thermal Conductivity	D 177	2.4 Btu-in (hr)(ft ²)(°F/in)	3.5x10 ⁻³ Watts/(cm ²)(°C/cm)

1. Before Cross-linking

2. 73°F

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Quality Assurance

When the product is marked with the ASTM F876/F877 designation, it affirms that the product was manufactured, inspected, sampled and tested in accordance with these specifications and has been found to meet the specified requirements.

Certifications

NSF-pw - Tested for health effects to ANSI/NSF standard 61 and performance to ANSI/NSF standard 14.

PEX 5006 - Tested and listed to the NSF-pw (CL5) Chlorine resistance rating for an end use condition of 100% @ 140°F per ASTM F876, which is the highest Chlorine resistance rating available through ASTM. When the product is marked with the PEX 5006 NSF-pw (CL5) designation, it affirms the product is approved for use in continuous domestic hot water circulation systems with up to 140°F water temperatures.



- IAPMO Certified



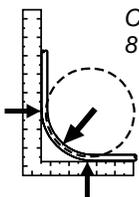
- ICC ES-PMG™ 1038 plumbing applications



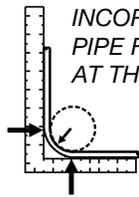
- NSF certified to CSA B137.5 (Canadian Standards Association)

HUD (Housing and Urban Development) - MR 1276

Minimum Bend Radius



CORRECT:
8 x O.D.



INCORRECT:
PIPE FLATTENS
AT THE BEND

NOTE: ViegaPEX tubing may be bent to a minimum of 5 x O.D. with approved bend support.

SDR-9 PEX Tubing ASTM F876/F877/CTS-OD SDR-9

Stock Code	Tubing Size	O.D.	Wall Thickness	Nom. I.D.	Weight Per Ft	Vol. (gal.) Per 100 Ft
33000	3/8"	0.500±.003	0.070+.010	0.350	.0413	0.50
33020	1/2"	0.625±.004	0.070+.010	0.475	.0535	0.92
33045	3/4"	0.875±.004	0.097+.010	0.671	.1023	1.82
33061	1"	1.125±.005	0.125+.013	0.862	.1689	3.04

NOTE: Dimensions are in English units. Tolerances shown are ASTM requirements. ViegaPEX is manufactured within these specifications.

Pressure Drop Table Expressed as PSI/ft. Pressure Drop

GPM	3/8"	1/2"	3/4"	1"
1	.070	.016		
1.5	.149	.034		
2.2	.303	.069		
2.5	.385*	.087		
3	.539	.122	.023	
3.5	.717	.162	.030	
4		.208*	.039	
5		.314	.059	
6		.440	.082	.024
7		.586	.109	.032
8			.140	.041
9			.174*	.051
10			.211	.062
11			.252	.074
12			.296	.087
13			.343	.101
14				.116
16				.148*
18				.184
20				.224
22				.267

EXAMPLE: To calculate the pressure drop of a 1/2" line, 40 ft. long, with a 3 gpm flow rate, calculate .122 psi x 40 ft. = 4.9 psi pressure drop. Most plumbing codes require 8 psi residual pressure at the fixture. Refer to your local code requirements.

*Indicates 8 fps maximum velocity required by some plumbing codes. NOTE: Maximum flow for each size based on 12 FPS velocity. PSI x 2.307 = head loss.

Minimum Burst Pressure (PSI) Per ASTM F876/F877

SIZE	73°F (23°C)	180°F (82°C)
3/8"	620	275
1/2"	480	215
3/4"	475	210
1"	475	210

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PureFlow[®] MANABLOC[®] Parallel Water Distribution System For ViegaPEX[™], ViegaPEX[™] Ultra and FostaPEX[®] SDR-9 Cross-linked Polyethylene (PEX)

Scope

This specification designates requirements for the PureFlow MANABLOC parallel water distribution system which supplies water to individual plumbing fixtures through dedicated ports and distribution lines. Each port (outlet) is equipped with a built-in shut-off valve to provide control for each fixture from a central location. The MANABLOC has separate hot and cold water inlets and ports to manage the entire plumbing system. A variety of standard and Zero Lead¹ fitting options are available for the MANABLOC distribution ports, including PEX Compression, Bronze PEX Press, Brass PEX Crimp and PolyAlloy PEX Crimp fittings. These distribution connections come complete with the MANABLOC when ordered. However, supply connections and fixture transition fittings are not included with the unit but are available separately.

Materials

The modular MANABLOC sections are molded from polysulfone (PLS) plastic. This material is used extensively in the medical industry and is highly resistant to hot water, chlorine and other chemicals typically found in potable water systems. The other components making up the MANABLOC consist of corrosion-resistant metals and engineered plastics that have been chosen specifically for each purpose. The stiffener used in the compression port fitting assembly is manufactured from 304 stainless steel.

Marking and Certification

MANABLOC units are marked with the product name, unit part number, material designation, production date and marks of third-party certifications by NSF International (NSF-pw) to ASTM F877, ANSI/NSF standards 14 and 61 CSA B137.5 and are listed with IAPMO as meeting the requirements of the Uniform Plumbing Code.

Recommended Uses

The MANABLOC is recommended for use in hot and cold potable water distribution systems in single and multifamily dwellings, as well as multiple-unit structures (apartments, condos, hotels, motels, etc.). Maximum pressure/temperature rating is 100 psi @ 180°F. The MANABLOC is not to be used directly in line with hot water domestic recirculation loops. PureFlow MANABLOC system components are not interchangeable with components and tubing from other suppliers. For information on other hot and cold applications not listed here, consult with your Viega representative.

Handling and Installation

The MANABLOC must be protected from UV exposure and petroleum products that can damage them. Use of these materials in hot and cold water distribution systems must be in accordance with good plumbing practices, applicable code requirements, and current installation practices available from Viega. Contact a Viega representative or the applicable code enforcement bureau for information about approvals for specific applications.

Capacities and K-Factor

Specifications	English Units	SI
Main Waterway (each side)	1-1/4"	31.8mm
Main Inlet/Outlet Connection	1" Male NPSM	-
Fixture Ports	3/8" CTS and 1/2" CTS	9.5mm and 12.7mm
Fixture Port Rating (each)	3/8" - 2.5 GPM	3/8" - 9.5 LPM
(@ 8 FPS tubing velocity)	1/2" - 4 GPM	1/2" - 15.1 LPM
Fixture Port K-Factor	3/8" - .35	3/8" - 1.66 x 10 ⁻³
	1/2" - .21	1/2" - 9.997 x 10 ⁻⁴
	(PSI=KxGPM ²)	(BAR=KxLPM ²)
Main Bore Flow Capacity (each side) (2006 IPC Table 604.10.1)	31 GPM	117.3 LPM
Main Bore Through Feed K Factor	0.012	56.98x10 ⁻⁶
(36 Ports with "Y" Block)	(PSI=KxGPM ²)	(BAR=KxLPM ²)
WSFU Capacity (each side) (2006 IPC, table E103.3)	60	-

1. "Zero Lead" identifies Viega products meeting the lead free requirements of California and Vermont law, effective January 1, 2010, as tested and listed against NSF- 61, Annex G

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TechData

viega

Quality Assurance

When the product is marked with the ASTM F877 designation, it affirms that all MANABLOC manifold control units are factory-assembled and pretested prior to delivery to the field. Viega utilizes protective packaging to reduce risk of damage during shipping and storage. MANABLOC manifolds are not intended to be fabricated or disassembled in the field. MANABLOC manifolds are intended for potable water use only.

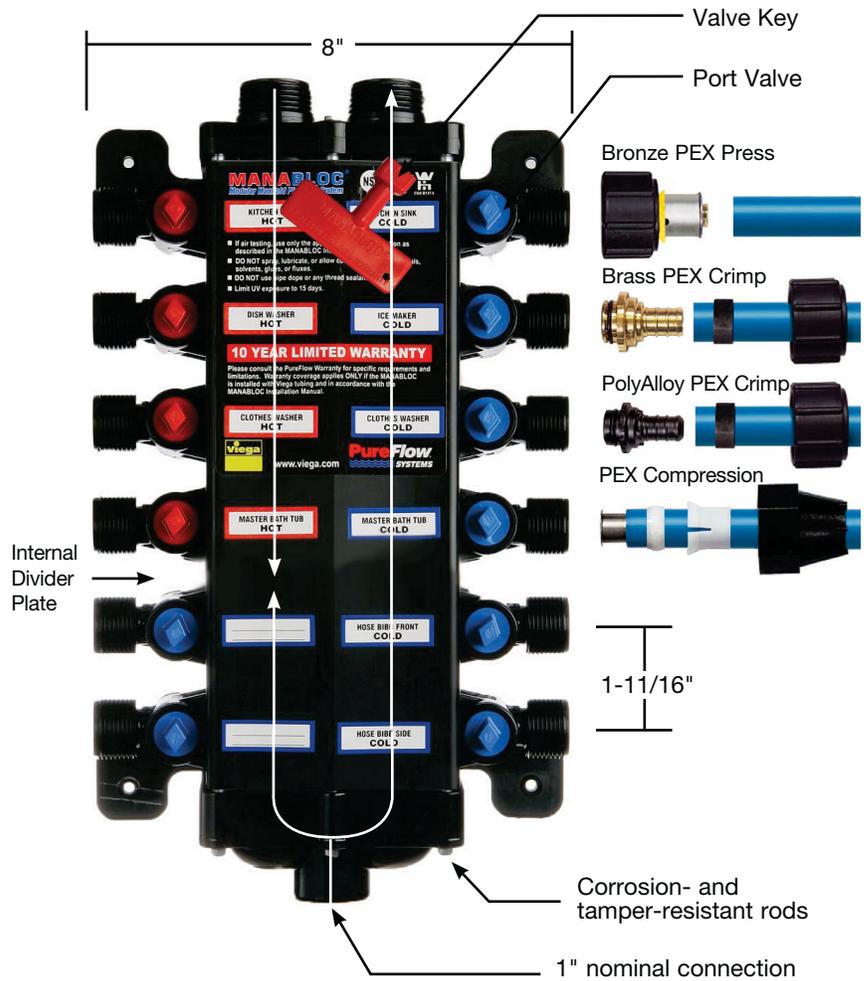
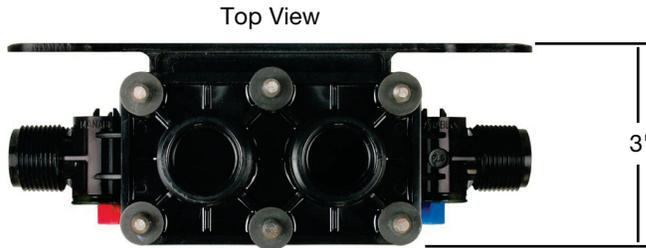
Certification

cNSF@us pw-G

- Zero lead listing meeting California AB 1953 and Vermont ACT 193
- NSF International Performance and Health Effects (Standards 14 & 61)
- NSF certified to CSA B137.5 (Canadian Standards Association)



- IAPMO Certified



MANABLOC Dimensions

Total Ports	Length
14	15 - 15/16"
18	19 - 3/8"
24	24 - 3/8"
30	29 - 1/2"
36	34 - 3/8"

Dimensions reflect stock MANABLOC sizes.

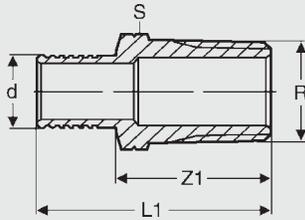
MANABLOC Pressure Drop Table Expressed as PSI Drop Through Port

Port Size	Rated Flow	PSI Drop
3/8"	2.5 gpm	2 psi
1/2"	4 gpm	3.4 psi

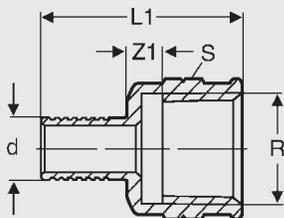
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Dimensional Documentation

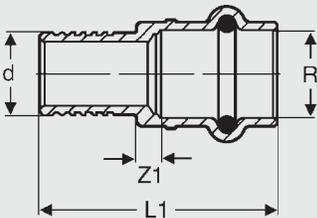
PEX Press Fittings



Bronze PEX Press Male NPT Adapters							
Stock Code	d x R (size)	L1 (in)	L1 (mm)	Z1 (in)	Z1 (mm)	S (in)	S (mm)
60505	3/8" PEX Press x 1/2" M NPT	1.77	45.0	1.18	30.0	0.87	22.0
60520	1/2" PEX Press x 1/2" M NPT	1.73	44.0	1.14	29.0	0.87	22.0
60525	1/2" PEX Press x 3/4" M NPT	1.77	45.0	1.18	30.0	1.06	27.0
60542	3/4" PEX Press x 1/2" M NPT	1.57	40.0	0.98	25.0	0.87	22.0
60540	3/4" PEX Press x 3/4" M NPT	1.77	45.0	1.18	30.0	1.06	27.0
60545	3/4" PEX Press x 1" M NPT	2.05	52.0	1.45	37.0	1.34	34.0
60555	1" PEX Press x 3/4" M NPT	1.93	49.0	1.18	30.0	1.06	27.0
60560	1" PEX Press x 1" M NPT	2.15	54.5	1.40	35.5	1.34	34.0
60570	1-1/4" PEX Press x 1-1/4" M NPT	2.44	62.0	1.50	38.0	1.73	44.0
60580	1-1/2" PEX Press x 1-1/2" M NPT	2.56	65.0	1.61	41.0	1.97	50.0



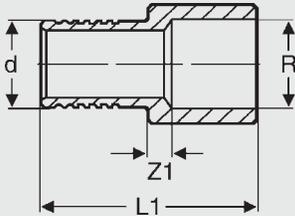
Bronze PEX Press Female NPT Adapters							
Stock Code	d x R (size)	L1 (in)	L1 (mm)	Z1 (in)	Z1 (mm)	S (in)	S (mm)
61520	1/2" PEX Press x 1/2" F NPT	1.36	34.5	0.80	19.5	0.98	25.0
61525	1/2" PEX Press x 3/4" F NPT	1.40	35.5	0.81	20.5	1.20	30.5
61540	3/4" PEX Press x 3/4" F NPT	1.40	35.5	0.81	20.5	1.20	30.5
61545	1" PEX Press x 3/4" F NPT	1.56	39.5	0.81	20.5	1.20	30.5
61560	1" PEX Press x 1" F NPT	1.67	42.5	0.93	23.5	1.48	37.5



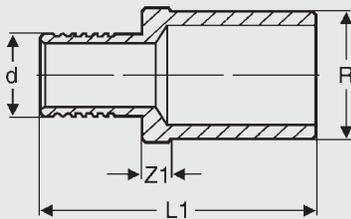
Bronze PEX Press ProPress Adapters					
Stock Code	d x R (size)	L1 (in)	L1 (mm)	Z1 (in)	Z1 (mm)
67620	1/2" PEX Press x 1/2" C	1.57	40.0	0.24	6.0
67626	1/2" PEX Press x 3/4" C	1.83	46.5	0.49	12.5
67630	3/4" PEX Press x 1/2" C	1.42	36.0	0.08	2.0
67640	3/4" PEX Press x 3/4" C	1.73	44.0	0.24	6.0
67660	1" PEX Press x 1" C	1.97	50.0	0.31	8.0
67670	1-1/4" PEX Press x 1-1/4" C	2.26	57.5	0.22	5.5
67680	1-1/2" PEX Press x 1-1/2" C	2.76	70.0	0.24	6.0

Dimensional Documentation

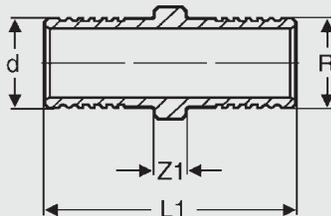
PEX Press Fittings



Bronze PEX Press Copper Tubing Adapters (female)					
Stock Code	d x R (size)	L1 (in)	L1 (mm)	Z1 (in)	Z1 (mm)
62005	3/8" PEX Press x 1/2" Copper	1.26	32.0	0.17	4.35
62020	1/2" PEX Press x 1/2" Copper	1.22	31.0	0.13	3.35
62025	1/2" PEX Press x 3/4" Copper	1.50	38.0	0.16	4.0
62035	3/4" PEX Press x 1/2" Copper	1.16	29.5	0.08	2.0
62040	3/4" PEX Press x 3/4" Copper	1.75	44.5	0.26	6.5
62045	3/4" PEX Press x 1" Copper	1.50	38.0	0.16	4.0
62060	1" PEX Press x 1" Copper	1.85	47.0	0.20	5.0
62070	1-1/4" PEX Press x 1-1/4" Copper	2.17	55.0	0.24	6.0
62080	1-1/2" PEX Press x 1-1/2" Copper	2.30	58.5	0.26	6.5



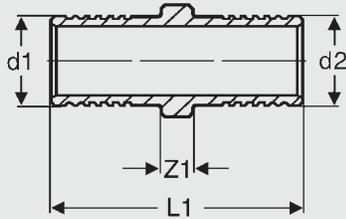
Bronze PEX Press Copper Fitting Adapters (male)					
Stock Code	d x R (size)	L1 (in)	L1 (mm)	Z1 (in)	Z1 (mm)
67520	1/2" PEX Press x 1/2" Copper	1.56	39.5	0.18	4.5
67525	1/2" PEX Press x 3/4" Copper	1.73	44.0	0.19	4.7
67535	3/4" PEX Press x 1/2" Copper	1.59	40.5	0.19	4.7
67540	3/4" PEX Press x 3/4" Copper	1.73	44.0	0.18	4.5
67545	3/4" PEX Press x 1" Copper	1.73	44.0	0.18	4.5
67560	1" PEX Press x 1" Copper	1.89	48.0	0.18	4.5
67570	1-1/4" PEX Press x 1-1/4" Copper	2.38	60.5	0.37	9.5
67580	1-1/2" PEX Press x 1-1/2" Copper	2.76	70.0	0.31	8.0



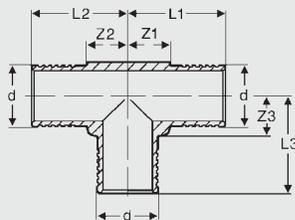
Bronze PEX Press PB Adapters					
Stock Code	d x R (size)	L1 (in)	L1 (mm)	Z1 (in)	Z1 (mm)
67820	1/2" PEX Press x 1/2" PB	1.36	34.5	0.16	4.0
67840	3/4" PEX Press x 3/4" PB	1.36	34.5	0.16	4.0

Dimensional Documentation

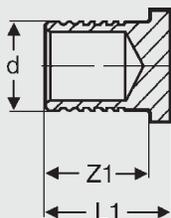
PEX Press Fittings



Bronze PEX Press Couplings					
Stock Code	d1 x d2 (size)	L1 (in)	L1 (mm)	Z1 (in)	Z1 (mm)
63000	3/8" PEX Press	1.34	34.0	0.16	4.0
63020	1/2" PEX Press	1.34	34.0	0.16	4.0
63040	3/4" PEX Press	1.34	34.0	0.16	4.0
63050	1/2" x 3/4" PEX Press	1.34	34.0	0.16	4.0
63055	3/4" x 1" PEX Press	1.50	38.0	0.16	4.0
63060	1" PEX Press	1.65	42.0	0.16	4.0
63065	1" x 1-1/4" PEX Press	1.89	48.0	0.20	5.0
63070	1-1/4" PEX Press	2.17	55.0	0.28	7.0
63071	3/4" x 1-1/4" PEX Press	1.73	44.0	0.20	5.0
63072	3/4" x 1-1/2" PEX Press	1.73	44.0	0.20	5.0
63073	1" x 1-1/2" PEX Press	1.89	48.0	0.20	5.0
63075	1-1/4" x 1-1/2" PEX Press	2.09	53.0	0.20	5.0
63080	1-1/2" PEX Press	2.17	55.0	0.28	7.0



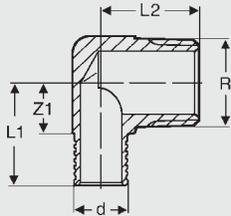
Bronze PEX Press Tees													
Stock Code	d (size)	L1 (in)	L1 (mm)	Z1 (in)	Z1 (mm)	L2 (in)	L2 (mm)	Z2 (in)	Z2 (mm)	L3 (in)	L3 (mm)	Z3 (in)	Z3 (mm)
64020	1/2" PEX Press	0.93	23.5	0.33	8.5	0.93	23.5	0.33	8.5	0.93	23.5	0.33	8.5
64040	3/4" PEX Press	1.05	26.7	0.46	11.7	1.05	26.7	0.46	11.7	1.05	26.7	0.46	11.7
64060	1" PEX Press	1.57	40.0	0.83	21.0	1.57	40.0	0.83	21.0	1.57	40.0	0.83	21.0
64070	1-1/4" PEX Press	1.73	44.0	0.79	20.0	1.73	44.0	0.79	20.0	1.73	44.0	0.79	20.0
64080	1-1/2" PEX Press	1.87	47.5	0.93	23.5	1.87	47.5	0.93	23.5	1.87	47.5	0.93	23.5



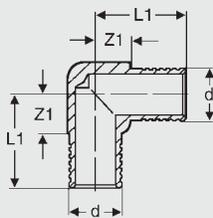
Bronze PEX Press Test Plugs					
Stock Code	d (size)	L1 (in)	L1 (mm)	Z1 (in)	Z1 (mm)
65000	3/8" PEX Press	0.71	18.0	0.59	15.0
65020	1/2" PEX Press	0.71	18.0	0.59	15.0
65040	3/4" PEX Press	0.71	18.0	0.59	15.0
65060	1" PEX Press	0.91	23.0	0.75	19.0

Dimensional Documentation

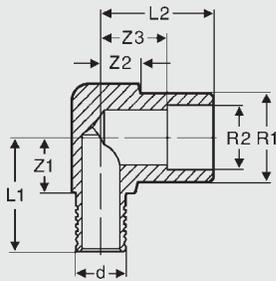
PEX Press Fittings



Bronze PEX Press Male NPT Elbows							
Stock Code	d x R (size)	L1 (in)	L1 (mm)	Z1 (in)	Z1 (mm)	L2 (in)	L2 (mm)
62520	1/2" PEX Press x 1/2" M NPT	1.10	28.0	0.51	13.0	1.14	29.8
62525	1/2" PEX Press x 3/4" M NPT	1.22	30.9	0.63	15.9	1.26	31.9
62540	3/4" PEX Press x 3/4" M NPT	1.22	30.9	0.63	15.9	1.26	31.9
62545	3/4" PEX Press x 1" M NPT	1.50	38.0	0.91	23.0	2.24	57.0
62560	1" PEX Press x 1" M NPT	1.61	41.0	0.87	22.0	2.28	58.0



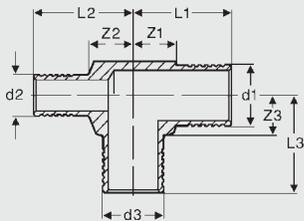
Bronze PEX Press Elbows					
Stock Code	d x d (size)	L1 (in)	L1 (mm)	Z1 (in)	Z1 (mm)
63520	1/2" PEX Press	0.93	23.5	0.33	8.5
63540	3/4" PEX Press	1.05	26.7	0.46	11.7
63560	1" PEX Press	1.57	40.0	0.83	21.0
63570	1-1/4" PEX Press	1.74	44.3	0.80	20.3
63580	1-1/2" PEX Press	1.88	47.8	0.94	23.8



Bronze PEX Press Copper Tubing Elbows											
Stock Code	d x R (size)	L1 (in)	L1 (mm)	Z1 (in)	Z1 (mm)	L2 (in)	L2 (mm)	Z2 (in)	Z2 (mm)	Z3 (in)	Z3 (mm)
19307	1/2" PEX Press x 1/2" Copper (female) or 3/4" Copper (male)	1.05	26.7	0.46	11.7	1.06	26.9	0.48	12.1	~	~
19308	1/2" PEX Press x 3/4" Copper (female)	1.16	29.4	0.57	14.4	1.22	31.0	~	~	0.47	12.0
19309	3/4" PEX Press x 3/4" Copper (female)	1.16	29.4	0.57	14.4	1.22	31.0	~	~	0.47	12.0
19310	1/2" PEX Press x 1/2" Copper (female)	1.05	26.7	0.46	11.7	1.06	26.9	0.48	12.1	~	~
19311	3/4" PEX Press x 1/2" Copper (female) or 3/4" Copper (male)	1.16	29.4	0.57	14.4	1.23	31.3	0.43	10.8	0.73	18.5

Dimensional Documentation

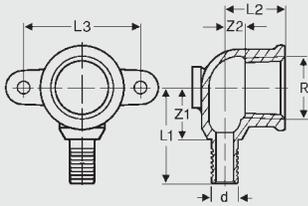
PEX Press Fittings



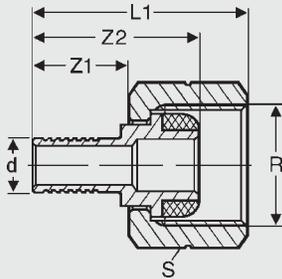
Bronze PEX Press Reducing Tees													
Stock Code	d1 x d2 x d3 (size)	L1 (in)	L1 (mm)	Z1 (in)	Z1 (mm)	L2 (in)	L2 (mm)	Z2 (in)	Z2 (mm)	L3 (in)	L3 (mm)	Z3 (in)	Z3 (mm)
64021	1/2" x 3/8" x 3/8" PEX Press	0.93	23.5	0.33	8.5	0.93	23.5	0.33	8.5	0.93	23.5	0.33	8.5
64022	1/2" x 1/2" x 3/4" PEX Press	1.05	26.7	0.46	11.7	1.05	26.7	0.46	11.7	1.05	26.7	0.46	11.7
64032	3/4" x 1/2" x 1/2" PEX Press	1.05	26.7	0.46	11.7	1.05	26.7	0.46	11.7	1.05	26.7	0.46	11.7
64034	3/4" x 1/2" x 3/4" PEX Press	1.05	26.7	0.46	11.7	1.05	26.7	0.46	11.7	1.05	26.7	0.46	11.7
64036	3/4" x 3/4" x 1/2" PEX Press	1.05	26.7	0.46	11.7	1.05	26.7	0.46	11.7	1.05	26.7	0.46	11.7
64037	1" x 1/2" x 1/2" PEX Press	1.54	39.0	0.79	20.0	1.46	37.0	0.87	22.0	1.46	37.0	0.87	22.0
64038	1" x 3/4" x 1/2" PEX Press	1.42	36.0	0.67	17.0	1.26	32.0	0.67	17.0	1.46	37.0	0.87	22.0
64039	1" x 1/2" x 1" PEX Press	1.57	40.0	0.83	21.0	1.50	38.0	0.91	23.0	1.57	40.0	0.83	21.0
64050	1" x 1" x 1/2" PEX Press	1.57	40.0	0.83	21.0	1.57	40.0	0.83	21.0	1.57	40.0	0.98	25.0
64052	1" x 3/4" x 3/4" PEX Press	1.57	40.0	0.83	21.0	1.54	39.0	0.79	20.0	1.54	39.0	0.94	24.0
64053	1" x 3/4" x 1" PEX Press	1.57	40.0	0.83	21.0	1.42	36.0	0.83	21.0	1.57	40.0	0.83	21.0
64056	1" x 1" x 3/4" PEX Press	1.57	40.0	0.83	21.0	1.57	40.0	0.83	21.0	1.54	39.0	0.94	24.0
64071	1-1/4" x 1" x 3/4" PEX Press	1.48	37.5	0.53	13.5	1.28	32.5	0.53	13.5	1.38	35.0	0.79	20.0
64072	1-1/4" x 1-1/4" x 3/4" PEX Press	1.48	37.5	0.53	13.5	1.48	37.5	0.53	13.5	1.38	35.0	0.79	20.0
64073	1-1/4" x 1" x 1" PEX Press	1.59	40.5	0.65	16.5	1.40	35.5	0.65	16.5	1.54	39.0	0.79	20.0
64074	1-1/4" x 1-1/4" x 1" PEX Press	1.59	40.5	0.65	16.5	1.59	40.5	0.65	16.5	1.54	39.0	0.79	20.0
64081	1-1/2" x 1" x 3/4" PEX Press	1.48	37.5	0.53	13.5	1.30	33.0	0.55	14.0	1.52	38.5	0.93	23.5
64082	1-1/2" x 1" x 1" PEX Press	1.59	40.5	0.65	16.5	1.44	36.5	0.69	17.5	1.67	42.5	0.93	23.5
64083	1-1/2" x 1-1/2" x 3/4" PEX Press	1.48	37.5	0.53	13.5	1.48	37.5	0.53	13.5	1.48	37.5	0.89	22.5
64084	1-1/2" x 1-1/2" x 1" PEX Press	1.59	40.5	0.65	16.5	1.59	40.5	0.65	16.5	1.67	42.5	0.93	23.5
64085	1-1/2" x 1-1/2" x 1-1/4" PEX Press	1.73	44.0	0.79	20.0	1.73	44.0	0.79	20.0	1.87	47.5	0.93	23.5

Dimensional Documentation

PEX Press Fittings

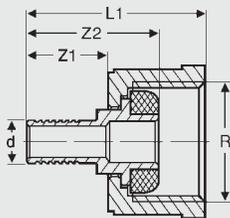


Bronze PEX Press Drop Ear Elbows											
Stock Code	d x R (size)	L1 (in)	L1 (mm)	L2 (in)	L2 (mm)	L3 (in)	L3 (mm)	Z1 (in)	Z1 (mm)	Z2 (in)	Z2 (mm)
64505	3/8" PEX Press x 1/2" F NPT	1.28	32.5	0.81	20.5	1.57	40.0	0.69	17.5	0.27	6.9
64520	1/2" PEX Press x 1/2" F NPT	1.28	32.5	0.81	20.5	1.57	40.0	0.69	17.5	0.27	6.9
64535	3/4" PEX Press x 1/2" F NPT	1.42	36.0	0.91	23.0	1.57	40.0	0.83	21.0	0.37	9.3
64540	3/4" PEX Press x 3/4" F NPT	1.42	36.0	0.96	24.5	1.77	45.0	0.83	21.0	0.41	10.5



Bronze PEX Press Lav Adapters									
Stock Code	d (size)	L1 (in)	L1 (mm)	Z1 (in)	Z1 (mm)	Z2 (in)	Z2 (mm)	S (in)	S (mm)
57002	3/8" PEX Press	1.44	36.5	0.59	15.0	1.12	28.5	1.00	25.4
57003	1/2" PEX Press	1.44	36.5	0.59	15.0	1.12	28.5	1.00	25.4

Note: Metal Nut

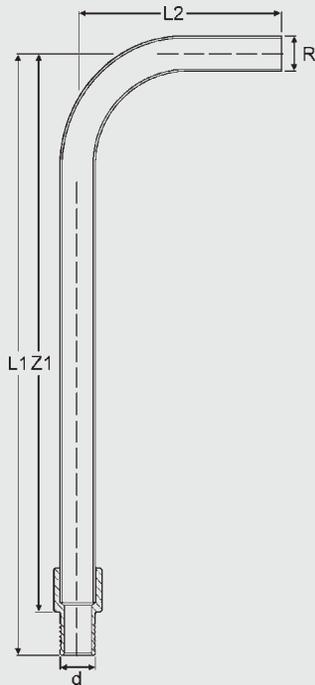


Bronze PEX Press Closet Adapters							
Stock Code	d (size)	L1 (in)	L1 (mm)	Z1 (in)	Z1 (mm)	Z2 (in)	Z2 (mm)
57004	3/8" PEX Press	1.48	37.5	0.59	15.0	1.12	28.5
57005	1/2" PEX Press	1.48	37.5	0.59	15.0	1.12	28.5

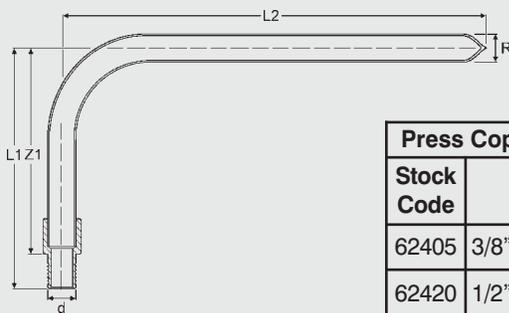
Note: Plastic Nut

Dimensional Documentation

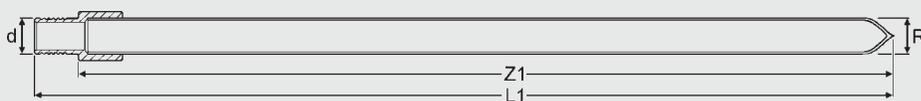
PEX Press Fittings



Press Copper Tub Els							
Stock Code	d x R (size)	L1 (in)	L1 (mm)	L2 (in)	L2 (mm)	Z1 (in)	Z1 (mm)
62220	1/2" PEX x 1/2" Copper (3" x 6")	6.72	171.0	3.00	76.2	6.13	156.0



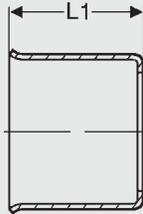
Press Copper Stub Outs							
Stock Code	d x R (size)	L1 (in)	L1 (mm)	L2 (in)	L2 (mm)	Z1 (in)	Z1 (mm)
62405	3/8" PEX x 1/2" Copper (3-1/2" x 8")	4.22	107.0	8.00	203.0	3.63	92.2
62420	1/2" PEX x 1/2" Copper (3-1/2" x 8")	4.22	107.0	8.00	203.0	3.63	92.2



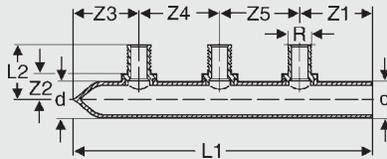
Press Copper Straight Stub Outs					
Stock Code	d x R (size)	L1 (in)	L1 (mm)	Z1 (in)	Z1 (mm)
62608	1/2" PEX x 1/2" Copper (8")	8.59	218.0	8.00	203.0
62615	1/2" PEX x 1/2" Copper (15")	15.59	396.0	15.00	381.0

Dimensional Documentation

PEX Press Fittings

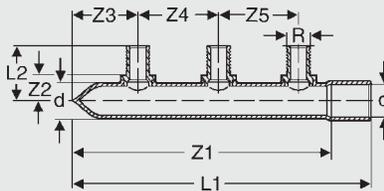


Stainless Steel PEX Press Sleeves			
Stock Code	d (size)	L1 (in)	L1 (mm)
61000	3/8" PEX Press	0.59	15.0
61020	1/2" PEX Press	0.59	15.0
61040	3/4" PEX Press	0.59	15.0
61060	1" PEX Press	0.75	19.0
61070	1-1/4" PEX Press	0.94	24.0
61080	1-1/2" PEX Press	0.94	24.0



Brazed PEX Press Copper Manifolds - male															
Stock Code	d x R (size)	L1 (in)	L1 (mm)	L2 (in)	L2 (mm)	Z1 (in)	Z1 (mm)	Z2 (in)	Z2 (mm)	Z3 (in)	Z3 (mm)	Z4 (in)	Z4 (mm)	Z5 (in)	Z5 (mm)
65703	1" CM x 1/2" PEX Press, 3 outlets	8.25	209.6	1.44	36.6	2.05	52.1	0.85	21.6	2.20	55.9	2.00	50.8	2.00	50.8
65704	1" CM x 1/2" PEX Press, 4 outlets	10.25	260.4	1.44	36.6	2.05	52.1	0.85	21.6	2.20	55.9	2.00	50.8	2.00	50.8
65705	1" CM x 1/2" PEX Press, 5 outlets	12.25	311.2	1.44	36.6	2.05	52.1	0.85	21.6	2.20	55.9	2.00	50.8	2.00	50.8
65706	1" CM x 1/2" PEX Press, 6 outlets	14.25	362.0	1.44	36.6	2.05	52.1	0.85	21.6	2.20	55.9	2.00	50.8	2.00	50.8
65708	1" CM x 1/2" PEX Press, 8 outlets	18.25	463.6	1.44	36.6	2.05	52.1	0.85	21.6	2.20	55.9	2.00	50.8	2.00	50.8
65710	1" CM x 1/2" PEX Press, 10 outlets	22.25	565.2	1.44	36.6	2.05	52.1	0.85	21.6	2.20	55.9	2.00	50.8	2.00	50.8
65712	1" CM x 1/2" PEX Press, 12 outlets	26.25	666.8	1.44	36.6	2.05	52.1	0.85	21.6	2.20	55.9	2.00	50.8	2.00	50.8

Note: CM = Copper Male

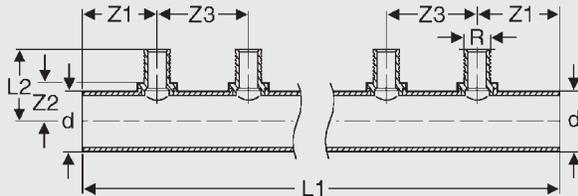


Brazed PEX Press Copper Manifolds - female															
Stock Code	d x R (size)	L1 (in)	L1 (mm)	L2 (in)	L2 (mm)	Z1 (in)	Z1 (mm)	Z2 (in)	Z2 (mm)	Z3 (in)	Z3 (mm)	Z4 (in)	Z4 (mm)	Z5 (in)	Z5 (mm)
65603	1" CF x 1/2" PEX Press, 3 outlets	8.25	209.6	1.44	36.6	7.20	182.9	0.85	21.6	2.20	55.9	2.00	50.8	2.00	50.8
65604	1" CF x 1/2" PEX Press, 4 outlets	10.25	260.4	1.44	36.6	9.20	233.7	0.85	21.6	2.20	55.9	2.00	50.8	2.00	50.8
65605	1" CF x 1/2" PEX Press, 5 outlets	12.25	311.2	1.44	36.6	11.20	284.5	0.85	21.6	2.20	55.9	2.00	50.8	2.00	50.8
65606	1" CF x 1/2" PEX Press, 6 outlets	14.25	362.0	1.44	36.6	13.20	335.3	0.85	21.6	2.20	55.9	2.00	50.8	2.00	50.8
65608	1" CF x 1/2" PEX Press, 8 outlets	18.25	463.6	1.44	36.6	17.20	436.9	0.85	21.6	2.20	55.9	2.00	50.8	2.00	50.8
65610	1" CF x 1/2" PEX Press, 10 outlets	22.25	565.2	1.44	36.6	21.20	538.5	0.85	21.6	2.20	55.9	2.00	50.8	2.00	50.8
65612	1" CF x 1/2" PEX Press, 12 outlets	26.25	666.8	1.44	36.6	25.20	640.1	0.85	21.6	2.20	55.9	2.00	50.8	2.00	50.8

Note: CF = Copper Female

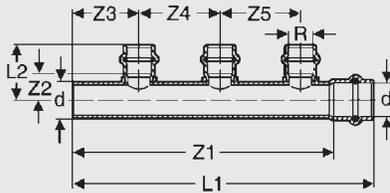
Dimensional Documentation

PEX Press Fittings

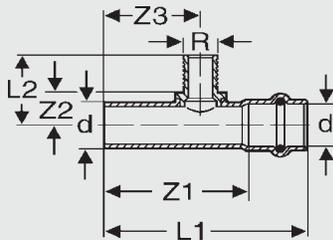


PEX Press Brazed Copper Manifold - Headers											
Stock Code	d x R (size)	L1 (in)	L1 (mm)	L2 (in)	L2 (mm)	Z1 (in)	Z1 (mm)	Z2 (in)	Z2 (mm)	Z3 (in)	Z3 (mm)
65470	1-1/4" CM x 1/2" PEX Press, 24 outlets	75.0	1905	1.58	40.1	3.00	76.2	0.99	25.1	3.00	76.2
65471	1-1/4" CM x 3/4" PEX Press, 24 outlets	75.0	1905	1.58	40.1	3.00	76.2	0.99	25.1	3.00	76.2
65480	1-1/2" CM x 3/4" PEX Press, 24 outlets	75.0	1905	1.70	43.2	3.00	76.2	1.11	28.3	3.00	76.2

Note: CM = Copper Male



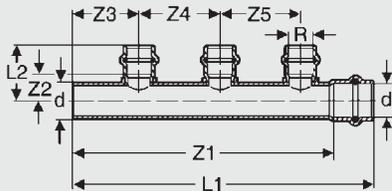
Bronze PEX Press ProPress Copper Manifolds															
Stock Code	d x R (size)	L1 (in)	L1 (mm)	L2 (in)	L2 (mm)	Z1 (in)	Z1 (mm)	Z2 (in)	Z2 (mm)	Z3 (in)	Z3 (mm)	Z4 (in)	Z4 (mm)	Z5 (in)	Z5 (mm)
65903	3/4" C x 1/2" PEX Press, 3 outlets	7.32	186.0	1.37	34.7	6.38	162.0	0.78	19.7	1.65	42.0	1.97	50.0	1.97	50.0
65913	1" C x 1/2" PEX Press, 3 outlets	7.32	186.0	1.43	36.3	6.38	162.0	0.84	19.7	1.65	42.0	1.97	50.0	1.97	50.0



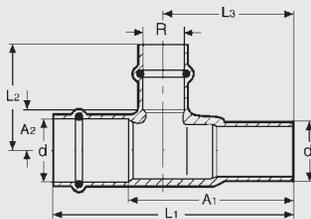
Bronze PEX Press ProPress Copper Manifolds											
Stock Code	d x R (size)	L1 (in)	L1 (mm)	L2 (in)	L2 (mm)	Z1 (in)	Z1 (mm)	Z2 (in)	Z2 (mm)	Z3 (in)	Z3 (mm)
65901	3/4" C x 1/2" PEX Press, 1 outlet	3.39	86.1	1.37	34.7	2.48	63.0	0.78	19.7	1.65	42.0
65902	3/4" C x 3/4" PEX Press, 1 outlet	3.39	86.1	1.37	34.7	2.48	63.0	0.78	19.7	1.65	42.0
65911	1" C x 1/2" PEX Press, 1 outlet	3.39	86.1	1.43	36.2	2.48	63.0	0.83	21.2	1.65	42.0
65912	1" C x 3/4" PEX Press, 1 outlet	3.39	86.1	1.43	36.2	2.48	63.0	0.83	21.2	1.65	42.0

Dimensional Documentation

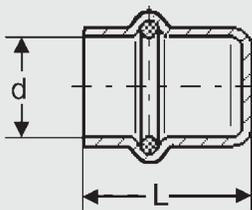
PEX Press Fittings



ProPress Copper Manifolds															
Stock Code	d x R (size)	L1 (in)	L1 (mm)	L2 (in)	L2 (mm)	Z1 (in)	Z1 (mm)	Z2 (in)	Z2 (mm)	Z3 (in)	Z3 (mm)	Z4 (in)	Z4 (mm)	Z5 (in)	Z5 (mm)
65803	1" C x 1/2" C, 3 outlets	7.32	186.0	1.51	38.4	6.38	162.0	0.76	19.4	1.65	42.0	1.97	50.0	1.97	50.0



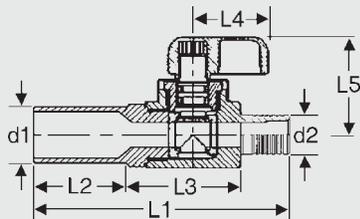
ProPress Copper Manifold											
Stock Code	d x R (size)	A1 (in)	A1 (mm)	A2 (in)	A2 (mm)	L1 (in)	L1 (mm)	L2 (in)	L2 (mm)	L3 (in)	L3 (mm)
65801	1" C x 1/2" C, 1 outlets	2.69	68.5	0.78	20.0	3.66	93.0	1.53	39.0	2.06	52.5



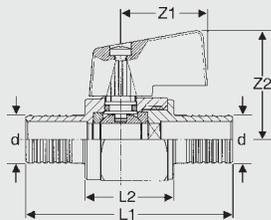
Copper ProPress End Cap			
Stock Code	d (size)	L1 (in)	L1 (mm)
65840	3/4" C	1.067	27.1
65860	1" C	1.110	28.2

Dimensional Documentation

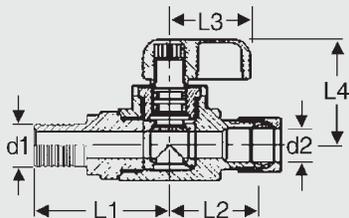
PEX Press Fittings



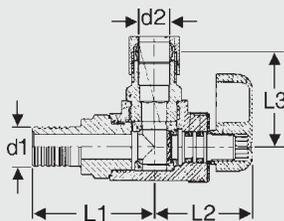
ProPress Copper Manifold Valves											
Stock Code	d1 x d2 (size)	L1 (in)	L1 (mm)	L2 (in)	L2 (mm)	L3 (in)	L3 (mm)	L4 (in)	L4 (mm)	L5 (in)	L5 (mm)
74001	1/2" Copper x 1/2" PEX Press	2.95	74.9	1.00	25.4	1.36	34.5	0.88	22.4	1.20	30.5



PEX Press Ball Valves									
Stock Code	d (size)	L1 (in)	L1 (mm)	L2 (in)	L2 (mm)	Z1 (in)	Z1 (mm)	Z2 (in)	Z2 (mm)
73500	3/8" PEX Press	2.19	55.5	1.00	25.5	0.87	22.10	1.09	27.69
73520	1/2" PEX Press	2.07	52.6	0.89	22.6	0.87	22.10	1.09	27.69
73540	3/4" PEX Press	2.32	59.0	1.14	29.0	0.87	22.10	1.27	32.26



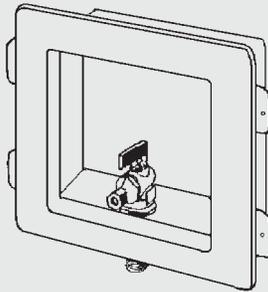
PEX Press Straight Stop Valves, 1/4 Turn									
Stock Code	d1 x d2 (size)	L1 (in)	L1 (mm)	L2 (in)	L2 (mm)	L3 (in)	L3 (mm)	L4 (in)	L4 (mm)
73031	1/2" PEX Press x 3/8" OD	1.45	36.83	1.00	25.4	0.88	22.35	1.20	30.48



PEX Press Angle Stop Valves, 1/4 Turn							
Stock Code	d1 x d2 (size)	L1 (in)	L1 (mm)	L2 (in)	L2 (mm)	L3 (in)	L3 (mm)
72511	1/2" PEX Press x 3/8" OD	1.45	36.83	1.20	30.48	1.00	25.4

Dimensional Documentation

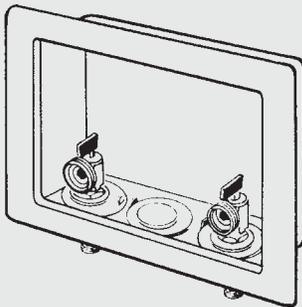
PEX Press Fittings



Ice Maker Box

(box dimensions without face plate or valves)

Height: 5-1/4 inches
Width: 5-1/4 inches
Depth: 2-1/2 inches
Face plate: 6-3/4 inches high x 6-3/4 inches wide
Valve: 3/8" or 1/2" PEX Press



Washing Machine Box

(box dimensions without face plate or valves)

Height: 6-5/8 inches
Width: 7-3/4 inches
Depth: 3 inches
Face plate: 8-1/4 inches high x 10-3/8 inches wide
Valve: 1/2" PEX Press

» Pumps » Well » Shallow Well Jet Pumps

High Efficiency Shallow Well Jet Pump

Brand: [Dayton](#)
 Model: **1D880**
 SKU: **68515**



\$347.30
 Free 3 Business Day Shipping

Total Ratings: 0
 Average Rating: 0
REVIEW THIS ITEM

MORE PRODUCTS



Dayton
Shallow Well Jet Pump

Model: D4RJ53
 SKU: 87168

(0 reviews)

\$273.50 + FREE Shipping
(Out of Stock)

PRODUCT INFORMATION

ITEM	High-efficiency Shallow Well Jet Pump
PUMP MATERIAL	Cast-iron
HP	3/4
VOLTAGE	115/230
AMPS AC	13.0/6.5
NPT INLET (IN.)	1-1/4
NPT OUTLET	3/4
TANK PSI	30 50
GPM OF WATER @ 5 FT @ 30, 50 PSI	15.7 9.0
GPM OF WATER @ 10 FT @ 30, 50 PSI	14.3 8.3
GPM OF WATER @ 15 FT @ 30, 50 PSI	12.3 7.0
GPM OF WATER @ 20 FT @ 30, 50 PSI	10.0 6.2
GPM OF WATER @ 25 FT @ 30, 50 PSI	7.5 5.5
SHUT OFF (PSI)	74
MOTOR TYPE	Capacitor Start
MAX. OPERATING TEMP. (F)	140
LENGTH (IN.)	20
WIDTH (IN.)	9-7/8
HEIGHT (IN.)	6-3/4
RESISTS	Corrosion
FACTORY PRESET (PSI)	30-50
APPLICATION	Ideal for Installations with Driven Well Points, Dug Wells, Drilled Wells or Cisterns Where Higher Operating Efficiencies are Desired, for Use When Vertical Distance to Water is Less Than 25 Feet and Installed as a Single Pipe System to the Water Source
INCLUDES	Large Cast Iron Housing with Open Case Design, Top Located Priming Ports for Easy Priming, Removable Bolt-on, Cast Iron Ejector with Nozzle Cleanout Port, Air Volume Control Tapping, Impeller, Diffuser, 1/2" NPT Drain Plug, Reusable Buna N Internal Seal
WEIGHT	42.00

High Efficiency Shallow Well Jet Pump, Power Rating 3/4 HP, Voltage Rating 115/230 Volts, Current Rating 13.0/6.5 Amps, Pressure 20/30/40/50 PSI, Suction 1 1/4 Inches, Discharge Port 3/4 Inch, Water Flow @ 25 Feet of Head 7.5/7.5/7.5/5.5 GPM, Motor Type Capacitor Start, Shut Off 74/74/74/74 PSI, Length 20 Inches, Height 6 3/4 Inches, Width 9 7/8 Inches, Cast Iron, Single Phase



Dayton
Shallow Well Jet Pump

Model: 1D878
 SKU: 74260

(0 reviews)

\$555.69 + FREE Shipping



Dayton
Shallow Well Jet Pump

Model: 1D872
 SKU: 76954

(0 reviews)

\$501.24 + FREE Shipping



Dayton
Shallow Well Jet Pump

Model: 1D874
 SKU: 77399

(0 reviews)

\$399.02 + FREE Shipping

CUSTOMER SERVICE

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720-204-3660
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Quote Request

SHIPPING + RETURNS

Shipping Policy
Cancellations / Changes
Returns
Warranty

COMPANY INFO

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Testimonials
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ACCOUNT

Login / Register
My Account
Order Status
Order History



Dayton
Shallow Well Jet Pump

Model: D2P898
SKU: 97308

(0 reviews)

\$459.75 + **FREE** Shipping

(Out of Stock)

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LR90197

UL Std. No. 778

ENCLOSURE 3

Model: 1D876
Model: 9P040B

Rev: F

Date Code/Código: 0211

Hz: 60
Amps A.: 8.6/4.3
Type/Tipo: C

Ph: 1
S.F., F.S.: 1.6
RPM, Tr/Min: 3450

Service/Servicio: Continuous / Continuo
KVA Code/Código: K
Ins Class/Catég. Isolat./Clase: B

Chassis/Bastidor: 56U

115

For connected for / Moteur raccorde pour / El motor esta conectado para:

Record pump model number prior to motor replacement.

Relever le numéro de modèle de la pompe avant de remplacer le moteur

Anota el número de modelo de la bomba antes de cambiar el motor

Normally protected automatic / Coupe-circuit thermique, automatique / Protección térmica, automática

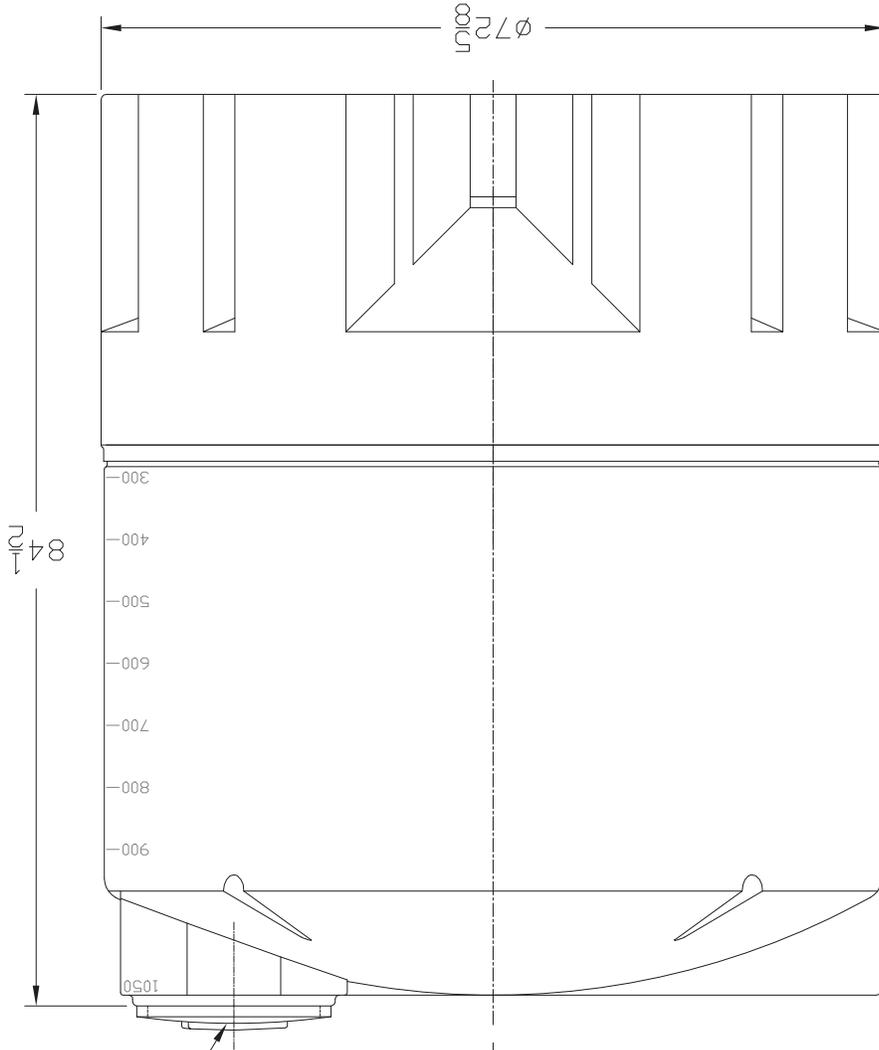
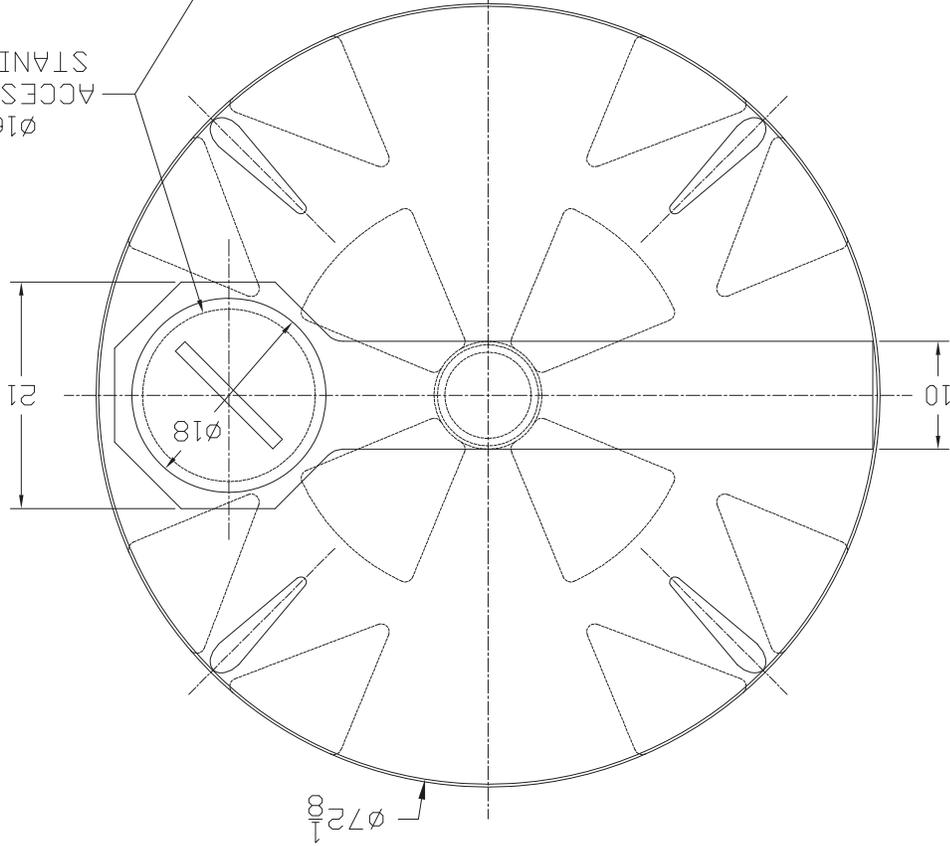
Use copper conductors only

Utilisez uniquement des conducteurs en cuivre

Use conductores de cobre solamente

Model: 1D876 / Rev: F / Enclosure 3 / Made in USA

STANDARD
ACCESS IS
Ø16

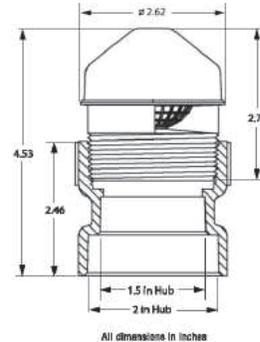


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OTHER THAN BY THE OWNER. CHEM-TAINER DOES NOT
AUTHORIZE THE REPRODUCTION OR CONVEYANCE
OF ANY INFORMATION CONTAINED HEREIN.

ALL DIMENSIONS SHOWN ARE OUTSIDE PART DIMENSIONS IN INCHES,
AND VARY BY THE STANDARD ROTATIONAL MOLDING TOLERANCE OF ±2%.

Rev. 0	Date 07/14/00	File Name JP7285-1
CHEM-TAINER		Scale
Industries Inc.		Date 07/14/00
361 Neptune Ave.	V.Babylon, NY 11704	Drawn By: IIA
(631) 661-8300	Fax: (631) 661-8209	Cust. Rep.
TITLE 1050 GAL. CONICAL BOTTOM BULK STORAGE TANK W/ STAND		
Part #	Dwg. #	
TN7285JP	C-7285-1N	

TECHNICAL SPECIFICATION: The purpose of an Air Admittance Valve is to provide a method of allowing air to enter the plumbing drainage system without the use of a vent extended to open air and to prevent sewer gases from escaping into a building. An Air Admittance Valve is a one way valve designed to allow air to enter the plumbing drainage system when negative pressures develop in the piping system. The device shall close by gravity and seal the vent terminal at zero differential pressure (no flow conditions) and under positive internal pressures.



Materials and Dimensions

- Valve – PVC with 2" NPT Threads
- Tension Membrane – Neoprene
- Adapter – 1-1/2" x 2" PVC or ABS

Features

- Rated 20 DFU's for venting DWV 2" and smaller
- Sweet Spot™ technology opens at -0.01 psi and seals at 0 psi and above
- Screening on air inlets to guard the seal
- Protective rubber sleeve provides grip for installation and keeps valve free from debris
- 100% functionally tested at 1/4" H₂O and 30" H₂O ensuring trouble free performance
- Limited Lifetime Warranty

Listings

- ASSE 1050 & 1051
- ICC ESR-1664
- NSF Standard 14
- IAPMO – Classified Mark
- ASTM D 2665/D 2661



Installation: Read installation instructions prior to use of this product. Always consult local plumbing codes prior to installing an AAV. Individual, branch and circuit vents are permitted to terminate with a connection to a Sure-Vent® AAV. The Sure-Vent® AAV will only vent fixtures that are on the same floor and connect to a horizontal branch drain. The horizontal branch drain shall connect to the drainage stack a maximum of four branch intervals from the top of the stack. The Sure-Vent® AAV should be located within the maximum developed length permitted for the vent. The Sure-Vent® AAV must be located a minimum of 4 inches above the horizontal branch drain and 6 inches above any insulation material and within 15 degrees of vertical. Every structure in which plumbing is installed shall have at least one primary stack vent. The stack vent should run as directly as possible from the building drain through to the open air.

Apply approved pipe joint compound or thread seal tape to the male threads of the valve. Remove protective orange rubber sleeve after installation.

Sure-Vent® AAV are intended for installation in the confines of a structure, cannot be exposed to outside elements and are intended for use between -40° F and 150° F. AAVs must be accessible for inspection and service.

Code Approvals

- International Plumbing Code (IPC) 2003
- International Residential Code (IRC) 2003

✓	PRODUCT NUMBER	DESCRIPTION	PACK	CARTON WEIGHT
	39016	20 DFU AAV with 1-1/2" x 2" PVC Schedule 40 adapter	6	2.2 lbs.
	39018	20 DFU AAV with 1-1/2" x 2" ABS Schedule 40 adapter	6	2.2 lbs.
	39017	20 DFU AAV with 1-1/2" x 2" PVC Schedule 40 adapter	50	18 lbs.
	39019	20 DFU AAV with 1-1/2" x 2" ABS Schedule 40 adapter	50	18 lbs.
	39238	20 DFU AAV with mechanical adapter	12	4 lbs.

Data is subject to manufacturing tolerances.

"QUALITY PUMPS SINCE 1939"

Product information presented here reflects conditions at time of publication. Consult factory regarding discrepancies or inconsistencies.

ZOELLER
PUMP CO.



SECTION: 3.10.012

FM2485

0310

Supersedes

0108

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visit our web site:
www.zoeller.com

PREASSEMBLED 24" x 24" SEWAGE SYSTEMS

Complete and Job-Ready for Fast Installation!

912 SEWAGE SYSTEMS INCLUDE:

- (1) 2" solids sewage ejector
- (1) 24" x 24" poly molded basin
- (1) PSF cover with 2V2D
- Internal 2" PVC discharge pipe

PUMP FEATURES:

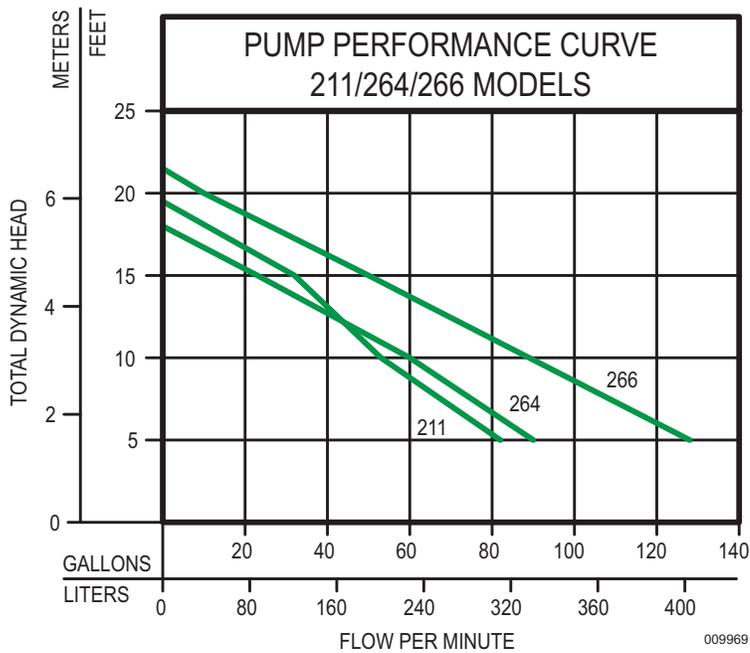
- Cast iron construction (264/266)
- Thermoplastic construction (211)
- Automatic or piggyback configuration available
- Full 2" solids capacity
- Thermal overload protection
- Non-clogging vortex impeller

BASIN FEATURES:

- 24" depth for easier installation in troublesome areas
- 41 gallon capacity (exceeds 18 x 30)
- 25 gallon capacity below 4" inlet
- Vertical support ribs help eliminate stuck float switches
- Anti-flotation device helps to eliminate basin from "floating"
- 360° molded handle (acts as secondary AFD)
- (1) 4" pre-drilled inlet (flex-coupling provided by others)
- (7) additional flat areas for inlet installation (field drilled)
- Molded torque stops for added pump support
- One-piece molded PSF cover with integrated molded foam seal
- Ribbed reinforced cover to provide additional strength and stability
- Threaded 2" vent and 2" discharge piping connections
- Stainless steel cover bolts and hardware
- High water alarm available on certain packages
- Stackable for storage/shipping

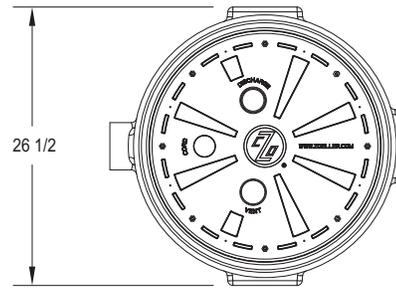


912-0116 Shown



TOTAL DYNAMIC HEAD/FLOW
PER MINUTE
SEWAGE AND DEWATERING

MODELS		211		264		266	
Feet	Meters	Gal.	Liters	Gal.	Liters	Gal.	Liters
5	1.5	82	310	90	341	128	484
10	3.1	53	201	60	227	89	337
15	4.6	32	121	23	87	50	189
20	6.1	-	-	-	-	10	38
Shut-off Head:		19.5 ft.(5.9m)		18 ft.(5.5m)		21.5 ft.(6.6m)	

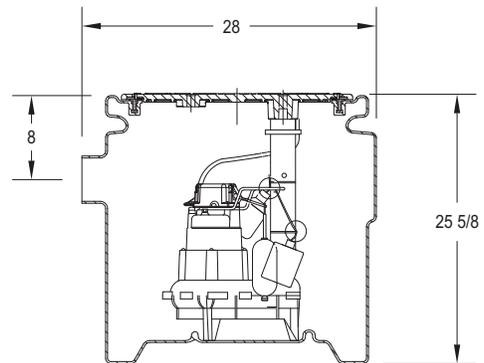


PUMP SPECIFICATIONS:

- 0.4 HP (211/264) or 1/2 HP (266) available
- 115 Volts
- 2" NPT discharge with 2" solids capacity
- Refer to **FM1784 (211)**, **FM1495 (264)** or **FM0390 (266)** for additional specifications

BASIN SPECIFICATIONS:

- Poly molded basin with PSF cover
- 41 gallon capacity (25 gallons below inlet)
- (1) 4" inlet (predrilled, coupling by others)
- Integral foam seal
- Stainless steel bolt kit



SK2694

Part Number	Pump	Description	Weight (lbs)
912-0112	M211	Automatic 211 - Poly Molded Basin w/ 2V2D PSF Simplex Cover	50
912-1112	"	Automatic 211 - Poly Molded Basin w/ 2V2D PSF Simplex Cover includes (1) 10-1494 Indoor Alarm	54
912-0113	BN211	Piggyback Float 211 - Poly Molded Basin w/ 2V2D PSF Simplex Cover	50
912-1113	"	Piggyback Float 211 - Poly Molded Basin w/ 2V2D PSF Simplex Cover includes (1) 10-1494 Indoor Alarm	54
912-0114	M264	Automatic 264 - Poly Molded Basin w/ 2V2D PSF Simplex Cover	73
912-1114	"	Automatic 264 - Poly Molded Basin w/ 2V2D PSF Simplex Cover includes (1) 10-1494 Indoor Alarm	75
912-0115	BN264	Piggyback Float 264 - Poly Molded Basin w/ 2V2D PSF Simplex Cover	73
912-1115	"	Piggyback Float 264 - Poly Molded Basin w/ 2V2D PSF Simplex Cover includes (1) 10-1494 Indoor Alarm	75
912-0116	M266	Automatic 266 - Poly Molded Basin w/ 2V2D PSF Simplex Cover	76
912-1116	"	Automatic 266 - Poly Molded Basin w/ 2V2D PSF Simplex Cover includes (1) 10-1494 Indoor Alarm	78
912-0117	BN266	Piggyback Float 266 - Poly Molded Basin w/ 2V2D PSF Simplex Cover	76
912-1117	"	Piggyback Float 266 - Poly Molded Basin w/ 2V2D PSF Simplex Cover includes (1) 10-1494 Indoor Alarm	78

JOB READY FOR EASY INSTALLATION



WARNING TO REDUCE THE RISK OF ELECTRICAL SHOCK A PROPERLY GROUNDED RECEPTACLE OF GROUNDING TYPE SHALL BE INSTALLED AND PROTECTED BY A GROUND FAULT CIRCUIT INTERRUPTER (GFCI) IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE AND LOCAL CODES. DO NOT REMOVE GROUND PIN FROM PLUG.

RESERVE POWERED DESIGN

For unusual conditions a reserve safety factor is engineered into the design of every Zoeller pump.

"QUALITY PUMPS SINCE 1939"

Product information presented here reflects conditions at time of publication. Consult factory regarding discrepancies or inconsistencies.

ZOELLER
PUMP CO.



SECTION: 2.30.010

FM1784

0305

Supersedes

0803

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COMPARE THESE FEATURES

- 115V single phase/60 Hz, .4 HP, 5.5 Amps, 3400 RPM.
- Thermal overload protection.
- Non-corrosive engineered plastic motor housing, pump housing, base, and impeller.
- Oil Free.
- No steel sheet metal parts to rust or corrode.
- All stainless steel screws, switch arm, and lower motor housing.
- 2-pole float operated mechanical switch.
- Solid polypropylene float.
- UL Listed 15' cord with 3-prong plug.
- Maximum temperature for dewatering - 110°F (43°C).
- Passes 2" inch spherical solids.
- 2" NPT discharge.
- Non-clogging vortex impeller.
- On point— 13" • Off point— 5-3/4"
- Major width - 9-5/16" • Height - 15-7/8"

Note: The sizing of effluent systems normally requires variable level float(s) controls and properly sized basins to achieve required pumping cycles or dosing timers with nonautomatic pumps.

ZOELLER
PUMP CO.



Manufacturers of . . .

"QUALITY PUMPS SINCE 1939"

**ALL MODELS ARE
COMPLETELY SUBMERSIBLE
HERMETICALLY SEALED**
Watertight - dust tight.

Model 211
(For Pump Prefix Identification
see News & Views 0052)

"AQUA-MATE"
SUBMERSIBLE PUMP

FOR
SEWAGE/EFFLUENT OR DEWATERING

PASSES 2" SOLIDS
2" NPT DISCHARGE

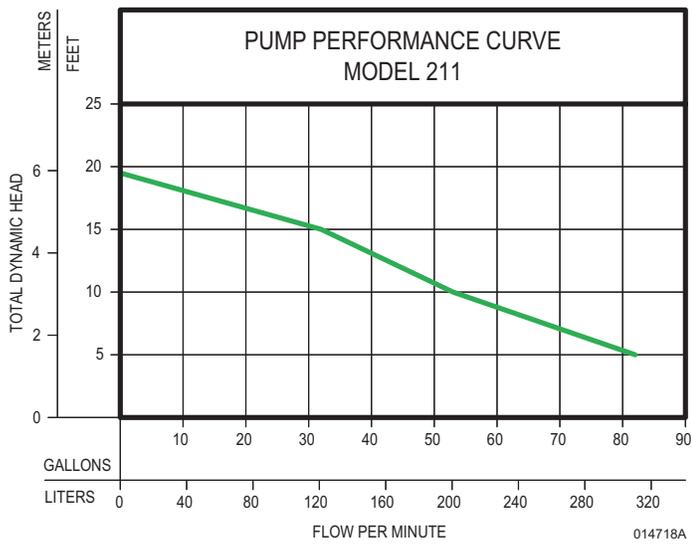


AUTOMATIC
MODEL



MODELS AVAILABLE
• Automatic or Nonautomatic

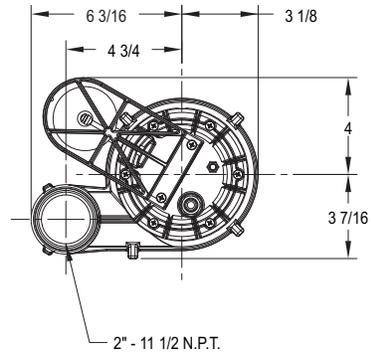




TOTAL DYNAMIC HEAD/FLOW
PER MINUTE
SEWAGE AND DEWATERING

MODEL		211	
Feet	Meters	Gal.	Liters
5	1.5	82	310
10	3.0	53	201
15	4.6	32	121
Shut-off Head:		19.5 ft. (5.9m)	

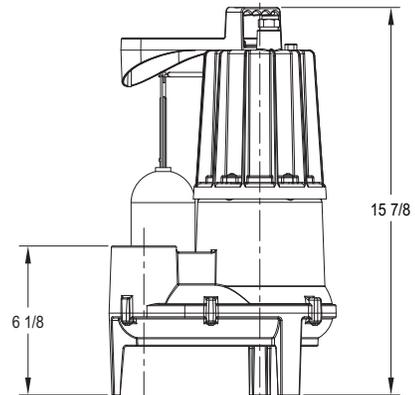
014718B



Recommended for 2" pipe only.

**CONSULT FACTORY
FOR SPECIAL APPLICATIONS**

- Variable level Float Switches available.
- Variable level long cycle systems available.
- Alarm systems available.



SK2092A

Single Seal	Control Selection					
	Model	Volts - Ph	Mode	Amps	Simplex	Duplex
M 211	115	1	Auto	5.5	1	3
N 211	115	1	NonAuto	5.5	2	2 & 3

SELECTION GUIDE

1. Integral float operated mechanical switch, no external control required.
2. For automatic use single piggyback variable level float switch or double piggyback variable level float switch. Refer to FM0477.
3. See FM1663 for a residential alternator system.

For information on additional Zoeller products refer to catalog on Piggyback Variable Level Float Switches, FM0477; Sump/Sewage Basins, FM0487; and Single Phase Simplex Pump Control/Alarm Systems, FM0732.

CAUTION

All installation of controls, protection devices and wiring should be done by a qualified licensed electrician. All electrical and safety codes should be followed including the most recent National Electric Code (NEC) and the Occupational Safety and Health Act (OSHA).

RESERVE POWERED DESIGN

For unusual conditions a reserve safety factor is engineered into the design of every Zoeller pump.



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Manufacturers of..

"QUALITY PUMPS SINCE 1939"

GeoSpring™ hybrid water heater



Model# GEH50DNSRSA



FEATURES

Control Type	Integrated Electronic 20 Character x 4 Line Display Backlit LCD Display Service Diagnostics Integrated
Fuel Type	Electric
Operating Modes	eHeat™ Technology Hybrid (Factory Default Mode) High Demand Standard Electric
Vacation Setting	3 to 90 days
Demand Response Capable	4 Settings
Renewable Air Filter	Washable (included)
PreciseTemp	+/- 3°F
Temperature Setting	100-140° F Range
Temperature Setting Factory Default	120° F
Condensate Collector	Integrated (tubing included)

- ENERGY STAR® Qualified - Exceeds federal guidelines for energy efficiency and provides year-round energy and money savings
- - Consumes up to 62% less energy than a standard electric water heater
- - Save \$320 per year in water heater operating cost (Based on DOE test procedure and comparison of a 50-gallon standard electric tank water heater using 4879 kWh per year vs. the GeoSpring™ hybrid water heater using 1856 kWh per year)
- - Demand response capable
- - Offers easy replacement of standard electric water heater
- - Fits in similar footprint as a standard 50-gallon water heater
- - Uses existing water and electrical connections
- - Perfect for new construction or replacement upgrade

Have more questions? Please contact 1-800-626-2005

GeoSpring™ hybrid water heater



Model# GEH50DNSRSA

APPROXIMATE DIMENSIONS (HxDxW)

- 60 1/2 in x 21 3/4 in x 21 3/4 in

CAPACITY

- Unit Capacity 50 Gallons

Claims & Certifications

- ENERGY STAR® Qualified

WARRANTY

- Parts Warranty - Limited 10 year entire appliance
- Labor Warranty - Limited 1-year entire appliance

Have more questions? Please contact 1-800-626-2005



LISTED

SA32593

HEAT PUMP

WATER HEATERS

3LZR

POMPE À CHALEUR

CHAUFFE-EAU

3LZR

VS
00 PSI

S:

34 kPa

Features

- Vitreous china
- Round-front
- Class Five® flushing system
- Polished chrome trip lever
- Less supply
- 12" (30.5 cm) rough-in
- 1.28 gpf (4.8 lpf)
- 2-1/8" (5.4 cm) glazed trapway
- 10-1/2" (26.7 cm) x 7-3/4" (19.7 cm) water area
- 27-1/2" (69.9 cm) x 19-5/8" (49.8 cm) x 28-1/4" (71.8 cm)



Codes/Standards Applicable

Specified model meets or exceeds the following:

- ASME A112.19.2/CSA B45.1
- EPA WaterSense®

Colors/Finishes

- 0: White
- Other: Refer to Price Book for additional colors/finishes

Accessories

- CP: Polished Chrome
- PB: Vibrant® Polished Brass
- Other: Refer to Price Book for additional colors/finishes

Specified Model

Model	Description	Trip Lever	Colors/Finishes	
K-3577	Class Five® toilet	left-hand	<input type="checkbox"/> 0	<input type="checkbox"/> Other_____
K-3577-RA	Class Five® toilet	right-hand	<input type="checkbox"/> 0	<input type="checkbox"/> Other_____
K-3577-RZ	Class Five® toilet with Insuliner®, and cover locks	right-hand	<input type="checkbox"/> 0	<input type="checkbox"/> Other_____
K-3577-T	Class Five® toilet with cover locks	left-hand	<input type="checkbox"/> 0	<input type="checkbox"/> Other_____
K-3577-TR	Class Five® toilet with cover locks	right-hand	<input type="checkbox"/> 0	<input type="checkbox"/> Other_____
K-3577-U	Class Five® toilet with Insuliner®	left-hand	<input type="checkbox"/> 0	<input type="checkbox"/> Other_____
K-3577-UR	Class Five® toilet with Insuliner®	right-hand	<input type="checkbox"/> 0	<input type="checkbox"/> Other_____
K-3577-UT	Class Five® toilet with Insuliner®, and cover locks	left-hand	<input type="checkbox"/> 0	<input type="checkbox"/> Other_____

Product Specification

The toilet with round-front bowl shall be made of vitreous china. Toilet shall be 27-1/2" (69.9 cm) in length, 19-5/8" (49.8 cm) in width, and 28-1/4" (71.8 cm) in height with a 10-1/2" (26.7 cm) x 7-3/4" (19.7 cm) water area. Toilet shall be 1.28 gpf (4.8 lpf) with Class Five® flushing system. Toilet shall have 2-1/8" (5.4 cm) glazed trapway. Toilet shall include polished chrome trip lever. Toilet shall be 12" (30.5 cm) rough-in and less supply. Toilet shall be Kohler Model K-3577-_____.

WELLWORTH®

Recommended Accessories

K-4658	Brevia™ seat with cover	<input type="checkbox"/> 0			<input type="checkbox"/> Other_____
K-4689	Cachet® seat with cover	<input type="checkbox"/> 0			<input type="checkbox"/> Other_____
K-7637	Angle supply with stop – 3/8" NPT		<input type="checkbox"/> CP	<input type="checkbox"/> PB	<input type="checkbox"/> Other_____

Technical Information

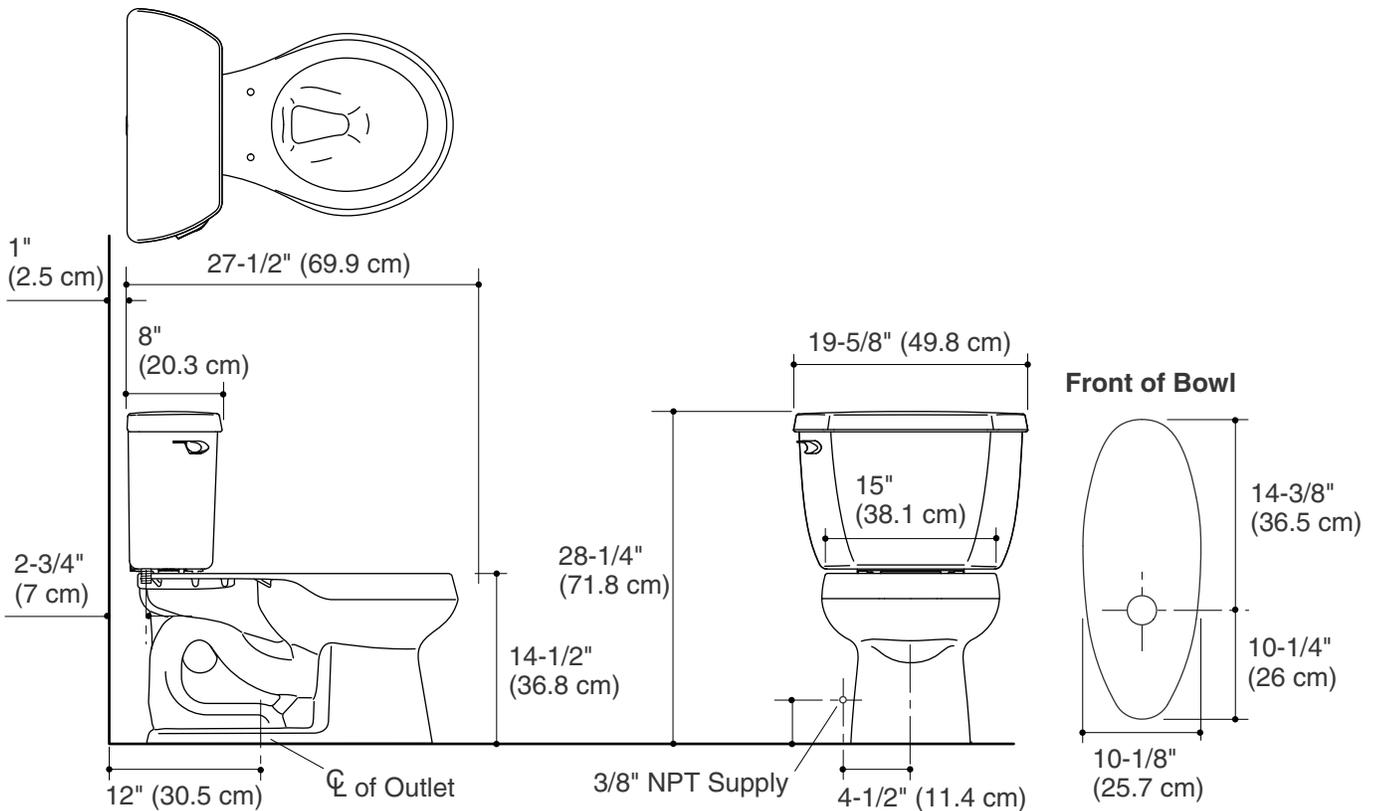
Fixture:	
Configuration	two-piece, round
Water per flush	1.28 gpf (4.8 lpf)
Passageway	2-1/8" (5.4 cm)
Water area	10-1/2" (26.7 cm) x 7-3/4" (19.7 cm)
Water depth from rim	5-1/4" (13.3 cm)
Seat post hole centers	5-1/2" (14 cm)

Included components:

Bowl	K-4197
Tank	K-4436
Tank cover	84591
Trip lever	K-9380
Tank attachment kit	1016548
Bolt cap accessory pack	1013092

Installation Notes

Install this product according to the installation guide.



Product Diagram

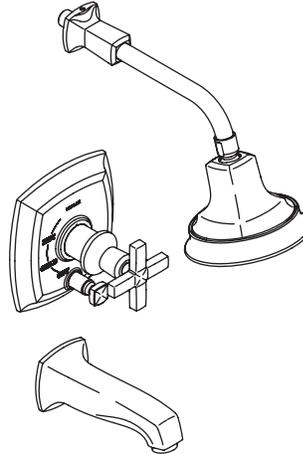
MARGAUX® RITE-TEMP®

Features

- Brass construction
- MasterClean™ sprayface on showerhead resists mineral buildup
- Available with cross handle or lever handle
- Push button diverter on bath and shower trim models [K-T16233]
- Requires a Rite-Temp valve
- Complements Margaux Suite

**BATH AND SHOWER TRIM
K-T16233**

ALSO K-T16234, K-T16235, K-T16246



Codes/Standards Applicable

Specified model meets or exceeds the following:

- ASME A112.18.1/CSA B125.1
- ASSE 1016

Colors/Finishes

- CP: Polished Chrome
- Other: Refer to Price Book for additional colors/finishes

Accessories

- NA: None applicable

Specified Model

Model	Description	Colors/Finishes	
K-T16233-3	Bath and shower trim – cross handle (shown)	<input type="checkbox"/> CP	<input type="checkbox"/> Other _____
K-T16233-4	Bath and shower trim – lever handle	<input type="checkbox"/> CP	<input type="checkbox"/> Other _____
K-T16234-3	Shower trim only – cross handle	<input type="checkbox"/> CP	<input type="checkbox"/> Other _____
K-T16234-4	Shower trim only – lever handle	<input type="checkbox"/> CP	<input type="checkbox"/> Other _____
K-T16235-3	Valve trim – cross handle	<input type="checkbox"/> CP	<input type="checkbox"/> Other _____
K-T16235-4	Valve trim – lever handle	<input type="checkbox"/> CP	<input type="checkbox"/> Other _____
K-16246	Bath spout	<input type="checkbox"/> CP	<input type="checkbox"/> Other _____

Required Accessories		
K-304-*	Rite-Temp® valve OR	<input type="checkbox"/> NA
K-2971-KS	HiFlow Rite-Temp valve with stops OR	<input type="checkbox"/> NA
K-11748-K	Rite-Temp valve with diverter OR	<input type="checkbox"/> NA

Product Specification

The bath and shower trim shall be made of brass construction. Faucet trim shall be available with a cross handle or a lever handle. Product shall feature a push button diverter on bath and shower trim models [K-T16233]. Showerhead shall feature a MasterClean sprayface on showerhead which resists mineral buildup. Product requires a Rite-Temp valve. Product shall complement the Margaux Suite. Bath and shower trim shall be Kohler Model K-T____-____-____ or K-____-____ and Rite-Temp valving shall be K-____-____-NA.

MARGAUX® RITE-TEMP®

Required Accessories

K-11748-KS Rite-Temp valve with diverter and stops

NA

* For a complete listing of all the Rite-Temp valves, refer to the K-304-* Specification Sheet or Roughing-In Sheet.

Optional Accessories

88526 HiFlow Rite-Temp® thin wall installation kit

CP

Other _____

Installation Notes

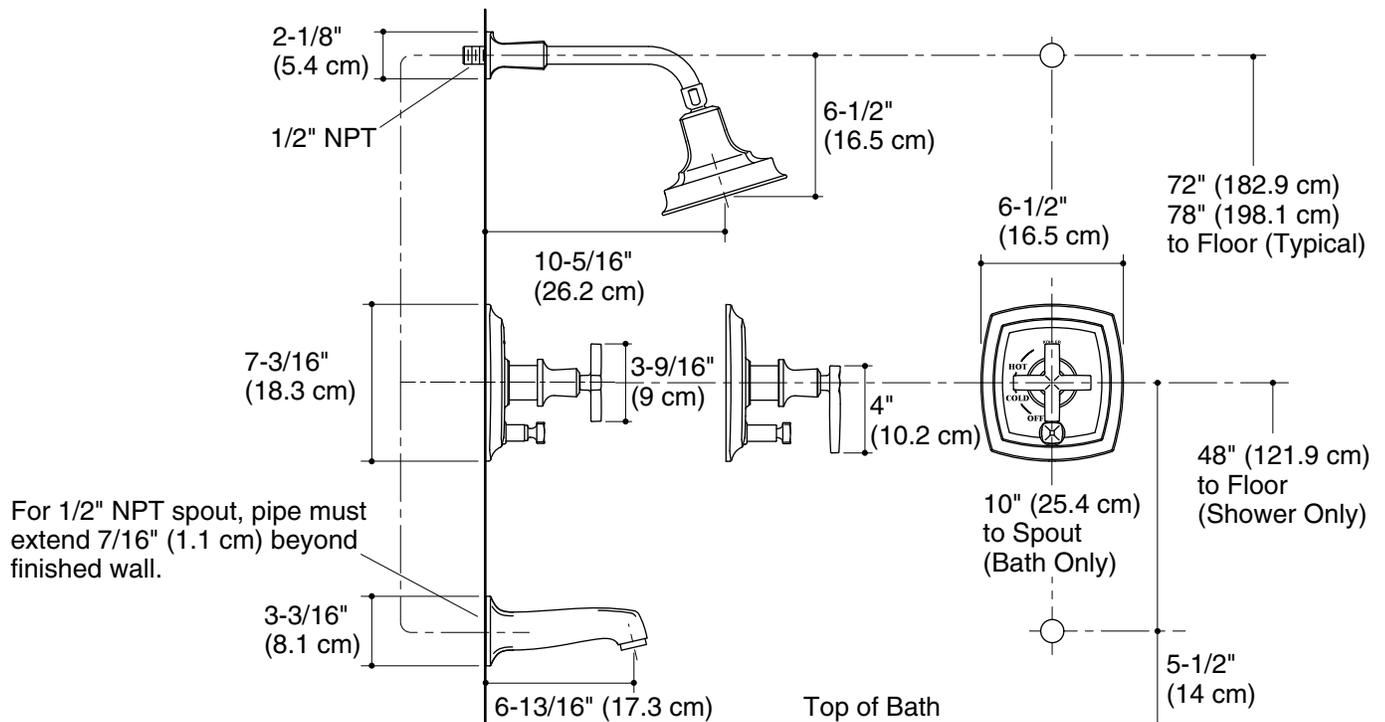
Install this product according to the installation guide.

NOTICE: Risk of product damage. Long screws, for installing trim, can damage the K-2971-KS valve. Consult the trim installation guide to verify if the thin wall installation kit (88526) is needed.

Avoid cross-flow conditions. Do not install shut-off device on either valve outlet.

Cap shower outlet if deck-mount spout, diverter, or handshower is connected to spout outlet.

Install straight pipe or tube drop of 7" (17.8 cm) to 18" (45.7 cm) with single elbow between the valve and wall-mount spout.



Product Diagram

DIVERTER BATH SPOUT K-496

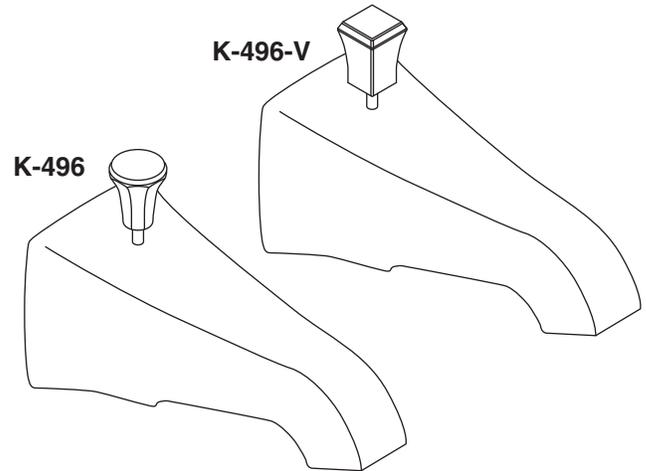
Features

- Metal construction
- 6" (15.2 cm) diverter spout with NPT connection
- Wall-mount installation

Codes/Standards Applicable

Specified model meets or exceeds the following:

- ASME A112.18.1
- IAPMO/UPC



Colors/Finishes

- CP: Polished Chrome
- Other: Refer to Price Book for additional colors/finishes

Specified Model

Model	Description	Colors/Finishes	
K-496	Diverter Bath Spout	<input type="checkbox"/> CP	<input type="checkbox"/> Other_____
K-496-V	Diverter Bath Spout with Deco lift knob	<input type="checkbox"/> CP	<input type="checkbox"/> Other_____

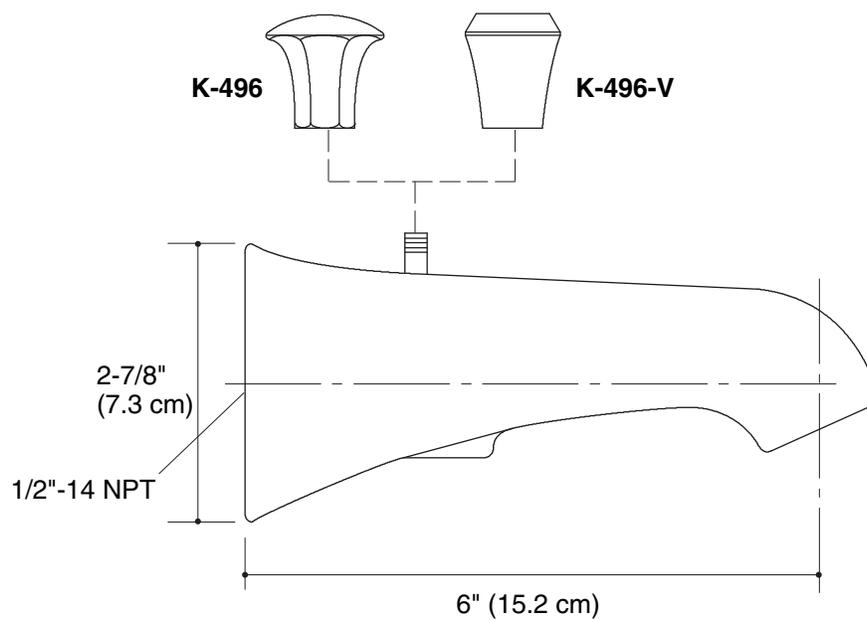
Product Specification

Product shall be a wall-mount 6" (15.2 cm) diverter bath spout and shall be of metal construction. Spout shall have NPT connection. Spout shall be Kohler Model K-496-_____ or K-496-V-_____.

MEMOIRS® STATELY

Installation Notes

Install this product according to the installation guide.



Product Diagram

Features

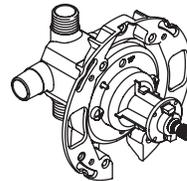
- Brass valve body
- High-temperature limit setting for added safety
- Mixing valve cycles from "cold" to "hot"
- Rite-Temp pressure-balancing diaphragm design valve
- One-piece diaphragm cartridge design for ease of maintenance
- Available with or without screwdriver stops

Codes/Standards Applicable

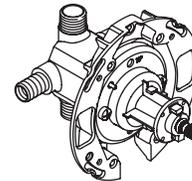
Specified model meets or exceeds the following:

- ASME A112.18.1/CSA B125.1
- ASSE 1016

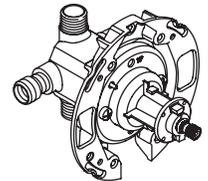
**PRESSURE-BALANCING VALVE
K-304**



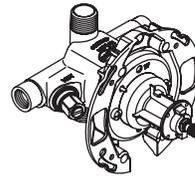
K-304-K



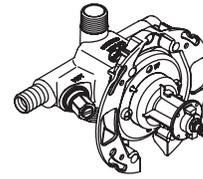
K-304-PX



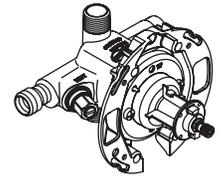
K-304-UX



K-304-KS



K-304-PS



K-304-US

Colors/Finishes

- NA: None applicable

Specified Model

Model	Description	Colors/Finishes
K-304-K	Pressure-balancing valve without screwdriver stops – universal inlets	<input type="checkbox"/> NA
K-304-KS	Pressure-balancing valve with screwdriver stops – universal inlets	<input type="checkbox"/> NA
K-304-PX	Pressure-balancing valve without screwdriver stops – PEX inlets (crimp)	<input type="checkbox"/> NA
K-304-PS	Pressure-balancing valve with screwdriver stops – PEX inlets (crimp)	<input type="checkbox"/> NA
K-304-UX	Pressure-balancing valve without screwdriver stops – PEX inlets (cold expansion)	<input type="checkbox"/> NA
K-304-US	Pressure-balancing valve with screwdriver stops – PEX inlets (cold expansion)	<input type="checkbox"/> NA
K-304-CX	Pressure-balancing valve without screwdriver stops – 1/2" CPVC inlets	<input type="checkbox"/> NA
K-304-CS	Pressure-balancing valve with screwdriver stops – 1/2" CPVC inlets	<input type="checkbox"/> NA

The K-304-CX and K-304-CS are K-304-K and K-304-KS with CPVC adapters installed on the inlets.

Optional Accessories		
58221	Deep roughing-in kit for Rite-Temp® valve for Antique™ valve six-prong and artist edition handles	<input type="checkbox"/> NA
58222	Deep roughing-in kit for Rite-Temp® valve for Antique™ lever handles	<input type="checkbox"/> NA
58223	Deep roughing-in kit for Rite-Temp® valve for IV Georges Brass®, Triton® lever handles	<input type="checkbox"/> NA
58224	Deep roughing-in kit for Rite-Temp® valve for IV Georges Brass® cross handles	<input type="checkbox"/> NA
58226	Deep roughing-in kit for Rite-Temp® valve for Taboret® lever and T-handle	<input type="checkbox"/> NA

Optional accessories continued on page 2

Product Specification

Rite-Temp pressure-balancing valve shall have a brass valve body. Product shall include a Rite-Temp pressure-balancing diaphragm design valve with a one-piece diaphragm cartridge design for ease of maintenance. Product shall have mixing valve cycles from "cold" to "hot" and a high-temperature limit stop for added safety. Product shall be available without or with screwdriver stops. Valve shall be Kohler Model K-304-____-NA.

RITE-TEMP®

Optional Accessories		
58229	Deep roughing-in kit for Rite-Temp® valve for Triton® standard handles	<input type="checkbox"/> NA
73418	Deep roughing-in kit for Rite-Temp® valve for Pinstripe™, Finial®, Revival®, Memoirs®, Stately and Memoirs® Classic standard handles	<input type="checkbox"/> NA
79639	Deep roughing-in kit for Rite-Temp® valve for Cabriole® lever handles	<input type="checkbox"/> NA
1007937	Deep roughing-in kit for Rite-Temp valve for Fairfax® faucet trim, Coralais® single-control faucet trim lever and acrylic handle, and K-T9492 MasterShower® trim lever and cylinder handle	<input type="checkbox"/> NA
1016154	Deep roughing-in kit for Rite-Temp® valve for Stillness®, Purist® lever and cross handles	<input type="checkbox"/> NA
1025388	Deep roughing-in kit for Rite-Temp® valve for Forte® lever handles	<input type="checkbox"/> NA
1030932	Deep roughing-in kit for Rite-Temp® valve for Devonshire® lever handles	<input type="checkbox"/> NA

Installation Notes

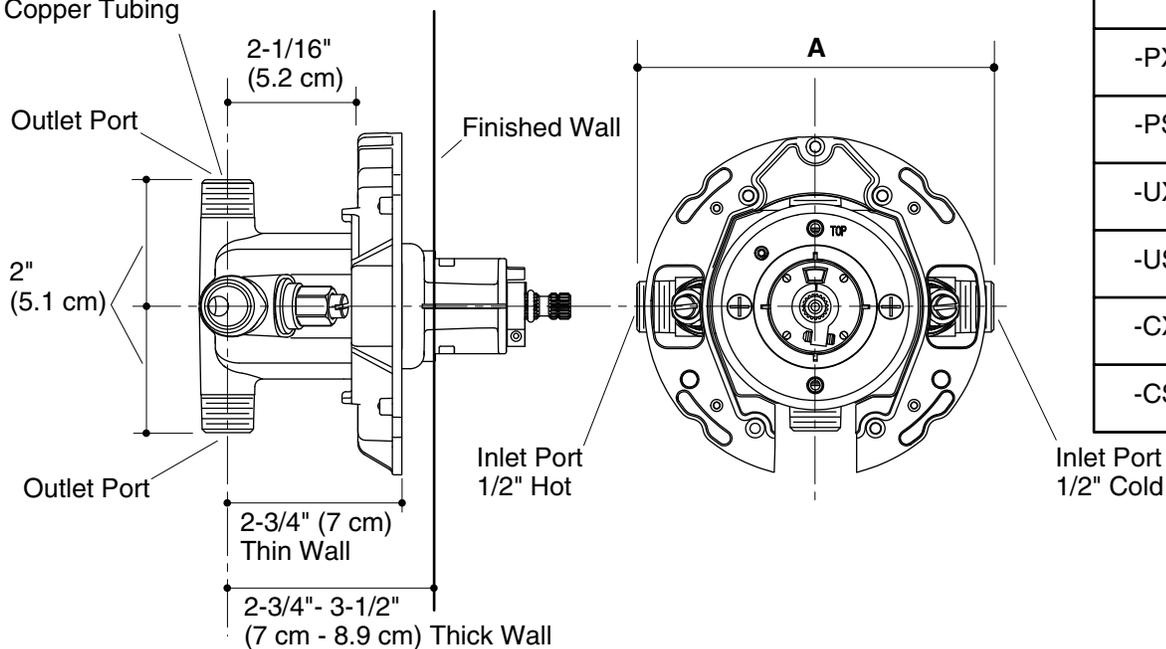
Install this product according to the installation guide.

Avoid cross-flow conditions. Do not install a shut-off device on either valve outlet.

Cap the shower outlet if a deck-mount spout, diverter, or handshower is connected to a spout outlet.

Install straight pipe or tube drop of 7" (17.8 cm) to 18" (45.7 cm) with single elbow between valve and wall-mount spout. Refer to the installation instructions for proper configuration of the connection between the valve and bath spout.

1/2"-14 NPT or 5/8" ID
for 1/2" Nominal
Copper Tubing



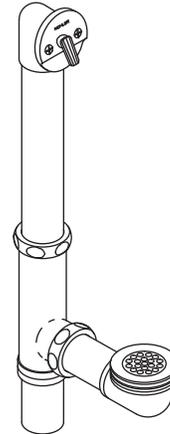
Model	A
-K	4" (10.2 cm)
-KS	5-3/4" (14.6 cm)
-PX	3-3/16" (8.1 cm)
-PS	6-1/8" (15.6 cm)
-UX	4" (10.2 cm)
-US	6-1/8" (15.6 cm)
-CX	6-5/8" (16.8 cm)
-CS	8-1/2" (21.6 cm)

Product Diagram

Features

- Adjustable trip lever pop-up drain
- 1-1/2" connection
- Brass tailpiece
- For 14" (35.6 cm) -16" (40.6 cm) deep bath installations
- For through-the-floor installations
- Available in 17 or 20 gauge brass construction
- Removable grid strainer

BATH DRAIN
K-11660
ALSO K-11666



Codes/Standards Applicable

Specified model meets or exceeds the following:

- ASME A112.18.2/CSA B125.2
- IAPMO/cUPC

Colors/Finishes

- CP: Polished Chrome
- PB: Vibrant® Polished Brass

Specified Model

Model	Description	Colors/Finishes	
K-11660	Bath drain with 17-gauge brass construction	<input type="checkbox"/> CP	<input type="checkbox"/> PB
K-11666	Bath drain with 20-gauge brass construction	<input type="checkbox"/> CP	

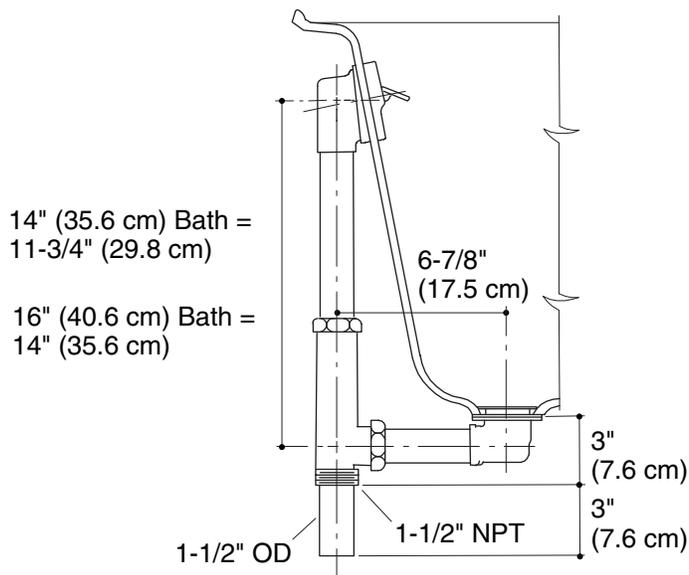
Product Specification

Bath drain shall be of brass construction and is intended for through-the-floor installations. Product includes an adjustable trip lever drain, 1-1/2" connection, removable grid strainer, and brass tailpiece. Product is intended for 14" (35.6 cm) to 16" (40.6 cm) deep bath installations. Optional feature shall be 17 or 20 gauge brass construction. Drain shall be Kohler Model K-_____-_____.

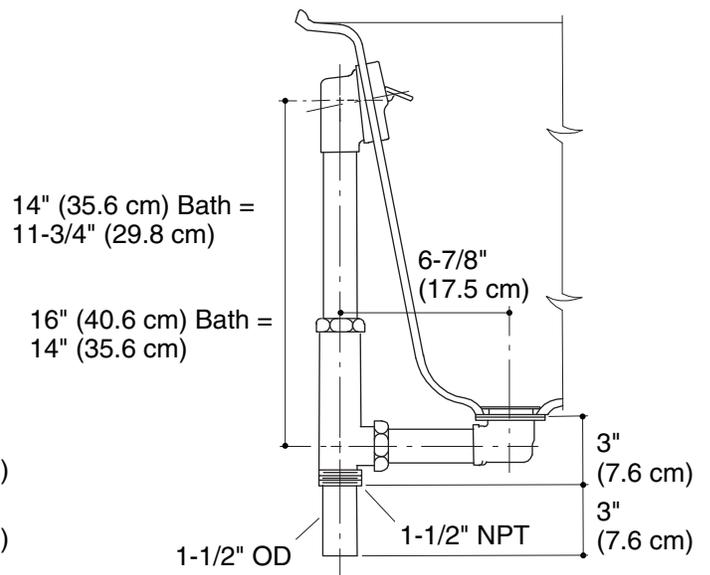
SWIFTFLO™

Installation Notes

Install this product according to the installation guide.



K-11660



K-11666

Product Diagram

Features

- Cast iron with Safeguard® finish
- Left or right drain
- Extra 4" (10.2 cm) ledge
- 60" (152.4 cm) x 34-1/4" (87 cm) x 14" (35.6 cm)

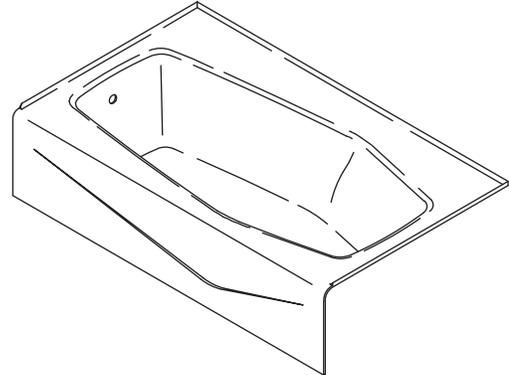
BATH
K-713
ALSO K-714

ADA **CSA B651** **OBC**

Codes/Standards Applicable

Specified model meets or exceeds the following:

- ADA
- ICC/ANSI A117.1
- CSA B651
- OBC
- ASME A112.19.1/CSA B45.2



Colors/Finishes

- 0: White
- Other: Refer to Price Book for additional colors/finishes

Accessories

- 0: White
- CP: Polished Chrome
- PB: Vibrant® Polished Brass
- Other: Refer to Price Book for additional colors/finishes

Specified Model

Model	Description	Colors/Finishes	
K-713	Bath – left drain	<input type="checkbox"/> 0	<input type="checkbox"/> Other _____
K-714	Bath – right drain	<input type="checkbox"/> 0	<input type="checkbox"/> Other _____

Recommended Accessories			
K-7213	Clearflo bath cable drain with PVC tubing	<input type="checkbox"/> CP	<input type="checkbox"/> Other _____
K-7214	Clearflo bath cable drain without PVC tubing	<input type="checkbox"/> CP	<input type="checkbox"/> Other _____
K-7160-TF	Clearflo pop-up bath drain	<input type="checkbox"/> CP	<input type="checkbox"/> PB <input type="checkbox"/> Other _____

Product Specification

The bath shall be made of cast iron with Safeguard finish. Product shall be 60" (152.4 cm) in length, 34-1/4" (87 cm) in width, and 14" (35.6 cm) in height. Product shall have an extra 4" (10.2 cm) ledge. Product shall be available with a left or right drain. Bath shall be Kohler Model K-____-____.

VILLAGER™

Optional Accessories

K-1491	Pillow	<input type="checkbox"/> 0	<input type="checkbox"/> Other_____
K-1601	Footstop	<input type="checkbox"/> 0	<input type="checkbox"/> Other_____

Technical Information

Fixture*:	
Bathing well:	
Basin area, bottom	45" (114.3 cm) x 22" (55.9 cm)
Basin area, top	55" (139.7 cm) x 24" (61 cm)
Weight	330 lbs (149.7 kg)
To overflow:	
Water depth	8-5/8" (21.9 cm)
Capacity	33 gal (124.9 L)
* Approximate measurements for comparison only.	

Installation Notes

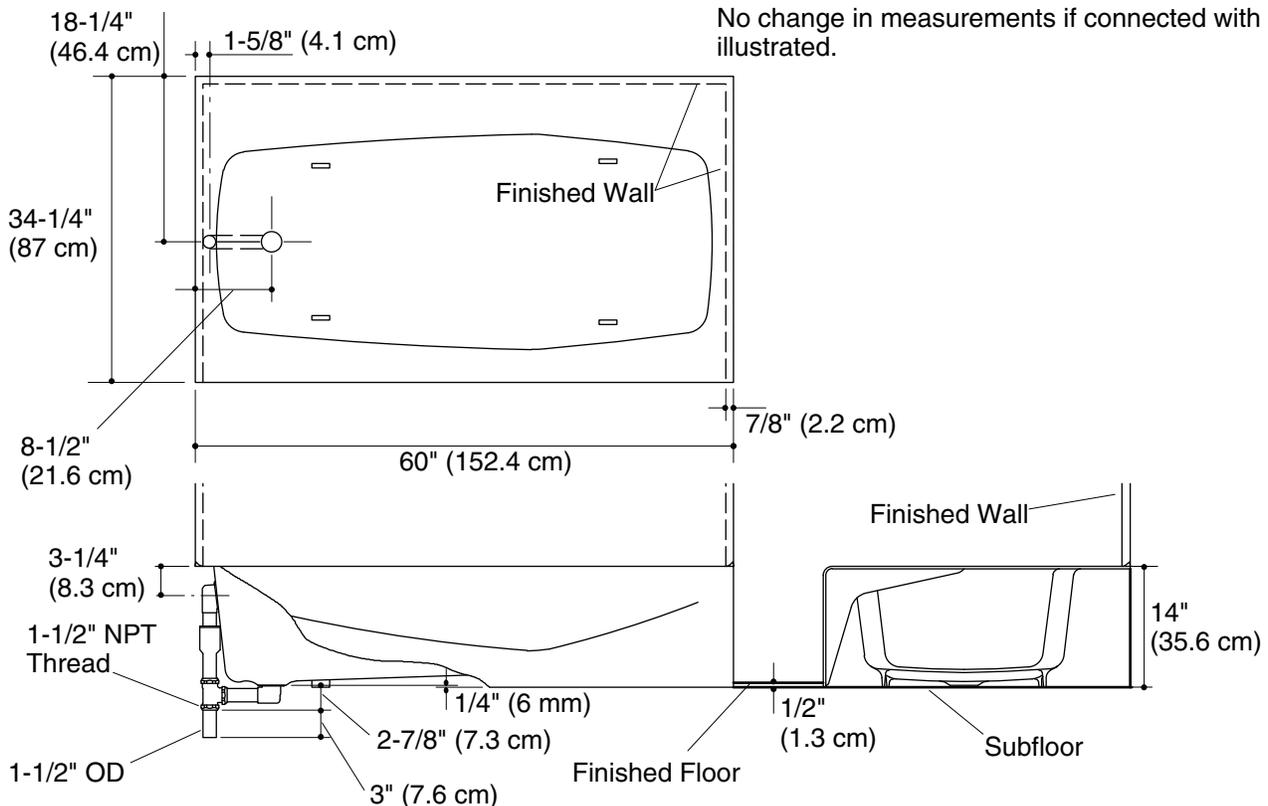
Install this product according to the installation guide.

Floor support under the bath must provide for a minimum of 44 lbs/square foot (215.7 kg/square meter) loading.

Will comply with **ADA** when installed per Section 607 Bathtubs of the Act.

Will comply with **CSA B651** when installed per Clause 4.4.7 of the standard.

will comply with **OBC** when installed per Clause 3.8.3.13.



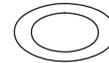
Product Diagram

**SINGLE-CONTROL LAVATORY
FAUCET
K-18140**

ADA

Features

- Brass construction
- Single-hole mounting
- One-piece, self-contained ceramic disc valve allows both volume and temperature control
- Temperature memory allows faucet to be turned on and off at any temperature setting
- Pop-up drain with lift rod and tailpiece
- ADA compliant lever handle
- 4-3/8" (11.1 cm) spout reach
- Stationary spout
- 1.5 gallons (5.7 liters) per minute maximum flow rate



Codes/Standards Applicable

Specified model meets or exceeds the following at date of manufacture:

- ADA
- ASME A112.18.1/CSA B125.1
- Energy Policy Act of 1992
- All applicable US Federal and State material regulations

Colors/Finishes

- CP: Polished Chrome
- G: Brushed Chrome

Accessories

- NA: None applicable

Specified Model

Model	Description	Colors/Finishes
K-18140	Single-control lavatory faucet	<input type="checkbox"/> CP <input type="checkbox"/> G

Optional Accessories		
_____	Additional flow options are available (refer to the Kohler Price Book)	<input type="checkbox"/> NA

PRODUCT SPECIFICATION

The single-control mounting lavatory faucet shall be made of brass construction. Product shall have a maximum flow rate of 1.5 gallons (5.7 L) per minute. Product shall feature a one-piece, self-contained ceramic disc valve, which allows both volume and temperature control, and a temperature memory, allowing the faucet to be turned on and off at any temperature setting. Product shall feature a 4-3/8" (11.1 cm) spout reach, pop-up drain with lift rod and tailpiece. Product shall feature stationary spout, and ADA compliant lever handle. Faucet shall be Kohler Model K-18140-_____.

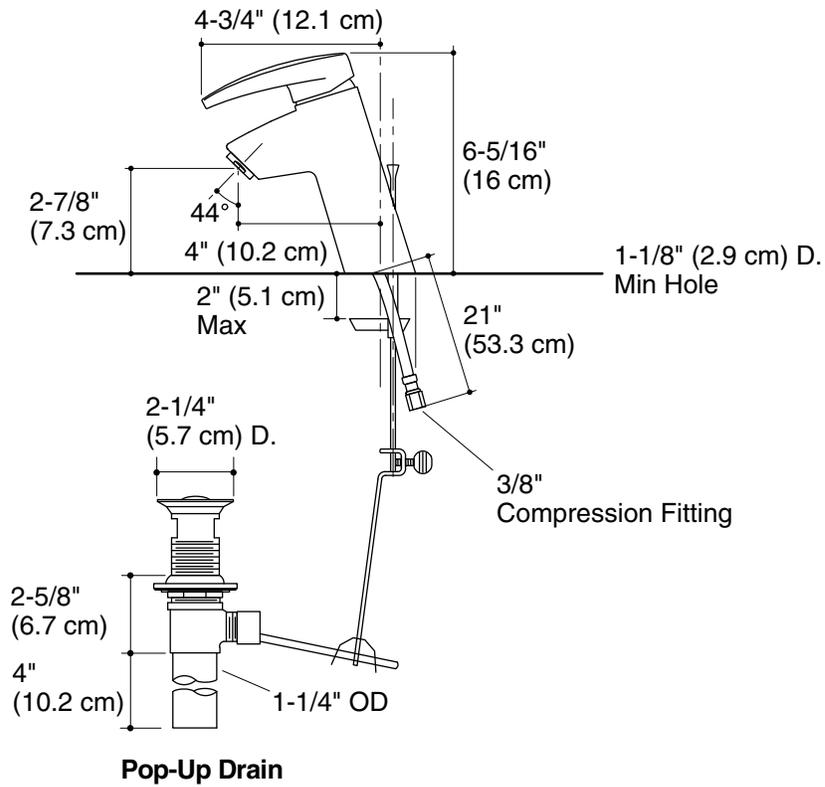
PANACHE™

Technical Information

Included components:	
Drain	1035350

Installation Notes

Install this product according to the installation guide.



Product Diagram

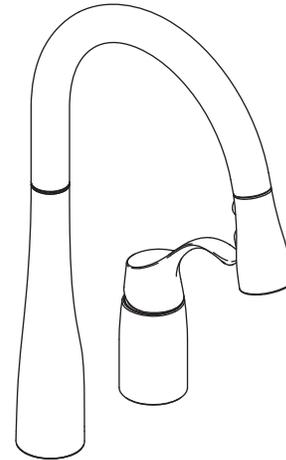
Features

- Metal construction
- One-piece, self-contained ceramic disc valve allows both volume and temperature control
- Temperature memory allows faucet to be turned on and off at any temperature setting
- High-temperature limit setting for added safety
- Remote valve
- Three-function sprayhead with spray, aerated stream, and pause settings
- Flexible supplies
- Available with an 8" (203 mm) or 9" (229 mm) spout reach
- 360° spout rotation
- Meets CalGreen requirements for kitchen faucets
- 1.8 gallons (6.8 L) per minute maximum flow rate at 60 psi (4.1 bar)

PULL-DOWN KITCHEN SINK FAUCET

K-647
ALSO K-649

ADA



Codes/Standards Applicable

Specified model meets or exceeds the following at date of manufacture:

- ADA
- ASME A112.18.1/CSA B125.1
- ICC/ANSI A117.1
- Energy Policy Act of 1992
- NSF 61
- All applicable US Federal and State material regulations

Colors/Finishes

- CP: Polished Chrome
- VS: Stainless Steel
- Other: Refer to Price Book for additional colors/finishes

Specified Model

Model	Description	Colors/Finishes		
K-647	Pull-down kitchen sink faucet – 9" (229 mm) spout reach (shown)	<input type="checkbox"/> CP	<input type="checkbox"/> VS	<input type="checkbox"/> Other ____
K-649	Pull-down kitchen sink faucet – 8" (203 mm) spout reach	<input type="checkbox"/> CP	<input type="checkbox"/> VS	<input type="checkbox"/> Other ____

Product Specification

The pull-down kitchen sink faucet shall be of metal construction. Product shall feature a one-piece, self-contained ceramic disc valve, allowing volume and temperature control. Product shall feature temperature memory, allowing the faucet to be turned on and off at any temperature setting. Product shall feature a high-temperature limit setting for added safety, remote valve, ADA compliant remote lever handle, and 360° spout rotation. Product shall feature a three-function sprayhead with spray, aerated flow, and pause function. Product shall include flexible connections for easy installation. Product shall be available with an 8" (203 mm) or 9" (229 mm) spout reach. Product shall meet CalGreen requirements for kitchen faucets. Product shall be 1.8 gallon (6.8 L) per minute maximum flow rate. Pull-down kitchen faucet shall be Kohler Model K-____-____.

SIMPLICE™

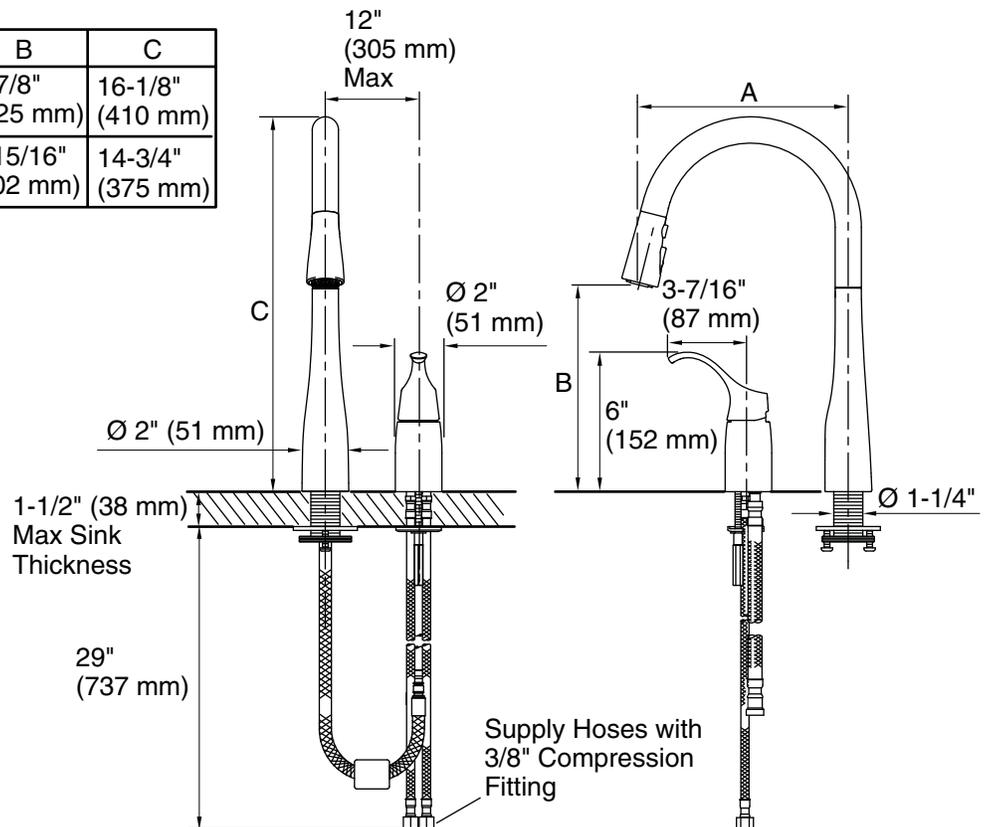
Optional Accessories		
1124126	Deep roughing-in kit	<input type="checkbox"/> NA
1167289	Low flow kit – reduces maximum flow to 1.5 gpm (5.7 L) at 60 psi (4.1 bar)	<input type="checkbox"/> NA
1167290	High flow kit – increases maximum flow to 2.2 gpm (8.3 L) at 60 psi (4.1 bar)	<input type="checkbox"/> NA

Installation Notes

Install this product according to the installation guide.

ADA compliant when installed to the specific requirements of these regulations.

Model	A	B	C
K-647	9" (229 mm)	8-7/8" (225 mm)	16-1/8" (410 mm)
K-649	8" (203 mm)	7-15/16" (202 mm)	14-3/4" (375 mm)



Product Diagram

UNDERCOUNTER SINK K-3180

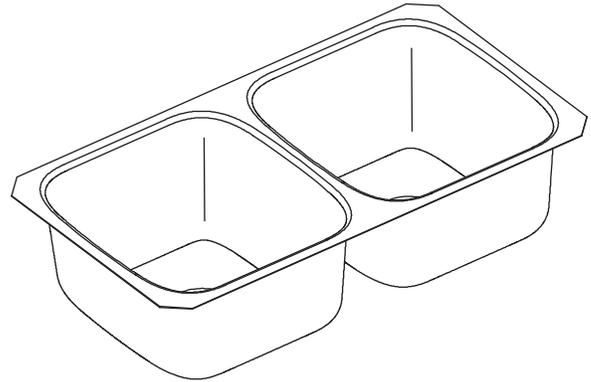
Features

- 18-gauge stainless steel
- Undercounter
- Double (equal) compartment
- Includes installation hardware
- 7-5/8" (19.4 cm) deep basins
- 28-3/4" (73 cm) x 15" (38.1 cm)

Codes/Standards Applicable

Specified model meets or exceeds the following:

- ASME A112.19.3/CSA B45.4



Colors/Finishes

- NA: None applicable

Accessories

- CP: Polished Chrome
- ST: Stainless Steel
- NA: None applicable
- Other: Refer to Price Book for additional colors/finishes

Specified Model

Model	Description	Colors/Finishes
K-3180	Undercounter sink	<input type="checkbox"/> NA

Optional Accessories					
K-3119	Hardwood cutting board (for either basin)	<input type="checkbox"/> NA			
K-3129	Stainless steel bottom basin rack (for either basin)		<input type="checkbox"/> ST		
K-8801	Duostrainer® sink strainer			<input type="checkbox"/> CP	<input type="checkbox"/> Other_____
K-8813	Stainless steel sink strainer with tailpiece			<input type="checkbox"/> CP	
K-8814	Stainless steel sink strainer less tailpiece			<input type="checkbox"/> CP	

Product Specification

The undercounter sink shall be 28-3/4" (73 cm) in length and 15" (38.1 cm) in width, with 7-5/8" (19.4 cm) deep basins. Sink shall be made of 18 gauge stainless steel. Sink shall be double (equal) compartment. Sink shall include installation hardware. Sink shall be Kohler Model K-3180.

UNDERTONE®

Technical Information

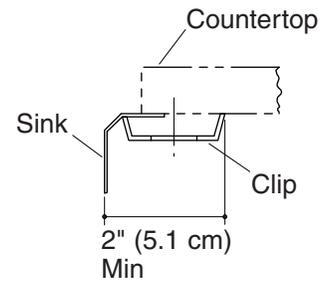
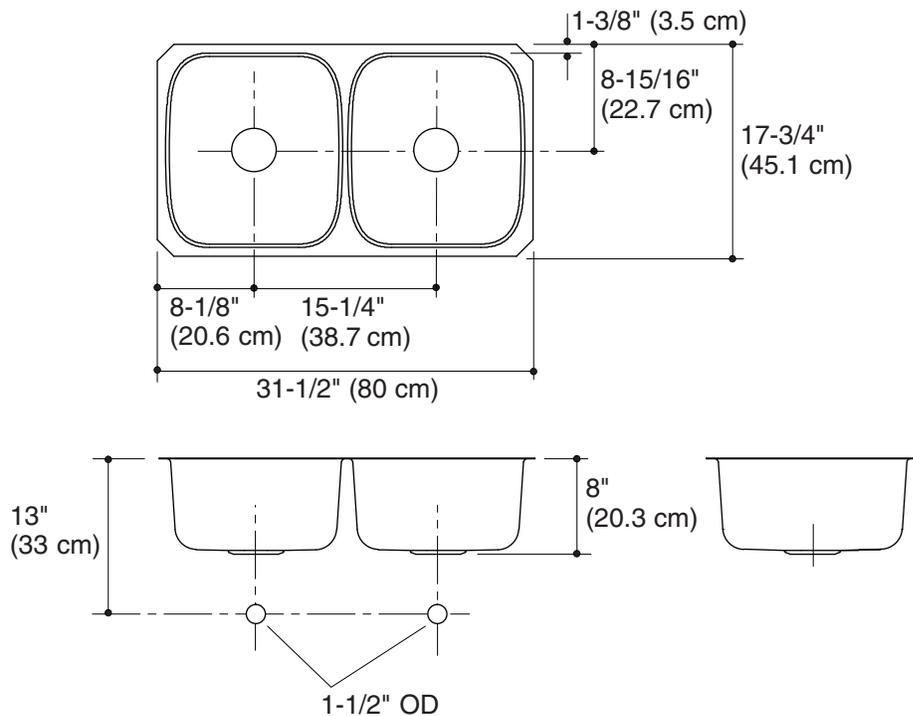
Fixture*:	
Basin area	14-1/2" (36.8 cm) x 15-3/4" (40 cm)
Water depth	7-5/8" (19.4 cm)
Drain holes	3-5/8" (9.2 cm) D.
*Approximate measurements for comparison only.	

Included components:	
Hardware kit	91915
Cut-out template	1016732-7

Installation Notes

Install this product according to the installation guide.

Allow a minimum of 2" (5.1 cm) minimum clearance around the sink rim for clip attachment.



Product Diagram

Features

- Vitreous china
- Undercounter
- With overflow
- Without faucet hole(s)
- Includes 52047 clamp assembly
- 17-1/4" (43.8 cm) x 13" (33 cm)

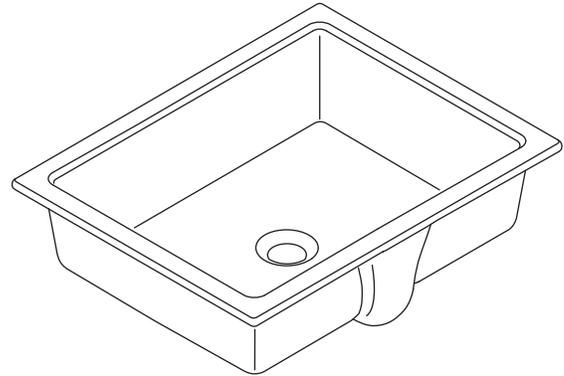
UNDERCOUNTER LAVATORY K-2882

ADA

Codes/Standards Applicable

Specified model meets or exceeds the following:

- ADA
- ASME A112.19.2/CSA B45.1
- ICC/ANSI A117.1



Colors/Finishes

- 0: White
- Other: Refer to Price Book for additional colors/finishes

Accessories

- CP: Polished Chrome
- Other: Refer to Price Book for additional colors/finishes

Specified Model

Model	Description	Colors/Finishes	
K-2882	Undercounter lavatory	<input type="checkbox"/> 0	<input type="checkbox"/> Other_____
Recommended Accessories			
K-8998	Adjustable P-Trap	<input type="checkbox"/> CP	<input type="checkbox"/> Other_____

Product Specification

The undercounter lavatory shall be made of vitreous china. Lavatory shall be 17-1/4" (43.8 cm) in length and 13" (33 cm) in width. Lavatory shall be with overflow and without faucet hole(s). Lavatory shall include 52047 clamp assembly. Lavatory shall be Kohler Model K-2882-_____.

VERTICYL™

Technical Information

Fixture*:	
Basin area	17-1/4" (43.8 cm) x 13" (33 cm)
Water depth	3-1/8" (7.9 cm)
Drain hole	1-3/4" (4.4 cm) D.
* Approximate measurements for comparison only.	

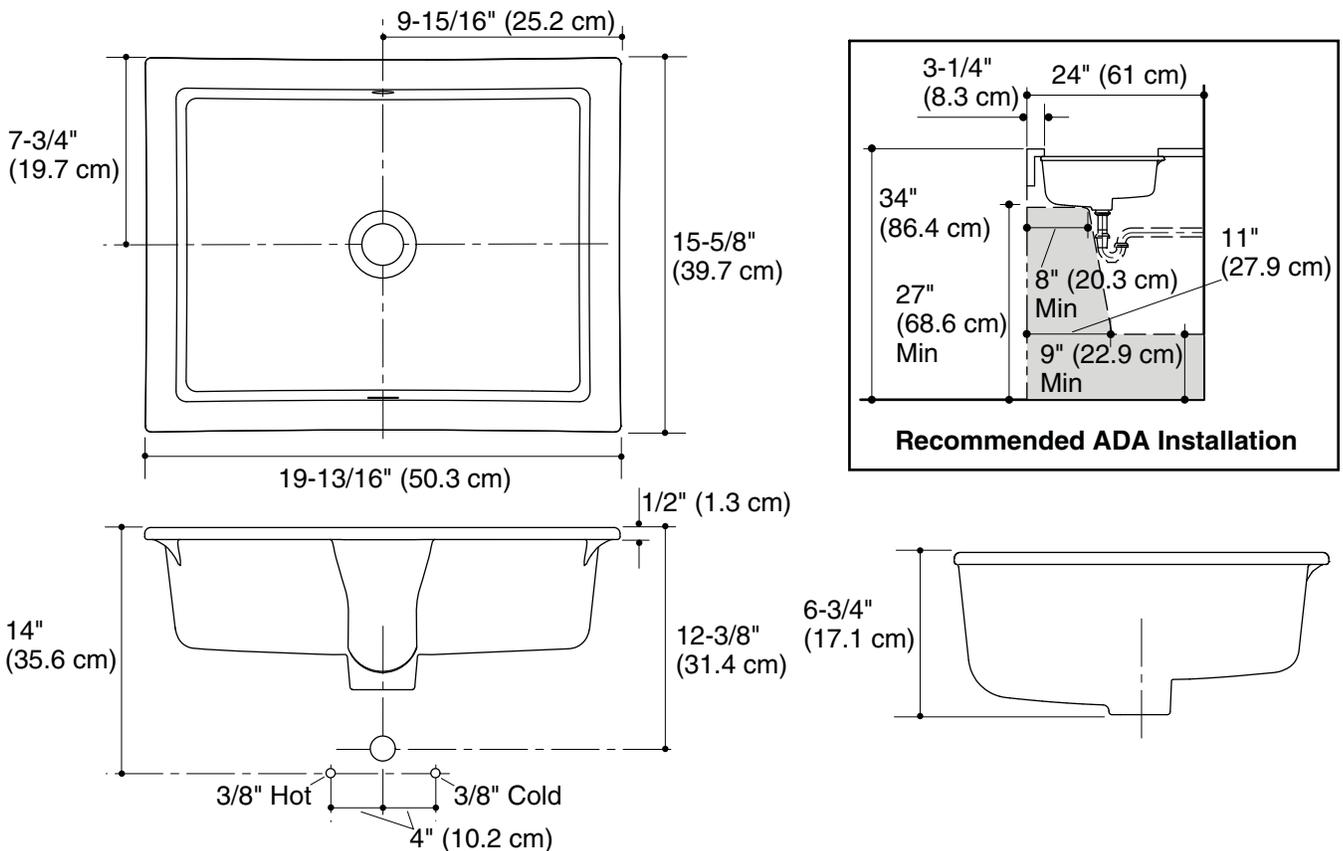
Included components:	
Basin clamp assembly	52047
Cut-out template	1109226-7

Installation Notes

Install this product according to the installation guide.

Supplied basin clamp assemblies require 1" (2.5 cm) minimum countertop thickness. Installer must supply anchors for thinner countertops.

NOTICE: Countertop manufacturer or cutter must use the cut-out template provided with the product, or a current one provided by Kohler (call 1-800-4-KOHLER). Kohler is not responsible for cut-out errors when incorrect cut-out template is used.



Product Diagram

SoftTouch™ Duct Wrap Insulation

1. PRODUCT NAME

CertainTeed SoftTouch™
Duct Wrap Insulation

2. MANUFACTURER

CertainTeed Corporation
P.O. Box 860
Valley Forge, PA 19482-0105
Phone: 610-341-7000
800-233-8990
Fax: 610-341-7571
Website:
www.certainteed.com/insulation

3. PRODUCT DESCRIPTION

Basic Use: SoftTouch Duct Wrap Insulation is used to insulate rectangular and round heating, ventilating and air conditioning ductwork.

Benefits: SoftTouch Duct Wrap Insulation provides thermal efficiency that reduces unwanted heat loss or gain from equipment and ductwork. When properly installed in the correct thickness, this product virtually eliminates condensation problems on cold duct surfaces.

Composition and Materials: SoftTouch Duct Wrap is a blanket-type insulation composed of glass fibers bonded together with a thermosetting resin. It is available unfaced or with FSK, gray PSK or white PSK vapor retarder facing. On faced products, a stapling/taping tab is provided on one edge.

Limitations: The product should be kept clean and dry from the time of manufacture through job site installation and system operation.

SoftTouch Duct Wrap is suitable for use with most heating, ventilating and air conditioning ductwork operating at temperatures from 35°F to 250°F (1.7°C to 121°C) for faced SoftTouch Duct Wrap, and from 35°F to 450°F (1.7°C to 232°C) for unfaced SoftTouch Duct Wrap.

Sizes: Available sizes as shown in the table below. Contact CertainTeed for other sizes and minimum order quantities.

4. TECHNICAL DATA

Applicable Standards:

- Model Building Codes:
 - ICC
- Material Standards:
 - ASTM C1290
 - ASTM C553
 - Type I; Type 75 Duct Wrap
 - Type II; Type 100 & 150 Duct Wrap
 - Type III; Type 150 Duct Wrap
 - CAN/CGSB-51.11-92
 - ASTM C1136
 - FSK and white PSK, Type II
 - Gray PSK, Type IV
- Fire Safety Standards:
 - NFPA 90A, NFPA 90B
- **Fire Resistance:**
 - Fire Hazard Classification:
 - UL 723, ASTM E84, NFPA 255, CAN/ULC-S102-M88
 - Max. Flame Spread Index: 25
 - Max Smoke Developed Index: 50
 - Non-Combustible: ASTM E136
 - Meets tests requirements



Physical/Chemical Properties:

- Thermal Performance:
 - See table on other side
- Operating Limits:
 - Temperature: ASTM C411
 - Faced: Max. 250°F (121°C)
 - Unfaced: Max. 450°F (232°C)
- Water Vapor Sorption:
 - ASTM C1104
 - < 5% by weight
- Water Vapor Transmission –
 - Facing: ASTM E96, Dessicant Method
 - FSK and white PSK: Max. 0.02 perms
 - 1.15 x 10⁻⁹ g/Pa•s•m²
 - Gray PSK: Max. 0.09 perms
 - 5.17 x 10⁻⁹ g/Pa•s•m²
- Corrosiveness: ASTM C665
 - Pass test requirements
- Fungi Resistance: ASTM C1338
 - Pass test requirements
- Odor Emission: ASTM C1304
 - Pass test requirements

Quality Assurance: CertainTeed's commitment to quality and environmental management has ensured the registration of the Athens, Chowchilla and Kansas City plants to ISO 9001:2000 and ISO 14001:2004 standards. The GREENGUARD Environmental Institute has certified SoftTouch Duct Wrap for low emissions of total particle, formaldehyde and other Volatile Organic Compounds (VOCs).

5. INSTALLATION

Sheet metal ducts shall be clean, dry and sealed tightly prior to insulating with CertainTeed SoftTouch Duct Wrap.

To ensure installed thermal performance, CertainTeed SoftTouch Duct Wrap shall be cut to "stretch-out" dimensions. This requires measurement of the duct perimeter, then cutting the duct wrap to the dimensions (perimeter + add-on) indicated in the stretch-out table on other side. A 2"

AVAILABLE SIZES											
Product Type	Facing	Thickness		Length		Width					
		in.	mm	ft.	m	in.	mm				
75 (0.75lbs./cu. ft.)	Unfaced	1	25	150	45.7	9 – 72	229 – 1829				
		1½	38	150	45.7						
		2	51	75	22.9						
		2½	64	75	22.9						
		3	76	50	15.2						
	FSK/PSK*	1½	38	100	30.5	48	1219				
		2	51	75	22.9						
		2⅛	54	75	22.9						
		2¼	57	75	22.9						
		2½	64	75	22.9						
		3	76	50	15.2						
		4	102	50	15.2						
		100 (1.0lbs./cu. ft.)	Unfaced	1	25			150	45.7	9 – 72	229 – 1829
				1	25			100	30.5		
FSK/PSK*	1½		38	100	30.5						
	2	51	75	22.9							
150 (1.5lbs./cu. ft.)	FSK/PSK*	1½	38	75	22.9	48	1219				
		2	51	50	15.2						

* PSK Faced products are made-to-order

piece of insulation is removed from the facing at the end of the piece of insulation to form an overlapping stapling and taping flap.

CertainTeed SoftTouch Duct Wrap is installed by wrapping the insulation around the perimeter of the duct with the facing out. Adjacent sections of duct wrap are tightly butted with the 2" taping flap overlapping. Seams shall be stapled with outward-clinching staples on approximately 6" centers. Where a vapor retarder is required, all seams, joints, tears, punctures and/or other penetrations of the duct wrap shall be sealed with a pressure sensitive vapor retarder tape that matches the facing, or a suitable mastic system.

Where rectangular ducts are 24" in width or greater, CertainTeed SoftTouch Duct Wrap shall be additionally secured to the bottom of the duct with mechanical fasteners spaced 18" on center to prevent sagging.

For additional installation details, consult the National Commercial and Industrial Insulation Standards (current edition) published by the Midwest Insulation Contractors Association (MICA).

6. AVAILABILITY AND COST

Manufactured and sold throughout the United States. For availability and cost contact your local distributor, or call CertainTeed Sales Support Group in Valley Forge, PA at 800-233-8990.

7. WARRANTY

Refer to CertainTeed's Limited One-Year Warranty for Fiber Glass Duct Wraps (30-29-047).

8. MAINTENANCE

An inspection and preventative maintenance program for the HVAC system is recommended to ensure optimum performance.

9. TECHNICAL SERVICES

Technical assistance can be obtained either from the local CertainTeed sales representative, or by calling CertainTeed Sales Support Group in Valley Forge, PA at 800-233-8990.

10. FILING SYSTEMS

- CertainTeed Pub. No. 30-36-081
- Sweet's Catalog Files, 230700
- Additional product information available upon request.

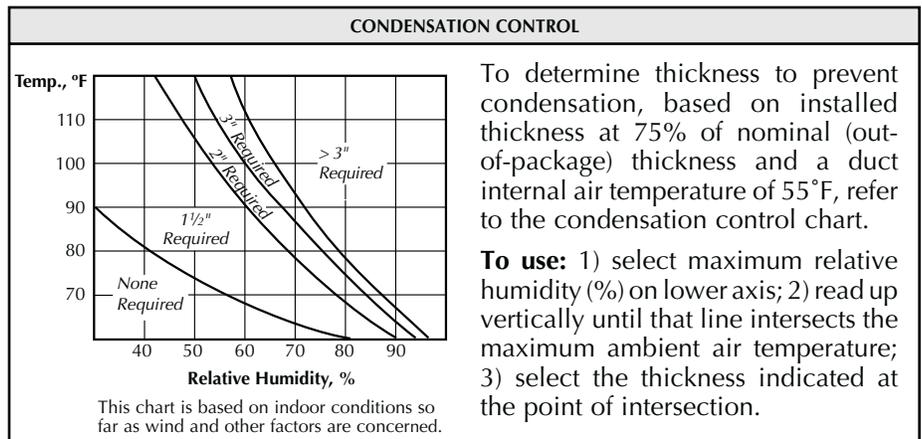


THERMAL PERFORMANCE										
Product			R-Value		Installed R-Value		K-Value		Installed K-Value	
Type	Thickness		h•ft ² •°F	m ² •°C	h•ft ² •°F	m ² •°C	Btu•in	W	Btu•in	W
	in.	mm	Btu	W	Btu	W	h•ft ² •°F	m•°C	h•ft ² •°F	m•°C
75 (0.75lbs./cu. ft.)	1	25	3.8	.67	3.0	0.53	0.26	0.038	0.25	0.036
	1½	38	5.2	.92	4.2	0.74	0.29	0.042	0.27	0.039
	2	51	6.9	1.22	5.7	1.00	0.29	0.042	0.26	0.038
	2½	54	7.3	1.29	6.0	1.06	0.29	0.042	0.27	0.038
	2¾	57	7.8	1.37	6.5	1.14	0.29	0.042	0.26	0.037
	2½	64	8.6	1.51	7.1	1.25	0.29	0.042	0.26	0.037
	3	76	9.6	1.69	8.0	1.41	0.31	0.045	0.28	0.041
100 (1.01lbs./cu. ft.)	1	25	3.8	0.67	3.0	0.53	0.26	0.038	0.25	0.036
	1½	38	5.7	1.00	4.5	0.79	0.26	0.038	0.25	0.036
	2	51	7.6	1.34	6.1	1.07	0.26	0.038	0.25	0.035
150 (1.5lbs./cu. ft.)	1	25	4.1	0.72	3.2	0.56	0.24	0.035	0.23	0.034
	1½	38	6.2	1.09	4.8	0.85	0.24	0.035	0.23	0.034
	2	51	8.3	1.46	6.4	1.13	0.24	0.035	0.23	0.034

Tested in accordance with ASTM C518 and/or ASTM C177 at 75°F (24°C) mean temperature. R means resistance to heat flow. The higher the R-Value, the greater the insulating power. The installed R-Value and K-Value based upon 25% compression of the product thickness during installation. To get the installed R-Value, it is essential that this insulation be installed properly. If you do it yourself, follow the installation instructions carefully.

INSTALLATION STRETCH-OUT DIMENSIONS										
Product Label Thickness		Average Installed Thickness		P+	Stretch-Out Dimensions ¹					
in.	mm	in.	mm		Round Duct		Square Duct		Rectangular Duct	
					in.	mm	in.	mm	in.	mm
1½	38	1.13	29	P+	9.5	241	8	203	7	178
2	51	1.50	38	P+	12	305	10	254	8	203
2¾	57	1.69	43	P+	13.5	343	11.5	292	9	229
2½	54	1.59	40	P+	12.6	321	10.4	270	8.4	213
3	76	2.25	57	P+	17	432	14.5	368	11.5	292
4	102	3.00	76	P+	22.0	559	18.5	470	14.5	368

(1) The stretch-out dimension is equal to the duct perimeter (P) plus the add-on factor for the type of duct being installed.



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P.O. Box 860
Valley Forge, PA 19482

Professional: 800-233-8990
Consumer: 800-782-8777
www.certainteed.com/insulation

CertainTeed
SAINT-GOBAIN

ComfortLink™ II Thermostat

**XL 950
TZONE950AC52ZA**



- Controls Communicating or conventional 24V HVAC systems (5 heat/2 cool/Dual Fuel) with 24V Relay Panel Accessory
- 7" High Definition Color LCD Display
- Compatible with ComfortLink™ II Zoning Systems
- Optional faceplate colors (silver/black, black, white, graphite)
- System Modes - Heat/Cool/Auto
- Fan Modes - On/Auto/Circulate
- Control up to eight (8) systems from any XL 950 Thermostat (Requires an XL 950 on each System and a Wireless Router)
- Easy to use Touch Screen Interface
- 7 Day Programmable - (manual or guided scheduling options)
- 1-Touch Pre-Sets for Home, Away, Sleep Settings
- Customizable Home Screen (Color, Information, Layout)
- 5 Day Weather Forecast, Local Radar Image & Weather Alerts (via Wireless Home Network)
- Weekly & Monthly System Run Time Monitor helps manage energy usage
- Allergy Clean & Quick Clean Indoor Air Cycles
- Built in Dual Fuel Economic Calculator.
- Digital Photo Album with Slide Show Screen Saver Option
- Embedded Diagnostics - (Alerts have time/date stamp with on screen probable causes)
- Heating Humidification Control
- Window Frost Control - Dew Point Control of Humidifier
- Cooling Dehumidification Control
- Smart Continuous Fan (disables Cont. Fan if RH is above setpoint)
- Adjustable Continuous Fan Airflow Settings (35 to 100%)
- Service Reminders - Filters, EAC, Humidifier, HVAC System, UV Lights
- Upgradeable Firmware via SD Card.
- Remote Access Option via Internet & Cell Phone (Schlage LiNK™ - Summer 2011)
- Keypad lock - Pin Code Option Security Options
- Dealer and System Information Screens
- Remote Indoor Temperature Sensor - (Wired or Wireless Options)
- Outdoor Temperature Sensor Option for 24 Volt systems
- Fahrenheit or Celsius Indoor Display Options
- 802.11 B/G - WLAN (wireless local area network) for weather feed and multi-system control)
- 802.15.4 - WPAN (wireless personal area network) for use with wireless ComfortLink II Zone Sensors)

Dimensions:

- 7.3" width X 4.3" height X 1.2" depth

Storage Temperature:

- -40°F to 175°F, 5% to 95% RH non-condensing

Operating Temperature:

- 25°F to 126°F, 5% to 90% RH non-condensing

Optional front bezels for XL 950 thermostat:

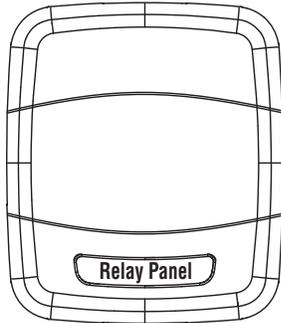
- TZSBK950ABEZEL - Silver/Black
- TZGRA950ABEZEL - Graphite
- TZWHT950ABEZEL - White
- TZBLK950ABEZEL - Black

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It's Hard To Stop A Trane.®

Conventional 24 Volt HVAC System Interface Relay Panel for XL 950 Thermostat



BAY24VRPAC52DA

BAY24VRPAC52DA

- 5 Heat (Gas, Oil, Electric)/2 Cool/Heat Pump/Dual Fuel
- Optional remote indoor temperature connection point for XL 950
- Optional outdoor temperature connection point for XL 950
- LED stage indicators
- Removable low voltage terminal blocks for easy service and replacement.
- Humidifier Control

Dimensions:

- 8.0" width x 9.3" height x 1.9" depth

Storage Temperature:

- -40° to 175°F, 5% - 95% RH non-condensing

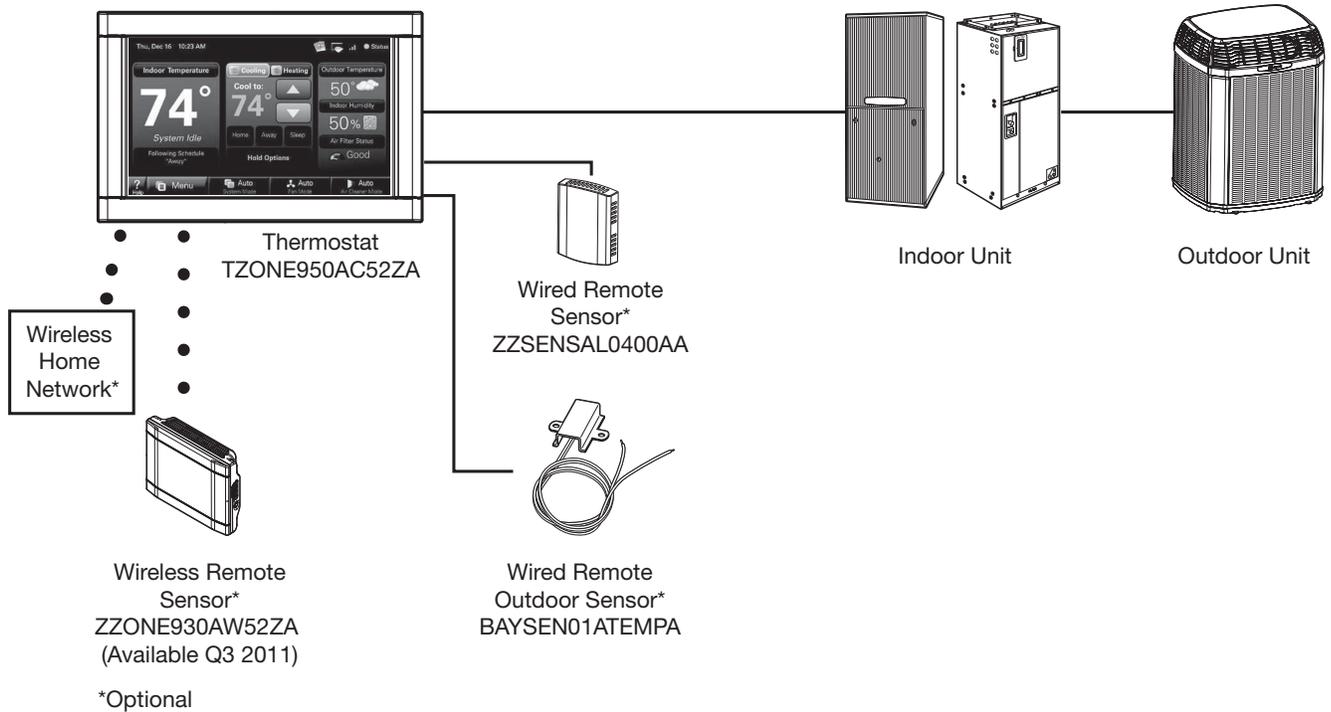
Operating Temperature:

- -40° to 150°F, 5% - 95% RH non-condensing

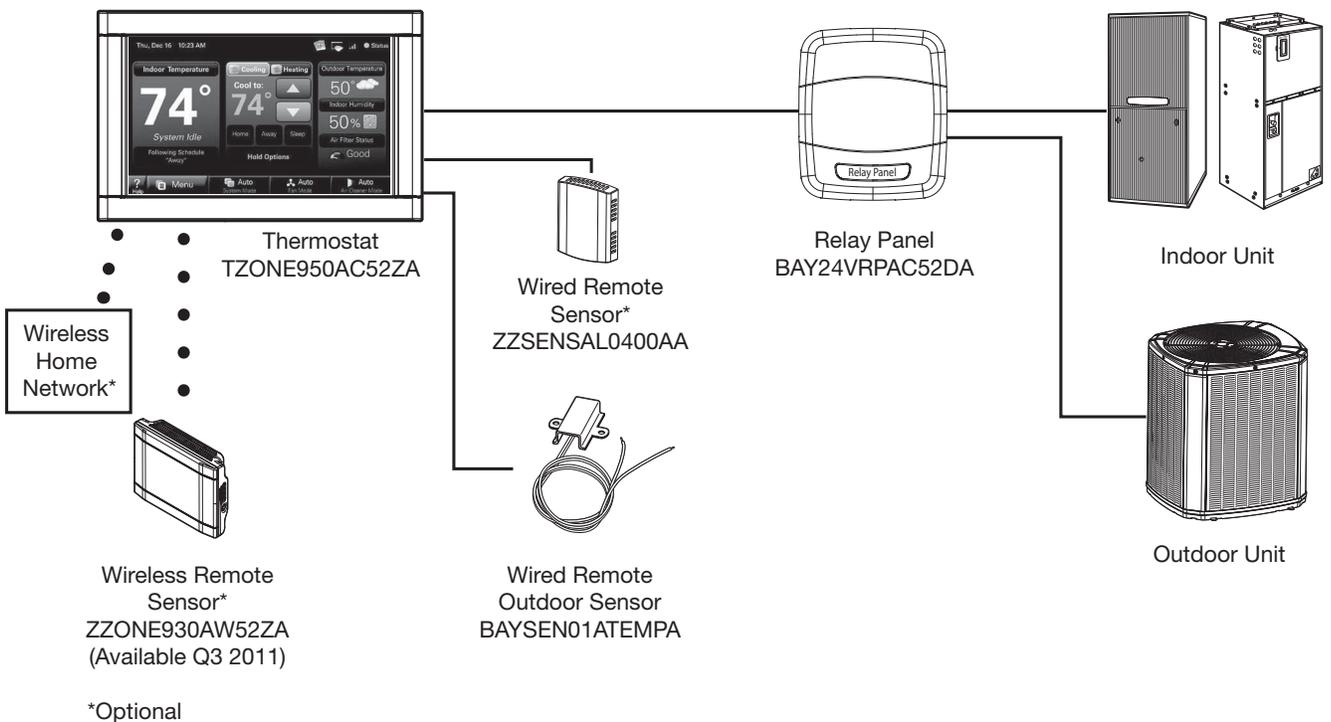
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ComfortLink™ II Thermostat Component Overview

Communicating System



24V System





The
*Finishing
Touch.*



Simplicity Registers & Grilles

Accord Ventilation Products offers the broadest selection of registers and grilles. Simplicity series registers and grilles feature all-steel construction with a durable epoxy powder-coat finish. ABS registers and grilles are rust-proof and scratch resistant.

ABS Louvered - Taupe	A
APFRTPL48	4X8
APFRTPL410	4X10
APFRTPL212	2X12
APFRTPL412	4X12
ABS Louvered - White	B
APFRWHL410	4X10
APFRWHL212	2X12
APFRWHL412	4X12
Floor Louvered Diffusers - Brown	C
ABFRBR210	2X10
ABFRBR212	2X12
ABFRBR214	2X14
ABFRBR48	4X8
ABFRBR410	4X10
ABFRBR412	4X12
ABFRBR414	4X14
ABFRBR610	6x10
ABFRBR612	6X12
Floor Louvered Diffusers - White	D
ABFRWH210	2X10
ABFRWH212	2X12
ABFRWH214	2X14
ABFRWH48	4X8
ABFRWH410	4X10
ABFRWH412	4X12
ABFRWH414	4X14
ABFRWH610	6x10
ABFRWH612	6X12
1-Way Curved Sidewall/Ceiling - White	E
ABSWWH1C84	8X4
ABSWWH1C106	10X6
ABSWWH1C126	12X6
ABSWWH1C128	12X8

2-Way Sidewall/Ceiling with 1/2" fin spacing	F
ABSWWH264	6X4
ABSWWH266	6X6
ABSWWH284	8X4
ABSWWH286	8X6
ABSWWH2104	10X4
ABSWWH2106	10X6
ABSWWH2124	12X4
ABSWWH2126	12X6
ABSWWH2128	12X8
ABSWWH2144	14X4
ABSWWH2146	14X6
ABSWWH2148	14X8
2-Way Sidewall/Ceiling with 1/3" fin spacing	G
AB3SWWH2104	10X4
AB3SWWH2106	10X6
AB3SWWH2124	12X4
AB3SWWH2126	12X6
AB3SWWH2146	14X6
AB3SWWH2148	14X8
2-Way Aluminum Sidewall/Ceiling	H
AASWWH2106	10X6
AASWWH2126	12X6
AASWWH2146	14X6



A



B



C



D



E



F/G/H



Simplicity Registers & Grilles



3-Way Sidewall/Ceiling	I
ABSWWH366	6X6
ABSWWH384	8X4
ABSWWH3104	10X4
ABSWWH3106	10X6
ABSWWH3126	12X6
ABSWWH3146	14X6
ABSWWH3148	14X8
4-Way Sidewall/Ceiling	J
ABSWWH466	6X6
ABSWWH488	8X8
ABSWWH41010	10X10
ABSWWH41212	12X12
Adjustable Sidewall/Ceiling	K
ABSWWHA104	10X4
ABSWWHA106	10X6
ABSWWHA126	12X6
Baseboard - White	L
ABBBWH15	15"
ABBBWH18	18"
ABBBWH24	24"
Baseboard Return Grilles with 1/3" fin spacing	M
AB3BGWH146	14X6
AB3BGWH148	14X8
AB3BGWH246	24X6
AB3BGWH306	30X6
AB3BGWH308	30X8

Return Filter Grilles - White with 1/2" fin spacing	N
ABRFWH1212	12X12
ABRFWH1414	14X14
ABRFWH1420	14X20
ABRFWH1424	14X24
ABRFWH1616	16X16
ABRFWH1620	16X20
ABRFWH1818	18X18
ABRFWH2014	20X14
ABRFWH2016	20X16
ABRFWH2020	20X20
ABRFWH2025	20X25
ABRFWH2030	20X30
ABRFWH2412	24X12
ABRFWH2414	24X14
ABRFWH2420	24X20
ABRFWH2514	25X14
ABRFWH2520	25X20
ABRFWH3014	30X14
ABRFWH3020	30X20
Return Filter Grilles - White with 1/3" fin spacing	O
AB3RFWH1212	12X12
AB3RFWH1414	14X14
AB3RFWH2020	20X20
AB3RFWH2520	25X20
Steel Toe Space Grilles	P
Brown	
ABTSBR210	2X10
ABTSBR212	2X12
White	
ABTSWH210	2X10
ABTSWH212	2x12



I



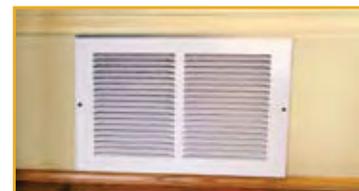
J



K



L



M



N/O



P

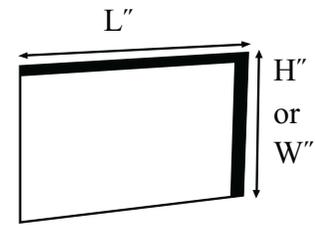


Simplicity Registers & Grilles



Return Grilles - White with 1/2" fin spacing	Q
ABRGWH88	8X8
ABRGWH104	10X4
ABRGWH106	10X6
ABRGWH1010	10X10
ABRGWH1020	10X20
ABRGWH126	12X6
ABRGWH128	12X8
ABRGWH1212	12X12
ABRGWH1220	12X20
ABRGWH1224	12X24
ABRGWH146	14X6
ABRGWH148	14X8
ABRGWH1410	14X10
ABRGWH1414	14X14
ABRGWH1420	14X20
ABRGWH1424	14X24
ABRGWH166	16X6
ABRGWH168	16X8
ABRGWH1616	16X16
ABRGWH1620	16X20
ABRGWH1625	16X25
ABRGWH1818	18X18
ABRGWH2010	20X10
ABRGWH2012	20X12
ABRGWH2014	20X14
ABRGWH2016	20X16
ABRGWH2020	20X20
ABRGWH2024	20X24
ABRGWH246	24X6
ABRGWH248	24X8
ABRGWH2410	24X10
ABRGWH2412	24X12
ABRGWH2414	24X14
ABRGWH2416	24X16
ABRGWH2420	24X20
ABRGWH2424	24X24
ABRGWH2514	25X14
ABRGWH306	30X6
ABRGWH308	30X8
ABRGWH3010	30X10
ABRGWH3012	30X12

Return Grilles - White with 1/3" fin spacing	R
AB3RGWH106	10X6
AB3RGWH126	12X6
AB3RGWH1212	12X12
AB3RGWH146	14X6
AB3RGWH148	14X8
AB3RGWH1414	14X14
AB3RGWH2010	20X10
AB3RGWH2020	20X20
AB3RGWH246	24X6
AB3RGWH248	24X8
AB3RGWH306	30X6
AB3RGWH308	30X8
Round Ceiling Diffusers & Dampers	S
White Ceiling Diffusers	
ABCDWH06	6"
ABCDWH08	8"
ABCDWH10	10"
ABCDWH12	12"
Round Ceiling Diffuser Damper	
ABCDBRD06	6"
ABCDBRD08	8"
ABCDBRD10	10"
ABCDBRD12	12"



Q/R



S





Accord Ventilation Products

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Quantity:

SPEEDI-GRILLE 8 in. x 10 in. Hands Free Ceiling or Wall Vent Grille Vent Register Cover with 3 Way Reflector

Model # SG-810 CW3 Internet # 202542210

(2) [Write a Review](#)

\$12.30 /EA-Each

Free Shipping

Online Only



Zoom View More Views

Description

Now there is innovation in a Heating & Air register grilles. Are you tired of juggling tools & screws, especially on a ladder to install register grille covers. How difficult is it to try & install a HVAC register grille cover when you need three hands on only have two. Speedi-Grille is designed to install HANDS FREE! You no longer have to hold grilles in place while trying start your trim mounting screws. Just slide your Speedi-Grille register grille cover in & the patent pending clip-design holds the Speedi-Grille in place leaving your hands free to install the trim mounting screws. Finish the Job in seconds not minutes. The clips hold the Speedi-Grille in place & align the mounting holes perfectly to fit with the innovative Speedi-Boot mud ring frame. This precise fit improves air flow & your comfort level. Speedi-Grille (Ceiling/Sidewall) is made in the USA out of a durable all steel construction with 1/2 in. fan shaped louvers and includes a volume damper. It has a white paintable powder coat finish. Speedi-Grille also comes in other sizes as and styles which includes floor, return air and filter versions which are available on this web site. Speedi-Grille stays in place & reduces frustration & headaches. You will be amazed at how easy installing Speedi-Grille is & how much time/labor you will save. Grille trim screws must be installed for secure installation. (Speedi-Grille can be installed in a non-Speedi-Boot installation)

Finally innovation & simplicity have come to the HVAC register grille cover category with Speedi-Grille Speedi-Grille provides hands free installation of your HVAC register cover with the patent pending Speedi-Clip design

The clip-in design allows you to install trim mounting screws in seconds with a screw driver or screw gun not minutes Speedi-Grille creates a precise fit every time with speedi-boot to improve air flow & your comfort level

Speedi-Grille (ceiling/sidewall) is made of durable all steel construction with 1/2 in. shaped louvers for longer life and includes a volume damper

They come with paintable durable powder coat white finish that provides years of maintenance free life

Quick & ease of installation reduces labor that save time & money

Speedi-Grille comes in many sizes & styles to choose from which are available on this web site

Speedi-Grille is made in the USA

MFG Brand Name : SPEEDI-GRILLE

MFG Model # : SG-810 CW3

MFG Part # : SG-810 CW3

Specifications

Assembled Depth (in.) : 2 in
 Assembled Height (in.) : 9.5 in
 Assembled Width (in.) : 11.75 in
 Color : White
 Color Family : Whites
 Decorative : No
 Depth (in) : 2.0 in
 Grille material : Steel
 Height (in) : 9.5 in
 Item Weight : 1.88 lb
 Louvered : Yes
 Manufacturer Warranty : 1 Year
 Material : Steel
 Maximum Duct Height : 8
 Maximum Duct Width : 10
 Outside Length : 11.75 in
 Outside Width : 9.5 in
 Product Weight (lb.) : 1.88
 Returnable : 90-Day
 Width (in) : 11.75 in

SHOPPERS WHO VIEWED THIS ITEM PURCHASED...



6 in. x 10 in. Hands Free Ceiling or Wall Vent Grille ...

\$8.47/Each



8 in. x 10 in. Hands Free Ceiling or Wall Vent Grille ...

\$12.30/Each



8 in. x 14 in. Hands Free Ceiling or Wall Vent Grille ...

\$11.30/Each

More Info

Warranty

For warranty information on this product, please call our Internet Customer Service Center at 1-800-435-4654.

Shipping

Most orders ship within 3 business days.

Please allow an additional 3-5 business days for **Standard Ground Delivery** in the U.S. Orders for this item may be expedited for an additional fee.

Other Delivery Options:

Expedited Delivery: Delivery the second business day.

Express Delivery: Delivery the next business day.

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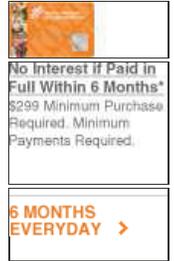
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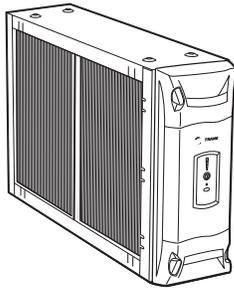
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† Local store prices may vary from those displayed. Products shown as available are normally stocked but inventory levels cannot be guaranteed.

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It's Hard To Stop A Trane.®



Trane CleanEffects™ Whole House Air Cleaner:

- Trane CleanEffects™ removes up to 99.98% of allergens from the filtered air
- Removes particles down to .1 micron in size
- Outperforms HEPA, and up to 100 times more effective than a standard 1" filter
- Constructed of heavy 18 gage metal to protect the filter and internal electronics
- Power door provides easy access to internal components and features a filter status display as well as safety interlocks that automatically shut down the power when the door is opened for maintenance or cleaning
- Designed for flush fit on both sides and rear of equipment cabinet
- No transitions required on Trane CleanEffects™ applications
- Gaskets included with the air cleaner
- 24 Volt input power
- **10-year electronics warranty**
- **5-year parts warranty**

Trane CleanEffects™ Whole House Upgrade Kits:

- Same great features as in the Trane CleanEffects™ Whole House Air Cleaners
- Fits any Perfect Fit™ Air Cleaner cabinet
- Easily convert Perfect Fit™, TFP, TFM or TFE product to Trane CleanEffects™ Air Cleaner
- 24 Volt input power
- **10-year electronics warranty**
- **5-year parts warranty**

Trane CleanEffects™ Whole House Air Cleaner and Upgrade Kits

Table IAQ-1-A – Air Handler – 24 Volt Trane CleanEffects™ Whole House Air Cleaner

Model Number	Airflow Range	Trane CleanEffects™ Air Handler Width	Uncrated Dimensions(in.) H x W x D	Shipping Weight
TFD215ALAH000C	300-1200	21½ inch	7½ x 21½ x 21	42
TFD235ALAH000C	350-1600	23½ inch	7½ x 23½ x 21	44
TFD260ALAH000C	400-2000	26 inch	7½ x 26 x 21	46

Table IAQ-1-B – Upflow / Side Return Furnace – 24 Volt Trane CleanEffects™ Whole House

Model Number	Airflow Range	Trane CleanEffects™ Air Handler Width	Uncrated Dimensions(in.) H x W x D	Shipping Weight
TFD145ALFR000C	300-1200	14½ inch ^①	7½ x 14½ x 27	39
TFD175ALFR000C	300-1600	17½ inch ^①	7½ x 17½ x 27	43
TFD210ALFR000C	300-2000	21 inch ^②	7½ x 21 x 27	47
TFD245ALFR000C	400-2000	24½ inch ^②	7½ x 24½ x 27	49

Table IAQ-1-C – Downflow Furnace – 24 Volt Trane CleanEffects™ Whole House

Model Number	Airflow Range	Trane CleanEffects™ Air Handler Width	Uncrated Dimensions(in.) H x W x D	Shipping Weight
TFD14DALFR000C	300-1200	14½ inch	7½ x 14½ x 21	33
TFD17DALFR000C	300-1600	17½ inch	7½ x 17½ x 21	37
TFD21DALFR000C	300-2000	21 inch	7½ x 21 x 21	41
TFD24DALFR000C	400-2000	24½ inch	7½ x 24½ x 21	45

Table IAQ-1-D – Air Handler – Trane CleanEffects™ Whole House Upgrade Kit

Model Number	Airflow Range	Perfect Fit™ Cabinet Width	Shipping Weight
TFD215ALUPGRDC	300-1200	21½ inch	38
TFD235ALUPGRDC	350-1600	23½ inch	40
TFD260ALUPGRDC	400-2000	26 inch	42

Table IAQ-1-E – Furnace – Trane CleanEffects™ Whole House Upgrade Kit

Model Number	Airflow Range	Perfect Fit™ Cabinet Width	Shipping Weight
TFD145ALUPGRDC	300-1200	14½ inch ^①	35
TFD175ALUPGRDC	300-1600	17½ inch ^①	39
TFD210ALUPGRDC	300-2000	21 inch ^②	43
TFD245ALUPGRDC	400-2000	24½ inch ^②	45

Table IAQ-1-F – Downflow Furnace – Trane CleanEffects™ Whole House Upgrade Kit

Model Number	Airflow Range	Perfect Fit™ Cabinet Width	Shipping Weight
TFD14DALUPGRDC	300-1200	14½ inch	29
TFD17DALUPGRDC	300-1600	17½ inch	33
TFD21DALUPGRDC	300-2000	21 inch	37
TFD24DALUPGRDC	400-2000	24½ inch	41

Table IAQ-1-G – Accessories – Trane CleanEffects™ Whole House and Upgrade Kits

Model Number	Description	Used With	Shipping Weight
BAYTRANS12024	120 to 24 Volt Transformer	All TFD Air Cleaners	6

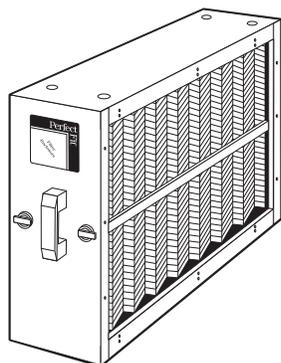
① Side return no transition required.

② Side return transition required.



It's Hard To Stop A Trane.®

Perfect Fit™ Electronic Media Filters



- Three sizes to flush fit TEE/TEP 6-way convertible Air Handler return
- Four sizes to flush fit bottom of Trane furnaces
- TFP175, TFM175, TFE175 (17½") bottom return model can be used for a **Perfect Fit™** side return on all furnace models
- Air Cleaners designed for flush fit on both sides and rear of equipment cabinet
- All service and access is from the front of the air cleaner
- **Air-Tite™** Door construction eliminates air leaks, improves air quality and keeps operating costs low
- Gaskets included with the air cleaner
- Can be easily converted to **Trane CleanEffects™** Whole House technology with upgrade kit listed on tables IAQ-1-D to IAQ-1-F

Table IAQ-2-A – Air Handler Perfect Fit™ High Efficiency Air Cleaner With Five (5) Inch Expandable Media Filter

Model Number	Airflow Range	Perfect Fit™ Air Handler Width	Uncrated Dimensions(in.) H x W x D	Shipping Weight	Return Air Opening ^③
TFM215B0AH0	300-1400	21½ inch	7½ x 21½ x 21	22	18⅞ x 18⅞
TFM235B0AH0	300-1700	23½ inch	7½ x 23½ x 21	24	20⅞ x 18⅞
TFM260B0AH0	400-2100	26 inch	7½ x 26 x 21	25	23⅞ x 18⅞

Table IAQ-2-B – Furnace Perfect Fit™ High Efficiency Air Cleaner With Five (5) Inch Expandable Media Filter

Model Number	Airflow Range	Perfect Fit™ Air Handler Width	Uncrated Dimensions(in.) H x W x D	Shipping Weight	Return Air Opening ^③
TFM145B0FR0	300-1200	14½ inch ^①	7½ x 14½ x 27	18	11⅞ x 24 ¹³ / ₁₆
TFM175B0FR0	300-1500	17½ inch ^①	7½ x 17½ x 27	21	14⅞ x 24 ¹³ / ₁₆
TFM210B0FR0	300-2000	21 inch ^②	7½ x 21 x 27	24	18 ³ / ₈ x 24 ¹³ / ₁₆
TFM245B0FR0	400-2000	24½ inch ^②	7½ x 24½ x 27	27	21⅞ x 24 ¹³ / ₁₆

Table IAQ-2-C – Downflow Furnace Perfect Fit™ High Efficiency Air Cleaner With Five (5) Inch Expandable Media Filter

Model Number	Airflow Range	Perfect Fit™ Air Handler Width	Uncrated Dimensions(in.) H x W x D	Shipping Weight	Return Air Opening ^③
TFM14DA0FR0	300-1200	14½ inch	7½ x 14½ x 21	17	11⅞ x 18⅞
TFM17DA0FR0	300-1500	17½ inch	7½ x 17½ x 21	19	14⅞ x 18⅞
TFM21DA0FR0	300-2000	21 inch	7½ x 21 x 21	22	18 ³ / ₈ x 18⅞
TFM24DA0FR0	400-2000	24½ inch	7½ x 24½ x 21	24	21⅞ x 18⅞

Table IAQ-2-D – Air Handler Perfect Fit™ Medium Efficiency Air Cleaner With One (1) Inch Pleated Filter

Model Number	Airflow Range	Perfect Fit™ Air Handler Width	Uncrated Dimensions(in.) H x W x D	Shipping Weight	Return Air Opening ^③
TFP215A0AH1	300-1200	21½ inch	7½ x 21½ x 21	20	18⅞ x 18⅞
TFP235A0AH1	300-1500	23½ inch	7½ x 23½ x 21	22	20⅞ x 18⅞
TFP260A0AH1	400-1800	26 inch	7½ x 26 x 21	24	23⅞ x 18⅞

Table IAQ-2-E – Furnace Perfect Fit™ Medium Efficiency Air Cleaner With One (1) Inch Pleated Filter

Model Number	Airflow Range	Perfect Fit™ Air Handler Width	Uncrated Dimensions(in.) H x W x D	Shipping Weight	Return Air Opening ^③
TFP145A0FR1	300-1200	14½ inch ^①	7½ x 14½ x 27	17	11⅞ x 24 ¹³ / ₁₆
TFP175A0FR1	300-1500	17½ inch ^①	7½ x 17½ x 27	19	14⅞ x 24 ¹³ / ₁₆
TFP210A0FR1	400-1800	21 inch ^②	7½ x 21 x 27	22	18 ³ / ₈ x 24 ¹³ / ₁₆
TFP245A0FR1	400-2000	24½ inch ^②	7½ x 24½ x 27	25	21⅞ x 24 ¹³ / ₁₆

- ① Side return no transition required.
 ② Side return transition required.
 ③ Actual opening does not include flange.



Perfect Fit™ Filter Accessories

Table IAQ-3-A — Furnace Enclosure Filters

Model			Enclosure	Shipping
Number	Description	Qty	Used with	Weight
BAYFTFR14P4	1" Pleated Filter	4 / Box	14 1/2	3
BAYFTFR17P4	1" Pleated Filter	4 / Box	17 1/2	3
BAYFTFR21P4	1" Pleated Filter	4 / Box	21	3
BAYFTFR24P4	1" Pleated Filter	4 / Box	24 1/2	3
BAYFTFR14M2	5" Media Filter	2 / Box	14 1/2	5
BAYFTFR17M2	5" Media Filter	2 / Box	17 1/2	5
BAYFTFR21M2	5" Media Filter	2 / Box	21	5
BAYFTFR24M2	5" Media Filter	2 / Box	24 1/2	6
BAYFTFREXM2	Expandable 5" Cartridge Media Filter	2 / Box	14 1/2-24 1/2	5

Table IAQ-3-B — Air Handler Enclosure Filters

Model			Enclosure	Shipping
Number	Description	Qty	Used with	Weight
BAYFTA21P4	1" Pleated Filter	4 / Box	21 1/2	3
BAYFTA23P4	1" Pleated Filter	4 / Box	23 1/2	3
BAYFTA26P4	1" Pleated Filter	4 / Box	26	3
BAYFTA21M2	5" Media Filter	2 / Box	21 1/2	5
BAYFTA23M2	5" Media Filter	2 / Box	23 1/2	5
BAYFTA26M2	5" Media Filter	2 / Box	26	6
BAYFTAHEXM2	Expandable 5" Cartridge Media Filter	2 / Box	21 1/2-26	5

Table IAQ-3-C — Downflow Cartridge Media

Model			Enclosure	Shipping
Number	Description	Qty	Used with	Weight
BAYFTDN14M2	5" Downflow Media Filter	2/ Box	14 D	5
BAYFTDN17M2	5" Downflow Media Filter	2/ Box	17 D	5
BAYFTDN21M2	5" Downflow Media Filter	2/ Box	21 D	5
BAYFTDN24M2	5" Downflow Media Filter	2/ Box	24 D	5

Table IAQ-3-D — Furnace Frames

Model			Enclosure	Shipping
Number	Description	Qty	Used with	Weight
BAYFRAME145Ⓞ	Expandable Media Filter	1/ Box	14 1/2	5
BAYFRAME175Ⓞ	Expandable Media Filter	1/ Box	17 1/2	5
BAYFRAME210Ⓞ	Expandable Media Filter	1/ Box	21	5
BAYFRAME245Ⓞ	Expandable Media Filter	1/ Box	24 1/2	5

Table IAQ-3-E — Air Handler Frames

Model			Enclosure	Shipping
Number	Description	Qty	Used with	Weight
BAYFRAME215Ⓞ	Expandable Media Frame	1/ Box	21	5
BAYFRAME235Ⓞ	Expandable Media Frame	1/ Box	23 1/2	5
BAYFRAME260Ⓞ	Expandable Media Frame	1/ Box	26	5

Ⓞ Includes one filter.



It's Hard To Stop A Trane.

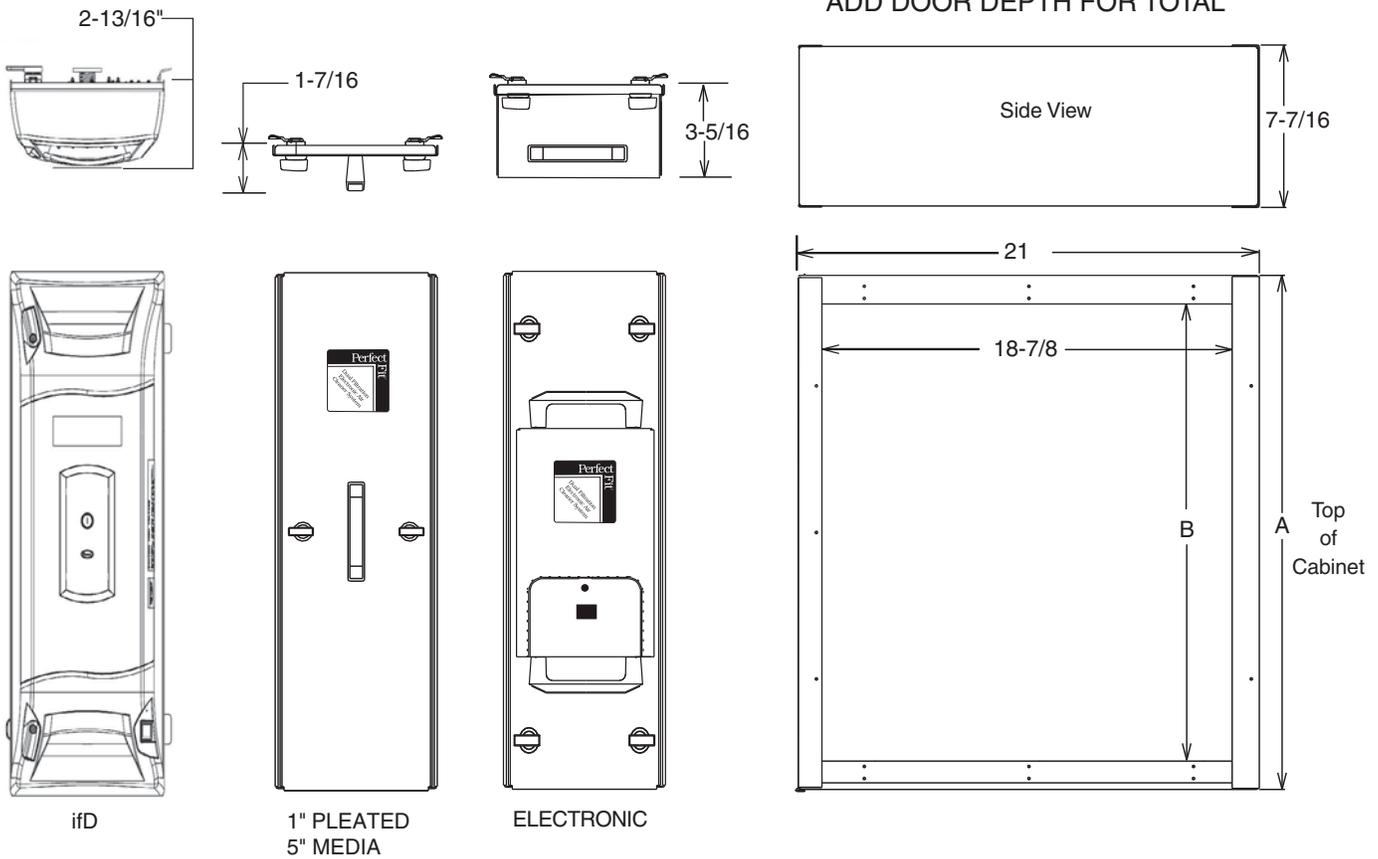
Perfect Fit™

Table IAQ-4-A — Air Handler Filters

AIR HANDLER MODEL NUMBER					
1" Pleated Filter	5" Media Filter	Electronic Filter	Trane CleanEffects™	A	B
TFP215A0AH0	TFM215A0AH0	TFE215A1AH0, A9AH0	TFD215ALAH000C	21-1/2	19
TFP235A0AH0	TFM235A0AH0	TFE235A1AH0, A9AH0	TFD235ALAH000C	23-1/2	21
TFP260A0AH0	TFM260A0AH0	TFE260A1AH0, A9AH0	TFD260ALAH000C	26	23-1/2

OUTLINE DRAWING AIR HANDLER MODELS

21" CABINET DEPTH ONLY
ADD DOOR DEPTH FOR TOTAL



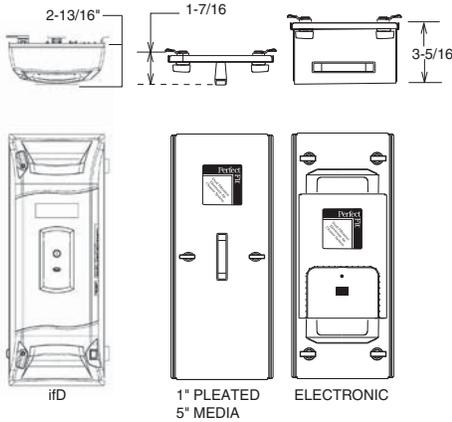
Perfect Fit™

Table IAQ-5-A — Upflow Furnace Filters

FURNACE MODEL NUMBER					
1" Pleated Filter	5" Media Filter	Electronic Filter	Trane CleanEffects™	A	B
TFP145A0FR0	TFM145A0FR0	TFE145A9FR0	TFD145ALFR000C	14-1/2	12
TFP175A0FR0	TFM175A0FR0	TFE175A9FR0	TFD175ALFR000C	17-1/2	15
TFP210A0FR0	TFM210A0FR0	TFE210A9FR0	TFD210ALFR000C	21	18-1/2
TFP245A0FR0	TFM245A0FR0	TFE245A9FR0	TFD245ALFR000C	24-1/2	22

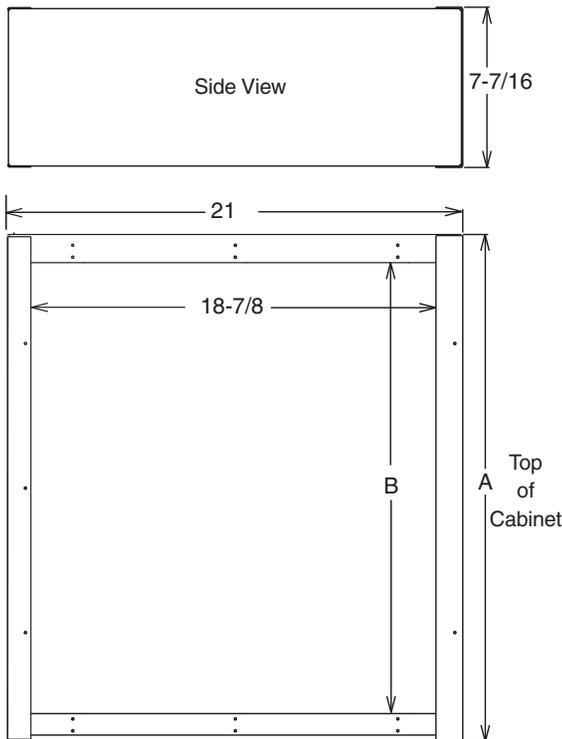
Table IAQ-5-B — Downflow Furnace Filters

FURNACE MODEL NUMBER			
5" Media Filter	ifD Filter	A	B
TFM14DA0FR0	TFD14DALFR000C	14-1/2	11-7/8
TFM17DA0FR0	TFD17DALFR000C	17-1/2	14-7/8
TFM21DA0FR0	TFD21DALFR000C	21	18-3/8
TFM24DA0FR0	TFD24DALFR000C	24-1/2	21-7/8



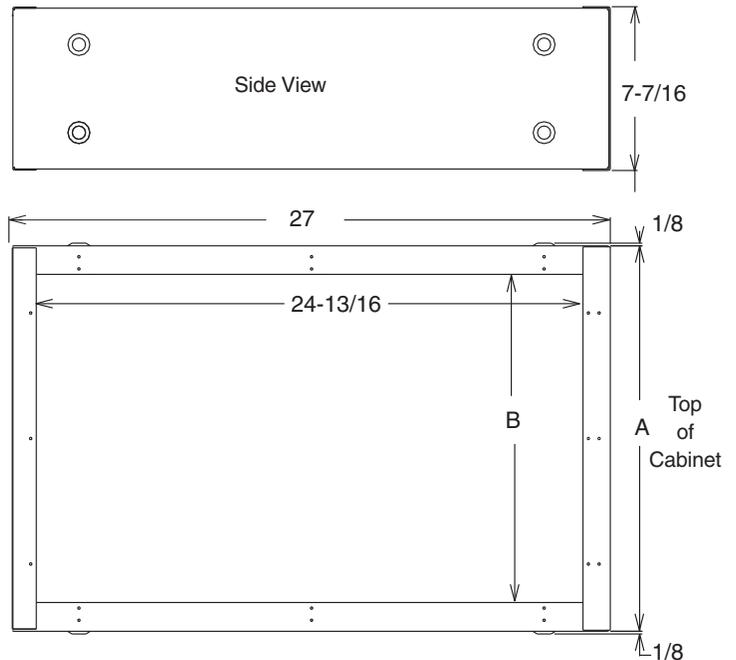
OUTLINE DRAWING DOWNFLOW FURNACE MODELS

21" CABINET DEPTH ONLY
ADD DOOR DEPTH FOR TOTAL



OUTLINE DRAWING UPFLOW FURNACE MODELS

27" CABINET DEPTH ONLY
ADD DOOR DEPTH FOR TOTAL





Item

NaturalAire Cut-to-Fit 24" x 36"

Effective Protection Against



DUST/LINT



DUST MITE
DEBRIS



POLLEN



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PET DANDER

Important Features

- lasts up to one year
- made with natural fibers
- cuts to fit any size up to 24" x 36"

Item Number: 40655

Vendor Case Quantity: 12pk.

You can cut this material with heavy shears or a razor knife to create almost any size one-inch air filter for furnace and central air. It is springy, almost rigid and needs no frame for support. Just cut and install. Moreover, it can be washed and reused several times. It is the ideal replacement for hard to find or special filter sizes.

PVC FLOAT VALVES, BALLS, AND RODS

Corrosion Resistant



PVC

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MANUFACTURER OF FLOAT VALVES AND ACCESSORIES

Phone: 904-732-2258

Website: www.floatvalve.com

Kerick Valve

"M" Series Float Valves

Kerick's "M" series float valves are available in two different styles. The adjustable arm style "MA" and the fixed arm style "M". Both are tank (bulkhead) mountable.



M252 - 1/4" tubing inlet, fixed arm*



MA252 - 1/4" tubing inlet, adjustable arm*



M382 - 3/8" tubing inlet, fixed arm*



MA382 - 3/8" tubing inlet, adjustable arm*



M052 - 1/2" pipe thread inlet, fixed arm**



MA052 - 1/2" pipe thread inlet, adjustable arm **



MB22 - 1/4" barb inlet, fixed arm



MAB22 - 1/4" barb inlet, adjustable arm



M2S2 - 1/4" pipe thread inlet, fixed arm



MA2S2 - 1/4" pipe thread inlet, adjustable arm



M2P2 - 1/4" extended pipe thread inlet, fixed arm***



MA2P2 - 1/4" extended pipe thread inlet, adjustable arm ***



M3P2 - 3/8" pipe thread inlet, fixed arm



MA3P2 - 3/8" pipe thread inlet, adjustable arm

*Tubing inlet models utilize JACO compression nuts for plastic tubing

**1/2" valves can be tapped with 1/4" female pipe thread

***Optional bulkhead nut

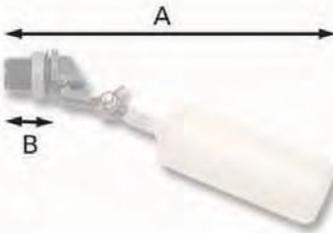
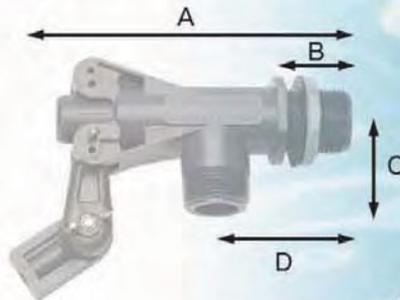
Kerick Valve offers a non-corrosive, heavy duty, high-quality PVC alternative for fluid level control. Kerick's patented design utilizes the latest materials for increased performance, reliability, and economy. Our PVC float valves are the cost-effective alternative to stainless steel and the non-corrosive alternative to brass float valves.

Kerick Valve

"M" Series Float Valves

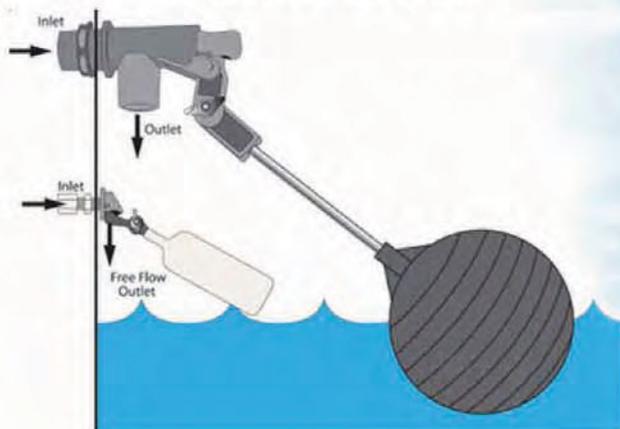
APPROXIMATE DIMENSIONS IN INCHES				
MODEL	A	B	C	D
M052	6.7	1	N/A	N/A
M252	6.7	1	N/A	N/A
M382	6.7	1	N/A	N/A
MA052	7.5	1	N/A	N/A
MA252	7.5	1	N/A	N/A
MA382	7.5	1	N/A	N/A
PS75SS	4.8	N/A	1.5	1.5
PT75SS	5.25	1.15	1.5	2
PS75LS	4.8	N/A	1.5	1.5
PT75LS	5.25	1.15	1.5	2
PX75SS	5.25	N/A	1.5	2
PS100SS	6	N/A	1.8	1.8
PT100SS	7	1.3	1.8	2.7
PS125SS	9	N/A	2.7	2.7
PS150SS	9	N/A </tr		

- All "M" series valves have a .093 orifice with a free flow outlet. Estimated flow rate is 1.3 GPM @ 40 PSI and 1.5 GPM @ 60 PSI and all have been tested to 100 PSI
- Standard valves are made with NSF approved PVC
- Seals are made of long-wearing and chemical resistant Satnprene® rubber
- Standard hardware is made of 18-8 stainless steel
- Valves come complete with jam nut, sealing washer, and polyethylene float attached
- "MA" models can be mounted vertically



"M" SERIES VALVES CAN BE CUSTOMIZED TO MEET OEM REQUIREMENTS SEE PAGE 7 FOR FLOAT OPTIONS

Installation Diagram



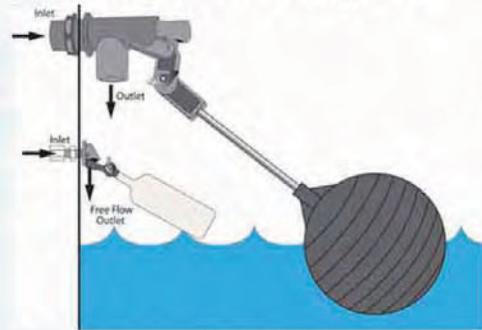
Kerick Valve

3/8" & 1/2" HEAVY DUTY NON CORROSIVE PVC FLOAT VALVES

Kerick's 3/8" and 1/2" valves are available with three different orifice sizes: .187", .25", and .312" in order to match required flow range.

- Standard valves are made with NSF approved PVC
- Hardware made with 18-8 stainless steel
- Replaceable seals are made of long-wearing and chemical resistant Santoprene® rubber
- Use with 3" or 6" rod and 4x5" or 2x2x4" float
 - *see page 7 for float options
- .187" orifice has an estimated flow rate of 4.4 GPM @ 20 PSI and 7.2 GPM @ 60 PSI
- .25" orifice has an estimated flow rate of 7.7 GPM @ 20 PSI and 12.5 GPM @ 60 PSI
- .312" orifice has an estimated flow rate of 8 GPM @ 20 PSI and 15 GPM @ 60 PSI

Installation Diagram



PS3838xxx* - Standard mount

- 3/8" pipe thread inlet and outlet



PT3838xxx* - Tank (bulkhead) mount

- 3/8" pipe thread inlet and outlet
- Extended threads on the inlet side of the valve for mounting through a tank wall
- Comes complete with sealing washer and jam nut



PS0505xxx* - Standard mount

- 1/2" pipe thread inlet and outlet



PT0505xxx* - Tank (bulkhead) mount

- 1/2" pipe thread inlet and outlet
- Extended threads on the inlet side of the valve for mounting through a tank wall
- Comes complete with sealing washer and jam nut

Kerick Valve

3/4" HEAVY DUTY NON-CORROSIVE
PVC FLOAT VALVES

- Standard valves are made with NSF approved PVC
- Hardware made with 18-8 stainless steel
- Replaceable seals are made of long-wearing and chemical resistant Santoprene® rubber

PS75SS - Standard mount

- .48" orifice
- 3/4" inlet and outlet
- Estimated flow rates of 27.5 GPM @ 30 PSI and 37 GPM @ 60 PSI
- Use with 12"x1/4" stainless steel rod and 6" float



PT75SS - Tank (bulkhead) mount

- .48" orifice
- 3/4" inlet and outlet
- Estimated flow rates of 27.5 GPM @ 30 PSI and 37 GPM @ 60 PSI
- Use with 12"x1/4" stainless steel rod and 6" float
- Extended threads on the inlet side of the valve for mounting through a tank wall
- Comes complete with sealing washer and jam nut



PS75LS - Standard mount

- .30" orifice
- 3/4" inlet and outlet
- Estimated flow rates of 13 GPM @ 30 PSI and 16.5 GPM @ 60 PSI
- Use with 12"x1/4" stainless steel rod and 4x5" float
- Size of rod may be reduced when using less than maximum pressure



PT75LS - Tank (bulkhead) mount

- .30" orifice
- 3/4" inlet and outlet
- Estimated flow rates of 13 GPM @ 30 PSI and 16.5 GPM @ 60 PSI
- Use with 12"x1/4" stainless steel rod and 4x5" float
- Size of rod may be reduced when using less than maximum pressure
- Extended threads on the inlet side of the valve for mounting through a tank wall
- Comes complete with sealing washer and jam nut



PX75SS - Standard mount extended inlet

- .48" orifice
- 3/4" inlet and outlet
- Estimated flow rates of 27.5 GPM @ 30 PSI and 37 GPM @ 60 PSI
- Use with 12"x1/4" stainless steel rod and 6" float



Kerick Valve

**1" TO 1.5" HEAVY DUTY
NON CORROSIVE
PVC FLOAT VALVES**

Kerick's 1" through 1.5" float valves have lever brackets on both sides so they can be used upside-down. Two fulcrum positions on the lever add further flexibility to accommodate different pressures and flow rates.

- Standard valves are made of NSF approved PVC
- Hardware made with 18-8 stainless steel
- Replaceable seals are made of long-wearing and chemical resistant Santoprene® rubber



PS100SS - Standard Mount

- 1" inlet and outlet
- .69" orifice
- Estimated flow rates of 42 GPM @ 30 PSI and 56 GPM @ 60 PSI*
- Estimated flow rates of 51 GPM @ 30 PSI and 69 GPM @ 60 PSI**
- Use with 12"x1/4" stainless steel rod and 6" or 8" float ball



PT100SS - Tank (bulkhead) mount

- 1" inlet and outlet
- .69" orifice
- Estimated flow rates of 42 GPM @ 30 PSI and 56 GPM @ 60 PSI*
- Estimated flow rates of 51 GPM @ 30 PSI and 69 GPM @ 60 PSI**
- Use with 12"x1/4" stainless steel rod and 6" or 8" float ball
- Extended threads on the inlet side of the valve for mounting through a tank wall
- Comes complete with sealing washer and jam nut



PT100LS - Tank (bulkhead) mount

- 1" inlet and outlet
- .38" orifice
- Estimated flow rates of 12 GPM @ 30 PSI and 16 GPM @ 60 PSI*
- Estimated flow rates of 19 GPM @ 30 PSI and 26 GPM @ 60 PSI**
- Use with 12"x1/4" stainless steel rod and 6" or 8" float ball
- Extended threads on the inlet side of the valve for mounting through a tank wall
- Comes complete with sealing washer and jam nut



PS125SS - Standard mount

- 1.25" inlet and outlet
- 1.0" orifice
- Estimated flow rates of 85 GPM @ 20 PSI and 124 GPM @ 50 PSI*
- Estimated flow rates of 90 GPM @ 20 PSI and 145 GPM @ 50 PSI**
- Use with 5/16" threaded stainless steel rod in 14", 16", or 18" length and an 8" float ball



PS150SS - Standard mount

- 1.25" inlet and outlet
- 1.0" orifice
- Estimated flow rates of 85 GPM @ 20 PSI and 124 GPM @ 50 PSI*
- Estimated flow rates of 90 GPM @ 20 PSI and 145 GPM @ 50 PSI**
- Use with 5/16" threaded stainless steel rod in 14", 16", or 18" length and an 8" float ball

*Position # 1 (Low Flow)

**Position # 2 (High Flow)

GEOGLOBAL PARTNERS

E304677

SUBMERSIBLE WATER PUMP



DD11210

120V 60Hz 0.35A

LISTED
36LY

THERMALLY PROTECTED

THERMIQUEMENT PROTÉGÉ

ENCLOSURE TYPE 3

DO NOT RUN "DRY"

ACCEPTABLE FOR INDOOR AND OUTDOOR USE

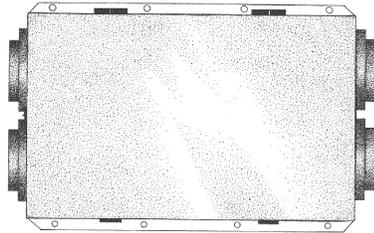
12/10

MADE IN CHINA - SKYISH



It's Hard To Stop A Trane.®

FreshEffects™ Energy Recovery Ventilator (ERV)



- FreshEffects™ ERV technology for all seasons and climates
- Static plate energy transfer core for efficient transfer of heat and moisture
- Passive defrost - condensate drain not required
- Balancing dampers not required
- Multi position mounting
- Percent Timer (PT) control included with ERV for simple, automatic operation
- Optional push button control for use with PT control
- Cam action door latches for quick service access
- Heavy gauge, powder painted steel cabinet
- Permanently lubricated motor bearings (ball bearings)
- 6" and 8" double collar duct connections for TERVR100 and 200
- 8" round compatible duct connection for TERVR300
- Closed cell foam gasketing for insulation integrity
- 1" duct board insulation with cleanable foil face
- May be installed in conditioned and unconditioned spaces
- Cabinet / Door color: Trane Polyslate Gray / Tarpaulin Gray
- **5-year limited warranty on parts**
- **10-year limited warranty on energy transfer core**
- **Optional extended warranty**

Table IAQ-9-A — Specifications: ERV

Model Number	Nominal Airflow (CFM)	Power Supply	Uncrated Dimensions (In.) H x W x D	Shipping Weight
TERVR100A9P00A ^①	130	120/1/60	20 ¹ / ₈ x 28 ³ / ₄ x 13	58
TERVR200A9P00A ^①	200	120/1/60	20 ¹ / ₈ x 28 ³ / ₄ x 23 ⁷ / ₈	80
TERVR300A9P00A ^①	300	120/1/60	20 ¹ / ₈ x 28 ³ / ₄ x 23 ⁷ / ₈	88

^① Percent Timer Control included with the ERV.

Table IAQ-9-B — Specifications: ERV

Model Number	Apparent Sensible Effectiveness(32°F)	Sensible Recovery Effectiveness(32°F)	Latent Recovery (32°F)	Total Recovery (32°F)
TERVR100A9P00A	80% @ 120 cfm	84% @ 120 cfm	73% @ 251 cfm	51% @ 63 cfm
TERVR200A9P00A	72% @ 120 cfm	77% @ 120 cfm	64% @ 251 cfm	59% @ 63 cfm
TERVR300A9P00A	44% @ 120 cfm	63% @ 120 cfm	40% @ 251 cfm	31% @ 252 cfm

Table IAQ-9-C — Optional Accessories

Model Number	Description	Used With	Shipping Weight
TCONTV10APBC0A	Point of Use Push Button Control	ERV models 100, 200, 300	1
BAYFLT10A1010A	Filters - 2 per pack	ERV models 100	1
BAYFLT20A1020A	Filters - 2 per pack	ERV models 200, 300	1
BAYWHT10AVENTA ^②	6 inch White Vinyl Ventilation Hood	ERV models 100, 200	1
BAYBRN10AVENTA ^②	6 inch Brown Vinyl Ventilation Hood	ERV models 100, 200	1
BAYGLV10AVENTA ^②	8 inch Galvanized Ventilation Hood	ERV models 300	2

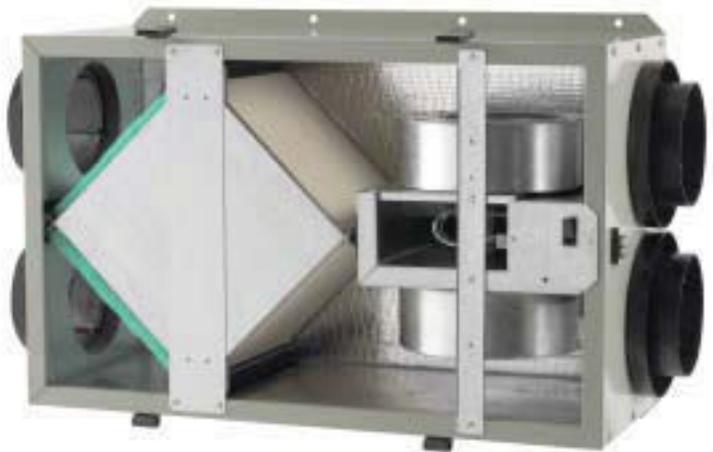
^② Qty 1.



TRANE[®]

FreshEffects™ Energy Recovery Ventilator

TERVR100A9P00A
TERVR200A9P00A
TERVR300A9P00A



PUB. NO. 22-1776-03



General Features

General Features

Energy Recovery Ventilator (ERV)

Product Description

Packaged static plate enthalpic-energy recovery ventilator. Energy transfer core is constructed of static plates in a cross flow arrangement with no moving parts. The unit is capable of operating in summer and winter conditions without generating condensate. No condensate drain pan or drain line is required. The ERV ships with cleanable polyester air filters in the exhaust and fresh air streams to protect the energy transfer core.

Product Certification

ERV models are listed under UL 1812 Standard for Ducted Air to Air Heat Exchangers and are certified by the Home Ventilating Institute (HVI) per CSA 439. Both a heating and cooling test are run to demonstrate year round energy recovery.

Energy Transfer

ERV's are capable of transferring both heat and moisture between airstreams. Moisture transfer is achieved by direct water vapor transfer from one air stream to the other.

Passive Frost Control

The energy transfer core performs without condensing or frosting under normal operating conditions (defined as outside temperatures above -10F and inside relative humidity below 40%). Occasional extreme conditions will not affect the usual function or performance of the element. A condensate drain is not required.

Continuous Ventilation

FreshEffects™ ERV's have the capacity to operate continuously without the need for bypass, recirculation, pre-heaters or defrost cycles under normal operating conditions.

Positive Airstream Separation

Water vapor transfer is achieved through molecular transport by hygroscopic resin and shall not be achieved by "porous plate" mechanisms. Exhaust and fresh air travel in separate passages at all times, and airstreams do not mix.

Laminar Flow

Airflow through the energy transfer core is laminar, avoiding deposit of particulates on the interior of the energy exchange plate material.

Contents

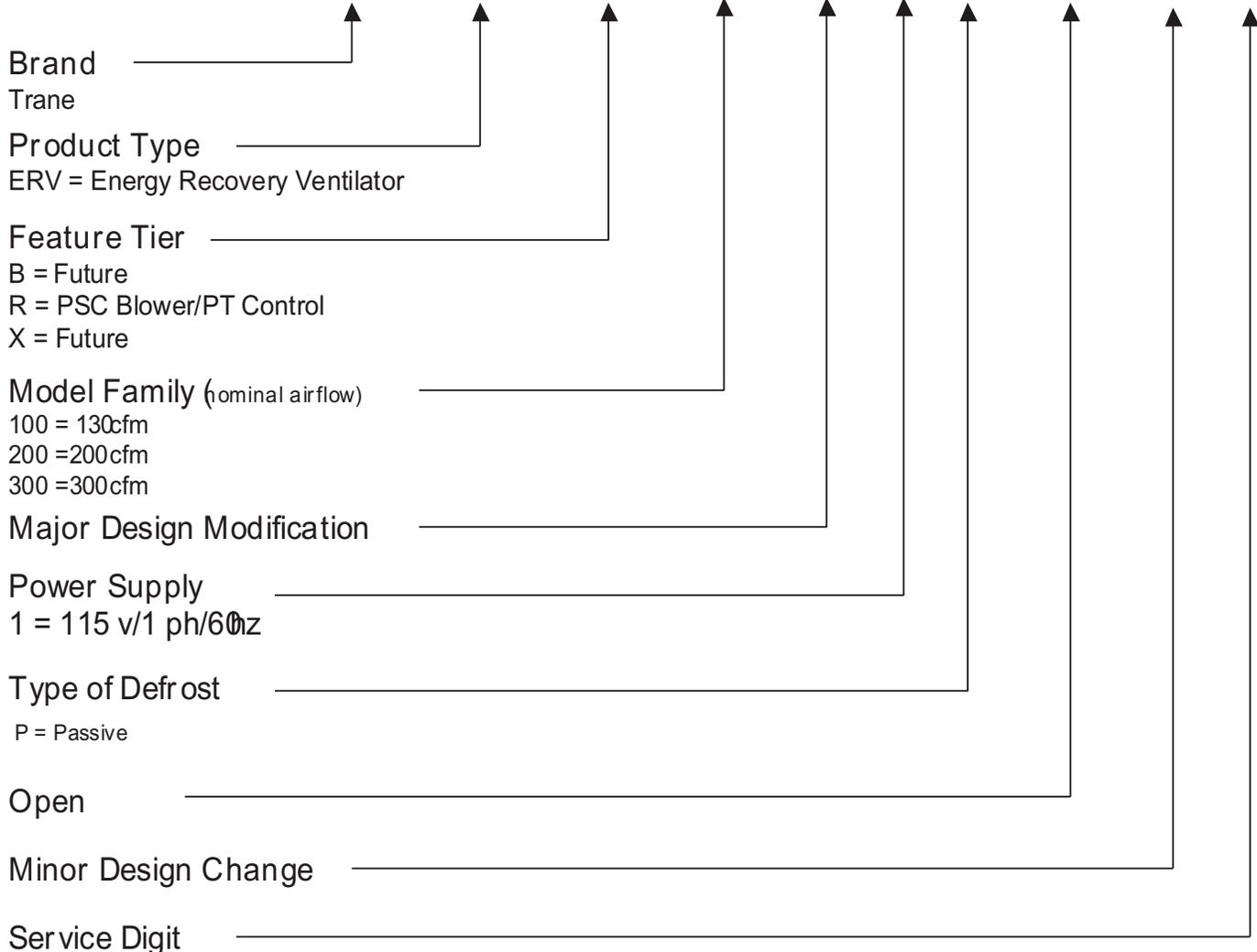
General Features	2
Model Nomenclature	4
Features and Benefits	5
General Data	6
Performance Data	8
Electrical Data	10
Dimensions	12



ERV Model Nomenclature



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
T E R V R 1 0 0 A 9 P 0 0 A A





Features and Benefits

Features and Benefits

Features:

- FreshEffects™ ERV technology for all seasons and climates
- Static plate energy transfer core for efficient transfer of heat and moisture
- Passive defrost does not require condensate drain and provides lower installed cost and improves reliability
- Multi position mounting for installation flexibility
- FreshEffects™ ERV airflow design does not require installation of balancing dampers reducing installation and start up time
- Percent Timer (PT) control included with ERV for simple, automatic operation
- Optional push button control accessory provides manual override at point of use
- Cam action latches and hinged access doors provide quick access for maintenance and service.
- Heavy gauge, powder painted steel cabinet provides durability and matches Trane system appearance
- Permanently lubricated motor bearings for long life
- Standard 34" power cord with ground plug for easy installation
- Double duct collars (6" & 8")for connection of flexible or rigid ductwork for TERVR100 and 200
- 8" round compatible duct connection for TERVR300
- Cabinet wall and doors have 1" cleanable, foil face, high density board insulation, with 1/4" foam insulation on access panel for thermal and sound insulation
- ERV cabinet / door color: Polyslate Gray/ Tarpaulin Gray
- 5 year limited warranty on parts
- 10 year limited warranty on energy transfer core
- **Optional 5 and 10 year extended warranties**

OPTIONAL ACCESSORIES

Point of Use Push Button Control for use with ERV models 100, 200, 300	TCONTV10APBC0A []
Filters - 2 per pack, for use with ERV model 100	BAYFLT10A1010A []
Filters - 2 per pack, for use with ERV model 200 & 300	BAYFLT20A1020A []
6 inch White Vinyl Ventilation Hood	BAYWHT10AVENTA []
6 inch Brown Vinyl Ventilation Hood	BAYBRN10AVENTA []
8 inch Galvanized Ventilation Hood	BAYGLV10AVENTA []



General Data

MODEL	TERVR100A9P00A	TERVR200A9P00A	TERVR300A9P00A
RATINGS ①	See Note ①	See Note ①	See Note ①
AIRFLOW RANGE (cfm)	50-130	100-210	150-320
BLOWER ASSEMBLY			
Diameter x Width	6.75" x 1.89"	6.75" x 1.89"	7.67" x 1.89"
No. Blower Wheels Used	2	2	2
Speeds ②	1	1	1
No. Motors — H.P.	1 - 0.09	1 - 0.09	1 - 0.25
Nominal Motor Speed (R.P.M.)	1750	1750	1550
POWER CONNECTIONS			
Volts/Ph/Hz	120/1/60	120/1/60	120/1/60
Ampacity (in Amps)	15	15	15
Fuse Size - Max (Amps)	15	15	15
F.L. Amps	1.2	1.5	3.5
FILTER			
Filter Furnished?	Yes	Yes	Yes
Type Recommended	Cleanable Polyester	Cleanable Polyester	Cleanable Polyester
No.-Size-Thickness	2 - 10.5" x 10.5"	2 - 10.5" x 21.75"	2 - 10.5" x 21.75"
Defrost	Passive	Passive	Passive
Duct Connections	See Note ②	See Note ②	8" oval connection for flex or rigid
Heat Exchanger	See Note ③	See Note ③	See Note ③
Insulation - Thermal/Sound	See Note④	See Note④	See Note④
DIMENSIONS			
	H x W x D	H x W x D	H x W x D
Crated (In.)	21-1/2 x 32 x 17-1/2	21-1/2 x 32 x 28-1/2	21-1/2 x 32 x 28-1/2
Uncrated (In.) (Not including duct collars)	20-1/8 x 28-3/4 x 13	20-1/8 x 28-3/4 x 23-7/8	20-1/8 x 28-3/4 x 23-7/8
WEIGHT			
Shipping (Lbs.)/ Net (Lbs) Including collars)	65 / 58	91 / 78	95 / 82

① Certified HVI 2100 PER CSA 439 and listed under UL standard UL 1812.

② Insulating double collars with 6" and 8" round connections for flex or rigid duct.

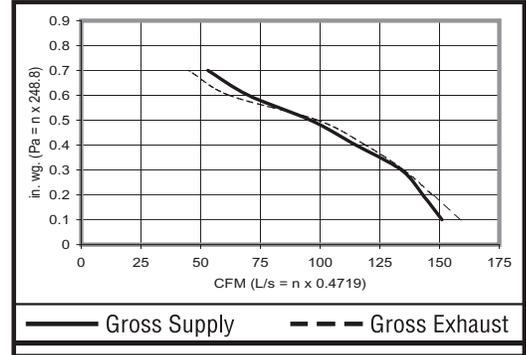
③ Cross flow - fixed plate enthalpic energy transfer core. Transfers heat and moisture.

④ Cabinet - 1" cleanable foil face fiberglass high density board insulation. Access door - 1/4" foam insulation over 1" fiberglass board insulation.



Performance Data

*ERVR100 - Ventilation Performance							
Ext. Static Pressure		Net Supply Airflow		Gross Airflow			
				Supply		Exhaust	
Pa	in. wg	L/S	CFM	L/S	CFM	L/S	CFM
25	0.1	70	148	71	151	75	159
50	0.2	66	141	67	143	69	147
75	0.3	62	132	63	134	64	135
100	0.4	53	113	54	115	56	119
125	0.5	44	94	45	96	47	99
150	0.6	32	69	33	70	29	62
175	0.7	24	52	25	53	21	45

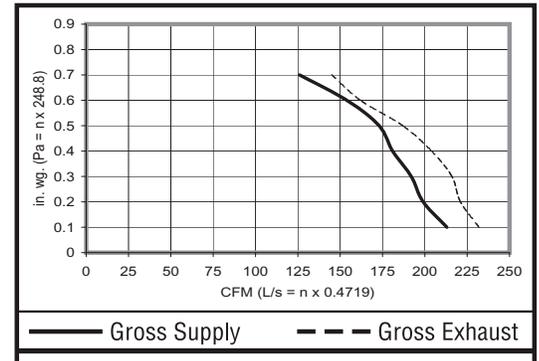


Electrical Requirements Volts 120 Amps 1.3

Exhaust Air Transfer Ratio = 2% @ 0.2 in. wg (50 PA) and 2% @ 0.4 in. wg (100 PA)

*ERVR100 - Energy Performance							
Supply Temperature		Net Airflow		Average Power Watts	Sensible Recovery Efficiency %	Apparent Sensible Effectiveness %	Net Moisture Transfer %
C°	F°	L/S	CFM				
Heating							
0°	32°	58	124	121	72	80	55
Cooling							
35°	95°	59	126	121	Total Recovery Efficiency %		46

*ERVR200 - Ventilation Performance							
Ext. Static Pressure		Net Supply Airflow		Gross Airflow			
				Supply		Exhaust	
Pa	in. wg	L/S	CFM	L/S	CFM	L/S	CFM
25	0.1	97	207	100	213	109	232
50	0.2	90	192	93	199	104	221
75	0.3	88	186	90	192	101	216
100	0.4	83	176	85	181	96	204
125	0.5	79	168	81	173	88	187
150	0.6	70	149	72	154	76	162
175	0.7	57	122	59	126	68	145



Electrical Requirements Volts 120 Amps 1.5

Exhaust Air Transfer Ratio = 3% @ 0.2 in. wg (50 PA) and 3% @ 0.4 in. wg (100 PA)

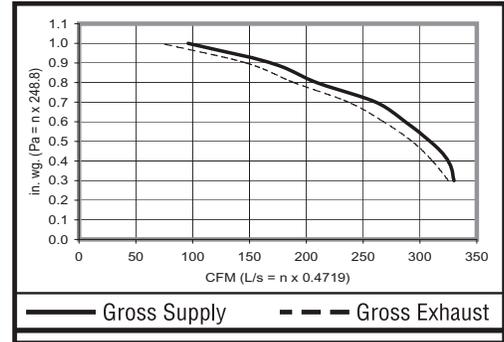
*ERVR200 - Energy Performance							
Supply Temperature		Net Airflow		Average Power Watts	Sensible Recovery Efficiency %	Apparent Sensible Effectiveness %	Net Moisture Transfer %
C°	F°	L/S	CFM				
Heating							
0°	32°	85	181	157	78	85	62
Cooling							
35°	95°	85	180	155	Total Recovery Efficiency %		52

*May be "A" or "T"



Performance Data

*ERVR300 - Ventilation Performance							
Ext. Static Pressure		Net Supply Airflow		Gross Airflow			
				Supply		Exhaust	
Pa	in. wg	L/S	CFM	L/S	CFM	L/S	CFM
100	0.4	148	315	153	325	146	311
125	0.5	141	299	145	309	138	293
150	0.6	131	279	135	287	126	268
175	0.7	119	253	123	261	111	237
200	0.8	95	202	98	209	89	189
225	0.9	77	163	79	169	69	147
250	1.0	44	93	45	96	34	72



Electrical Requirements Volts 120 Amps 3.3

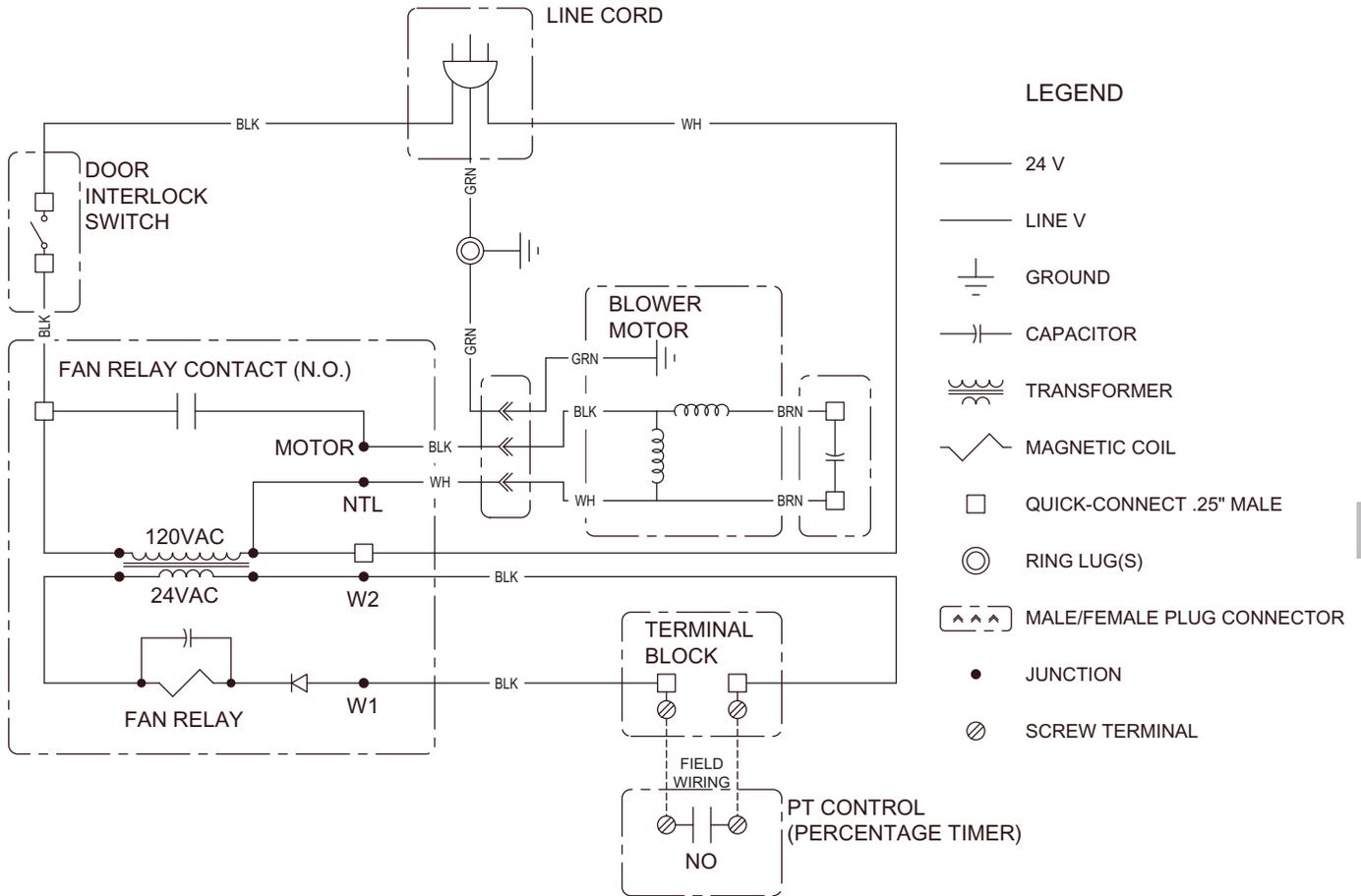
Exhaust Air Transfer Ratio = 3% @ 0.4 in. wg (50 PA)

*ERVR300 - Energy Performance							
Supply Temperature		Net Airflow		Average Power Watts	Sensible Recovery Efficiency %	Apparent Sensible Effectiveness %	Net Moisture Transfer %
C°	F°	L/S	CFM				
Heating							
0°	32°	139	295	317	70	78	51
Cooling							
35°	95°	134	285	311	Total Recovery Efficiency %		43

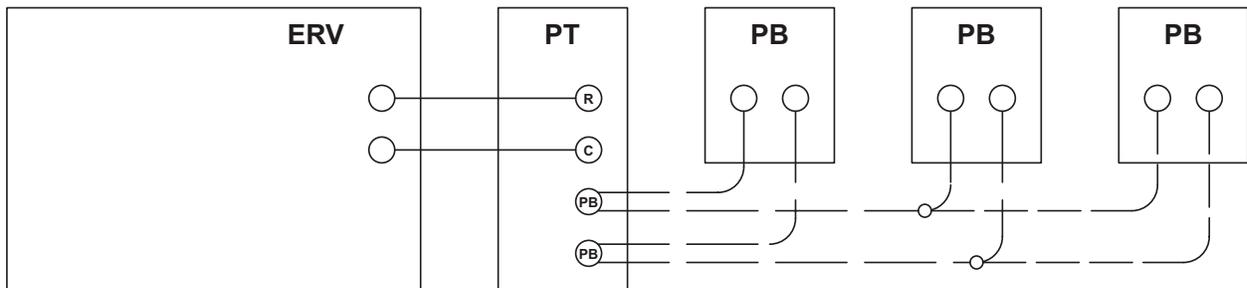
*May be "A" or "T"

* Refer to HVI Directory (Home Ventilation Institute) for definitions of column headings

Electrical Data



Optional PB Controls

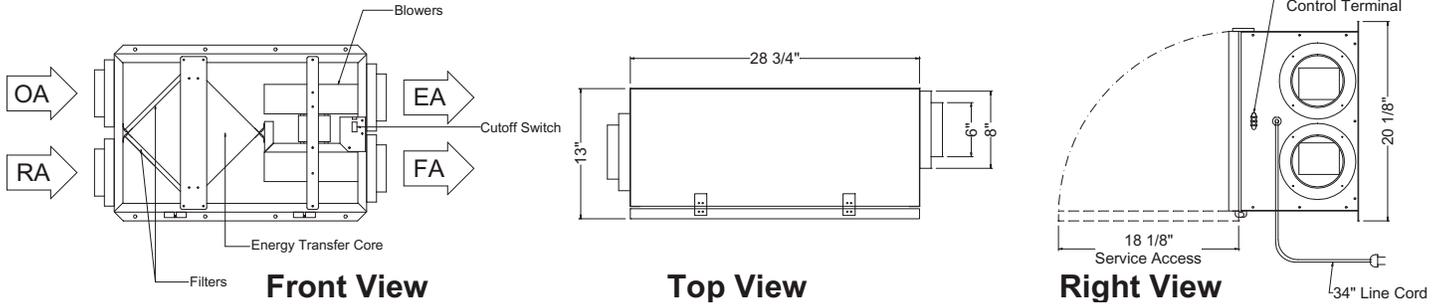


(2) PB controls can be directly connected to the PT control
 Up to (6) PB controls, wired in parallel, may be used.

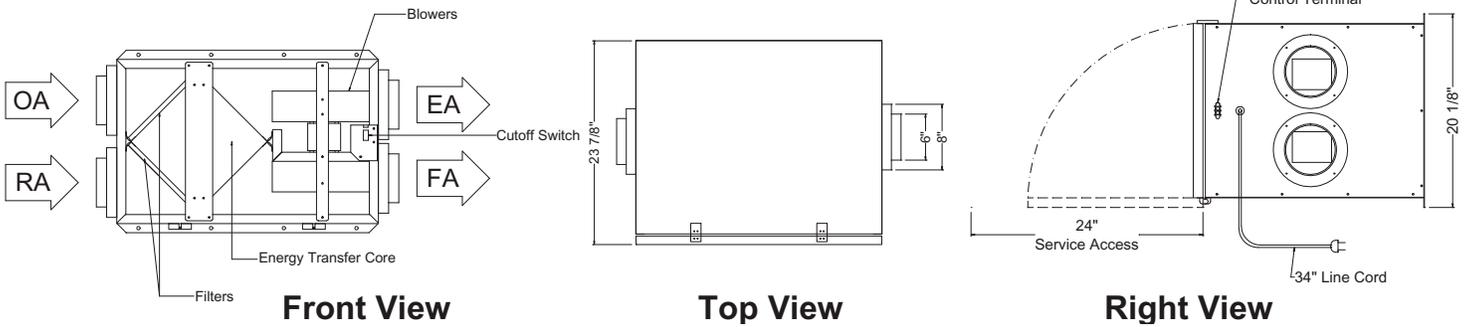


Dimensions

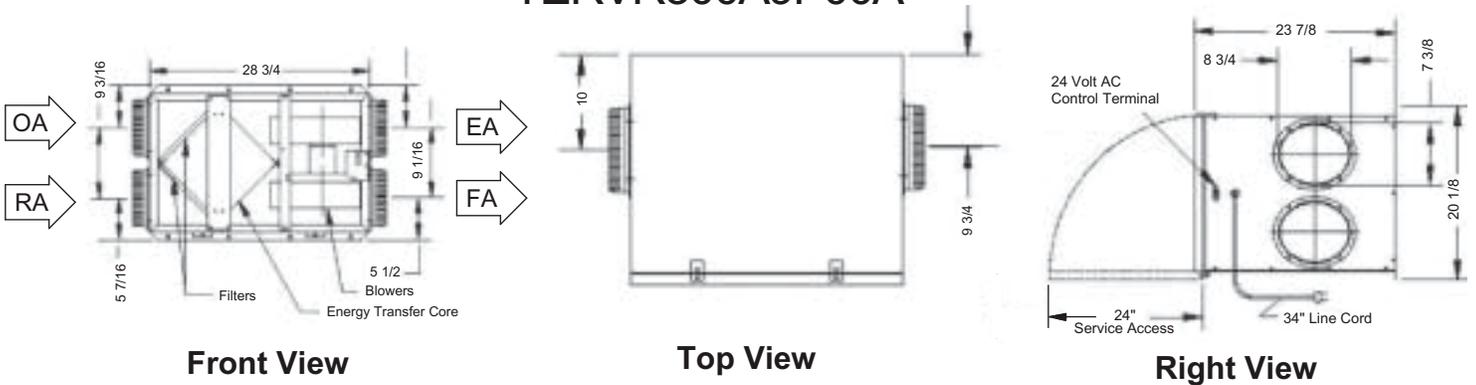
TERVR100A9P00A



TERVR200A9P00A



TERVR300A9P00A





Notes



Trane
A business of American Standard Companies
www.trane.com
6200 Troup Highway
Tyler, TX 75707



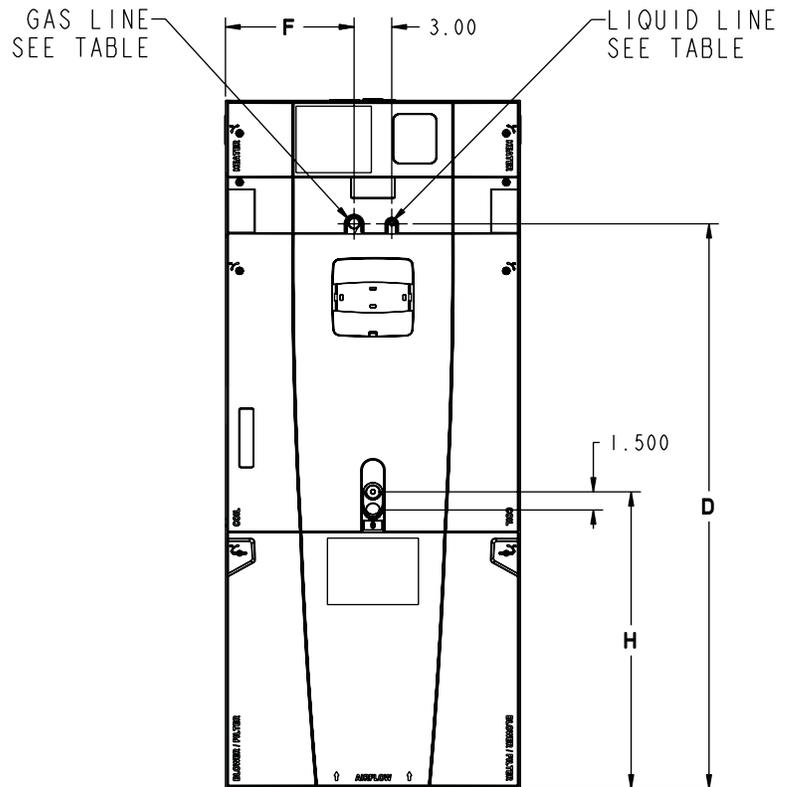
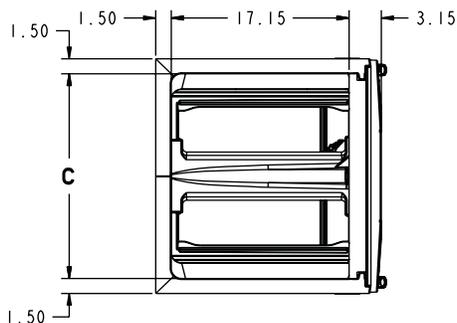
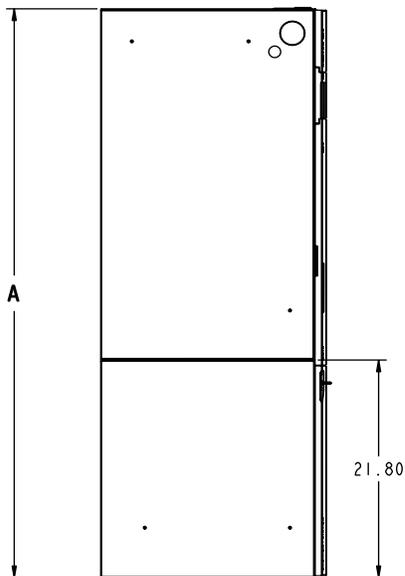
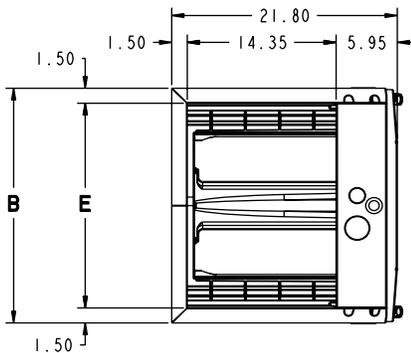
Since Trane has a policy of continuous product improvement, it reserves the right to change design and specifications without notice.



TAG: _____

Submittal

2-1/2 Ton Convertible Communicating Air Handler TAM8A0B30V21CA



	TO COMBUSTIBLE MATERIAL (REQUIRED)	SERVICE CLEARANCE (RECOMMENDED)
SIDES	0"	2"
FRONT	0"	21"
BACK	0"	0"
INLET DUCT	0"	
OUTLET DUCT	0"	

MODEL NO.	A	B	C	D	E	F	H	FLOW CONTROL	GAS LINE BRAZE	LIQ LINE BRAZE
*AM8A0B30V21CA	55.7	21.3	18.4	45.5	18.4	9.2	24.8	EEV	3/4	3/8
* May be "A" or "T"										

PRODUCT SPECIFICATIONS

PRODUCT SPECIFICATIONS

MODEL	TAM8A0B30V21CA
RATED VOLTS/PH/HZ.	200-230/1/60
RATINGS ①	See O.D. Specifications
INDOOR COIL — Type	Plate Fin
Rows — F.P.I.	3 - 14
Face Area (sq. ft.)	5.04
Tube Size (in.)	3/8
Refrigerant Control	EEV
Drain Conn. Size (in.) ②	3/4 NPT
DUCT CONNECTIONS	See Outline Drawing
INDOOR FAN — Type	Centrifugal
Diameter-Width (In.)	11 X 10
No. Used	1
Drive - No. Speeds	Direct - Variable
CFM vs. in. w.g.	See Fan Performance Table
No. Motors — H.P.	1 - 1/2
Motor Speed R.P.M.	Variable ECM
Volts/Ph/Hz	208-230/1/60
F.L. Amps	3.0
FILTER	
Filter Furnished?	No
Type Recommended	Throwaway
No.-Size-Thickness	1 - 20 X 20 - 1 in.
REFRIGERANT	R-410A
Ref. Line Connections	Brazed
Coupling or Conn. Size — in. Gas	3/4
Coupling or Conn. Size — in. Liq.	3/8
DIMENSIONS	H x W x D
Crated (In.)	56.8 x 23.5 x 24.5
Uncrated	55.7 x 21.3 x 21.8
WEIGHT	
Shipping (Lbs.)/Net (Lbs.)	150/138

- ① These Air Handlers are A.H.R.I. certified with various Split System Air Conditioners and Heat Pumps (AHRI STANDARD 210/240).
- ② 3/4" Male Plastic Pipe (Ref.: ASTM 1785-76)



Heater Attribute Data											
*AM8A0B30V21SA											
Heater Model No.	No. of Circuits	240 Volt					208 Volt				
		Capacity		Heater Amps per Circuit	Minimum Circuit Ampacity	Maximum Overload Protection	Capacity		Heater Amps per Circuit	Minimum Circuit Ampacity	Maximum Overload Protection
		kW	BTUH				kW	BTUH			
No Heater	0	-	-	3.0**	4	15	-	-	3.0**	4	15
BAYEVAC05++1	1	4.80	16400	20.0	29	30	3.60	12300	17.3	25	25
BAYEVAC08++1	1	7.68	26200	32.0	44	45	5.76	19700	27.7	38	40
BAYEVAC10++1	1	9.60	32800	40.0	54	60	7.20	24600	34.6	47	50
BAYEVAC10LG3	1-3 PH	9.60	32800	23.1	32	35	7.20	24600	20.0	28	30
BAYEVBC15LG3	1-3 PH	14.40	42000	34.6	47	50	10.80	36900	30.0	41	45
BAYEVBC15BK1 - Circuit 1 ①	2	9.60	32800	40.0	54	60	7.20	24600	34.6	47	50
BAYEVBC15BK1 - Circuit 2		4.80	16400	20.0	25	25	3.60	12300	17.3	22	25

Note: * May be "A" or "T"
 Note: ** Motor Amps
 ① MCA and MOP for circuit 1 contains the motor amps

Notes:

1. See Product Data or Air Handler nameplate for approved combinations of Air Handlers and Heaters
2. Heater model numbers may have additional suffix digits.

***AM8A0B30 AIRFLOW PERFORMANCE
CONSTANT CFM MODE / CONSTANT TORQUE MODE**

OUTDOOR MULTIPLIER (TONS)	COOLING AIRFLOW SETTING	Airflow Power	EXTERNAL STATIC PRESSURE (Constant CFM / Constant Torque)						HEATING AIRFLOW SETTING	Airflow Power	EXTERNAL STATIC PRESSURE													
			0.1		0.3		0.5				0.7		0.9		0.1		0.3		0.5		0.7		0.9	
			CFM	Watts	CFM	Watts	CFM	Watts			CFM	Watts	CFM	Watts	CFM	Watts	CFM	Watts	CFM	Watts	CFM	Watts	CFM	Watts
1.5 tons	290 CFM/ton	490/587 21/30	438/406 44/42	388/NA 69/NA	338/NA 97/NA	279/NA 130/NA	290 CFM/ton	485 21	437 44	393 69	0.7	350 97	301 130											
	350 CFM/ton	578/672 29/39	546/523 56/54	515/270 85/60	484/NA 115/NA	449/NA 146/NA	350 CFM/ton	574 29	545 56	517 85	0.7	489 115	458 146											
	400 CFM/ton	646/738 37/48	626/607 67/65	605/413 99/72	582/NA 132/NA	554/NA 164/NA	430 CFM/ton	683 42	669 75	653 108	0.7	636 143	614 177											
	450 CFM/ton	712/803 45/59	700/683 80/77	686/520 115/86	669/231 151/91	647/NA 186/NA	450 CFM/ton	709 45	698 80	685 115	0.7	669 151	649 186											
	290 CFM/ton	628/721 35/46	605/585 64/62	582/380 95/69	557/NA 127/NA	528/NA 159/NA	290 CFM/ton	625 35	604 64	582 95	0.7	560 127	533 160											
	350 CFM/ton	734/824 49/62	724/708 84/81	712/552 121/91	696/299 157/94	676/NA 193/NA	350 CFM/ton	731 49	722 84	710 120	0.7	696 157	678 193											
2 tons †	400 † CFM/ton	819/908 63/79	818/803 103/100	812/668 145/112	803/463 186/115	788/NA 226/NA	430 † CFM/ton	868 73	871 116	869 161	0.7	864 205	853 248											
	450 CFM/ton	904/993 80/99	910/896 126/122	911/775 173/136	907/621 219/141	895/394 264/138	450 CFM/ton	902 80	908 126	908 172	0.7	905 219	895 263											
	290 CFM/ton	755/870 52/71	748/760 89/91	737/617 126/102	723/409 164/105	704/NA 201/NA	290 CFM/ton	753 52	746 88	736 126	0.7	723 164	706 201											
	350 CFM/ton	883/996 75/100	887/899 120/123	886/778 165/137	881/625 211/142	869/401 254/139	350 CFM/ton	881 75	884 120	884 165	0.7	879 210	869 254											
	400 CFM/ton	991/1107 101/131	1004/1016 153/156	1010/908 206/173	1010/777 258/180	1001/609 307/177	400 CFM/ton	1057 119	1074 176	1084 234	0.7	1087 290	1078 342											
	450 CFM/ton	1106/1226 133/172	1126/1141 194/199	1139/1041 256/218	1141/925 314/227	1128/784 366/226	450 CFM/ton	1104 133	1125 194	1136 255	0.7	1139 314	1128 366											
2.5 tons	290 CFM/ton	879/992 74/99	882/894 119/121	881/773 164/136	875/619 209/140	863/391 252/138	290 CFM/ton	877 74	880 118	879 164	0.7	874 208	863 252											
	350 CFM/ton	1036/1153 113/146	1052/1065 168/172	1061/960 224/189	1063/836 279/197	1053/681 330/195	350 CFM/ton	1034 112	1049 168	1058 224	0.7	1061 279	1053 330											
	400 CFM/ton	1179/1304 158/203	1202/1221 224/231	1217/1126 291/251	1217/1016 352/261	1196/886 403/261	400 CFM/ton	1271 193	1298 267	1309 337	0.7	1300 398	1271 446											
	450 CFM/ton	1338/1471 222/282	1365/1391 300/311	1369/1302 370/333	1350/1201 427/345	1311/1086 471/347	450 CFM/ton	1338 221	1363 299	1368 369	0.7	1350 427	1314 472											

- NOTES:
- * Models start with "A" or "I"
 - † Factory Setting
 - Status LED will blink once per 100 CFM requested. In torque mode, actual airflow may be lower.
 - Torque mode will reduce airflow when static is above approximately 0.35" water column.
 - All heating modes default to Constant CFM.
 - Cooling airflow values are with wet coil, no filter

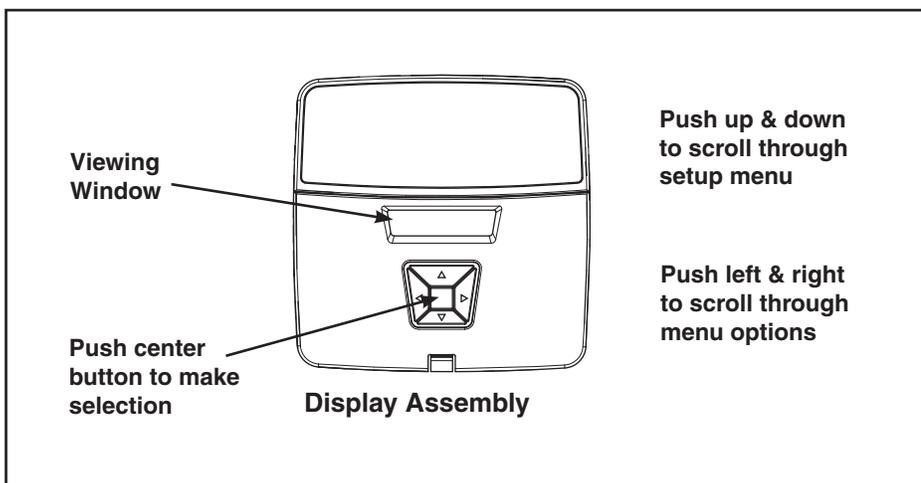
AM8A0B30 Minimum Heating Airflow Settings

MODEL NO.	MINIMUM HEATER AIRFLOW CFM - HEATER MATRIX					
	BAYEAC05BK1AA BAYEAC05LG1AA 723/808	BAYEAC08BK1AA BAYEAC08LG1AA 723/1020	BAYEAC10BK1AA BAYEAC10LG1AA 680/808	BAYEAC15BK1AA BAYEAC15LG1AA 765/1063	BAYEAC20BK1AA BAYEAC20LG1AA 850/1105	BAYEAC25BK1AA BAYEAC25LG1AA --
*AM8A0B30V21SAA	WITHOUT HEAT PUMP / WITH HP SEE AIR HANDLER NAMEPLATE					

NOTE: Minimum auxiliary heating airflow is automatically configured by the air handler model and the auxiliary heater model number. This is not field adjustable.

Mechanical Specifications

- **Air-Tite II™** cabinet
 - 2% or less air leakage
 - Precision applied - durable door seals
 - Specially designed air seal around refrigerant, condensate and conduit connections
 - Double wall foamed cabinet system
 - ≥ R-4.2 insulating value
 - No loose fiber design
 - Smooth cleanable interior design
 - Sweat eliminating design
 - Composite foamed cabinet doors
 - Water proof cabinet design
 - Integrated horizontal drain pans
 - Modular cabinet with 5/16" allen wrench "quick latch" design
- Multi-position up/down flow horizontal left/right
- 3 Wire communication
- Display Assembly with enhanced diagnostic information and setup capability
- Status Mode scrolling on Display Assembly
- Side return option (sold as accessory)
- Control board protection pocket built into cabinet wall
- Alert port to view control board codes without door removal
- Alert code notification
- Low voltage terminal connection point
- Quarter turn phillips head door fasteners
- **Vortica®** blower with polarized plug connections and integrated slide deck for easy removal
- Aluminum coil with integrated slide deck for easy removal and polarized plug connections on coil EEV
- Patented enhanced coil fin
- Electronic Expansion Valve (EEV) with low ambient and low superheat compressor protection
- Dual refrigerant compatible as shipped
- Slide in electric heaters with polarized plug connections (sold as accessory)
- Slide in hot water coils with polarized plug connections (sold as accessory)
- UVC light kit with safety switch and polarized plug connections (sold as accessory)
- Labeled panels and connections
- Molded in 1" standard filter rail
- Variable speed ECM motor
- Soft start fan motor operation
- **Comfort R™** mode
- Built in fan delay modes
- Maximum width of 23.5"
- Compact 20.8" depth with doors removed
- Two tone color
- Fused 24v power
- Safety door switch
- **1-year warranty**
- **10-year warranty registered**
- **Optional extended warranty available**



Trane

6200 Troup Highway
Tyler, TX 75707

The manufacturer has a policy of continuous product and product data improvement and it reserves the right to change design and specification without notice.



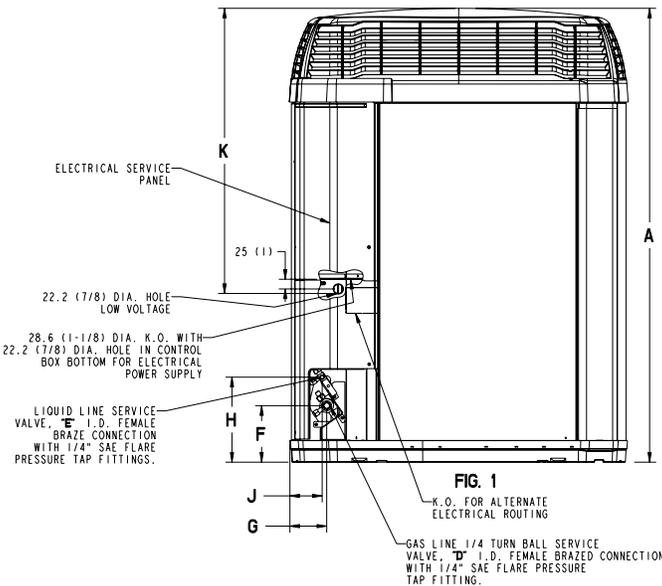
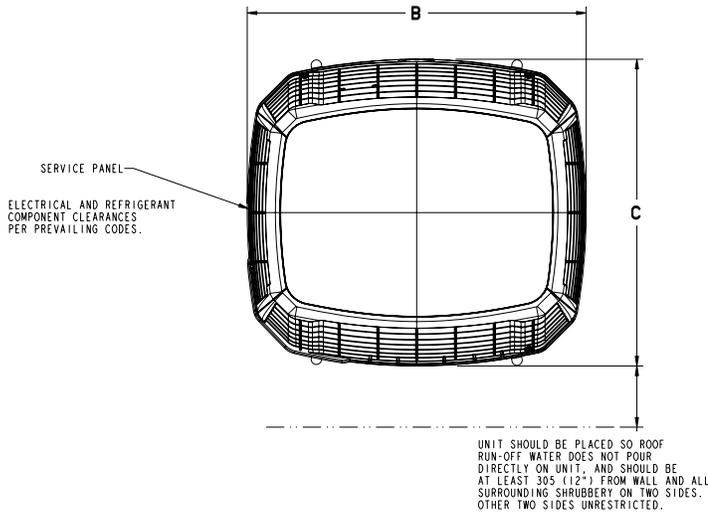
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SUBMITTAL

2 Ton Split System Heat Pump — 1 Ph with ComfortLink™ II and Charge Assist™

4TWZ0024A

NOTE: All dimensions are in mm/inches.



From Dwg. D152635 Rev. 15

MODELS	BASE	A	B	C	D	E	F	G	H	J	K
4TWZ0024A	4	1369 (53 7/8)	946 (37-1/4)	870 (34-1/4)	5/8	3/8	152 (6)	98 (3-7/8)	219 (8-5/8)	86 (3-3/8)	1035 (40 3/4)

Product Specifications

OUTDOOR UNIT ①②	4TWZ0024A1000A
POWER CONNS. — V/PH/HZ ③	200/230/1/60
MIN. BRCH. CIR. AMPACITY	14
BR. CIR. PROT. RTG. — MAX. (AMPS)	20
COMPRESSOR	CLIMATUFF [®]
NO. USED - NO. STAGES	2 - 2
VOLTS/PH/HZ	200/230/1/60
R.L. AMPS ⑦ - L.R. AMPS	8.7 - 58
FACTORY INSTALLED	
START COMPONENTS ⑧	YES
INSULATION/SOUND BLANKET	YES
COMPRESSOR HEAT	YES
OUTDOOR FAN	PROPELLER
DIA. (IN.) - NO. USED	27.6 - 1
TYPE DRIVE - NO. SPEEDS	DIRECT - 2
CFM @ 0.0 IN. W.G. ④	3390/2270
NO. MOTORS - HP	1 - 1/3
MOTOR SPEED R.P.M.	759/493
VOLTS/PH/HZ	200/230/1/60
F.L. AMPS	2.80
OUTDOOR COIL — TYPE	SPINE FIN™
ROWS - F.P.I.	1 - 24
FACE AREA (SQ. FT.)	30.79
TUBE SIZE (IN.)	3/8
REFRIGERANT CONTROL	EEV
REFRIGERANT	R-410A
LBS. — R-410 (O.D. UNIT) ⑤	10 LBS.- 1 OZ.
FACTORY SUPPLIED	YES
LINE SIZE - IN. O.D. GAS ⑥	5/8
LINE SIZE - IN. O.D. LIQ. ⑥	3/8
CHARGING SPECIFICATION	See Charging Chart (Service Facts)
SUBCOOLING	
DIMENSIONS	H X W X D
CRATED (IN.)	57.4 X 35.1 X 38.7
WEIGHT	
SHIPPING (LBS.)	390
NET (LBS.)	340

- ① Certified in accordance with the Air-Source Unitary Air-conditioner Equipment certification program, which is based on ARI standard 210/240. In order to achieve ARI standard rating, the indoor fan time delay on the comfort control must be enabled.
- ② Rated in accordance with ARI standard 270.
- ③ Calculated in accordance with Natl. Elec. Codes. Use only HACR circuit breakers or fuses.
- ④ Standard Air — Dry Coil — Outdoor
- ⑤ This value approximate. For more precise value see unit nameplate.
- ⑥ Max. linear length 80 ft.; Max. lift - Suction 25 ft.; Max. lift - Liquid 25 ft. For greater length consult refrigerant piping software Pub. No. 32-3312-0* (* denotes latest revision).
- ⑦ This value shown for compressor RLA on the unit nameplate and on this specification sheet is used to compute minimum branch circuit ampacity and max. fuse size. The value shown is the branch circuit selection current.
- ⑧ No means no start components. Yes means quick start kit components. PTC means positive temperature coefficient starter.

A-weighted Sound Power Level [dB(A)]

MODEL	SOUND POWER LEVEL [dB(A)]		A-WEIGHTED FULL OCTAVE SOUND POWER LEVEL dB - [dB(A)] High Stage							
	Low Stage Overall	High Stage Overall	63	125	250	500	1000	2000	4000	8000
4TWZ0024A1	62	70	51.4	52.3	60.1	61.8	63.7	64.9	56.6	50

Note: Rated in accordance with AHRI Standard 270-2008

Mechanical Specification Options

General

The 4TWZ0 is fully charged from the factory for matched indoor section and up to 15 feet of piping. This unit is designed to operate at outdoor ambient temperatures as high as 115°F. Cooling capacities are matched with a wide selection of air handlers and furnace coils that are A.R.I. certified. The unit is certified to UL 1995. Exterior is designed for outdoor application.

ComfortLink™ II

This outdoor unit contains the ComfortLink™ II digital communication with 2 wire connection to outdoor and Plug-n-Play set up.

Charge Assist™

The Charge Assist™ indicates system Charge Status.

Casing

Unit casing is constructed of heavy gauge, G60 galvanized steel and painted with a weather-resistant powder paint on all louvers, panels, prepaint on all other panels. Corrosion and weather-proof CMBP-G30 DuraTuff™ base.

Refrigerant Controls

Refrigeration system controls include condenser fan, compressor contactor and high and low pressure switches. High and low pressure controls are inherent to the compressor. A factory installed liquid line drier is standard.

Compressor

Two Climatuff® compressors deliver 50% or 100% capacity modulation and feature internal over temperature and pressure protection and total dipped hermetic motor. Other features include: roto lock suction and discharge refrigerant connections, centrifugal oil pump and low vibration and noise.

Condenser Coil

The outdoor coil provides low airflow resistance and efficient heat transfer. The coil is protected on all four sides by louvered panels.

Low Ambient Cooling

As manufactured, this unit has a cooling capability to 55°F. For low ambient cooling below 55° see Application Guide SSC-APG005-EN.

Comfort Control

ComfortLink™ II Control with Plug-n-Play set up and 3 wire connection.



ARI Standard
210/240 UHP



INSTALLER'S & OWNER'S MANUAL

HVAC INSTALLER: PLEASE LEAVE MANUAL FOR HOMEOWNER

Ultra·Aire™ 70H



- **Energy Star efficient**
- **High capacity effective dehumidification:
up to 70 pints of water a day**
- **MERV-11 filtration standard; MERV-14 optional**
- **Compact design**
- **5 year warranty**

P/N 4029870 • Serial No. _____ Install Date: _____

Sold by:



Driven by performance. Powered by design.™ | 4201 Lien Rd Madison, WI 53704 • TOLL-FREE 1-800-533-7533 • www.thermastor.com • sales@thermastor.com
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SAFETY PRECAUTIONS

Read the installation, operation and maintenance instructions carefully before installing and operating this device. Proper adherence to these instructions is essential to obtain maximum benefit from your Ultra-Aire 70H indoor air quality system.

READ AND SAVE THESE INSTRUCTIONS

- The device is designed to be installed **INDOORS IN A SPACE THAT IS PROTECTED FROM RAIN AND FLOODING.**
- Install the unit with space to access the front panel for maintenance and service. **DO NOT INSTALL UNIT WITH THE SERVICE PANEL INACCESSIBLE.**
- Avoid directing the discharge air at people, or over the water in pool areas.
- If used near a water source; be certain there is no chance the unit could fall into the water or get wet. The unit should also be plugged into a GFCI (Ground Fault Circuit Interrupt outlet).
- **DO NOT** use the device as a bench or table.
- **DO NOT** place the device directly on structural members.
- A drain pan **MUST** be placed under the unit if installed above a living area or above an area where water leakage could cause damage (see local regularity code for more information).

Read and Save These Instructions

 **WARNING!** — This symbol indicates important instructions. Failure to heed them can result in serious injury or death.

 **CAUTION!** — This symbol indicates important instructions. Failure to heed them can result in injury or material property damage.

1. Intended Application for Ultra-Aire 70H

For the ideal installation, draw air from the central part of the home and return it to isolated areas of the home like the bedrooms, den, utility room, or family room. The ductwork of the existing heating system can be used to supply air to the home.

2. Registrations

The Ultra-Aire 70H conforms to UL STD 474 and CSA Standard C22.2 No.92.

3. Specifications

Part Number:	4029870
Blower:	160 CFM @ 0.0" WG
Power:	600 Watts @ 80°F and 60% RH
Supply Voltage:	110-120 VAC – 1phase – 60 Hz
Current Draw:	5.3 Amps
Energy Factor:	2.32 L/kWh
Operating Temp.:	Between 45°F and 95°F Max (inlet air temp)
Sized for:	Up to 1800 Sq. Ft. - Typical
Minimum Performance at 80°F and 60% RH	
Water Removal:	70 pints/day
Efficiency:	4.9 Pints/kWh
Air Filter:	MERV-11
Efficiency:	Standard 65% Efficient ASHRAE Dust Spot Test
Size:	9" x 11" x 1"
Power Cord:	9', 110-120 VAC, Ground
Drain Connection:	3/4" Threaded NPT

Dimensions	Unit	Shipping
Width:	12"	27"
Height:	12"	17"
Depth:	28"	17"
Weight:	55 lbs	59 lbs

4. Installation

4.1 Installation Checklist

CAUTION

Prior to installation of the Ultra-Aire 70H, the following checklist should be reviewed. The Ultra-Aire 70H can be installed in a variety of locations to meet the owner's needs, and be integrated with existing forced air systems or existing ductwork if desired. The location choice is contingent on a variety of requirements not limited to: ease of service, controls access, drainage, filtration, power, fresh-air ventilation (optional), water damage prevention, and current regulatory codes (ASHRAE, fire, etc). Please address all of these issues before you select the location of the device.

■ 4.1A Power Accessibility

Unit should be located in an area where the cord's length (9') should easily reach a 110-120 VAC electrical outlet with a minimum of a 15 A circuit capacity.

FOR HVAC INSTALLER ONLY

■ 4.1B Space

Location should have enough clearance to handle the unit's overall dimensions as well as the necessary return/supply ductwork to the unit. Allow a minimum 12" clearance to the side of the unit to allow for filter removal and replacement. Refer to section 6.1.

■ 4.1C Low Voltage Wiring

Unit location should be in an area where field wiring the remote controls (low voltage) to the unit will be possible.

■ 4.1D Back-Draft Damper (P/N 4023647 or 4023646)

It is recommended that a back draft damper be used in the discharge duct of the Ultra-Aire 70H, especially when connecting to the supply ducting system. The backdraft damper prevents supply air from counter flowing through the Ultra-Aire 70H when it is not operating. The unit location should be chosen to allow installation of this accessory.

■ 4.1E Support Structure and Suspension

Place the Ultra-Aire 70H on supports to raise the base of the unit. Do not place the Ultra-Aire 70H directly on structural building members without vibration absorbers or unwanted noise may result.

The Ultra-Aire 70H may be suspended with a hang kit (4029908) or a suitable alternative from structural members, as long as the suspending assembly supports the Ultra-Aire 70H's base in its entirety. Do not hang the Ultra-Aire 70H from the cabinet. Remember to place a drain pan under the



Hang Kit (4029908) shown suspending a UA70H. Available from your dealer or Therma-Stor. Call 1-800-533-7533.

unit if it is suspended above a finished area or above an area where water leakage could cause damage.

4.2 Electrical Requirements

⚠ WARNING!

WARNING: DO NOT ALLOW THE YELLOW LEAD FROM THE ULTRA-AIRE TO CONTACT THE RED LEAD FROM THE ULTRA-AIRE OR DAMAGE TO THE TRANSFORMER WILL RESULT.

The Ultra-Aire 70H plugs into a common grounded 115VAC outlet. The device draws 5.3 Amps under normal operating conditions. If used in an area which may become wet, a ground fault interrupter (GFI) protected circuit is recommended. Please, consult local electrical codes for any further information.

Therma-Stor LLC offers a family of control devices for use with the Ultra-Aire 70H. The controls are to be located remotely from the unit and located in the space to be conditioned. The controls are low voltage (24 volt) and should be connected to the Ultra-Aire 70H with low voltage wire (thermostat or other appropriate).

⚠ CAUTION

Do not install the control panel where it may not accurately sense the relative humidity such as near HVAC supply registers, near exterior doors, on an outside wall, near a window, or near a water source.

The installer must supply the wiring between the Ultra-Aire 70H and the control panel. Be sure to safely route the control wiring to prevent damage during installation.

⚠ CAUTION

Do not cross wires when connecting the Ultra-Aire 70H and the remote control panel or damage to the transformer may result. The remote controls of the Ultra-Aire 70H are powered by a low voltage circuit (24VAC) and must NEVER contact or be connected to a high voltage circuit.

The control wires leaving the Ultra-Aire 70H and the remote control panels are numbered and color-coded to prevent confusion. Some of the control wires leaving the Ultra-Aire 70H may not be used with certain control panels and should be left unconnected with wire nuts taped onto the stripped ends for safety. Be sure to consult the electrical schematic in this manual or inside the access panel of the Ultra-Aire 70H before making control connections.

4.3 Condensate (Water) Removal

CAUTION

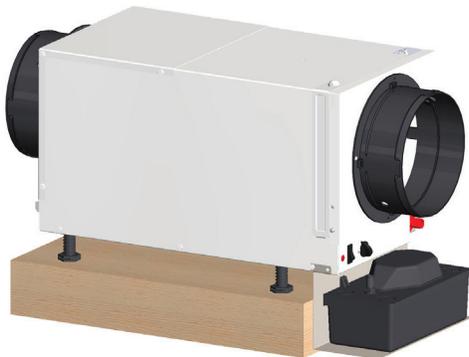
A trap in the drain line is preferred, but not required for the unit to drain properly. Local codes may require a trap. Use care to keep the pipe assembly as flat to the floor as possible. Kinks and/or humps will prevent proper drainage. The Ultra-Aire 70H generates condensate. Install a 3/4" male nominal pipe thread adapter to the drain pan. It is necessary to assemble your own drain pipe assembly utilizing 3/4" PVC pipe to get the condensate to a floor or other drain. Pipe is commonly available in 10' lengths from building supply, plumbing or hardware stores. Grade of pitch should be 1" per 10'.

4.3A Lifting Condensate

A condensate pump may be installed if lift is required to dispose of the condensate.

4.3B Condensate Pump Kit (4030113)

A condensate pump kit is available from the factory for use with the Ultra-Aire 70H and provides 15' of lift. Condensate is automatically pumped to a remote location when the water level in the pump's reservoir rises to close the float switch. The pump also contains a safety float switch. The white leads from this switch extend from beneath the pump cover. This switch should be installed in series with the field wire that connects the blue (#5) lead from the Ultra-Aire 70H to the control panel. If the pump fails, this switch opens the compressor control circuit and stops water production before the reservoir overflows. The Ultra-Aire 70H will continue to ventilate or circulate air as normal, but will not dehumidify until this switch closes.



Condensate Pump Kit (4030113) shown installed. Available from your dealer or Therma-Stor. Call 1-800-533-7533.

4.4 Ducting

For the ideal installation, draw air from the central part of the home and return it to the isolated areas of the home like the bedrooms, den, utility room, or family room. The ductwork of the existing heating system can be used to supply air to the home. If the existing supply goes to isolated areas of the home, discharge the supply of the Ultra-Aire 70H into the supply of the existing heating system. Installation of a separate supply duct to the Ultra-Aire 70H from a central area is recommended.

4.4A Supply Air

CAUTION

DO NOT draw air directly from the kitchen, laundry, or isolated basement.

You may draw air from a basement that is open to the home. All flexible ducting connected to the Ultra-Aire 70H should be UL listed.

A short piece of flexible ducting on all Ultra-Aire 70H duct connections is recommended to reduce noise and vibration transmitted to rigid ductwork in the structure. Ducting the Ultra-Aire 70H as mentioned requires consideration of the following points:

Duct Sizing: For total duct lengths up to 25', use a minimum 8" diameter round or equivalent rectangular. For longer lengths, use a minimum 10" diameter or equivalent. Grills or diffusers on the duct ends must not excessively restrict airflow.

Connecting to existing HVAC systems: An optional 8" check backdraft damper is available from the factory to prevent reverse air flow through the Ultra-Aire 70H. If the Ultra-Aire 70H is ducted to the supply of an air handler, the check damper should be placed in the Ultra-Aire 70H supply duct.

CAUTION

Contact the factory when connecting to a static pressure of greater than or equal to +.5" WG.

4.4B Ducting for Fresh Air — Option

Fresh air may be brought into the structure by connecting an insulated duct from outside the structure to a tee located in the inlet duct of the Ultra-Aire 70H. Advantages of this form of ventilation include:

1. Outside air is filtered before entering the building.
2. Outside air will be dehumidified before entering if the

FOR HVAC INSTALLER ONLY

Ultra-Aire 70H is running in dehumidification mode.

3. Drawing air from outside and blowing inside aids in slightly pressurizing the structure. This helps prevent dirty and humid air from entering elsewhere. It also reduces the potential for carcinogenic radon gas to enter and provides a small amount of make-up air for open combustion and exhaust devices like the clothes drier, fireplace, and water heater.
4. Exhaust fans are recommended in the bath rooms and kitchen.

In cold climates or areas where the outdoor dew point is low at times, ventilation can be used to dehumidify the structure, making the Ultra-Aire 70H capable of year-round drying. This is accomplished by bringing the dry, low dew point air into the structure during these times. This approach is often more economical than running the dehumidifier to remove excess moisture from the structure. In cold climates, adequately ventilating is critical to reduce the inside moisture content and avoid moisture accumulating in the wall cavities. TIP: if your house experiences condensation on the interior surface of the windows during the winter, increasing the amount of ventilation will often solve the problem.

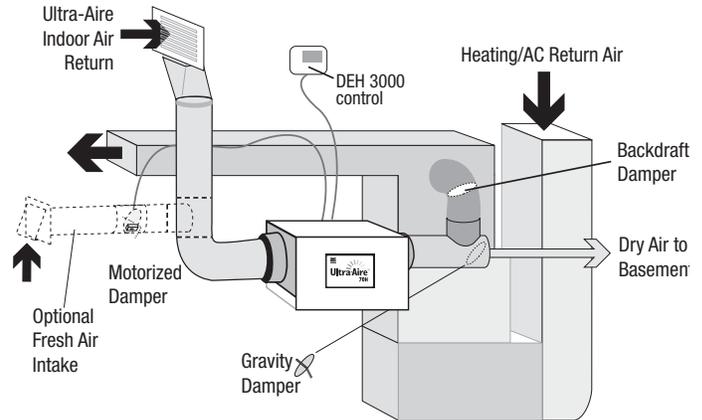
An insulated 6" diameter duct is generally sufficient to provide up to 55 CFM of outside air. Large quantities of outside air will impact Ultra-Aire 70H performance positively or negatively, depending upon the inside and outside air conditions. The outside air duct should be connected to the front of the unit. With a standard tee, the amount of outside air can be restricted with a blade damper.

4.4C Installation in a Basement or Crawlspace with an Existing Forced Air HVAC System.

Basement Installation: Install a separate 8" return for the Ultra-Aire 70H in a central area of the structure. Optional: Duct the supply of the Ultra-Aire to a 8" x 8" x 8" tee/damper, adjusted to 20% open to the basement. Duct the other side of the tee to the air supply of the existing HVAC system with a backdraft damper.

Crawlspace Installation: Install a separate return for the Ultra-Aire 70H in a central area of the structure. Optional: Duct the supply of the Ultra-Aire 70H to a 8" x 8" x 8" tee/damper that is 20% open to the crawlspace if desired. Duct the other side of the tee to the air supply of the existing HVAC system with a backdraft damper.

Instead of installing a separate return to the Ultra-Aire 70H, and if the existing system has multiple returns, it is possible to select one to disconnect from the existing forced air system and use it for the dedicated Ultra-Aire return. Always select a return from a central location in the structure in an area that is always open to the rest of the structure. Do not



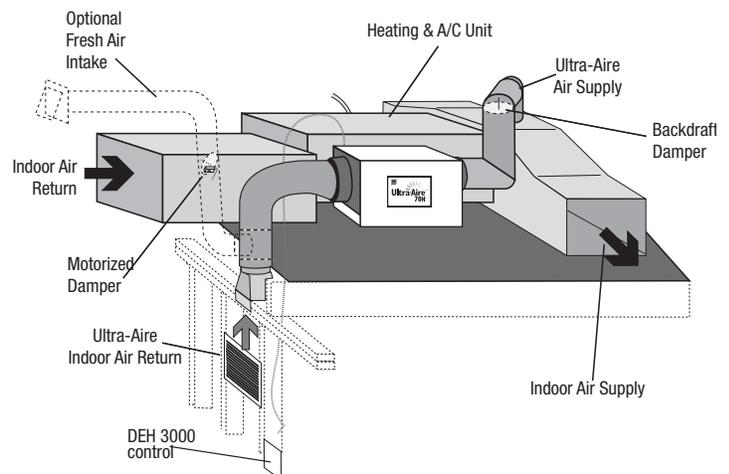
use a return from a room that may have its door closed much of the time or, alternatively, install a separate return from the open part of the house.

4.4D Installation in an Attic with an Existing Forced Air HVAC System

CAUTION

ALWAYS place a drain pan under the unit if it is suspended above a finished area or above an area where water leakage could cause damage.

When installing the UA70H above a finished area or where water leakage could cause damage, use a secondary drain pan with an overflow interrupter switch. The interrupt switch should be installed in series with the field wire that connects the blue (#5) lead from the Ultra-Aire 70H to the blue (#5) lead on the control panel. If overflow occurs, this switch opens the compressor control circuit and stops water production before the drain pan overflows. The Ultra-Aire 70H will continue to ventilate or circulate air as normal, but will not dehumidify until this switch closes.



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The preferred method of installation is to create a separate return for the Ultra-Aire 70H in a central area of the structure. Duct the supply of the Ultra-Aire 70H to the air supply of the existing HVAC system.

4.4E Installation in a Structure with No Existing Forced Air HVAC System

When installing the Ultra-Aire 70H in a structure that does not have a forced air HVAC system, a single return for the Ultra-Aire 70H should be installed in central open area of the structure. DO NOT locate the return in a bathroom or a kitchen. The supplies of the Ultra-Aire 70H should be located in the remote areas of the structure (such as bedrooms, den, etc.). By ducting this way, the air inside the structure will circulate through the Ultra-Aire 70H to be filtered and dehumidified. A 6" diameter duct is recommended for branches to the bedrooms. A 8" diameter duct is recommended for branches to larger areas.

4.4F Ducting for High Efficiency Filtration

The Ultra-Aire 70H is equipped with a high efficiency MERV 11 media filter (P/N 4027158). For optimal performance it is recommended that the filter be replaced every 3-6 months.

Additional filtering options, including charcoal filtration and MERV 14 filtration, are available with the addition of an optional external filter housing that may be installed with the UA70H. The external filter housing is ducted to the inlet of the UA70H and intake ducting from the structure is ducted to the intake side of the filter housing. The external filter housing can accommodate a variety of filter combinations up to a total of 6" in thickness. Contact the factory or visit www.ultra-aire.com additional details.

4.4G Converting to Vertical Discharge Airflow

The UA70H is shipped from the factory with the exhaust panel of the cabinet configured for horizontal air discharge. The cabinet can be easily converted to vertical air discharge. To convert the air discharge from horizontal to vertical, follow these steps:

1. Using a 5/16" nut driver or a straight screwdriver, remove three (3) sheet metal screws that attach the exhaust panel from each side of the UA70H. There will be a total of six (6) screws. Do not remove the exhaust collar.



2. Remove the exhaust panel.



3. Rotate the exhaust panel so that the exhaust collar is located on the top of the unit. Align screw holes and snap the panel onto the base.



4. Secure the exhaust panel to the base by replacing the six (6) screws.



4.5 Noise Abatement

A length of 10 feet or more of flex ducting on the outlet of the Ultra-Aire 70H will reduce air noise from the fan. A length of flexible ducting on all Ultra-Aire 70H duct connections is recommended to reduce noise transmitted to rigid ductwork in the structure.

CAUTION

Replacing the filter requires the return duct to be removed. Failure to use flex duct will prevent filter access. Three feet of flex duct should be adequate to access the filter.

4.6 Controls

The UA70H features a built-in dehumidistat control as well as the ability to wire a remote mounted control to the unit. The control used to operate the unit should be located in an area where the control can accurately sense the humidity of the area where humidity control is desired.

If the UA70H is located in the area where humidity control is desired, consider using the built-in control. Adjust the humidity control so that the unit maintains the desired level of humidity.

If the UA70H is located outside of the area where humidity control is desired, consider using a remote wired humidity controller that is located in the area where humidity control is desired.

When using a remote wired dehumidistat, be sure the built-in dehumidistat is set to the off position by turning it counterclockwise until it stops. Failure to do so may cause the unit to sense the humidity from the wrong area.

WARNING: DO NOT allow the yellow lead from the unit to contact the red lead or the white lead from the unit or damage to the transformers will result.



(P/N 4028539; with remote: P/N 4028407)

The UA dehumidifier is controlled using five color-coded wires.

Green (or brown) = Fan control

Blue = Dehumidification (fan and compressor) control

Red = 24volt AC power transformer neutral side (common with white)

White = 24volt AC power transformer neutral side (common with red)

Yellow = transformer high side

Between the red/white lead and the yellow leads is a 40VA transformer. This low voltage power source powers the relay coils which control the fan and compressors. This 24VAC transformer can also be used to power HVAC accessories external to the dehumidifier.

- To turn the dehumidifier on make contact between yellow and blue wires.
- To turn the fan on make contact between yellow and green(or brown) wires.
- To power an HVAC accessory, connect the accessory to the white (or red) wire and the yellow wire.

ATTENTION INSTALLER

WARNING: Allowing yellow wire to contact red or white wire will destroy the transformer.

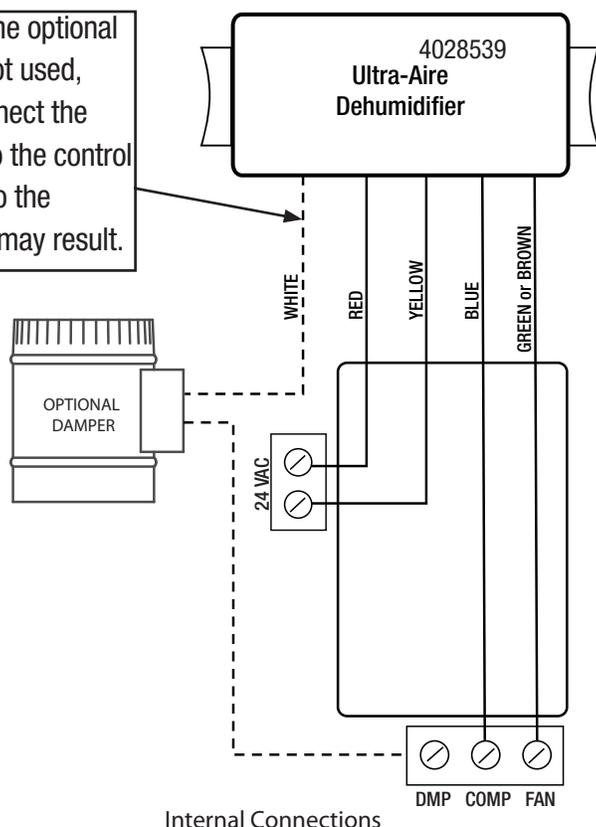
Dehumidifier on : Connect yellow and blue wires.

Fan only on : Connect yellow and green (or brown) wires.

Accessory power : 24volt AC power supply available for HVAC accessories between yellow and white(and/or red) wire. Red and white wires are common with each other.

Ultra-Aire DEH 3000 dehumidification & ventilation control

Warning: if the optional damper is not used, DO NOT connect the white wire to the control or damage to the transformer may result.



Control Part No. 4028539

Refer to DEH3000 manual for additional wiring diagrams. DEH300R (with remote wired sensor) is also available as a separate unit. Refer to the DEH300R manual for wiring details.

FOR HVAC INSTALLER AND HOMEOWNER

6. Maintenance

6.1 High Efficiency Air Filter

The Ultra-Aire 70H is equipped with a MERV 11 media filter. This filter should be checked every three months. Operating the unit with a dirty filter will reduce dehumidifier capacity and efficiency and may cause the compressor to cycle off and on unnecessarily on the defrost control.

DO NOT operate the unit without a filter or with a less effective filter. Operating the unit without a filter or with a less effective filter may cause internal damage to the unit and invalidate the product warranty.

To replace the filter, remove the filter door from one of the sides of the UA70 by pushing the snap button in and gently pulling to door away from the body of the unit, then pulling up to disengage the door flange from the slot, removing the door.



Remove the filter by gently pulling straight out of the unit. Insert new filter in the same manner, pushing it gently straight into the unit.



Replace filter door by inserting the bottom tab into the slot, aligning the door and pushing it gently against the unit until the snap button secures the door.

6.2 Optional Fresh Air Intake

Check and clean the screen on the outdoor fresh air intake port seasonally. The screen may become plugged during the seasons when there are many particles in the outdoor air.

Notes:

FOR HVAC INSTALLER ONLY

9. Service Parts List: Ultra-Aire 70H Indoor Air Quality System

Part No.	Description
4029567	Compressor
4029568	Compressor Overload
1970010	Compressor Relay
4027165	Run Capacitor
4029595	Coil Set
4029587	Impeller Fan
4020924	Fan Relay
4029594	Fan Capacitor
4029736	Defrost Thermostat
4028096	Defrost Timer
4029737	Indicator Light
4029735	Overflow Switch
4022487	Transformer

FOR HOMEOWNER - ROUTINE MAINTENANCE

Part No.	Description
4027158	Air Filter MERV 11
4027422	4 Pack
4027427	12 Pack

The Ultra-Aire 70H is equipped with a MERV 11 media filter. This filter should be checked every three months. Operating the unit with a dirty filter will reduce dehumidifier capacity and efficiency and may cause the compressor to cycle off and on unnecessarily on the defrost control. Refer to section 6.1 for filter replacement instructions.

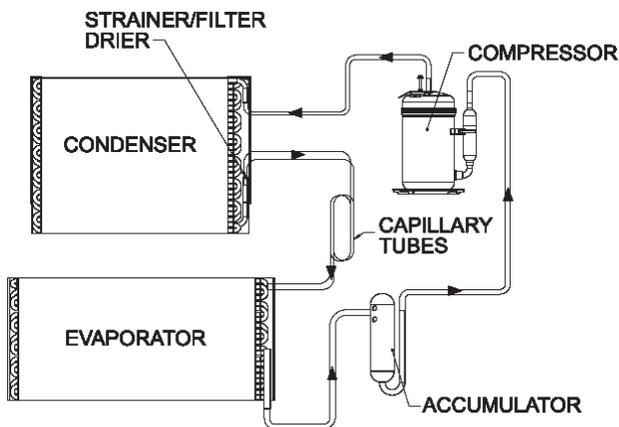
10. Service

CAUTION

CAUTION: Servicing the Ultra-Aire 70H with its high pressure refrigerant system and high voltage circuitry presents a health hazard which could result in death, serious bodily injury, and/or property damage. Please contact your HVAC professional.

10.1 Technical Description

The Ultra-Aire 70H uses a refrigeration system similar to an air conditioner's to remove heat and moisture from incoming air, and add heat to the air that is discharged. Hot, high-pressure refrigerant gas is routed from the compressor to the condenser coil (See Figure 1). The refrigerant is cooled and condensed by giving up its heat to the air that is about to be discharged from the unit. The refrigerant liquid then passes through a strainer and capillary tubing which causes the refrigerant pressure and temperature to drop. It next enters the evaporator coil where it absorbs heat from the incoming air and evaporates. The evaporator operates in a flooded condition, which means that all the evaporator tubes contain liquid refrigerant during normal operation. A flooded evaporator should maintain nearly constant pressure and



Refrigeration System of Ultra-Aire 70H

temperature across the entire coil, from inlet to outlet.

The mixture of gas and liquid refrigerant enter the accumulator after leaving the evaporator coil. The accumulator prevents any liquid refrigerant from reaching the compressor. The compressor evacuates the cool refrigerant gas from the accumulator and compresses it to a high pressure and temperature

10.2 Troubleshooting

Unit doesn't respond to humidity setpoint on remote wired dehumidistat.

1. Verify built-in dehumidistat is turned to the "off" position.
2. Check calibration of the control to determine if it is reading humidity level properly.
3. Verify control wiring is intact by connecting control directly to the pigtail of the unit.

Neither fan nor compressor running. Dehumidification is being called for. No fan call.

1. Unit unplugged or no power to outlet.
2. Humidity control set too high.
3. Loose connection in internal or control wiring.
4. Defective Compressor relay.
5. Defective control transformer.

Compressor is not running. Dehumidification is being called for. No fan call.

1. Defective compressor run capacitor (Sec. 7.6).
2. Loose connection in compressor circuit.
3. Defective compressor overload (Sec. 7.6A).
4. Defective compressor (Sec. 7.6).
5. Defrost thermostat open.

Compressor cycles on and off. Dehumidification is being called for. No fan call

1. Low ambient temperature and/or humidity causing unit to cycle through defrost mode.
2. Defective compressor overload (Sec. 7.6A).
3. Defective compressor (Sec. 7.6).
4. Defrost thermostat defective (Sec. 7.8).
5. Dirty air filter(s) or air flow restricted.

Fan is not running. Dehumidification or fan is being called for

1. Loose connection in fan circuit.
2. Obstruction prevents fan impeller rotation.
3. Defective fan.
4. Defective fan relay.

Low dehumidification capacity (evaporator is frosted continuously). Dehumidification is being called for

1. Defrost thermostat loose or defective (Sec. 7.8).
2. Low refrigerant charge
3. Dirty air filter(s) or air flow restricted.
4. Excessively restrictive ducting connected to unit.

No ventilation. Ventilation is being called for.

1. Loose connection in ventilation control circuit
2. Loose connection in damper power circuit.
3. Defective fresh air damper.

Unit removes some water, but not as much as expected.

1. Air temperature and/or humidity have dropped.
2. Humidity meter and or thermometer used are out of calibration.
3. Unit has entered defrost cycle.
4. Air filter dirty.
5. Defective defrost thermostat.
6. Low refrigerant charge.
7. Air leak such as loose cover or ducting leaks.
8. Defective compressor.
9. Restrictive ducting.
10. Optional Condensate Pump Safety Switch open.

Unit Test to determine problem:

1. Detach field control wiring connections from main unit.
2. Connect the yellow and green pigtails from the main unit together; only the fan should run. Disconnect the wires.
3. Connect the yellow and blue pigtails from the main unit together or turn the built-in dehumidistat all the way clockwise to the "on" position; the compressor and fan should run.
4. If these tests work, the main unit is working properly. You should check the control panel and field control wiring for problems next.
5. Remove the control panel from the mounting box and detach it from the field installed control wiring. Connect the blue, yellow, and green wires from the control panel directly to the corresponding colored pigtails on the main unit. Leave the green, white and red wires disconnected!
6. Engage the fan switch on the control; the fan should run. Turn off the fan switch.
7. Engage the dehumidistat of the control; the compressor and fan should run.
8. If these tests work, the problem is most likely in the field control wiring.

10.3 Refrigerant Charging

If the refrigerant charge is lost due to service or a leak, a new charge must be accurately weighed in. If any of the old charge is left in the system, it must be recovered before weighing in the new charge. Refer to the unit nameplate for the correct charge weight and refrigerant type.

10.4 Compressor/Capacitor Replacement

This compressor is equipped with a two terminal external overload and a run capacitor, but no start capacitor or relay.

CAUTION

CAUTION-ELECTRICAL SHOCK HAZARD: Electrical power must be present to perform some tests. These tests should be performed by a qualified service person.

10.5 Electric Ventilation Damper

The damper will open when the ventilation is called for, allowing fresh air into the structure through the fresh air inlet duct. The electric ventilation damper will remain closed when the ventilation is not activated in order to prevent over-ventilating the structure when the unit is dehumidifying or recirculating the indoor air. The electric ventilation damper operates on 24 Vac from the control circuit. DO NOT connect high voltage to the damper motor or damage to the motor will result. DO NOT force the blade of the damper by hand or damage to the damper motor may result.

The damper opens in one direction only. The damper rotates very slowly, allow sufficient time for the damper to cycle. The damper will take approximately one minute to cycle from closed to open or from open to closed.

If the electric ventilation damper fails to operate:

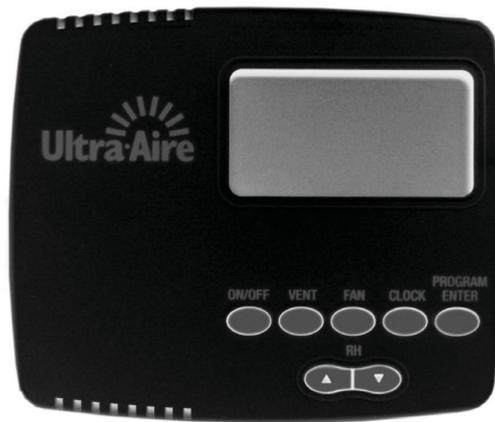
1. Check that the wiring is correct and that voltage is present at the damper motor.
2. Check for any obstruction inside the damper. If the electric ventilation damper fails to operate after performing these checks, it must be replaced.



Ultra-Aire™

DEH 3000/DEH 3000R

Part No. 4028539 Part No. 4028407



11. Optional Dehumidifier & Ventilation System Controller

When used with Ultra-Aire Whole House Ventilating Dehumidifiers, the DEH 3000/3000R allows homeowners the ability to monitor and control relative humidity levels in their home.

DEH3000 P/N:	4028539
DEH3000R (remote) P/N:	4028407
Model:	DEH 3000 DEH 3000R (remote)
Operating Voltage:	24 VAC
Max Current DMP, COMP, FAN:	1 AMP each
Humidity Sensing Range/Accuracy:	10 - 95% RH, ± 5%
Humidity Setpoint Range:	35 - 70%
Auxillary Relay Capacity:	5 Amps, 24VAC
Temp Range/Accuracy:	30°-90°F, 2%
Size:	4.95"L x 1.06"W x 4.19"H

Major Operations

- Digital control of Relative Humidity (Digital Set-Point)
- Fan/Filter Operation
- Programmable Ventilation Timer
- Large, easy-to-read backlit LCD display
- Easy interaction with air handler fan (Interlock/Lockout)
- High Temperature Cut-Out
- Dryout Cycle Timer
- Auto Reboot
- Remote Sensor (DEH 3000R Only)

**To order call Therma-Stor at
1-800-533-7533**



Ultra-Aire™ Limited Warranty 70H

Limited Warranty. Therma-Stor, LLC (“Therma-Stor”) warrants as follows: (i) the Ultra-Aire 70H dehumidifier (“Product”) will be free of material defects in workmanship or materials for a period of one (1) year (“One-Year Warranty”) following the date of initial purchase of such Product by an original customer purchasing from Therma-Stor or an authorized reseller (“Customer”); and (ii) the Product’s condenser, evaporator, and compressor will be free of material defects in workmanship or materials for a period of five (5) years following the date of initial purchase of such Product by a Customer.

Limitation of Remedies. CUSTOMER’S SOLE AND EXCLUSIVE REMEDY UNDER THE ABOVE LIMITED WARRANTY AND THERMA-STOR’S ENTIRE LIABILITY THEREUNDER, SHALL BE, AT THE SOLE OPTION OF THERMA-STOR, REPLACEMENT OR REPAIR OF SUCH PRODUCT OR ITS COMPONENTS (“COMPONENTS”) BY THERMA-STOR OR THERMA-STOR’S AGENTS ONLY. REFRIGERANT, PIPING, SUPPLIES, TRANSPORTATION COSTS, LABOR COSTS INCURRED IN REPAIR OR REPLACEMENT OF SUCH COMPONENTS ARE NOT INCLUDED. THIS DISCLAIMER AND EXCLUSION SHALL APPLY EVEN IF THE EXPRESS WARRANTY AND LIMITED REMEDY SET FORTH HEREIN FAILS OF ITS ESSENTIAL PURPOSE. CUSTOMER ACKNOWLEDGES THAT NO REPRESENTATIVE OF THERMA-STOR OR OF ITS AFFILIATES OR RESELLERS IS AUTHORIZED TO MAKE ANY REPRESENTATION OR WARRANTY ON BEHALF OF THERMA-STOR OR ANY OF ITS AFFILIATES OR RESELLERS THAT IS NOT IN THIS AGREEMENT. Notwithstanding the above, during the term of the One-Year Warranty only, Therma-Stor will provide, free of charge to Customer, all Components and labor (except costs related to removal and installation of Product) required to fulfill its obligations under such One-Year Warranty.

Disclaimer of Warranties. EXCEPT FOR ABOVE LIMITED WARRANTY, WHICH IS THE SOLE AND EXCLUSIVE WARRANTY PROVIDED WITH RESPECT TO THE PRODUCT AND ITS COMPONENTS, THERMA-STOR HEREBY DISCLAIMS ALL EXPRESS AND IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Warranty Limitations. The foregoing limited warranty extends only to a Customer and shall be null and void upon attempted assignment or transfer. A “defect” under the terms of the limited warranty shall not include problems resulting from Customer’s or Customer’s employees’, agents’, invitees’ or a third party’s misuse, improper installation, improper design of any system in which the Product is included, abuse, lack of normal care, failure to follow written instructions, tampering, improper repair, or freezing, corrosion, acts of nature or other causes not arising out of defects in Therma-Stor’s workmanship or material. If a Product or Component is replaced while under warranty, the applicable limited warranty period shall not be extended beyond the original warranty time period. The limited warranty does not cover any costs related to changes to a Product or Component that may be required by any codes, laws, or regulations that may become effective after initial purchase of the Product by Customer.

Customer Responsibilities. As a further condition to obtaining warranty coverage hereunder, the Customer must send a valid warranty claim to Therma-Stor such that Therma-Stor receives such claim prior to the end of the applicable warranty period. Therma-Stor shall have no obligation hereunder with respect to any claim received by Therma-Stor after the expiration of the applicable warranty period. As a further condition to obtaining warranty coverage hereunder, the Customer must present forms of invoices evidencing proof of purchase of a Product. If such invoices do not clearly indicate the date of initial purchase by a Customer, the applicable Product’s date of manufacture will be used instead of the date of initial purchase for the purpose of calculating the commencement of the applicable warranty period. Warranty service must be performed by Therma-Stor or a servicer authorized by Therma-Stor. In order to obtain warranty service, the Customer should call Therma-Stor at 1-800-533-7533 and ask for the Therma-Stor Products Service Department, which will then arrange for applicable warranty service. Warranty service will be performed during customary, daytime working hours. If the Product must be shipped for service, Customer shall be solely responsible for properly packaging the Product, for all freight charges, and for all risk of loss associated with shipment.

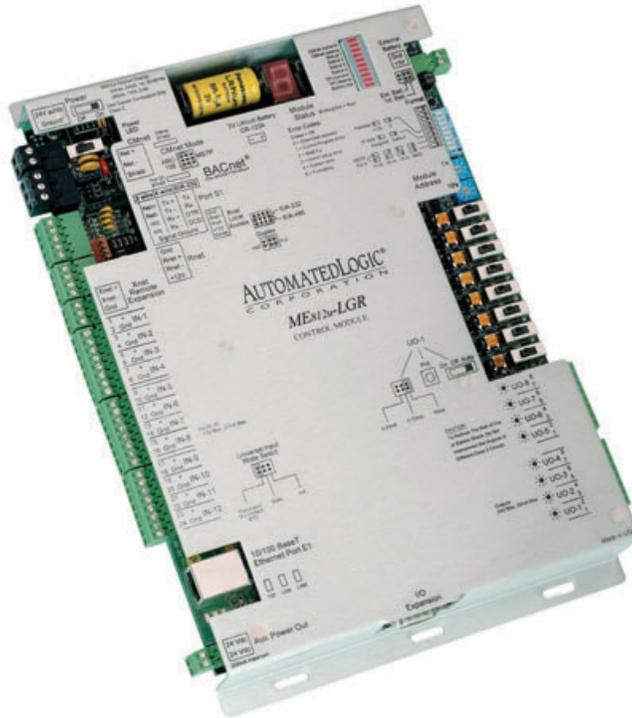
Limitation of Liability. IN NO EVENT SHALL THERMA-STOR, IN CONNECTION WITH THE DESIGN, SALE, INSTALLATION, USE, REPAIR, REPLACEMENT OR PERFORMANCE OF ANY PRODUCT, COMPONENT, PART THEREOF OR WRITTEN MATERIAL PROVIDED THEREWITH, BE LIABLE, TO THE EXTENT ALLOWED UNDER APPLICABLE LAW, UNDER ANY LEGAL THEORY FOR ANY SPECIAL, DIRECT, INDIRECT, COLLATERAL OR CONSEQUENTIAL DAMAGES OF ANY KIND. NOTWITHSTANDING THE ABOVE LIMITATIONS AND WARRANTIES, THE SOLE AND EXCLUSIVE LIABILITY OF THERMA-STOR, REGARDLESS OF THE NATURE OR THEORY OF THE CLAIM, SHALL UNDER NO CIRCUMSTANCES EXCEED THE PURCHASE PRICE OF THE PRODUCT, COMPONENT OR PART UPON WHICH THE CLAIM IS PREMISED.

Applicable Law and Venue. ANY ARBITRATION, ENFORCEMENT OF AN ARBITRATION OR LITIGATION RELATED TO THE PRODUCT WILL BE BROUGHT EXCLUSIVELY IN DANE COUNTY, WISCONSIN, AND CUSTOMER CONSENTS TO THE JURISDICTION OF THE FEDERAL AND STATE COURTS LOCATED THEREIN, SUBMITS TO THE JURISDICTION THEREOF AND WAIVES THE RIGHT TO CHANGE VENUE. CUSTOMER FURTHER CONSENTS TO THE EXERCISE OF PERSONAL JURISDICTION BY ANY SUCH COURT WITH RESPECT TO ANY SUCH PROCEEDING.

Miscellaneous. If any term or condition of this Limited Warranty is found by a court of competent jurisdiction to be invalid, illegal or otherwise unenforceable, the same shall not affect the other terms or conditions hereof or thereof or the whole of this Limited Warranty. Any delay or failure by Therma-Stor to exercise any right or remedy will not constitute a waiver of Therma-Stor to thereafter enforce such rights.

ME812u, ME812u-E, ME812u-LGR Router/Controller

Powerful Multi-Equipment Controllers



The ME812u series of controllers have the speed, power, memory and I/O flexibility to handle the most demanding control applications in the industry. Capable of controlling multiple pieces of HV-ac equipment simultaneously, this robust BACnet controller can support complex control strategies with plenty of memory for trends, and is capable of third party integration using other communication protocols.

Key Features and Benefits

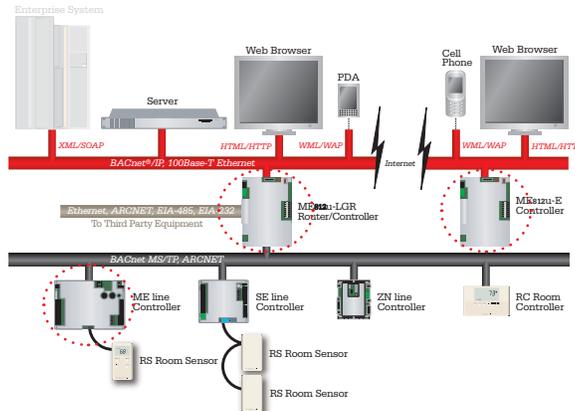
- Multi-equipment capabilities for general and custom HV-ac applications.
- Native BACnet communications to field devices over TCP/IP, Ethernet, high-speed ARCNET 156 Kbps or BACnet MS/TP networks.
- Universal Inputs and Outputs with Hand-Off-Auto override.
- Flexible communication port configurations are available for communications to field controllers and routing to other BACnet and non-BACnet devices.
- Easy third-party integration using Automated Logic's extensive library of integration drivers.
- Easy expansion of I/O using up to five MEx I/O expansion modules in a stack panel configuration or remote mounted up to 100ft away for scalable solutions.
- First MEx I/O expander can be mounted directly on top of the ME812u controller, reducing control panel space.
- 16 MByte of battery backed SDRAM memory for control and extensive trending, providing plant diagnostics and historical reports.
- 8 MByte Flash memory (32 bit wide) for easy field upgrades over the network.
- Battery backed real-time clock provides true standalone capabilities allowing complete recovery from power outages.
- Rnet port supports Automated Logic's line of RS room sensors and BACview⁶ local operator interface, and provides local access to the system.
- ME812u controllers are fully graphically programmable and offer full peer-to-peer communications with other ME line, SE line or ZN line controllers. Graphical programs are universally understood and provide self-documenting control sequences.
- Tough construction delivers superior performance and reliability. Modules are constructed with a rugged aluminum cover which provides optimum electrical protection and noise immunity.

AUTOMATED LOGIC[®]
CORPORATION

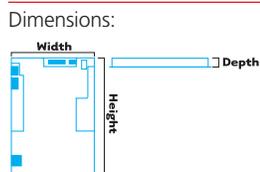
1150 Roberts Boulevard
Kennesaw, Georgia 30144
770/429-3000
Fax 770/429-3001
www.automatedlogic.com

ME812u, ME812u-E, ME812u-LGR Router/Controller

Specifications



BACnet Support:	Conforms to the BACnet Advanced Application Controller (B-AAC) Standard Device as defined in BACnet 135-2001 Annex L.
Communication Ports:	ME812u: EIA-485 port for ARCNET 156 Kbps or BACnet MS/Tp (9600 baud to 76.8 Kbps). Rnet port for RS room sensors and local BACview ⁶ operator displays. Xnet (500 Kbps) port for MEx I/O expansion modules. Local access port. ME812u-E: Ethernet port (10/100Mbps) only for BACnet/IP communications. Rnet port for RS room sensors and local BACview ⁶ operator displays. Xnet (500Kbps) port for MEx I/O expansion modules. Local access port. ME812u-LGR: Ethernet port* (10/100Mbps) for BACnet over Ethernet or BACnet/IP communications. EIA-485 port for ARCNET 156 Kbps or BACnet MS/TP (9600 baud to 76.8 Kbps). EIA-232/485* configurable port for BACnet PTP. Rnet port for RS room sensors and local BACview ⁶ operator displays. Xnet (500 Kbps) port for MEx I/O expansion modules. Local access port. *Third-Party integration drivers available through Ethernet and (1) EIA-232/485 configurable port.
Universal Inputs:	Twelve configurable universal inputs with 14-bit A/D resolution. Supported input types include: 0-5 V-dc, 0-10 V-dc, 0-20 mA, Thermistor (10k Ohm Type II), 1k Ohm RTD (Platinum, Nickel or Balco), and Dry Contact. All inputs support pulse counting up to 40 cycles per second (25mSec minimum pulse).
Universal Outputs:	Eight universal outputs that are jumper configurable as 0-10V-dc, or 0-20mAdc with 12-bit A/D or 24V-dc @ 50mA relay drive. HOA (hand/off/auto) switches for all outputs, including potentiometer for manual adjustment of analog outputs.
Expansion:	Five MEx I/O expansion modules can be connected - one mounted directly on top of the controller, mounted locally in a stack configuration or remote mounted up to 100ft away. Compatible with legacy MX I/O expanders using the 9-pin Sub-D connector only.
Microprocessor:	Powerful 32-bit Motorola Power PC microprocessor. High performance 32-bit communication co-processor. I/O expansion CAN co-processor.
Memory:	32-bit memory bus structure, 8 Mbyte FLASH memory, 16 Mbyte SDRAM battery backed. Battery CR123A has life of 10 years with 720 hours of cumulative power outage.
Real-time Clock:	Battery-backed real-time clock.
Status Indicators:	LED status indicators for EIA-232/485 communication, and low battery status. Seven segment status display for running, error, and power status.
Module Addressing:	Rotary dip switches for intuitive network addressing of modules.
Protection:	Built-in surge and transient protection circuitry for power, communications and I/O.
Listed by:	UL916 (Canadian Std C22.2 No. 205-M1983), CE, FCC Part 15 - Subpart B - Class A.
Environmental Operating Range:	-20°F to 140°F (-29°C to 60°C); 10 to 90% relative humidity, non-condensing.
Power Requirements:	24 V-ac \pm 10%, 50-60Hz, 50VA, or 26 V-dc \pm 10%, 23W. NOTE: Power consumption will increase when BACview ⁶ or other accessories are attached.
Physical:	Rugged aluminum cover. Removable screw terminal blocks.
Weight:	1.4 lb. (0.635 kg)

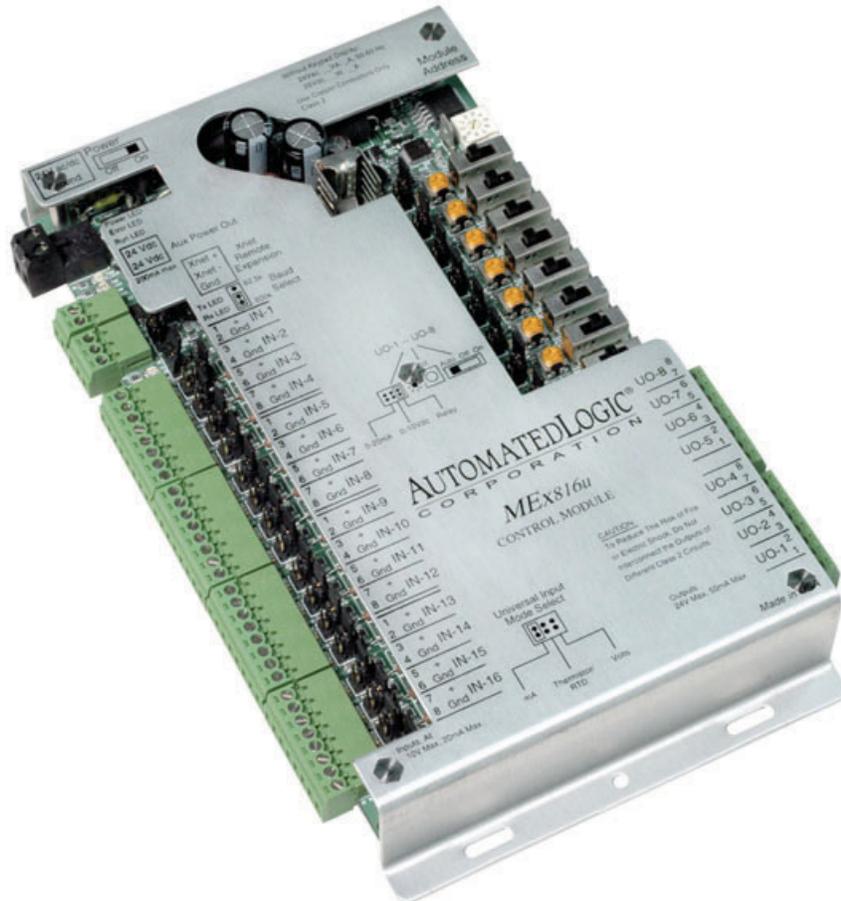


Overall	Mounting Holes
Width: 7-1/2" (190mm)	Width: 5" (127mm)
Height: 11-5/16" (287mm)	Height: 10-7/8" (276mm)
Depth: 1-1/4" (32mm) min. panel depth	



MEx I/O Expander

Superior Performance and Reliability



The MEx series of I/O expanders are designed for the powerful ME series of controllers, and for the most demanding control applications in the industry. The MEx I/O expanders can be remote mounted or directly mounted on the ME Controllers.

Key Features and Benefits

- High resolution Universal Inputs and Outputs for accuracy.
- Easy expansion of I/O using up to five MEx I/O expansion modules in a stack panel configuration or remote mounted up to 100ft away for scalable solutions.
- First MEx I/O expander can be mounted directly on top of the ME812u controller, reducing control panel space.
- Removable screw connectors for easy wiring, termination and service.
- Tough construction delivers superior performance and reliability. Modules are constructed with a rugged aluminum cover which provides optimum electrical protection and noise immunity.

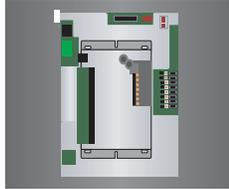
AUTOMATEDLOGIC[®]
CORPORATION

1150 Roberts Boulevard
Kennesaw, Georgia 30144
770/429-3000
Fax 770/429-3001
www.automatedlogic.com

MEx I/O Expander

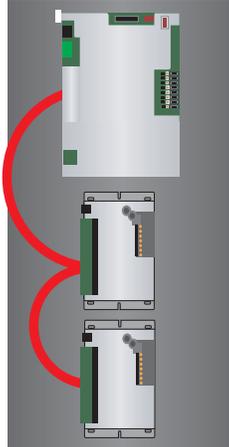
Specifications

Flexible Panel Configurations

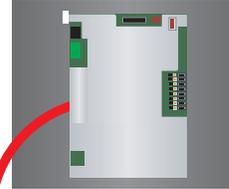


Direct Mounting

Easy expansion of I/O using up to five MEx816u expanders.



Stack Panel Mounting

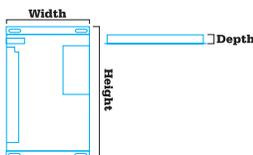


Remote Panel Mounting

Product	Universal Outputs	Universal Inputs
MEX48U	4	8
MEX88U	8	8
MEX016U	0	16
MEX816U	8	16

Communication:	Xnet I/O Expander bus for 500 Kbps communications between ME controller and I/O Expanders.
Universal Inputs:	Configurable universal inputs with 14-bit A/D resolution. Supported input types include: 0-5 V-dc, 0-10 V-dc, 0-20 mA, Thermistor (10k Ohm Type II), 1k Ohm RTD (Platinum, Nickel or Balco), and Dry Contact. All inputs support pulse counting up to 40 cycles per second (12.5mSec minimum pulse duration).
Universal Outputs:	Universal outputs that are jumper configurable as 0-10V-dc, or 0-20mAdc with 12-bit D/A or 24V-dc @ 50mA relay drive. HOA (hand/off/auto) switches for all outputs, including potentiometer for manual adjustment of analog outputs.
Expansion:	Five MEx I/O expansion modules can be connected - one mounted directly on top of the controller, mounted locally in a stack configuration or remote mounted up to 100ft away. Compatible with legacy Mx I/O expanders using the 9-pin Sub-D connector only.
Status Indicators:	LED status indicators for Power, Run, Error, Xnet TX and Xnet Rx.
Addressing:	Rotary dip switches for intuitive network addressing of modules.
Protection:	Built-in surge and transient protection circuitry for power, communications and I/O.
Listed by:	UL916 (Canadian Std C22.2 No. 205-M1983), CE, FCC Part 15 - Subpart B - Class A.
Environmental Operating Range:	-20°F to 140°F (-29°C to 60°C); 10 to 90% relative humidity, non-condensing.
Power Requirements:	24 V-ac ± 10%, 50-60Hz, 45VA, or 26 V-dc ± 10%, 21W. NOTE: Power consumption will increase when BACview® or other accessories are attached.
Physical:	Rugged aluminum cover. Removable screw terminal blocks.
Weight:	1.4 lb. (45.5 kg)

Dimensions:



Overall

Width: 4-3/4" (121mm)
Height: 9" (229mm)
Depth: 1-1/2" (38mm)

Mounting Holes

Width: 2-3/4" (70mm)
Height: 8-1/2" (216mm)





Powerful and Intuitive Front End for Building Control



Patents pending.

Navigational tree, intelligent use of color showing the status of zones and trends, plus superior graphics make WebCTRL rich in information yet easy to use.

Automated Logic's WebCTRL® is a building automation system that offers an intuitive user interface and powerful control features. Your building can be accessed from anywhere in the world using Internet Explorer® eliminating the need for special software on the workstation. Through a browser you can access all building management functions including:

- setting and changing schedules,
- adjusting setpoints and other control properties,
- graphically trending important building conditions,
- viewing and acknowledging alarms, and
- running preconfigured and custom reports on energy usage, occupant overrides, tenant billing, and much more.

Developed entirely around proven open standards and web technologies, WebCTRL's server software runs on major platforms, including Windows® and Linux. Major databases supported by the server include MS SQL Express, MS SQL Server, MySQL, PostgreSQL and Oracle.

Key Features and Benefits

- Intuitive, comprehensive building operation with dynamic, interactive graphical access
- Completely designed around open standards
 - Uses the language of the web (HTTP) to communicate over the Internet or intranet without special software or plug-ins
 - Runs on multiple platforms including Windows and Linux
 - Advanced alarm management capabilities including email, pagers, network printers, etc.
 - Uses sophisticated alarm escalation system protection with multi-level passwords and Secure Sockets Layer with 128-bit encryption for security
 - Monitors and controls a wide variety of third party HVAC and electrical equipment through a browser
 - Fully compatible with legacy ALC Systems

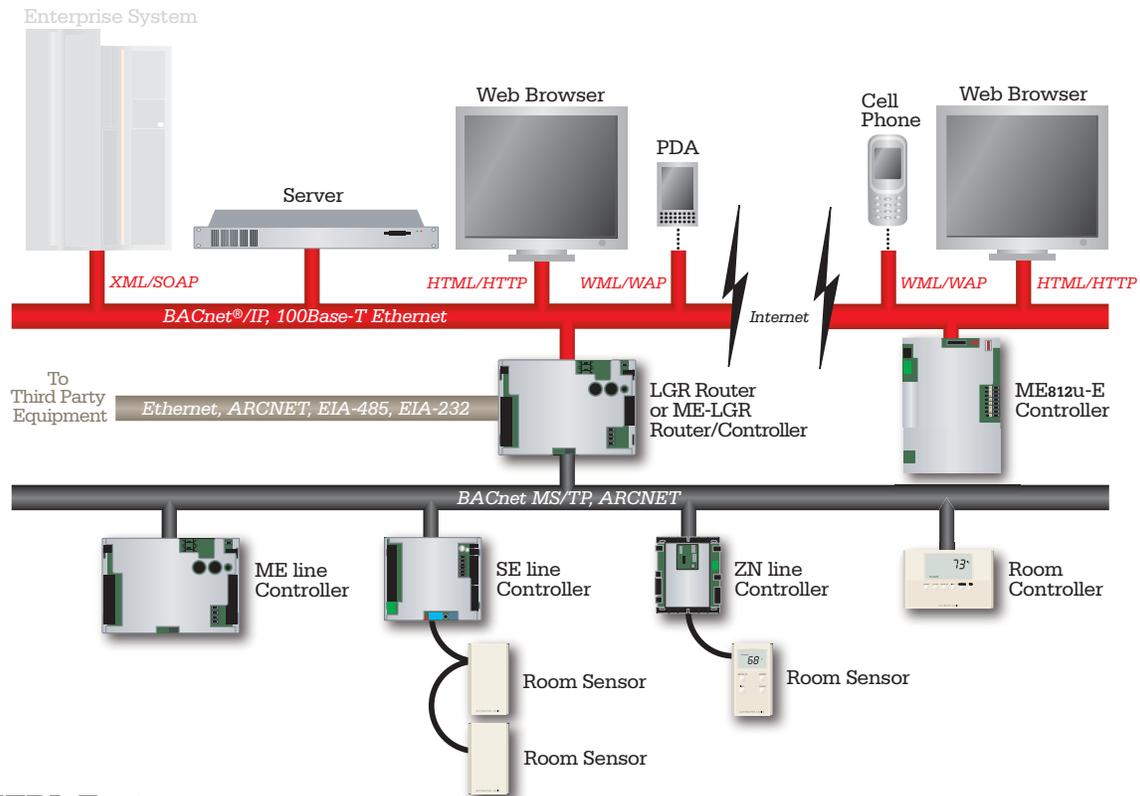
AUTOMATEDLOGIC
CORPORATION

1150 Roberts Boulevard
Kennesaw, Georgia 30144
770/429-3000
Fax 770/429-3001
www.automatedlogic.com

CSWCTRLRev13

WebCTRL®

Specifications



WebCTRL Features

Unlimited simultaneous users

Runs on Microsoft (Windows® 7, Server 2008 R2, Vista Business, Server 2003 SP2, XP Professional SP3), Red Hat Linux 5.5 and Ubuntu Desktop 10.04

Includes Secure Sockets Layer with 128 bit encryption

Supports Oracle, MS SQL Express, MS SQL Server, PostgreSQL

Supports data exchange via XML/SOAP (Web Services) and Add-On API

Supports third party integration

Supports communication to field controllers via BACnet (TCP/IP)

Supports web appliances (Palm Pilots, Pocket PCs, Blackberrys, etc.)

Supports Hierarchical Server configuration for very large systems

Includes alarming, trending, scheduling, and reporting capability

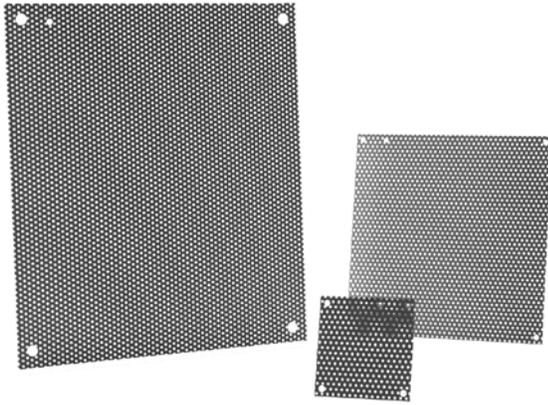
Includes international languages (International English, Spanish, French, German, Korean, Traditional and Simplified Chinese)

Fully compatible with legacy ALC systems



Panels for Enclosures

Perforated Panels

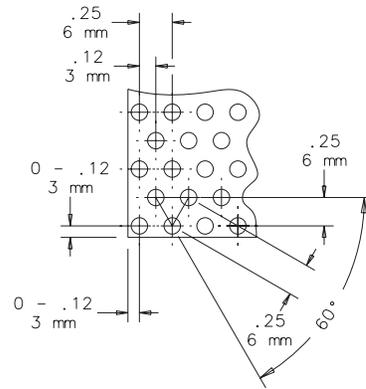
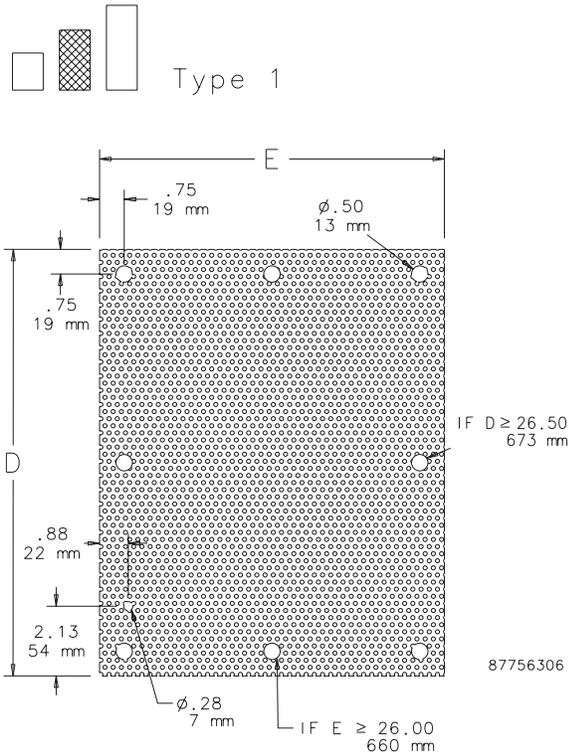
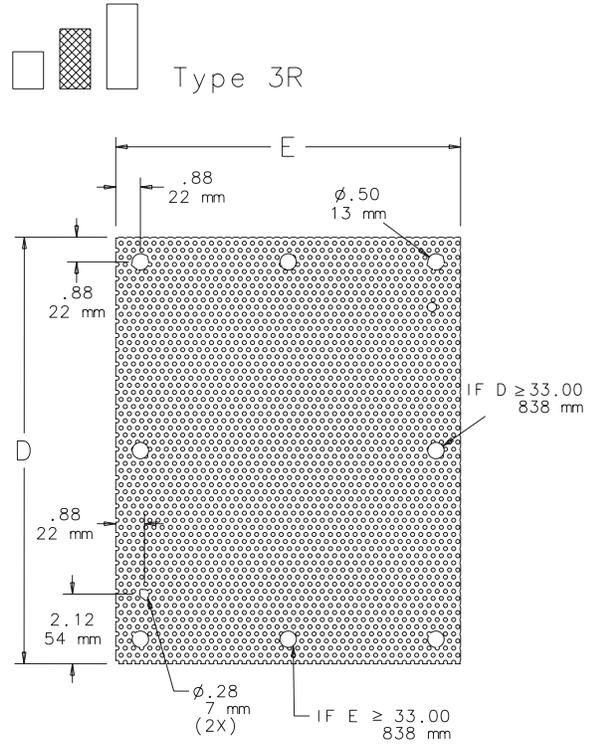
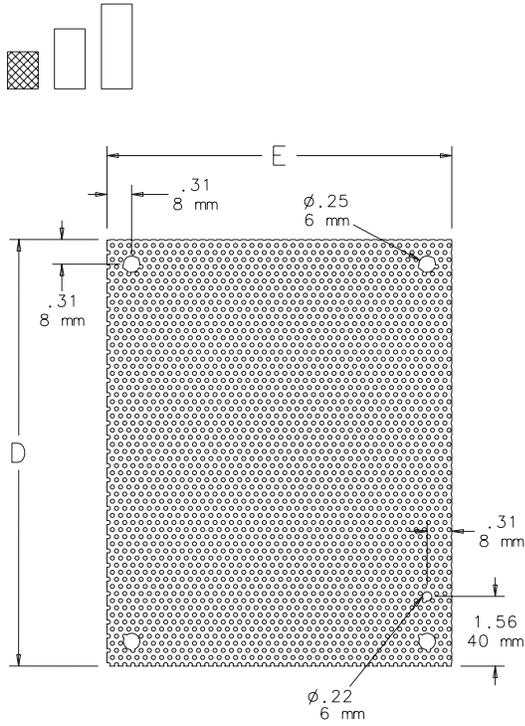


Perforated panels are 16 gauge steel and accept self-tapping screws and eliminate the need to measure, mark and drill when mounting components. Use for mounting lightweight control components.

Bulletin: PNL P

Catalog Number	Use in	Panel Size D x E (in.)	Panel Size D x E (mm)
A6N6PP	Small Type 1 Panel Enclosures and Small Type 3R Boxes	4.25 x 4.25	108 x 108
A8N6PP	Small Type 1 Panel Enclosures and Small Type 3R Boxes	6.25 x 4.25	159 x 108
A8N8PP	Small Type 1 Panel Enclosures and Small Type 3R Boxes	6.25 x 6.25	159 x 159
A10N8PP	Small Type 1 Panel Enclosures and Small Type 3R Boxes	8.25 x 6.25	210 x 159
A10N10PP	Small Type 1 Panel Enclosures and Small Type 3R Boxes	8.25 x 8.25	210 x 210
A12N10PP	Small Type 1 Panel Enclosures and Small Type 3R Boxes	10.25 x 8.25	260 x 210
A12N12PP	Small Type 1 Panel Enclosures and Small Type 3R Boxes	10.25 x 10.25	260 x 260
A14N12PP	Small Type 1 Panel Enclosures and Small Type 3R Boxes	12.25 x 10.25	311 x 260
A16N12PP	Small Type 1 Panel Enclosures and Small Type 3R Boxes	14.25 x 10.25	362 x 260
A20N12PP	Small Type 1 Panel Enclosures and Small Type 3R Boxes	18.25 x 10.25	464 x 260
A16N12MPP	Medium Type 1 Panel Enclosures	10.50 x 13.00	267 x 330
A16N16MPP	Medium Type 1 Panel Enclosures	14.50 x 13.00	368 x 330
A16N20MPP	Medium Type 1 Panel Enclosures	18.50 x 13.00	470 x 330
A18N18MPP	Medium Type 1 Panel Enclosures	16.50 x 15.00	419 x 381
A20N12MPP	Medium Type 1 Panel Enclosures	10.50 x 17.00	267 x 432
A20N16MPP	Medium Type 1 Panel Enclosures	14.50 x 17.00	368 x 432
A20N20MPP	Medium Type 1 Panel Enclosures	18.50 x 17.00	470 x 432
A24N16MPP	Medium Type 1 Panel Enclosures	14.50 x 21.00	368 x 533
A24N20MPP	Medium Type 1 Panel Enclosures	18.50 x 21.00	470 x 533
A24N24MPP	Medium Type 1 Panel Enclosures	22.50 x 21.00	572 x 533
A30N20MPP	Medium Type 1 Panel Enclosures	18.50 x 26.00	470 x 660
A30N24MPP	Medium Type 1 Panel Enclosures	22.50 x 26.00	572 x 660
A30N30MPP	Medium Type 1 Panel Enclosures	28.50 x 26.00	724 x 660
A36N24MPP	Medium Type 1 Panel Enclosures	22.50 x 32.00	572 x 813
A36N30MPP	Medium Type 1 Panel Enclosures	26.50 x 32.00	724 x 813
A16P12PP	Medium Type 3R Hinged-Cover Panel Enclosures	13.00 x 9.00	330 x 229
A16P16PP	Medium Type 3R Hinged-Cover Panel Enclosures	13.00 x 13.00	330 x 330
A20P16PP	Medium Type 3R Hinged-Cover Panel Enclosures	17.00 x 13.00	432 x 330
A18P18PP	Medium Type 3R Hinged-Cover Panel Enclosures	15.00 x 15.00	381 x 381
A20P20PP	Medium Type 3R Hinged-Cover Panel Enclosures	17.00 x 17.00	432 x 732
A24P20PP	Medium Type 3R Hinged-Cover Panel Enclosures	21.00 x 17.00	533 x 432
A24P24PP	Medium Type 3R Hinged-Cover Panel Enclosures	21.00 x 21.00	533 x 533
A30P24PP	Medium Type 3R Hinged-Cover Panel Enclosures	27.00 x 21.00	686 x 533
A36P24PP	Medium Type 3R Hinged-Cover Panel Enclosures	33.00 x 21.00	838 x 533
A30P30PP	Medium Type 3R Hinged-Cover Panel Enclosures	27.00 x 27.00	686 x 686
A36P30PP	Medium Type 3R Hinged-Cover Panel Enclosures	33.00 x 27.00	838 x 686
A36P36PP	Medium Type 3R Hinged-Cover Panel Enclosures	33.00 x 33.00	838 x 838

Panels for Enclosures



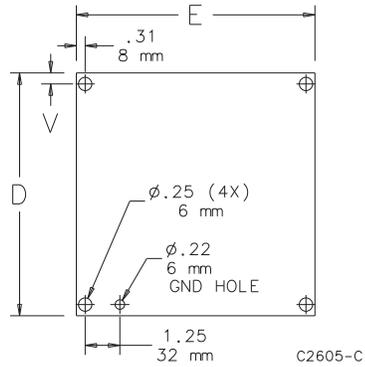
Panels for Enclosures

Panels for Junction Boxes



Steel panels are 14 gauge, finished with white polyester powder paint or with a conductive, corrosion-resistant coating. Stainless steel panels are 14 gauge Type 304 and have a commercial #2B finish which is protected on one side with a plastic film. Aluminum panels are 5052-H32 aluminum alloy 0.080-in. (2-mm) thick and protected on one side with a plastic film. Panel mounting hardware is furnished with all enclosures which accept these panels.

Bulletin: PNLJ, PNLWM



C2605-C

Catalog Number	Material	Panel Size D x E (in.)	Panel Size D x E (mm)	V (in.)	V (mm)
A6P4	Painted steel	4.88 x 2.88	124 x 73	0.31	8
A6P4G	Conductive steel	4.88 x 2.88	124 x 73	0.31	8
A6P4SS	Stainless Steel	4.88 x 2.88	124 x 73	0.31	8
A6P4AL	Aluminum	4.88 x 2.88	124 x 73	0.31	8
A6P6	Painted steel	4.88 x 4.88	124 x 124	0.31	8
A6P6G	Conductive steel	4.88 x 4.88	124 x 124	0.31	8
A6P6SS	Stainless Steel	4.88 x 4.88	124 x 124	0.31	8
A6P6AL	Aluminum	4.88 x 4.88	124 x 124	0.31	8
A8P6	Painted steel	6.75 x 4.88	171 x 124	0.25	6
A8P6G	Conductive steel	6.75 x 4.88	171 x 124	0.25	6
A8P6SS	Stainless Steel	6.75 x 4.88	171 x 124	0.25	6
A8P6AL	Aluminum	6.75 x 4.88	171 x 124	0.25	6
A8P8	Painted steel	6.75 x 6.88	171 x 175	0.25	6
A8P8AL	Aluminum	6.75 x 6.88	171 x 175	0.25	6
A10P8	Painted steel	8.75 x 6.88	222 x 175	0.25	6
A10P8G	Conductive steel	8.75 x 6.88	222 x 175	0.25	6
A10P8SS	Stainless Steel	8.75 x 6.88	222 x 175	0.25	6
A10P8AL	Aluminum	8.75 x 6.88	222 x 175	0.25	6
A10P10	Painted steel	8.75 x 8.88	222 x 226	0.25	6
A10P10G	Conductive steel	8.75 x 8.88	222 x 226	0.25	6
A10P10AL	Aluminum	8.75 x 8.88	222 x 226	0.25	6
A12P6	Painted steel	10.75 x 4.88	273 x 124	0.25	6
A12P6G	Conductive steel	10.75 x 4.88	273 x 124	0.25	6
A12P10	Painted steel	10.75 x 8.88	273 x 226	0.25	6
A12P10G	Conductive steel	10.75 x 8.88	273 x 226	0.25	6
A12P10SS	Stainless Steel	10.75 x 8.88	273 x 226	0.25	6
A12P10AL	Aluminum	10.75 x 8.88	273 x 226	0.25	6
A12P12	Painted steel	10.75 x 10.88	273 x 276	0.25	6
A12P12G	Conductive steel	10.75 x 10.88	273 x 276	0.25	6
A12P12SS	Stainless Steel	10.75 x 10.88	273 x 276	0.25	6
A14P8	Painted steel	12.75 x 6.88	324 x 175	0.25	6
A14P8G	Conductive steel	12.75 x 6.88	324 x 175	0.25	6
A14P12	Painted steel	12.75 x 10.88	324 x 276	0.25	6
A14P12G	Conductive steel	12.75 x 10.88	324 x 276	0.25	6
A14P12SS	Stainless Steel	12.75 x 10.88	324 x 276	0.25	6
A14P12AL	Aluminum	12.75 x 10.88	324 x 276	0.25	6
A16P10	Painted steel	14.75 x 8.88	375 x 226	0.25	6
A16P10G	Conductive steel	14.75 x 8.88	375 x 226	0.25	6
A16P14	Painted steel	14.75 x 12.88	375 x 327	0.25	6
A16P14G	Conductive steel	14.75 x 12.88	375 x 327	0.25	6
A16P14SS	Stainless Steel	14.75 x 12.88	375 x 327	0.25	6
A16P14AL	Aluminum	14.75 x 12.88	375 x 327	0.25	6
A18P16	Painted steel	16.75 x 14.88	425 x 378	0.25	6
A18P16G	Conductive steel	16.75 x 14.88	425 x 378	0.25	6
A18P16SS	Stainless Steel	16.75 x 14.88	425 x 378	0.25	6
A18P16AL	Aluminum	16.75 x 14.88	425 x 378	0.25	6

Panels for Enclosures

Composite Panels for Junction Boxes and UL/NEMA Wall-Mount Enclosures

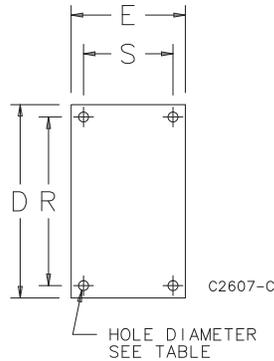
Manufactured from light-brown, reinforced phenolic laminate sheet stock. This material has exceptional strength and chemical resistance, which makes it ideally suited for the most corrosive environments. Composite panels are intended for use in corrosion-resistant enclosures. Panel sizes are available for junction boxes and UL/NEMA

size enclosures. Composite panels may be drilled and tapped but work equally as well with self-threading or thread-cutting screws. Refer to the table for recommended mounting specifications.

Bulletin: PNLC

Standard Product

Catalog Number	Panel Size D x E in./mm	R in./mm	S in./mm	Hole Dia. in./mm	Panel Thickness in./mm
A6P4C	4.88 x 2.88	4.25	2.25	0.25	0.12
	124 x 73	108	57	6	3
A6P6C	4.88 x 4.88	4.25	4.25	0.25	0.12
	124 x 124	108	108	6	3
A8P6C	6.75 x 4.88	6.25	4.25	0.25	0.12
	171 x 124	159	108	6	3
A10P8C	8.75 x 6.88	8.25	6.25	0.25	0.12
	222 x 175	210	159	6	3
A12P10C	10.75 x 8.88	10.25	8.25	0.25	0.19
	273 x 226	260	210	6	5
A14P12C	12.75 x 10.88	12.25	10.25	0.25	0.19
	324 x 276	311	260	6	5
A16P14C	14.75 x 12.88	14.25	12.25	0.25	0.19
	375 x 327	362	311	6	5
A18P16C	16.75 x 14.88	16.25	14.25	0.25	0.19
	425 x 379	413	362	6	5
A20P16C	17.00 x 13.00	15.25	11.25	0.50	0.19
	432 x 330	387	286	13	5
A20P20C	17.00 x 17.00	15.25	15.25	0.50	0.19
	432 x 432	387	387	13	5
A24P20C	21.00 x 17.00	19.25	15.25	0.50	0.19
	533 x 432	489	387	13	5
A24P24C	21.00 x 21.00	19.25	19.25	0.50	0.19
	533 x 533	489	489	13	5
A30P24C	27.00 x 21.00	25.25	19.25	0.50	0.19
	686 x 533	641	489	13	5



Composite Panel Mounting Recommendations

Screw Type	Screw Size	Hole Size in./mm	Max. Insertion Torque (lb.) in 0.12 in. Material	Max. Insertion Torque (lb.) in 0.19 in. Material	Max. Load (lb. per screw) in 0.12 in. Material	Max. Load (lb. per screw) in 0.19 in. Material
Machine (tapped hole)	8-32	.136	15	25	40	45
		3				
Machine (tapped hole)	10-32	.161	15	25	35	40
		4				
Machine (tapped hole)	1/4-20	.204	20	25	30	35
		5				
Thread Cutting Type T	8-32	.144	15	25	40	45
		4				
Thread Cutting Type T	10-32	.166	15	25	35	40
		4				
Thread Cutting Type T	1/4-20	.288	20	25	30	35
		7				
Sheet Metal A-B	8-32	.147	Not recommended	10	40	45
		4				
Sheet Metal A-B	10-32	.166	Not recommended	10	35	40
		4				
Sheet Metal A-B	1/4-20	.221	Not recommended	15	30	35
		6				

Panels for Enclosures

Junction Box and Wall-Mount Enclosure Swing-Out Panel Kit

Kits allow mounting standard Hoffman junction box and NEMA style panels (purchase separately) near the front of the enclosure for easy access to or reading of gauges, switches, pilot lights and other components. Kits consist of heavy-gauge brackets and hinges which are easily installed by drilling small holes in the sides of the enclosure and bolting the brackets in place. External screws are stainless steel; internal components are plated steel. All mounting hardware and instructions are provided. Sealing washers ensure the enclosure will meet original JIC or NEMA standards after installation. Swing-Out Panel Kits do not fit single-door disconnect enclosures.

Bulletin: A80

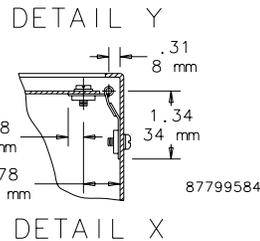
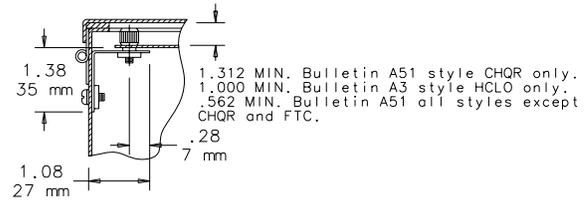
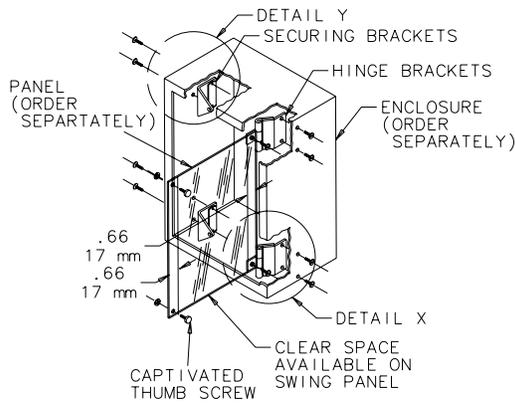


Catalog Number	Description	Maximum Load (lb.)	Maximum Load (kg)	Use In
AJCDFK	Junction Box Kit	25	11.3	- Junction boxes where A x B is 8.00 x 6.00 in. (203 x 152 mm) or larger - HCL0 Type 3R enclosures where A x B is 16.00 x 12.00 in. (406 x 305 mm) or smaller
ANADFK	Wall-Mount Enclosure Kit	100	45.4	- One-door Type 4, 12 and 13 enclosures where A x B is 12.00 x 12.00 in. (305 x 305 mm) or larger - HCL0 Type 3R enclosures where A x B is 16.00 x 16.00 in. (406 x 406 mm) or larger - HCR Type 3R enclosures where A x B is 16.00 x 12.00 (406 x 305 mm) or larger - Type 1 enclosures where A x B is 42.00 x 30.00 in. (1067 x 762 mm) or larger

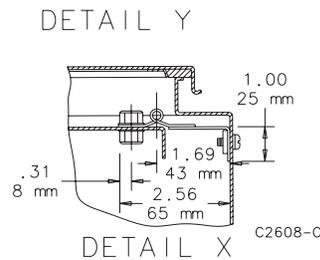
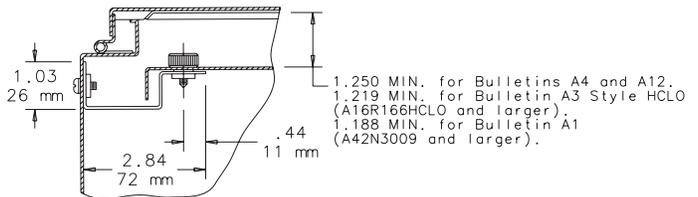
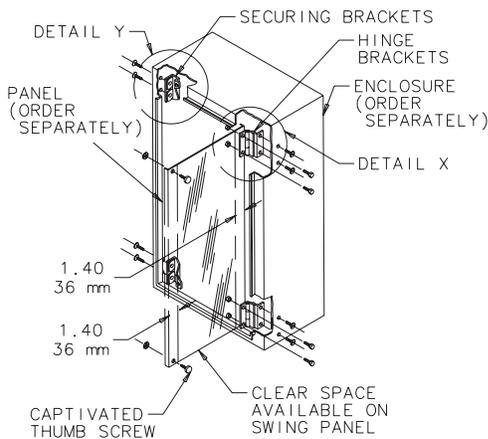
Both kits maintain UL Type 4 rating when properly installed in a Hoffman enclosure.

Maximum load includes the weight of the panel plus the weight of the components, with the weight of the components spread evenly over the panel.

Junction Box Swing-Out Panel Kit



Wall-Mount Enclosure Swing-Out Panel Kit

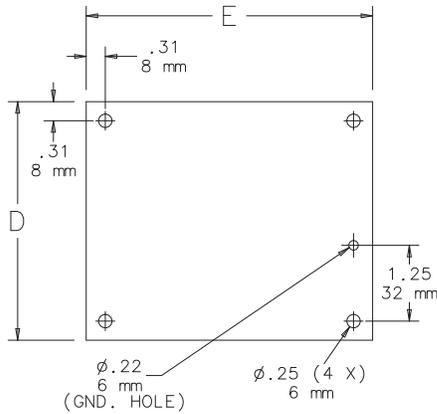


Panels for Enclosures

Panels for Type 1 Enclosures and Small Type 3R Enclosures

Steel panels are 14 gauge, finished with white polyester powder paint. Panel mounting hardware is furnished with enclosure.

Bulletin: PNLT1



C2646-C

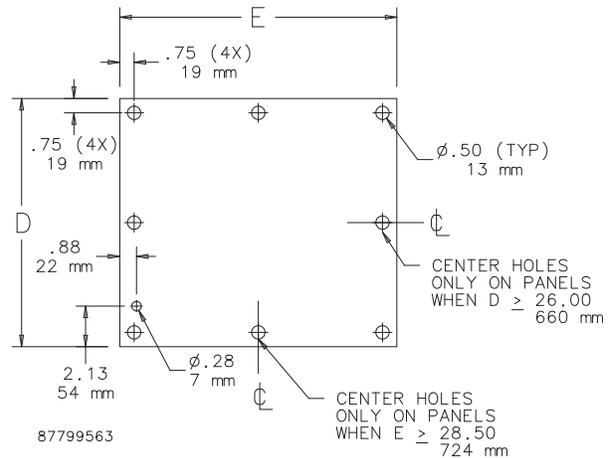
Catalog Number	Panel Size D x E (in.)	Panel Size D x E (mm)
A6N4P	4.25 x 2.25	108 x 57
A6N6P	4.25 x 4.25	108 x 108
A8N6P	6.25 x 4.25	159 x 108
A8N8P	6.25 x 6.25	159 x 159
A10N8P	8.25 x 6.25	210 x 159
A10N10P	8.25 x 8.25	210 x 210
A12N10P	10.25 x 8.25	260 x 210
A12N12P	10.25 x 10.25	260 x 260
A14N12P	12.25 x 10.25	311 x 260
A16N12P	14.25 x 10.25	362 x 260
A20N12P	18.25 x 10.25	464 x 260

Panels for Medium Type 1 Enclosures

Steel panels are 14 or 12 gauge with a white polyester powder paint finish. Panel mounting hardware is furnished with enclosure.

Bulletin: PNLT1

Catalog Number	Panel Thickness (ga.)	Panel Size D x E (in.)	Panel Size D x E (mm)
A16N12MP	14	13.00 x 10.50	330 x 267
A20N12MP	14	17.00 x 10.50	432 x 267
A16N16MP	14	13.00 x 14.50	330 x 368
A20N16MP	14	17.00 x 14.50	432 x 368
A24N16MP	14	21.00 x 14.50	533 x 368
A18N18MP	14	15.00 x 16.50	381 x 419
A16N20MP	14	13.00 x 18.50	330 x 470
A20N20MP	14	17.00 x 18.50	432 x 470
A24N20MP	14	21.00 x 18.50	533 x 470
A30N20MP	14	26.00 x 18.50	660 x 470
A24N24MP	12	21.00 x 22.50	533 x 571
A30N24MP	12	26.00 x 22.50	660 x 571
A36N24MP	12	32.00 x 22.50	813 x 571
A30N30MP	12	26.00 x 28.50	660 x 724
A36N30MP	12	32.00 x 28.50	813 x 724



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Panels for Enclosures

Panels for Type 3R, 4, 4X, 12 and 13 Enclosures

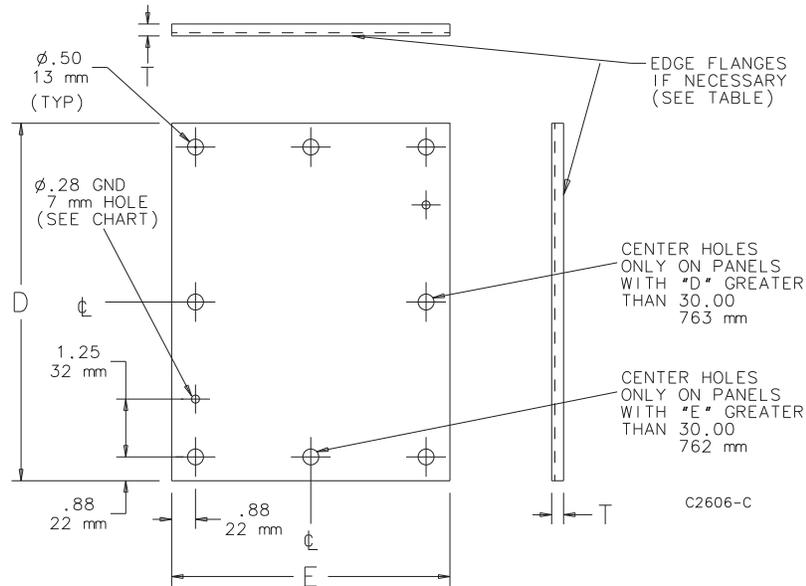
Steel panels are 12 gauge, finished with white polyester powder paint or a conductive, corrosion-resistant coating. Larger panels have flanges on two or four sides. Some larger steel panels are 10 gauge and include extra holes for panel lifting. Aluminum panels are 5052-H32 aluminum alloy. Larger panels have flanges on four sides. Aluminum panels are protected on one side with a plastic film. Stainless steel panels are Type 316 stainless steel. Panel mounting hardware is furnished with all enclosures which accept these panels.

Bulletin: PNLFS, PNLJ, PNLWM

Catalog Number	Material	Panel Size D x E (in.)	Panel Size D x E (mm)	Panel Gauge or Thickness	Edge Flanges	T (in.)	T (mm)	Number of Holes
A12P24	Painted steel	9.00 x 21.00	229 x 533	12 ga.	None	—	—	4
A12P24G	Conductive steel	9.00 x 21.00	229 x 533	12 ga.	None	—	—	4
A16P12	Painted steel	13.00 x 9.00	330 x 229	12 ga.	None	—	—	4
A16P12G	Conductive steel	13.00 x 9.00	330 x 229	12 ga.	None	—	—	4
A16P12SS6	Stainless Steel	13.00 x 9.00	330 x 229	12 ga.	None	—	—	4
A16P12AL	Aluminum	13.00 x 9.00	330 x 229	0.10 in./3 mm	None	—	—	4
A16P16	Painted steel	13.00 x 13.00	330 x 330	12 ga.	None	—	—	4
A16P16G	Conductive steel	13.00 x 13.00	330 x 330	12 ga.	None	—	—	4
A16P16SS6	Stainless Steel	13.00 x 13.00	330 x 330	12 ga.	None	—	—	4
A16P16AL	Aluminum	13.00 x 13.00	330 x 330	0.10 in./3 mm	None	—	—	4
A18P18	Painted steel	15.00 x 15.00	381 x 381	12 ga.	None	—	—	4
A18P18G	Conductive steel	15.00 x 15.00	381 x 381	12 ga.	None	—	—	4
A20P12	Painted steel	17.00 x 9.00	432 x 229	12 ga.	None	—	—	4
A20P12G	Conductive steel	17.00 x 9.00	432 x 229	12 ga.	None	—	—	4
A20P16	Painted steel	17.00 x 13.00	432 x 330	12 ga.	None	—	—	4
A20P16G	Conductive steel	17.00 x 13.00	432 x 330	12 ga.	None	—	—	4
A20P16SS6	Stainless Steel	17.00 x 13.00	432 x 330	12 ga.	None	—	—	4
A20P16AL	Aluminum	17.00 x 13.00	432 x 330	0.10 in./3 mm	None	—	—	4
A20P20	Painted steel	17.00 x 17.00	432 x 432	12 ga.	None	—	—	4
A20P20G	Conductive steel	17.00 x 17.00	432 x 432	12 ga.	None	—	—	4
A20P20SS6	Stainless steel	17.00 x 17.00	432 x 432	12 ga.	None	—	—	4
A20P20AL	Aluminum	17.00 x 17.00	432 x 432	0.10 in./3 mm	None	—	—	4
A24P16	Painted steel	21.00 x 13.00	533 x 330	12 ga.	None	—	—	4
A24P16G	Conductive steel	21.00 x 13.00	533 x 330	12 ga.	None	—	—	4
A24P16SS6	Stainless Steel	21.00 x 13.00	533 x 330	12 ga.	None	—	—	4
A24P20	Painted steel	21.00 x 17.00	533 x 432	12 ga.	2	0.75	19	4
A24P20G	Conductive steel	21.00 x 17.00	533 x 432	12 ga.	2	0.75	19	4
A24P20SS6	Stainless Steel	21.00 x 17.00	533 x 432	12 ga.	2	0.75	19	4
A24P20AL	Aluminum	21.00 x 17.00	533 x 432	0.10 in./3 mm	4	0.75	19	4
A24P24	Painted steel	21.00 x 21.00	533 x 533	12 ga.	2	0.75	19	4
A24P24G	Conductive steel	21.00 x 21.00	533 x 533	12 ga.	2	0.75	19	4
A24P24SS6	Stainless Steel	21.00 x 21.00	533 x 533	12 ga.	2	0.75	19	4
A24P24AL	Aluminum	21.00 x 21.00	533 x 533	0.10 in./3 mm	2	0.75	19	4
A30P16	Painted steel	27.00 x 13.00	686 x 330	12 ga.	2	0.75	19	4
A30P16G	Conductive steel	33.00 x 27.00	838 x 686	12 ga.	2	0.75	19	4
A30P20	Painted steel	27.00 x 17.00	686 x 432	12 ga.	2	0.75	19	4
A30P20G	Conductive steel	27.00 x 17.00	686 x 432	12 ga.	2	0.75	19	4
A30P20SS6	Stainless Steel	27.00 x 17.00	686 x 432	12 ga.	2	0.75	19	4
A30P24	Painted steel	27.00 x 21.00	686 x 533	12 ga.	2	0.75	19	4
A30P24G	Conductive steel	27.00 x 21.00	686 x 533	12 ga.	2	0.75	19	4
A30P24SS6	Stainless Steel	27.00 x 21.00	686 x 533	12 ga.	2	0.75	19	4
A30P24AL	Aluminum	27.00 x 21.00	686 x 533	0.10 in./3 mm	2	0.75	19	4
A30P30	Painted steel	27.00 x 27.00	686 x 686	12 ga.	4	0.75	19	4
A30P30G	Conductive steel	27.00 x 27.00	686 x 686	12 ga.	4	0.75	19	4
A30P30SS6	Stainless Steel	27.00 x 27.00	686 x 686	12 ga.	4	0.75	19	4
A36P16	Painted steel	33.00 x 13.00	838 x 330	12 ga.	2	0.75	19	4
A36P16G	Conductive steel	33.00 x 13.00	838 x 330	12 ga.	2	0.75	19	4
A36P24	Painted steel	33.00 x 21.00	838 x 533	12 ga.	2	0.75	19	6
A36P24G	Conductive steel	33.00 x 21.00	838 x 533	12 ga.	2	0.75	19	6
A36P24SS6	Stainless Steel	33.00 x 21.00	838 x 533	12 ga.	2	0.75	19	6
A36P24AL	Aluminum	33.00 x 21.00	838 x 533	0.10 in./3 mm	2	0.75	19	6
A36P30	Painted steel	33.00 x 27.00	838 x 686	12 ga.	4	0.75	19	6
A36P30G	Conductive steel	33.00 x 27.00	838 x 686	12 ga.	4	0.75	19	6
A36P30SS6	Stainless Steel	33.00 x 27.00	838 x 686	12 ga.	4	0.75	19	6
A36P30AL	Aluminum	33.00 x 27.00	838 x 686	0.10 in./3 mm	4	0.75	19	6
A36P36	Painted steel	33.00 x 33.00	838 x 838	12 ga.	4	0.75	19	8
A36P36G	Conductive steel	33.00 x 33.00	838 x 838	12 ga.	4	0.75	19	8
A36P36SS6	Stainless Steel	33.00 x 33.00	838 x 838	12 ga.	4	0.75	19	8
A40P24	Painted steel	37.00 x 21.00	940 x 533	12 ga.	4	0.75	19	6
A40P24G	Conductive steel	37.00 x 21.00	940 x 533	12 ga.	4	0.75	19	6
A40P30	Painted steel	37.00 x 29.00	940 x 737	12 ga.	4	0.75	19	4 (no D dim. center hole)
A40P30G	Conductive steel	37.00 x 29.00	940 x 737	12 ga.	4	0.75	19	4 (no D dim. center hole)
A42P24	Painted steel	39.00 x 21.00	991 x 533	12 ga.	2	0.75	19	6
A42P24G	Conductive steel	39.00 x 21.00	991 x 533	12 ga.	2	0.75	19	6
A42P30	Painted steel	39.00 x 27.00	991 x 686	12 ga.	4	0.75	19	6
A42P30G	Conductive steel	39.00 x 27.00	991 x 686	12 ga.	4	0.75	19	6
A42P30SS6	Stainless Steel	39.00 x 27.00	991 x 686	12 ga.	4	0.75	19	6
A42P36	Painted steel	39.00 x 33.00	991 x 838	12 ga.	4	0.75	19	8
A42P36G	Conductive steel	39.00 x 33.00	991 x 838	12 ga.	4	0.75	19	8
A42P36SS6	Stainless Steel	39.00 x 33.00	991 x 838	12 ga.	4	0.75	19	8
A42P42	Painted steel	39.00 x 39.00	991 x 991	12 ga.	4	0.75	19	8

Panels for Enclosures

Catalog Number	Material	Panel Size D x E (in.)	Panel Size D x E (mm)	Panel Gauge or Thickness	Edge Flanges	T (in.)	T (mm)	Number of Holes
A42P42G	Conductive steel	39.00 x 39.00	991 x 991	12 ga.	4	0.75	19	8
A48P24	Painted steel	45.00 x 21.00	1143 x 533	12 ga.	2	0.75	19	6
A48P24G	Conductive steel	45.00 x 21.00	1143 x 533	12 ga.	2	0.75	19	6
A48P30	Painted steel	45.00 x 27.00	1143 x 686	12 ga.	4	0.75	19	6
A48P30G	Conductive steel	45.00 x 27.00	1143 x 686	12 ga.	4	0.75	19	6
A48P36	Painted steel	45.00 x 33.00	1143 x 838	12 ga.	4	0.75	19	8
A48P36G	Conductive steel	45.00 x 33.00	1143 x 838	12 ga.	4	0.75	19	8
A48P36S56	Stainless Steel	45.00 x 33.00	1143 x 838	12 ga.	4	0.75	19	8
A48P36AL	Aluminum	45.00 x 33.00	1143 x 838	0.10 in./3 mm	4	0.75	19	8
A48P42	Painted steel	45.00 x 39.00	1143 x 991	12 ga.	4	0.75	19	8
A48P42G	Conductive steel	45.00 x 39.00	1143 x 991	12 ga.	4	0.75	19	8
A48P48	Painted steel	44.00 x 44.00	1118 x 1118	10 ga.	4	0.88	22	8
A48P48G	Conductive steel	44.00 x 44.00	1118 x 1118	10 ga.	4	0.88	22	8
A54P42	Painted steel	50.00 x 38.00	1270 x 965	12 ga.	4	0.75	19	8
A54P42G	Conductive steel	50.00 x 38.00	1270 x 965	10 ga.	4	0.75	19	8
A60P24	Painted steel	57.00 x 21.00	1448 x 533	12 ga.	4	0.75	19	6
A60P24G	Conductive steel	57.00 x 21.00	1448 x 533	12 ga.	4	0.75	19	6
A60P30	Painted steel	57.00 x 27.00	1448 x 686	12 ga.	4	0.75	19	6
A60P30G	Conductive steel	57.00 x 27.00	1448 x 686	12 ga.	4	0.75	19	6
A60P36	Painted steel	57.00 x 33.00	1448 x 838	12 ga.	4	0.75	19	8
A60P36G	Conductive steel	57.00 x 33.00	1448 x 838	12 ga.	4	0.75	19	8
A60P36S56	Stainless Steel	57.00 x 33.00	1448 x 838	12 ga.	4	0.75	19	8
A60P36AL	Aluminum	57.00 x 33.00	1448 x 838	0.10 in./3 mm	4	0.75	19	8
A60BFP42	Painted steel	56.00 x 38.00	1422 x 965	10 ga.	4	0.88	22	10
A60BFP42G	Conductive steel	56.00 x 38.00	1422 x 965	10 ga.	4	0.88	22	10
A60P48	Painted steel	56.00 x 44.00	1422 x 1118	10 ga.	4	0.88	22	12
A60P48G	Conductive steel	56.00 x 44.00	1422 x 1118	10 ga.	4	0.88	22	12
A60P60	Painted steel	56.00 x 56.00	1422 x 1422	10 ga.	4	0.88	22	10
A60P60G	Conductive steel	56.00 x 56.00	1422 x 1422	10 ga.	4	0.88	22	10
A72P36	Painted steel	69.00 x 33.00	1753 x 838	12 ga.	4	0.75	19	8
A72P36G	Conductive steel	69.00 x 33.00	1753 x 838	12 ga.	4	0.75	19	8
A72P60	Painted steel	68.00 x 56.00	1727 x 1422	10 ga.	4	0.88	22	12
A72P60G	Conductive steel	68.00 x 56.00	1727 x 1422	10 ga.	4	0.88	22	12
A72P72	Painted steel	68.00 x 68.00	1727 x 1727	10 ga.	4	0.88	22	10
A72P72G	Conductive steel	68.00 x 68.00	1727 x 1727	10 ga.	4	0.88	22	10



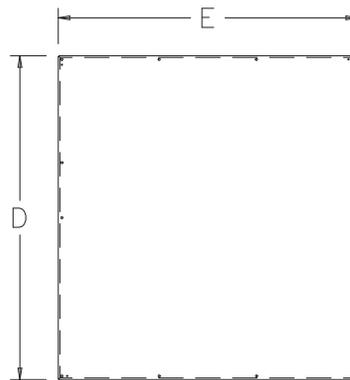
Panels for Enclosures

Panels for Large Bulletin A27, A28, A28S4 and A34 Multi-Door Enclosures

Extra panels for large enclosures (Bulletins A27, A28, A28S4 and A34) can be ordered for panel assembly prior to receiving the enclosures (enclosures include panels). Panels are 12 gauge steel with .88-in. (22-mm) flanges on four sides. Finish is white polyester powder paint or a conductive, corrosion-resistant coating. Two extra holes are provided for lifting and installing panels. Mounting hardware included with enclosure.

Bulletin: PNLFS

Catalog Number	Finish	Panel Size D x E (in.)	Panel Size D x E (mm)	Number of Holes	Fits Enclosure Height
A72PM28	Painted steel	60.00 x 21.75	1524 x 552	8	72 in.
A72PM28G	Conductive	60.00 x 21.75	1524 x 552	8	72 in.
A72PM34	Painted steel	60.00 x 27.75	1524 x 705	8	72 in.
A72PM34G	Conductive	60.00 x 27.75	1524 x 705	8	72 in.
A72PM40	Painted steel	60.00 x 33.75	1524 x 857	8	72 in.
A72PM40G	Conductive	60.00 x 33.75	1829 x 857	8	72 in.
A72PM54	Painted steel	60.00 x 48.00	1524 x 1219	10	72 in.
A72PM54G	Conductive	60.00 x 48.00	1524 x 1219	10	72 in.
A72PM66	Painted steel	60.00 x 60.00	1524 x 1524	10	72 in.
A72PM66G	Conductive	60.00 x 60.00	1524 x 1524	10	72 in.
A72PM78	Painted steel	60.00 x 72.00	1524 x 1829	12	72 in.
A72PM78G	Conductive	60.00 x 72.00	1524 x 1829	12	72 in.
A84PM40	Painted steel	72.00 x 33.75	1829 x 857	8	84 in.
A84PM40G	Conductive	72.00 x 33.75	1829 x 857	8	84 in.
A84PM78	Painted steel	72.00 x 72.00	1829 x 1829	12	84 in.
A84PM78G	Conductive	72.00 x 72.00	1829 x 1829	12	84 in.
A86PM37	Painted steel	78.00 x 34.00	1981 x 864	8	86 in.
A86PM37G	Conductive	78.00 x 34.00	1981 x 864	8	86 in.
A86PM75	Painted steel	78.00 x 70.00	1981 x 1778	12	86 in.
A86PM75G	Conductive	78.00 x 70.00	1981 x 1778	12	86 in.
A90PM40	Painted steel	78.00 x 33.75	1981 x 857	8	90 in.
A90PM40G	Conductive	78.00 x 33.75	1981 x 857	8	90 in.
A90PM78	Painted steel	78.00 x 72.00	1981 x 1829	12	90 in.
A90PM78G	Conductive	78.00 x 72.00	1981 x 1829	12	90 in.



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Panels for Enclosures

Panels for Free-Stand Type 1 Large One-Door Enclosures

Panels for free-stand Type 1 large one-door standard and disconnect enclosures are 12 gauge steel. Panels have either polyester powder paint finish or a conductive, corrosion-resistant coating.

Bulletin: A26P, A38P

Catalog Number	Finish	Panel Size D x E (in.)	Panel Size D x E (mm)
A37P21N	Painted steel	37.16 x 21.50	944 x 546
A37P21NG	Conductive	37.16 x 21.50	944 x 546
A49P21N	Painted steel	49.16 x 21.50	1249 x 546
A49P21NG	Conductive	49.16 x 21.50	1249 x 546
A61P21N	Painted steel	61.16 x 21.50	1553 x 546
A73P21N	Painted steel	73.16 x 21.50	1858 x 546
A73P21NG	Conductive	73.16 x 21.50	1858 x 546
A49P32N	Painted steel	49.16 x 32.00	1249 x 813
A49P32NG	Conductive	49.16 x 32.00	1249 x 813
A61P32N	Painted steel	61.16 x 32.00	1553 x 813
A61P32NG	Conductive	61.16 x 32.00	1553 x 813
A73P32N	Painted steel	73.16 x 32.00	1858 x 813
A73P32NG	Conductive	73.16 x 32.00	1858 x 813

Panels for Free-Stand Type 1 Large Two-Door Enclosures

Panels for free-stand Type 1 large two-door standard and disconnect enclosures are 10 gauge steel. Panels have either polyester powder paint finish or a conductive, corrosion-resistant coating.

Bulletin: A38P

Catalog Number	Finish	Panel Size D x E (in.)	Panel Size D x E (mm)
A37P48N	Painted steel	37.16 x 48.00	944 x 1219
A37P48NG	Conductive	37.16 x 48.00	944 x 1219
A49P48N	Painted steel	49.16 x 48.00	1249 x 1219
A49P48NG	Conductive	49.16 x 48.00	1249 x 1219
A49P68N	Painted steel	49.16 x 68.00	1249 x 1727
A49P68NG	Conductive	49.16 x 68.00	1249 x 1727
A61P68N	Painted steel	61.16 x 68.00	1553 x 1727
A61P68NG	Conductive	61.16 x 68.00	1553 x 1727
A73P68N	Painted steel	73.16 x 68.00	1858 x 1727
A73P68NG	Conductive	73.16 x 68.00	1858 x 1727

Panels for Enclosures

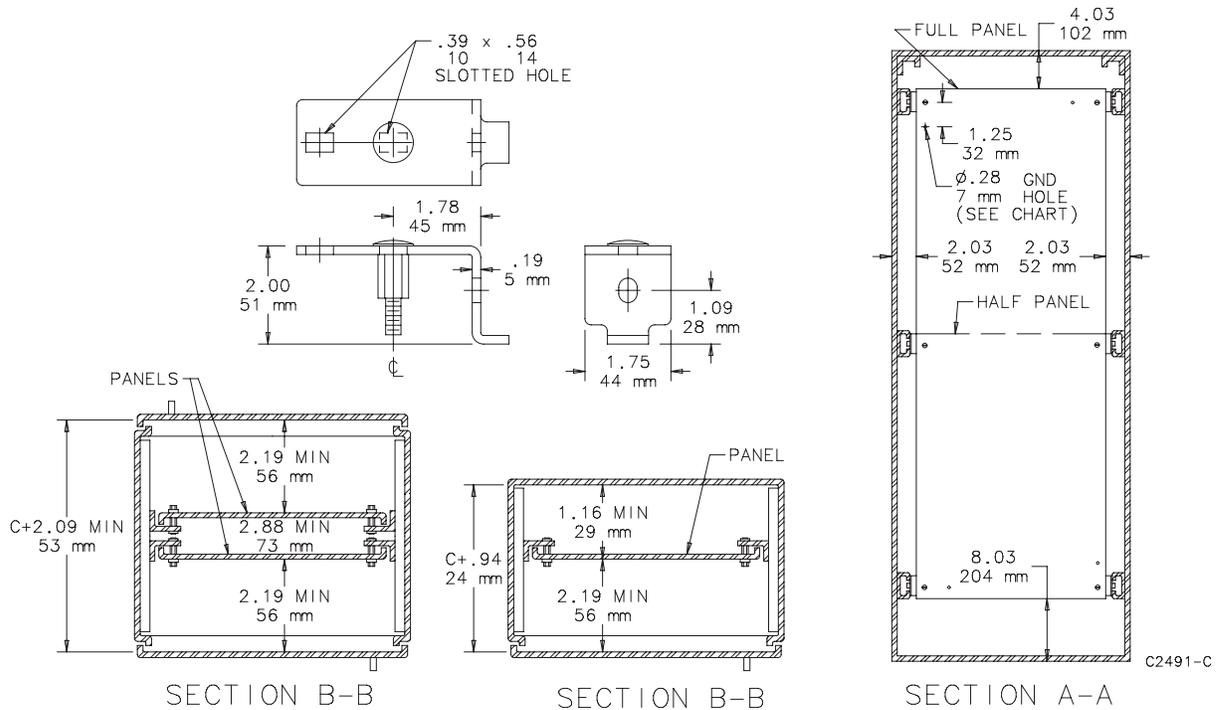
Panels for Free-Stand Type 4, 4X and 12 Single- and Dual-Access One-Door Enclosures with Mounting Channel

Panels for one-door, single-access and one-door, dual-access Free-Stand Type 12 Enclosures, Free-Stand Type 4 Enclosures and One-Door Type 4X Free-Stand Fiberglass Enclosures. Panels are 12 gauge steel and can be positioned anywhere along horizontal mounting channels (see dimension drawing Sections B-B for limitations). Half-length panels can be located in the upper or lower portion of the enclosure. Panels are finished with white polyester powder paint or a conductive, corrosion-resistant coating and furnished with plated mounting hardware.

Bulletin: PNL30, PNLFS

Catalog Number	Description	Finish	Panel Size (in.)	Panel Size (mm)	Fits Enclosure A x B (in.)	Fits Enclosure A x B (mm)
A60P24F1	Full Panel	Painted steel	48.00 x 20.00	1218 x 508	60.00 x 24.00	1524 x 610
A60P24F1G	Full Panel	Conductive	48.00 x 20.00	1218 x 508	60.00 x 24.00	1524 x 610
A60P24F2	Half Panel	Painted steel	24.88 x 20.00	632 x 508	60.00 x 24.00	1524 x 610
A60P24F2G	Half Panel	Conductive	24.88 x 20.00	632 x 508	60.00 x 24.00	1524 x 610
A72P24F1	Full Panel	Painted steel	60.00 x 20.00	1524 x 508	72.00 x 24.00	1829 x 610
A72P24F1G	Full Panel	Conductive	60.00 x 20.00	1524 x 508	72.00 x 24.00	1829 x 610
A72P24F2	Half Panel	Painted steel	30.88 x 20.00	784 x 508	72.00 x 24.00	1829 x 610
A72P24F2G	Half Panel	Conductive	30.88 x 20.00	784 x 508	72.00 x 24.00	1829 x 610
A90P24F1	Full Panel	Painted steel	78.00 x 20.00	1981 x 508	90.00 x 24.00	2286 x 610
A90P24F1G	Full Panel	Conductive	78.00 x 20.00	1981 x 508	90.00 x 24.00	2286 x 610
A90P24F2	Half Panel	Painted steel	39.88 x 20.00	1013 x 508	90.00 x 24.00	2286 x 610
A90P24F2G	Half Panel	Conductive	39.88 x 20.00	1013 x 508	90.00 x 24.00	2286 x 610
A72P30F1	Full Panel	Painted steel	60.00 x 26.00	1524 x 660	72.00 x 30.00	1829 x 762
A72P30F1G	Full Panel	Conductive	60.00 x 26.00	1524 x 660	72.00 x 30.00	1829 x 762
A72P30F2	Half Panel	Painted steel	30.88 x 26.00	784 x 660	72.00 x 30.00	1829 x 762
A72P30F2G	Half Panel	Conductive	30.88 x 26.00	784 x 660	72.00 x 30.00	1829 x 762
A60P36F1	Full Panel	Painted steel	48.00 x 32.00	1219 x 813	60.00 x 36.00	1524 x 914
A60P36F1G	Full Panel	Conductive	48.00 x 32.00	1219 x 813	60.00 x 36.00	1524 x 914
A60P36F2	Half Panel	Painted steel	24.88 x 32.00	632 x 813	60.00 x 36.00	1524 x 914
A60P36F2G	Half Panel	Conductive	24.88 x 32.00	632 x 813	60.00 x 36.00	1524 x 914
A72P36F1	Full Panel	Painted steel	60.00 x 32.00	1524 x 813	72.00 x 36.00	1829 x 914
A72P36F1G	Full Panel	Conductive	60.00 x 32.00	1524 x 813	72.00 x 36.00	1829 x 914
A72P36F2	Half Panel	Painted steel	30.88 x 32.00	784 x 813	72.00 x 36.00	1829 x 914
A72P36F2G	Half Panel	Conductive	30.88 x 32.00	784 x 813	72.00 x 36.00	1829 x 914
A90P36F1	Full Panel	Painted steel	78.00 x 32.00	1981 x 813	90.00 x 36.00	2286 x 914
A90P36F1G	Full Panel	Conductive	78.00 x 32.00	1981 x 813	90.00 x 36.00	2286 x 914
A90P36F2	Half Panel	Painted steel	39.88 x 32.00	1013 x 813	90.00 x 36.00	2286 x 914
A90P36F2G	Half Panel	Conductive	39.88 x 32.00	1013 x 813	90.00 x 36.00	2286 x 914

Use combinations of panels for 3-5 door A 28 enclosures.



Panels for Enclosures

Panels for Free-Stand Type 4, 4X and 12 Single- and Dual-Access Two-Door Enclosures with Mounting Channel

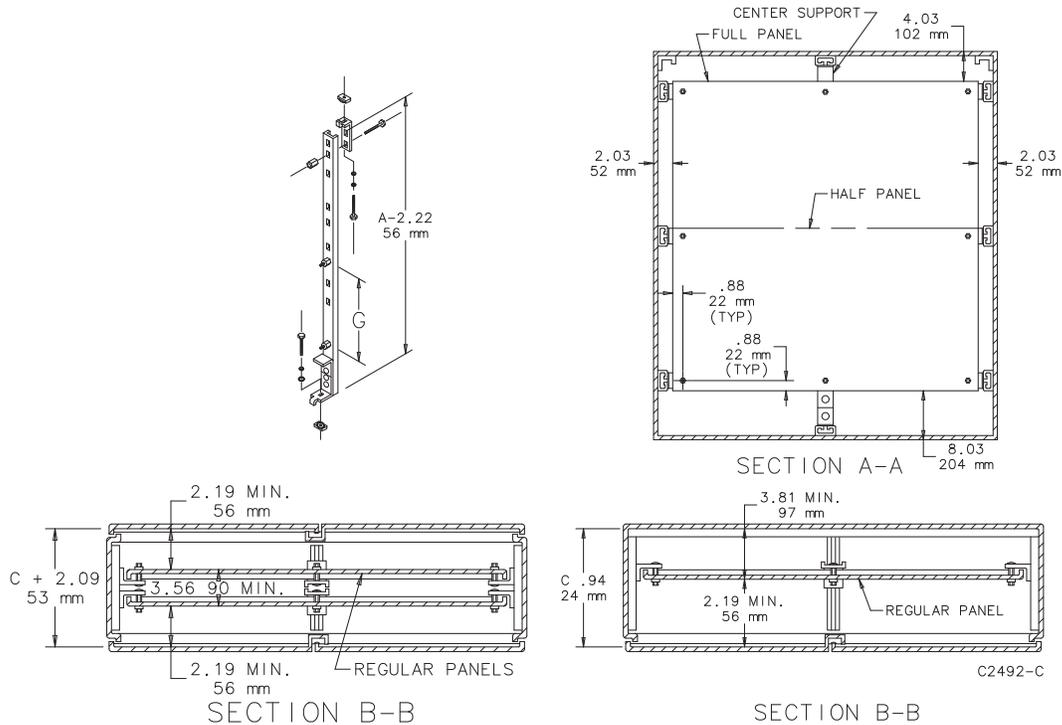
Panels for two-door single access and two-door dual access Free-Stand Type 4, 4X and 12 Enclosures with mounting channel are 10 gauge steel and can be positioned anywhere along horizontal mounting channels (see Sections B-B for limitations). Half-length panels can be located in the upper or lower portion of the enclosure. Some assembly is required.

Panels are finished with white polyester powder paint or a conductive, corrosion-resistant coating and furnished with plated mounting hardware.

Center support is furnished with each full panel or half panel for two-door enclosures. The center support attaches to the top and bottom mounting channels and can be positioned from front to back in the enclosure. The center support can be used with heavy duty panel supports to support panels of various heights.

Bulletin: PNL30, PNLFS

Catalog Number	Description	Fits Enclosure		Panel Size (in.)	Panel Size (mm)	G (in.)	G (mm)
		A x B (in.)	A x B (mm)				
A60P48F1	Full Panel	60.00 x 48.00	1524 x 1219	48.00 x 44.00	1219 x 1118	23.12	587
A60P48F1G	Full Panel	60.00 x 48.00	1524 x 1219	48.00 x 44.00	1219 x 1118	23.12	587
A72P48F1	Full Panel	72.00 x 48.00	1829 x 1219	60.00 x 44.00	1524 x 1118	29.12	740
A72P48F1G	Full Panel	72.00 x 48.00	1829 x 1219	60.00 x 44.00	1524 x 1118	29.12	740
A72P48F2	Half Panel	72.00 x 48.00	1829 x 1219	30.88 x 44.00	784 x 1118	29.12	740
A72P48F2G	Half Panel	72.00 x 48.00	1829 x 1219	30.88 x 44.00	784 x 1118	29.12	740
A90P48F1	Full Panel	90.00 x 48.00	2286 x 1219	78.00 x 44.00	1981 x 1118	38.12	968
A90P48F1G	Full Panel	90.00 x 48.00	2286 x 1219	78.00 x 44.00	1981 x 1118	38.12	968
A90P48F2	Half Panel	90.00 x 48.00	2286 x 1219	39.88 x 44.00	1013 x 1118	38.12	968
A90P48F2G	Half Panel	90.00 x 48.00	2286 x 1219	39.88 x 44.00	1013 x 1118	38.12	968
A72P60F1	Full Panel	72.00 x 60.00	1829 x 1524	60.00 x 56.00	1524 x 1422	29.12	740
A72P60F1G	Full Panel	72.00 x 60.00	1829 x 1524	60.00 x 56.00	1524 x 1422	29.12	740
A72P60F2	Half Panel	72.00 x 60.00	1829 x 1524	30.88 x 56.00	784 x 1422	29.12	740
A72P60F2G	Half Panel	72.00 x 60.00	1829 x 1524	30.88 x 56.00	784 x 1422	29.12	740
A72P72F1	Full Panel	72.00 x 72.00	1829 x 1829	60.00 x 68.00	1524 x 1727	29.12	740
A72P72F1G	Full Panel	72.00 x 72.00	1829 x 1829	60.00 x 68.00	1524 x 1727	29.12	740
A72P72F2	Half Panel	72.00 x 72.00	1829 x 1829	30.88 x 68.00	784 x 1727	29.12	740
A72P72F2G	Half Panel	72.00 x 72.00	1829 x 1829	30.88 x 68.00	784 x 1727	29.12	740
A90P72F1	Full Panel	90.00 x 72.00	2286 x 1829	78.00 x 68.00	1981 x 1727	38.12	968
A90P72F1G	Full Panel	90.00 x 72.00	2286 x 1829	78.00 x 68.00	1981 x 1727	38.12	968
A90P72F2	Half Panel	90.00 x 72.00	2286 x 1829	39.88 x 68.00	1013 x 1727	38.12	968
A90P72F2G	Half Panel	90.00 x 72.00	2286 x 1829	39.88 x 68.00	1013 x 1727	38.12	968



Panels for Enclosures

Side-Mounted Panels

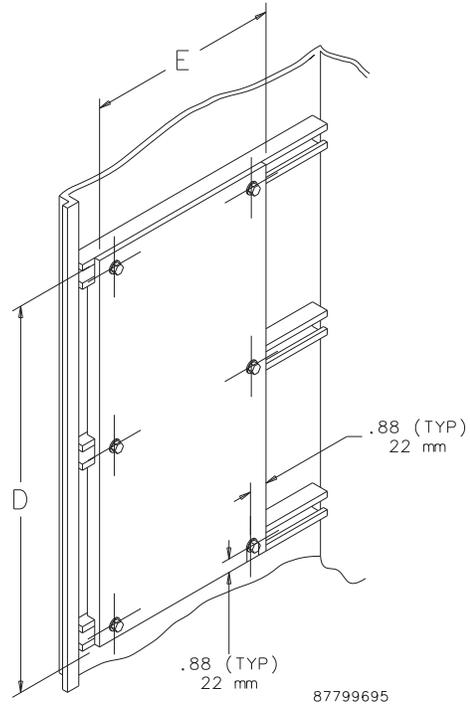
Panels provide extra mounting space on the sides of enclosures. 12 gauge steel side-mounting panels are painted white. Conductive panels are steel with a conductive, corrosion-resistant coating. Panels attach securely to mounting channels. Plated steel mounting hardware is furnished.

Bulletin: PNL30, PNLFS

Catalog Number	Description	Panel Size D x E in./mm	Fits Enclosure A in./mm
A60SMP14	Painted steel	48.00 x 14.00 1219 x 356	60.00 1524
A60SMP14G	Conductive	48.00 x 14.00 1219 x 356	60.00 1524
A72SMP14	Painted steel	60.00 x 14.00 1524 x 356	72.00 1829
A72SMP14G	Conductive	60.00 x 14.00 1524 x 356	72.00 1829
A72SMP20	Painted steel	60.00 x 20.00 1524 x 508	72.00 1829
A72SMP20G	Conductive	60.00 x 20.00 1524 x 508	72.00 1829
A90SMP14	Painted steel	78.00 x 14.00 1981 x 356	90.00 2286
A90SMP14G	Conductive	78.00 x 14.00 1981 x 356	90.00 2286
A90SMP20	Painted steel	78.00 x 20.00 1981 x 508	90.00 2286
A90SMP20G	Conductive	78.00 x 20.00 1981 x 508	90.00 2286

A90SMP14 and A90SMP14G will not fit 18.06-in. deep two-door enclosures (FSD style) if regular panel is also installed.

A90SMP20 and A90SMP20G will not fit 20.12-in. deep enclosures. Will not fit 24.12-in. deep two-door enclosures (FSD style) if regular panel is also installed.

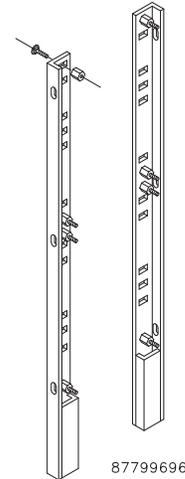


Heavy Duty Panel Supports

Heavy Duty Panel Supports, sold in pairs, are used in place of the panel supports furnished with panels when heavy equipment will be installed on the panels. They extend to the bottom of the enclosure. Adjustable mounting studs allow mounting of different height panels or a combination of panels. Use mounting hardware furnished with panels.

Bulletin: A80

Catalog Number	Fits Enclosure A in./mm	Support Length in./mm
A60FSHDPS	60.00 1524	57.25 1454
A72FSHDPS	72.00 1829	69.25 1759
A90FSHDPS	90.00 2286	87.25 2216



Panels for Enclosures

Center Panel Supports

Center panel supports are used with Free-Stand Type 12 (Bulletin A30) two-door enclosures. They permit the installation of panels, swing-out panels and rack-mounting angles sized for one-door enclosures. The Center Panel Support can be positioned from front to back of the enclosure.

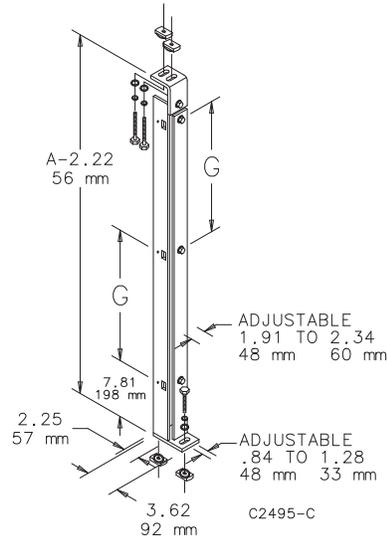
Bulletin: A80

Standard Product Panel Supports

Catalog Number	Fits Enclosure A (in.)	Fits Enclosure A (mm)	G (in.)	G (mm)
A60FSCPS	60.00	1524	23.12	587
A72FSCPS	72.00	1829	29.12	740
A90FSCPS	90.00	2286	38.12	968

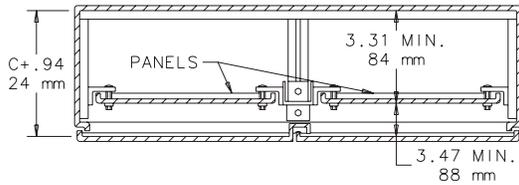
Accessory Width with Center Panel Supports

Two Door Enclosure Width (in.)	Two Door Enclosure Width (mm)	Accessory Width (in.)	Accessory Width (mm)
48.00	1219	24.00	610
60.00	1524	30.00	762
72.00	1829	36.00	914



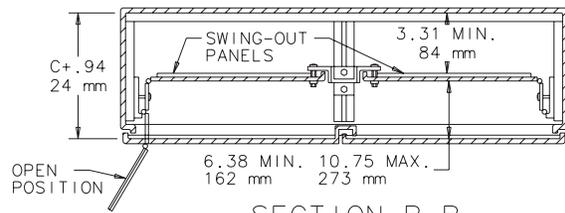
Panels for Enclosures

Center Panel Supports Enclosure Section Views



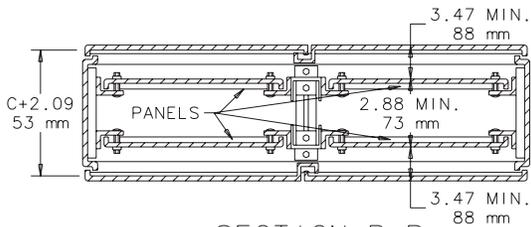
SECTION B-B

Showing two panels (for one-door enclosures) and center panel support mounted in two-door enclosure.



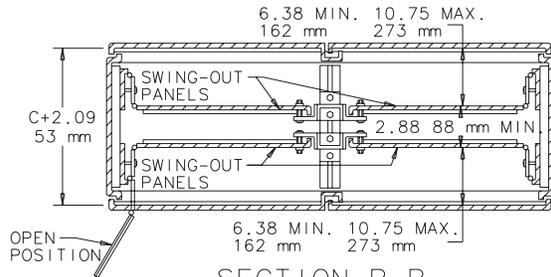
SECTION B-B

Showing four swing-out panels and center panel support mounted in two-door enclosure.



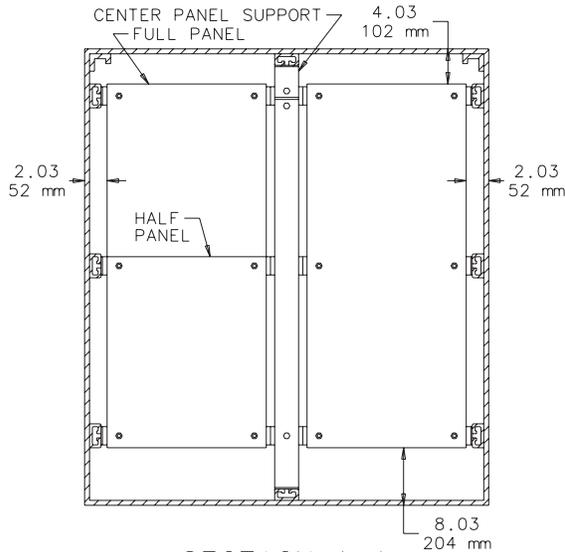
SECTION B-B

Showing four panels (for one-door enclosures) and two center panel supports mounted in two-door access enclosure.



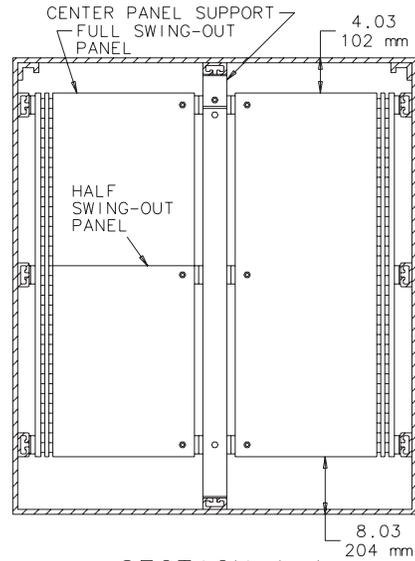
SECTION B-B

Showing four swing-out panels and two center panel supports mounted in two-door dual access enclosure.



SECTION A-A

Panels shown are for one-door free-stand enclosures. Half panel fits in top or bottom half of enclosure.



SECTION A-A

Showing swing-out panels installed in one-door enclosure.

C2496-C

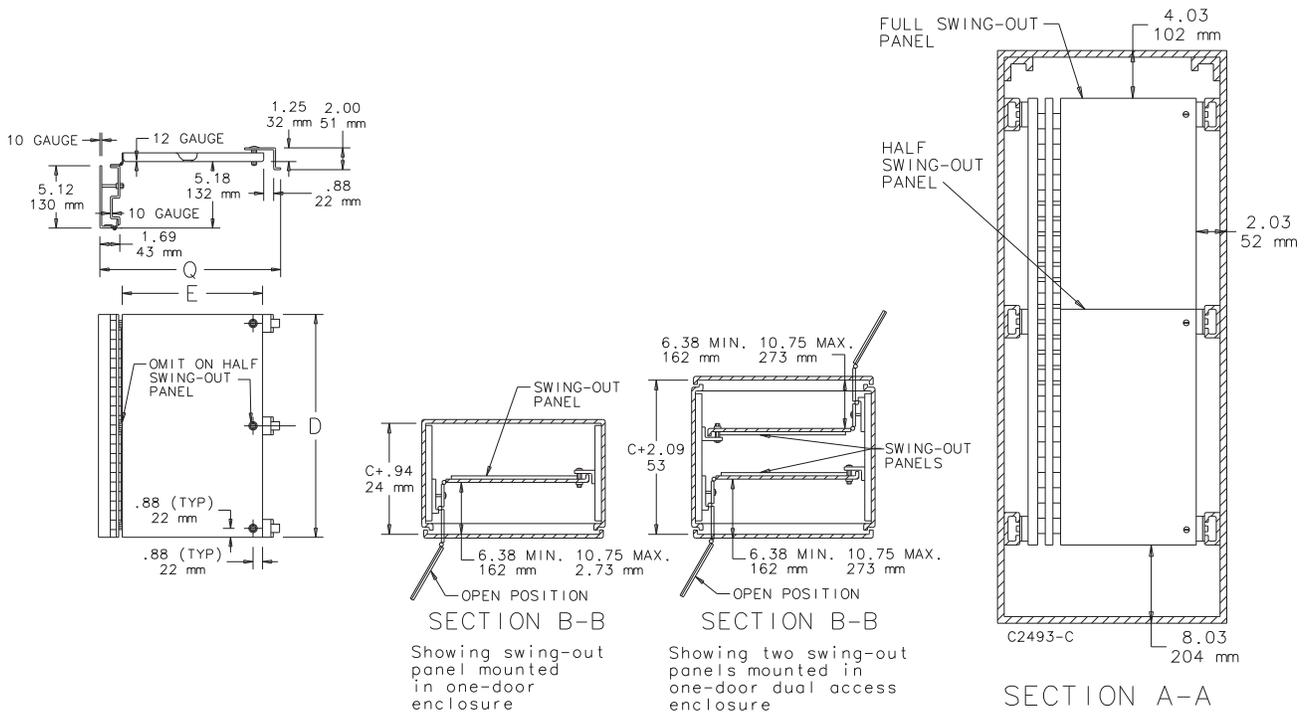
Panels for Enclosures

Swing-Out Panels for Free-Stand Type 4, 4X and 12 Enclosures with Mounting Channel

Panels for Free-Stand Type 12 Enclosures, Free-Stand Type 4 Enclosures and One-Door Type 4X Free-Stand Fiberglass Enclosures. Full-length and half-length swing-out panels are available. Half-length panels can be located in the upper or lower portion of the enclosures. Swing-out panels have a 10 gauge steel support frame and two heavy-gauge continuous hinges which permit the panel to swing completely out of the enclosure if it is located within approximately 10.75 in. (273 mm) of the door. These panels are 12 gauge steel and can be mounted on either side of the enclosure. Panels are finished with white polyester powder paint and furnished with plated mounting hardware.

Bulletin: PNL30

Catalog Number	Description	Panel Size D x E (in.)	Panel Size D x E (mm)	Fits Enclosure A x B (in.)	Fits Enclosure A x B (mm)	Q (in.)	Q (mm)
A72SP24F3	Full Panel	60.00 x 18.81	1524 x 478	72.00 x 24.00	1829 x 610	21.84	555
A72SP24F4	Half Panel	30.88 x 18.81	784 x 478	72.00 x 24.00	1829 x 610	21.84	555
A72SP30F3	Full Panel	60.00 x 24.81	1524 x 630	72.00 x 30.00	1829 x 762	27.84	707
A72SP30F4	Half Panel	30.88 x 24.81	784 x 630	72.00 x 30.00	1829 x 762	27.84	707
A72SP36F3	Full Panel	60.00 x 30.81	1524 x 783	72.00 x 36.00	1829 x 914	33.84	860
A72SP36F4	Half Panel	30.88 x 30.81	784 x 783	72.00 x 36.00	1829 x 914	33.84	860
A90SP36F3	Full Panel	78.00 x 30.81	1981 x 783	90.00 x 36.00	2286 x 914	33.84	860
A90SP36F4	Half Panel	39.88 x 30.81	1013 x 783	90.00 x 36.00	2286 x 914	33.84	860



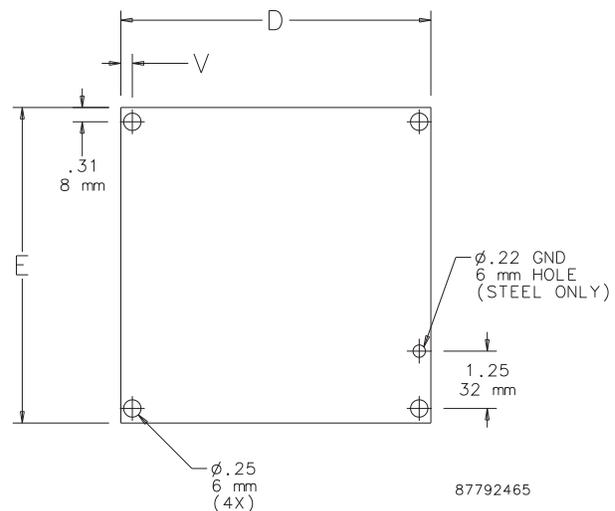
Panels for WiFi Cabinets and Small Wall-Mount Enclosures



Panels are available in both steel and wood. Steel panels are 14 gauge steel with a white polyester powder paint finish. Wood panels are 3/4-in. plywood and are unfinished. Wood panels are supplied with Fiberglass Hinged-Cover and POLYPRO® Type 4X WiFi Cabinets.

Bulletin: DWS12, PNLJ, PNLWM

Catalog Number	Material	Panel Size D x E (in.)	Panel Size D x E (mm)	V (in.)	V (mm)
A6P6	Steel	4.88 x 4.88	124 x 124	0.31	8
A6P6WD	Wood	4.88 x 4.88	124 x 124	0.31	8
A16P14	Steel	14.75 x 12.88	375 x 327	0.25	6
A16P14WD	Wood	14.75 x 12.88	375 x 327	0.25	6
A18P16	Steel	16.75 x 14.88	425 x 378	0.25	6
A18P16WD	Wood	16.75 x 14.88	425 x 378	0.25	6



PSH300A
Shown
With
Cover



PSH300A
Shown
Without
Cover



PSMN300A



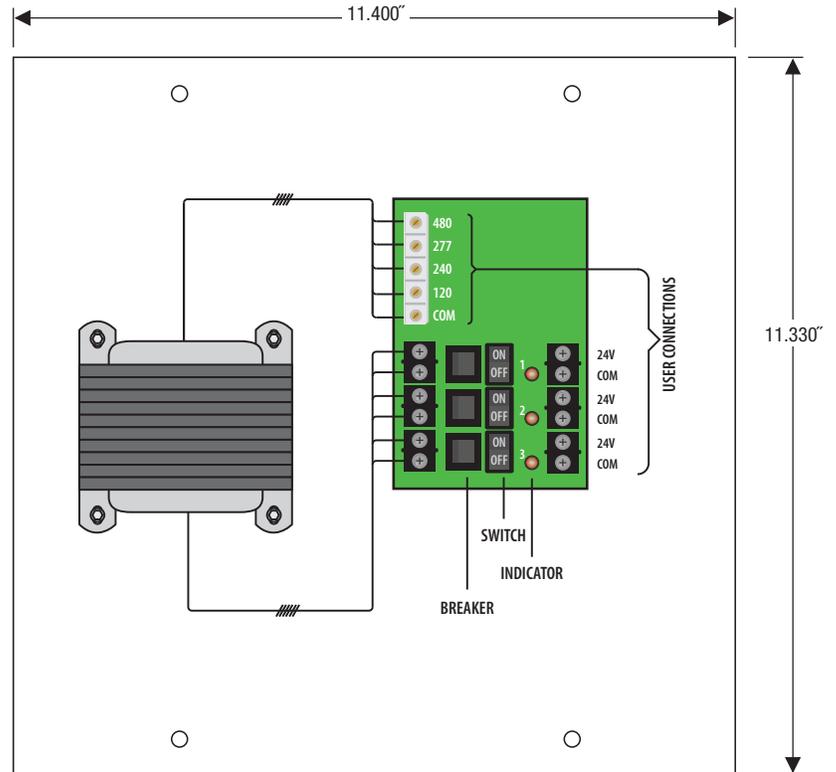
AC Power Supply

PSH300A

Enclosed 300VA Power Supply with Three 100VA Class 2 Outputs, 480/277/240/120 Vac to 24 Vac

PSMN300A

Sub-Panel Mounted 300VA Power Supply with Three 100VA Class 2 Outputs, 480/277/240/120 Vac to 24 Vac



SPECIFICATIONS

<p>Transformer: One (1) 300 VA</p> <p>Over Current Protection: Circuit Breaker</p> <p>Primary: 480/277/240/120 Vac</p> <p>Frequency: 50/60 Hz</p> <p>Dimensions: 12.125" x 12.125" x 6.000" (PSH300A) 11.330" x 11.400" x 4.500" (PSMN300A)</p> <p>Approvals: Class 2 UL Listed, UL916, UL508, C-UL, CE, RoHS</p> <p>Sub-Panel: Plenum Rated Polymetal Sub-Panel (PSMN300A)</p> <p>Housing: NEMA1 Metal Enclosure (PSH300A)</p> <p>Weight: 18.08 lbs. (PSH300A) 12.06 lbs. (PSMN300A)</p>	<p>3 Secondaries: 24 Vac, with LED Indicators</p> <p>24 Vac ON/OFF: On / Off Switch & Breaker</p> <p>Input: 480/277/240/120 Vac Finger-Safe Terminals, 8-18 AWG</p> <p>Output: 3 Isolated, Floating 100 VA Class 2 24 Vac Terminals, 12-26 AWG</p> <p>Notes: » To order UL508, add "-IC" to end of model number.</p>	<p>Standby Wattage: 16.61 W @ 120 Vac 17.70 W @ 240 Vac 16.26 W @ 277 Vac 19.20 W @ 480 Vac</p> <p>Full Load Primary Current: 2.66 A @ 120 Vac 1.36 A @ 240 Vac 1.18 A @ 277 Vac 0.68 A @ 480 Vac</p> <p>Ambient Temperature Derating: 4A up to 40° C ; 3A up to 50° C ; 2A up to 55° C (When All 3 Outputs Operated Simultaneously)</p>
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Great for VAV Applications

Humidity & Combination Temp/Humidity Sensors

Rev. 12/08/10

Features & Options

- Low Profile Delta Style Enclosure
- Humidity Only or Temp./Humidity Combo
- Optional Display
- 2% and 3% RH Accuracies
- Optional Communications Jack
- User Adjustable Toggle Rate Between Temperature and Humidity
- Wide Selection of Temperature Sensing Elements
- Full-range Temperature Compensation of RH Signal
- Two Year Warranty



Delta Style Enclosures with and without Display

The Delta Style room units are available as Humidity Only sensors or as Combination temperature and humidity sensors. The Delta Style enclosure features an optional display with a user adjustable toggle rate between humidity and temperature and can display in either °C or °F.

The unit is available with the entire line of BAPI temperature sensors. In addition, these units save time and money by allowing for field replacement of humidity elements without recalibration. If a temperature transmitter and humidity transmitter are desired, then see the "X-Combo" Unit on page B12-13 of this section.

For detailed specs on the individual Sensors & Transmitters, turn to the "Sensors" section.

* All Passive Thermistors 10K Ω and smaller are CE compliant.

The BAPI-Guard™

- Prevents Tampering, Physical Damage and Unauthorized Adjustment
- Exceptional Airflow for Proper Thermostat Operation
- Two Sizes to Fit Most Thermostats



BAPI-Guard Mounted Over a Thermostat

(See Accessories for more info.)

Specifications

Power: 10 to 35 VDC (0 - 5 VDC or 4 - 20 mA Outputs)
 15 to 40 VDC (0 - 10 VDC Output)
 12 to 24 VAC (0 - 5 VDC Output)
 15 to 28 VAC (0 - 10 VDC Output)

Power Consumption:
 22 mA max. DC (0 - 5 VDC or 4 - 20 mA Outputs)
 6 mA max DC (0 - 10 VDC Output)
 0.53 VA max. AC (0 - 5 VDC Output)
 0.14 VA max. AC (0 - 10 VDC Output)

Sensing Elements:
 Temperature - Thermistor, RTD or Semiconductor
 Humidity - Impedance Type, $\pm 2\%$ or $\pm 3\%$ RH

RH Calb. Adjustment: $\pm 2\%$ POT

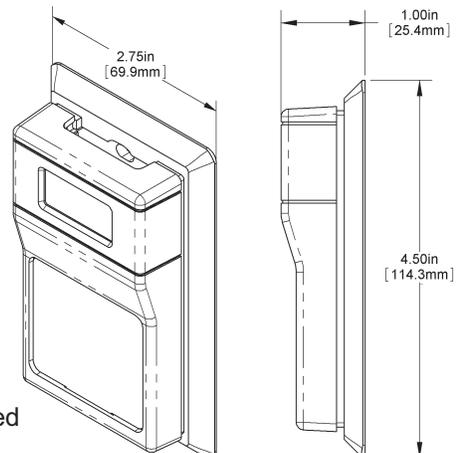
Wiring: 2 to 3 pair of 16 to 22 AWG*

Mounting: Standard 2"x4" J-box or drywall mount - screws provided

Environmental Operation Range:
 Temperature: 32 to 122 °F (0 to 50 °C)
 Humidity: 0 to 95%, non-condensing

Material: ABS Plastic

Material Rating: UL 94, V-0



* BAPI recommends that you do not run wiring for the room units in the same conduit as line voltage wiring or with wiring used to supply highly inductive loads such as motors, generators, and coils.



Delta Style Room Units **B15**

Humidity & Combination Temp/Humidity Sensors

Rev. 12/08/10

Ordering Information		Delta Style Room Unit, Humidity only or Temp./Humidity Combo			
BA/					
Optional Temp. Sensor Use the designator number, shown to the left in bold. Omit if ordering humidity only					
##-	THERMISTORS			RTDs	
	1.8K	1.8K Ω @ 25 °C	100	100 Ω Platinum @ 0 °C, .385 Ω /°C temp. coeff.	
	2.2K	2.2K Ω @ 25 °C	1K [375]	1K Ω Platinum @ 0 °C, 3.75 Ω /°C temp. coeff.	
	3K	3K Ω @ 25 °C	1K[NI]	1K Ω Nickel @ 21°C, 5 Ω /°C temp. coeff.	
	3.25K	3.25K Ω @ 25 °C (T30 type)	1K	1K Ω Platinum @ 0 °C, 3.85 Ω /°C temp. coeff.	
	3.3K	3.3K Ω @ 25 °C	2K	2K Ω Silicon @ 20 °C, 8 Ω /°C temp. coeff.	
	10K-2	10K Ω @ 25 °C			
	10K-3	10K Ω @ 25 °C			
	10K-3[11K]	5,238 Ω @ 25 °C			
	20K	20K Ω @ 25 °C			
	47K	47K Ω @ 25 °C	334	LM334 Semiconductor	
	50K	50K Ω @ 25 °C	592	AD592 Semiconductor, 273 μ A @ 0 °C	
	100K	100K Ω @ 25 °C			
	TEMPERATURE TRANSMITTERS				
	T10K - Note See T10K Specific ordering grid below				
Humidity Transmitter Must select one					
H200	\pm 2% Humidity Transmitter with Interchangeable Output of 0 to 5 V or 4 to 20 mA*				
H210	\pm 2% Humidity Transmitter with 0 to 10 V Output				
H300	\pm 3% Humidity Transmitter with Interchangeable Output of 0 to 5 V or 4 to 20 mA*				
H310	\pm 3% Humidity Transmitter with 0 to 10 V Output				
Delta Style Enclosure Must select					
-R	Delta Style Room Enclosure				
Optional LCD Display Omit if ordering a unit without display					
D	LCD Display				
Optional Comm. Jack Mounted in unit's base					
-C35L	3.5 mm Phono Jack w/ Leads Attached				
-C35LT	3.5 mm Phono Jack w/ Leads & Terminal Block				
EXAMPLE					
BA/	10K-2	H200	-R	D	-C35L
Example Part Number: BA/10K-2-H200-RD-35L					
Your Part Number:					

*DC input voltage is required for current output.

See the "X-Combo" Unit on page B12-13 for more Temperature Transmitter & Humidity Transmitter combination options.

Call BAPI if you have questions about the above ordering grid or the configuration of the product you are ordering.

Ordering Information		T10K Transmitter Grid for Delta Style Room Units			
BA/					
Sensor Type Must select one					
T10K[range]	TEMPERATURE TRANSMITTERS Must include a "range" figure				
	T10K[range]	10K Thermistor, 10,000 Ω @ 25 °C with 4 to 20 mA Output			
	TEMPERATURE TRANSMITTER RANGES				
	Custom temperature transmitter ranges are available. Common ranges are listed below				
	0 TO 100F	-18 TO 38C	50 TO 90F	10 TO 32C	
	40 TO 90F	4 TO 32C	55 TO 85F	13 TO 30C	
	45 TO 96F	7 TO 35C	60 TO 80F	15 TO 27C	
			65 TO 80F	18 TO 27C	
	Humidity Transmitter Must select one				
	-H205	\pm 2% Humidity Transmitter with 0 to 5 V output for temperature & humidity transmitters			
-H220	\pm 2% Humidity Transmitter with 4 to 20 mA* output for temperature & humidity transmitters				
-H305	\pm 3% Humidity Transmitter with 0 to 5 V output for temperature & humidity transmitters				
-H320	\pm 3% Humidity Transmitter with 4 to 20 mA* output for temperature & humidity transmitters				
Enclosure Style Must select one					
-R	Delta Style Room Enclosure				
LCD Display Omit if ordering a unit without display					
D	LCD Display				
Optional Comm. Jack Mounted in unit's base					
-C35L	3.5 mm Phono Jack w/ Leads Attached				
-C35LT	3.5 mm Phono Style Jack with Leads and				
EXAMPLE					
BA/	T10K[65 TO 80F]	H205	-R	D	
Example Part Number: BA/T10K[65 TO 80F]-H205-RD					
Your Part Number:					

*DC input voltage is required for current output.

Call BAPI if you have questions about the above ordering grid or the configuration of the product you are ordering.

Rev. 02/28/11

Features & Options

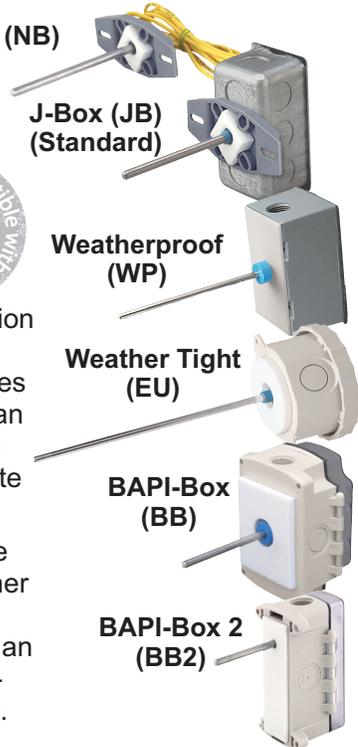
- Series 304 Stainless Steel Probes: 2", 4", 8", 12" and 18"
- Several Enclosure Styles
- Double Encapsulated Sensors & Etched Teflon Leadwires
- Wide Selection of Temperature Sensing Elements
- Limited Lifetime Warranty

Single Point Duct Units feature closed cell foam to seal the probe insertion hole and to absorb vibration. Mounting tabs allow for easy installation directly to the wall of the duct. All Duct Units have etched Teflon leadwires and double encapsulated sensors to create a watertight package that can withstand high humidity and condensation and perform under real world conditions. Duct Units have probe lengths from 2" to 18" to accommodate most duct shapes and sizes. Custom probe lengths are also available.

Duct Units come standard with a 2"x4" steel J-Box but are also available with no box (NB) or four styles of enclosure: Weatherproof (WP), Weather Tight (EU) or BAPI-Box (BB) and BAPI-Box 2 (BB2). The metal WP enclosure carries a NEMA 3R rating, while the ABS polymer EU carries an IP66 rating and is available in a UV-resistant material (EUO). The BAPI-Boxes are made of UV-resistant polycarbonate and carry an IP66 rating.

* All Passive Thermistors 10K Ω and smaller are CE compliant.

No Box (NB)



For detailed specs on the individual Sensors & Transmitters, turn to the "Sensors" section.

Specifications

Enclosure Material:

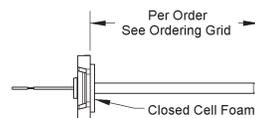
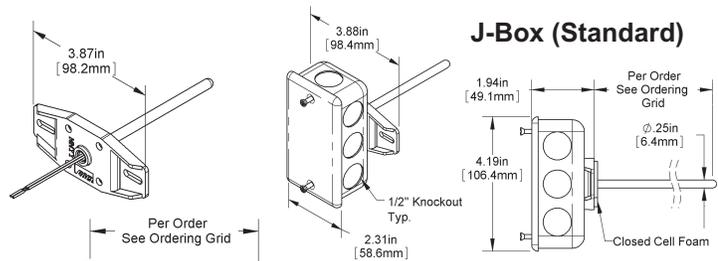
- WP Model: Cast Aluminum
- BB & BB2: Polycarbonate, UL94, V-0
- EU Model: ABS Plastic, UL94, V-0
- J-Box Model: Galv. Steel

Enclosure Rating:

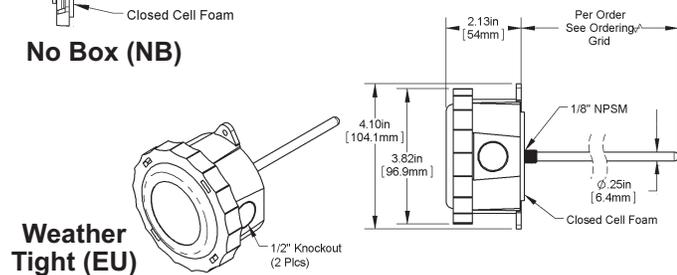
- J-Box Model: NEMA 1
- WP Model: NEMA 3R
- EU, BB & BB2 Models: IP66, NEMA 4

Environmental Operation Range:

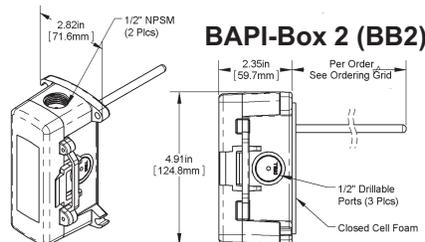
- Temperature: -40 °C to 100 °C
- Humidity: 0-100%, non-condensing



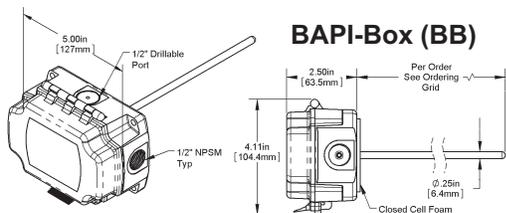
No Box (NB)



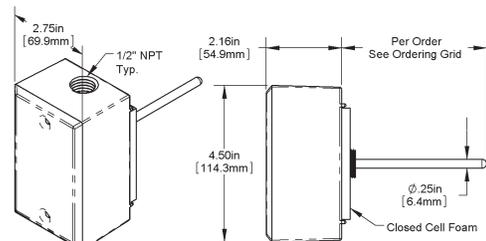
Weather Tight (EU)



BAPI-Box 2 (BB2)



BAPI-Box (BB)



Weatherproof (WP)



Rev. 02/28/11

Ordering Grids without List Prices are available on our website at www.bapihvac.com

Ordering Information			Duct Units - Temperature	List Price	Your Order		
BA/		Sensor Type	Required selection				
		Use the designator number (shown to the left in bold) to indicate the sensor					
#		<u>THERMISTORS</u>		<u>RTD's</u>	<u>Thermistors</u>		
		1.8K	1.8K Ω @ 25 °C	100	100 Ω Platinum @ 0 °C, .385 Ω/°C temp. coeff.	\$18 Each	
		2.2K	2.2K Ω @ 25 °C	100[3W]	3 Wire 100 Ω Plat. @ 0 °C, .385 Ω/°C temp. coeff.	\$ _____	
		3K	3K Ω @ 25 °C	1K[375]	1K Ω Platinum @ 0 °C, 3.75 Ω/°C temp. coeff.		
		3.25K	3.25K Ω @ 25 °C (T30 type)	1K[Ni]	1K Ω Nickel @ 21°C, 5 Ω/°C temp. coeff.	<u>RTD's</u>	
		3.3K	3.3K Ω @ 25 °C	1K	1K Ω Platinum @ 0 °C, 3.85 Ω/°C temp. coeff.	\$25 Each	
		10K-2	10K Ω @ 25 °C	2K	2K Ω Silicon @ 20°C, 8 Ω/°C temp. coeff.	or	
		10K-3	10K Ω @ 25 °C			\$ _____	
		10K-3[11K]	5,238 Ω @ 25 °C			<u>SEMICONDUCTORS</u>	
		20K	20K Ω @ 25 °C	334	LM334 Semiconductor	\$35 for 1K[Ni]	
		47K	47K Ω @ 25 °C	592	AD592 Semiconductor, 273 μA @ 0C	<u>Semi-conductors</u>	
		50K	50K Ω @ 25 °C	592-10K	AD592 Semicond. w/ 10 kΩ shunt resistor, 2.73 V @ 0C	\$25 Each	
		100K	100K Ω @ 25 °C			\$ _____	
						<u>TEMPERATURE TRANSMITTERS</u>	
			<i>Must include a "range" figure. Requires an enclosure.</i>				
		T100[range]	100 Platinum RTD, 100 Ω @ 0 °C with 4 to 20 mA Output			<u>Temperature Transmitters</u>	
		T100M[range]	100 Platinum RTD, 100 Ω @ 0 °C with MATCHED 4 to 20 mA Output*			\$125 for	
		T1K[range]	1K Platinum RTD, 1,000 Ω @ 0 °C with 4 to 20 mA Output			T100, T1K	
		T1KM[range]	1K Platinum RTD, 1,000 Ω @ 0 °C with MATCHED 4 to 20 mA Output*			& T10K	
		T10K[range]	10K Thermistor, 10,000 Ω @ 25 °C with 4 to 20 mA Output**			\$ _____	
		T10K5[range]	10K Thermistor, 10,000 Ω @ 25 °C with 0-5 VDC Output**				
		T10K10[range]	10K Thermistor, 10,000 Ω @ 25 °C with 0-10 VDC Output**				
						<u>TEMPERATURE TRANSMITTER RANGES</u>	
			Custom temperature transmitter ranges are available. Common ranges are listed below				
			40 TO 90F	4 TO 32C	-30 TO 130F	-34 TO 54C	
			0 TO 100F	-18 TO 38C	32 TO 212F	0 TO 100C	
			20 TO 120F	-7 TO 49C	30 TO 234F	-1 TO 112C	
			32 TO 134F	0 TO 57C			
						\$280 for	
						T100M	
						& T1KM	
						\$ _____	
		Probe Length	Required selection				
		-D-2"	2" length of 1/4" Diameter, Stainless Steel Probe			\$7	
		-D-4"	4" length of 1/4" Diameter, Stainless Steel Probe			\$7	
		-D-8"	8" length of 1/4" Diameter, Stainless Steel Probe			\$7	
		-D-12"	12" length of 1/4" Diameter, Stainless Steel Probe			\$7	
		-D-18"	18" length of 1/4" Diameter, Stainless Steel Probe			\$7	
		-D-XX"	Custom lengths of 1/4" Dia, Stainless Steel Probe are available. Call for details.			Call	
			Optional Enclosure Type	2"x4" Steel J-Box comes standard			
			-BB	BAPI-Box Enclosure - IP66 rated, UV-resistant polycarbonate			\$12
			-BB2	BAPI-Box 2 Enclosure - IP66 rated, UV-resistant polycarbonate			\$12
			-WP	Weatherproof Enclosure - NEMA 3R rated metal enclosure			\$12
			-EU	Weather Tight Enclosure - IP66 rated ABS polymer enclosure			\$12
			-EUO	Weather Tight Enclosure - IP66 rated UV-resistant enclosure			\$12
			-NB-18"	No Junction Box, 18" Lead Length, Plenum Rated Cable			\$0
			-NB-5'	No Junction Box, 5' Lead Length, Plenum Rated Cable			\$2
			-NB-10'	No Junction Box, 10' Lead Length, Plenum Rated Cable			\$4
			-NB-15'	No Junction Box, 15' Lead Length, Plenum Rated Cable			\$6
			-NB-XX	Custom lead lengths (Plenum Rated cable) are available. Call for details.			Call
				Options An enclosure is required			
			-TB	Test & Balance Switch (BB or BB2 required, includes a Terminal Strip Connection, not available with Temp. Transmitter)			\$7.50
			-TS	Terminal Strip Connection (BB or BB2 required for units with a Thermistor, RTD or Semiconductor)***			\$ _____
EXAMPLE							
BA/	10K-2	-D-8"	-NB-5'				
Example Part Number: BA/10K-2-D-8"-NB-5						Total =	
Your Part Number						\$ _____	

Call BAPI if you have questions about the above ordering grid or the configuration of the product you are ordering.
 *MATCHED Transmitter use Class A RTD's & are matched at 25%, 50% & 75% of calibrated scale limited to within -25°C to 150°C.
 **Range is limited to -40 to 158°F (-40 to 70°C)
 ***TS option is not available with the 100[3W] RTD sensor, the 592-10K Semiconductor sensor or the T10K transmitters.

“No-Frills” - Self Calibrating - CO₂ Transmitters

With LonMark[®] Certified Communicating Option



Wall Mount
TR9290

Wall Mount
TR9294

In-Duct Mount
TR9291

Splash Resistant
Wall Mount
TR9293

Aspiration Duct Probe
TR9292

The “No-Frills” CO₂ Transmitter

The TR9290 family of sensors are value-engineered CO₂ transmitter targeted at applications where the only requirement is a dependable CO₂ sensor that never needs calibration.

Key features of these CO₂ transmitters include:

- Internal self-calibration method based on background measurement that also eliminates need for outdoor CO₂ sensor.
- Choice of outputs: 0-10V, 0-5V or 4-20mA and LonWorks[®].
- Built to ISO 9001 standards
- Mounting options include wall, duct and in-duct.
- Utilizes a proven infrared measurement technology with over 18 years of flawless operating history.
- Supported by a team of knowledgeable application specialists. We are just a phone call away if you have questions.
- LonMark[®] Certified output option.

AirTest also offers CO₂ sensors that feature self-calibrating dual beam technology, and that integrate CO₂ temperature and humidity in one device. We also have a wide variety of other sensors to measure combustible and toxic gases, humidity, dew point and air velocity. Contact us for more information.

Length Does Matter...

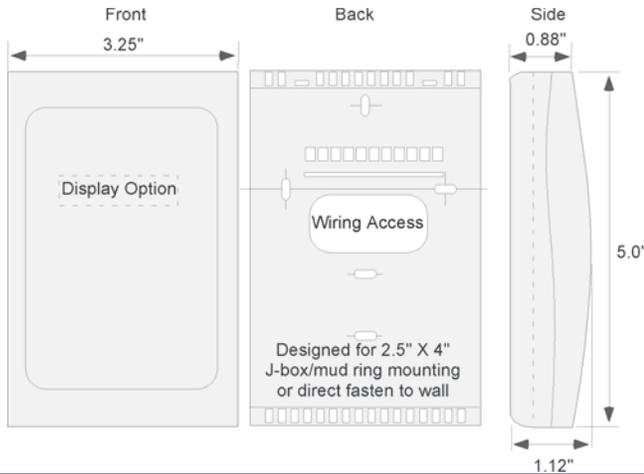
The AirTest CO₂ transmitter has proven itself to be the most trouble free CO₂ product available today. A important reason for this is the unique, patented, oval design of the sensor. All competitive sensors use a straight path of infrared energy shining through an air sample to measure CO₂. The amount of gas that can be sampled, called the “path length” is limited by the size constraints of their wall-mounted and duct-mounted cases.

The AirTest design, using a similar sized case, provides over double the path length of any other CO₂ sensor (4.8”) by bouncing the light around the small oval sensor element. Longer path length means that a larger sample of air is measured. In technical terms this results in an increased signal-to-noise ratio. This means that the AirTest sensor performs better at long-term sensor stability and accuracy than other devices.

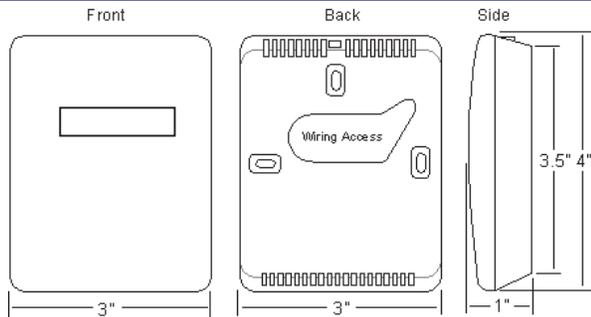
Greater dependability is the ultimate result.



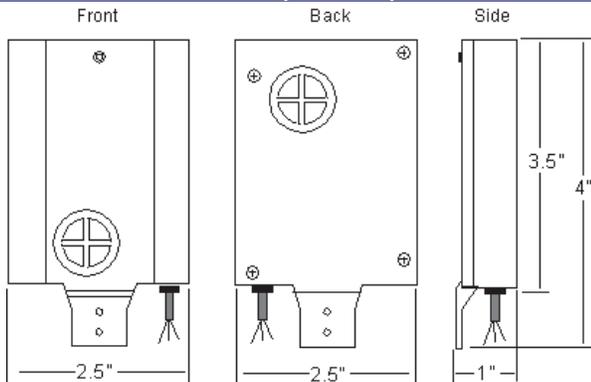
Dimensions TR9294 (New Wall Mount)



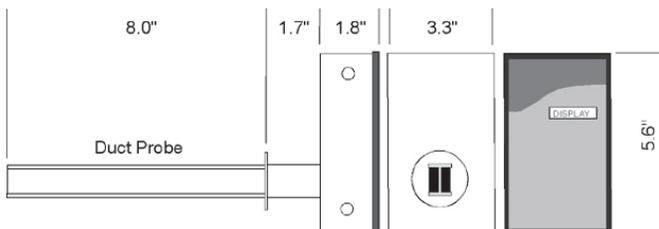
Dimensions: TR-9290 (Wall)



Dimensions: TR-9291 (In-Duct)



Dimensions: TR9292 (Aspiration Duct Probe)



Distributed By:

Specifications

General

CO₂ Detection Method: Gold Plated Non-Dispersive Infrared Optical Sensor with Automatic Baseline Correction for Self-Calibration, 4.8" optical path length, diffusion sampling.

Certification: CE, EMC89/336/EEC, CA Energy Commission, NYSERDA, LonMark® Certified (V3.4).

Transmitter Rated Life: minimum 15 years

Operating Conditions: 32 to 122° F (0 to 50°C), 0 to 95% RH

Storage Conditions: -40 to 158° F (-40 to 70° C)

Performance

CO₂ Measurement Range: 0-2000 ppm (factory adjustable to 10,000 ppm upon request),

CO₂ Accuracy: +/- 1% of measurement range +/- 3% of measured value.

Calibration: Self Calibrating, Calibration Not Required

Response Time: T90 = <2 minutes (diffusion), < 15 seconds for flow through.

Power

Input: 24 VAC/VDC ±20%, 50-60 hz (half-wave rectified)

Average Power Consumption: ≤< 1 Watt average

Ground: Analog output transmitters must share common ground with control system.

Outputs

Linear Analog Output: Two simultaneous dual output options available: A) 0-5V & 4-20mA, B) 0-10V & 4-20mA.

LonWorks®: CO₂ ppm & % SNVT (See LonWorks® Specification on next page). LonMark® Certified.

Order Options

Model Number	Output	Display
TR9290 ¹ - Wall (3" x 5")	A - 0-5V, 4-20mA	- no display
TR9291 ¹ - In-duct	B - 0-10V, 4-20mA	L - display
TR9292 - Duct Probe	Lon - LonWorks® ²	
TR9293 - Splash Resistant		
TR9294 - Wall (3.25" x 5")		

Notes:

¹ - LonWorks® version not available.

² - LonWorks® communicating and LonMark® Certified.



Covered By US Patents: 6194735, 6016203, other patents pending

AirTest™ Technologies Inc. specializes in the application of cost effective, state-of-the-art air monitoring technology to ensure the comfort, security, health and energy efficiency of buildings.



AirTest LonWorks[®] Specifications

Description:

Three versions of AirTest CO₂ sensors are offered with LonWorks[®] communication capability that is LonMark[®] Certified including:

1. TR9292-LON Duct Aspiration Probe for in duct measurements.
2. TR9293-LON Splash Resistant Enclosure for dirty and wet areas.
3. TR9294-LON Wall Mount for commercial, institutional and residential applications.

These sensors are all self-calibrating and will not require any maintenance for the life for the sensor (typically 15 years). These sensors provide a CO₂ ppm & % SNVT for 0-2000 ppm CO₂. Other ranges up to 0-10,000 can be factory set.

Product Models:

Duct Aspiration Probe



TR9292-L-Lon

TR9292-Lon

Splash Resistant Enclosure Wall Mount



TR9293-L-Lon

TR9293-Lon

Wall Mount

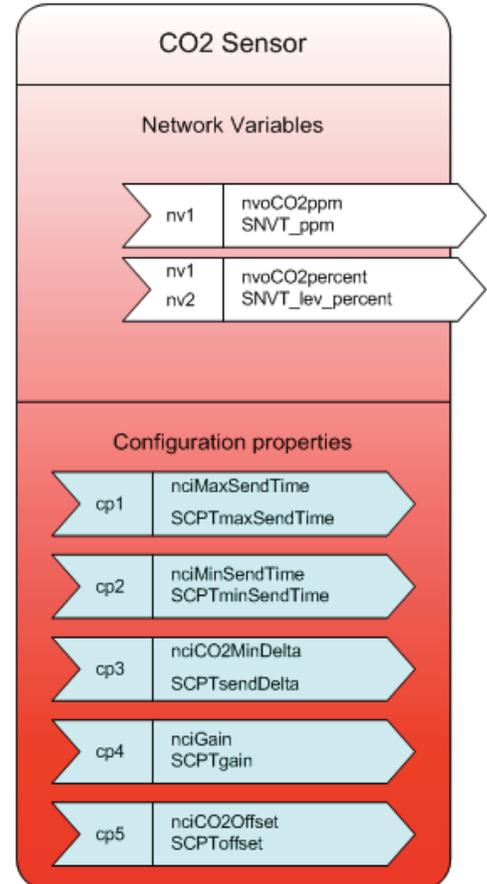


TR9294-L-Lon

TR9294-Lon

LonMark[®] Specification:

AirTest Models:	TR9292-L-Lon, TR9292-Lon, TR9293-L-Lon, TR9293-Lon, TR9294-L-Lon, TR9294-Lon, Sensor
Category:	Sensor
Measurement Range:	0-2000 ppm (factory adjustable to 10,000 ppm)
Standard Program ID:	80:00:E5:0A:46:06:04:01
LonMark[®] Version:	3.4
Manufacturer ID:	229
Device Class:	CO ₂ Sensor (10.70)
Usage:	06 – Residential/Commercial
XIF/DRF Download:	www.airtest.ca/support/sw/AirTestLon.zip
Transceiver:	04-TPFT-10
Model:	1
XIF Available:	True
DRF available:	True
LonMark Objects:	0000 Node object (1), 1070 CO ₂ Sensor (1)
Clock Rate:	10 MHz
Power Requirement:	18-30VAC/VDC (1/2 wave rectified) < 1 W average
Object Details:	See diagram



Features & Options

- VOC Alone or Temperature and Humidity Combination
- Indicates Space Occupancy by Detecting Human-Generated VOCs
- Output is Correlated to a CO₂ Value Allowing You to Ventilate Using ASHRAE's Occupancy-Based VRP Algorithm

Humans respire Volatile Organic Compounds (VOCs) as well as CO₂. The BAPI sensor is able to measure these VOCs, therefore it is as good an indicator of space occupancy as a CO₂ sensor.

The BAPI Sensor is different from other VOC sensors because it has been optimized for Demand Controlled Ventilation (DCV). Using a calibration algorithm, the sensor value is converted to an output with a high correlation to a CO₂ level¹. This lets you use ASHRAE's occupancy-based VRP schedule to ventilate. (¹More info on this correlated output is available on our website at www.bapihvac.com)

Besides from respiration, the sensor picks up VOCs from other sources such as building materials, perfumes, colognes and furniture off gassing. Using this sensor to ventilate is a way of achieving true indoor air quality and not just CO₂ dilution.

The unit is available as a VOC sensor alone or as a combination temperature and humidity sensor. The optional display alternates between the measured values and is field adjustable between °F or °C. An optional three color LED indicates "VOC Level" of Good, Fair or Poor.



Demand Controlled Ventilation with Confidence!

The VOC Sensor is part of BAPI's "True Blue IEQ Family". When used as a combination Temp. and Humidity Sensor, it addresses the Indoor Air Quality and Thermal Comfort portions of ASHRAE's Indoor Environment Quality (IEQ) section of Standard 189.1.



VOC Sensors with Temp. Setpoint and Override.

The top unit has the VOC Level of "Good, Fair or Poor" shown by an arrow on the display. The bottom unit has the VOC level shown by a 3-color LED.

Specifications

Power: (No AC Power)

- 9-35 VDC @ 50 mA Max (9-24VDC recommended) for 0-5 VDC Outputs
- 15-35 VDC @ 50mA Max (15-24VDC recommended) for 0-10 VDC Output

Sensing Elements:

- Humidity – Capacitive Polymer, ±1.8% RH Accuracy
- VOCs – Micro-machined Metal Oxide

Temp. Sensor: Thermistor, RTD or Semiconductor

Mounting: 2"x4" J-Box or drywall mount – screws provided

VOC Detection Range: 0 – 2,000 CO₂ PPM equivalent

Response Time: Less Than 60 Sec. (after Start-Up Time)

Start-Up Time: 15 minutes

Operating Environment:

- 32-122°F (0-50°C) • 0-95% RH non-condensing

LCD Display:

- Main Display: 0.76" 4-digit Numeric (Numeric Values)
- Minor Display: 0.34" 3-digit Alpha-Numeric (PPM, %RH, °F, °C)
- Occ/Un-occ BAPI Man Icon: (Blk=Occupied)

Measurement Offsets (field adjustable)

- ±5° (F or C) in 0.1° increments
- ±5% RH in 0.1% RH increments
- ±5% Contaminants in 0.1% increments
- ±100 ppp CO₂ Equivalent Contaminants in 2 ppm increments

Analog Outputs (0-5, 0-10 or 2-10VDC [%RH only], >10KΩ impedance)

- VOC Contaminants: 0-100%
- %RH: 0-100% or 35-70% RH

Override Output:

- Contact: SPST
- Sensor: Shorts out direct Temperature sensor (Temp)
- Setpoint: Contact in parallel, resistive setpoint only

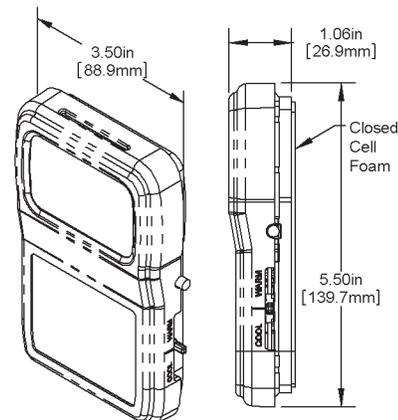
LED CO₂ Equivalent Level Indicator:

- Good, Green < 1,000 PPM
- Fair, Yellow = 1,000 to 1,500 PPM
- Poor, Red > 1,500 PPM

Material: ABS Plastic, Material Rated UL94V-0

Certifications: RoHS

Warranty Period: Two years from manufacture date





VOC Room Sensor

D3

Air Quality Sensors

Rev. 04/08/11

Ordering Grids without List Prices are available on our website at www.bapihvac.com

Ordering Information		List Price	Your Order																																						
VOC Room Sensor in the BAPI-Stat 3 Style Enclosure																																									
BA/																																									
Temperature Display Mode (Must select one)																																									
BS3F	Temperatures Displayed in °F (Temperature is displayed by default but can be turned off by the user. See instruction sheet.)	\$35.00	\$ _____																																						
BS3C	Temperatures Displayed in °C (Temperature is displayed by default but can be turned off by the user. See instruction sheet.)	\$35.00	\$ _____																																						
BS3X	No LCD Display	\$0.00	\$ _____																																						
VOC Output (Must select one)																																									
-VOC05	VOCs Transmitted as 0 to 2,000 ppm CO2 Equivalent, 0 to 5 VDC output	\$475.00	\$ _____																																						
-VOC10	VOCs Transmitted as 0 to 2,000 ppm CO2 Equivalent, 0 to 10 VDC output	\$475.00	\$ _____																																						
Humidity Output (Skip if not required)																																									
-H205	±2% Humidity Transmitter, 0 to 5 VDC output	\$80.00	\$ _____																																						
-H210	±2% Humidity Transmitter, 0 to 10 VDC output	\$80.00	\$ _____																																						
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-C22L	RJ22 (4 pin) Style Jack with Leads Attached	\$25.00	\$ _____																																						
-C22LT	RJ22 (4 pin) Style Jack with Leads and Terminal Block	\$25.00	\$ _____																																						
	<p>Optional Test and Balance Switch (Skip if not required)</p> <table border="1"> <tbody> <tr> <td>-TB</td> <td>Three Position Switch</td> <td>\$7.50</td> <td>\$ _____</td> </tr> </tbody> </table>	-TB	Three Position Switch	\$7.50	\$ _____																																				
-TB	Three Position Switch	\$7.50	\$ _____																																						
	<p>VOC Level Indication (Must select one)</p> <table border="1"> <tbody> <tr> <td>-LED</td> <td>Green/Orange/Red LED on Logo Plate to Indicate VOC PPM Level. Includes Legend for Good, Fair and Poor.</td> <td></td> <td></td> </tr> <tr> <td>-ARW</td> <td>Black Arrow on Display to Indicate VOC PPM Level. Includes Legend Below Display for Good, Fair and Poor</td> <td></td> <td></td> </tr> <tr> <td>-BNK</td> <td>No LED or Arrow Indicators, No Legend</td> <td></td> <td></td> </tr> </tbody> </table>	-LED	Green/Orange/Red LED on Logo Plate to Indicate VOC PPM Level. Includes Legend for Good, Fair and Poor.			-ARW	Black Arrow on Display to Indicate VOC PPM Level. Includes Legend Below Display for Good, Fair and Poor			-BNK	No LED or Arrow Indicators, No Legend																														
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EXAMPLE																																									
BA/	BS3F -VOC05 -H205 -A 80L6 -0 -J -C11L -TB -LED																																								
Example Part Number: BA/BS3F-VOC05-H205-A80L6-0-J-C11L-TB-LED		Total =	\$ _____																																						
Your Part Number:																																									

Call BAPI if you have questions about the above ordering/pricing grid or the configuration of the product you are ordering.

Air Quality Sensors

Rev. 04/05/11

Features & Options

- Corresponds to ASHRAE's Occupancy-Based DCV Algorithm
- Quick Response Sensor Through Aspiration Tube
- Indicates Space Occupancy by Detecting Human-Generated VOCs
- 0-5 VDC or 0-10 VDC Output

Humans respire Volatile Organic Compounds (VOCs) as well as CO₂. The BAPI Duct Sensor is able to measure these VOCs, therefore it is as good an indicator of space occupancy as a CO₂ sensor.

The BAPI Sensor is different from other VOC sensors because it has been optimized for Demand Controlled Ventilation (DCV). Using a calibration algorithm, the sensor value is converted to an output with a high correlation to a CO₂ level¹. This lets you use Ashrae's occupancy-based VRP schedule to ventilate. (¹More info on this correlated output is available on our website at www.bapihvac.com)

Besides from respiration, the sensor picks up VOCs from other sources such as building materials, perfumes, colognes and furniture off gassing. Using this sensor to ventilate is a way of achieving true indoor air quality and not just CO₂ dilution.

BAPI's VOC Duct Sensor samples duct air using an aspiration tube. Moving air from the duct enters the tube, is forced into the BAPI-Box enclosure and exits through the other half of the tube. As long as there is air movement in the duct, air is continuously exchanged.



VOC Duct Sensor

Demand Controlled Ventilation with Confidence!

Specifications

Power:

- 9-35 VDC @ 50 mA Max (9-24VDC recommended) for 0-5 VDC Outputs
- 15-35 VDC @ 50mA Max (15-24VDC recommended) for 0-10 VDC Outputs
- No AC Power

Sensing Element:

VOCs – Micro-machined Metal Oxide

VOC Detection Range: 0 – 100%

Response Time: Less Than 60 Seconds

Start-Up Time: 15 minutes

Operating Environment:

- 32 - 122°F (0 - 50°C)
- 0 – 95% RH non-condensing

Analog Outputs

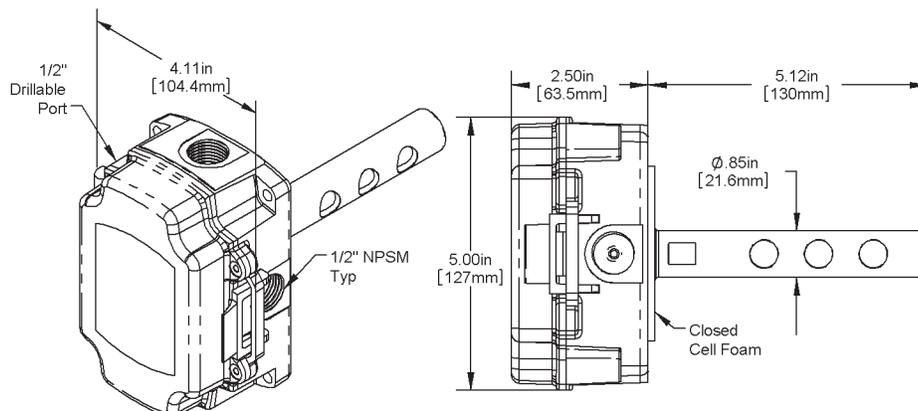
(0-5VDC or 0-10VDC, >10KΩ impedance)
VOC Contaminants 0 - 100%

Dimension: 4.91"H x 3.21"W x 1.20"D
(124.6 x 81.5 x 30.5 mm)

Material: ABS Plastic, Material Rated UL94V-0

Certifications: RoHS

Warranty Period: Two years from manufacture date





VOC Duct Sensor D5

Air Quality Sensors

Rev. 04/01/11

Ordering Grids without List Prices are available on our website at www.bapihvac.com

Ordering Information VOC Duct Sensor in the BAPI-Box Enclosure				List Price	Your Order
BA/					
VOC Output					
VOC05	VOCs Transmitted as 0 to 100% Contaminated, 0 to 5 VDC output			\$475.00	\$ _____
VOC10	VOCs Transmitted as 0 to 100% Contaminated, 0 to 10 VDC output			\$475.00	\$ _____
Enclosure					
-D-BB	BAPI-Box Enclosure - IP66 rated, UV-resistant polycarbonate			\$12.00	\$ _____
EXAMPLE					
BA/	VOC05	-D-BB			
Example Part Number: BA/VOC05-D-BB				Total =	\$ _____
Your Part Number:					

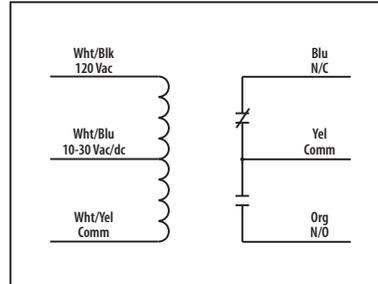
Call BAPI if you have questions about the above ordering grid.



10 Amp Pilot Control Relays

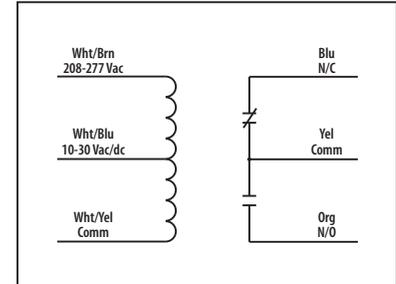
RIBU1C

Enclosed Relay 10 Amp SPDT with 10-30 Vac/dc/
 120 Vac Coil



RIBH1C

Enclosed Relay 10 Amp SPDT with 10-30 Vac/dc/
 208-277 Vac Coil



RIBU1C-RD
 RIBH1C-RD
 » Red housing



RIBU1C-N4
 RIBH1C-N4
 » NEMA 4X housing
 » UL508 only

■ SPECIFICATIONS

Relays & Contact Type: One (1) SPDT Continuous Duty Coil
Expected Relay Life: 10 million cycles minimum mechanical
Operating Temperature: -30 to 140° F
Operate Time: 20mS
Relay Status: LED On = Activated
Dimensions: 1.70" x 2.80" x 1.50" with .50" NPT nipple
Wires: 16", 600V Rated
Approvals: UL Listed, UL916, UL864, C-UL
 California State Fire Marshal, CE, RoHS
Housing Rating: Plenum, NEMA 1
Gold Flash: Yes
Override Switch: No

Contact Ratings:
 10 Amp Resistive @ 277 Vac
 10 Amp Resistive @ 28 Vdc
 480 VA Pilot Duty @ 240-277 Vac
 480 VA Ballast @ 277 Vac
 600 Watt Tungsten @ 120 Vac N/O
 240 Watt Tungsten @ 120 Vac N/C
 1/3 HP for N/O @ 120-240 Vac
 1/6 HP for N/C @ 120-240 Vac
 1/4 HP for N/O @ 277 Vac
 1/8 HP for N/C @ 277 Vac

Coil Current:
 33 mA @ 10 Vac 13 mA @ 10 Vdc
 35 mA @ 12 Vac 15 mA @ 12 Vdc
 46 mA @ 24 Vac 18 mA @ 24 Vdc
 55 mA @ 30 Vac 20 mA @ 30 Vdc
 28 mA @ 120 Vac (RIBU1C)
 39 mA @ 208-277 Vac (RIBH1C)

Coil Voltage Input:
 10-30 Vac/dc ; 120 Vac ; 50-60 Hz (RIBU1C)
 10-30 Vac/dc ; 208-277 Vac ; 50-60 Hz (RIBH1C)
 Drop Out = 2.1 Vac / 2.8 Vdc
 Pull In = 9 Vac / 10 Vdc

Notes

Hawkeye® Mini Split- & Solid-Core Fixed Setpoint Digital Output Current Switches 600/800

24

LOW-COST STATUS!



H800 Mini Solid-core

FIVE-YEAR
5
WARRANTY



H600 Mini Split-core

**LOWEST
TURN-ON IN
THE INDUSTRY!**

The Hawkeye 600/800 Series go/no current switches provide a cost-effective solution for monitoring status on unit vents, exhaust fans, recirculation pumps and other fixed loads where belt loss is not a concern.

APPLICATIONS

- Monitoring on/off status of electrical loads
- Monitoring direct drive units, exhaust fans and other fixed loads
- Verifying lighting run times

On/off status for direct-drive fans, pumps, and process motors

- More reliable for status than relays across auxiliary contacts
- Ideal for direct-drive units, unit vents, fan coil units, exhaust fans and other fixed loads
- Great for lighting status—less expensive than 277V relays
- Low 0.15A turn-on (H600)... ideal for small exhaust fans (Not intended to detect belt loss)
- Mounting bracket provides installation flexibility

Monitor status of fans, pumps, motors & other electrical loads

- Split-core 600 for fast retrofit installation
- Mini solid-core 800 fits in tight enclosures
- 100% solid-state, no moving parts to fail
- Polarity insensitive output
- 5-year limited warranty

**ORDERING INFORMATION**

See the H500 series on page 18 for Start/Stop & Status of fractional HP loads

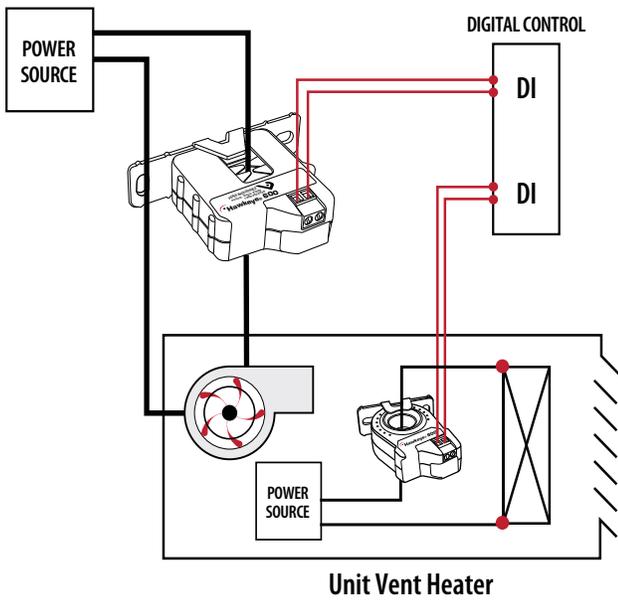
MODEL	AMPERAGE RANGE	OUTPUT TYPE	OUTPUT RATING (MAX.)
Solid-Core			
H800	0.25 - 200A*	N.O., Solid-state	1.0A@30VAC/DC
H800HV	0.75 - 200A*	N.O., Solid-state	.5A@250VAC/DC
H800NC	0.5 - 200A*	N.C., Solid-state	.1A@30VDC
Split-Core			
H600	0.15 - 200A*	N.O., Solid-state	1.0A@30VAC/DC

*See temperature specifications on next page

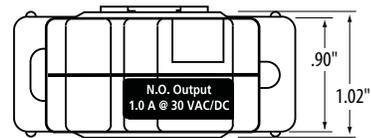
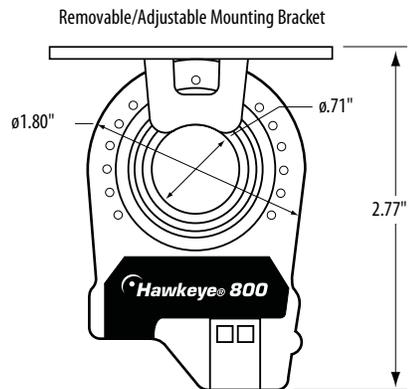
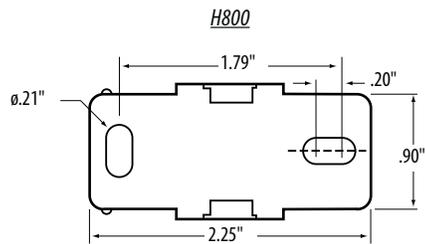
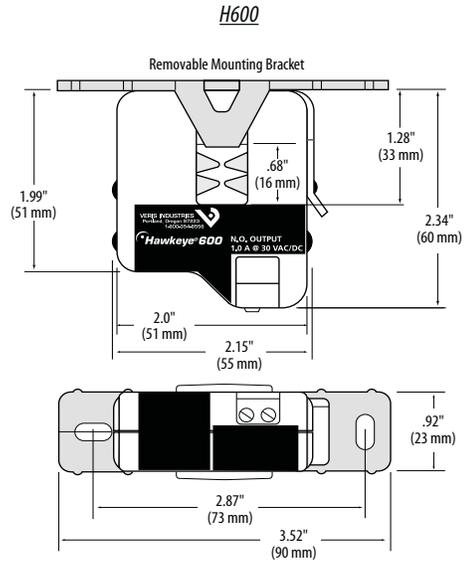
**ACCESSORIES**

MODEL	DESCRIPTION
AH01	DIN Rail Clip Set compatible with all solid-core models

APPLICATIONS/WIRING EXAMPLE



DIMENSIONAL DRAWINGS



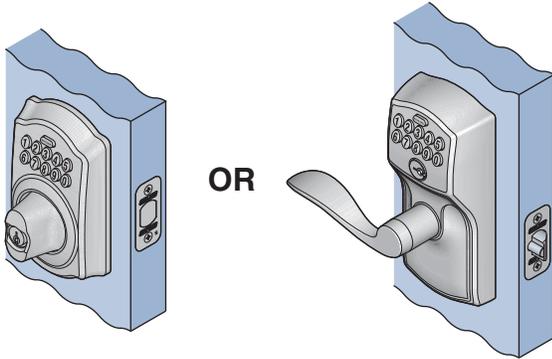
SPECIFICATIONS

Amperage Range	Fixed 0.25 to 200A (H800), 0.15 to 200A (H600)
Sensor Power	Induced
Output	Digital switch (see ordering table)
Insulation Class	600VAC rms
Frequency Range	50/60Hz.
Temperature Range	
(H600*)	15° to 40°C (151-200A)*; -15° to 60°C (0-150A)
(H800/800NC*)	-15° to 60°C.
(H800HV**)	-40° to 75° C. (0.75-100A), contacts to 0.25A@250VAC/DC
	-40° to 50° C. (0.75-200A), contacts to 0.5A@250VAC/DC
	*Use min. 75°C insulated conductor
	** Use min. 90° C. insulated conductor
Humidity Range	0 - 95% non-condensing
Trip Setpoint	
H600	Fixed 0.15A
H800	Fixed 0.25A
H800HV	Fixed 0.75A
H800NC	Fixed 0.50A
Dimensions (H600)...(L x W x H)	(2.34" x 2.0" x .92")
Sensor Hole Size (H600)...(L x W)	.52" x .68"
Dimensions (H800)...(L x W x H)	2.77" x 1.80" x 1.02"
Sensor Hole Size (H800)	0.71" diameter

2 SCHLAGE LiNK™ System Setup



The lock should already be installed on your door. If not, use the installation instructions (document number **1**) to install the lock and then come back to this document.



OR

Important Information

Lock Programming Code

six (6) digits

Bridge MAC ID

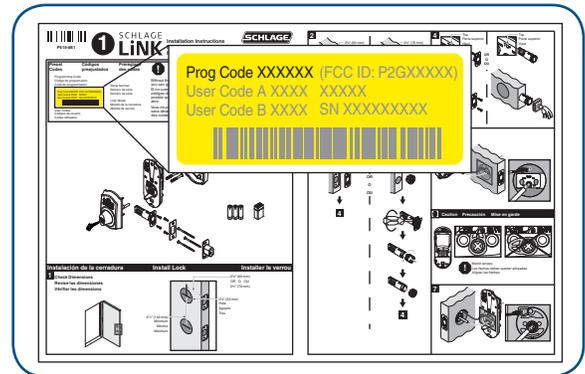
twelve (12) characters

Web Support: part2.schlage.com

Customer Service: (877) 288-7707

1 Locate the programming code, on top of the lock installation instructions, document **1**. Write the programming code in the “Important Information” box at the top of this page.

- The programming code is six digits long and is located on the yellow sticker on the installation sheet that is packed in the box.
- The programming code can be changed. If you have changed your programming code, the code that is printed on the label will not work. (See Manual Lock Programming at part2.schlage.com.)
- If you don't remember your programming code, you can reset your lock, which will restore the original programming code. (See Manual Lock Programming at part2.schlage.com.)



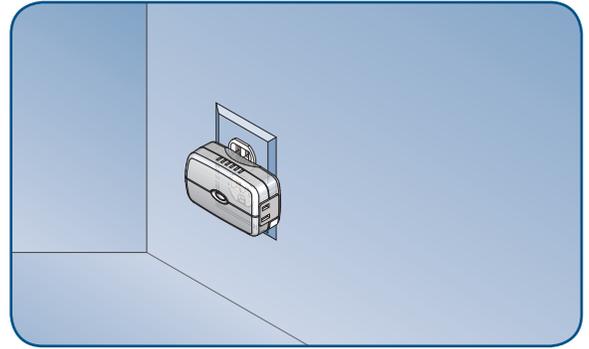
2 Locate the bridge MAC ID. Write the MAC ID in the “Important Information” box at the top of this page.

- The MAC ID is 12 characters long and is located on the yellow label inside the battery compartment of the bridge.



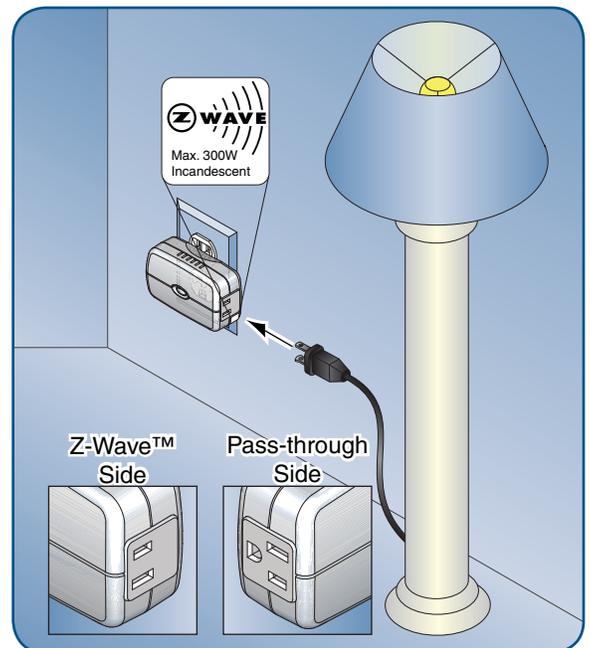
3 Install the light module.

- The light module can be used to control a lamp.
- The light module repeats the Z-Wave™ signal. In some homes, the light module must be used to improve communication between the bridge and the lock. See the "Understanding Signals" section for more information. During the online portion of the setup, the system will determine if it is communicating properly or not. You can move the light module during online setup if necessary.
- The light module should be installed into any indoor, three-prong, 120 volt A/C outlet.



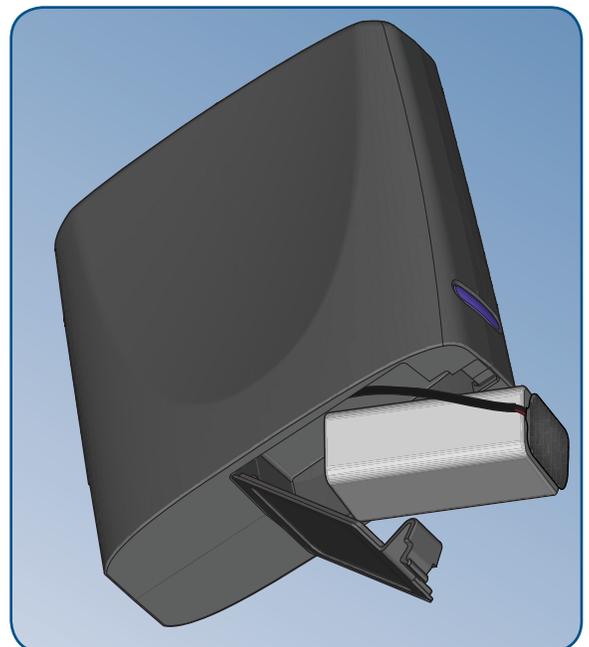
4 (Optional) Plug a lamp into the Z-Wave™ (two-prong) side of the light module.

- There are two outlets on the light module. One of the outlets has only two prongs and is labelled with a Z-Wave™ sticker. A lamp (25 watts minimum and 300 watts maximum) can be controlled by the system if it is plugged into the Z-Wave™ side of the light module.
- Use only an incandescent light bulb in the lamp that is plugged into the light module. DO NOT use a CFL (compact fluorescent light bulb) or any other kind of electric device.
- The other outlet has three prongs and can be used simply as a pass-through outlet (1500 watts maximum). It is not controlled by the system, and the system is not affected when it is used.



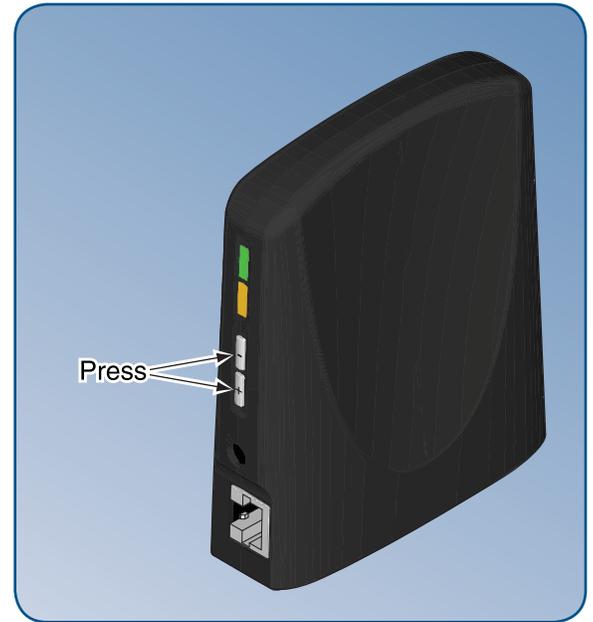
5 Install the 9 volt battery into the bridge.

- Use the 9 volt battery that is included in the box.
- Use any premium quality 9 volt battery for replacement.



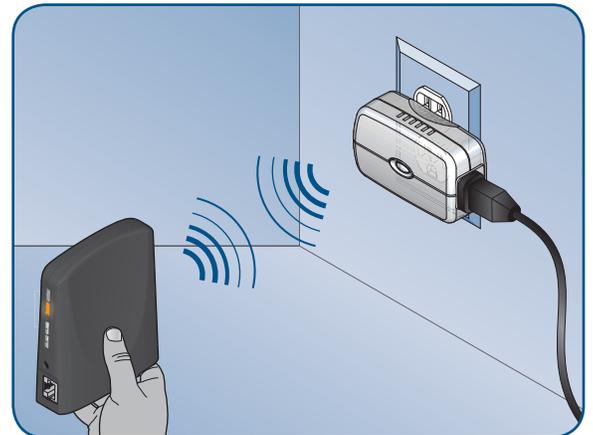
6 Initialize the bridge.

- Press and hold the plus (+) and minus (-) buttons simultaneously for 10 seconds.
 - Release both buttons.
 - The orange light on the bridge will continue to flash for 10 - 15 seconds.
- This procedure can be used to initialize the bridge at any time. See "System Reset" at part2.schlage.com for more information.



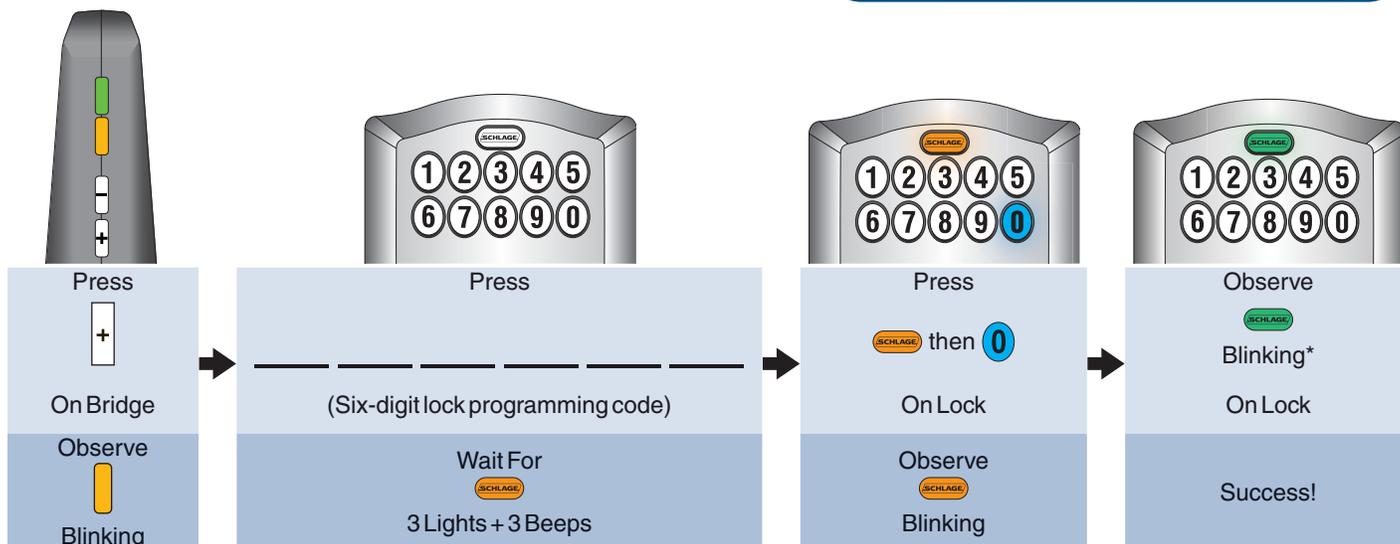
7 Enroll the light module into the bridge.

- Hold the bridge within 6 feet (1.8 meters) of the light module throughout all of step 7.
- Press and release the plus (+) button on the bridge.
- Double-click the button on the light module.
- Observe the lights on bridge. The orange light will blink while enrollment is taking place. Enrollment is complete when the orange light becomes solid.



8 Enroll the lock into the bridge.

- Before you begin this step, find the six-digit lock programming code, located in the "Important Information" box on the first page. For your convenience, there is space to write the programming code below.
- **After you begin the enrollment process, you have 30 seconds to complete the remainder of the steps. The bridge must remain within 6 feet (1.8 meters) of the lock throughout the enrollment process.**



Repeat this process for additional locks.

***NOTE: ONLY if you observe a red blinking light instead of a green blinking light, exclude the lock from the bridge and then try enrollment again.**

- Press and release the minus (-) button on the bridge.
- Enter the six-digit programming code on the keypad and wait for three orange lights and three beeps.
- Press the Schlage button and then the zero (0) button on the keypad and wait for three orange lights and three beeps.
- Wait for all lights to stop blinking. You should then be able to enroll the lock normally.

9 This portion of the setup is complete. For the next portion, you will need a computer that is connected to the Internet.

- Internet Explorer 7.0 or Firefox 3.0 is required for proper operation. You can check your browser version by clicking Help > About in the browser's menu. If you do not have the proper version, you can download a newer version from the following web sites:
 - Internet Explorer 7.0 (www.microsoft.com/windows/downloads/ie/getitnow.msp)
 - Firefox 3.0 (www.mozilla.com)

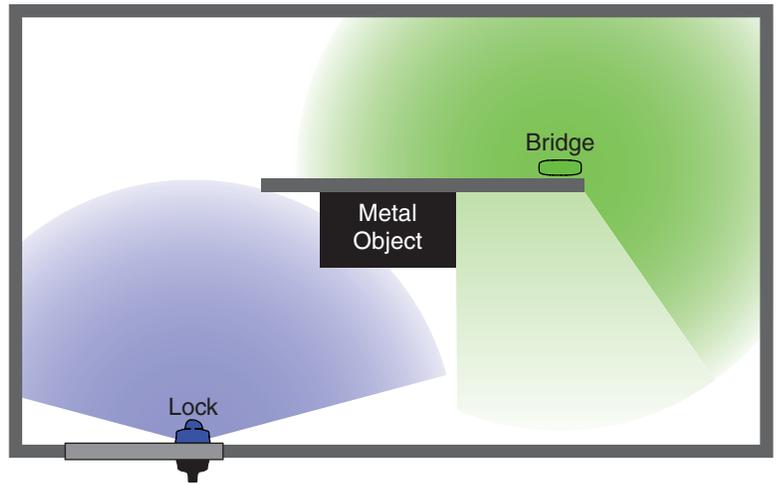
3 Using either Internet Explorer 7.0 or Firefox 3.0, browse to www.schlagelink.com. Look for "Just purchased a Schlage LiNK System? Click here," and click the link.

Understanding Signals

Below are some examples of how signals interact with objects you may have in your home. Walls will diminish the signal. Metal objects (such as refrigerators or file cabinets) will block the signal entirely. Also notice that the signals for the Light Module and the Lock are directional. The Lock and Light Module have a better chance of communicating if they are "pointing" at each other.

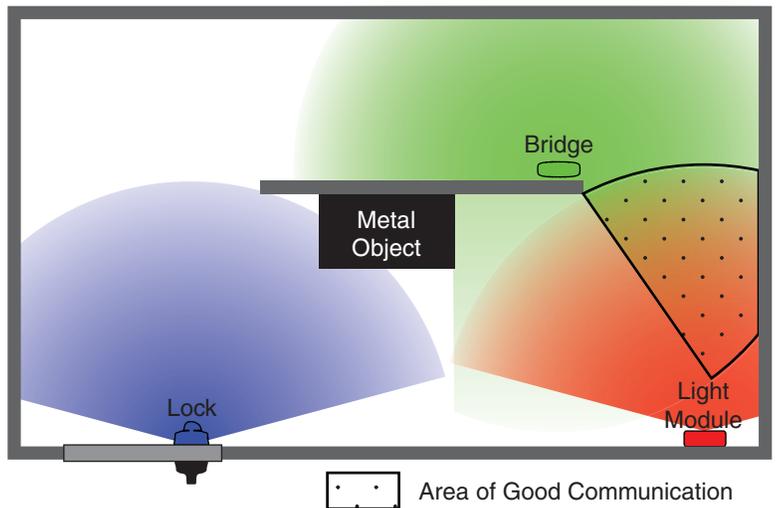
No Communication

In this drawing, there is no communication between the Bridge and Lock. The signal is first diminished by the wall. Then the signal is blocked entirely by the metal object.



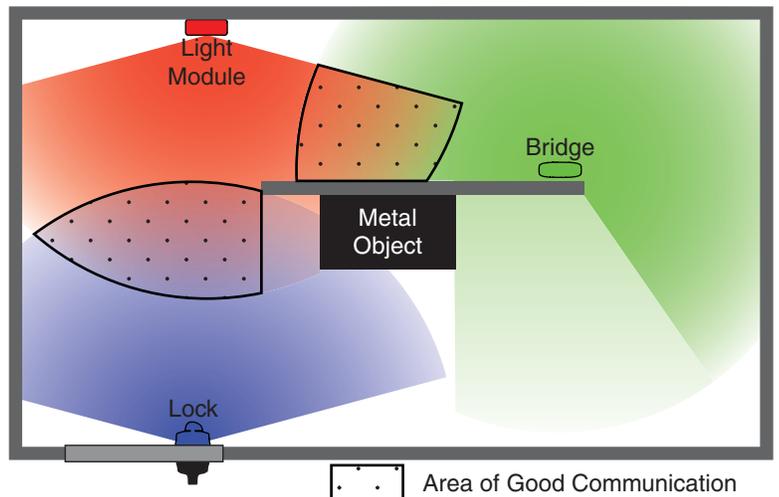
Limited Communication

In this drawing, the Light Module and the Bridge can communicate, but the Lock can still not communicate with anything.



Good Communication

In this drawing, the signal problem is fixed by placing the Light Module in a location that has good communication with both the Bridge and the Lock. The Light Module repeats the signal from the Bridge to the Lock.



FCC Notice

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications to this equipment not expressly approved by Schlage could void the user's authority to operate the equipment.

FCC ID: P2GBE369 IC: 7954A-BE369
FCC ID: P2GFE599 IC: 7954A-FE599
FCC ID: P2GBR100 IC: 7954A-BR100

PATENT NOTICE

Schlage® products and those of its subsidiary companies and licensees may be covered by both issued and pending U.S. and foreign patents, copyrights and trademarks. Manufactured items are covered by one or more of the following patents:

5070715	5765412	6523375	D372417	D458829
5152558	5769472	6533336	D372854	D467155
5308131	5809816	6540274	D406056	D472788
5395144	5816086	6581426	D406528	D487388
5593193	5820290	6802546	D426452	D520331
5598726	5881590	6905773	D428324	D520332
5640863	5918916	6926319	D450558	D537702
5683127	6286347	7143477	D457048	D541620
5715717	6297725	7159424	D457049	D543435

LOCK PRODUCT: Lifetime Limited Mechanical and Finish Warranty and 1-Year Limited Electronics Warranty

Subject to the terms and conditions of this warranty, Schlage extends a lifetime limited mechanical and finish warranty and a one-year limited electronics warranty to the original consumer user ("Original User") of our Schlage brand lock product ("Lock Product") against defects in material and workmanship, as long as the Original User occupies the residential premises upon which the Lock Product was originally installed.

NON-LOCK PRODUCT: 1-Year Limited Mechanical and Electronics Warranty

Subject to the terms and conditions of this warranty, Schlage extends a 1-year limited mechanical and electronics warranty to the original consumer user ("Original User") of our Schlage brand non-lock product used in conjunction with our Lock Product ("Non-Lock Product") against defects in material and workmanship, as long as the Original User occupies the residential premises upon which the Lock Product was originally installed.

"Lock Product" and "Non-Lock Product" are collectively referred to herein as "Product".

What Schlage will do: Upon return of the defective Product to Schlage, Schlage's sole obligation, at its option, is to either repair or replace the Product, or refund the original purchase price in exchange for the Product.

Original User: This warranty only applies to the Original User of Products. This warranty is not transferable.

What is not covered: The following costs, expenses and damages are not covered by the provisions of this limited warranty: (i) labor costs including, but not limited to, such costs as the removal and reinstallation of Product; (ii) shipping and freight expenses required to return Product to Schlage; (iii) failures, defects, or damage (including, but not limited to, any security failure or loss of data) caused by any third party product, service, or system connected or used in conjunction with the Product; and (iv) any other incidental, consequential, indirect, special and/or punitive damages, whether based on contract, warranty, tort (including, but not limited to, strict liability or negligence), patent infringement, or otherwise, even if advised of the possibility of such damages.

The provisions of this warranty do not apply to Product: (i) used in commercial applications; (ii) used in common area applications; (iii) used for purposes for which they are not designed or intended; (iv) which have been subjected to alteration, abuse, misuse, negligence or accident; (v) which have been improperly stored, installed, maintained or operated; (vi) which have been used in violation of written instructions provided by Schlage; (vii) which have been subjected to improper temperature, humidity or other environmental conditions; or (viii) which, based on

Schlage's examination, do not disclose to Schlage's satisfaction non-conformance to the warranty. Additionally, this warranty DOES NOT COVER scratches, abrasions, or deterioration due to the use of paints, solvents or other chemicals.

Exclusions: Oil Rubbed Bronze finish (613) is designed to improve over time and change in appearance, creating a living finish through daily use and thus, finish discoloration is not applicable to the above warranty.

Additional terms: Schlage does not authorize any person to create for it any obligation or liability in connection with the Product. Schlage's maximum liability hereunder is limited to the original purchase price of the Product. No action arising out of any claimed breach of this warranty by Schlage may be brought by the Original User more than one (1) year after the cause of action has arisen.

How local law applies: This warranty gives you specific legal rights, and you may also have other rights as otherwise permitted by law. If this Product is considered a consumer product, please be advised that some local laws do not allow limitations on incidental or consequential damages or how long an implied warranty lasts, so that the above limitations may not fully apply. Refer to your local laws for your specific rights under this warranty.

Guaranteed Fit Program: Schlage products are designed to fit standard residential door preparations and retrofit existing tubular locks. Note: Mortise locks and preparations are not considered standard and are not guaranteed under this program. During the initial installation, if there is a problem with the Product's performance, the Original User may simply contact Schlage Customer Service at (877) 288-7707 in the U.S. and Canada.

Program and warranty claims: If you encounter a residential door preparation or fit issue under the Guaranteed Fit Program or have a claim under this warranty, please contact Schlage Customer Service for repair, replacement or refund of the original purchase price in exchange for the return of the Product to Schlage.



SIMpull THHN®

600 Volts. Copper Conductor
 Thermoplastic Insulation/SIM Nylon Sheath
 Heat, Moisture, Gasoline, and Oil Resistant ¹
 Also Rated MTW and THWN-2
 SIM Technology® for easier pulling



APPLICATIONS

Southwire SIMpull THHN® or THWN-2 conductors are primarily used in conduit and cable trays for services, feeders, and branch circuits in commercial or industrial applications as specified in the 2008 National Electrical Code. When used as Type THHN, or T90 Nylon conductor is suitable for use in dry locations at temperatures not to exceed 90 °C. When used as Type THWN-2 or TWN75, conductor is suitable for use in wet or dry locations at temperatures not to exceed 90 °C or not to exceed 75 °C when exposed to oil. When used as Type MTW, conductor is suitable for use in wet locations or when exposed to oil at temperatures not to exceed 60 °C or dry locations at temperatures not to exceed 90 °C (with ampacity limited to that for 75 °C conductor temperature per NFPA 79). Conductor temperatures not to exceed 105 °C in dry locations when rated AWM and used as appliance wiring material or when used as T90 Nylon. Voltage for all applications is 600 volts. This cable should be installed without application of pulling lubricant.

SPECIFICATIONS

Southwire SIMpull THHN® or THWN-2 or MTW (also AWM) meet or exceed

- All applicable ASTM specifications
- UL Standard 83, 1581, and 1063(MTW)
- CSA
- NOM-ANCE 90° C
- Federal Specification A-A-59544
- The National Electrical Code
- VW-1 - Sizes 14 through 1 AWG
- CT - UL 1685, Sizes 1/0 AWG and larger for CT use
- FT1 - Sizes through 500 kcmil
- T90 Nylon - Sizes through 500 kcmil
- TWN 75 - Sizes through 500 kcmil
- RoHS Compliant
- Sunlight Resistant - Marked and listed in all colors 2 AWG and larger
- NEMA WC 70 Construction Requirements

CONSTRUCTION

Southwire SIMpull THHN® or THWN-2 or MTW copper conductors are annealed (soft) copper, unilay compressed strand, insulated with a tough heat and moisture resistant polyvinyl chloride (PVC), over which a SIM (SLIKQWIK® Infused Membrane) nylon (polyamide) or UL Recognized equal jacket is applied. Available in black, white, red, blue, purple, green, yellow, brown, orange, and gray. Some colors standard, some subject to economic order quantity. THWN-2 available on sizes #8 AWG and larger.

¹ Oil and gasoline resistant II as defined by Underwriters Laboratories.



Southwire
 One Southwire Drive
 Carrollton, Ga. 30119 USA



NoLube™

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®Southwire is a registered trademark
 of Southwire Company.

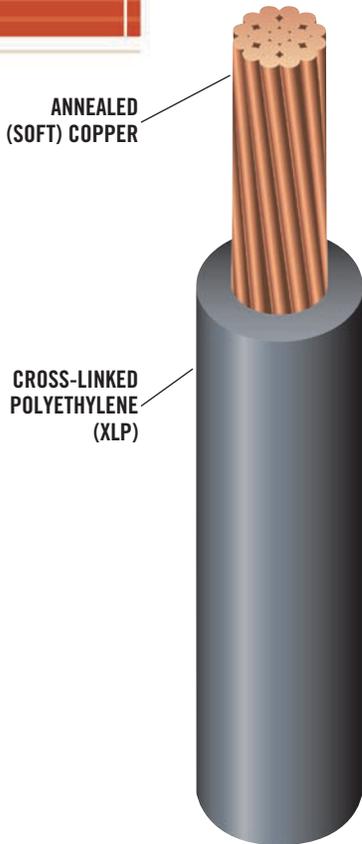
SIMpull THHN

Conductor		Insulation Thickness (mils)	Jacket Thickness (mils)	Nominal O.D. (mils)		Approx. Net Weight Per 1000 ft. (lbs)		Allowable Ampacities+			Standard Package
Size (AWG or kcmil)	Num. Strands			Sol.	Str.	Sol.	Str.	60 °C	75 °C	90 °C	
14	19	15	4	102	109	15	16	15	15	15	DNF
12	19	15	4	119	128	23	24	20	20	20	DNF
10	19	20	4	150	161	36	38	30	30	30	DQF
8	19	30	5	--	213	--	63	40	50	55	F
6	19	30	5	--	249	--	95	55	65	75	E
4	19	40	6	--	318	--	152	70	85	95	C
3	19	40	6	--	346	--	189	85	100	110	BC
2	19	40	6	--	378	--	234	95	115	130	C
1	19	50	7	--	435	--	299	110	130	150	B
1/0	19	50	7	--	474	--	372	125	150	170	B
2/0	19	50	7	--	518	--	462	145	175	195	B
3/0	19	50	7	--	568	--	575	165	200	225	B
4/0	19	50	7	--	624	--	718	195	230	260	B
250	37	60	8	--	678	--	851	215	255	290	B
300	37	60	8	--	730	--	1012	240	285	320	B
350	37	60	8	--	777	--	1174	260	310	350	B
400	37	60	8	--	821	--	1334	280	335	380	B
500	37	60	8	--	902	--	1655	320	380	430	B
600	61	70	9	--	998	--	1987	355	420	475	C
750	61	70	9	--	1126	--	2464	400	475	535	C
1000	61	70	9	--	1275	--	3257	455	545	615	C

**Sizes 14 - 10 AWG not available with patented SIM Technology® No Lube® jacket.
 Sizes 8 and larger available with patented SIM Technology®.
 + Allowable ampacities shown are for general uses as specified by the National Electrical Code, 2008 Edition, section 310.15 unless the equipment is marked for use at higher temperatures the conductor ampacity shall be limited to the following.
 60 °C - When terminated to equipment for circuits rated 100 amperes or less or marked for size 14 through 1 AWG conductors. MTW wet locations or when exposed to oil or coolant.
 75 °C - When terminated to equipment for circuits rated over 100 amperes or marked for conductors larger than size 1 AWG. THWN-2 when exposed to oil or coolant. MTW dry locations.
 90 °C - THHN dry locations. THWN-2 wet or dry locations. For ampacity derating purposes.
 For derating purposes use Article 315 of the National Electrical Code

--	--	--

RHH/RHW/USE



**Underground Service
Entrance Cable**

600 Volt

Copper Conductors

**Cross-Linked
Polyethylene (XLP)
Insulation**

**High-Heat, Moisture,
and Sunlight Resistant**

**Sizes 6 Through
4/0 AWG Also
Rated SIS**

APPLICATIONS Suitable for use as follows:

- Southwire Type RHH or RHW-2 or USE-2 conductors are used with conduit as specified in the National Electrical Code¹
- When used as Type USE-2, conductor is suitable for use as underground service entrance cable for direct burial at conductor temperatures not to exceed 90°C
- When used as RHH, conductor temperatures shall not exceed 90°C in dry locations
- When used as RHW-2 or USE-2, conductor temperatures shall not exceed 90°C in wet or dry locations
- Voltage rating for RHH or RHW-2 or USE-2 conductors is 600 volts

STANDARDS & REFERENCES

Southwire Type RHH or RHW-2 or USE-2 meets or exceeds UL Standard 44 (for RHH or RHW-2), UL Standard 854 (for USE-2), Federal Specification A-A-59544, and requirements of the National Electrical Code.

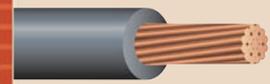
CONSTRUCTION

- Southwire Type RHH or RHW-2 or USE-2 copper conductors are annealed (soft) copper.
- Insulation is an abrasion, moisture, heat, and sunlight resistant black cross-linked polyethylene (XLP).

SPECIFICATIONS

- Conductors shall be UL-listed Type RHH or RHW-2 or USE-2, suitable for operation at 600 volts or less in wet or dry locations, including direct burial in the earth.
- Conductors shall be annealed copper, cross-linked polyethylene (XLP) insulated, as manufactured by Southwire Company or approved equal.

¹ 2005 Edition



COPPER CONDUCTORS

RHH/RHW/USE

WEIGHTS, MEASUREMENTS AND PACKAGING

CONDUCTOR		INSULATION THICKNESS (mils)	NOMINAL O.D. (mils)	ALLOWABLE AMPACITIES†			APPROX. NET WEIGHT PER 1000 FT. (lbs)	STANDARD PACKAGE
SIZE (AWG or kcmil)	NUMBER OF STRANDS			60°C	75°C	90°C		
14	7	45	160	15	15	15	21	A
12	7	45	177	20	20	20	30	A
10	7	45	201	30	30	30	44	A
8	7	60	262	40	50	55	72	B
6	7	60	297	55	65	75	106	B
4	7	60	344	70	85	95	156	B
2	7	60	400	95	115	130	238	B
1	19	80	484	110	130	150	309	B
1/0	19	80	523	125	150	170	381	B
2/0	19	80	567	145	175	195	472	B
3/0	19	80	617	165	200	225	586	B
4/0	19	80	673	195	230	260	729	B
250	37	95	751	215	255	290	867	B
300	37	95	804	240	285	320	1029	B
350	37	95	854	260	310	350	1191	B
400	37	95	899	280	335	380	1352	B
500	37	95	983	320	380	430	1674	B
600	61	110	1089	355	420	475	2012	C
700	61	110	1158	385	460	520	2332	C
750	61	110	1191	400	475	535	2492	C
800	61	110	1223	410	490	555	2652	C
900	61	110	1283	435	520	585	2970	C
1000	61	110	1340	455	545	615	3288	C

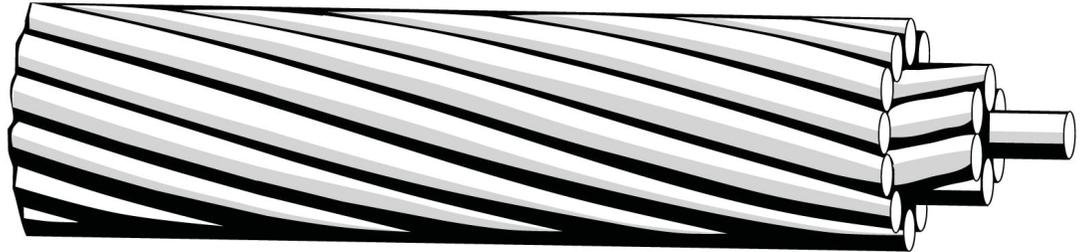
†Allowable Ampacities:
 Allowable ampacities shown are for general use as specified by the National Electrical Code, 2005 Edition, section 310.15.
 60°C - When terminated to equipment for circuits rated 100 amperes or less or marked for 14 through 1 AWG conductors.
 75°C - When terminated to equipment for circuits rated over 100 amperes or marked for conductors larger than 1 AWG.
 90°C - RHH dry locations. RHW-2 and USE-2 wet or dry locations. For ampacity derating purposes.

STANDARD PACKAGE CODES

A – 2500 ft. reel
 B – 1000 ft. reel
 C – 500 ft. reel

Bare Copper Wire and Cable

Bare Copper Conductor. Solid and Stranded .



APPLICATIONS

Solid and stranded (classes AA and A) bare copper are suitable for overhead transmission and distribution applications. Stranded conductor of greater flexibility (classes B and C) are suitable for uninsulated hook up, jumpers, and grounds in electrical construction. Soft Drawn copper is unilay construction.

SPECIFICATIONS

Southwire's bare copper wire and cable meets or exceeds the following ASTM specifications:

- B-1 Hard-Drawn Copper Wire.
- B-2 Medium-Hard Copper Wire.
- B-3 Soft or Annealed Copper Wire.
- B-787 19 Wire Combination Unilay-Stranded Soft copper wire.
- B-8 Concentric-Lay-Stranded Hard, Medium-Hard or Soft Copper Conductor.

CONSTRUCTION

Bare copper, solid or stranded. Available in tempers hard, medium-hard, or soft. Stranded conductors are concentrically stranded in hard and medium-hard tempers and are Combination Unilay stranded in the soft-drawn temper.

Bare Copper

Size (AWG)	Weight Per 1000 ft. (lbs.)	Diameter (mils)	Circular Mil Area (cmils)	Hard-Drawn		Medium-Hard Drawn		Soft-Drawn (Annealed)		Allowable Ampacity+
				Rated Strength (lbs.)	DC Resistance Ohms/1000 ft. @ 20°C	Rated Strength (lbs.)	DC Resistance Ohms/1000 ft. @ 20°C	Rated Strength (lbs.)	DC Resistance Ohms/1000 ft. @ 20°C	
SOLID										
14	12.4	64.1	4110	213.5	2.626	166.6	2.613	124.2	2.525	--
13	15.7	72	5180	268.0	2.083	208.8	2.072	156.6	2.003	--
12	19.8	80.8	6530	336.9	1.652	261.2	1.643	197.5	1.588	--
11	24.9	90.7	8230	422.9	1.310	327.6	1.303	249.0	1.260	--
10	31.4	101.9	10380	529.2	1.039	410.4	1.033	314.0	.999	--
9	39.6	114.4	13090	661.2	.824	514.2	.820	380.5	.792	--
8	50	128.5	16510	826.0	.653	643.9	.650	479.8	.628	95
7	63	144.3	20820	1030.0	.518	806.6	.515	605.0	.498	105
6	79.4	162	26240	1280.0	.411	1010.0	.409	762.9	.395	125
5	100.2	181.9	33090	1591.0	.326	1265.0	.324	961.9	.313	145
4	126.3	204.3	41740	1970.0	.258	1584.0	.257	1213.0	.249	170
3	159.3	229.4	52620	2439.0	.205	1984.0	.204	1530.0	.197	195
2	200.9	257.6	66360	3003.0	.163	2450.0	.162	1929.0	.156	225
1	253.3	289.3	83690	3688.0	.129	3024.0	.128	2432.0	.124	260

+ Ampacity based on 75°C conductor temperature; 25°C ambient temperature; 2 ft./sec. wind in sun.

Bare Copper

Size (AWG or kcmil)	Stranding	Stranding Class	Weight Per 1000 ft. (lbs.)	Diameter (mils)		Hard-Drawn		Medium-Hard Drawn		Soft-Drawn (Annealed)		Allowable Ampacity ⁺
				Individual Wires	Complete Cable	Rated Strength	DC Resistance Ohms/1000 ft. @ 20°C	Rated Strength	DC Resistance Ohms/1000 ft. @ 20°C	Rated Strength	DC Resistance Ohms/1000 ft. @ 20°C	
STRANDED												
8	7	B	51	49	146	777	.6663	610	.6629	499	.6408	95
6	7	B	81	61	184	1228	.4191	959	.4169	794	.4030	130
4	7	A, B	128.9	77	232	1938	.2636	1505	.2622	1320	.2534	170
3	7	A, B	162.5	87	260	2433	.2090	1885	.2079	1670	.2010	200
2	7	A, B	204.9	97	292	3050	.1660	2360	.1650	2110	.1578	230
1	7	A	258.4	109	328	3801	.1316	2955	.1309	2552	.1252	265
1/0	7	A, AA	326.1	123	368	4752	.1042	3705	.1037	3221	.1002	310
1/0	19	B	326.1	75	373	4752	.1042	3705	.1037	3221	.1002	310
2/0	7	A, AA	410.9	138	414	5926	.08267	4640	.08224	4062	.07949	355
2/0	19	B	410.9	84	418	6690	.08267	4765	.08224	4024	.07949	355
3/0	7	A, AA	518.1	155	464	7366	.06556	5812	.06522	5118	.06304	410
4/0	7	A, AA	653.3	174	522	9154	.05199	7278	.05172	6459	.04999	480
4/0	19	B	653.3	106	528	9617	.05199	7479	.05172	6453	.04999	480
250	19	A	771.9	115	574	11360	.04400	8836	.04378	7627	.04231	530
250	37	B	771.9	82	575	11600	.04400	8952	.04378	7940	.04231	530
300	19	A	926.2	126	628	13510	.03667	10530	.03648	9160	.03526	590
350	19	A	1080.6	136	679	15590	.03143	12200	.03127	10680	.03022	650
500	37	A, B	1543.8	116	814	22510	.02200	17550	.02189	15240	.02116	810
600	37	A, AA	1852.5	127	891	27020	.01834	21060	.01825	18300	.01763	910
750	61	A, B	2315.6	111	998	34090	.01467	26510	.01459	22890	.01410	1040
1000	61	A, B	3087.5	128	1152	45030	.01100	35100	.01094	30500	.01058	1240

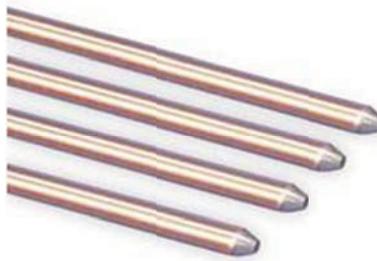
⁺Ampacity based on 75°C conductor temperature; 25°C ambient temperature; 2 ft./sec. wind in sun.

ERITECH Ground Rod, Dia 5/8 In, Length 8 FT

Electrical > Conduit Fittings > Ground Rods

Ground Rod, Pointed End, Copper Bonded Steel, Diameter 5/8 In, Length 8 FT, Standards UL, Description/Special Features 10 Mil Copper Coating

Grainger Item #	2KXL8
Price (ea.)	\$22.18
Brand	ERITECH
Mfr. Model #	615880
Ship Qty. ?	1
Sell Qty. (Will-Call) ?	1
Ship Weight (lbs.)	6.8
Usually Ships** ?	Today
Catalog Page No.	516 +
Country of Origin (Country of Origin is subject to change.)	USA



[+ Enlarge Image](#)

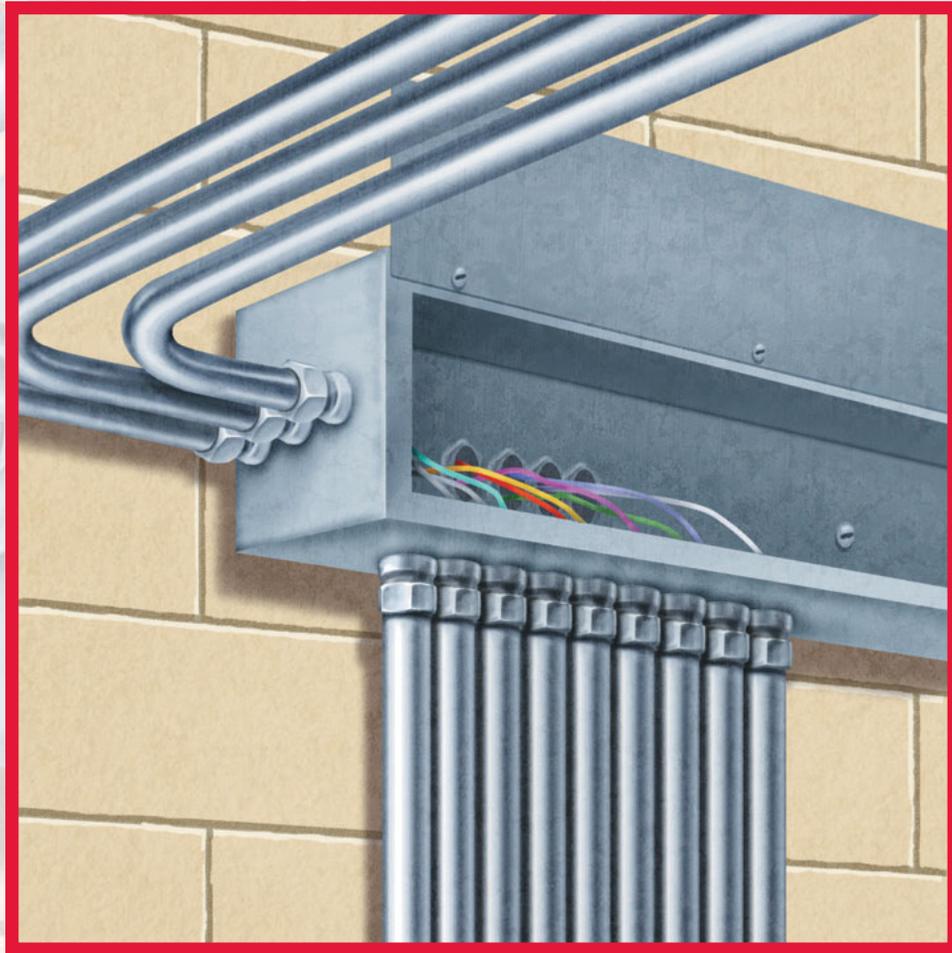
Qty.

[Add to Order](#) [Add to Personal List](#) [Compare Alternates](#)

Price shown may not reflect your price. [Sign in](#) or [register](#)

Tech Specs	Additional Information	Compliance & Restrictions	MSDS	Required Accessories	Optional Accessories	Alternate Products	Repair Parts
Item	Ground Rod						
Type	Pointed End						
Material of Construction	Copper Bonded Steel						
Diameter	5/8"						
Length (Ft.)	8						
Description/Special Features	10 Mil Copper Coating						
Standards	UL						
Package Quantity	1						

Fas Trak Electrical Metallic Tubing



Wheatland Tube

JMC STEEL GROUP

Fas Trak EMT: Tough, Yet Easy to Install.

Wheatland's listed steel Fas Trak Electrical Metallic Tubing (EMT) has the thinnest wall of all of the metallic raceways Wheatland produces, but still provides considerable physical protection for conductors and cables in all applications except those requiring protection from severe physical damage. The lighter wall of EMT means lighter weight, which permits the use of hand benders and easy handling. Steel EMT doesn't burn, contribute to smoke volume, emit potentially escape-inhibiting fire gases, or add to fuel load or flame spread. It also provides an excellent electrical path to ground and is recognized as an equipment grounding conductor by NFPA 70: National Electrical Code® 250.118 (4). We apply a propriety slick, smooth ID coating to Fas Track to make wire pulling easier — which creates less stress on the conductors and enables quicker installation.

The Winning Team

When the job needs to be done on time and within budget, rely on Wheatland. Our in-house, hot-dip galvanizing process is the quality benchmark for the industry. Wheatland's Fas Trak EMT is produced on our state-of-the-art ERW mills using the latest technology to assure the highest quality. Whether you use 10 ft. or 20 ft. lengths, you can save installation time and money with our Fas Trak EMT. Experience. Quality. Total in house capabilities. You and Wheatland. That's *the* winning team.

A Quick Look at Wheatland's Fas Trak EMT

Steel Electrical Metallic Tubing is manufactured from mild steel tube. It has an accurate circular cross section, a uniform wall thickness, a defect free interior surface, and continuously welded seams. EMT is unthreaded and it's installed with set-screws or compression-type couplings and connectors.

Applications: Wheatland Galvanized Steel Electrical Metallic Tubing can be installed indoors or outdoors, in dry or wet locations, exposed or concealed, and in hazardous locations, when in accordance with the NEC®, providing it will not be subject to severe physical damage during and after installation, and is properly protected against corrosion.

Coatings: The exterior surface is thoroughly and evenly coated with zinc using an in-line galvanizing process, so that metal-to-metal contact and galvanic protection against corrosion are provided. The exterior is also protected by a clear post-galvanizing coating to further protect against corrosion. The interior surface is coated with a propriety slick, lubricating



coating that reduces friction during wire insertion, and also retards corrosion.

Sizes: Nominal trade sizes from ½" to 4"

Lengths: EMT is produced in traditional 10 foot lengths, as well as 5 foot and 20 foot lengths. Wheatland was the first to introduce 20 foot lengths, which are factory inventoried in all EMT trade sizes. Our 5 foot lengths are only available in ½ and ¾ trade sizes.

Protection: EMT provides mechanical protection for the cables and conductors, reduces Electro-Magnetic Field (EMF) exposure, shields against Electro-Magnetic Interference (EMI) and provides an excellent electrical path to ground.

Green: The steel used to produce Wheatland's EMT contains recycled steel and is virtually totally recyclable. Steel is the most recycled material in the world, but the recycling may not take place for decades, since the service life of steel conduit is very long. Conductors can easily be removed and new conductors inserted; additional circuits may be added in the same conduit.

Specifications

Wheatland's Fas Trak Electrical Metallic Tubing (EMT) is manufactured in accordance with the latest specifications and standards of ANSI® C80.3, UL 797, and federal specification WW-C-563.

Trade Size Identification

Bundles of finished EMT are wrapped with industry color-coded, special lightweight filament tape. Black tape identifies trade sizes ½" and 1 ½", red tape identifies ¾" and 1 ¼", and blue tape 1". Trade sizes 2" and larger are not bundled.

Protects Against EMI

Steel EMT reduces exposure to EMF and shields against Electro-Magnetic Interference (EMI) at power frequencies which could impact computers and other sensitive electronic equipment and controls. Contact Wheatland's Marketing Department at info@wheatland.com for a copy of Georgia Tech's Grounding and Electro-Magnetic Interference (GEMI) Analysis software.

Provides Equipment Grounding

EMT is approved for use by NFPA 70: National

Electrical Code® as an equipment grounding conductor when utilizing the appropriate fittings in a Code compliant installation.

Circuit Identification

You can identify critical systems easily with Wheatland Tube Company's new Color Check color-coded EMT in 10' and 20' lengths. Color Check EMT offers the same in-line galvanized OD corrosion protection as traditional Wheatland EMT, and features a brilliant durable top-coat in assorted colors for immediate recognition of your systems. No more spray painting or taping in the field!

Electrical Metallic Tubing (EMT)

Weights and Dimensions

Trade Size	Metric Designator	Weight		Outside Diameter(1)		Inside Diameter(2)		Wall Thickness(2)	
		10 Unit Lengths							
		lb	kg	in.	mm	in.	mm	in.	mm
½	16	30	13.6	0.706	17.93	0.622	15.80	.042	1.07
¾	21	46	20.9	0.922	23.42	0.824	20.93	.049	1.24
1	27	67	30.4	1.163	29.54	1.049	26.64	.057	1.45
1¼	35	101	45.8	1.510	38.35	1.380	35.05	.065	1.65
1½	41	116	52.6	1.740	44.20	1.610	40.89	.065	1.65
2	53	148	67.1	2.197	55.80	2.067	52.50	.065	1.65
2½	63	216	98.0	2.875	73.03	2.731	69.37	.072	1.83
3	78	263	119.3	3.500	88.90	3.356	85.24	.072	1.83
3½	91	349	158.3	4.000	101.60	3.834	97.38	.083	2.11
4	103	393	178.3	4.500	114.30	4.334	110.08	.083	2.11

Notes : Applicable tolerances Length: 10 Ft. (3.05 m) +/- 1/4 in. (+/- 6.35 mm)

(1) Outside Diameter: 1/2 - 2 +/- 0.005 in. (16 - 53 +/- 0.13mm), 2-1/2 +/- 0.010 in. (63 +/- 0.25 mm), 3 +/- 0.015 in. (78 +/- 0.38 mm) , 3-1/2 - 4 +/- 0.020 in. (91 - 103 +/- 0.51 mm).

(2) For information only, not a UL 797 requirement.

Packaging

Trade Size	Metric Designator	Threads Protectors Color	Quantity Per Bundle		Quantity Per Lift				Weight Per Lift		Volume Per Lift	
			Feet	Meters	Pieces	Bundles	Feet	Meters	Pounds	Kilograms	Cu. Feet	Cu. m
½	16	Black	100	30.5	---	70	7000	2134	2100	952.5	31.7	0.9
¾	21	Red	100	30.5	---	50	5000	1524	2300	1043.3	36.1	1.0
1	27	Blue	100	30.5	---	30	3000	914	2010	911.7	36.5	1.0
1¼	35	Red	50	15.2	---	40	2000	610	2020	916.3	38.2	1.1
1½	41	Black	50	15.2	---	30	1500	457	1740	789.3	37.9	1.1
2	53	---	---	---	120	---	1200	366	1776	805.6	46.7	1.3
2½	63	---	---	---	61	---	610	186	1318	597.8	41.5	1.2
3	78	---	---	---	51	---	510	155	1341	608.3	48.9	1.4
3½	91	---	---	---	37	---	370	113	1291	585.6	48.6	1.4
4	103	---	---	---	30	---	300	91	1179	534.8	50.0	1.4

The quantity per Lift conforms to the National Electrical Manufacturers Association Standards Publication RN-2 Packaging of Master Bundles for Steel Rigid Conduit, Intermediate Metal Conduit (IMC), and Electrical Metallic Tubing.



JMC Steel Group
Pipe and Tube Solutions

Corporate Office
3201 Enterprise Parkway
Suite 150
Beachwood, OH 44122
Ph: 216.910.3700
info@jmcsteelgroup.com
jmcsteelgroup.com



Wheatland Tube
JMC STEEL GROUP

700 South Dock Street
Sharon, PA 16146
Ph: 800.257.8182
Fax: 724.346.7260
info@wheatland.com
wheatland.com

Wheatland produces a full line of listed electrical conduit, EMT and tubular fittings. We supply Steel and Aluminum Rigid Metal Conduit (RMC), Steel Intermediate Metal Conduit (IMC) and Steel Electrical Metallic Tubing (EMT). We also manufacture a full line of complementary tubular fittings made from the same materials as our raceways — nipples, elbows, couplings and running thread. (See Wheatland's individual product literature for specific product details.)

All Wheatland manufacturing locations' quality management systems are certified to the ISO 9001:2008 requirements.

For more information contact Wheatland's Electrical Sales Department at 800-257-8182, email: info@wheatland.com or visit our website at www.wheatland.com.



Made in U.S.A.

Alflex® - Type RWA

(Reduced Wall Aluminum Flexible Metal Conduit)

Aluminum Flexible Metal Conduit. High Strength Aluminum Alloy Strip.
5/16" is UL Recognized Component. UL Listed in sizes 3/8" to 3".
600 Volt



APPLICATIONS

Alflex® Type RWA (Reduced Wall Aluminum) Flexible Metal Conduit is suitable for the following installations:

- Environmental air-handling spaces per NEC® 300.22(C)
- Power and lighting branch circuit conductors and cables for connecting receptacles, luminaires, equipment, office partitions, etc.
- Metal raceway for wires and cables per NEC® (ANSI/NFPA-70) Article 348
- Motor feeder, branch, and control circuit conductors and cables
- Class 1, Class 2, Class 3 Remote-control, signaling, and power-limited circuit conductors and cables
- Fire alarm system conductors and cables of power-limited or non-power-limited fire alarm circuits
- Voice, data, communications and video cables including CATV and optical fiber cables
- Concealed or exposed installations per NEC® Article 348 and the applicable NEC® provisions
- Elevators, hoistways, and escalators per NEC® 620.21
- As a grounding conductor for lengths up to 6 feet (20A max) as per 2008 NEC® 250.118(5)
- Electric signs and outline lighting per NEC® 600.7, 600.31 (1000 volts or less), and 600.32 (>1000 volts)
- Hazardous location, Class 1, Div. 2, for flexible connectors only per 2008 NEC® 501.10(B)(2) & 501.30(B)
- UL 1, 2, & 3 Hour Through-Penetration Firestop Systems: C-AJ-1462, C-AJ-1463, C-AJ-1464, W-L-1308, and W-L-1309

STANDARDS & REFERENCES

- UL Listed per UL 1, Standard for Safety for Flexible Metal Conduit, ANSI/UL-1
- Meets federal specification WW-C-566c
- NEC Type Designation - Article 348, Type FMC (flexible metal conduit)

CONSTRUCTION

Alflex® Type RWA is manufactured with a lightweight, high strength aluminum alloy. Metal strip is helically formed into continuously interlocked flexible metal conduit that can withstand impact and crushing forces.

Alflex™ is a trademark of Southwire Company.

Alflex - Type RWA

Trade Size (Inches)	Approximate Weight (lbs/100 ft)	Inner Diameter Min./Max. (inches)	Outer Diameter Min./Max. (inches)	Minimum* Bending Radius (Inches)	Standard Coil Length (feet)	Standard Reel Length (feet)
5/16*	5.5	0.312 / -	.0470 / 0.510	3.5	100	1000
3/8	7	0.375 / 0.393	.0560 / 0.610	4	100 / 250	1000
1/2	9	0.625 / 0.645	0.860 / 0.920	4	100	500 / 1000
3/4	12.5	0.812 / 0.835	1.045 / 1.105	5	100	500 / 1000
1	25	1.000 / 1.040	1.300 / 1.380	6	50	400
1-1/4	32	1.250 / 1.300	1.550 / 1.630	8	50	250
1-1/2	46	1.500 / 1.575	1.850 / 1.950	10	25	150
2	70	2.000 / 2.080	2.350 / 2.450	12	25	100
2-1/2	92	2.500 / -	2.860 / 3.060	15	25	-
3	107	3.000 / -	3.360 / 3.560	18	25	-
3-1/2**	125	3.500 / -	3.860 / 4.060	21	25	-
4**	142	4.000 / -	4.360 / 4.560	24	25	-

* Trade size 5/16" is provided as UL Recognized construction.
 ** Trade sizes 3-1/2" and 4" are non-UL.
 Minimum bend radius based on NEC Chapter 9, Table 2 (other bends).

FEATURES

- Provides mechanical protection for conductors and cable
- For use with listed connectors intended for NEC Type FMC (Flexible Metal Conduit)
- 66% lighter than steel
- Cuts 80% faster than steel
- Smooth interior for easy wire pulling
- High strength aluminum alloy construction
- Superior corrosion resistance
- Built in flexibility for simplified positioning

ADDITIONAL APPLICATIONS

- Listed wired fixtures per NEC 410.77(C)
- Raised floors for connection of information technology per NEC 645.5(D)(2) and 645.5(D)
- Places of assembly and theaters per NEC Articles 518 and 520
- Cranes & hoists per NEC 610.11(C)

ONLINE CERTIFICATIONS AND TOOLS

- UL Online Certifications Directory (www.ul.com)
- CSA Online Certifications Directory (www.csa.ca)
- UL Guide Information - Flexible Metal Conduit (DXUZ)
- CSA Product Information - Flexible Metal Conduit (1811-01)

Ultratite® - Type NM

(Liquidtight Flexible Nonmetallic Conduit)

Liquidtight Flexible Nonmetallic Conduit. UL/CSA Listed.
Oil-Resistant. Sunlight-Resistant. Crush-Resistant.
Temperature Rated -30°C to 80°C.



APPLICATIONS

Ultratite® Liquidtight Flexible Nonmetallic Conduit is suitable for the following installations:

- For the installation and protection of electrical conductors in circuits of 600 volts nominal, or less
- Motor circuits - for conductors of motor feeders, branch and control circuits
- Where the conditions of installation, operation, or maintenance require flexibility or protection from liquids, vapors, solids, or weather
- Agricultural buildings per NEC® 547.5
- Used in industrial and commercial applications for conveyors, blowers, cranes, air conditioners, machine tooling and lubrication equipment
- Exposed or concealed installations
- Applications requiring movement, crossover connections, or tight bends
- For direct burial and encased in concrete
- For flexible connections to swimming pool, spa, and hot tub motors per NEC® 680.21(A)(3) & 680.42(A)(1)
- Electric signs and outline lighting supply and secondary-circuit conductors per NEC® 600.7, 600.31 (1000 volts or less) & 600.32 (over 1000 volts)
- Hazardous locations - see Additional Applications Section on the following page for more details

STANDARDS & REFERENCES

- NEC® Type designation - Type LFNC-B (Liquidtight Flexible Nonmetallic Conduit)
- ANSI / NFPA-70, NEC® Article 356
- UL Listed to Underwriters Laboratories Standard UL 1660
- Approved by Canadian Standards Association

CONSTRUCTION

Ultratite® Type NM is manufactured with a spiral of rigid PVC reinforcement imbedded within a flexible PVC wall. The construction provides excellent impact and crush strength while remaining highly flexible. The conduit resists oils, mild acids and exposure to sunlight.

™ Ultratite is a trademark of Southwire Company.



Southwire
One Southwire Drive
Carrollton, Ga. 30119 USA



greenSpec™
RoHS Compliant

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® Southwire is a registered trademark
of Southwire Company.

Ultratite - Type NM

Trade Size (Inches)	Approximate Weight (lbs/100 ft)	Inner Diameter Min./Max. (inches)	Outer Diameter Min./Max. (inches)	Approx. Bend Radius* (Inches)	Standard Coil Length (feet)	Standard Reel Length (feet)
3/8	10.5	0.484 / 0.504	0.690 / 0.710	4	100	600
1/2	13	0.622 / 0.642	0.820 / 0.840	4	100	1000
3/4	18	0.820 / 0.840	1.030 / 1.050	5	100	1000
1	27	1.041 / 1.066	1.290 / 1.315	6	100	400
1-1/4	34	1.380 / 1.410	1.630 / 1.660	8	50	250
1-1/2	45	1.575 / 1.600	1.865 / 1.900	10	50	150
2	64	2.020 / 2.045	2.340 / 2.375	12	50	100

* Minimum bend radius based on NEC Chapter 9, Table 2 (other bends) per Article 356.

FEATURES

- A protective combination of thermoplastic materials formed into a conduit/raceway which seals out water, liquids, abrasives, alcohol, coolants, corrosive fumes and gases, dirt, grease, mineral acids, non-concentrated fixed alkalines, petroleum oils, salt air and spray, and weather
- Smooth interior for easy wire pulling
- UV sunlight resistant jacket
- Rated for temperature range of -30°C to 80°C , 60°C Oil (-22 to +176, 140°F Oil)
- Accepts standard liquid-tight fittings for use with LFNC-B

ADDITIONAL APPLICATIONS

- In Hazardous Locations - where necessary for flexible connections within hazardous locations in accordance with the following:
 - Class I, Div. 2 - NEC® 501.10(B)(2)
 - Class II, Div. 1 - NEC® 502.10(A)(2)
 - Class II, Div. 2 - NEC® 502.10(B)(2)
 - Class III, Div. 1 - NEC® 503.10(A)(2)
 - Class III, Div. 2 - NEC® 503.10(B)
- Floating building feeders and services per NEC® 553.7
- Boatyards & Marinas in accordance with NEC® 555.13
- Cranes & Hoists in accordance with NEC® 610.11(C)
- For Elevator, Dumbwaiters, Escalators, Moving Walks, Wheel Chair Lifts & Stairway Chair Lifts in accordance with NEC® 620.21 (where expressly permitted)
- Under raised floors in information technology equipment conductors and cables in accordance with NEC® 645.5 (D) & 645.5(D)(2)
- Service entrance in lengths up to six feet per NEC® 230.43(15)
- For containment of 600 Volt and lower potential circuits
- Approved for use in lengths longer than 6 feet per NEC® 356.10(5)
- Motor leads per NEC® 430.145(B)



Southwire
One Southwire Drive
Carrollton, Ga. 30119 USA



greenSpec
RoHS Compliant

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Ultratite - Type NM

ONLINE CERTIFICATIONS AND TOOLS

- [UL Online Certifications Directory \(www.ul.com \)](http://www.ul.com)
- [CSA Online Certifications Directory \(www.csa.ca \)](http://www.csa.ca)
- [UL Guide Information - Flexible Non-Metallic Conduit, Liquid-tight \(DXOQ\)](#)
- [CSA Product Information - Conduit-Flexible Nonmetallic, Liquid-Tight Conduit \(1813-01\)](#)

Interior Assembly

Part Number	Description	Min. Qty.	Master Pack Qty.
TLM4020U2	Interior, 40 circuit, 200 A, Cu	1	6
THDWRKIT2	Interior Mounting Screw Kit	10	10

Front Assembly

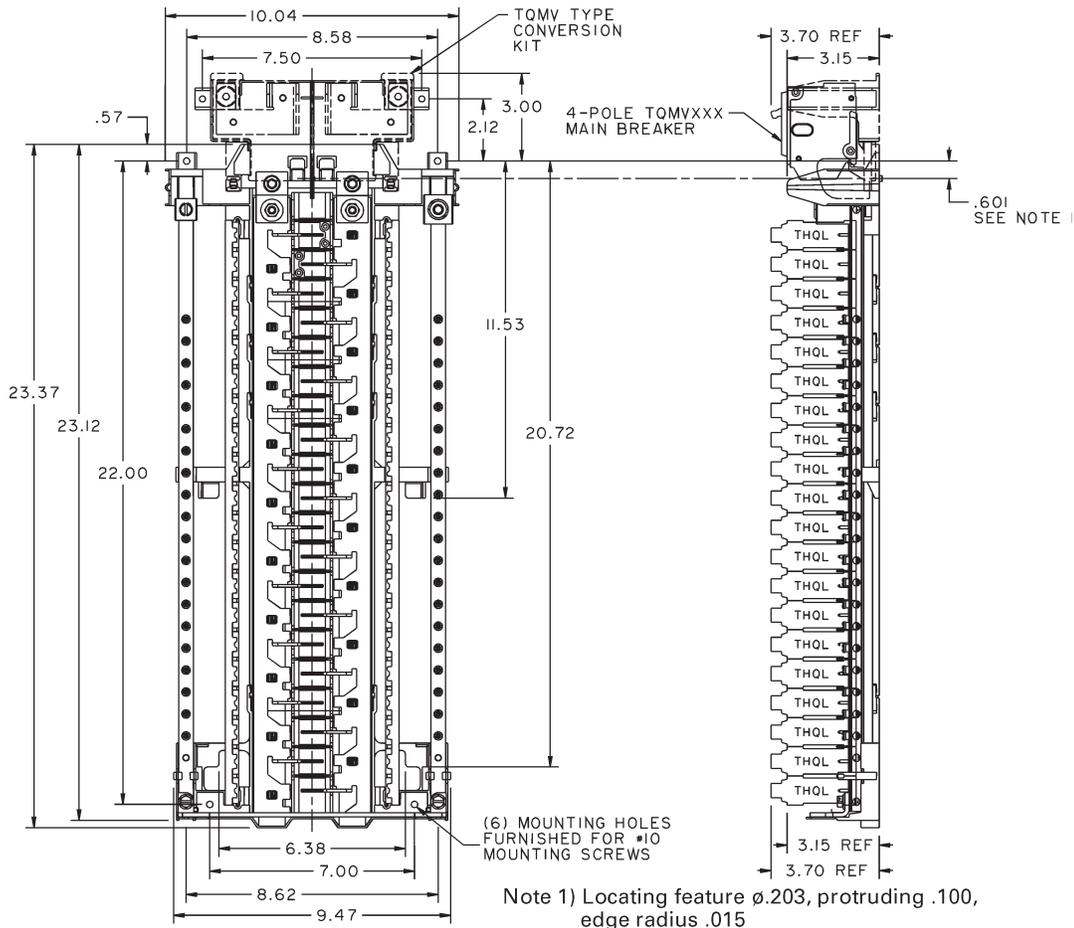
TM40BC	Assembly, Front and Pan	1	1
139C5515P5	Door	1	1
192A6597P1	Hinge	3	1200
THDWRKIT	Front Mounting Screw Kit	20	20

Box Assembly

LC4020BOX	Box Assembly	1	24
-----------	--------------	---	----

Accessories

TBS	Bonding Screw Kit	1	1
TGK42	Equipment Ground Kit	1	1



OEM interiors are UL-recognized components listed under UL file E21790.

Main Ampere Rating	Maximum Spaces				Total 1-Pole Spaces	Main Breaker Conv Kit
	1" THQL		1/2" THQL			
	1-Pole	2-Pole	1-Pole	2-Pole		
200	40	20	—	—	40	THQMV200

SolaDeck

FLASHED PV ROOF-MOUNT COMBINER/ENCLOSURE

Basic Features

- Stamped Seamless Construction
- 18 Gauge Galvanized Steel
- Powder Coated Surfaces
- Flashes into the roof deck
- 3 Roof deck knockouts .5", .75", 1"
- 5 Centering dimples for entry/exit fittings or conduit
- 2 Position Ground lug installed
- Mounting Hardware Included



SolaDeck Model SD 0783



SolaDeck UL50 Type 3R Enclosures

Available Models:

- Model SD 0783 - (3" fixed Din Rail)
- Model SD 0786 - (6" slotted Din Rail)



SolaDeck UL 1741 Combiner/Enclosures

Models SD 0783-41 and SD 0786-41 are labeled and ETL listed UL STD 1741 according to the UL STD 1741 for photovoltaic combiner enclosures.

Max Rated - 600VDC, 120AMPS

Model SD 0783-41 3" Fixed Din Rail fastened using Norlock System

**Typical System Configuration

- 4- Din Rail Mounted Fuse Holders 600VDC 30 AMP
- 1- Power Distribution Block 600VDC 175AMP
- 1- Bus Bar with UL lug

Model SD 0786-41 6" Slotted Din Rail fastened using steel studs

**Typical System Configuration

- 4- Din Rail Mounted Fuse Holders 600VDC 30 AMP
- 4- Din Rail Mounted Terminal Blocks
- Bus Bars with UL lug

**Fuse holders and terminal blocks added in the field must be UL listed or recognized and meet 600 VDC 30 AMP 110C for fuse holders, 600V 50 AMP 90C for rail mounted terminal blocks and 600 V 175 AMP 90C for Power Distribution Blocks. Use Copper Wire Conductors.



Cover is trimmed to allow conduit or fittings, base is center dimpled for fitting locations.



Model SD 0783-41, wired with Din Rail mounted fuse holders, bus bar and power distribution block.



Model SD 0786-41, wired with Din Rail mounted fuse holders, terminal blocks and bus bars.

WIEGMANN Enclosure, NEMA 1, 16 Ga

[Electrical](#) > [Enclosures](#) > [Enclosures](#)

Enclosure With Screw Cover, NEMA Type 1, Knockout Pattern (2) 1/2-3/4 Inch, Knockout Pattern (1) 3/4-1 Inch, Height 8.00 Inches, Width 8.00 Inches, Depth 4.00 Inches, Gauge 16, Mounting Hole Height 5.88 Inches, Mounting Hole Width 5.88 Inches

Grainger Item #	4KP28
Price (ea.)	\$24.82
Brand	WIEGMANN
Mfr. Model #	SC080804
Ship Qty. ?	1
Sell Qty. (Will-Call) ?	1
Ship Weight (lbs.)	5.1
Usually Ships** ?	Today
Catalog Page No.	523 ?
Country of Origin (Country of Origin is subject to change.)	USA



Qty.

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Price shown may not reflect your price. [Sign in](#) or [register](#)

Tech Specs	Additional Information	Compliance & Restrictions	MSDS	Required Accessories	Optional Accessories	Alternate Products	Repair Parts
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NEMA 1 and 3R Enclosures

Steel with ANSI 61 gray polyester powder-coated finish.

UL Listed and CSA Certified

NEMA 1

For general use in areas not requiring oiltight and dust-tight specifications.



Air conditioner disconnects

PULLER TYPE AC DISCONNECTS

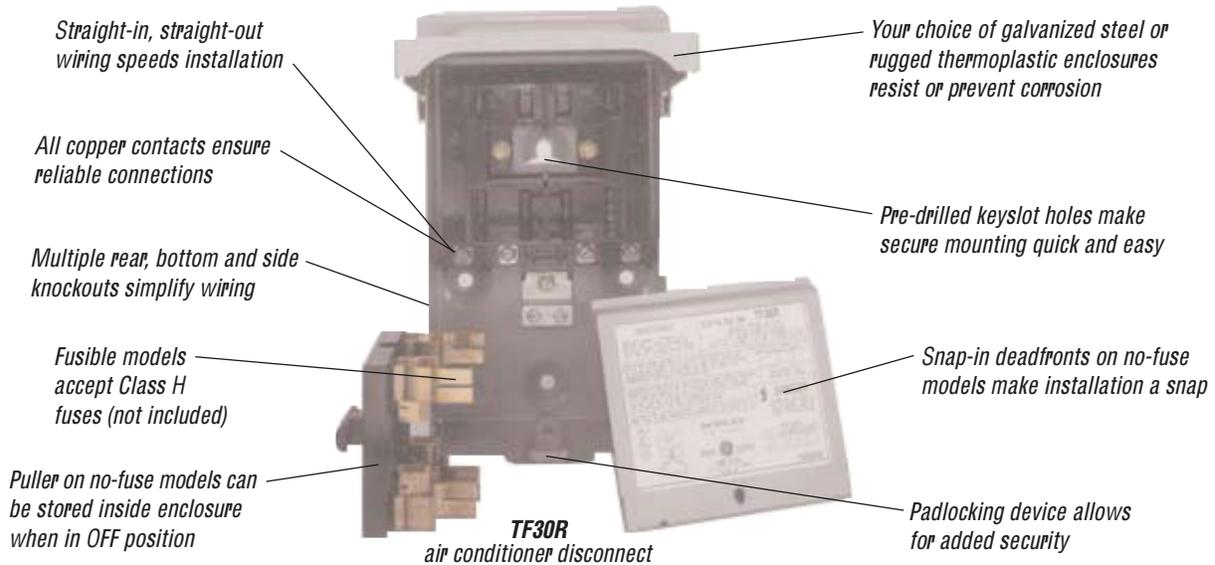


Cool operators

Fusible and non-fusible in plastic and metal enclosures

With GE air conditioner disconnects, you get:

- Compact size
- Easy installation
- Fusible and non-fusible types
- Plastic and metal enclosures
- Puller and non-automatic switch type disconnects



Schematic Diagram	Puller Type	Maximum Ampere Rating	Volts	Outdoor, Type 3R Catalog Number	Horsepower Rating	Lug Wire Range AWG Cu/Al
Thermoplastic-Enclosures — GE Noryl® Resin						
	Fusible	30	120-240	TPF30R	3	14-3
		60	120-240	TPF60R	10	
	No Fuse	60	240	TPN60R1	10	14-3
	Non-Auto Switch	60	240	TPNA60R1	10	14-3
Steel Enclosures						
	Fusible	30	120-240	TF30R	3	14-3
		60	120-240	TF60R	10	
	No Fuse	60	240	TFN60R	10	14-3
	Non-Auto Switch	60	240	TNA60R1	10	14-3

Application Information

UL Information

Fusible: **UL Listed** — UL869 Service Entrance

No Fuse: **UL Listed** — UL1429 Enclosed Pull-out Switch

cUL Listed — TFN60R only

NEC: **440-14**

Install Confidence. Install GE.



GE Industrial Systems

General Electric Company
 41 Woodford Avenue, Plainville, CT 06062
 www.GEindustrial.com

Molded Case Circuit Breakers

Q-Line Circuit Breakers

Plug-in Circuit Breakers
120/240V Class

TQL and THQL 120/240 Vac

# of Poles	Ampere Rating	Wire Range ¹	120/240 Vac Interrupting Rating	Product Number	List Price GO-138A
1	10 ⁴		5kA	TQL1110	\$20.00
1	15 ²	(1) 14-8 Cu/12-8 Al	10kA	THQL1115	\$20.25
1	20 ²	(1) 14-8 Cu/12-8 Al	10kA	THQL1120	\$20.25
1	25	(1) 14-8 Cu/12-8 Al	10kA	THQL1125	\$20.25
1	30	(1) 14-8 Cu/12-8 Al	10kA	THQL1130	\$20.25
1	35	(1) 8-3 Cu/8-3 Al	10kA	THQL1135	\$21.25
1	40	(1) 8-3 Cu/8-3 Al	10kA	THQL1140	\$21.25
1	45	(1) 8-3 Cu/8-3 Al	10kA	THQL1145	\$21.25
1	50	(1) 8-3 Cu/8-3 Al	10kA	THQL1150	\$21.25
1	60	(1) 8-3 Cu/8-3 Al	10kA	THQL1160	\$21.25
1	70	(1) 6-1/0 Cu/4-1/0 Al	10kA	THQL1170	\$42.50



THQL1120

TQL and THQL 120/240 Vac, Internal Common Trip

# of Poles	Ampere Rating	Wire Range ¹	120/240 Vac Interrupting Rating	Product Number	List Price GO-138A
2	10 ⁴		5kA	TQL2110	\$46.00
2	15	(1) 14-8 Cu/12-8 Al	10kA	THQL2115	\$46.00
2	20	(1) 14-8 Cu/12-8 Al	10kA	THQL2120	\$46.00
2	25	(1) 14-8 Cu/12-8 Al	10kA	THQL2125	\$46.00
2	30	(1) 14-8 Cu/12-8 Al	10kA	THQL2130	\$46.00
2	35	(1) 8-3 Cu/8-3 Al	10kA	THQL2135	\$47.75
2	40	(1) 8-3 Cu/8-3 Al	10kA	THQL2140	\$47.75
2	45	(1) 8-3 Cu/8-3 Al	10kA	THQL2145	\$47.75
2	50	(1) 8-3 Cu/8-3 Al	10kA	THQL2150	\$47.75
2	60	(1) 8-3 Cu/8-3 Al	10kA	THQL2160	\$47.75
2	70	(1) 6-1/0 Cu/4-1/0 Al	10kA	THQL2170	\$95.00
2	80	(1) 6-1/0 Cu/4-1/0 Al	10kA	THQL2180	\$131.00
2	90	(1) 6-1/0 Cu/4-1/0 Al	10kA	THQL2190	\$131.00
2	100	(1) 6-1/0 Cu/4-1/0 Al	10kA	THQL21100	\$131.00
2	110	(1) 2-2/0 Cu/2-2/0 Al	10kA	THQL21110	\$284.00
2	125	(1) 2-2/0 Cu/2-2/0 Al	10kA	THQL21125 ³	\$284.00



THQP130

THQP 120/240 Vac

# of Poles	Ampere Rating	Wire Range ¹	120/240 Vac Interrupting Rating	Product Number	List Price GO-138A
1	15	14-8 Cu/12-8 Al	10kA	THQP115	\$20.25
1	20	14-8 Cu/12-8 Al	10kA	THQP120	\$20.25
1	25	14-8 Cu/12-8 Al	10kA	THQP125	\$20.25
1	30	8-4 Cu/8-4 Al	10kA	THQP130	\$20.25
1	35	8-4 Cu/8-4 Al	10kA	THQP135	\$21.25
1	40	8-4 Cu/8-4 Al	10kA	THQP140	\$21.25
1	45	8-4 Cu/8-4 Al	10kA	THQP145	\$21.25
1	50	8-4 Cu/8-4 Al	10kA	THQP150	\$21.25

THQP 120/240 Vac, Internal Common Trip

# of Poles	Ampere Rating	Wire Range ¹	120/240 Vac Interrupting Rating	Product Number	List Price GO-138A
2	15	14-8 Cu/12-8 Al	10kA	THQP215	\$46.00
2	20	14-8 Cu/12-8 Al	10kA	THQP220	\$46.00
2	25	14-8 Cu/12-8 Al	10kA	THQP225	\$46.00
2	30	8-4 Cu/8-4 Al	10kA	THQP230	\$46.00
2	35	8-4 Cu/8-4 Al	10kA	THQP235	\$47.75
2	40	8-4 Cu/8-4 Al	10kA	THQP240	\$47.75
2	45	8-4 Cu/8-4 Al	10kA	THQP245	\$47.75
2	50	8-4 Cu/8-4 Al	10kA	THQP250	\$47.75



THQP230

¹Solid or stranded for 14-10 AWG.

²UL listed as SWD (Switching Duty) rated. Suitable for switching 120 Vac fluorescent lighting loads.

³Recommended for use as main or submain breaker only.

⁴Not UL listed.

UL listed as HACR (heating, air conditioning and refrigeration).

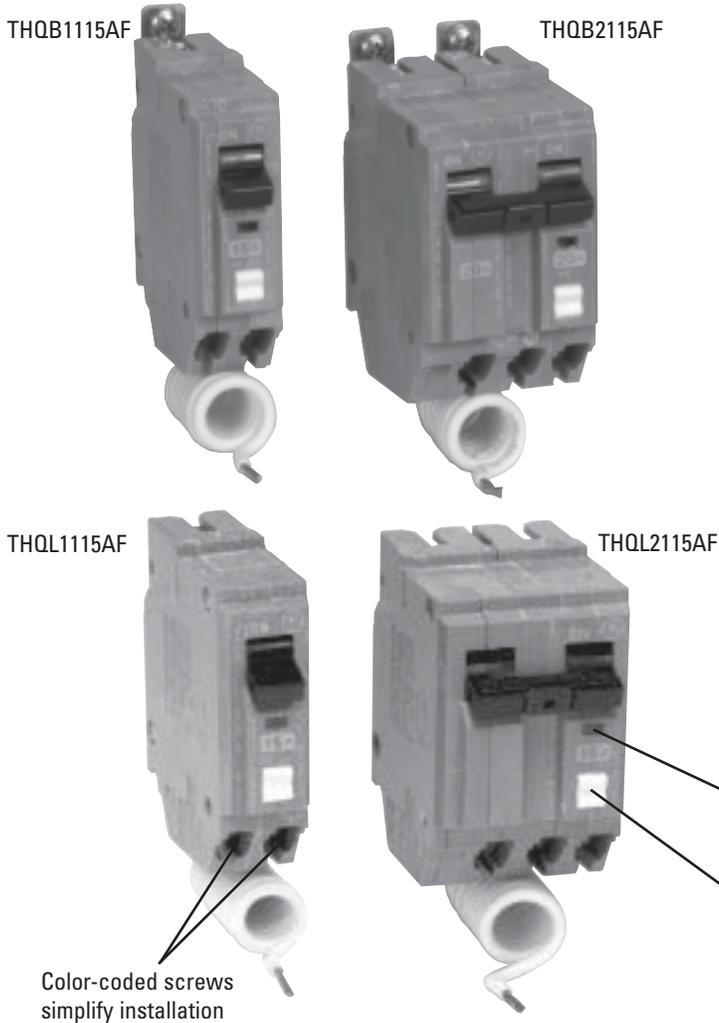


Publications and Reference: See Section 22 for a complete list of additional product-related publications



GE Industrial Systems

Bolt-on & Plug-in Arc Fault Circuit Interrupters



- **Industry first:** the only available AFCI breaker with a dual-function test button, providing two safety tests
- **Locate tripped breakers fast** with trip notification flag and distinctive gray housing
- **2-pole breaker solution** for shared neutral wiring
- **Protects the entire circuit** with both plug-in and bolt-on breaker designs
- **Plug-in design** suitable for all PowerMark™ load centers and A-Series® Type AL panelboards
- **Bolt-on design** suitable for both Pro-Stock™ Type AQ panelboards and factory-assembled A Series® Type AQ panelboards
- **Fulfills 2002 National Electrical Code** requirements for dwelling unit bedrooms

The Problem: Electrical fires in homes break out more than 40,000 times each year in the U.S. alone. A significant portion of these fires result from arc faults, which are unintended electrical arcs – caused by damaged, aged or improperly used electrical wires – that may cause the ignition of combustible materials in the home.

The GE Solution: In addition to protecting against short circuits and overloads, an AFCI electronically identifies unique current and voltage characteristics of arcing faults and de-energizes the entire circuit when the fault occurs.

Arc Fault Circuit Interrupters

Product specifications

- Wire size 14-10 AWG 60/75°C Cu/Al
- 1" module per pole

Poles	Amperage	Voltage	10kAIC		22kAIC	
			Plug-in	Bolt-on	Plug-in	Bolt-on
1	15	120	THQL1115AF	THQB1115AF	TTHQL1115AF	TTHQB1115AF
	20	120	THQL1120AF	THQB1120AF	TTHQL1120AF	TTHQB1120AF
2	15	120/240	THQL2115AF	THQB2115AF	TTHQL2115AF	TTHQB2115AF
	20	120/240	THQL2120AF	THQB2120AF	TTHQL2120AF	TTHQB2120AF

Standards and Approvals

- UL Listed (Molded Case Circuit Breakers) UL 489
- UL Listed (Arc Fault Circuit Interrupters) UL 1699
- CS Listed (Molded Case Circuit Breakers) CAN/CSA-C22.2 No. 5.1, 1 Pole Only
- CS Listed (Interim Requirements for Arc Fault Circuit Interrupters) TIL No. M-02, 1 Pole Only

GE AFCI breakers deliver added protection

- Parallel Protection— direct contact of two wires with opposite polarity (example: improperly stapled cable)
- Ground Protection – arc between a single conductor and ground (example: improperly installed wall receptacles)
- Overload Protection
- Short Circuit Protection

Typical causes of arc faults

- Damaged wires
- Neutral leads pinched to grounded metal box
- Worn electrical insulation
- Wet connections or conduit
- Shorted wires
- Wires or cords in contact with vibrating metal
- Overheated or stressed electrical cords and wires
- Misapplied/damaged appliances

Wiring Diagrams

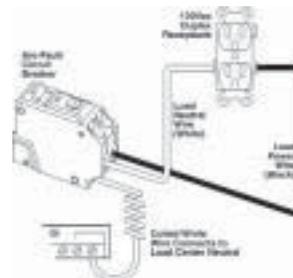


Diagram A. 1-pole 120Vac 2-wire branch circuit

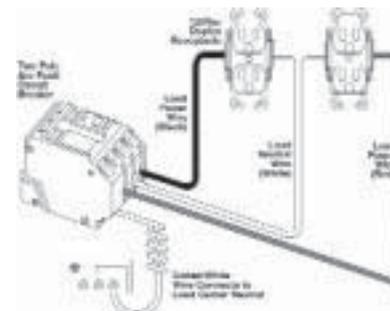


Diagram B. Two 1-pole duplex receptacles with shared neutral application

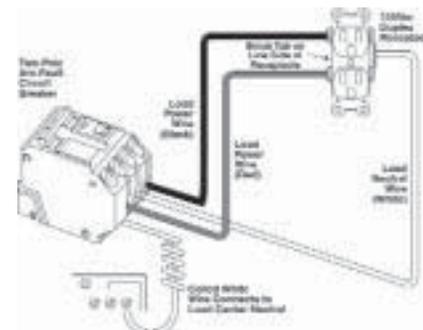


Diagram C. 2-pole shared neutral with duplex receptacle

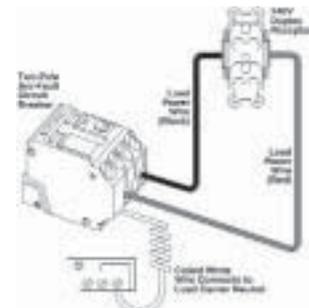


Diagram D. 2-pole 240Vac load application derived from 120/240Vac



GE Industrial Systems

General Electric Company
 41 Woodford Avenue, Plainville, CT 06062
 1-800-379-5080
 www.GEindustrial.com
 © 2002 General Electric Company



Specification Grade Ground Fault Circuit Interrupter Receptacles

2-Pole, 3-Wire Grounding
15A, 125V/AC; 20A, 125V/AC
NEMA 5-15, 5-20

		Device Type	Specification Grade GFCI 15A & 20A VGF and VGF_F Series, VGF__-AG* ArrowLink: MCR125_, MCR250_, MCR300_ Series	Specification Grade Tamper Resistant & Weather Resistant Duplex GFCI 15A & 20A; TRVGF, TRVGF_F, WRVGF, TWRVGF Series, TRVGF__-AG ArrowLink: MCR125_, MCR250_, MCR300_ Series
Wiring Type	Base Device		Back & side wire	Back & side wire
	ArrowLink		Integral wire leads, crimped & resistance welded	Integral wire leads, crimped & resistance welded
	ArrowLink SPD		Backwire feed through	Backwire feed through
Testing & Code Compliance	Base Device		<ul style="list-style-type: none"> cULus Listed to UL 498 and UL 943, file no. E60120 Meets all UL 943 (GFCI), UL 498 (Receptacles) and applicable CSA requirements NOM certified 	<ul style="list-style-type: none"> cULus Listed to UL 498 and UL 943, file no. E60120 Meets all UL 943 (GFCI), UL 498 (Receptacles) and applicable CSA requirements NOM certified
	ArrowLink		<ul style="list-style-type: none"> Plug & connector cULus Listed to to UL 2459, file no. E325188 	<ul style="list-style-type: none"> Plug & connector cULus Listed to to UL 2459, file no. E325188
	Combined		<ul style="list-style-type: none"> cULus Listed wiring assembly, UL file no. E326691 	<ul style="list-style-type: none"> cULus Listed wiring assembly, UL file no. E326691
Specifications: Environmental	Base Device	Flammability	Meets UL 94 requirements; V2 rated	Meets UL 94 requirements; V2 rated
		Temperature Rating	-35°C to 66°C (-31°F to 150.8°F)	-35°C to 66°C (-31°F to 150.8°F)
	ArrowLink	Flammability	Meets UL 94 requirements; V2 rated	Meets UL 94 requirements; V2 rated
		Temperature Rating	-35°C to 66°C (-31°F to 150.8°F)	-35°C to 66°C (-31°F to 150.8°F)
Specifications: Electrical	Base Device	Dielectric Voltage	Withstands 2000V per UL 498	Voltage: withstands 2000V per UL 498
		Current Interrupting	Yes, at full-rated current	Yes, at full-rated current
		Temperature Rise	Temperature Rise: max. 30°C (86°F) after 100 cycles of overload @ 150% of rated current (DC)	Max. 30°C (86°F) after 100 cycles of overload @ 150% of rated current (DC)
		Trip Time	0.025 seconds (Class A)	0.025 seconds (Class A)
		Frequency	60 Hz; Voltage: 125V; Amperage: 15A/20A 20A Feed Through	60 Hz; Voltage: 125V; Amperage: 15A/20A 20A Feed Through
		Short Circuit Testing	Meets and exceeds 10 kA	Meets and exceeds 10 kA
		Maximum Interrupting Capacity	20 Amps	20 Amps
	ArrowLink	Max. Working Voltage	300V/AC	300V/AC
		Max. Continuous Current	20A	20A
		Overload	52.5A/AC for 10 cycles	52.5A/AC for 10 cycles
		Dielectric Voltage	Withstands 1600V per UL 2459	Withstands 1600V per UL 2459
		Current Interrupting	Limited cycles at full-rated current	Limited cycles at full-rated current
		Temperature Rise	Max. 50°C (122°F) while conducting 35A after 10 cycles of overload @ 52.5A/AC	Max. 50°C (122°F) while conducting 35A after 10 cycles of overload @ 52.5A/AC
Specifications: Mechanical	Base Device Terminal Accommodation	#14 - #10 AWG	#14 - #10 AWG	
	ArrowLink Wire Leads	#12 AWG	#12 AWG	
	ArrowLink SPD Screw Terminals	Accepts #12-#14 stranded and solid wire	Accepts #12-#14 stranded and solid wire	
	ArrowLink SPD Ground	Integral THHN #12 AWG 6" lead with ring terminal and #10 ground screw	Integral THHN #12 AWG 6" lead with ring terminal and #10 ground screw	
	Voltage Ratings	Permanently marked on device	Permanently marked on device	
Specifications: Screw Terminal Guards	ArrowLink Models Only	Material: UL recognized insulating material Dielectric Strength: 2,000V min HWI Rating: 4 min. Relative temperature index, electrical: 80°C (176°F) Flammability: V0 (UL 94)	Material: UL recognized insulating material Dielectric Strength: 2,000V min HWI Rating: 4 min. Relative temperature index, electrical: 80°C (176°F) Flammability: V0 (UL 94)	
Materials:	Base Device	Top Housing	Thermoplastic, nylon	Thermoplastic, nylon, except WR: nylon 6/6
		Bottom Housing	PVC	PVC
		Strap	0.047" thick steel, zinc plated	0.047" thick steel, zinc plated; WR & TWR: nickel-plated
		Line Contacts	0.030" thick brass	0.030" thick brass
		Terminal & Ground Screws	#8-32 steel, brass plated; neutral screw nickel plated, ground screw green	Terminal: Brass/nickel-plated steel; WR & TWR brass/nickel-plated stainless steel; Ground: ground screw green on all models, WR and TWR stainless steel
		Terminal Clamps	0.070" thick steel	Brass-plated steel; WR & TWR nickel-plated steel
	ArrowLink	Housing	Polycarbonate	Polycarbonate
		Contacts	Copper alloy	Copper alloy
		Wire Leads	Solid or stranded THHN #12 AWG	Solid or stranded THHN #12 AWG
	ArrowLink SPD	Housing	Polycarbonate	Polycarbonate
Contacts		Copper alloy	Copper alloy	

*VGF__-AG not available with ArrowLink

***One Cover Handles GFCI, Single, Duplex,
or Switch Configurations***

Red•Dot®

Code Keeper®
Universal
While-In-Use
Covers



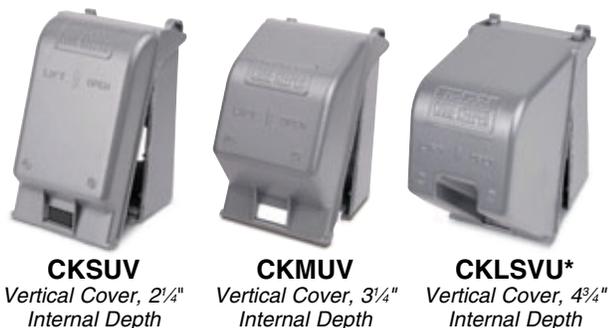
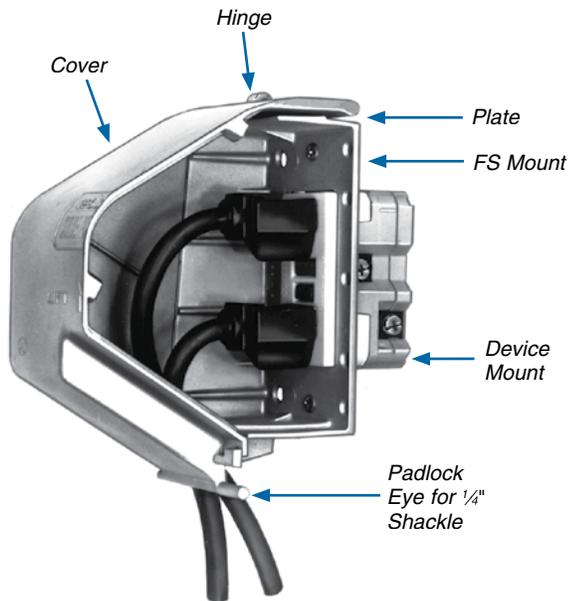


Red•Dot®

Red Dot® Code Keeper® Universal While-In-Use Covers

One Cover Handles GFCI, Single, Duplex, or Switch Configurations

Red Dot® Code Keeper® Universal While-in-Use Covers make it easier than ever to comply with National Electrical Code (NEC) requirements for weatherproof while-in-use covers in wet locations. Preconfigured for GFCI — the industry's most common configuration — each cover ships with adapter plates to accommodate single or duplex receptacles and switches. Now contractors can handle any application they encounter without needing dozens of different covers.

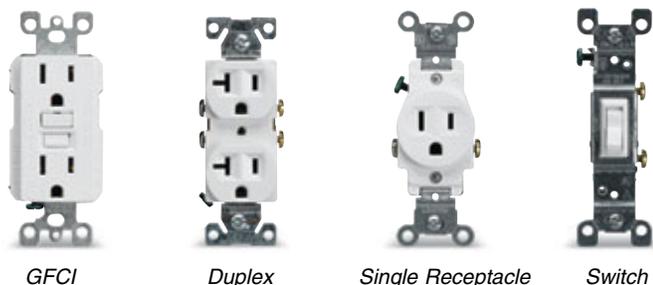


- Wide range of cover depths and receptacle configurations accommodates almost every common plug and cord size
- Key-hole mounts on back make installation fast and efficient (not available on CKLSVU)
- Combination box or device-mounting design provides flexibility in installation
- Durable latching covers prevent accidental equipment disconnects, reduce tampering and deter theft
- Lockable covers comply with OSHA lockout/tagout requirements
- Clearly visible UL® and CSA markings speed approval by inspectors
- Complies with the National Electrical Code Article 406.8 (B) for unattended in-use plugs in wet locations
- Two adapter plates included with single-gang covers, and four adapter plates included with two-gang covers

* For 1.594" to 2.125" round receptacles only.



Accommodates Multiple Device Configurations (device not included)



Red Dot® Code Keeper® Universal While-In-Use Covers

Cat. Number	Description	Std. Pkg. Qty.	UPC Number
Single-Gang			
CKSUV	Vertical Cover, 2 1/4" Internal Depth	8	042269-00510
CKMUV	Vertical Cover, 3 1/4" Internal Depth	6	042269-00466
CKLSVU	Vertical Cover, 4 3/4" Internal Depth	2	042269-00468
CKMU	Horizontal Cover, 3 1/4" Internal Depth	3	042269-00465
Two-Gang			
2CKU	Vertical Cover, 4 1/4" Internal Depth	2	042269-00467

www.tnb.com

Thomas & Betts

Please ask your Thomas & Betts sales representative for a complete catalog of quality Thomas & Betts electrical products or visit us at www.tnb.com. For customer service, call 1-800-816-7809. For technical questions, call 1-888-862-3289.

Thomas & Betts Corporation
Electrical Division
8155 T&B Boulevard
Memphis, TN 38125
901-252-5000

Thomas & Betts Ltd.
700 Thomas Avenue
Iberville, Québec J2X 2M9
450-347-5318

**Commercial
Specification Grade
Power Devices**

2-Pole, 3-Wire Grounding
3-Pole, 3-Wire Non-Grounding
3-Pole, 4-Wire Grounding
4-Pole, 4-Wire Non-Grounding

	Device Type	Commercial Power Plugs, Straight Blade	Commercial Power Flush Receptacles, Straight Blade	Commercial Power Surface Receptacles, Straight Blade	Commercial Power Panel Mount Receptacles, Straight Blade
	Wiring Type	Back wire	Back wire	Back wire	Back wire
	Testing & Code Compliance	• S41, S42, S80: Listed to UL 498 file no. E15012	• Listed to UL 498, file no. E15058	• Listed to UL 498, file no. E15058	• Listed to UL 498, file no. E15058
		• S19, S20, S21: cULus listed to UL 498 file no. E15012	• Complies with Federal Spec. WC-596G	• CSA certified to C22.2, no. 42, file no. 6914 (6233-81)	• CSA certified to C22.2, no. 42, file no. 6914 (6233-81)
		• S41, S42: CSA certified to C22.2, no. 42-99 file no. 2081 (6221-02)	• cUL listed to CSA C22.2, no. 42-M1999	• NOM certified	• NOM certified
		• NOM certified			
Specifications: Environmental	Flammability	Meets UL 94 requirements, V0 rated	Meets UL 94 requirements, V0 rated	Meets UL 94 requirements, V0 rated	Meets UL 94 requirements, V0 rated
	Temperature Rating	-20°C to 60°C (-4°F to 140°F)	-20°C to 75°C (-4°F to 167°F)	-20°C to 75°C (-4°F to 167°F)	-20°C to 75°C (-4°F to 167°F)
Specifications: Electrical	Dielectric Voltage	Withstands 1500V per UL 498	Withstands 2000V per UL 498	Withstands 2000V per UL 498	Withstands 2000V per UL 498
	Current Interrupting	Yes, at full-rated current	Yes, at full-rated current	Yes, at full-rated current	Yes, at full-rated current
	Temperature Rise	Max. 30°C (86°F) after 50 cycles of overload @ 150% of rated current (DC)	Max. 30°C (86°F) after 50 cycles of overload @ 150% of rated current (DC)	Max. 30°C (86°F) after 50 cycles of overload @ 150% of rated current (DC)	Max. 30°C (86°F) after 50 cycles of overload @ 150% of rated current (DC)
Specifications: Mechanical	Terminal Accommodation	S19, S20, S21: #10 - #4 AWG S41, S42: #10 - #6 AWG S80: #10 - #8 AWG	#10 - #4 AWG	#10 - #4 AWG	#10 - #4 AWG
	Voltage Ratings	Permanently marked on device	Permanently marked on device	Permanently marked on device	Permanently marked on device
Materials:	Receptacle Base	N/A	Urea	Urea	Urea
	Receptacle Face	N/A	Urea	Polypropylene	Urea
	Plug/Connector Outer Shell	PVC	N/A	N/A	N/A
	Blades	0.096" thick brass	N/A	N/A	N/A
	Line Contacts	N/A	0.040" thick 260 brass	0.040" thick brass, solder plated	0.045" thick brass, tin plated
	Terminal Clamps	Steel, zinc plated	0.072" thick steel with SCR	0.093" thick steel	0.013" thick steel
	Terminal Screws	1/4-28 set screw, steel, zinc plated	5/16-24 steel lug screws, AL lug	1/4-20 set screw, copper plated	1/4-28
	Ground Contact	N/A	0.032" thick brass	0.032" thick brass	0.032" thick brass
	Ground Screw	1/4-28 set screw, steel, zinc plated	5/16-24 steel lug screws	1/4-20 steel, zinc plated, green	1/4-28 steel, zinc plated
	Assembly/ Mounting Screws	#8-32 steel, zinc plated, except S80: #6-32 steel, nickel plated	#6-32 steel, zinc plated	#6-32 steel, zinc plated	#6-32 steel, zinc plated
	Cord Clamp Screws	#8-32 steel, zinc plated, except S80: #6-32 steel, nickel plated	N/A	N/A	N/A
	Cord Clamp	Steel, zinc plated	N/A	N/A	N/A
Receptacle Mounting Plate	N/A	0.045" thick galvanized steel	0.045" thick galvanized steel	0.040" thick steel, galvanized	

TR Receptacles

Project Name:	Prepared By:
Project Number:	Date:
Catalog Number:	Type:



Tamper Resistant Receptacles

2-Pole, 3-Wire
15A 125V/AC
20A, 125V/AC

Single & Duplex Receptacles

FEATURES

- Provides compliance with 2008 NEC® Article 406.11 that states that all receptacles installed in dwelling units must be tamper resistant.
- Durable impact-resistant thermoplastic face and back body is virtually unbreakable.
- "TR" designation provides visual identification.
- Terminal screws are backed out and ready to wire.
- Extra-long and extra-wide mounting straps.
- Patented built-in wire stripper for #14 and #12 wire (#12 and #10 TR817, TR877, 9508TR, 9507TR, TR6350, TR6350) to speed installation.
- Side-wire terminals accept up to #10 solid or stranded wire.
- Push-in terminals accept #14 solid wire (TR270, TR1107 & 9500TR duplex devices only).



Residential Grade, Single & Duplex

Rating: A/V	NEMA	Description	Catalog No.	Available Colors
15 125	5-15R	Duplex Receptacle	<input type="checkbox"/> TR270__	A, B, BK, LA, V, W
		Duplex Receptacle, Auto Grounding	<input type="checkbox"/> TR270-9__	A, B, LA, V, W
		Decorator Duplex Receptacle	<input type="checkbox"/> TR1107__	A, B, GY, LA, V, W
		Decorator Duplex Receptacle, Auto Grounding	<input type="checkbox"/> TR1107-9__	A, BK, LA, V, W
		ASPIRE™ Duplex Receptacle	<input type="checkbox"/> 9505TR__	DS, SG, WS
		ASPIRE™ Single Receptacle	<input type="checkbox"/> 9507TR__	DS, SG, WS
20 125	5-20R	ASPIRE™ Single Receptacle	<input type="checkbox"/> 9508TR__	DS, SG, WS
		ASPIRE™ Duplex Receptacle	<input type="checkbox"/> 9510TR__	DS, SG, WS

Commercial Grade, Single & Duplex



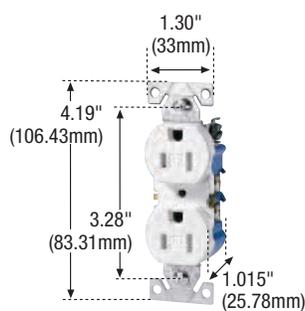
Rating: A/V	NEMA	Description	Catalog No.	Available Colors
15 125	5-15R	Single Receptacle	<input type="checkbox"/> TR817__	A, B, BK, GY, LA, V, W
		Duplex Receptacle*	<input type="checkbox"/> TRBR15__	A, B, BK, GY, LA, V, W
		Decorator Single Receptacle	<input type="checkbox"/> TR6250__	A, B, BK, GY, LA, V, W
		Decorator Duplex Receptacle	<input type="checkbox"/> TR6252__	A, B, BK, GY, LA, V, W
20 125	5-20R	Single Receptacle	<input type="checkbox"/> TR1877__	A, B, BK, LA, V, W
		Duplex Receptacle*	<input type="checkbox"/> TRBR20__	A, B, BK, GY, LA, RD, V, W
		Decorator Single Receptacle	<input type="checkbox"/> TR6350__	A, B, BK, GY, LA, V, W
		Decorator Duplex Receptacle	<input type="checkbox"/> TR6352__	A, B, BK, GY, LA, V, W

Specification Grade Duplex

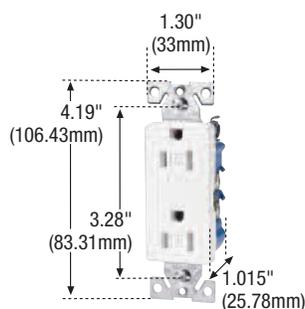


Rating: A/V	NEMA	Description	Catalog No.	Available Colors
15 125	5-15R	Duplex GFCI	<input type="checkbox"/> TRVGF15__	A, B, BK, GY, LA, V, W
		ASPIRE Duplex GFCI	<input type="checkbox"/> 9566TR__	DS, SG, WS
		Hospital Grade Duplex Receptacle*	<input type="checkbox"/> TR8200__	B, GY, RD, V, W
20 125	5-20R	Tamper Resistant Hospital Grade GFCI	<input type="checkbox"/> TRVGFH15__	B, GY, V, LA, RD, W
		Duplex GFCI	<input type="checkbox"/> TRVGF20__	A, B, BK, GY, LA, V, W
		ASPIRE Duplex GFCI	<input type="checkbox"/> 9569TR__	DS, SG, WS
		Hospital Grade Duplex Receptacle*	<input type="checkbox"/> TR8300__	B, GY, RD, V, W
		Tamper Resistant Hospital Grade GFCI	<input type="checkbox"/> TRVGFH20__	B, GY, V, LA, RD, W

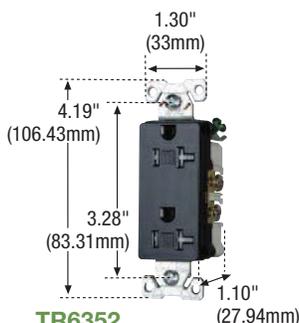
For ordering, include Cat. No. followed by the color code: A (Almond), B (Brown), BK (Black), GY (Gray), LA (Light Almond), RD (Red), V (Ivory), W (White), DS (Desert Sand), SG (Silver Granite), WS (White Satin)



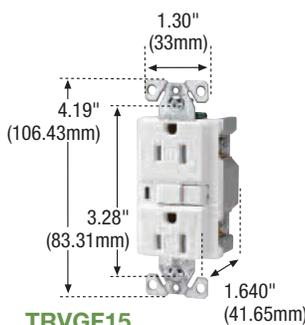
TR270



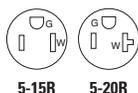
TR1107



TR6352



TRVGF15



5-15R 5-20R

TESTING & CODE COMPLIANCE

- cULus Listed to UL498, file nos. E60120 (TRVGF, 9566, 9569), E15058 (all others), except TR8200 & TR8300: Listed to UL498, file no. E140596.
- UL Certified to CSA C22.2, no. 42.
- TRVGF meets all UL943 and UL498 requirements.
- TRBR, TR8200/TR8300 UL verified to Fed. Spec. WC-596G.
- NOM/ANSI Certified.

MATERIAL CHARACTERISTICS

- Environmental: Flammability meets UL94 requirements; TR817, TR1877, TR6250, TR6252, TR6350, TR6352, 9566TR, 9569TR, TRBR, TRVGF, 9507TR, 9508TR, 9510TR V2 rated; TR270, TR1107, 9505TR V0 rated.
- Temperature Rating: TR270, TR1107, 9510TR: -20°C to 60°C (-4°F to 140°F); TR817, TR1877, TR6250, TR6252, TR6350, TR6352, TRBR, 9505TR, 9507TR, 9508TR; -20°C to 70°C (-4°F to 158°F); TRVGF, 9566TR, 9569TR: -35°C to 66°C (-31°F to 150.8°F); TR8200, TR8300 -40°C to 60°C (-40°F to 140°F).

TR Receptacles Specification & Performance Data

Project Name:	Prepared By:
Project Number:	Date:
Catalog Number:	Type:



Tamper Resistant Receptacles

2-Pole, 3-Wire
15A 125V/AC
20A, 125V/AC

Application

Tamper Resistant Receptacles contain a UL listed safety shutter system that prevents the insertion of foreign objects into receptacles. The safety shutters will open only upon insertion of a 2-prong or 3-prong plug. Installing these receptacles ensures compliance with 2008 NEC® Article 406.11. Areas of application include: new residential construction; remodel/retrofit residential construction; apartment buildings; condominiums and townhouses; hotels, motels, inns and suites with kitchenettes; retirement communities, nursing homes and assisted living facilities. (Note: 2008 NEC Article 406.11 applies to new construction only).

Receptacle Type	Residential Grade Duplex & Single TR270, TR1107, 9500TR Series	Commercial Grade Duplex & Single TR817, TR1877, TRBR TR6200, TR6300 Series	Specification Grade Duplex GFCI TRVGF, 9560TR Series	Hospital Grade Duplex TR8200, TR8300 Series
Wiring Type	Back & Side Wire 9509TR, 9510TR (except 9507 push & side wire)	Back & Side Wire (except TR817/TR1877 side wire only)	Back & Side Wire	Back & Side Wire
Testing & Code Compliance	<ul style="list-style-type: none"> cULus Listed to UL498, file no. E15058. UL Certified to CSA C22.2, no. 42. NOM/ANSI Certified. 	<ul style="list-style-type: none"> cULus Listed to UL498, file no. E15058. UL Certified to CSA C22.2, no. 42. NOM/ANSI Certified. TRBR UL verified to Fed. Spec. WC-596G. 	<ul style="list-style-type: none"> cULus Listed to UL498, file no. E60120. UL Certified to CSA C22.2, no. 42. Meets all UL943 (GFCI) and UL498 (Receptacles) requirements. NOM/ANSI Certified. 	<ul style="list-style-type: none"> Listed to UL498, file no. E140596. UL verified to Fed. Spec. WC-596. UL Certified to CSA C22.2, no. 42, file no. LR16063.
Specifications: Environmental	Flammability meets UL 94 requirements; TR1107, TR270, 9505TR V0 rated; 9507TR, 9508TR, 9510TR V2 rated. Temperature Rating: TR1107, TR270, 9505TR -20°C to 60°C (-4°F to 140°F); 9507TR, 9508TR, 9510TR -20°C to 70°C (-4°F to 158°F)	Flammability meets UL 94 requirements; V2 rated. Temperature Rating: -20°C to 70°C (-4°F to 158°F)	Flammability meets UL 94 requirements; V2 rated. Temperature Rating: -35°C to 66°C (-31°F to 150.8°F)	Flammability meets UL 94 requirements; V2 rated. Temperature Rating: -40°C to 60°C (-40°F to 140°F)
Electrical	Dielectric Voltage: withstands 2000V per UL498 Current interrupting: yes, at full-rated current Temperature Rise: max. 30°C (86°F) after 100 cycles of overload @ 150% of rated current (DC).	Dielectric Voltage: withstands 2000V per UL498 Current interrupting: yes, at full-rated current Temperature Rise: Standard - max. 30°C (86°F) after 100 cycles of overload @ 150% of rated current (DC). Fed. Spec. - max. 30°C (86°F) after 250 cycles of overload @ 200% of rated current (DC).	Dielectric Voltage: withstands 2000V per UL498 Current interrupting: yes, at full-rated current Temperature Rise: max. 30°C (86°F) after 100 cycles of overload @ 150% of rated current (DC).	Dielectric Voltage: withstands 2000V per UL498 Current interrupting: yes, at full-rated current Temperature Rise: max. 30°C (86°F) after 50 cycles of overload at 250% of rated current (DC).
Mechanical	Terminal Accommodation: #14 - #10 AWG Voltage ratings permanently marked on device.	Terminal Accommodation: #14 - #10 AWG Voltage ratings permanently marked on device.	Terminal Accommodation: #14 - #10 AWG Voltage ratings permanently marked on device.	Terminal Accommodation: #14 - #10 AWG Voltage ratings permanently marked on device.
Materials: Body Top & Bottom	TR1107, TR270, 9505TR - PVC 9507TR, 9508TR - Nylon 9510TR - PVC Top, Nylon Bottom	Thermoplastic, Nylon	Thermoplastic, Nylon	Thermoplastic, Nylon
Strap	Galvanized Steel TR1107, TR270, 9505TR Nickel Plated Steel 9507TR, 9508TR, 9510TR	Galvanized Steel	Galvanized Steel	Brass
Contacts	Brass Alloy	Brass Alloy	Brass Alloy	Nickel-Plated Brass
Terminal Screws	Brass/Nickel-Plated Steel	Brass/Nickel-Plated Steel	Brass/Nickel-Plated Steel	Brass/Nickel-Plated Steel
Terminal Clamps	Brass Plated 9507TR, 9508TR; Steel 9510TR	Steel (TR817/TR1877 N/A)	Steel Brass Plated	Nickel-Plated Brass



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RESIDENTIAL
LIGHT COMMERCIAL



7500 Series Decorator Switch Line

*The quietest and
smoothest-operating
line of 15 Amp, 120/277V
decorator switches*

 **COOPER** Wiring Devices

**7500 SERIES
DECORATOR
SWITCH LINE**
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LIGHT COMMERCIAL



Cooper Wiring Devices' 7500 Series... New and totally redesigned to be the decorator switches the industry has been asking for.

How do we know? We checked. And distributors, contractors and homeowners alike told us they wanted a switch that was quieter, offered a solid on/off "feel," and provided long-lasting durability.

The contractors also wanted features to make installation faster and easier, and we listened to every request. Then we opened a blank CAD/CAM window and started building a better switch from the ground up, turning their wishes into reality.

Applications

- New home construction
- Apartments and condos
- Residential upgrades and renovations
- Retail locations
- Banks and brokerage firms
- Business offices/conference rooms
- Medical and dental practices
- Hotels and resorts



FEATURES AND BENEFITS

- **Thermoplastic rocker, top and backbody** are virtually unbreakable, promising years of durable performance.
- **Quiet operation** thanks to a new design that softens the "click."
- **Backwire clamps on the side terminals** provide for easy installation of #12 and #14 wire.
- **Advanced rocker mechanism** assures solid tactile feedback and smooth operation.
- **Rugged fabrication techniques**, including ultrasonic welding and integrated construction of the strap and body, provide superior integrity.
- **Tri-combo screws** accept slotted-, Phillips-, and Robertson-head tools for installations in both the U.S. and Canada.
- **Backed by 5-year Limited Warranty.**

TESTING & CODE COMPLIANCE

· UL and cUL Listed, meets all UL20 requirements, (file no. E18704).

MATERIAL CHARACTERISTICS

Meets flammability requirements per UL94: VO rated.
Temperature Rating:
-20°C to 60°C.



Quieter operation in any installation.

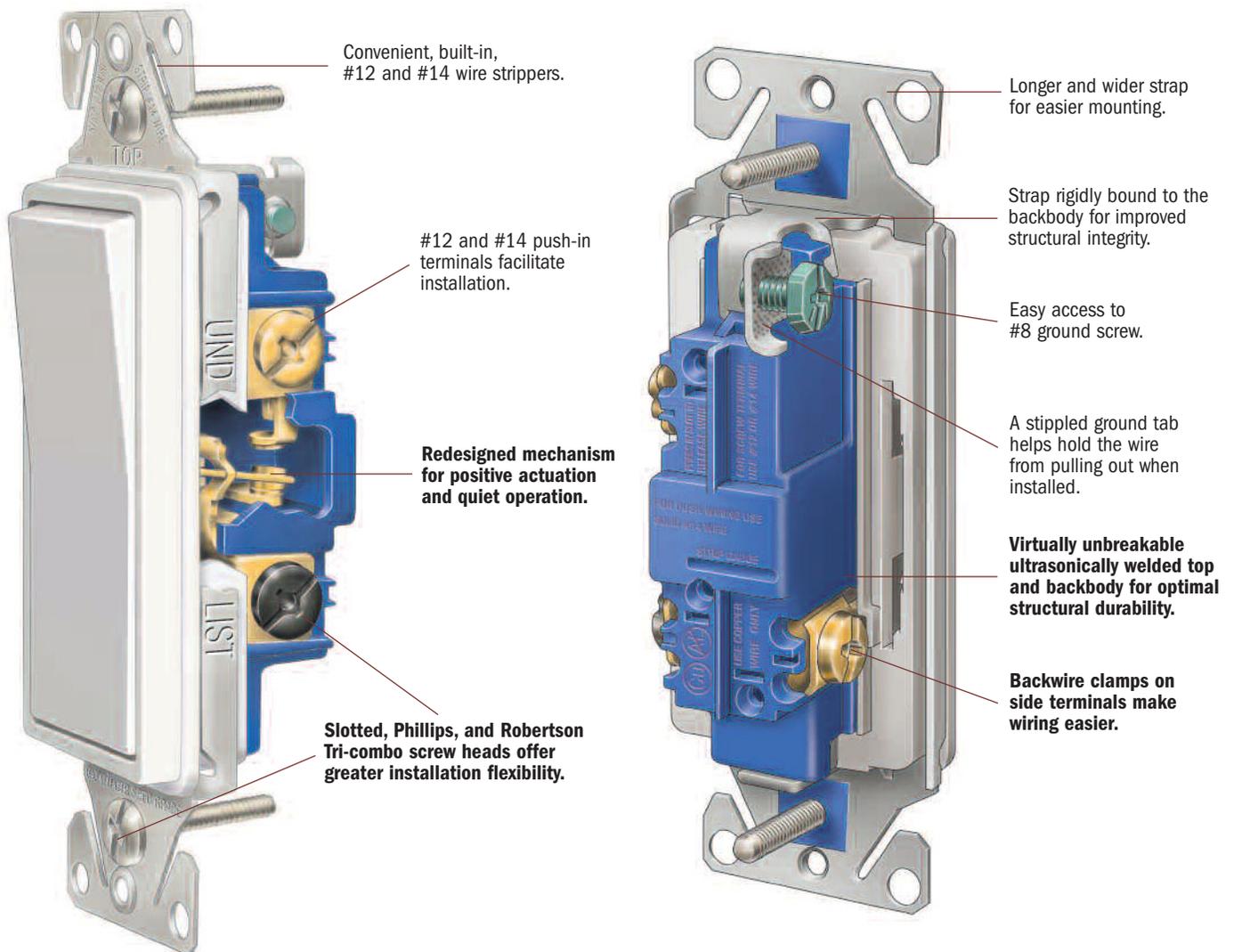
Broad selection of popular designer colors.

Solid on/off mechanism provides solid, positive "feel."

Compare decorator switches and you'll appreciate the difference.

You'll find the 7500 Series switch line has been designed to define a new level of quality and quiet functionality. This new switch provides easy actuation and a satisfyingly solid "feel" as it moves smoothly between the on and off positions. But elegant good looks and functionality are only part of the picture. Once you see how many features and benefits are packed inside you'll agree - the 7500 Series is the best line of decorator switches available today.

The 7500 Series Decorator Switch Line

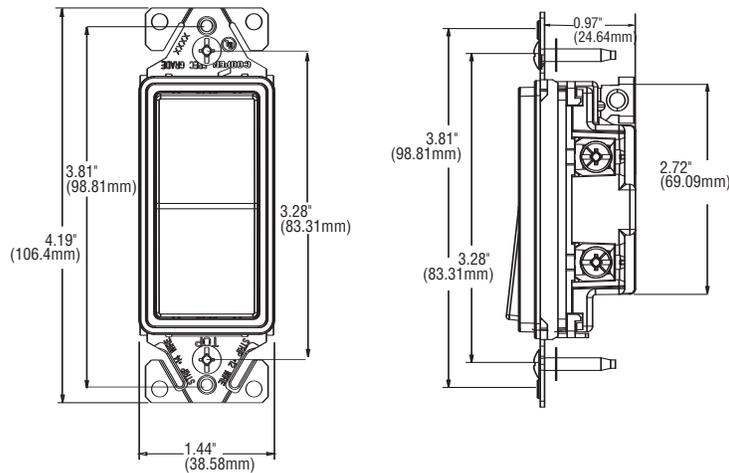
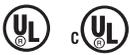


7500 Series Decorator Switch Line Ordering Information

Metal Strap – Side Wire and Push Wire					
Rating		Colors	Single-Pole	Catalog No.	
A	V/AC			Three-Way	Four-Way†
15	120/277	Almond, Light Almond, Black, Brown, Gray, Ivory, White	7501	7503	7504

Lighted – Metal Strap – Side Wire and Push Wire					
Rating		Colors	Single-Pole	Catalog No.	
A	V/AC			Three-Way	Four-Way
15	120/277	Almond, Light Almond, Ivory, White	7511	7513	7514

We offer an entire line of decorator products including GFCIs, combination switches, dimmers and receptacles.



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For more information:

Cooper Wiring Devices Customer Service

United States
45-31 Court Square
Long Island City, NY 11101
Phone: (800) 441-3177
Fax: (800) 329-3055

Canada
5925 McLaughlin Road
Mississauga, Ontario, L5R 1B8
Phone: (800) 267-1042
Fax: (800) 761-5748

Visit our web site at:
www.cooperwiringdevices.com

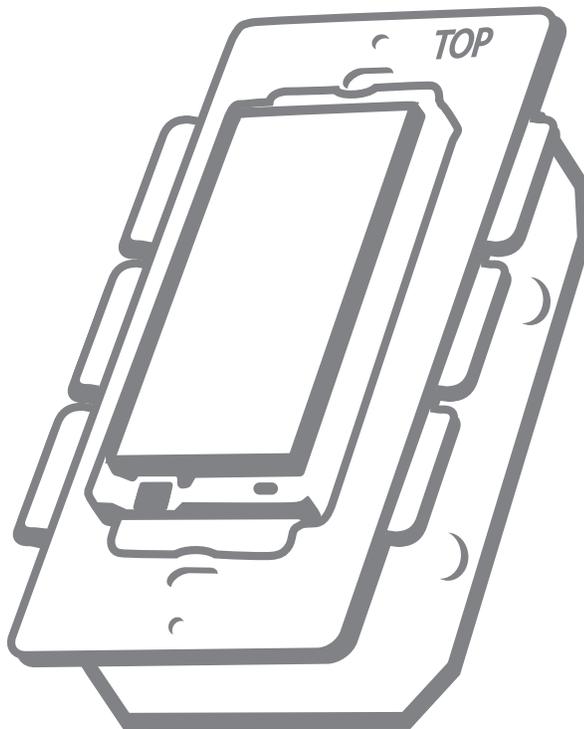


45609/45614

Z-Wave® Certified
Wireless Lighting Control

On/Off Relay Switch and 3-Way Switch Kit

Control the On/Off status of
permanently installed lighting,
fans and more!



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Wireless Lighting Control

On/Off Relay Switch and 3-Way Switch Kit

Introduction

Thank you for your purchase of a GE Z-Wave® control device. Z-Wave technology is designed to automate lighting/home control and provide easy remote operation of all your Z-Wave enabled devices. The GE Z-Wave product family includes a variety of devices to control lighting in your home. It is up to you whether you want to control one room or your entire house and whether you want to do it all now or start with one room and add more over time.

This switch is one component of a Z-Wave® control system and is designed to work with all other Z-Wave enabled devices in a home control network. It will also act as a wireless repeater to insure that commands intended for another device in the network are received, thereby extending the range of the wireless controller. Z-Wave devices of other types and brands can be added to the system and will also act as range extenders if they support this function of repeating the signal received to other nodes in the system.

CAUTION

This device is intended for installation in accordance with the National Electric Code and local regulations in the United States, or the Canadian Electrical Code and local regulations in Canada. If you are unsure or uncomfortable about performing this installation consult a qualified electrician.

This switch is designed for use only with permanently installed fixtures. The device controlled by this Z-Wave switch must not exceed 600 watts (Incandescent); 15 Amps, 1800W (Resistive); or ½ HP (Motor).

NOT FOR USE WITH MEDICAL OR LIFE SUPPORT EQUIPMENT

Z-Wave enabled devices should never be used to supply power to or control the On/Off status of medical and/or life support equipment!

There are no user serviceable parts in this unit.

 **WARNING**

RISK OF FIRE

RISK OF ELECTRICAL SHOCK

RISK OF BURNS

Controlling Appliances:

Exercise extreme caution when using Z-Wave devices to control appliances. Operation of the Z-Wave device may be in a different room than the controlled appliance, also an unintentional activation may occur if the wrong button on the remote is pressed. Z-Wave devices may automatically be powered on due to timed event programming. Depending upon the appliance, these unattended or unintentional operations could possibly result in a hazardous condition. For these reasons, we recommend the following:

1. Assign Z-Wave controlled appliances to device numbers 10 – 18 on the GE remote. The likelihood of unintentionally turning on the appliance will be reduced significantly because the “Shift” button will need to be pressed before pressing device numbers 10-18.
2. Z-Wave devices controlling appliances should be removed from “All” control setting. Instructions on how to do this are included in the manual for your GE remote.
3. Do Not include Z-Wave devices in Groups or Scenes if they control appliances.
4. Do Not use Z-Wave devices to control electric heaters or any other appliances which may present a hazardous condition due to unattended or unintentional or automatic power on control.
5. Double check programs for accuracy before using them.

WIRELESS RANGE

This device complies with the Z-Wave standard of open-air, line of sight transmission distances of 65 feet. Actual performance in a home depends on the number of walls between the remote controller and the destination device, the type of construction and the number of Z-Wave enabled devices installed in the control network. Most Z-Wave devices act as signal repeaters and multiple devices result in more possible transmission routes which helps eliminate “RF dead-spots”.

Things to consider regarding RF range:

- Each wall or obstacle (i.e.: refrigerator, big screen TV, etc.) between the remote or Z-Wave device and the destination device will reduce the maximum range by approximately 25-30%.
- Brick, tile or concrete walls block more of the RF signal than walls made of wooden studs and plasterboard (drywall).
- Wall mounted Z-Wave devices installed in metal junction boxes may suffer a significant loss of range (approximately 20%) since the metal box blocks a large part of the RF signal.

Effects of Home Construction on Wireless Range Between Z-Wave Enabled Devices

Note: The distances shown in the table below are typical examples. Actual performance in your home will vary.

From the Remote (or repeating Z-Wave module) to destination device:					
Type of Construction		Wood Frame with Drywall		Brick, Tile or Concrete	
		Plastic J-Boxes*	Metal J-Boxes	Plastic J-Boxes*	Metal J-Boxes
Number of Walls or Obstacles	0**	100'	80'	100'	80'
	1	70'	56'	60'	48'
	2	49'	39'	36'	29'
	3	34'	27'	21'	17'

* For Plug-in Modules or In-Wall Devices Installed in Plastic Junction Boxes

** Line of Sight / no obstructions

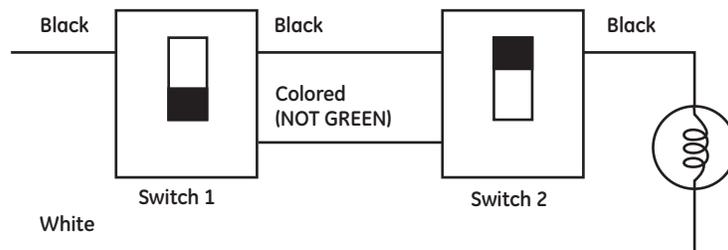
Please Note: Z-Wave home control networks are designed to work properly alongside 802.11 wireless computer networks, Bluetooth and other 2.4GHz or 5.8GHz devices. Some baby cams, wireless video devices and older cordless phones using the 900MHz frequency range may cause interference and limit Z-Wave functionality. Many 900MHz products have a switch to select channel "A" or "B". You may find that one of these channels will cause less interference than the other.

IMPORTANT NOTE ABOUT 3-WAY CIRCUITS

The term "3-way circuit" refers to a circuit with two switches and one load (light) like you find at the top and bottom of a stairway. There are many ways to physically wire a 3-way circuit and it is important to understand how the circuit you wish to upgrade to Z-Wave control is wired. Below is a description of a typical 3-way circuit.

One of the ways to wire a two-switch/one-load circuit is to route the incoming power through the first switch, then to the second switch and then to the load. Although very common and by no means a standard, it is the easiest to convert to Z-Wave control. With this type of circuit, Switch 1 is replaced by the Z-Wave auxiliary switch and Switch 2 is replaced with the primary Z-Wave switch. The auxiliary switch does not actually control the power; instead, it sends a momentary voltage signal through the traveler wire to the primary switch which in turn, controls the power to the load.

Typical 3-way circuit:

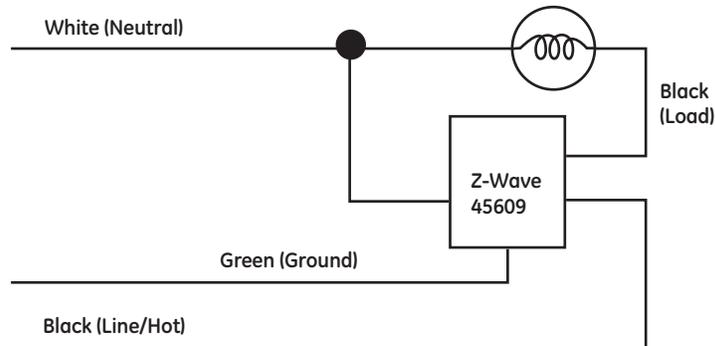


Please consult an electrician if you have trouble identifying the type of wiring circuit you wish to convert or if you do not feel confident in your ability to convert the circuit to Z-Wave control.

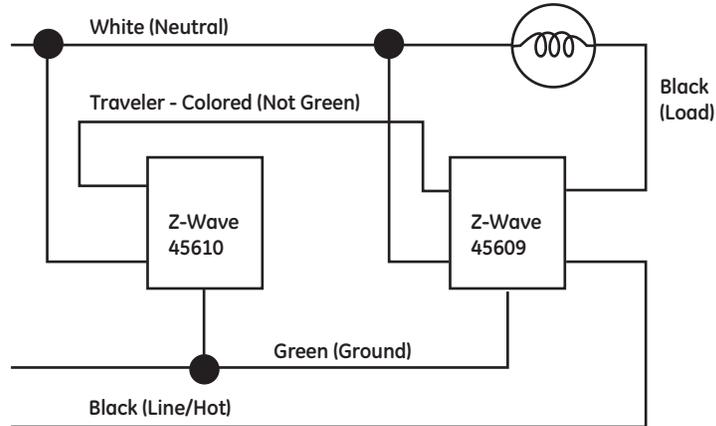
INSTALLATION

This switch may be used in new installations or to replace an existing wall switch. It may be used by itself for 2-way control (one switch & one load), with one 45610 Auxiliary Switch for 3-way control (two switches & one load) or with two 45610 Auxiliary switches for 4-way control (three switches & one load). When used by itself for 2-way control, please make sure that the screw terminal for the traveler wire is insulated (Do Not Remove the tape over the terminal if you are not using the traveler connection).

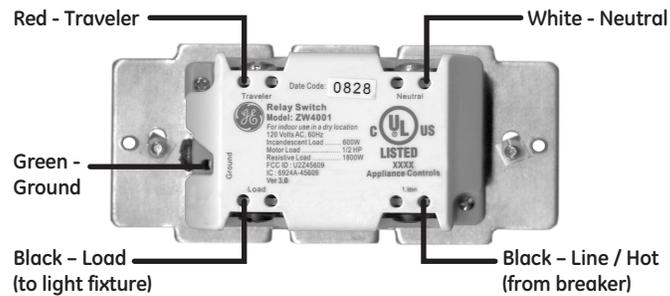
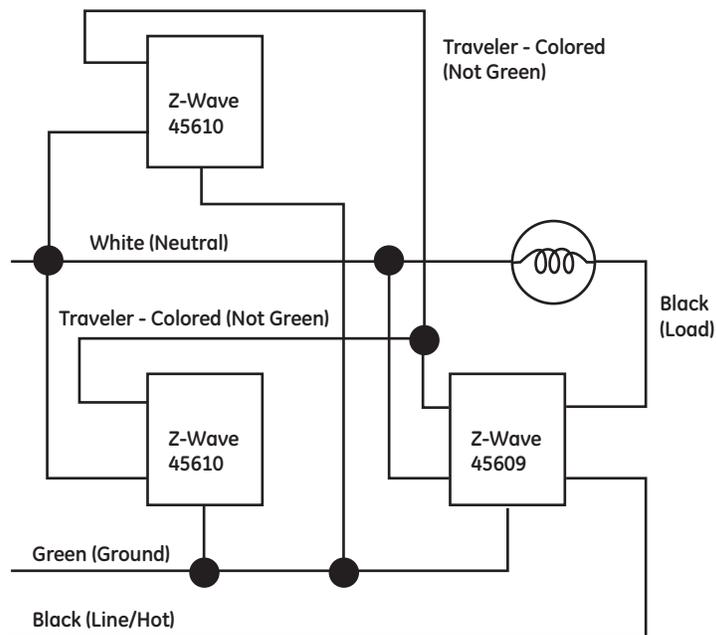
Single Switch Wiring Schematic



3-Way Wiring Schematic using one 45609 and one 45610

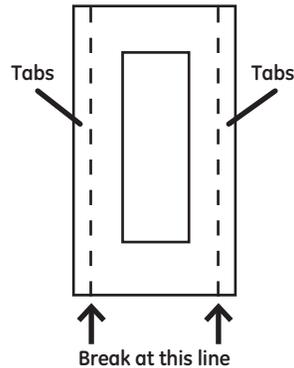


4-Way Wiring Schematic using one 45609 and two 45610's



Single, Dual and Triple Gang Boxes

When installing the 45609 in multiple gang boxes it may be necessary to break off one or both of the scored tabs on the front yoke. This does not affect the electrical rating of the 45609.



⚠ WARNING - SHOCK HAZARD

Turn OFF the power to the branch circuit for the switch and lighting fixture at the service panel. All wiring connections must be made with the POWER OFF to avoid personal injury and/or damage to the switch.

1. Shut off power to the circuit at fuse box or circuit breaker.
2. Remove wall plate.
- ! Warning: Verify power is OFF to switch box before continuing.**
3. Remove the switch mounting screws.
4. Carefully remove the switch from the switch box. DO NOT disconnect the wires.
5. There are five screw terminals on the 45609 switch; these are marked LINE (Hot), Neutral, LOAD, GROUND and TRAVELER. The Traveler terminal is only used for 3-way or 4-way wiring and should remain insulated if the 45609 is being installed in a 2-way system (one switch & one load). Match these screw terminals to the wires connected to the existing switch. (Do Not remove the tape over the terminal if you are not using the traveler connection).
6. Disconnect the wires from the existing switch.
7. Connect the green or bare copper ground wire to the GROUND terminal.
8. Connect the black wire that goes to the light to the terminal marked LOAD.
9. Connect the black wire that comes from the electrical service panel (Hot) to the terminal marked LINE.
10. Connect the white wire to the neutral terminal.

Note: UL specifies that the tightening torque for the screws is 14Kgf-cm.

11. OPTIONAL for 3 or 4-way control): Connect the Traveler wire (usually Red) to the screw terminal marked TRAVELER. The other end of this Traveler wire connects to the TRAVELER screw terminal on the 45610 Auxiliary Switch. See the following section for information about wiring the 45610 Auxiliary Switch.
12. Insert Z-Wave Switch into the switch box being careful not to pinch or crush wires.
13. Secure the switch to the box using the supplied screws.
14. Mount the wall plate.
15. Reapply power to the circuit at fuse box or circuit breaker and test the system.

Optional for 3 or 4-Way Control:

1. The 45610 requires the following 3 wiring connections:
 - a. The Traveler wire. This is used to send voltage signals to the primary Z-Wave switch. The signals tell the Z-wave switch what action to perform.
 - b. Ground.
 - c. Neutral.
2. DO NOT connect the 45610 auxiliary switch to the home's black Hot (Line) wire.

Observe Important Wiring Information

Important: This switch is rated for and intended to only be used with copper wire.

The home's electrical wires may be attached to the screw terminals or inserted into the holes in the back of the switch enclosure and clamped in place by tightening the screw terminals. Always follow the recommended wire strip lengths when making wiring connections.

Wire gauge requirements

- Use 14 AWG or larger wires suitable for at least 80° for supply (HOT), Load, Neutral and Traveler connections.
- Use 12 AWG or larger wires suitable for 80° for ground connection.

Wire strip length:

- For attachment to screw terminals: Strip insulation 5/8".
- For attachment using the enclosure's holes: Strip insulation 5/8".

You should now be able to use the rocker to manually turn On/Off the connected load.

Use your primary controller to include the switch in the home control network after the switch is wired as shown in the above

diagram. It can then be added to groups and/or lighting scenes and managed remotely to control the On/Off status of the connected lighting.

Air Gap Switch

The 45609 has an air gap switch on the lower left side (see diagram for location) to completely disconnect power to the load. Pull the air gap switch OUT to disconnect the power while replacing light bulbs and push it all the way back in for normal operation. The air gap switch must be all the way in for the switch to function and control the lighting.

Key Features

- Remote On/Off control via the Z-Wave controller/network
- Manual On/Off control with the front panel rocker
- LED indicates switch location in a dark room

BASIC OPERATION

Remote Control

GE Z-Wave remotes provide control of an Individual device, Groups of devices and Scenes. Other brands of Z-Wave Certified remotes may not offer as much flexibility in how you can set up your lighting control network. Please refer to your remote control's instructions for details on its capabilities and instructions for adding and controlling devices.

Manual Control

The 45609 switch allows the user to:

Turn ON/OFF the connected lighting.

- **To turn the connected lighting ON:** Tap the top of the rocker.
- **To turn the connected lighting OFF:** Tap the bottom of the rocker.

Program your Light Switch (Include or exclude the switch to/from the Z-Wave home control network.)

- Refer to the instructions for your primary controller to access the network setup function and include or exclude devices.
- When prompted by your primary controller, tap the top or bottom of the rocker.
- The primary controller should indicate that the action was successful. If the controller indicates the action was unsuccessful, please repeat the procedure.

- Once the switch is part of the network, the same basic procedure is used to add the switch to groups & scenes or change advanced functions. Refer to the primary controller's instructions for details.

Please Note: After a power failure, the 45609 switch returns to the last used state.

ADVANCED OPERATION

The following Advanced Operation parameters require that you have an advanced controller like the GE model 45601 LCD remote. Advanced remotes from other manufacturers may also be able to change these settings; however, basic remotes do not have this capability.

All On/All Off

Depending upon your primary controller, the 45609 switch can be set to respond to ALL ON and ALL OFF commands in up to four different ways. Some controllers may not be able to change the response from its default setting. Please refer to your controller's instructions for information on whether or not it supports the configuration function and if so, how to change this setting.

The four possible responses are:

It **will** respond to ALL ON and the ALL OFF command (default).

It **will not** respond to ALL ON or ALL OFF commands.

It **will** respond to the ALL OFF command but **will not** respond to the ALL ON command.

It **will** respond to the ALL ON command but **will not** respond to the ALL OFF command.

LED Light

When shipped from the factory, the LED is set to turn ON when the connected light is turned OFF. This allows the LED to indicate the switch's location in a dark room. This is the default setting and can be changed if your primary controller supports the node configuration function. To make the LED turn ON when the light is turned ON, change parameter 3's value to "1".

- **Parameter No: 3**
- **Length: 1 Byte**
- **Valid Values = 0 or 1 (default 0)**

Invert Switch

If the switch is accidentally installed upside down with “On” at the bottom and “Off” at the top, the default On/Off rocker settings can be reversed by changing parameter 4’s value to “1”.

- **Parameter No: 4**
- **Length: 1 Byte**
- **Valid Values = 0 or 1 (default 0)**

Restoring Factory Defaults

All Configuration Parameters can all be restored to their factory default settings by using your primary controller to delete/reset the device.

Interoperability with Z-Wave™ Devices

A Z-Wave™ network can integrate devices of various classes, and these devices can be made by different manufacturers. Although every Z-Wave certified product is designed to work with all other Z-Wave certified products, your controller must include the appropriate device classifications in order to control non-lighting Z-wave devices. As an example, the GE 45600 basic remote is designed only for controlling Z-Wave devices using the lighting control classification. The GE 45601 deluxe remote with LCD read-out can control other Z-Wave certified devices like thermostats as well as lighting.

WARRANTY

JASCO Products warrants this product to be free from manufacturing defects for a period of two years from the original date of consumer purchase. This warranty is limited to the repair or replacement of this product only and does not extend to consequential or incidental damage to other products that may be used with this product. This warranty is in lieu of all other warranties, expressed or implied. Some states do not allow limitations on how long an implied warranty lasts or permit the exclusion or limitation of incidental or consequential damage, so the above limitations may not apply to you. This warranty gives you specific rights, and you may also have other rights which vary from state to state. Please contact Customer Service at 800-654-8483 (option 4) between 7:30AM – 5:00PM CST or via our website (www.jascopeproducts.com) if the unit should prove defective within the warranty period:

JASCO Products Company
Building B, 10 E Memorial Rd.
Oklahoma City, OK 73114

FCC

U2Z45609

The Federal Communication Commission Radio Frequency Interference Statement includes the following paragraph:

The equipment has been tested and found to comply with the limits for a Class B Digital Device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment uses, generates and can radiate radio frequency energy and, if not installed and used in accordance with the instruction, may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Operation is subject to the following two conditions:

- This device may not cause interference
- This device must accept any interference, including interference that may cause undesired operation of the device.

Important Note: To comply with the FCC RF exposure compliance requirements, no change to the antenna or the device is permitted. Any change to the antenna or the device could result in the device exceeding the RF exposure requirements and void user's authority to operate the device.

Compliance with IC Rules and Regulations

IC: 6924A-45609

Jasco Products Company

Model: 45609

This Class B digital device complies with Canadian ICES-003.

SPECIFICATIONS

ZW4001

Power: 120 VAC, 60 Hz.

Signal (Frequency): 908.42 MHz.

Maximum Loads: 600W, incandescent, ½ HP Motor or 1800W (15A) Resistive

Range: Up to 100 feet line of sight between the Wireless Controller and the closest Z-Wave receiver module.

Operating Temperature Range: 32-104° F (0-40° C)

For indoor use only.

Specifications subject to change without notice due to continuing product improvement

Z-Wave is a registered US trademark of Zensys A/S



is a trademark of General Electric Company and is used under license to Jasco Products Company LLC, 10 E. Memorial Road, Oklahoma City, OK 73114
www.jascoproducts.com

Especialistas en cualquier



43613-1 © 2009 JASCO (516)600-3100/3104
ZW4001 ZW2002

Off Light Switch Kit

with:
1 switches controlling
lighting

Example of uses:

- Top and bottom of stairs.
- Switch in two locations of a room.

with other GE Z-Wave® products to create a
complete lighting control system



Date Code: 1118

Traveler

Relay Switch
Model: ZW5001

For indoor use in a dry location
120 Volts AC, 60Hz
Incandescent Load 600W
Motor Load 1/2 HP
Resistive Load 1800W

UL US LISTED
3MWZ
Appliance Controls

Ground

Load

JASCO Products, Oklahoma City, OK
www.jascoproducts.com
Made in China

Line

Neutral



Date Code: 1118

Traveler

Auxiliary Switch
Model: ZW5002

For use with GE Z-Wave
switches or dimmers
120 Volts AC, 60Hz

UL US LISTED
1MWZ
Appliance Controls

Ground

JASCO Products, Oklahoma City, OK

Neutral

Specifications:
Power: 120VAC, 60Hz
Signal Frequency:
433 MHz
Maximum Load:
600W incandescent and
1/2 HP motor
3000W 25A maximum
range up to 200 feet (60)
of sight between the
switching controller and
the switch. Z-wave
receiver module
operating temperature
range: 32 to 104°F
0 to 40°C
See website for more info

PRODUCT SPECIFICATIONS / INFO

LEVITON



1256-W

UPC Code: 07847788057

Country of Origin: Mexico - **Eligible for ARRA funded projects > \$7,443,000*



**Disclaimer*

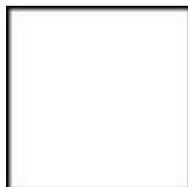
Description

15 Amp, 120/277 Volt, Toggle Double-Throw Ctr-OFF Momentary Contact Single-Pole AC Quiet Switch, Extra Heavy Duty Spec Grade, Grounding, Back & Side Wired, - White

Product Features

Color: White

Color: White

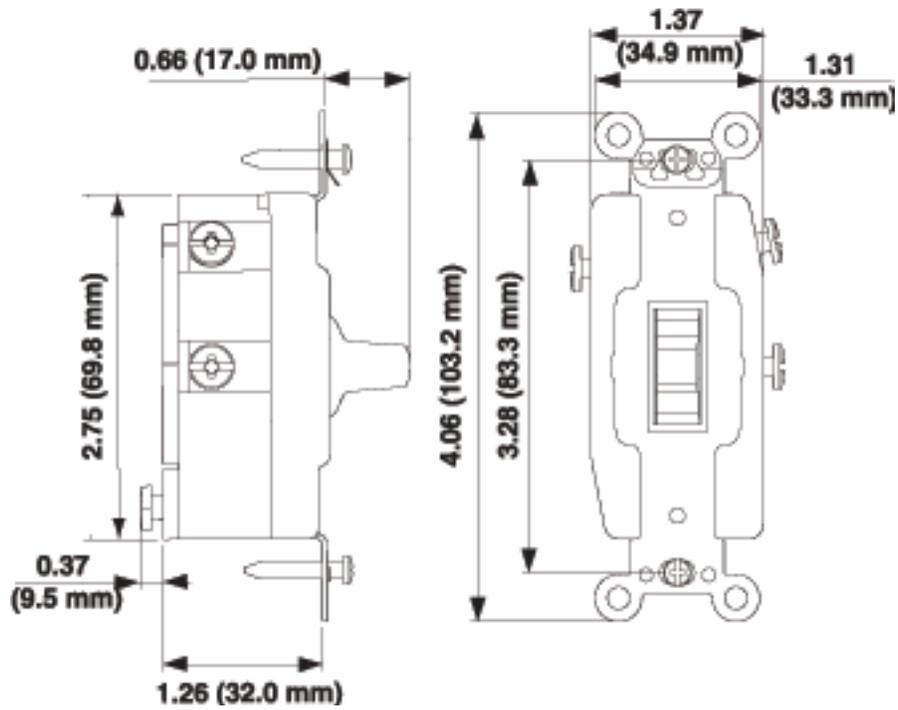


AC Horsepower Ratings	
HP Rating	1/2HP-120V 2HP-240V
Max. Amperage	12 Amp
Environmental Specifications	
Flammability	Rated V-2 per UL94
Operating Temperature	-40°C to 65°C
Mechanical Specifications	
Terminal ID	Brass-Hot Black-Hot White-Neutral Green-Gnd
Terminal Accom.	14-#10 AWG back wired; #14-#12 AWG side wired
Product ID	Ratings are permanently marked on device
Torque Range	12-14 inch pounds

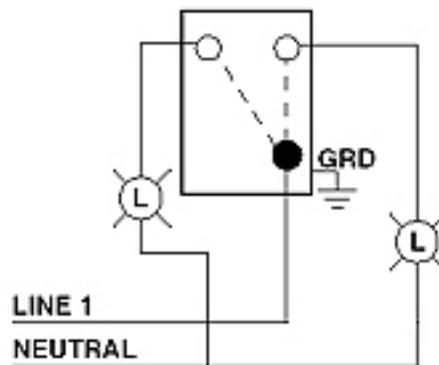
Electrical Specifications	
Amperage	15 Amp
Voltage	120/277 Volt
Grounding	Self Grounding
Dielectric Voltage	Withstands 1500V for 1 minute
Overload UL20 Test	100 cycles of OL at 4.8 times rated current
Temperature Rise	Maximum 30 degrees C rise
Endurance	50,000 cycles minimum

Material Specifications	
Strap Material	.048" Thick Galvanized Steel
Base Material	Thermoplastic
Toggle	Polycarbonate
Cover Material	Thermoplastic
Contact Material	Silver Alloy
Terminal Screws	Brass 8-32
Grounding Screw	Brass 8-32
Ground Clips	Brass
Color	White

Standards and Certifications	
NEMA	WD-1 & WD-6
ANSI	C-73
UL Fed Spec WS896E	File #E7458
UL Standard	UL 20
CSA C22.2 No. 111	File #152105
NOM	057
RoHS	Compliant
Warranty	10 Year Limited



Wiring Diagram
Single-Pole, Double Throw
(SPDT) Center OFF



SPECIFICATION SUBMITTAL

JOB NAME: <input type="text"/>	CATALOG NUMBERS: <input type="text"/>	
JOB NUMBER: <input type="text"/>	<input type="text"/>	<input type="text"/>

Leviton Manufacturing Co., Inc.

201 North Service Road, Melville, NY 11747

Telephone: 1-800-323-8920 · FAX: 1-800-832-9538 · Tech Line (8:30AM-7:30PM E.S.T. Monday-Friday): 1-800-824-3005

Leviton Manufacturing of Canada, Ltd.

165 Hymus Boulevard, Pointe Claire, Quebec H9R 1E9 · Telephone: 1-800-469-7890 ·

FAX: 1-800-824-3005 · www.leviton.com/canada

Leviton S. de R.L. de C.V.

Lago Tana 43, Mexico DF, Mexico CP 11290 · Tel.: (+52)55-5082-1040 · FAX: (+52)5386-1797 ·

www.leviton.com.mx

Visit our Website at: www.leviton.com

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If you would like to know where your local Leviton office is located please go to:

www.leviton.com/international/contacts/

**Buy American Compliant Logo -- The American Recovery And Reinvestment Act of 2009 ("ARRA") provides federal grants and loans for projects throughout the country. Section 1605 of the Act, named the "Buy American" provision, requires that certain materials and manufactured products used in projects funded by the Act be manufactured in the United States. The appearance of the Recovery Act Logo in relation to a Leviton product is only intended to reflect that such product may be used in an ARRA funded project. It does not mean that such product or Leviton is sponsored or endorsed by, or that Leviton receives funds from, the federal government or the Recovery Accountability and Transparency Board. Nothing in Leviton's use of the logo is intended to suggest anything regarding the requirements for funding under ARRA.*





Shown actual size: Skylark dimmer and 1-gang Claro wallplate in White (WH).

Product family features

- Rocker switch returns light to your favorite light level
- Slide up to brighten, down to dim (adjust light to suit any activity)
- **eco-dim®** model available
- 1000 W preset dimmers have voltage compensation which maintains stable light levels, despite line voltage variations
- 100% factory tested
- Coordinating Claro® and Stainless Steel wallplates only available separately
- Custom engraving available for wallplates, see pg. 155

Control types

 Single-pole (one location)

 3-way or 4-way (two or more locations)

Direct load type compatibility

-  Incandescent/halogen lighting
-  Magnetic low-voltage lighting
-  Electronic low-voltage lighting
-  Fluorescent lighting
-  LED lighting
-  Dimmable compact fluorescent
-  Ceiling fans
-  Ceiling fan/lights

Load type requiring load interface

 Neon/cold cathode lighting

Lighting load interfaces may be applicable for some additional load type, voltage and capacity combinations.

For additional information, see pg. 174.

Available finishes

Use **BOLD** color code in model number (Example: S-600P-**GR**)

Gloss finishes*



WH
White



LA
Light Almond



AL
Almond



IV
Ivory



GR
Gray



BR
Brown



BL
Black



SS
Stainless Steel

*Coordinating wallplates only available separately. For wallplate information, see pg. 160.

Stainless Steel wallplate includes black plastic trim/adaptor, visible from side. Match with separate Black (BL) controls.

Dimmers

Slide-to-off dimmers



- Slide up to on/brighten; down to dim/off

Dimmers with on/off switch and locator light



- Rocker switch turns on/off
- Slide up to brighten; down to dim
- Includes amber locator light

Dimmers with on/off switch



- Rocker switch turns on/off
- Slide up to brighten; down to dim
- **eco-dim**® model guarantees at least 15% energy savings compared to a standard switch

Fan and fan/light controls

Slide-to-off fan controls



- Slide up to on/increase speed; down to decrease/off
- 3-quiet fan speeds for increased comfort
- For use with only one ceiling paddle fan
- Quiet 3-speed designed to prevent motor hum
- Fully variable model also available

Slide-to-off fan controls with on/off light switch



Fan control (top)

- Slide up to on/increase fan speed; down to decrease fan speed/off
 - 3-quiet fan speeds for increased comfort
 - For use with only one ceiling paddle fan
 - Quiet 3-speed designed to prevent motor hum
- #### Switch (bottom)
- Rocker switch turns light on/off

Dual devices

Dual slide-to-off dimmers (two loads)



Dimmers (left/right)

- Slide up to on/brighten; down to dim/off

Dual slide-to-off fan control and dimmer



Fan control (left)

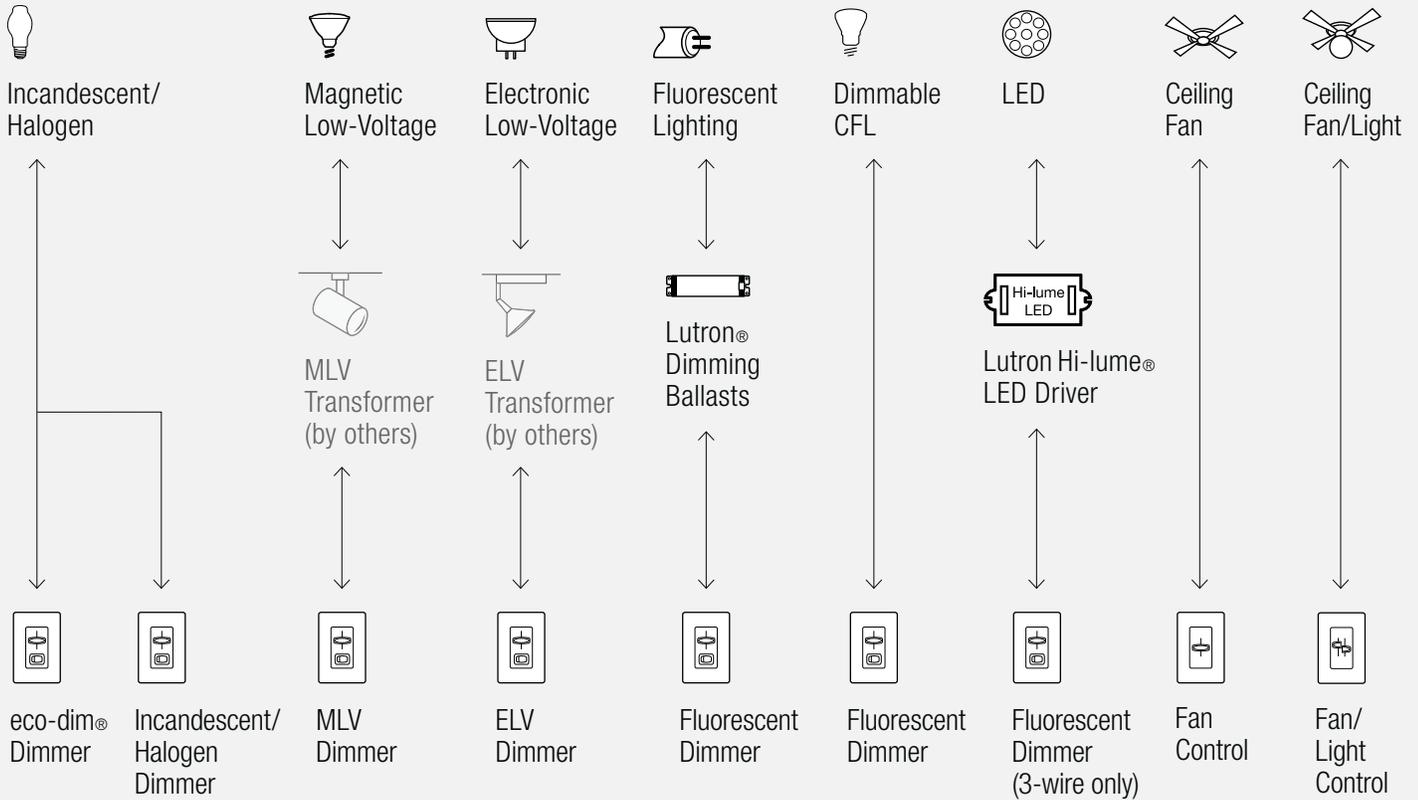
- Slide up to on/increase speed; down to decrease/off
- 3-quiet fan speeds for increased comfort
- Quiet 3-speed designed to prevent motor hum
- Fully variable available for use with multiple paddle or exhaust fans

Dimmer (right)

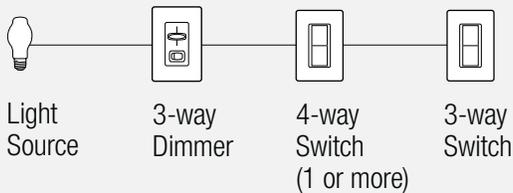
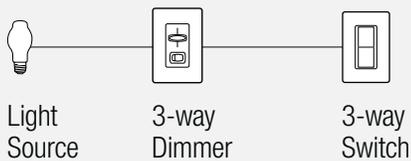
- Slide up to on/brighten; down to dim/off

Connections overview

Load connections*



Control types (for 2 or more locations)
Dim from one location, switch from the others



For more information on ballasts, visit www.lutron.com/ballasts.
For more information on LED drivers, visit www.lutron.com/LED.

*For illustration purposes only. Consult model number pages for specific voltage and capacity information.

Dimmer model numbers

 **Incandescent/halogen dimmers**

Dimmers with on/off switch

Single-pole 120V 600W	S-600P- CC ³
Single-pole 120V 1000W	S-10P- CC ³
3-way 120V 600W	S-603P- CC ³
3-way 120V 1000W	S-103P- CC ³

eco-dim® dimmer with on/off switch

3-way/single-pole 120V 600W	S-603PG- EE ²
--------------------------------	---------------------------------

eco-dim model guarantees at least 15% energy savings compared to a standard switch.

Dimmers with on/off switch and locator light

Single-pole 120V 600W	S-600PNL- CC ³
Single-pole 120V 1000W	S-10PNL- CC ³
3-way 120V 600W	S-603PNL- CC ³
3-way 120V 1000W	S-103PNL- CC ³

Slide-to-off dimmers

Single-pole 120V 600W	S-600- CC ³
Single-pole 120V 1000W	S-1000- CC ³

For dual slide-to-off dimmers (two loads), see page 111.

 **Magnetic low-voltage dimmers**

Dimmers with on/off switch

Single-pole 120V 600VA (450W)	SLV-600P- CC ³
3-way 120V 600VA (450W)	SLV-603P- CC ³

The stated VA (Volt-Ampere) rating includes the magnetic transformer heat losses and the lamp load. The stated W (Watt) rating is the maximum lamp wattage based on assumed 20% transformer loss.

 **Electronic low-voltage dimmers***

Dimmers with on/off switch

Single-pole 120V 300W	SELV-300P- CC ³
3-way 120V 300W	SELV-303P- CC ³

Certain LED drivers are dimmable using an ELV dimmer, for more information, visit www.lutron.com/LED.

CC³: Gloss color codes, see pg. 105
EE²: Available in White (WH), Ivory (IV), Almond (AL) and Light Almond (LA) (Wallplates not included, order separately, see pg. 160)

All models must be derated if ganged unless otherwise noted, see pg. 170.

***Requires neutral wire connection.**

Dimmer model numbers

 **3-wire fluorescent dimmers***

Dimmers with on/off switch

Single-pole 120V 8A	SF-10P- CC ³
Single-pole 277V 6A	SF-12P-277- CC ³
3-way 120V 8A	SF-103P- CC ³
3-way 277V 6A	SF-12P-277-3- CC ³

For use with Hi-lume®, Hi-lume® Compact SE, Hi-lume® 3D, Eco-10®, EcoSystem® ballasts.

No derating required if ganged.

Adjustable low-end trim.

 **Hi-lume® LED drivers:**
3-wire fluorescent dimmers*

Dimmers with on/off switch

Single-pole 120V 8A	SF-10P- CC ³
Single-pole 277V 6A	SF-12P-277- CC ³
3-way 120V 8A	SF-103P- CC ³
3-way 277V 6A	SF-12P-277-3- CC ³

For use with Hi-lume LED driver only.

For more information on Hi-lume LED drivers, visit www.lutron.com/HilumeLED.

No derating required if ganged.

Adjustable low-end trim.

 **Tu-Wire® fluorescent dimmers**

Dimmers with on/off switch

3-way/single-pole 120V 5A	SFTU-5A3P- CC ³
------------------------------	-----------------------------------

Also compatible with Advance Mark X ballasts, for further information, visit www.lutron.com/advance.

For information on use with Universal and OSRAM ballasts, contact Technical Support at 1.800.523.9466.

CC³: Gloss color codes, see pg. 105
(Wallplates not included, order separately, see pg. 160)

For more information on ballasts, visit www.lutron.com/ballasts.
All models must be derated if ganged unless otherwise noted, see pg. 170.

***Requires neutral wire connection.**

Fan control model numbers

✂ Fan controls

Slide-to-off fan controls—quiet 3-speed

Single-pole SFSQ-F-**CC**³
120V 1.5A

Single-pole SFSQ-F-HO-**CC**³
120V 2.0A

For use with only one ceiling paddle fan.

SFSQ-F-HO- for use with Hunter Original Series.

Slide-to-off fan control—fully variable

Single-pole SFS-5E-**CC**³
120V 5A

For use with multiple ceiling paddle fans or exhaust fans.

✂ Fan/light controls

Fan control—quiet 3-speed and dimmer

Single-pole fan control S2-LFSQ-**CC**³
120V 1.5A (left)

120V single-pole dimmer 300W (right)

For use with only one ceiling paddle fan.

Fan control—fully variable and dimmer

Single-pole fan control S2-LF-**CC**³
120V 2.5A (left)

120V single-pole dimmer 300W (right)

For use with multiple ceiling paddle fans.

✂ Fan control/light switch

Fan control—quiet 3-speed and switch

Single-pole fan control SFSQ-LF-**CC**³
120V 1.5A (top)

120V single-pole switch 360W (bottom)
(incandescent/halogen loads only)

CC³: Gloss color codes, see pg. 105
(Wallplates not included, order separately,
see pg. 160)

All models must be derated if ganged unless
otherwise noted, see pg. 170.

***Requires neutral wire connection.**

Dual device model numbers



**Incandescent/halogen and
Incandescent/halogen dimmers**

Dual slide-to-off dimmers (two loads)

Single-pole	S2-L- CC ³
120V 300W light (left) incandescent/halogen	
120V 300W light (right) incandescent/halogen	

Replacement knob model numbers

Knobs

Single-pole	SK- EE ²
Standard knob	
Split knobs	contact customer service

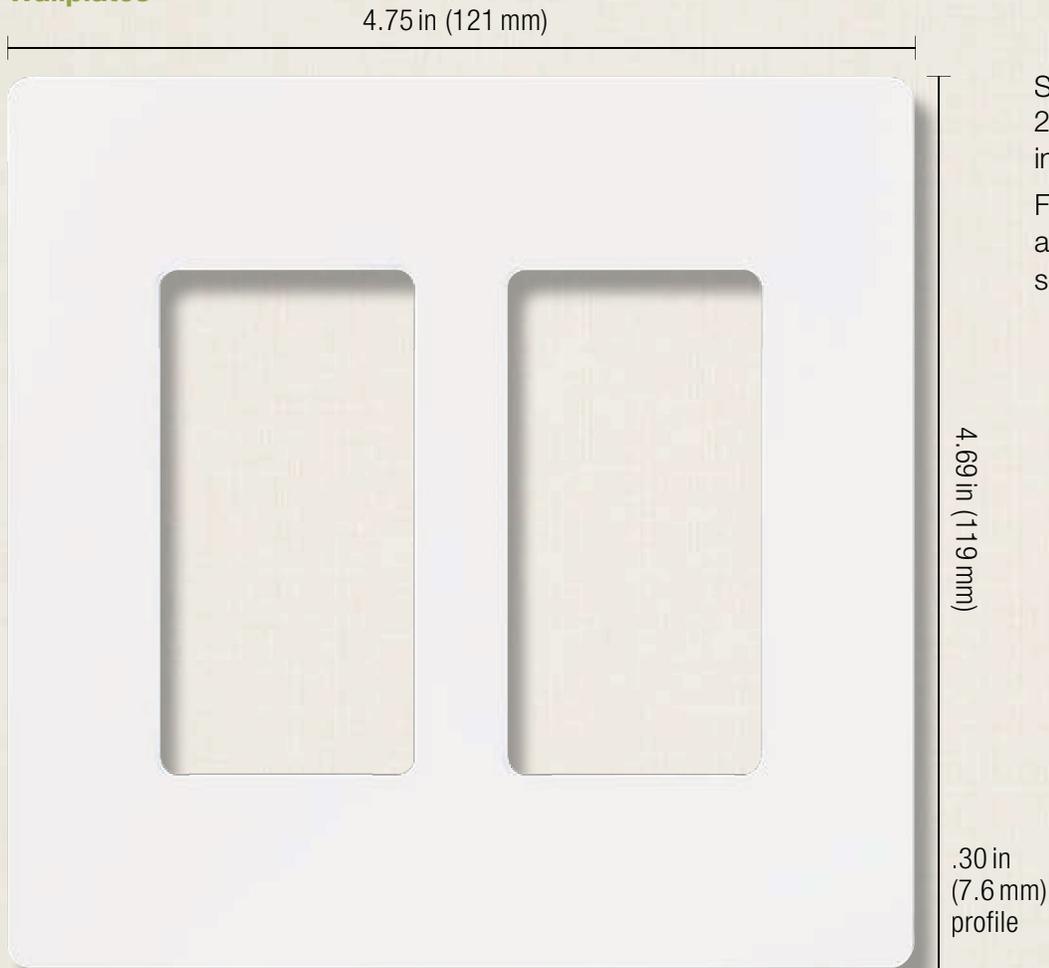
CC³: Gloss color codes, see pg. 105
(Wallplates not included, order separately,
see pg. 160)

EE²: Available in White (WH), Ivory (IV),
Almond (AL) and Light Almond (LA)

All models must be derated if ganged unless
otherwise noted, see pg. 170.

Accessories

Wallplates



Shown actual size:
2-gang Claro® wallplate
in White (WH).

For more information
about Designer wallplates,
see pg. 160.

Coordinated electrical devices



Tamper resistant
GFCI receptacle

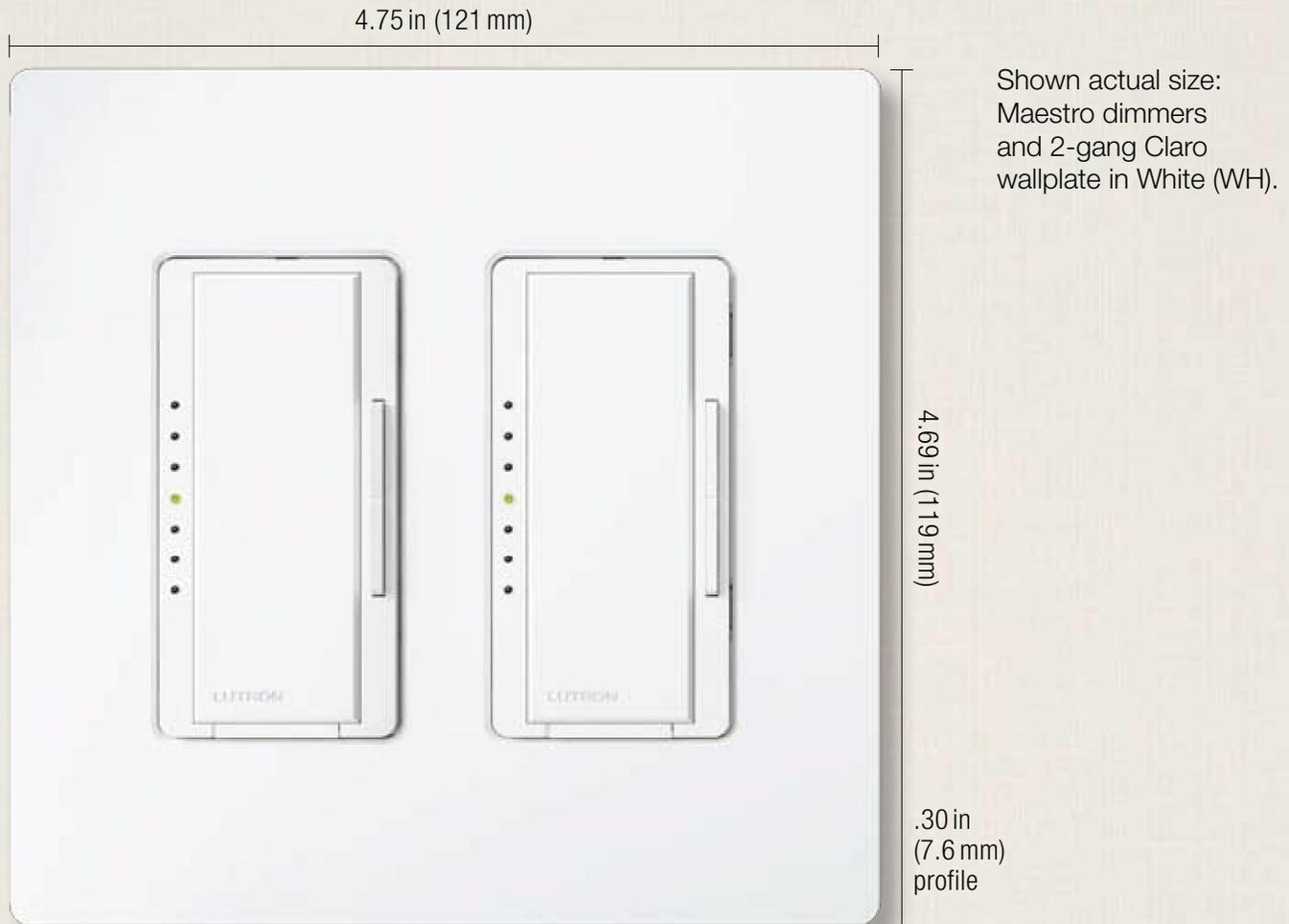


Customizable
6-port frame



Cable jack

For more information
about coordinated
Designer electrical
devices, see pg. 163.



Product family features

- Can be used in conjunction with the following dimmer(s) and switch(es): Maestro®, Maestro IR®, Maestro Wireless®, Pico™ wireless control, Spacer System®, Diva®, Lyneo® Lx, Skylark®, Skylark Contour™
- All Lutron® wallplates are screwless, seamless and have no visible hardware; the front plate securely snaps into the alignment adapter plate
- Full line of wiring devices in designer style opening
- Blank inserts available for Gloss colors (DV-BI-) and Satin colors (SC-BI-)
- Customize your designer wallplate with engraving, contact customer service to get started at 1.888.LUTRON1

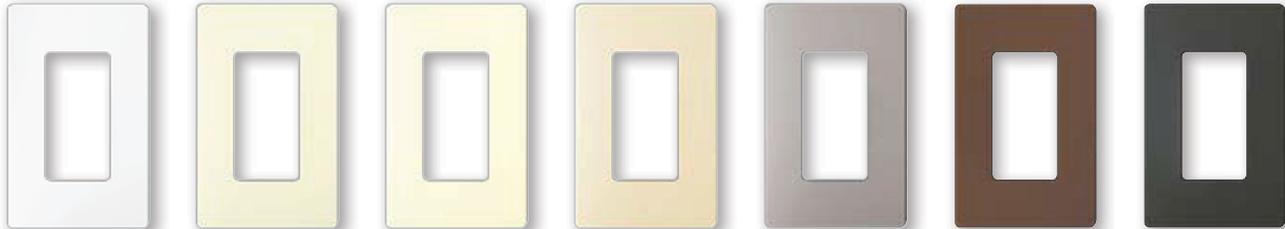
Ganging and derating

- Designer wallplates use standard ganging
- Requires fins to be removed from dimmers for proper spacing (“Fins Broken” ganging), see pg. 170
- May require derating (i.e., reduction of dimmer capacity due to fin removal), see Derating Tables, pg. 172

Available finishes

Use **BOLD** color code in model number (Example: SC-1-**PL**)

Gloss finishes



WH
White

LA
Light Almond

AL
Almond

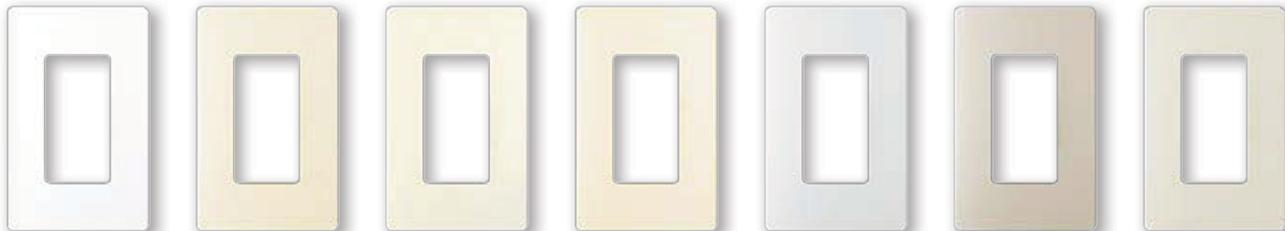
IV
Ivory

GR
Gray

BR
Brown

BL
Black

Satin finishes



SW
Snow

LS
Limestone

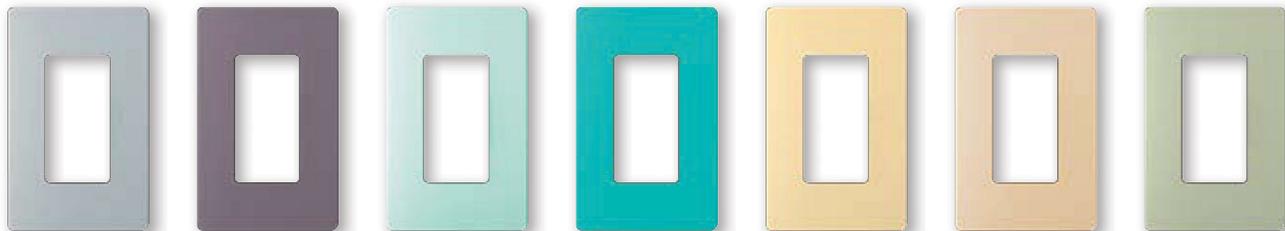
BI
Biscuit

ES
Eggshell

PD
Palladium

TP
Taupe

ST
Stone



BG
Bluestone

PL
Plum

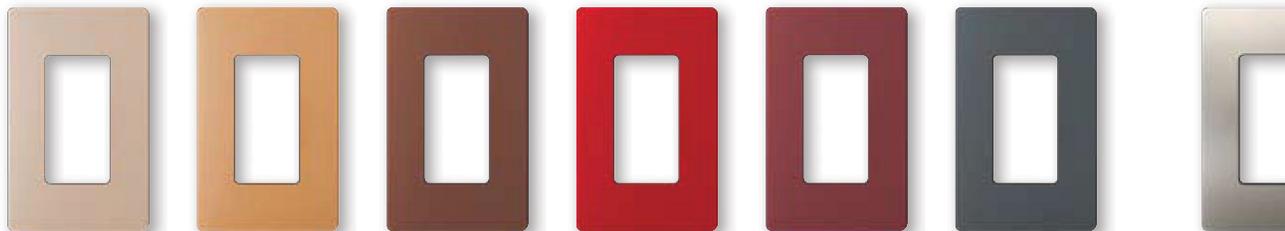
SG
Sea Glass

TQ
Turquoise

GS
Goldstone

DS
Desert Stone

GB
Greenbriar



MS
Mocha Stone

TC
Terracotta

SI
Sienna

HT
Hot

MR
Merlot

MN
Midnight

SS
Stainless Steel*

*Stainless Steel finish wallplates include black plastic trim/adaptor, visible from side. Match with separate Black (BL) or Midnight (MN) controls and accessories.

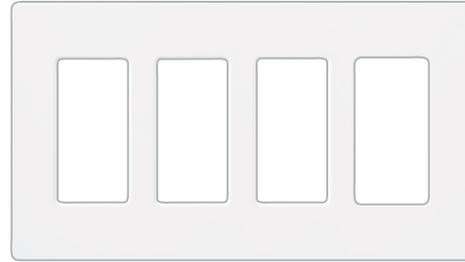
Wallplates for Maestro®, Maestro IR®, Maestro Wireless®, Pico™ wireless control, Spacer System®, Diva®, Lyneo® Lx, Skylark® and Skylark Contour™



1-gang*

CW-1-**CC**²
SC-1-**CC**⁴

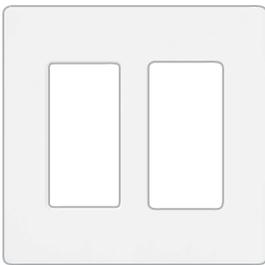
W: 2.94 in (75 mm); H: 4.69 in (119 mm)
D: .30 in (7.6 mm)



4-gang*

CW-4-**CC**²
SC-4-**CC**⁴

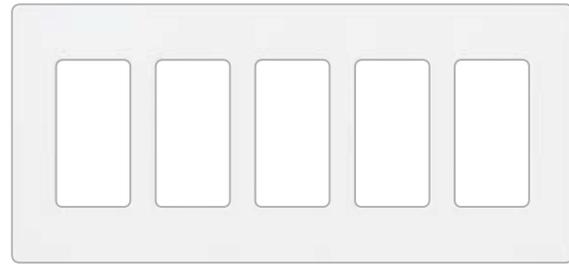
W: 8.37 in (213 mm); H: 4.69 in (119 mm);
D: .30 in (7.6 mm)



2-gang*

CW-2-**CC**²
SC-2-**CC**⁴

W: 4.75 in (121 mm); H: 4.69 in (119 mm);
D: .30 in (7.6 mm)



5-gang*

CW-5-**CC**²
SC-5-**CC**⁴

W: 10.18 in (259 mm); H: 4.69 in (119 mm);
D: .30 in (7.6 mm)



3-gang*

CW-3-**CC**²
SC-3-**CC**⁴

W: 6.56 in (167 mm); H: 4.69 in (119 mm);
D: .30 in (7.6 mm)

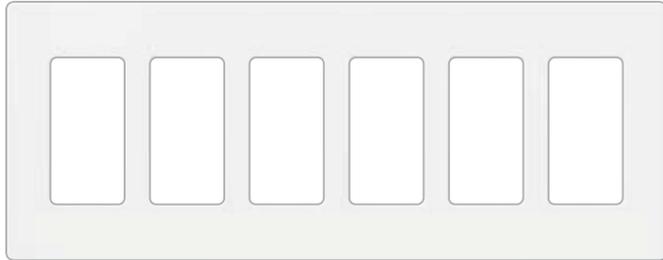
Multiple devices with line and low-voltage can be mounted behind a common wallplate using a standard barrier backbox, see Application Note #213 (Combining Low-Voltage and Line Voltage Wiring Devices in a Multi-Gang Box) at www.lutron.com/applicationnotes.

CC²: Gloss and Stainless Steel color codes, see pg. 161

CC⁴: Satin color codes, see pg. 161

Multi-gang dimmer installations may require derating, see pg. 170.

*Stainless Steel finish wallplates include black plastic trim/adaptor, visible from side. Match with separate Black (BL) or Midnight (MN) controls and accessories.



6-gang* CW-6-**CC**²
SC-6-**CC**⁴

W: 12.00in (305mm); H: 4.69in (119mm);
D: .30in (7.6mm)

Cable jacks



- F-style, 75-Ohm coaxial cable

Single cable jack* CA-CJH-**CC**³
SC-CJ-**CC**⁴

Telephone jacks



- 6-conductor telephone jack, RJ11

Single telephone jack* CA-PJH-**CC**³
SC-PJ-**CC**⁴

CC²: Gloss and Stainless Steel color codes, see pg. 161

CC³: Gloss color codes, see pg. 161

CC⁴: Satin color codes, see pg. 161

Receptacles



Tamper resistant receptacles

15A, 125V*	CARS-15-TR- CC ³
	SCRS-15-TR- CC ⁴
20A, 125V*	SCRS-20-TR- CC ⁴

Receptacles

15A, 125V*	CAR-15H- CC ³
	SCR-15- CC ⁴
20A, 125V*	SCR-20- CC ⁴

GFCI Receptacles



- Press test button to confirm LED indicator status
- Press reset button to reset GFCI after circuit interruption

Tamper resistant GFCI receptacles

15A, 125V*	GFCI	CAR-15-GFTR- CC ³
		SCR-15-GFTR- CC ⁴
20A, 125V*	GFCI	SCR-20-GFTR- CC ⁴

*Stainless Steel finish only available as separate wallplate. Match with separate Black (BL) or Midnight (MN) controls and accessories.

Receptacles for dimming use



- Duplex for dimming both connected loads
- Projecting nubs prevent standard plugs from being used
- Requires replacement plugs for dimming use

Duplex for dimming use

15 A	120/125V*	CAR-15-DFDU- CC ²
15 A	120/125V*	SCR-15-DFDU- CC ⁴
20 A	120/125V*	CAR-20-DFDU- CC ²
20 A	120/125V*	SCR-20-DFDU- CC ⁴

Receptacles for dimming use



- Top half for dimming
- Projecting nub prevents standard plug from being used
- Requires replacement plugs for dimming use
- Bottom half is a general use receptacle and will fit standard duplex plugs

Split duplex (half for dimming use)

15 A	120/125V*	CAR-15-HFDU- CC ²
15 A	120/125V*	SCR-15-HFDU- CC ⁴
20 A	120/125V*	CAR-20-HFDU- CC ²
20 A	120/125V*	SCR-20-HFDU- CC ⁴

Receptacles for dimming use



- Duplex for dimming both connected loads
- Projecting nubs prevent standard plugs from being used
- Requires replacement plugs for dimming use
- 15 A model shown
- Tamper resistant shutter mechanism

Dual dimming tamper resistant

15 A	120/125V*	CAR-15-DDTR- CC ²
15 A	120/125V*	SCR-15-DDTR- CC ⁴
20 A	120/125V*	CAR-20-DDTR- CC ²
20 A	120/125V*	SCR-20-DDTR- CC ⁴

Receptacles for dimming use



- Top half for dimming
- Projecting nub prevents standard plug from being used
- Requires replacement plugs for dimming use
- Bottom half is a general use receptacle and will fit standard duplex plugs
- 15 A model shown
- Tamper resistant shutter mechanism

Half dimming tamper resistant

15 A	120/125V*	CAR-15-HDTR- CC ²
15 A	120/125V*	SCR-15-HDTR- CC ⁴
20 A	120/125V*	CAR-20-HDTR- CC ²
20 A	120/125V*	SCR-20-HDTR- CC ⁴

CC²: Gloss color code and Stainless Steel, see pg. 161

CC⁴: Satin color codes, see pg. 161

*Stainless Steel finish only available as separate wallplate. Match with separate Black (BL) or Midnight (MN) controls and accessories.

Replacement plug for dimming
(use with receptacles on left)



- This plug required for use with Lutron® receptacles for dimming use—plug will work in standard receptacle
- Easily replaces the existing plugs on lamps

120/125V White	RP-FDU-10-WH
120/125V Brown	RP-FDU-10-BR

UL/CSA/NOM regulatory approvals.

Important notes

- If the hot and dimmed hot feeds to the split duplex HFDDU are supplied from different circuits or split-wired with separate switch-legs, a means to simultaneously disconnect these circuits must be provided at the panel board where they originate (NEC 210.7(C) 2002 Edition). A 2-pole circuit breaker or two single-pole circuit breakers with an approved handle tie can be used to accomplish this simultaneous disconnect. Feed-through dimming panels, which are those without breakers, are recommended when using the HFDDU.
- Receptacles and plugs for dimming use are UL listed for use with all Lutron® wallbox dimmers included in this catalog.
- If there is only one electrical feed to the receptacle, then the duplex DFDDU must be used.
- For detailed information, see Application Notes #91 (Guide to Dimming Table Lamps) and #109 (Guide to Dimming Portable Lamps via Receptacles) at www.lutron.com/applicationnotes.

CC²: Gloss color code and Stainless Steel, see pg. 161
CC⁴: Satin color codes, see pg. 161

*Stainless Steel finish only available as separate wallplate. Match with separate Black (BL) or Midnight (MN) controls and accessories.

Field customizable 6-port frame



- Shipped with six blanks in matching colors
- Connectors and wallplate sold separately
- Connectors snap in (no tools required)
- Connectors available in White (WH), unless noted

6-port frame*	CA-6PF- CC ³ SC-6PF- CC ⁴
---------------	--

Connectors for 6-port frame

Telephone/network jacks

 8-conductor, RJ45 category 3	CON-1P-C3- EE ⁴
8-conductor, RJ45 category 5e	CON-1P-C5E- EE ⁴
8-conductor, RJ45 category 6	CON-1P-C6- EE ⁴

Fiber jacks

 MT-RJ feed through	CON-1F-MTRJ-WH
 SC simplex	CON-1F-SC-WH
 LC non-flush mount	CON-1F-LG-WH
 ST style	CON-1F-ST-WH

Cable jack

 F-style, 75-Ohm coaxial cable	CON-1C- EE ⁴
---	--------------------------------

BNC jack

 BNC connector, 50-Ohm	CON-1B-WH
---	-----------

Connectors only for use with 6-port frame.

Switches



- Paddle turns on/off
- Use with any 15A load
- General purpose switching of all sources and motor loads
- No derating if ganged

General purpose switches (120/277 V)

Single-pole	15A*	CA-1PSH- CC ³ SC-1PS- CC ⁴
3-way	15A*	CA-3PSH- CC ³ SC-3PS- CC ⁴
4-way	15A*	CA-4PSH- CC ³ SC-4PS- CC ⁴

General purpose switch with locator light (120V only)

Single-pole	15A*	CA-1PSNL- EE ² SC-1PSNL- EE ¹⁰
3-way	15A*	CA-3PSNL- EE ² SC-3PSNL- EE ¹⁰
4-way	15A*	CA-4PSNL- EE ² SC-4PSNL- EE ¹⁰

CC³: Gloss color codes, see pg. 161

CC⁴: Satin color codes, see pg. 161

EE²: Only available in Almond (AL), Ivory (IV), Light Almond (LA) and White (WH)

EE⁴: Only available in White (WH) and Black (BL)

EE¹⁰: Available in Biscuit (BI), Eggshell (ES), Goldstone (GS), Limestone (LS), Sea Glass (SG) and Snow (SW)

*Stainless Steel finish only available as separate wallplate. Match with separate Black (BL) or Midnight (MN) controls and accessories.

How to understand ganging and derating

Standard ganging

Ganging is the side-by-side mounting of two or more dimmers or accessory devices under a multi-gang wallplate.

Standard multi-gang installation:

- Uses standard multi-gang electrical backboxes
- Uses standard multi-gang wallplates
- Requires fins to be removed from dimmers for proper spacing (“Fins Broken” ganging)
- May require derating (i.e., reduction of dimmer capacity due to fin removal), see Derating Tables, pgs. 172–173

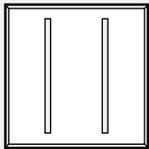
Custom ganging for Architectural style controls

For Architectural style dimmers and switches, it is possible to retain the maximum capacity of dimmers in multi-gang applications via custom architectural multi-gang:

- May require customized, wider-than-standard wallplates
- May require wider-than-standard electrical backboxes
- Allows full capacity (“No Fins Broken”) ganging
- Required for Nova® dimmers and for larger width (high capacity) architectural controls
- Visit www.lutron.com/customganging for additional information

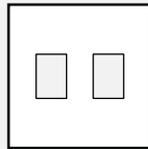
Standard ganging for dimmers, switches and accessories

New Architectural



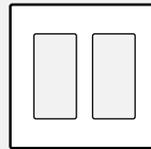
pg. 148

Architectural



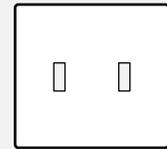
pg. 152

Designer

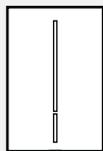


pg. 160

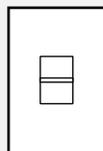
Traditional



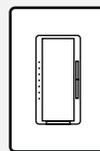
pg. 166



Vierti®



Vareo®
Nova T☆®



Maestro®
Maestro IR®
Maestro Wireless®
Spacer System®
Diva®
Lyneo® Lx
Skylark®
Skylark Contour™



Abella®
Ceana®
Ariadni®
Glyder®
Rotary

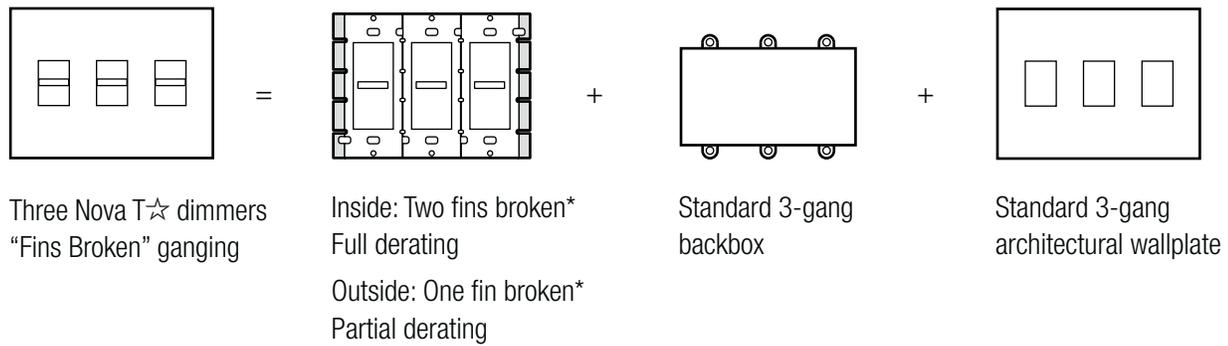
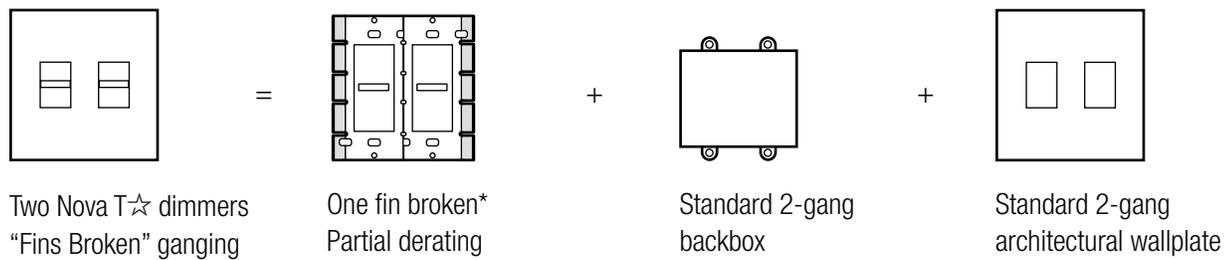
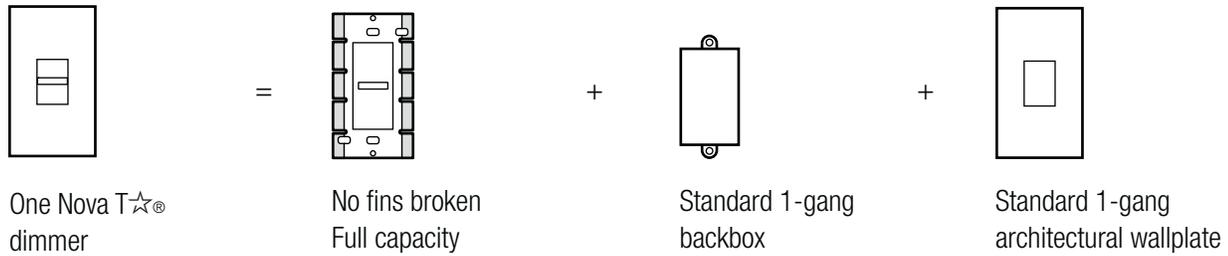
Derating Table 1
pg. 172

Derating Table 2
pg. 173

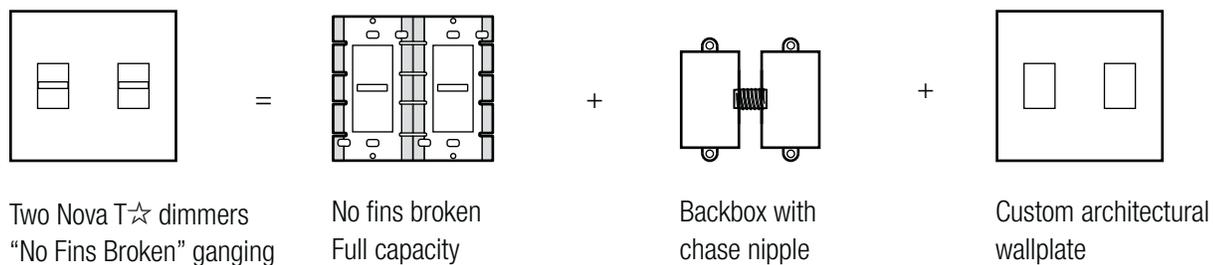
Derating Table 1
pg. 172

Derating Table 1
pg. 172

Standard ganging and fins broken derating examples:



Custom Architectural ganging example:



For further information on ganging and derating, visit www.lutron.com/multigang.

*The fins are scored and designed to be removed easily.

Derating Table 1

New Architectural | Verti®

Designer | Maestro®, Maestro IR®, Maestro Wireless®, Spacer System®, Diva®, Lyneo® Lx, Skylark Contour™, Skylark®

Traditional | Abella®, Ceano®, Ariadni®, Glyder®, Rotary



No fins broken



1 fin broken



2 fins broken

	No fins broken	1 fin broken	2 fins broken
Incandescent			
Dimmers	600W	500W	400W
	1000W	800W	650W
Dual dimmers	300W	250W	200W
	300W	250W	200W
Magnetic low-voltage			
Dimmers	600VA/450W	500VA/400W	400VA/300W
	1000VA/800W	800VA/650W	650VA/500W
Electronic low-voltage			
Dimmers	300W	250W	200W
	500W	450W	400W
	600W	500W	400W
Fluorescent			
Hi-lume®/Hi-lume® Compact SE/Eco-10®/EcoSystem®			
Verti	60 ballasts/6A	50 ballasts/5A	35 ballasts/3.5A
Maestro/Spacer System	20 ballasts/6A	20 ballasts/5A	20 ballasts/3.5A
Diva, Skylark, Lyneo Lx and Ariadni	no derating	no derating	no derating
Tu-Wire®: Spacer System, Diva, Skylark	5A	4A	3.3A
Fan controls			
Quiet 7-speed	1.0A/300W	1.0A/300W	1.0A/300W
Quiet 3-speed	1.5A	1.5A	1.5A
Fully variable	5A	4A	3A
Fan/light controls			
Quiet 7-speed	1.0A/300W	1.0A/300W	1.0A/300W
Quiet 3-speed	1.5A/300W	1.5A/300W	1.5A/300W
	1.5A/360W	1.5A/360W	1.5A/360W
Fully variable	2.5A/300W	2.1A/250W	1.7A/200W
Electronic switches			
Verti	6A/3A	5A/3A	3.5A/3A
Maestro (light/fan)	8A/3A	6.5A/3A	5A/3A
Abella (light/fan)	6A/3A	5A/3A	3.5A/3A

Derating Table 2

Architectural | Vareo®, Nova T☆®



No fins broken



1 fin broken



2 fins broken

	No fins broken	1 fin broken	2 fins broken
Incandescent			
Dimmers	600W	500W	300W
	1000W	900W	700W
	1500W	1250W	1000W
	1950W	–	–
Magnetic low-voltage			
Dimmers	600 VA/450 W	500 VA/400 W	300 VA/250 W
	1000 VA/800 W	900 VA/750 W	700 VA/500 W
	1500 VA/1200 W	1250 VA/1000 W	1000 VA/800 W
Electronic low-voltage			
Dimmers	300W	300W	250W
	600W	500W	400W
Fluorescent			
Hi-lume®/Hi-lume® Compact SE/Eco-10®/EcoSystem®			
Vareo	20 ballasts /8 A	20 ballasts /6 A	20 ballasts /4.5 A
Nova T☆	6 A	no derating	no derating
	8 A	no derating	no derating
	16 A	no derating	no derating
0-10VDC control ¹	30mA ballasts	no derating	no derating
Tu-Wire®	5 A	4 A	3.3 A
Fan controls			
Quiet 3-speed	1.5 A	no derating	no derating
Fully variable	6 A	4.2 A	2.5 A
Fully variable	12 A	10 A	8.3 A
Electronic tapswitches²			
VETS-1000-	1000W	800W	650W
VETS-1000-SL-	1000W	900W	700W
VETN-1000-	1000 VA	700 VA	550 VA

For further information on ganging Nova®, visit www.lutron.com/customganging.

¹PowerPack required for line voltage switching.

²VETS-R-Auxiliary electronic tapswitches do not require derating.

Dimmer capabilities and interface requirements

- M** Multi-location—true dimming from each location
- E** eco-model available
- Compatible dimmer (no interface)
- WBX** **TVI** **3F** **PA** Requires interface, see notes below



Dimmers	capacity†	M				
Incandescent/halogen 120V	600W				M	
	1000W				M	
	1500W			WBX		
	2000W			WBX		
Magnetic low-voltage 120V	600 VA (450W)					
	1000 VA (800W)					
	1500 VA (1200W)			WBX		
	2000 VA (1600W)			WBX	WBX	
Magnetic low-voltage 277V	600 VA (450W)			WBX		WBX
	1000 VA (800W)			WBX		WBX
Electronic low-voltage 120V	300W			WBX		
	450W			WBX	WBX	
	600W			WBX		WBX
Electronic low-voltage 277V	16A			WBX	WBX	WBX
Neon/cold cathode				WBX	WBX	
3-wire ballasts and Hi-lume® LED driver 120V	6A					
	Hi-lume, Hi-lume Compact SE,	8A				
	Eco-10® and EcoSystem® ballasts	16A			3F	
3-wire ballasts and Hi-lume LED driver 277V	6A			3F		
	Hi-lume, Hi-lume Compact SE,	8A			3F	
	Eco-10 and EcoSystem ballasts	16A			3F	3F
					3F	3F
Tu-Wire® ballasts 120V	5A			PA		
0-10VDC (ballasts or LED Drivers) 120/277V	16A	TVI	TVI			

WBX: Wallbox Phase Adaptive Power Module (PHPM-WBX-DV-WH)

3F: Fluorescent Power Module (PHPM-3F-DV-WH)

TVI: 0-10V Interface (GRX-TVI)

PA: Phase Adaptive Power Module (PHPM-PA-DV-WH)

See pgs. 178–179 for specific compatible dimmer models and switching interface solutions.

*Consult Lutron Technical Support for information on interfaces with Vierti.

†UL listed for FULL wattage indicated (derate capacity only if ganged with other devices).

Dimmer capabilities and interface requirements

M Multi-location—true dimming from each location

E eco-model available

 Compatible dimmer (no interface)

WBX **TVI** **3F** **PA** Requires interface, see notes below



Dimmers	capacity†	M	M	M	M		
 Incandescent/halogen 120V	600W	E				E	
	1000W						
	1500W	WBX		WBX	WBX	WBX	
	2000W	WBX		WBX	WBX	WBX	
 Magnetic low-voltage 120V	600VA (450W)						
	1000VA (800W)						
	1500VA (1200W)	WBX		WBX	WBX	WBX	
	2000VA (1600W)	WBX		WBX	WBX	WBX	
 Magnetic low-voltage 277V	600VA (450W)	WBX		WBX	WBX	WBX	
	1000VA (800W)	WBX		WBX	WBX	WBX	
 Electronic low-voltage 120V	300W			WBX			
	450W			WBX		WBX	
	600W			WBX		WBX	
 Electronic low-voltage 277V	16A	WBX		WBX	WBX	WBX	
 Neon/cold cathode				WBX		WBX	
 3-wire ballasts and Hi-lume® LED driver 120V	6A						
	Hi-lume, Hi-lume Compact SE, Eco-10® and EcoSystem® ballasts	8A	3F		3F	3F	
	16A	3F		3F	3F	3F	
 3-wire ballasts and Hi-lume LED driver 277V	6A						
	Hi-lume, Hi-lume Compact SE, Eco-10 and EcoSystem ballasts	8A	3F		3F	3F	3F
	16A	3F		3F	3F	3F	
 Tu-Wire® ballasts 120V	5A	PA		PA			
 0-10VDC (ballasts or LED Drivers) 120/277V	16A	TVI		TVI	TVI	TVI	

WBX: Wallbox Phase Adaptive Power Module (PHPM-WBX-DV-WH)

3F: Fluorescent Power Module (PHPM-3F-DV-WH)

TVI: 0-10V Interface (GRX-TVI)

PA: Phase Adaptive Power Module (PHPM-PA-DV-WH)

See pgs. 178–179 for specific compatible dimmer models and switching interface solutions.

†UL listed for FULL wattage indicated (derate capacity only if ganged with other devices).

Dimmer capabilities and interface requirements

M Multi-location—true dimming from each location

E eco-model available

 Compatible dimmer (no interface)

WBX **TVI** **3F** **PA** Requires interface, see notes below



Dimmers	capacity†				M
💡 Incandescent/halogen 120V	600W		E	E	
	1000W				
	1500W	WBX		WBX	
	2000W	WBX		WBX	
💡 Magnetic low-voltage 120V	600 VA (450W)				
	1000 VA (800W)			WBX	
	1500 VA (1200W)	WBX		WBX	
	2000 VA (1600W)	WBX		WBX	
💡 Magnetic low-voltage 277V	600 VA (450W)	WBX		WBX	
	1000 VA (800W)	WBX		WBX	
💡 Electronic low-voltage 120V	300W				
	450W			WBX	
	600W			WBX	
💡 Electronic low-voltage 277V	16A	WBX		WBX	
💡 Neon/cold cathode		WBX		WBX	
💡 3-wire ballasts and Hi-lume® LED driver 120V	6A				
	Hi-lume, Hi-lume Compact SE, 8A				
	Eco-10® and EcoSystem® ballasts 16A	3F		3F	
💡 3-wire ballasts and Hi-lume LED driver 277V	6A				
	Hi-lume, Hi-lume Compact SE, 8A	3F		3F	
	Eco-10 and EcoSystem ballasts 16A	3F		3F	
⚡ Tu-Wire® ballasts 120V	5A	PA			
⚡ 0-10VDC (ballasts or LED Drivers) 120/277V	16A	TVI		TVI	

WBX: Wallbox Phase Adaptive Power Module (PHPM-WBX-DV-WH)

3F: Fluorescent Power Module (PHPM-3F-DV-WH)

See pgs. 178–179 for specific compatible dimmer models and switching interface solutions.

TVI: 0-10V Interface (GRX-TVI)

PA: Phase Adaptive Power Module (PHPM-PA-DV-WH)

†UL listed for FULL wattage indicated (derate capacity only if ganged with other devices).

Dimmer capabilities and interface requirements

M Multi-location—true dimming from each location

E eco-model available

 Compatible dimmer (no interface)

WBX **TVI** **3F** **PA** Requires interface, see notes below



Dimmers	capacity†				
 Incandescent/halogen 120V	600W		E		E
	1000W				
	1500W		WBX		
	2000W		WBX		
 Magnetic low-voltage 120V	600 VA (450W)				
	1000 VA (800W)				
	1500 VA (1200W)		WBX		
	2000 VA (1600W)		WBX		
 Magnetic low-voltage 277V	600 VA (450W)		WBX		
	1000 VA (800W)		WBX		
 Electronic low-voltage 120V	300W		WBX		
	450W		WBX		
	600W		WBX		
 Electronic low-voltage 277V	16A		WBX		
 Neon/cold cathode			WBX		
 3-wire ballasts and Hi-lume® LED driver 120V	6A				
	Hi-lume, Hi-lume Compact SE, Eco-10® and EcoSystem® ballasts	8A			
		16A		3F	
 3-wire ballasts and Hi-lume LED driver 277V	6A				
	Hi-lume, Hi-lume Compact SE, Eco-10 and EcoSystem ballasts	8A		3F	
		16A		3F	
 Tu-Wire® ballasts 120V	5A		PA		
 0-10VDC (ballasts or LED Drivers) 120/277V	16A		TVI		

WBX: Wallbox Phase Adaptive Power Module (PHPM-WBX-DV-WH)

3F: Fluorescent Power Module (PHPM-3F-DV-WH)

See pgs. 178–179 for specific compatible dimmer models and switching interface solutions.

TVI: 0-10V Interface (GRX-TVI)

PA: Phase Adaptive Power Module (PHPM-PA-DV-WH)

†UL listed for FULL wattage indicated (derate capacity only if ganged with other devices).

Dimmer models/load interface compatibility

	Incandescent, magnetic and electronic low-voltage (120/277 V)		3-wire Fluorescent ballasts or Hi-lume® LED drivers (120/277 V)		0-10VDC Ballasts or LED drivers (120/277 V)	
	WBX 		3F 		TVI 	
	Wallbox Phase Adaptive Power Module* PHPM-WBX-DV-WH		Fluorescent Power Module* PHPM-3F-DV-WH		0-10V Interface GRX-TV1	
Dimmer Family	Single-pole	3-way or multi-location	Single-pole	3-way or multi-location	Single-pole	3-way or multi-location
Abella®	–	–	–	–	–	–
Ariadni®	–	AYF-103P-	–	AYF-103P-	–	AYF-103P-
Ceana®	–	–	–	–	–	–
Diva® Gloss	–	DVF-103P-	–	DVF-103P-	–	DVF-103P-
Diva Satin Colors®	–	DVSCF-103P-	–	DVSCF-103P-	–	DVSCF-103P-
Glyder®	–	–	–	–	–	–
Lyneo® Lx	–	LXF-103PL-	–	LXF-103PL-	–	LXF-103PL-
Maestro® Gloss	–	MAF-6AM-	–	MAF-6AM-	–	MAF-6AM-
Maestro® Satin Colors®	–	MSCF-6AM-	–	MSCF-6AM-	–	MSCF-6AM-
Maestro Wireless®	–	MRF2-F6AN-DV-	–	MRF2-F6AN-DV-	–	MRF2-F6AN-DV-
Nova®	NF-10-	NF-103P-	NF-10-	NF-103P-	NF-10-	NF-103P-
Nova T☆®	NTF-10-	NTF-103P-	NTF-10-	NTF-103P-	NTF-10-	NTF-103P-
Skylark®	SF-10P-	SF-103P-	SF-10P-	SF-103P-	SF-10P-	SF-103P-
Spacer System®	–	SPSF-6AM-	–	SPSF-6AM-	SPSF-S6A-	SPSF-6AM-
Vareo®	–	VF-10-	–	VF-10-	–	VF-10-
Vierti®	contact Lutron		contact Lutron		–	VTF-6AM-

Use only dimmer model numbers listed.

*Dual 120/277 V model given, 120V only versions are also available. Please see Technical notes, pg. 179.

Dimmer models/load interface compatibility

Dimmer Family	Tu-Wire® Fluorescent Ballasts (120V)		Switched Lighting (120/277V)	
	PA		SW	
	Single-pole	3-way or multi-location	Single-pole	3-way or multi-location
Abella®	–	–	–	AB-S6AM-
Ariadni®	–	AYF-103P-	–	–
Ceana®	–	–	–	–
Diva® Gloss	–	DVF-103P-	–	–
Diva Satin Colors®	–	DVSCF-103P-	–	–
Glyder®	–	–	–	–
Lyneo® Lx	–	LXF-103PL-	LX-1PSL-	LX-3PSL-
Maestro® Gloss	–	MAF-6AM-	–	MA-S8AM-
Maestro® Satin Colors®	–	MSCF-6AM-	–	MSC-S8AM-
Maestro Wireless®	–	MRF2-F6AN-DV-	–	MRF2-6ANS-
Nova®	NF-10-	NF-103P-	–	–
Nova T☆®	NTF-10-	NTF-103P-	–	–
Skylark®	SF-10P-	SF-103P-	–	–
Spacer System®	SPSF-S6A-	SPSF-6AM-	SPSF-S6A-	SPSF-S6AM-
Vareo®	–	VF-10-	–	VETN-1000-
Vierti®	contact Lutron		contact Lutron	

Technical notes

- Lighting load interfaces must be matched to load type and voltage
- All load interfaces for dimmed load are controlled by a 120V 3-wire fluorescent dimmer
- Power feed to dimmer may differ from lighting load/interface voltage
- Interfaces typically require additional power feeds
- For wiring information, consult wiring diagrams, see pgs. 193-195
- For assistance and additional solutions, consult Lutron Technical Support at 1.800.523.9466 (24 hours/7 days)

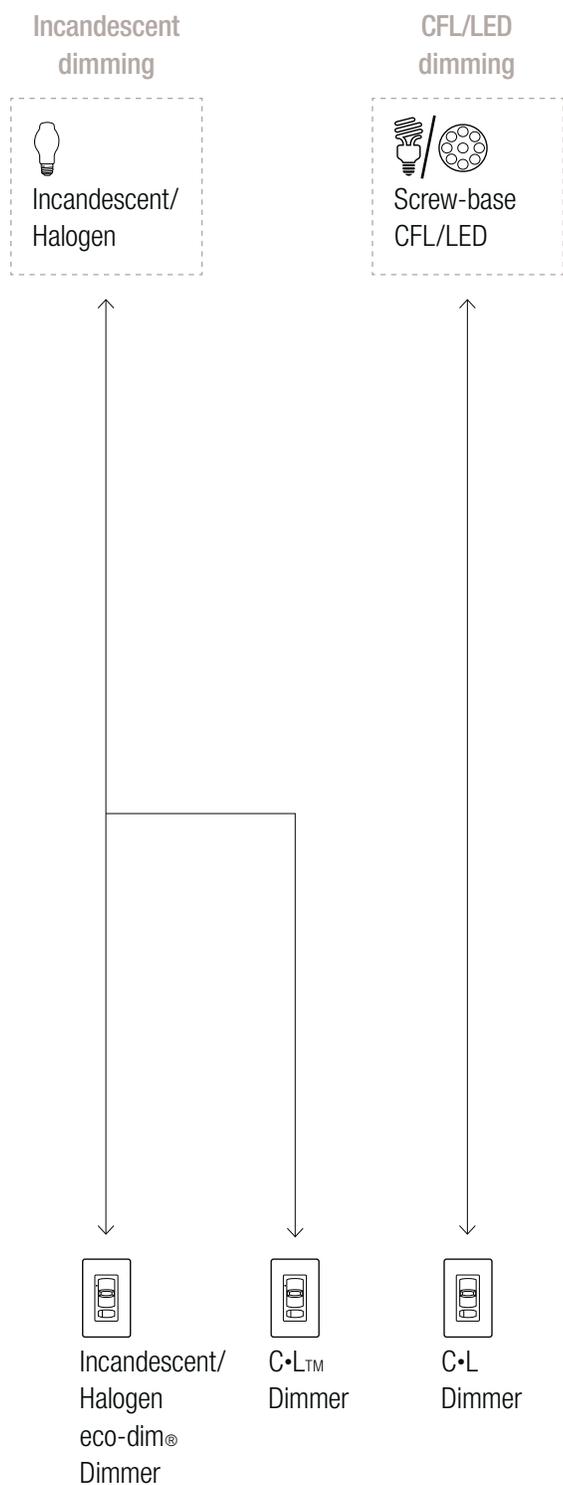
Interface mounting

- PHPM interfaces mount to 2-gang electrical backbox (W: 6.30 in x H: 5.10 in)
- GRX-TVI enclosure is surface mount only (W: 6.10 in x H: 12.50 in x D: 3.30 in)

Use only dimmer model numbers listed.

*Dual 120/277V model given, 120V only versions are also available. Please see Technical notes, pg. 179.

Skylark Contour™



For illustration purposes only. Consult model number pages for specific voltage and capacity information.

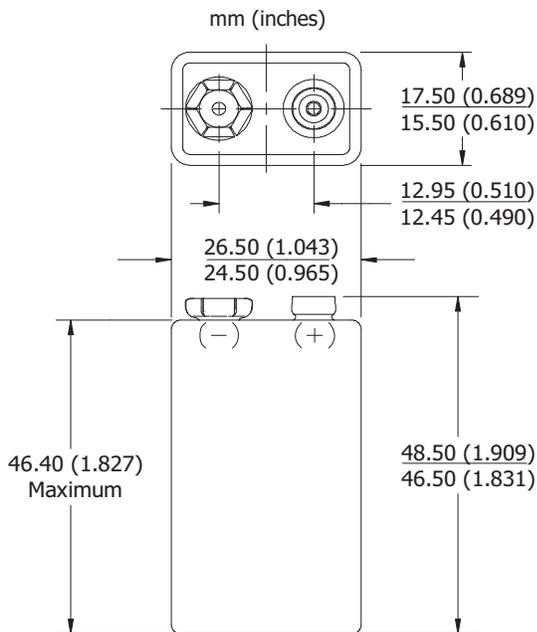


ENERGIZER 522

9V



Industry Standard Dimensions

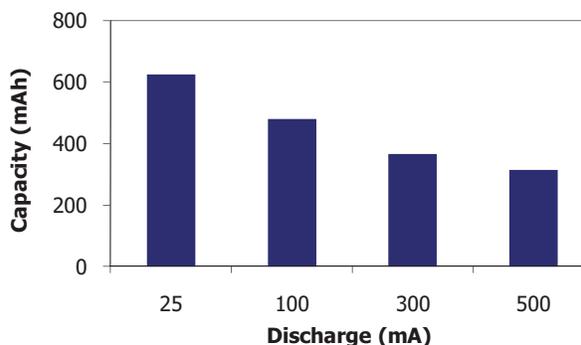


Specifications

Classification:	Alkaline
Chemical System:	Zinc-Manganese Dioxide (Zn/MnO ₂) No added mercury or cadmium
Designation:	ANSI-1604A, IEC-6LR61
Nominal Voltage:	9.0 volts
Operating Temp:	-18°C to 55°C (0°F to 130°F)
Typical Weight:	45.6 grams (1.6 oz.)
Typical Volume:	21.1 cubic centimeters (1.3 cubic inch)
Jacket:	Metal
Shelf Life:	5 years at 21°C (80% of initial capacity)
Terminal:	Miniature Snap

Milliamp-Hours Capacity

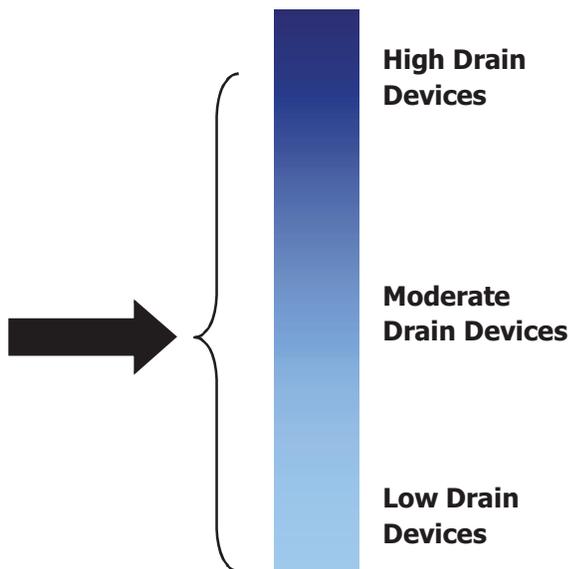
Continuous discharge to 4.8 volts at 21°C



Device Selection Guide:

- Toy 
- Baby Monitor 
- Garage Opener 
- Clock Radio 
- Smoke Detector 

Battery Selection Indicator



Important Notice

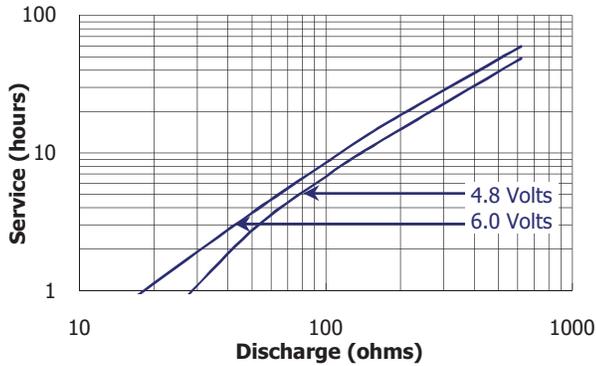
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ENERGIZER 522

9V

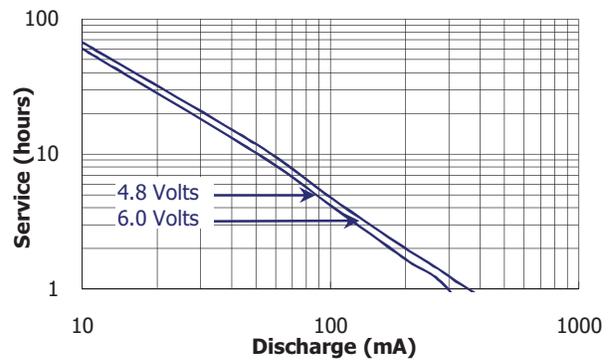
Constant Resistance Performance

Typical Characteristics (21°C)



Constant Current Performance

Typical Characteristics (21°C)



Industry Standard Tests (21°C)

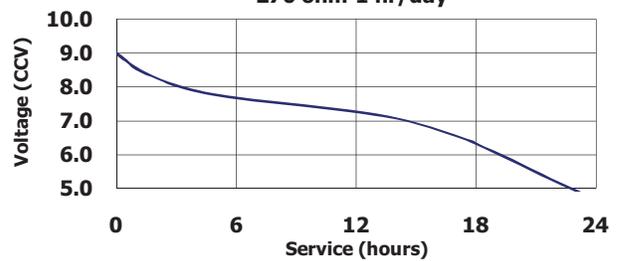
RADIO

620 ohm 2 hrs/day



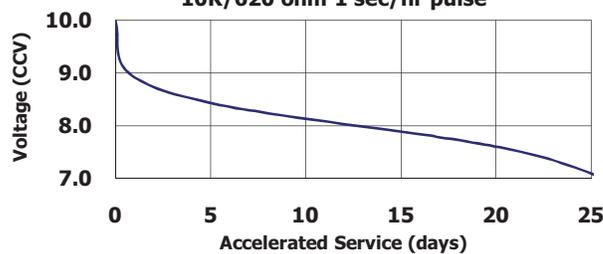
TOY

270 ohm 1 hr/day



ACCELERATED SMOKE DETECTOR

10K/620 ohm 1 sec/hr pulse



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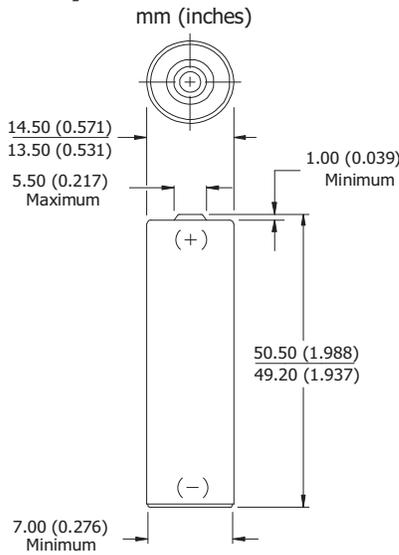
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ENERGIZER NH15-2300

AA

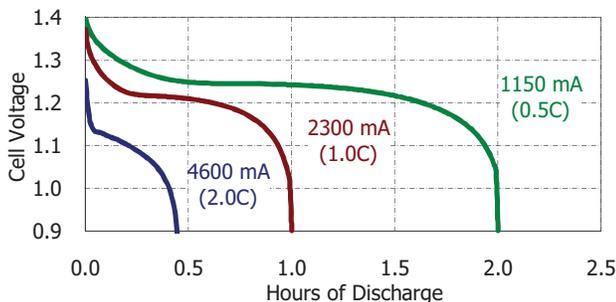
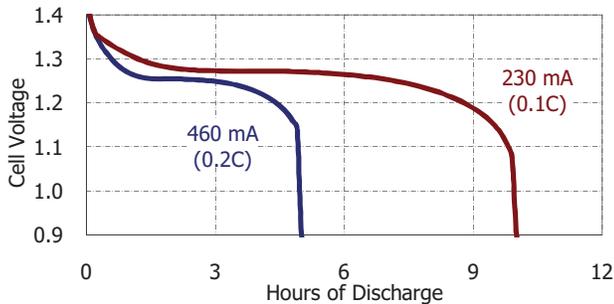


Industry Standard Dimensions



Discharge Characteristics

Typical Performance at 21°C (70°F)



Specifications

Classification:	Rechargeable
Chemical System:	Nickel-Metal Hydride (NiMH)
Designation:	ANSI-1.2H2
Nominal Voltage:	1.2 Volts
Rated Capacity:	2300 mAh* at 21°C (70°F)
Typical Weight:	30.0 grams (1.1 oz.)
Typical Volume:	8.3 cubic centimeters (0.5 cubic inch)
Terminals:	Flat Contact
Jacket:	Plastic

* Based on 460 mA (0.2C rate) continuous discharge to 1.0 volts.

Internal Resistance:

The internal resistance of the cell varies with state of charge, as follows:

<u>Cell Charged</u>	<u>Cell 1/2 Discharged</u>
30 milliohms	40 milliohms
(tolerance of ±20% applies to above values)	

AC Impedance (no load):

The impedance of the charged cell varies with frequency, as follows:

<u>Frequency (Hz)</u>	<u>Impedance (milliohms)</u>
1000	(charged cell) 12

Above values based on AC current set at 1.0 ampere.
Value tolerances are ±20%.

Operating and Storage Temperatures:

To maintain maximum performance, observe the following general guidelines regarding environmental conditions:

Charge:	0°C to 40°C (32°F to 104°F)
Discharge:	0°C to 50°C (32°F to 122°F)
Storage:	-20°C to 30°C (-4°F to 86°F)
Humidity:	65±20%

NOTE: Operating at extreme temperatures, will significantly impact battery cycle life.

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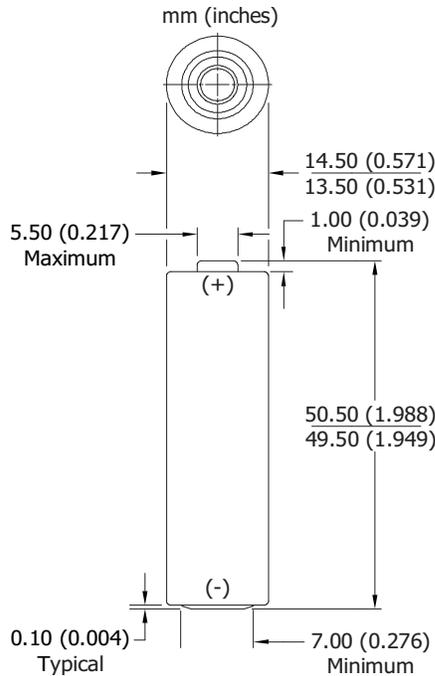
AA



Specifications

Classification:	Alkaline
Chemical System:	Zinc-Manganese Dioxide (Zn/MnO ₂) No added mercury or cadmium
Designation:	ANSI-15A, IEC-LR6
Nominal Voltage:	1.5 volts
Nominal IR:	150 to 300 milliohms (fresh)*
Operating Temp:	-18°C to 55°C (0°F to 130°F)
Typical Weight:	23.0 grams (0.8 oz.)
Jacket Volume:	8.1 cubic centimeters (0.5 cubic inch)
Jacket:	Plastic Label
Shelf Life:	7 years at 21°C (80% of initial capacity)
Terminal:	Flat Contact

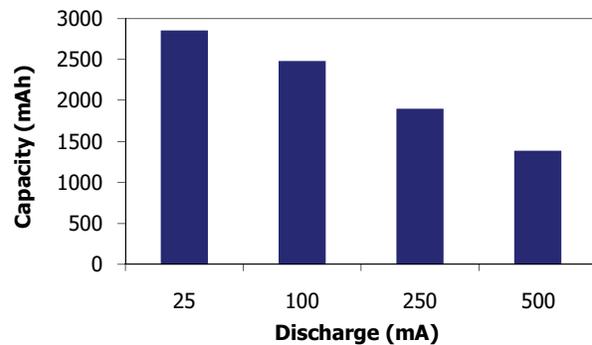
Industry Standard Dimensions



* For additional information, please reference the [IR technical white paper](#).

Milliamp-Hours Capacity

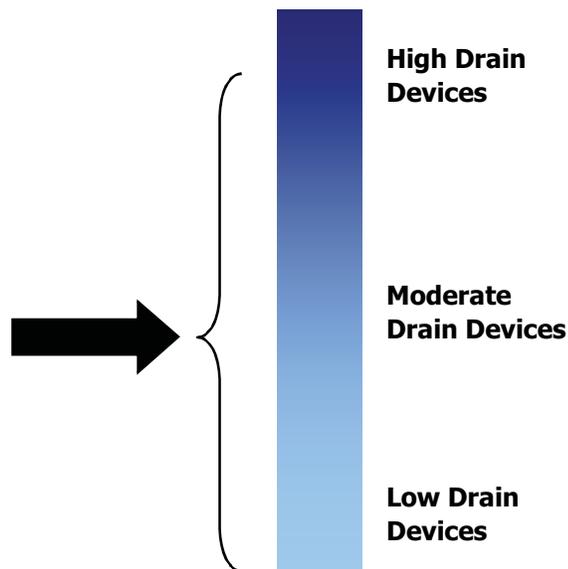
Continuous discharge to 0.8 volts at 21°C



Device Selection Guide:

- Digital Camera
- Photoflash
- Games, CD's, MD's
- Tape Player
- Lighting
- Toy
- Remote Control
- Radio
- Clock

Battery Selection Indicator



Important Notice

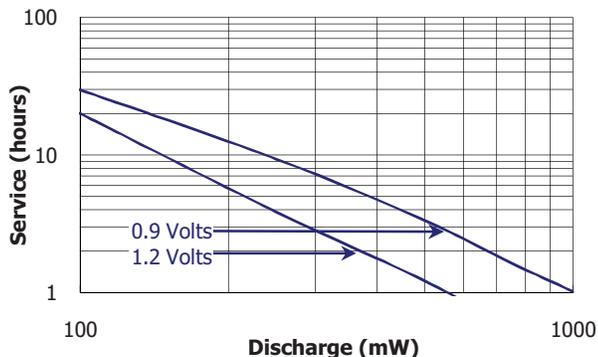
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ENERGIZER E91

AA

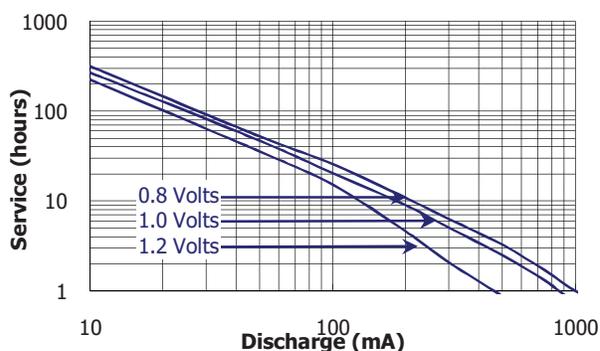
Constant Power Performance

Typical Characteristics (21°C)



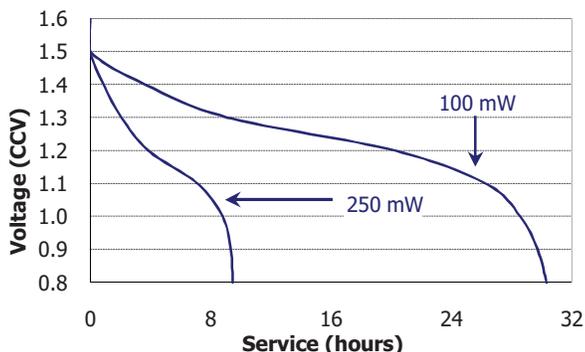
Constant Current Performance

Typical Characteristics (21°C)



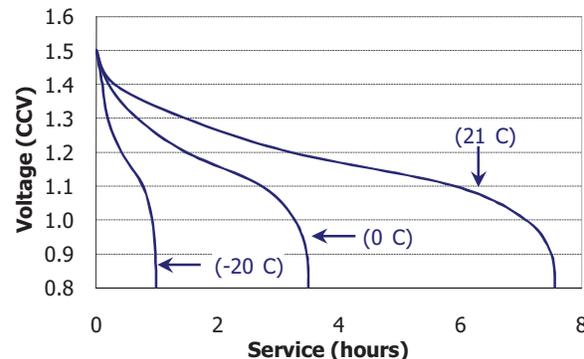
Constant Power Performance

Discharge Characteristics (21°C)

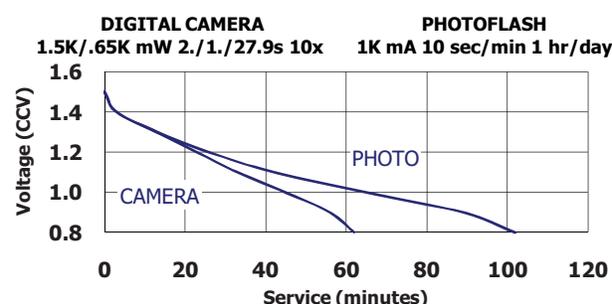
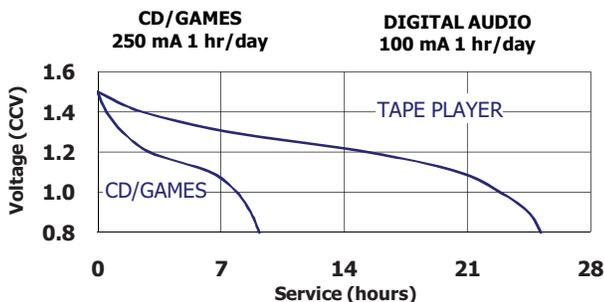
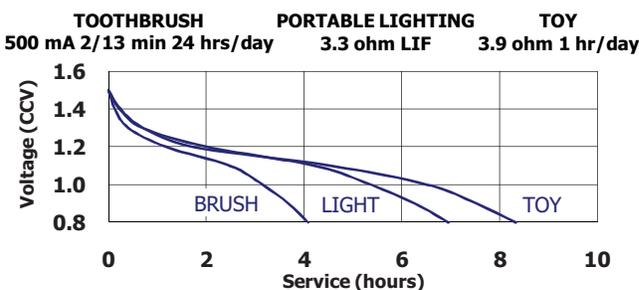
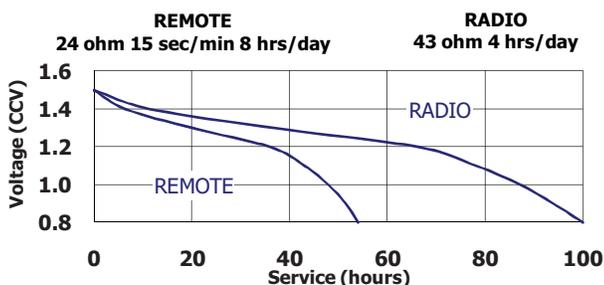


Constant Current Performance

250 mA Discharge (-20°C / 0°C / 21°C)



Industry Standard Tests (21°C)



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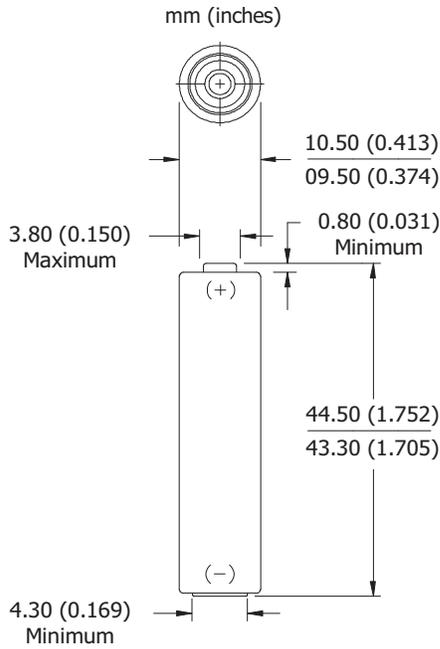
AAA



Specifications

Classification:	Alkaline
Chemical System:	Zinc-Manganese Dioxide (Zn/MnO ₂) No added mercury or cadmium
Designation:	ANSI-24A, IEC-LR03
Nominal Voltage:	1.5 volts
Nominal IR:	150 to 300 milliohms (fresh)*
Operating Temp:	-18°C to 55°C (0°F to 130°F)
Typical Weight:	11.5 grams (0.4 oz.)
Jacket Volume:	3.8 cubic centimeters (0.2 cubic inch)
Jacket:	Plastic Label
Shelf Life:	7 years at 21°C (80% of initial capacity)
Terminal:	Flat Contact

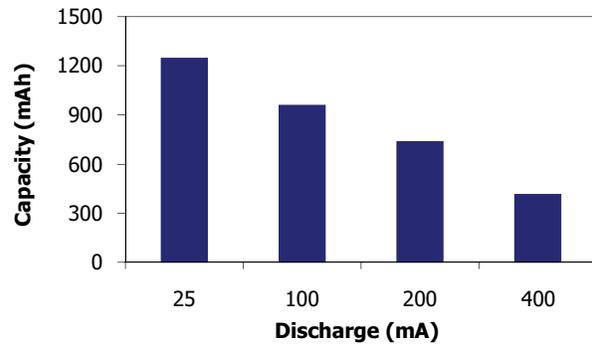
Industry Standard Dimensions



* For additional information, please reference the [IR technical white paper](#).

Milliamp-Hours Capacity

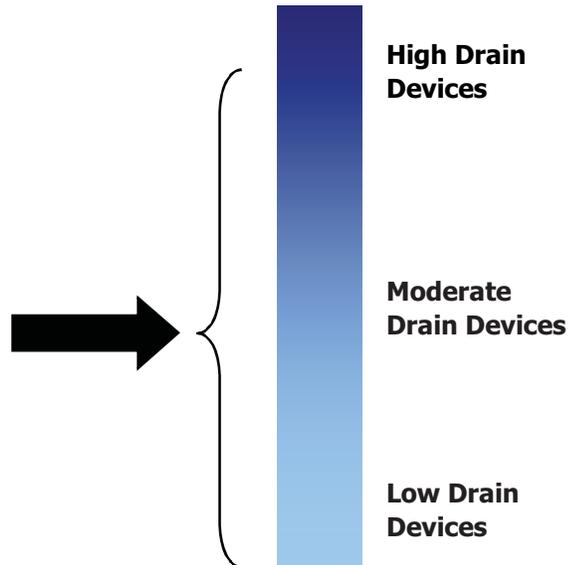
Continuous discharge to 0.8 volts at 21°C



Device Selection Guide:

Battery Selection Indicator

- Photoflash
- Games, Digital Audio
- Lighting
- Remote Control
- Radio



Important Notice

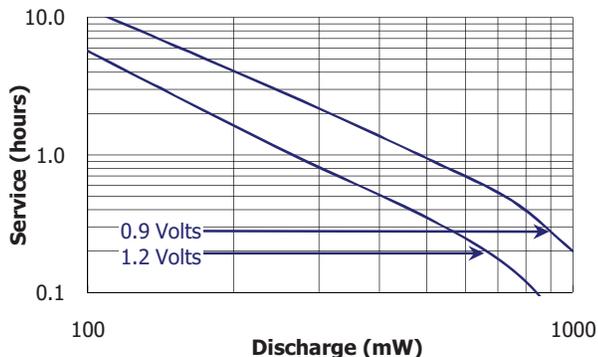
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AAA

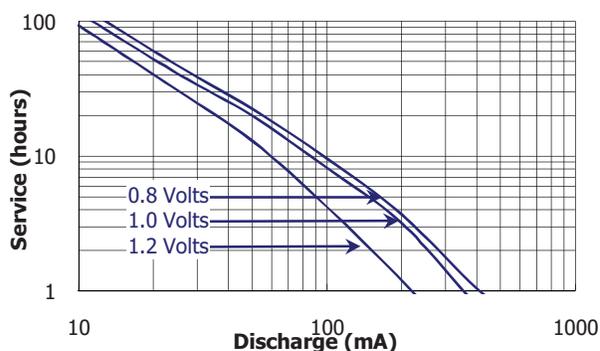
Constant Power Performance

Typical Characteristics (21°C)



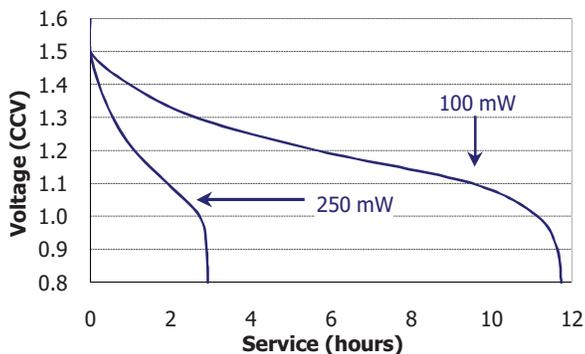
Constant Current Performance

Typical Characteristics (21°C)



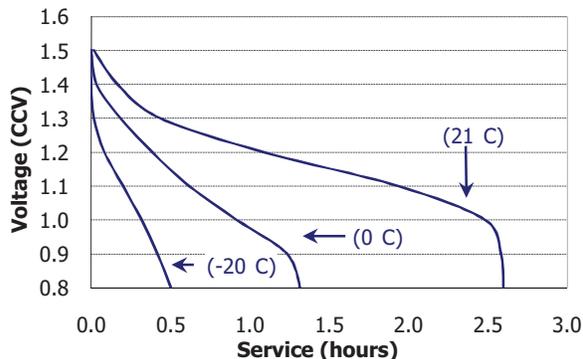
Constant Power Performance

Discharge Characteristics (21°C)



Constant Current Performance

250 mA Discharge (-20°C / 0°C / 21°C)



Industry Standard Tests (21°C)

LIGHTING
5.1 ohm LIF



REMOTE
24 ohm 15 sec/min 8 hrs/day



TAPE-GAME-DIGITAL AUDIO
100 mA 1 hr/day



PHOTOFLASH
600 mA 10 sec/min 1 hr/day



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No Family Association - Semi Flush 2Lt

3620NI

Semi Flush 2Lt

Dia./Width: 13.5 IN

Body Height: 7.25 IN

Available Finishes: Brushed Nickel, Olde Bronze

Gently curved Brushed Nickel arms embrace a White Etched glass shade in this Semi-flush ceiling light. 2 lights, 100-W Max (M). Diameter 13 1/2" and height 7 1/2". U. S. Patent Pending.

Technical Information

Type	Ceiling Lights	Backplate Dimensions	4.9 DIA IN
Style	Transitional	Bulb Included	N
Finish Group	Silver	Primary Bulb Count	2
Room	Bedroom, Hallway, Utility	Primary Lamp Type	A19
Weight	3.75 LBS	UL CSA Listed	Y
Body Height	7.25 IN	Diffuser Description	WHITE ETCHED GLASS
Width	13.5 IN	Body Material	STEEL

Related Products



Wall Mt 1Lt

Finish: Brushed Nickel
Dia./Width: 6.0
Body Height: 8.0



Bath 3Lt

Finish: Brushed Nickel
Dia./Width: 24.0
Body Height: 8.0



Pendant 1Lt

Finish: Polished Nickel
Dia./Width: 11.75
Body Height: 10.25



Pendant 1Lt

Finish: Polished Nickel
Dia./Width: 13.25
Body Height: 11.5

Safety Precautions

Read all safety precautions and installation instructions carefully before installing or servicing this fixture. Failure to comply with these instructions could result in potentially fatal electric shock and/or property damage.

It is recommended that a qualified electrician perform all wiring. This fixture must be wired in accordance with all national and local electrical codes.

Do not handle any energized fixture or attempt to energize any fixture with wet hands or while standing on a wet or damp surface or in water.

Make sure that the power source conforms to the requirements of the fixture. (See labels on fixture housing).

This portable lamp has a grounded 3-prong plug. As a safety feature, this plug will fit into a grounded 110-120v electrical outlet only one way. If the plug does not fit fully and securely into the outlet, or if your outlet is not grounded, contact a qualified electrician to install the correct outlet. Do not attempt to remove or bend the third prong. Never use a 3-prong adapter or extension cord unless the fixture plug can be properly inserted into the adapter or extension cord, and the adapter or extension cord can be properly inserted and

grounded into the electrical outlet. Do not attempt to modify or defeat this safety feature.

Protect power cord from coming into contact with sharp objects, oil, grease, hot surfaces, or chemicals.

Cautions:

- NOT FOR USE WITH DIMMER SWITCH OF ANY KIND
- FOR INDOOR DRY LOCATION ONLY
- DO NOT INSTALL OVER A HEAT SOURCE
- DO NOT INSTALL DIRECTLY OVER WATER
Such as: fish tanks, sinks, laundry tubs etc.
- Injury to persons and damage to the mounting surface may result if the fixture or mounting hardware is pulled from the mounting location. To reduce the possibility of such injury, be sure to mount the fixture only on a surface that is structurally sound. (See Mounting Instructions).

Minimum starting temperature is 0 degrees F. Maximum room temperature should not be above 100 degrees F.

This fixture is intended to be used for general indoor lighting in dry or damp locations only. Note: damp locations are defined as environments containing moisture that will not interfere with electrical components.

Installation Instructions

1. Select suitable ceiling location that can support the weight of the fixture. When mounting from drywall or wall board, plastic anchors are recommended (sold separately).
2. Measure the distance between the chain hanging slots on the back of the fixture. Mark two spots on the ceiling where you will install suitable hooks the same distance apart. Install hooks.
3. Hang fixture by placing one chain set over each hook that has been installed on ceiling. You may need to adjust the chains slightly on the hooks for fixture to hang level. Fixture must hang at least 3" from ceiling

For optimum performance use "F32T8 32watt 48 inch" lamps (sold separately).

4. To install lamps, insert pins into slots and rotate 90° to seat lamps in place.
5. Connect plug to a standard 120v grounded outlet.

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Pacifica Square Suspension by Forecast Lighting

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The Forecast Lighting Pacifica Square Suspension offers an organic take on contemporary lighting as warm, diffused light passes through sand and glass. Available with either a Merlot Bronze or Satin Nickel finish. Part of the Organic Modern Collection.

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Item # as Selected: ---- Manufacturer ID: ----

1. Select Finish:



[enlarge](#)
Merlot Bronze



[enlarge](#)
Satin Nickel

Finish



Price: Item #

Quantity:



In Stock

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Details - Dimensions

The Forecast Lighting Pacifica Square Suspension offers an organic take on contemporary lighting as warm, diffused light passes through sand and glass. Available with either a Merlot Bronze or Satin Nickel finish. Part of the Organic Modern Collection.

Dedicated to seeking customer feedback, Forecast Lighting has generated distinctive lighting designs that clearly stand out in a crowded marketplace. Founded in Southern California in the early 1970s as Forecast Lightolier, this unique lighting company has an in-house design team that travels the world to identify materials and trends that will ultimately result in extraordinary lighting for the home and office.

The Forecast Lighting Pacifica Square Suspension is available with the following:

Details:

- Sand on Clear glass panel
- 4 cylindrical inner Etched White Opal glass diffusers
- Metal hardware
- Rectangular ceiling canopy
- 96" field adjustable cord and suspension cables
- Part of the Organic Modern collection, featuring natural, sustainable materials
- UL Listed

Options:

- **Finish:** Merlot Bronze, or Satin Nickel (shown).

Lighting:

Four 75 Watt 120 Volt Medium Base Incandescent lamps (not included).

Shipping:

This item usually ships within 1-2 weeks.

Dimensions:

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Pacifica Pendant by Forecast Lighting

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The Forecast Lighting Pacifica Pendant, part of the Organic Modern Collection, is a simple though characterizing pendant that offers a natural, casual look to kitchens and living rooms. Sand on clear glass allows diffused light to pass through, creating a unique quality of illumination. **Save an additional 20% on this Forecast product for a limited time. Use Code FORECAST20 at Checkout.**

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Item # as Selected: ---- Manufacturer ID: ----

1. Select Finish:



[enlarge](#)
Merlot Bronze



[enlarge](#)
Satin Nickel

Finish

Please Select An Option

Price: Item #

Quantity:

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Details - Dimensions

The Forecast Lighting Pacifica Pendant, part of the Organic Modern Collection, is a simple though characterizing pendant that offers a natural, casual look to kitchens and living rooms. Sand on clear glass allows diffused light to pass through, creating a unique quality of illumination.

Dedicated to seeking customer feedback, Forecast Lighting has generated distinctive lighting designs that clearly stand out in a crowded marketplace. Founded in Southern California in the early 1970s as Forecast Lightolier, this unique lighting company has an in-house design team that travels the world to identify materials and trends that will ultimately result in extraordinary lighting for the home and office.

The Forecast Lighting Pacifica Pendant is available with the following:

Details:

- Sand on Clear glass panel
- Cylindrical inner Etched White Opal glass diffuser
- Metal hardware
- Square ceiling canopy
- 96" field adjustable cord
- Part of the Organic Modern collection, featuring natural, sustainable materials
- UL Listed

Options:

- **Finish:** Merlot Bronze (shown), or Satin Nickel.

Lighting:

One 75 Watt 120 Volt Medium Base Incandescent lamp (not included).

Shipping:

This item usually ships within 1-2 weeks.

Dimensions:

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Family Space - Inverted Pendant 3Lt

2752NI

Inverted Pendant 3Lt

Dia./Width: 17.5 IN

Body Height: 22.0 IN

Available Finishes:

Chrome, Brushed Nickel,
Brushed Nickel, Olde Bronze

Utilizing basic shapes and a simplistic design, the Family Spaces Pendant Collection provides fantastic lighting and classic style that goes with any décor. Our Brushed Nickel finish adds to the clean look of Family Spaces fixtures while the Satin-etched white glass generates a soft and pure ambiance in your home. This pendant uses three, 100-watt (max.) bulbs for optimum lighting. It measures 17 ½" in diameter, making it an ideal size for any open area in your home such as a foyer.

Technical Information

Type	Pendant Lighting	Bulb Included	N
Style	Contemporary / Modern	Primary Bulb Count	3
Finish Group	Silver	Primary Max Watt	100W
Room	Kitchen	UL CSA Listed	Y
Body Height	22 IN	Diffuser Description	SATIN ETCHED WHITE GLASS
Width	17.5 IN	Body Material	STEEL
Extra Lead	88 IN		

Related Products



Semi Flush 3Lt

Finish: Brushed Nickel

Dia./Width: 17.5

Body Height: 14.0



Semi Flush 3Lt

Finish: Antique Pewter

Dia./Width: 20.0

Body Height: 16.5

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Pacifica Edge Bow Wall Sconce by Forecast

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The Forecast Pacifica Edge Bow Wall Sconce, part of the Organic Modern Collection, is a unique, earthy fixture featuring sand on clear glass. Has the additional versatility of installing horizontally or vertically, or as a ceiling fixture. Additional hardware finishes can be ordered separately.

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Short



[enlarge](#)
Tall

Size



2. Select Lamping:



Fluorescent



Incandescent

Lamping



Price: Item #

Quantity:

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Details - Dimensions

The Forecast Pacifica Edge Bow Wall Sconce, part of the Organic Modern Collection, is a unique, earthy fixture featuring sand on clear glass. Has the additional versatility of installing horizontally or vertically, or as a ceiling fixture. Additional hardware finishes can be ordered separately.

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The Forecast Pacifica Edge Bow Wall Sconce is available with the following:

Details:

- Sand on Clear glass shade
- Satin Nickel hardware
- Wall or Ceiling mount
- Horizontal or Vertical mount
- Part of the Organic Modern collection, featuring natural, sustainable materials
- UL Listed
- ADA Compliant

Options:

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V10WW12V

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LEDs Per Reel		Max Run/Driver	12 feet/3.7M
Length	9.8"	Voltage	12V DC
Lumen Output	144(WW)	Cuttable	
Wattage	3.5W	Width & Height	0.94"W x 0.39"H
		Viewing Angle	90°
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Kichler Pira Bath Vanity 36in 1Lt Fluoresc in Brushed Aluminum 10424BAW

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List Price \$375.00
 You Save: **\$125.00 (33 %)**

Quantity

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30 in Stock (update 08/05/11)

Ships via UPS Ground

Product Information

Part Number	10424BAW
Category	Bathroom Lights
Collection	Pira
Finish	Brushed Aluminum
Dimensions	3.62H 3.82W 36.75L Dimensions are in inches.
Weight	6.75 lbs.
Number of Bulbs	1
Bulb Type	T5
Bulb Wattage	39W

Additional Information

This item replaces Aluche item number 31283
Voltage: 120
Bulbs Included: No
UL Listed: CSAP
Style: Transition
Country of Origin: CHN
Socket Type: T5FL

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Craftmade OLK3CFL-AW 9" Outdoor School House in Antique White Priced from \$23.00

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OVERVIEW SPECIFICATIONS REVIEWS

Bulb Type	Medium
Certification	UL Listed, ETL Listed
Collection	Light Source
Energy Star Compliant	No
Finish	Brushed Nickel
Glass Finish	Frost Cased White
Height	5
Light Direction	Downlight
Number of Lights	2
Specific Uses	Indoor use only, Ceiling Fan
Voltage	120
Wattage	13
Width	12-1/2

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120 Volt LED Strip Under Cabinet

Installation instructions for Models 0014-0001 and 0014-0002



WARNING: To avoid electrical shock, disconnect power to the unit prior to installation.

CAUTION: The LED lamp inside the fixture is not replaceable.

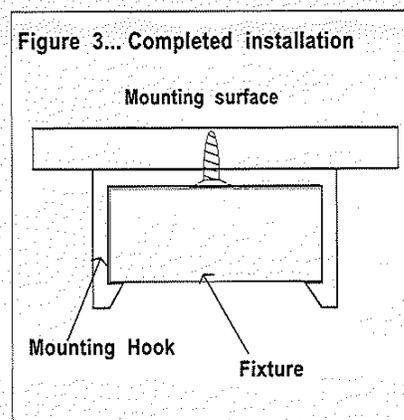
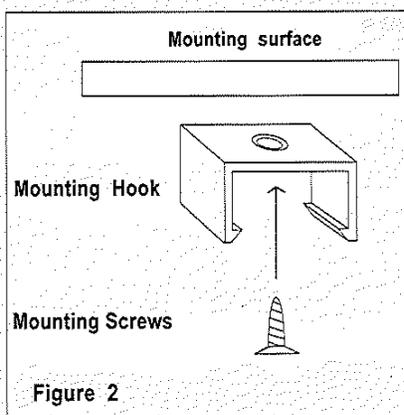
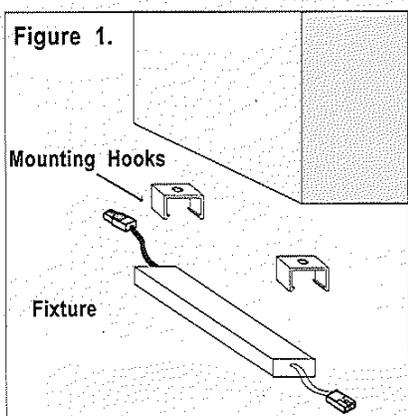
TECHNICAL DATA:

Model	0014-0001	0014-0002
Nominal voltage	120V AC +6% -10%, 60Hz	
Nominal current at 120V ac	13mA	20mA
Power	0.98Watt	1.45Watt
LED Quantity	15pcs	22pcs

MOUNTING:

This product is designed to be mounted to the underside of a horizontal surface such as the bottom of a cabinet or shelf.

1. Place fixture in desired location. Use the mounting hooks to hold the fixture. (Figure 1)
2. Mark the position of the mounting holes according to the mounting hooks.
3. Pre-drill holes at marked locations and attach mounting screws (included) to horizontal surface.
For mounting onto surfaces other than wood, use suitable fasteners (not included).
4. Fasten the screws in the mounting hooks, then install the fixture with the mounting hooks. (Figure 2) (Figure 3)
5. Plug in power cord.
6. 12" & 24" extensions (0003-0001,0003-0002) are sold separately for linking multiple fixtures together.
Do not link more than 20 Watts in a series.





120 Volt LED Strip Under Cabinet
Installation instructions for Models 0014-0001 and 0014-0002



ADDITIONAL SAFETY MEASURES:

1. Do not look directly at the lighted LED bulb.
2. Do not operate lamp with a missing or damaged lens.

IMPORTANT SAFETY INSTRUCTIONS

This product has a polarized plug (one blade is wider than the other) as a feature to reduce the risk of electric shock. This plug will fit in a polarized outlet only one way. If the plug does not fit fully in the outlet, reverse the plug. If it still does not fit, contact a qualified electrician. Never use with an extension cord unless plug can be fully inserted. Do not alter the plug.

CAUTION:

To reduce the risk of fire, electric shock, or injury to persons:

1. Use only insulated staples or plastic ties to secure cords.
2. Route and secure cords so that they will not be pinched or damaged when the cabinet is pushed to the wall.
3. Not intended for recessed installation in ceilings, or soffits.
4. Not intended surface installation inside built-in furnishings such as kitchen cabinets, china cabinets, or trophy cases.
5. The National Electrical Code (NEC) does not permit cords to be concealed where damage to insulation may go unnoticed. To prevent fire danger, do not run cord behind walls, ceilings, soffits, or cabinets where it may be inaccessible for examination. Cords should be visually examined periodically and immediately replaced when and damage is noted.

DO NOT RETURN PRODUCT TO THE STORE

- Save these installation instructions for future reference and in the event you need to order a replacement part.
- If you need replacement parts or have questions about the installation or use of this product, please contact RHL Customer Service at 800 801-1438 Option 4



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Low Profile, Single and Dual Channel, Steel Raceway

Wiremold 2400 Series Raceway is a single compartment raceway designed for communication or power applications and ideal for use in classrooms, offices, and hotel applications, or anywhere a small low profile raceway is needed.

2400D Series Divided Raceway is a low profile steel raceway for use where a limited number of power and low voltage cables are required in the same raceway.

2400 Series Raceway shown with our new Downward Facing Receptacles in a typical school library application.



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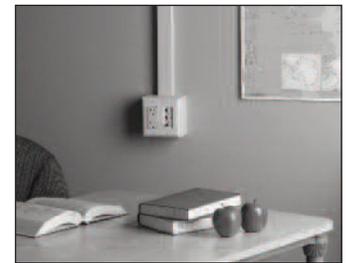
- **Steel raceway.** Provides superior strength for any dry location.
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- **ScuffCoat™ finish.** Tough durable ScuffCoat finish makes a scratch-resistant surface that can be painted.
- **Complete line of fittings.** Provides complete wiring solution and allows for interconnection between raceway systems.
- **Removable cover.** Allows easy access to wiring for changes and additions.
- **One- and two-gang device boxes.** Now you can wire devices into the raceway system, making 2400 Series Raceway an excellent choice for communication wiring.
- **Over the raceway boxes.** Provides tremendous labor savings. Boxes mount over continuous run of raceway base eliminating the need to cut raceway when locating devices.
- **Bend radius control fittings.** Corner and tee fittings are UL verified to maintain full capacity 2" [51mm] bend radius control and exceed the recommendations of EIA/TIA 569A. These fittings provide cable protection in both lay-in and pull-through cable installations.
- **V2475D Bridge Fitting.** Provides ability to bridge 2400 Series Raceways over existing installations of 2400, 700, and 500 Series Raceways.
- **In-line field-configurable receptacles.** Receptacles can be installed at any point along the raceway without a box.
- **In-line 106 frame data outlet.** A wide variety of data modules can be installed anywhere along the raceway run without a box.
- **Datacom connectivity options.** Accepts industry standard and proprietary devices from a wide range of manufacturers to provide a seamless and aesthetically pleasing interface for voice, data, audio, and video applications at the point of use.
- **UL and cUL Listed component raceways.** File E4376 Guide RJBT, Fittings: File E41751 Guide RJPR. Meets Article 386 of NEC and meets Section 12-600 of CEC.



Now compatible with A/V devices.

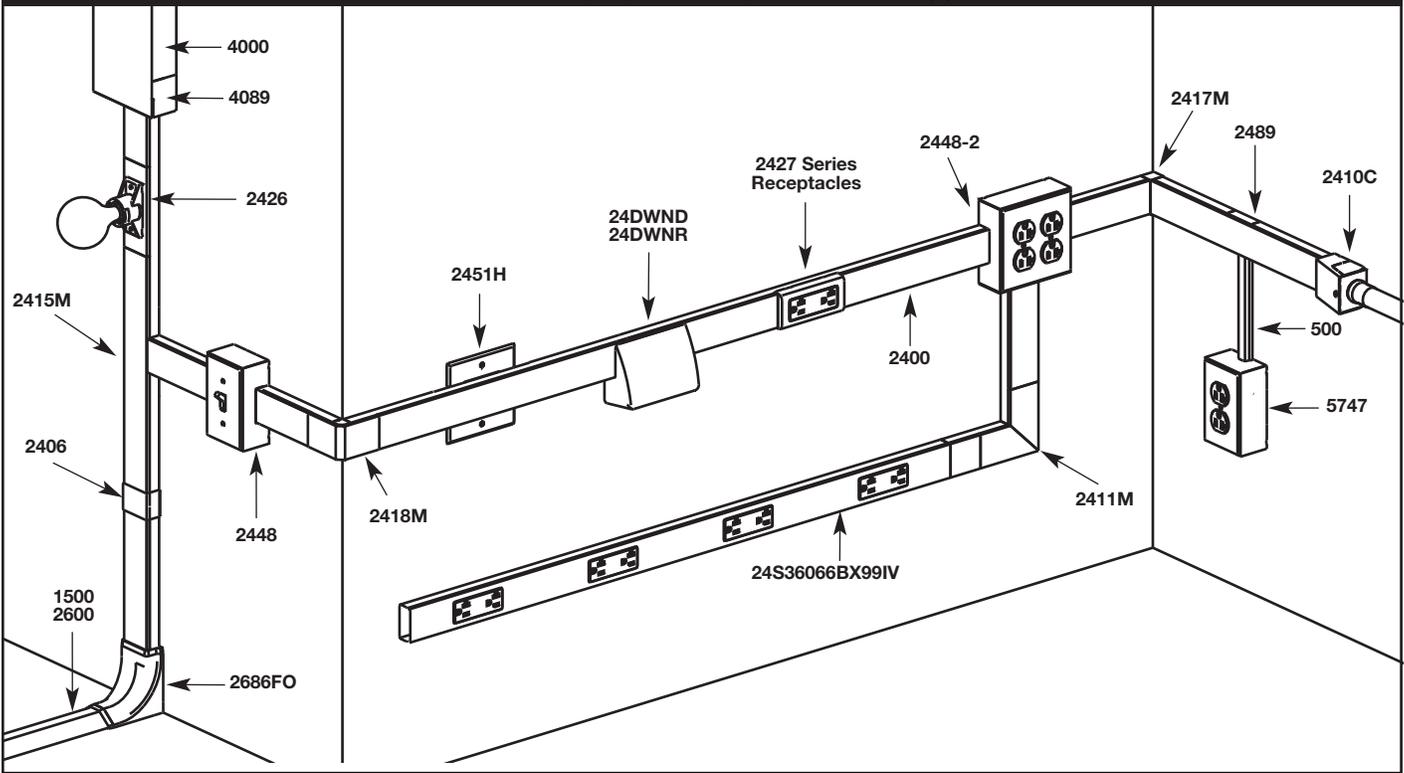


24DWNR Downward Facing Activation shown in a security application.



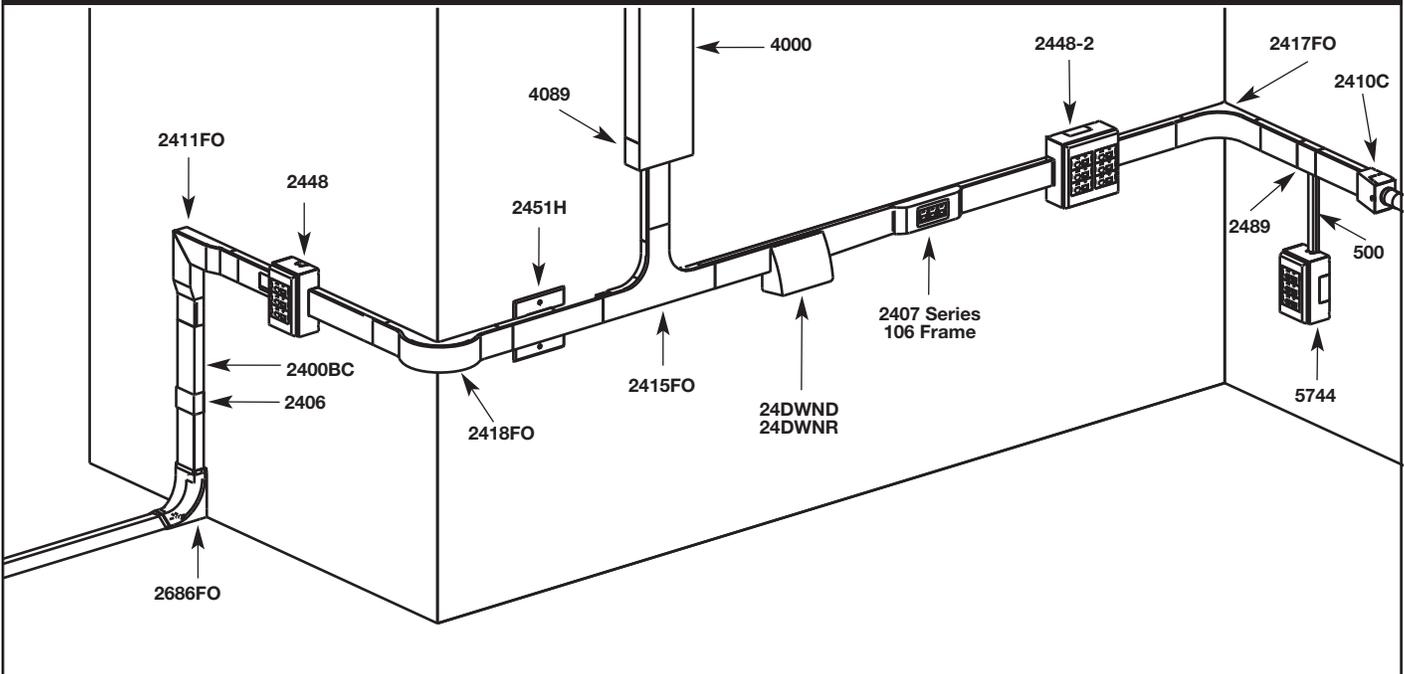
2400 Series Raceway shown with our new 2444D-2N Divided Device Box in a typical classroom application.

2400 Series Raceway System Layout (Power Applications)



NOTE: Illustration is for product applications and may not represent proper circuit wiring.
Color prefix is not included in part number identification.

2400 Series Raceway System Layout (Communication Applications)

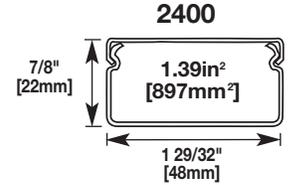


NOTE: Illustration is for product applications and may not represent proper circuit wiring.
Color prefix is not included in part number identification.

2400 Series Raceway Wire Fill Capacity Charts

2400 Raceway Wire Fill Capacities for Power*

WIRE SIZE THHN/THWN	O.D.		NUMBER OF CONDUCTORS (40% FILL)	
	Inches	[mm]	WITHOUT DEVICES	WITH 2427 RECEPTACLE
14 AWG	0.111	[2.8]	57	12
12 AWG	0.130	[3.3]	41	9
10 AWG	0.164	[4.2]	26	-

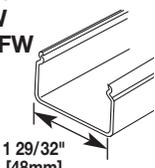
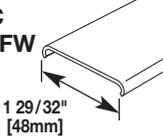
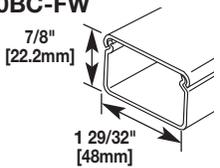
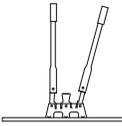


*For additional information refer to Technical Section of Wiremold Product Guide.

2400 Raceway Wire Fill Capacities for Communications

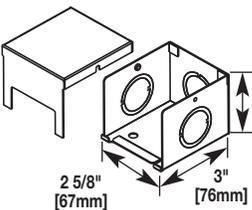
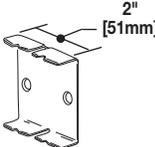
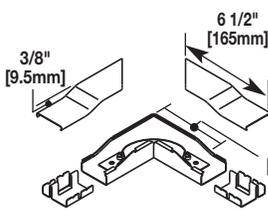
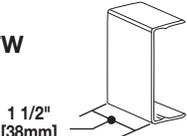
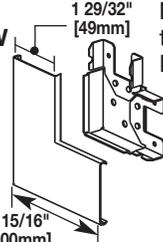
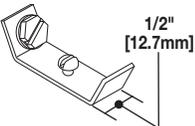
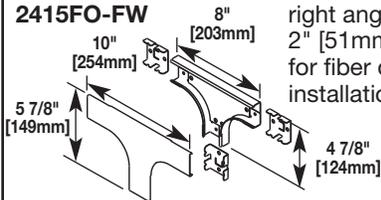
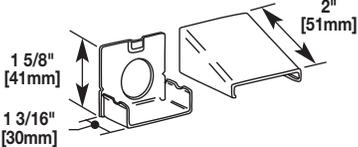
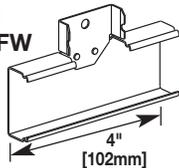
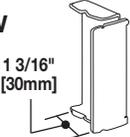
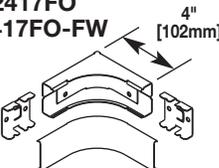
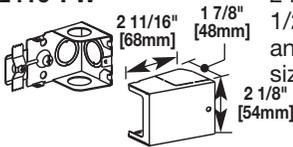
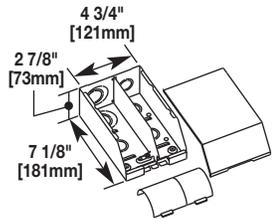
CABLE/WIRE SIZE	O.D. (Approx Dia.)		40% FILL**
	Inches	[mm]	
UNSHIELDED TWISTED PAIR	4-Pair, 24 AWG, Cat 3	0.190 [4.8]	19
	4-Pair, 24 AWG, Cat 5e	0.210 [5.3]	16
	4-Pair, 24 AWG, Cat 6	0.250 [6.3]	11
	4-Pair, 24 AWG, Cat 6a	0.354 [8.9]	5
	25-Pair, 24 AWG	0.410 [10.4]	4
COAXIAL	RG6/U	0.270 [6.9]	9
FIBER	ZipCord	0.118 x 0.236 [3 x 6]	20
	Round 4 Strand Fiber	0.187 [4.8]	20
	Round 6 Strand Fiber	0.256 [6.5]	10

2400 Series Raceway Base & Cover Ordering Information

Catalog No./Item	Description/Specifications	Catalog No./Item	Description/Specifications
V2400B V2400B-10 2400B-FW 2400B-10FW 	Raceway Base – .040" [1.0mm] steel; packed twenty 5' [1.5m] lengths per carton, or ten 10' [3.0m] lengths per carton.	V2400C 2400C-FW 	Raceway Cover – .040" [1.0mm] steel; packed twenty 5' [1.5m] lengths per carton.
V2400BC 2400BC-FW 	Raceway Base & Cover – .040" [1.0mm] steel. Packed ten 5' [1.5m] lengths of base and cover per carton.	624 	2400 Raceway Base & Cover Cutter – Portable cutter for 2400 & 2400D Series Raceway Base and Cover. Provides a clean and easy square cut every time.
		624BCK	Replacement Blade Kit – Replacement blades and die set for 624 Cutter.
		IWE-S DVWE-S 	Spray Paint – Used for touching up large areas. Available in Ivory (IWE-S) or Fog White (DVWE-S). Contains 12 oz. of paint. NOTE: Can only be shipped via ground transportation.
		IWE-P DVWE-P 	Touch-Up Paint Pen – Used for touching up small areas. Available in Ivory (IWE-P) or Fog White (DVWE-P). Contains 0.3 oz. of paint.

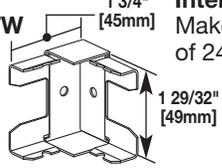
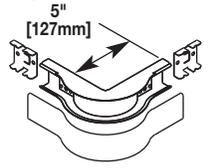
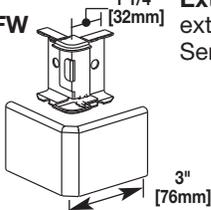
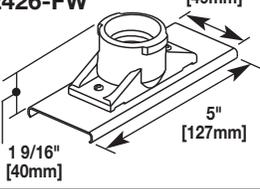
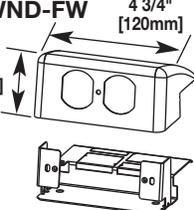
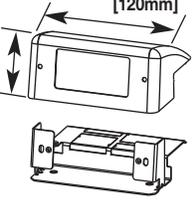
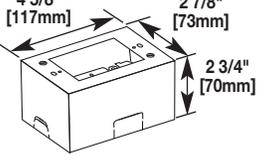
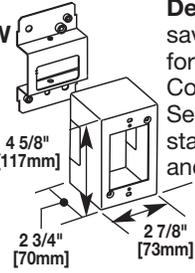
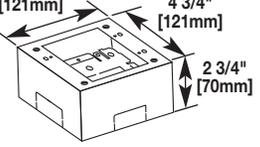
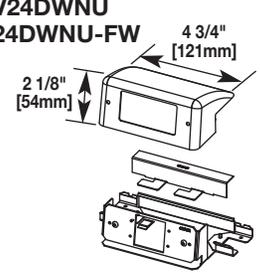
NOTE: "V" prefix indicates Ivory color, "-FW" suffix indicates Fog White color.

2400 Series Raceway Fittings Ordering Information

Catalog No./Item	Description/Specifications	Catalog No./Item	Description/Specifications
2400WC 	Wire Clip – Additional support for conductors in 2400 Series Raceway. (Nonmetallic)	V2410FC 2410FC-FW 	Full Capacity Entrance End Fitting – Feeds 2400 Series Raceway. Includes three 3/4" and 1" concentric trade size KOs.
2401 	Coupling – Joins sections of 2400B Base.	V2411FO 2411FO-FW 	Radiused Flat Elbow – 90° flat corner that provides 2" [51mm] cable bend radius control for fiber optic and UTP/STP cable installations. Ideal for lay-in or pull-through installations. Couplings included.
V2406 2406-FW 	Cover Clip – Covers joints where sections of 2400 Series Raceway cover or base come together. Nonmetallic construction.	V2411M 2411M-FW 	Flat Elbow – Makes right angle turns in runs of 2400 Series Raceway on same surface.
2409 	Ground Clamp – Connects equipment grounding conductor to 2400 Series Raceway. No. 10 ground screw provided.	V2415FO 2415FO-FW 	Radiused Tee – Branches at right angles. Provides a controlled 2" [51mm] cable bend radius control for fiber optic and UTP/STP cable installations. Couplings included.
V2410A 2410A-FW 	Entrance End Fitting – Connects 2400 Series Raceway with 1/2" trade size conduit or armored cable.	V2415M 2415M-FW 	Tee – Branches at right angles. Couplings included.
V2410B 2410B-FW 	Blank End Fitting – Closes off open end of 2400 Series Raceway.	V2417FO 2417FO-FW 	Radiused Internal Elbow – 90° internal corner. Provides a controlled 2" [51mm] cable bend radius control for fiber optic and UTP/STP cable installations. Couplings included.
V2410C 2410-FW 	Entrance End Fitting – Feeds 2400 Series Raceway. Includes 1/2" and 3/4" trade size KOs on end and bottom. Additional 1/2" trade size KO on both sides.		
V2410DFO 2410DFO-FW 	Divided Entrance End Fitting – Feeds 2400 & 2400D Series Raceway. Includes 1/2", 3/4", and 1" trade size KOs on back and end. Removable divider and bend radius control insert included.		

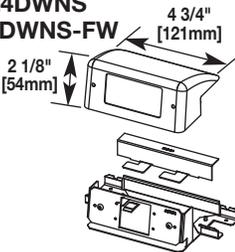
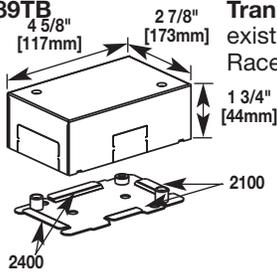
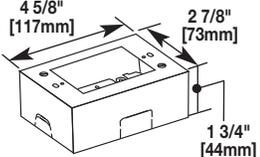
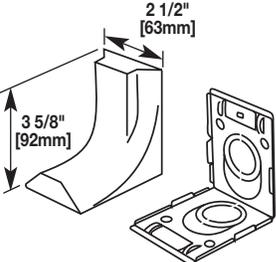
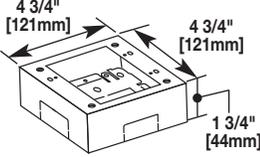
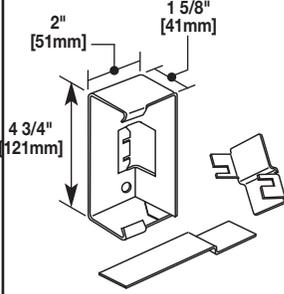
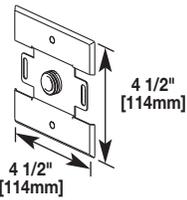
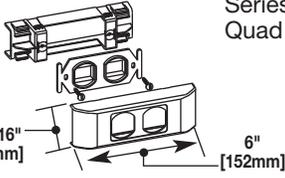
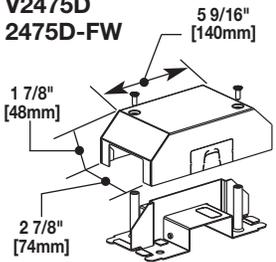
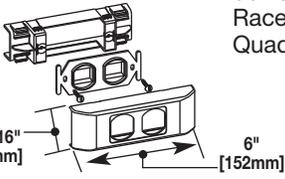
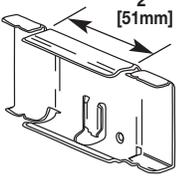
NOTE: "V" prefix indicates Ivory color, "-FW" suffix indicates Fog White color.

2400 Series Raceway Fittings Ordering Information (continued)

Catalog No./Item	Description/Specifications
V2417M 2417M-FW 	Internal Elbow – Makes 90° internal corners in runs of 2400 Series Raceway.
V2418FO 2418FO-FW 	Radiused External Elbow – 90° external elbow. Provides a controlled 2" [51mm] cable bend radius control for fiber optic and UTP/STP cable installations. Couplings included.
V2418M 2418M-FW 	External Elbow – Makes 90° external corners in runs of 2400 Series Raceway.
V2426 2426-FW 	Lamp Holder – Medium base lamp holder 660W, 250V. Black general purpose phenolic.
V24DWND 24DWND-FW 	Downward Duplex Device Bracket – Labor saving, over-the-raceway device bracket. For 15A or 20A duplex receptacles or 106 style data frame in 2400 Series Raceway.
V24DWNR 24DWNR-FW 	Downward Decorator Device Bracket – Labor saving over-the-raceway device bracket. For 15A or 20A decorator / GFCI receptacles or 106 style data frame in 2400 Series Raceway.
V2444 2444-FW 	Extra Deep Device Box – One-gang device box has extra depth to permit installation of cabling that requires greater bend radius and storage. Cover has one twistout for 2400 Series Raceway on two sides and one twistout for 500 and 700 Series Raceway on the top and bottom. Accepts industry standard faceplates for electrical and communication devices.
V2444D 2444D-FW 	Device Box – One-gang, labor saving, over-the-raceway box for use with 2400 Series Raceway. Cover has two twistouts for 2400 Series Raceway. Accepts industry standard faceplates for electrical and communication devices.
V2444-2 2444-2FW 	Extra Deep Device Box – Two-gang device box has extra depth to permit installation of cabling that requires greater bend radius and storage. Cover has four twistouts for 2400 Series Raceway. Base includes knockout to enable extension from existing single-gang flush wall box and 1/2" and 1" concentric trade size KOs. Accepts industry standard faceplates for electrical and communication devices.
V2444-2LS 2444-2LSFW 	Device Box – Two-gang, labor saving, over-the-raceway box for use with 2400 Series Raceway. Cover has four twistouts for 2400 Series Raceway. Accepts industry standard faceplates for electrical and communication devices.
V2444-2LS 2444-2LSFW 	Downward Extron® MAAP Device Plate – Labor saving, over-the-raceway device plate. Accepts two Extron® Electronics MAAP single space modules.

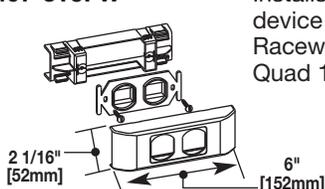
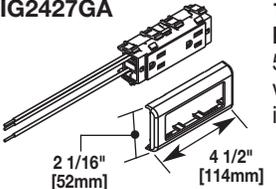
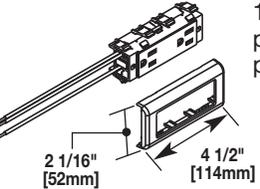
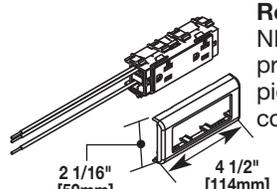
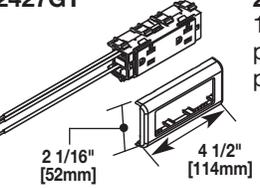
NOTE: "V" prefix indicates Ivory color, "-FW" suffix indicates Fog White color.

2400 Series Raceway Fittings Ordering Information (continued)

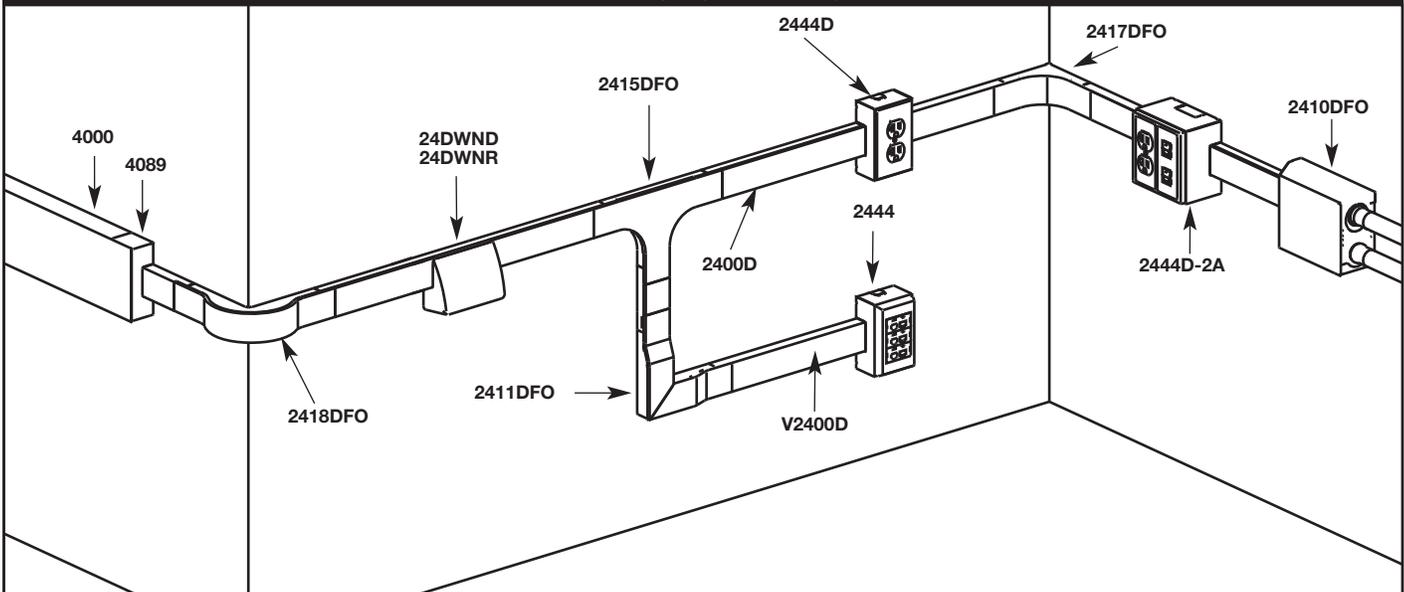
Catalog No./Item	Description/Specifications	Catalog No./Item	Description/Specifications
V24DWNS 24DWNS-FW 	Downward Ortronics® Series II Device Plate – Labor saving, over-the-raceway device plate. Accepts one Ortronics® Series II module. 	V2489TB 	Transition Box – Connects existing installations of 2100 Series Raceway to 2400 Series Raceway. 
V2448 2448-FW 	Device Box – One-gang device box. Cover has one twistout for 2400 Series Raceway on two sides and one twistout for 500 and 700 Series Raceway on the top and bottom. Base includes knockout to enable extension from existing single-gang flush wall box and 1/2" trade size KOs. Accepts industry standard faceplates for electrical and communication devices. 	2686FO 	Transition Feed Fitting – Eliminates offsetting of 2400 Series Raceway in connecting with surface panel boxes. Has 3/4" and 1" concentric trade size KOs with 1" trade size KO elongated so adjustment from surface to center of bushing is 1" [25mm] minimum to 1 5/8" [41mm] maximum. Has twistouts for transition to 1500 and 2600 Series Pancake Raceways. 
V2448-2 2448-2FW 	Device Box – Two-gang device box. Cover has four twistout for 2400 Series Raceway. Base includes knockout to enable extension from existing single-gang flush wall box and 1/2" trade size KOs. Accepts industry standard faceplates for electrical and communication devices. 	V4089 	Reducing Connector – Reduces and connects 4000 Series Raceway to 2400 Series Raceway. 
V2451H 2451H-FW 	Back Feed Fitting – Feeds 2400 Series Raceway from an existing outlet box. Equipped with 1/2" trade size male bushing and lock nut washer for grounding. 	V2407-2CM 2407-2CMFW 	106 Device Bracket and Frame – Installs two network wiring keystone device modules in 2400 Series Raceway. Does not support Quad 106 Frame. 
V2475D 2475D-FW 	Bridge Fitting – Allows 2400 Series Raceway to bridge over existing installations of 2400, 500, or 700 Series Raceways. 	V2407-2TJ 2407-2TJFW 	106 Device Bracket and Frame – Installs two Ortronics TracJack device modules in 2400 Series Raceway. Does not support Quad 106 Frame. 
V2489 	Side Reducing Connector – Connects 2400 Series Raceway with 500 Series Raceway. 		

NOTE: "V" prefix indicates Ivory color, "-FW" suffix indicates Fog White color.

2400 Series Raceway Receptacles Ordering Information

Catalog No./Item	Description/Specifications	Catalog No./Item	Description/Specifications
V2407-3TJ 2407-3TJFW 	106 Device Bracket and Frame – Installs three Ortronics TracJack device modules in 2400 Series Raceway. Does not support Quad 100 Frame.	IG2427GA 	15A Isolated Ground Duplex Receptacle – 3-Wire 125V NEMA 5-15R orange receptacle provided with 10-1/2" [267mm] pigtails and inline splice connectors.
V2427GA 	15A Duplex Receptacle – 3-Wire 125V NEMA 5-15R receptacle provided with 10-1/2" [267mm] pigtails and inline splice connectors.	IG2427GT 	20A Isolated Ground Duplex Receptacle – 3-Wire 125V NEMA 5-20R orange receptacle provided with 10-1/2" [267mm] pigtails and inline splice connectors.
V2427GT 	20A Duplex Receptacle – 3-Wire 125V NEMA 5-20R receptacle provided with 10-1/2" [267mm] pigtails and inline splice connectors.	NOTE: "V" prefix indicates Ivory color, "-FW" suffix indicates Fog White color.	

2400 Series Divided Raceway System Layout for Power & Data

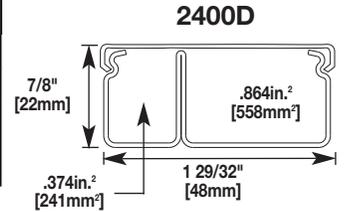


NOTE: Illustration is for product applications and may not represent proper circuit wiring.
 Color prefix is not included in part number identification.

2400 Series Divided Raceway Wire Fill Capacities

2400 Series Divided Raceway Wire Fill Capacities for Power

WIRE SIZE THHN/THWN	O.D.		NUMBER OF CONDUCTORS (40% FILL)	
	Inches	[mm]	1/3 COMP.	2/3 COMP.
14 AWG	0.111	[2.8]	11	26
12 AWG	0.130	[3.3]	9	19
10 AWG	0.164	[4.2]	6	11

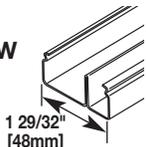
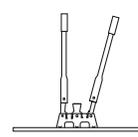
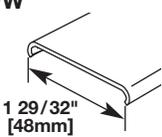


*For additional information refer to Technical Section of Wiremold Product Guide.

2400 Series Divided Raceway Wire Fill Capacities for Communications

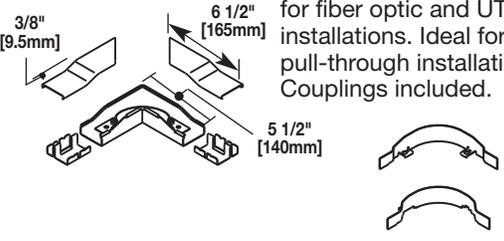
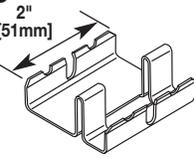
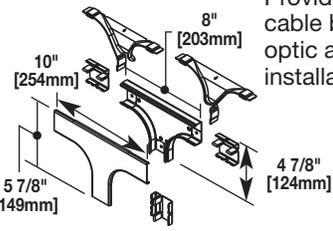
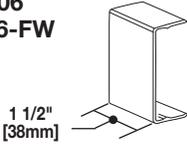
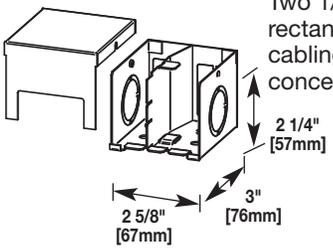
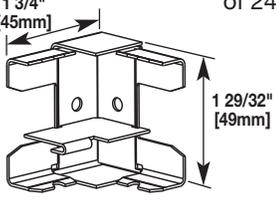
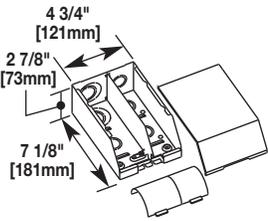
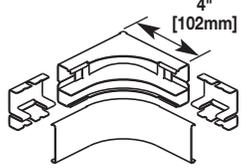
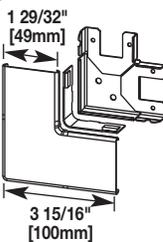
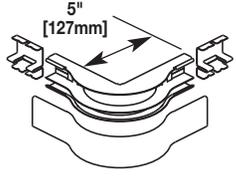
CABLE/WIRE SIZE	O.D. (Approx Dia.)		1/3 COMPARTMENT	2/3 COMPARTMENT
	Inches	[mm]	40% FILL	40% FILL**
UNSHIELDED TWISTED PAIR	4-Pair, 24 AWG, Cat 3	0.190 [4.8]	5	12
	4-Pair, 24 AWG, Cat 5e	0.210 [5.3]	4	9
	4-Pair, 24 AWG, Cat 6	0.250 [6.3]	3	7
	4-Pair, 24 AWG, Cat 6a	0.354 [8.9]	1	3
	25-Pair, 24 AWG	0.410 [10.4]	1	2
COAXIAL	RG6/U	0.270 [6.9]	2	6
FIBER	ZipCord	0.118 x 0.236 [3 x 6]	5	12
	Round 4 Strand Fiber	0.187 [4.8]	5	12
	Round 6 Strand Fiber	0.256 [6.5]	2	6

2400 Series Divided Raceway Base & Cover Ordering Information

Catalog No./Item	Description/Specifications	Catalog No./Item	Description/Specifications
V2400BD 2400BD-FW	 Divided Raceway Base – .040" [1.0mm] steel; divided into 1/3 and 2/3 compartments. Packed ten 10' [3.0m] lengths per carton.	624	 2400 Raceway Base & Cover Cutter – Portable cutter for 2400 & 2400D Series Raceway Base and Cover. Provides a clean and easy square cut every time.
V2400C 2400C-FW	 Raceway Cover – .040" [1.0mm] steel; packed twenty 5' [1.5m] lengths per carton.	624BCK	Replacement Blade Kit – Replacement blades and die set for 624 Cutter.
		IWE-S DVWE-S	 Spray Paint – Used for touching up large areas. Available in Ivory (IWE-S) or Fog White (DVWE-S). Contains 12 oz. of paint. NOTE: Can only be shipped via ground transportation.
		IWE-P DVWE-P	 Touch-Up Paint Pen – Used for touching up small areas. Available in Ivory (IWE-P) or Fog White (DVWE-P). Contains 0.3 oz. of paint.

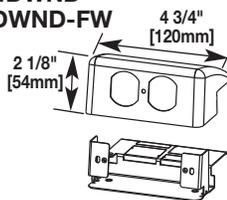
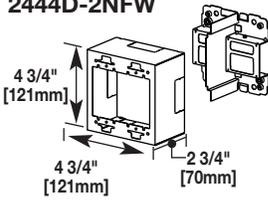
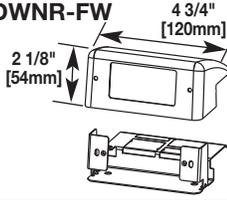
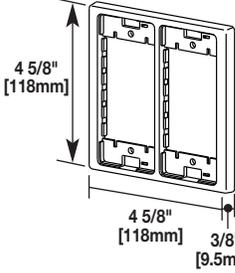
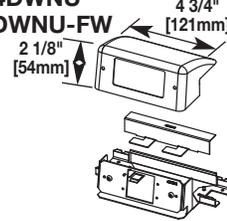
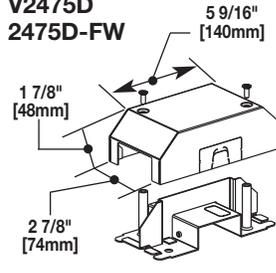
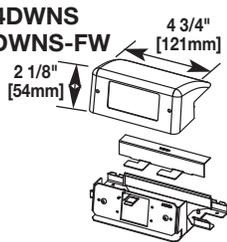
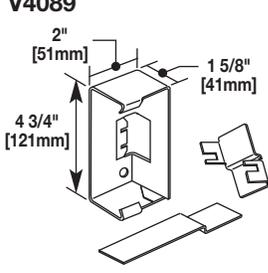
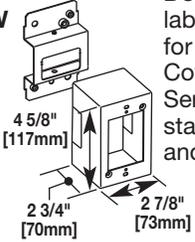
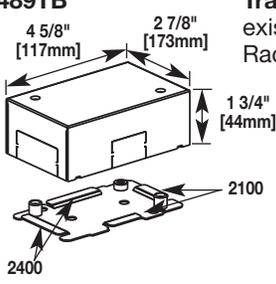
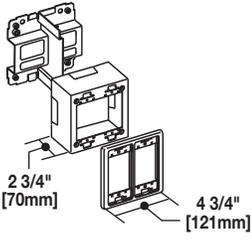
NOTE: "V" prefix indicates Ivory color, "-FW" suffix indicates Fog White color.

2400 Series Divided Raceway Fittings (continued)

Catalog No./Item	Description/Specifications	Catalog No./Item	Description/Specifications
2400WC 	Wire Clip – Additional support for conductors in 2400D Series Raceway. (Nonmetallic)	V2411DFO 2411DFO-FW 	Radiused Divided Flat Elbow – 90° flat elbow with integral dividers to provide 2" [51mm] full capacity cable bend radius control for fiber optic and UTP/STP cable installations. Ideal for lay-in or pull-through installations. Couplings included.
2401D 	Divided Coupling – Joins sections of 2400DB Divided Base.	V2415DFO 2415DFO-FW 	Radiused Divided Tee – For branches at right angles. Provides 2" [51mm] full capacity cable bend radius control for fiber optic and UTP/STP cable installations. Couplings included.
V2406 2406-FW 	Cover Clip – Covers joints where sections of 2400 Series Raceway cover or base come together. Nonmetallic construction.	V2410BD 2410BD-FW 	Divided Blank End Fitting – Closes off open end of 2400D Series Raceway.
V2410D 2410D-FW 	Divided Entrance End Fitting – Feeds 2400D Series Raceway. Two 1/2" trade size KOs and two rectangular KOs for communication cabling. Two additional 1" and 3/4" concentric trade size KOs on sides.	<div style="text-align: right;">NEW!</div> V2417D 2417D-FW 	Divided Internal Elbow – Makes internal 90° corners in runs of 2400D Series Raceway.
V2410DFO 2410DFO-FW 	Divided Entrance End Fitting – Feeds 2400 & 2400D Series Raceway. Includes 1/2", 3/4", and 1" trade size KOs on back and end. Removable divider and bend radius control insert included.	V2417DFO 2417DFO-FW 	Radiused Divided Internal Elbow – 90° internal corner. Provides a 2" [51mm] full capacity cable bend radius control for fiber optic and UTP/STP cable installations. Couplings included.
V2411D 2411D-FW 	Divided Flat Elbow – Makes right angle turns in runs of 2400D Series Raceway on same surface.	V2418DFO 2418DFO-FW 	Radiused Divided External Elbow – 90° external elbow. Provides a 2" [51mm] full capacity cable bend radius control for fiber optic and UTP/STP cable installations. Couplings included.

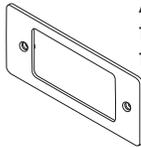
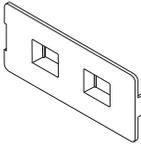
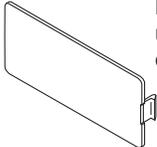
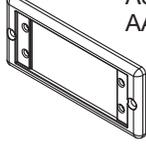
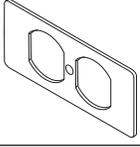
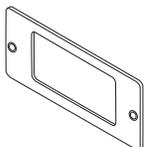
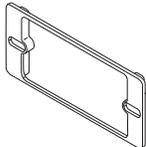
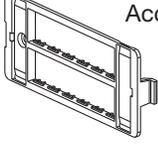
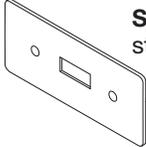
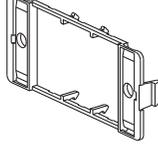
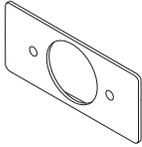
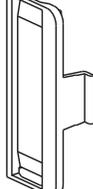
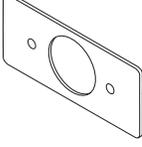
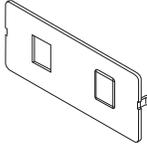
NOTE: "V" prefix indicates Ivory color, "-FW" suffix indicates Fog White color.

2400 Series Divided Raceway Fittings Ordering Information (continued)

Catalog No./Item	Description/Specifications	Catalog No./Item	NEW!	Description/Specifications
V24DWND 24DWND-FW 	Downward Duplex Device Bracket – Labor saving over-the-raceway device bracket. For 15A or 20A duplex receptacles or 106 style data frame in 2400D Series Raceway.	V2444D-2N 2444D-2NFW 	NEW!	Divided Box – Labor savings over-the-raceway box. A divided two-gang box for use with 2400D Series Raceway. Allows both power and low voltage at a single point-of-use. For use with commercially available faceplates (not supplied).
V24DWNR 24DWNR-FW 	Downward Decorator Device Bracket – Labor saving over-the-raceway device bracket. For 15A and 20A decorator/GFCI receptacles or 106 style data frame in 2400D Series Raceway.	V2450 2450-FW 	NEW!	Device Bracket – For use with 2444D-2N for both power and low voltage at a single point of use. Accepts 5507 Series Faceplates, Ortronics® TracJack & Series II Modules (requires S2-EPL Plate), Pass & Seymour Activate Series Inserts (requires CM-EPLA Plate) and Wiremold Open System Communication Modules (requires CM-EPLA Plate).
V24DWNU 24DWNU-FW 	Downward Extron® MAAP Device Plate – Labor saving, over-the-raceway device plate. Accepts two Extron® Electronics MAAP single space modules.	V2475D 2475D-FW 		Bridge Fitting – For allowing 2400D Series Raceway to bridge over existing installations of 2400, 2400D, 500, and 700 Series Raceways.
V24DWNS 24DWNS-FW 	Downward Ortronics® Series II Device Plate – Labor saving, over-the-raceway device plate. Accepts one Ortronics® Series II module.	V4089 		Reducing Connector – For reducing from 4000 Series Raceway to 2400D Series Raceway.
V2444D 2444D-FW 	Device Box – One-gang, labor saving, over-the-raceway box for use with 2400D Series Raceway. Cover has two twistouts for 2400D Series Raceway. Accepts industry standard faceplates for electrical and communication devices.	V2489TB 		Transition Box – Connects existing installations of 2100 Series Raceway to 2400D Series Raceway.
V2444D-2A 2444D-2AFW 	Divided Device Box – Divided two-gang, labor saving, over-the-raceway box for use with 2400D Series Raceway. Provides the ability to have both power and low voltage at a single point-of-use. Accepts 5507 Series Faceplates, Ortronics® TracJack & Series II Modules (requires S2-EPL Plate), Pass & Seymour Activate Series Inserts (requires CM-EPLA Plate) and Wiremold Open System Communication Modules (requires CM-EPLA Plate).			

NOTE: "V" prefix indicates Ivory color, "-FW" suffix indicates Fog White color.

5507 Series Faceplates Ordering Information

Catalog No./Item	Description/Specifications	Catalog No./Item	Description/Specifications
5507AD 5507AD-FW	Modular Furniture Adapter – Accepts Activate modular furniture bezel and other modular furniture adapters. 	5507FRJ 5507FRJ-FW	Flush Dual RJ11/RJ45 Faceplate – Mounts one or two keystone device modules, recessed to provide a flush installation. Has one opening and a KO for the other. 
5507B 5507B-FW	Blank Faceplate – Covers unused compartments in the device bracket. 	5507AAP 5507AAP-FW	Extron® AAP Faceplate – Accepts two Extron® Electronics AAP single space modules. NEW! 
5507D 5507D-FW	Duplex Faceplate – Covers duplex style devices. Accepts 106 Frame. 	5507MAAP 5507MAAP-FW	Extron® MAAP Faceplate – Accepts two Extron® Electronics MAAP single space modules. NEW! 
5507R 5507R-FW	Rectangular Faceplate – Covers rectangular style devices. 	5507-4TJ 5507-4TJFW	Ortronics® Faceplate – Mounts Ortronics datacom inserts. Accepts four TracJack Devices. 
5507S	Rectangular Spacer – Mounts commercial device plates. Installs between the device bracket and a device. 	5507-6TJ 5507-6TJFW	Ortronics® Faceplate – Mounts Ortronics datacom inserts. Accepts six TracJack Devices. 
5507SW 5507SW-FW	Switch Faceplate – Covers standard toggle switches. 	CM-EPLA CM-EPLA-FW	End Plates – Mounts Pass & Seymour Activate and Wiremold Open System communication modules into 5507 Series Faceplates. Includes two outlet identification labels with clear covers and two matching screw covers. 
5507T1 5507T1-FW	Single Receptacle Faceplate – Covers single receptacles – 1.59" [40.4mm] diameter. 	S2-EPL S2-EPL-FW	End Plates – Mounts Ortronics Series II modules into 5507 Series Faceplates. Includes two outlet identification labels with clear covers and two matching screw covers. 
5507T2 5507T2-FW	Single Receptacle Faceplate – Covers single receptacles – 1.41" [35.8mm] diameter. 	5507RJ 5507RJ-FW	Dual RJ11/RJ45 Connector Faceplate – Mounts one or two keystone device modules, has one opening and a KO for the other. 

NOTE: All faceplates have a standard measurement of 4 1/4" x 1 7/8" [108mm x 34mm].
Part number without prefix indicates Ivory color,
“-FW” suffix indicates Fog White color.

DATACOM CONNECTIVITY OPTIONS

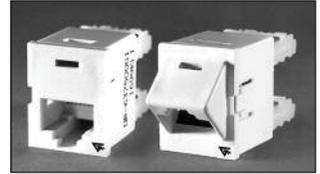
Now you have a wide range of options for providing datacom connectivity into Wiremold/Legrand Pathways. They are:

- **Ortronics® TracJack® and Series II Modular Connectivity Solutions**
- **Pass & Seymour Activate™ Modular Inserts**
- **Open System Communication Modules**

Ortronics® Connectivity

TracJack® Individual Jack System

- Front-loading, snap-in design supports future moves adds and changes
- Inserts for voice, data, audio, and video
- Available Category 3, 5e, 6, USOC 6-position, and other media
- Flat or angled 45° exit configurations
- Choice of 13 colors and color matched to Wiremold Systems
- Universal T568A/B wiring format



Series II Front-Loading, Module System

- Module design features easy snap-in front-loading design
- Linear 110 punch down format for easy termination
- Inserts for voice, data, audio, and video
- Available Category 3, 5e, 6, USOC 6-position, and other media
- Available in flat or angled 45° exit configurations
- Color matched to Wiremold Systems

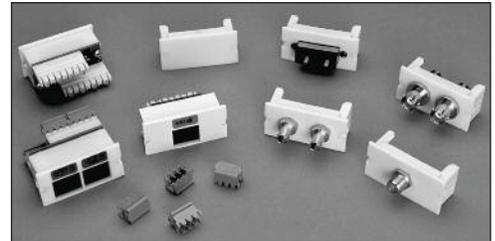


For detailed product selection refer to the **Ortronics Catalog** or visit www.ortronics.com.

Pass & Seymour Legrand Network Wiring

Activate™ Series Front-Loading Inserts

- Modular inserts for voice, data, audio and video applications
- Front-load, snap-in design
- Color and texture matched to Wiremold Systems
- Available Category 3, 5e, 6, as well as 6-position USOC
- Universal T568A/B wiring format

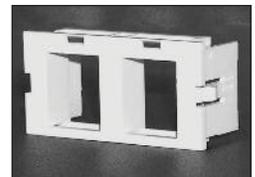


For detailed product selection refer to the **Pass & Seymour Network Wiring Catalog** or visit www.passandseymour.com.

Open Connectivity Solutions

Wiremold Open System Communications Modules

- Accommodate a wide range of manufacturers' communications outlets including keystone jacks, as well as proprietary solutions from Avaya (Systimax) and NORDX
- Modules insert into a wide range of Wiremold Systems
- Pre-punched faceplates accept common communication devices



NOTE: For more information on integrating connectivity into Wiremold Cable Management Systems contact the Wiremold Applications Engineering Team or your local Wiremold Sales Representative.



Wiremold

WIREMOLD

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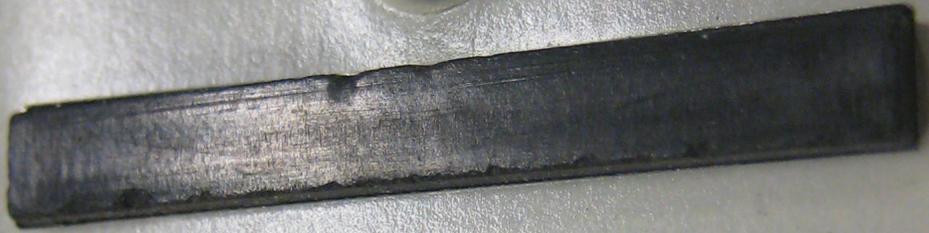
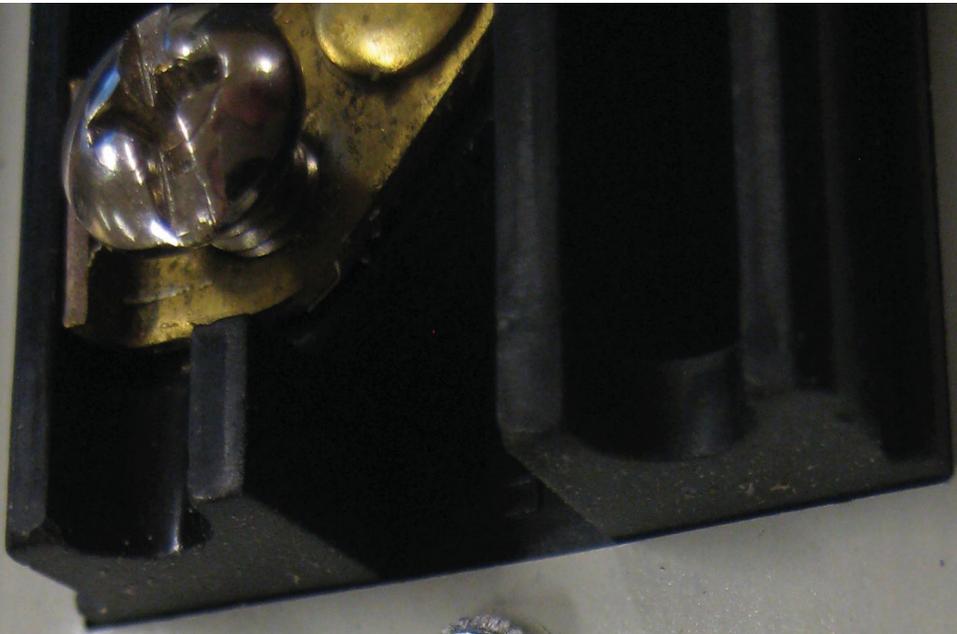
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1-800-723-5175 • FAX 905-738-9721

ED874R19 – Updated January 2010 – For latest specs visit www.legrand.us/wiremold



2400 SERIES RACEWAY FITTINGS ORDERING INFORMATION (continued)

PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
V2410DFO 2410DFO-FW 4 3/4" [121mm] 2 7/8" [73mm] 7 1/8" [181mm]	DIVIDED ENTRANCE END FITTING – Feeds 2400 & 2400D Series Raceway. Has 1/2", 3/4", and 1" trade size KO's on back and end. Removable divider and radiused insert included.	V2418FO 2418FO-FW 5" [127mm]	RADIUSED EXTERNAL ELBOW – 90° external elbow provides 2" [51mm] cable bend radius control for fiber optic and UTP/STP cable installations. Two couplings included.
V2410FC 2410FC-FW 2 5/8" [67mm] 3" [76mm]	FULL CAPACITY ENTRANCE END FITTING – Feeds 2400 Series Raceway. Has 3/4" and 1" concentric trade size KO's located on each side.	V2418M 2418M-FW 1 1/4" [32mm] 3" [76mm]	EXTERNAL ELBOW – 90° external corners.
V2411FO 2411FO-FW 3/8" [9.5mm] 6 1/2" [165mm] 5 1/2" [140mm]	RADIUSED FLAT ELBOW – 90° flat corner elbow provides 2" [51mm] cable bend radius control for fiber optic and UTP/STP cable installations. Ideal for lay-in or pull-through installations. Couplings included.	V2426 2426-FW 1 29/32" [49mm] 5" [127mm] 1 9/16" [40mm]	LAMP HOLDER – Medium base lamp holder 660W, 250V. Black general purpose phenolic.
V2411M 2411M-FW 1 29/32" [49mm] 3 15/16" [100mm]	FLAT ELBOW – Right angle turns on same surface.	V2426 2426-FW 1 29/32" [49mm] 5" [127mm] 1 9/16" [40mm]	DOWNWARD DUPLEX DEVICE BRACKET – Labor saving, over-the-raceway device bracket. Accepts 15A or 20A duplex receptacles or 106 style data frame.
V2415FO 2415FO-FW 10" [254mm] 5 7/8" [149mm] 8" [203mm] 4 7/8" [124mm]	RADIUSED TEE FITTING – For branches at right angles. Provides 2" [51mm] cable bend radius control for fiber optic and UTP/STP cable installations. Couplings included.	V2426 2426-FW 1 29/32" [49mm] 5" [127mm] 1 9/16" [40mm]	DOWNWARD DECORATOR DEVICE BRACKET – Labor saving, over-the-raceway device bracket. Accepts 15A or 20A decorator receptacles, GFCI receptacle, or 106 style data frame.
V2415M 2415M-FW 4" [102mm]	TEE FITTING – For branching raceway at right angles. Two couplings included.	V2426 2426-FW 1 29/32" [49mm] 5" [127mm] 1 9/16" [40mm]	DOWNWARD EXTRON® MAAP DEVICE PLATE – Labor saving, over-the-raceway metal device plate. Accepts two Extron® Electronics MAAP single space modules.
V2417FO 2417FO-FW 4" [102mm]	RADIUSED INTERNAL ELBOW – 90° internal corner elbow provides 2" [51mm] cable bend radius control for fiber optic and UTP/STP cable installations. Two couplings included.	V2426 2426-FW 1 29/32" [49mm] 5" [127mm] 1 9/16" [40mm]	DOWNWARD ORTRONICS® SERIES II DEVICE PLATE – Labor saving, over-the-raceway metal device plate. Accepts one Ortronics® Series II module.
V2417M 2417M-FW 1 3/4" [45mm] 1 29/32" [49mm]	INTERNAL ELBOW – Inside 90° angle turns.		



2426

CUL US
LISTED



PROJECT:	TYPE:
VOLTAGE:	COMMENTS:

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Array™ LED R16

SPECIFICATIONS FEATURES

Base Type	MED (E26)
Power Factor	All lamps > .92
Voltage	120VAC (60Hz)
Average Wattage	2.6 Watts
Color Temp (ANSI)	Cool White (6500K) Natural White (5000K) Warm White (3000K) Incandescent WW (2700K)
CRI* (60')	Cool White: 85 Natural White: 88 Warm White: 82 Incandescent WW: 87
Output* (Lumens) (60')	Cool White: 184 Natural White: 181 Warm White: 170 Incandescent WW: 144
Beam Angle	Flood (60° - 100°) Narrow Flood (25° - 30°)
Weight	1.2 oz
Width	2.0" (50mm)
Length	2.5" (63.5mm)
Operating Temp.	-40°F to 113°F (-40°C to 45°C)
Dimmable¹	100% to 10% on most commercial and incandescent dimmers
RoHS Compliant	Contains no mercury or lead
Rating	Indoor Applications Only
Rated Life	25,000 Hours
Listings	UL Listed, CE
IEC Certified	IEC61000-4-5/ IEC61000-4-12
Warranty	3 Years



SKU: AE26R163060

Available Colors:



- High efficacy/High Lumen Package
- RoHS Compliant
- Dimmable¹ on most commercial and incandescent dimmers

DESCRIPTION

Array LED R16 is a LED high output R16 lamp. The Array LED R16 uses up to 80% less energy and lasts up to 12 times longer than a halogen/incandescent bulb. The R16 lamp is designed for use in elevators, flood lighting, track lighting, and spot lighting. The lamps are compact in size and have an Edison base allowing them to be used with standard screw sockets for both interior applications. Worldwide patent pending SELECTIVE HEAT SINK TECHNOLOGY™ (SHS) ensures reliable operation for 25,000 hours which makes these lamps ideal for retail, commercial, and hospitality applications, as well as long duty cycle, "always-on" applications and/or hard to reach locations. The Array LED R16 is available in cool, natural, warm white, and incandescent warm white color temperatures.



ARRAY LED LAMPS UTILIZE RECYCLED PLASTICS AND PACKAGING MATERIALS

* All Array LED lamps are tested to LM-79 and LM-80 standards.

¹ Some dimming systems require a minimum load to operate properly. Array lamps are energy efficient, low power devices. With only a few lamps in a circuit, they may not meet the minimum load required for an existing dimming systems. As a result the LED lamps may glow or may not dim properly. Please consult the dimming systems manufacturer for minimum load requirements or contact Array Lighting to help you determine the proper dimming systems to operate the LED lamps.

*Data subject to change without notice.

* Lumen Output and CRI Values vary based on beam angle

ORDERING INFORMATION

MODEL	TYPE	COLOR TEMP	BEAM ANGLE
AE26	R16	27 - 2700K (INCAN. WARM WHITE)	25 - NARROW FLOOD (25° - 30°)
		30 - 3000K (WARM WHITE)	60 - FLOOD (60° - 100°)
		50 - 5000K (NATURAL WHITE)	
		65 - 6500K (COOL WHITE)	

Ordering Example: **AE26R162760**

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by Forecast

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142667G

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Dimensions

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Overview

Complete the expression of your interior style with beautiful exterior lighting. This exterior wall sconce offers a contemporary design of elegance that adds the perfect finishing touch to your exterior. Features Etched White Opal glass.

Light Bulb [\(1\)75w A19 Med F Incand](#) [\[Compare Bulbs\]](#)

Voltage 120 volt

Installation Wet Locations [\[Explain\]](#)

Listing , Quick Ship

Bulb sold separately

Compare Our Price

Farreys \$137.95

Coordinating Items

[Forecast F1542-6 3 Light Hollywood Hills Large](#)
\$309.00

[Forecast F1546-6 2 Light Hollywood Hills Semi](#)
\$214.00

[Forecast F8494 Hollywood Hills Post Most Mount](#)
\$189.00

[View more coordinating items](#)

Frequently Bought Together



Accessories

Light Bulbs

Customers Ultimately Buy

65% buy

[53A19SW/ECO - 2 bulbs - \\$16.55](#)
[CF13T2/WW - 6 bulbs - \\$40.61](#)

[9021 - Seaside Outdoor Wall](#)
\$34.00

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[20300 Poseidon](#)
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[Type Halogen](#)
[Ligh...](#)
\$7.24



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[20300MG](#)
[Poseidon](#)
\$72.00



[Access Lighting](#)
[20342 2 Light Po...](#)
\$140.40



[Access Lighting](#)
[20344 2 Light Po...](#)
\$140.40

Customer Reviews

This product has no customer reviews yet

[Write an online review](#) and be the first to share your thoughts with other customers

Questions & Answers

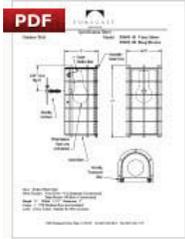


Type your question here...

We'll respond to your question in two days or less

There are no questions from the community yet

Manuals & Downloads



[F8491 Spec Sheet](#)

Product Support History

How often do people return this item?

How often does this arrive damaged?

Brand Info



Forecast is an industry leader in decorative residential and hospitality lighting, offering a broad range of contemporary and transitional fixtures for both interior and exterior lighting application. Forecast carries a large catalogue of high-quality chandeliers, ceiling fixtures, low-voltage mini pendants, hanging pot racks wall sconces, bath and vanity lighting, and post lanterns.

Overall Grade

B+

Shipping

On Time Shipping

In Stock

Packaging

Customer Reviews

Overall ([282 Reviews](#))

Quality

Support History

Rate of Return

Restocking Fee

No Fees

Installation

[Return Policy](#)

Value

[What do these values mean?](#)

Customers who bought this item also bought



[Forecast F1544-6 Hollywood Hills Wall Sconce Fi...](#)
\$113.00



[Forecast F8490 Hollywood Hills Outdoor Wall Light](#)
\$96.00



[Forecast F8492 2 Light Hollywood Hills Flush Ou...](#)
\$126.00



[Forecast F8494 Hollywood Hills Post Most Mount](#)
\$189.00



[Forecast F8495 2 Light Hollywood Hills Outdoor](#)
\$175.00

Tag this product

A tag is a keyword assigned to a product which helps describe the item and allows it to be found by other customers

Add a new tag:

Separate multiple tags with commas

[\(What's this?\)](#)

Additional Details

Mfr Part # F8491-68NV
Group # 142667
Category Outdoor Sconces - 115
Style Contemporary / Modern - 3
Sales Rank 387

Additional items in this family

[F8491-68NV](#) | [F8491-41NV](#)

Similar items

[Bronze Outdoor Sconce](#)
[Silver Outdoor Sconce](#)

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What Others Say



Industry Affiliates Payment Options



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Customer Reference Number: 41 - 22 - 08



Six Groove - Deck 1-Lt 12V

15064AZT

Landscape Deck 1Lt

Dia./Width: 4.0 IN

Height: 2.0 IN

Available Finishes:

Brushed Nickel - M, Bronzed
Brass, Textured White,
Textured Architectural
Bronze

HALF MOON - Understated, modern style for deck or patio in a choice of contemporary finishes. Use with matching path lights 15360 AZT.

Technical Information

Type	LAND_DECK_LIGHT	Bulb Included	I
Style	TRANSITIONAL	Primary Bulb Count	1
Finish Group	HAND_PAINT	Primary Max Watt	10W
Height	2 IN	Voltage	12V
Width	4 IN	UL CSA Listed	Y
Extension	2 IN	Diffuser Description	Satin etched glass
Extra Lead	72 IN	Body Material	Aluminum



Accent 1-Lt 12V

15384BKT

Accent Lndscp 12V

Dia./Width: 2.5 IN

Height: 6.0 IN

Length: 6.0 IN

Available Finishes:

Copper, Textured Midnight
Spruce, Beach, Bronzed
Brass, Bronzed Brass,
Bronzed Brass, Textured
Black, Textured
Architectural Bronze

MINI ACCENT - Recommended for spotlighting, cross-lighting and grazing.

Technical Information

Type	LAND_ACCNT_LGHT	Bulb Included	N
Style	NONE	Primary Bulb Count	1
Finish Group	BLACK	Primary Max Watt	35W
Weight	1.5 LBS	Voltage	12V
Height	6 IN	UL CSA Listed	Y
Length	6 IN	Diffuser Description	HEAT RESISTANT CLEAR FLAT GLASS
Width	2.5 IN	Body Material	ALUMINUM
Extra Lead	35 IN		



AC Wire-in Combination Carbon Monoxide & Smoke Alarm

- 120VAC Direct Wire with Battery Backup
- Alarm/Voice message warning system
- Permanent independent carbon monoxide and smoke alarm sensors

Part Number 21006377 (Previously 900-0114)

Model KN-COSM-IB

Voice Warning

Warns of hazard by announcing "Fire, Fire" or "Warning, Carbon Monoxide".

Peak Level Memory

Alerts user when the unit has detected CO concentrations of 100ppm or higher.

Smart Hush™

Silences the unit during nuisance alarm situations. (Smoke must be present before hush is activated)

Two LED's

- Red – Alarm mode.
- Green – Indicates that AC power is present.

Test/Reset Button Functions

- Tests the units electronics and resets the unit during CO alarm.
- Activates Hush Feature and Peak Level Memory.

Adjustable Mounting Bracket

Allows for easy installation and alignment.

Alerts user to replace CO alarm after 7 years of operation



Description

The Kidde 2106377 Combination Carbon Monoxide & Smoke Alarm provides two important safety devices in a single unit. This alarm includes a voice warning system that announces "Fire, Carbon Monoxide, Low Battery or Smart Hush™ Activation". The voice alarm eliminates any confusion and clearly warns you and your family of a smoke or carbon monoxide danger, or if your battery is in need of replacement. This technically advanced combination alarm includes 9V battery backup providing protection even during a power outage when many incidences occur. The 2106377 is an easy to install alarm that is suitable for all living areas. It has a 7-year life and a 5-year limited warranty.

Alarm Warnings

Fire: The red LED will flash and be accompanied by three long alarm beeps followed by a verbal warning message "FIRE! FIRE!". The alarm will repeat pattern until smoke is eliminated.

Carbon Monoxide: Four short alarm beeps followed by a verbal warning "WARNING! CARBON MONOXIDE!" This continues until the unit is reset or the CO is eliminated.

Low Battery: One chirp followed by warning "LOW BATTERY". The red LED light will flash. This pattern will continue every minute for the first hour. After the first hour the red LED light will flash once every minute accompanied by the chirp sound. The "LOW BATTERY" warning will only sound once every fifteen minutes.

Voice Hush Indication: "HUSH ACTIVATED" and "HUSH CANCELLED" voice announcement

Peak Level Memory: If the alarm had detected a CO level of 100ppm or higher when the Test/Reset button is pressed, the unit will announce "CO PREVIOUSLY DETECTED" to warn of the CO incident.

*Based on accuracy claims of major manufacturers

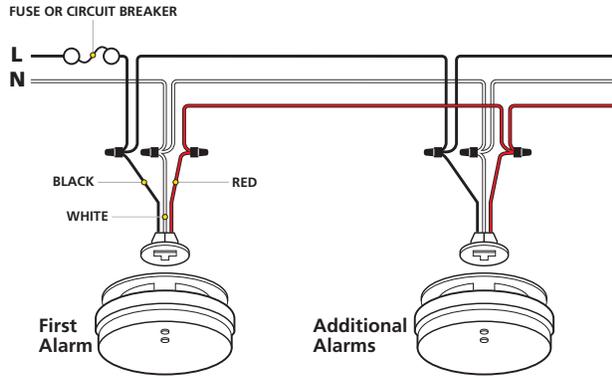
Features and Benefits

- **Smart Interconnect™** – Interconnects up to 24 Kidde devices (of which 18 can be initiating).
- **Battery Backup (9V battery included)** – Provides protection during power outages.
- **Battery Lockout System** – Minimized risk of mounting unit without installation of battery.
- **Alarm Tamper Resist** – Helps deter from tampering and theft.
- **Adjustable Mounting Bracket** – Makes installation fast and easy.
- **Peak Level Memory** – Announces "CO previously detected" if alarm had detected a CO level of 100ppm or higher since it was last reset.
- **Smart Hush™ Feature** – Silences nuisance alarms for approximately 10 minutes. (Smoke must be present before Smart Hush™ is activated)
- **Ionization Sensor Technology** – Ideal for detecting fast flaming and other types of fires.
- **Test Button Functions**
 - Tests the unit for proper operation
 - Resets the Carbon Monoxide alarm
 - Peak Level memory
- **Green LED**
Illuminates to indicate the unit is receiving AC power. Flashes every 5 seconds to indicate battery only mode. Flashes once per second (until reset) to indicate that the alarm sensed a smoke or CO hazard. Flashes every 2 seconds while the alarm is in HUSH® mode.
- **Red LED**
When a dangerous level of smoke or carbon monoxide is detected the red LED will flash. If the unit malfunctions, the red LED will flash and the unit will chirp every 30 seconds.



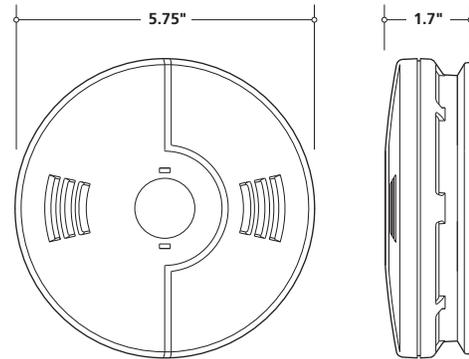
Installation of Smoke Alarm

The combination alarm should be installed to comply with all local codes having jurisdiction in your area, Article 760 of the National Electric Code, and NFPA 72. Make certain all alarms are wired to a single, continuous (non-switched) power line, which is not protected by a ground fault interrupter. A maximum of 1000 ft. of wire can be used in the interconnect system. Use standard UL listed household wire (18 gauge or larger as required by local codes).



Technical Specifications

Part Number:	21006377
Model:	KN-COSM-IB
Power Source:	120VAC, 60Hz 25mA max per alarm 9V battery backup
Smoke Sensor:	Ionization
CO Sensor:	Electrochemical
Audio Alarm:	85dB at 10ft
Temperature Range:	40°F (4.4°C) to 100°F (37.8°C)
Humidity Range:	5%-95% relative humidity
Size:	5.75" in diameter x 1.7" depth
Weight:	1lb
Wiring:	Quick connect plug with 8" pigtails
Interconnects:	Up to 24 Kidde devices (of which 18 can be initiating)
Warranty:	5 year limited



Ordering Information

UPC: 0-47871-00114-9

Part Number	I 2 of 5	Pack Quantity	Dimensions (w x d x h inches)	Weight	Case/Skid	Layers/Skid	Skid Weight
900-0114**	N/A	Individual	5.8 x 2 x 6.2	1lb	N/A	N/A	N/A
900-0114-02	200 47871 00114 3	Master Pack (6 units)	7 x 13 x 7	7.65lbs	100	5	765lbs

**Not for sale by individual unit



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Distributed by:



Tuscany - Terracotta with Original Diverter



Description

Reduce your outdoor watering bill while adding a touch of timeless style to your home.

The Tuscany Rain Barrel System makes it easy to collect up to 57 gallons of water for your garden and lawn, and a highly textured, terracotta-colored surface coordinates with virtually any home's outdoor décor. Our rain barrel is made in the USA, designed to withstand the elements and even fits snugly against your house so it's never in the way. An included rainwater diverter accommodates both

standard downspout sizes and channels overflow away from your home's foundation. Download our installation guide to see how easy it is to start collecting rainwater and reducing your watering bills.



[Download Installation guide here »](#)

Features

- Ideal for capturing rainwater for garden and lawn watering needs, lowering your watering bills
- Barrel and cover made of recyclable, UV-treated, impact-resistant polyethylene to withstand the elements
- Spigot position provides clearance for filling watering cans
- Threaded spigot design offers easy garden hose connection
- Concave back allows the rain barrel to sit flush against your house
- Rainwater diverter fits standard 2" x 3" and 3" x 4" downspouts and channels overflow away from your home to protect your foundation
- System includes rain barrel, snap-on cover, threaded spigot, rainwater diverter and detailed installation guide
- Rain barrel made in USA
- 57-gallon capacity
- Dimensions: 39.75"H x 24.5"W x 26.5"D
- Weight: 18.1 lbs.
- Limited three-year warranty

[+ FAQ](#)

- [Rainwater Harvesting Systems](#)

No answer

- [General](#)

No answer

- [What are the benefits of rainwater harvesting?](#)

Anyone who grows indoor or outdoor plants can benefit from a rain barrel. About 40% of a typical household's water use goes to watering lawns and gardens, which make rain barrels a convenient way to

BENEFITS

Highest Efficiency

SunPower™ Solar Panels are the most efficient photovoltaic panels on the market today.

More Power

Our panels produce more power in the same amount of space—up to 50% more than conventional designs and 100% more than thin film solar panels.

Reduced Installation Cost

More power per panel means fewer panels per install. This saves both time and money.

Reliable and Robust Design

Proven materials, tempered front glass, and a sturdy anodized frame allow panel to operate reliably in multiple mounting configurations.

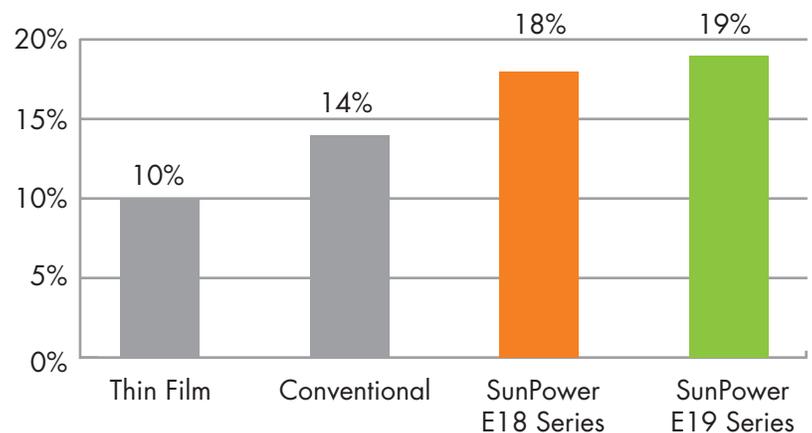


SPR-240E-WHT-D



The SunPower™ 240 Solar Panel provides today's highest efficiency and performance. Utilizing 72 all back-contact solar cells, the SunPower 240 delivers a total panel conversion efficiency of 19.3%. The panel's reduced voltage-temperature coefficient, anti-reflective glass and exceptional low-light performance attributes provide outstanding energy delivery per peak power watt.

SunPower's High Efficiency Advantage



Electrical Data

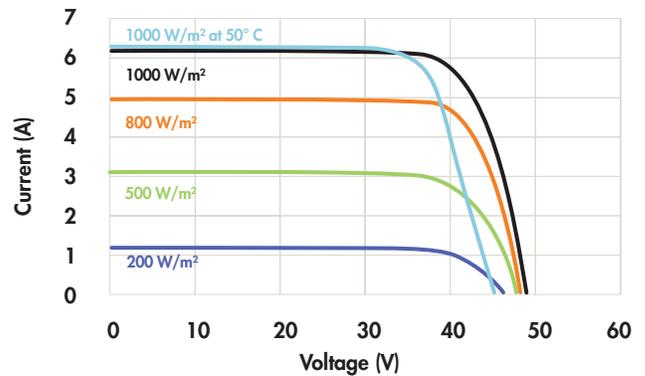
Measured at Standard Test Conditions (STC): irradiance of 1000W/m², AM 1.5, and cell temperature 25° C

Peak Power (+5/-3%)	P _{max}	240 W
Efficiency	η	19.3 %
Rated Voltage	V _{mpp}	40.5 V
Rated Current	I _{mpp}	5.93 A
Open Circuit Voltage	V _{oc}	48.6 V
Short Circuit Current	I _{sc}	6.30 A
Maximum System Voltage	UL	600 V
Temperature Coefficients	Power (P)	-0.38% / K
	Voltage (V _{oc})	-132.5mV / K
	Current (I _{sc})	3.5mA / K
NOCT		45° C +/-2° C
Series Fuse Rating		20 A

Mechanical Data

Solar Cells	72 SunPower all-back contact monocrystalline
Front Glass	High transmission tempered glass with anti-reflective (AR) coating
Junction Box	IP-65 rated with 3 bypass diodes Dimensions: 32 x 155 x 128 (mm)
Output Cables	1000mm length cables / MultiContact (MC4) connectors
Frame	Anodized aluminum alloy type 6063 (black)
Weight	33.1 lbs. (15.0 kg)

I-V Curve



Current/voltage characteristics with dependence on irradiance and module temperature.

Tested Operating Conditions

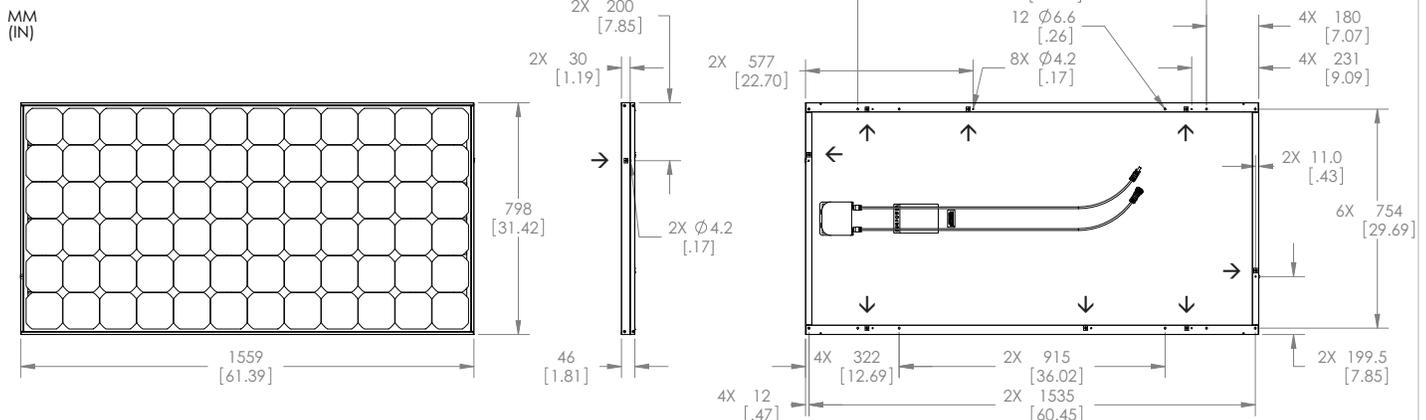
Temperature	-40° F to +185° F (-40° C to + 85° C)
Max load	113 psf 550kg/m ² (5400 Pa) front – e.g. snow; 50 psf 245kg/m ² (2400 Pa) front and back – e.g. wind
Impact Resistance	Hail 1 in (25 mm) at 52mph (23 m/s)

Warranties and Certifications

Warranties	25 year limited power warranty 10 year limited product warranty
Certifications	Tested to UL 1703. Class C Fire Rating

Dimensions

→ Grounding Holes



CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.

Visit sunpowercorp.com for details

BENEFITS

Reliable and Robust Design

Proven track record for durability and longevity

Effective Power Range

Enables most systems to use a single inverter rather than multiple units

Commercial Use

Flexible AC voltage output and scalable building blocks create an easy solution for commercial applications

High Efficiency

Weighted CEC efficiency of at least 95.5% and peak efficiency of at least 96.5%

Reduced Installation Cost

Integrated DC disconnect with fuses lowers material costs and labor requirements

Attractive Aesthetics

Integrated disconnect eliminates need for visible conduits to inverter



SunPower SPR-5000m, -6000m, -7000m and -8000m inverters offer superior reliability and performance and can be easily integrated into residential or commercial installations. All models are backed by a 10-year warranty.

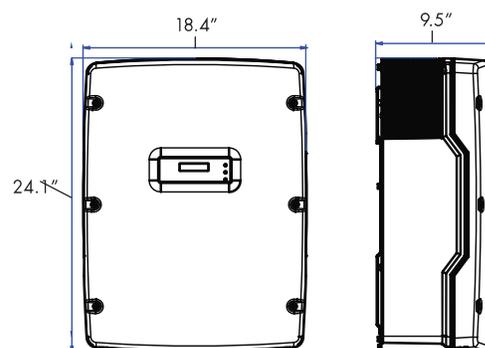
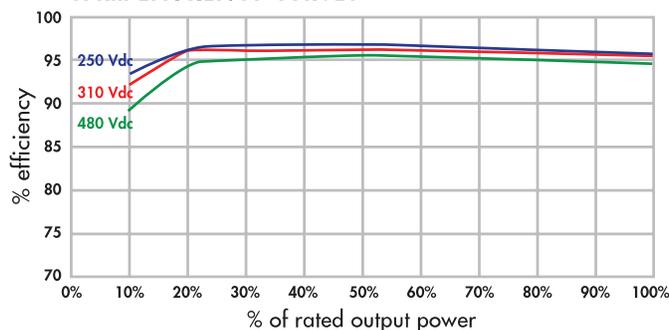


Electrical Data				
String Inverters	SPR-5000m	SPR-6000m	SPR-7000m	SPR-8000m
AC Nominal Power	5000 W	6000 W	7000 W	7680 W @ 240 V 8000 W @ 277 V
AC Max Output Current (@ 208V, 240V, 277V):	24 A, 21A, 18A	29A, 25A, 22A	34A, 29A, 25A	N/A, 32A, 29A
AC Nominal Voltage / Range	183 – 229 V @ 208 V 211 – 264 V @ 240 V 244 – 305 V @ 277 V	183 – 229 V @ 208 V 211 – 264 V @ 240 V 244 – 305 V @ 277 V	183 – 229 V @ 208 V 211 – 264 V @ 240 V 244 – 305 V @ 277 V	N/A @ 208 V 211 – 264 V @ 240 V 244 – 305 V @ 277 V
AC Freq / Range	60 Hz / 59.3 Hz – 60.5 Hz	60 Hz / 59.3 Hz – 60.5 Hz	60 Hz / 59.3 Hz – 60.5 Hz	60 Hz / 59.3 Hz – 60.5 Hz
Power Factor (Nominal)	0.99	0.99	0.99	0.99
Peak Inverter Efficiency	96.8%	97.0%	97.1%	96.5%
CEC Weighted Efficiency	95.5% @ 208 V 95.5% @ 240 V 95.5% @ 277 V	95.5% @ 208 V 95.5% @ 240 V 96.0% @ 277 V	95.5% @ 208 V 96.0% @ 240 V 96.0% @ 277 V	N/A @ 208 V 96.0% @ 240 V 96.0% @ 277 V
Recommended Maximum PV Power (Module @ STC)	6250 W	7500 W	8750 W	10000 W
DC Input Voltage Range	250 – 600 V	250 – 600 V	250 – 600 V	300 – 600 V
Peak Power Tracking Voltage	250 – 480 V	250 – 480 V	250 – 480 V	300 – 480 V
DC Max. Input Current	21A	25A	30A	30A
DC Voltage Ripple	4%	4%	4%	4%
No. of Fused String Inputs	4	4	4	4
Power Consumption: Operation/Nighttime	<7W / 0.1 W			
Topology	Low frequency transformer			
Fused DC Disconnect	Standard; Complies with NEC Standards			
Electrical Grounding	Configurable in the field with integrated grounding kit: SunPower™ Solar Panels: DC circuit positively grounded Serengeti™ Solar Panels: DC circuit negatively grounded			

Mechanical Data	
SPR-5000m, SPR-6000m, SPR-7000m and SPR-8000m	
Shipping Dimensions W x H x D (inches)	23.5" x 31.0" x 16.0"
Unit Dimensions W x H x D (inches)	18.4" x 24.1" x 9.5"
Inverter Weight	141 lbs for SPR-5000m, -6000m and -7000m / 148 lbs for SPR-8000m
Shipping Weight	148 lbs for SPR-5000m, -6000m and -7000m / 152 lbs for SPR-8000m
Cooling	Forced Air / Sealed Electronics Enclosure
Enclosure	NEMA 3R
Mounting	Wall Mount Bracket Standard
Ambient Temperature Range	-13 to +113 °F

Warranty and Certifications	
Warranty	10 year limited warranty
Certifications	Compliance: IEEE-929, IEEE-1547, UL 1741, UL 1998, FCC Part 15 A & B

SPRm EFFICIENCY CURVES



About SunPower

Founded in 1985, SunPower Corp. (Nasdaq: SPWRA, SPWRB) designs, manufactures and delivers the planet's most powerful solar technology. Residential, business, government and utility customers rely on the company's experience and proven results to maximize return on investment.

BENEFITS

Rapid Installation

30% faster installation means lower costs for dealers

Integrated Grounding

Ground conductors between panels are not required

Rails Eliminated

No need to transport, install, or align mounting rails

Direct to Sheathing Attachment

Offers flexibility to install the array virtually anywhere on the roof

High Wind Resistance

Withstands wind speeds up to 120 mph

Superior Aesthetics

Minimizes panel gaps and eliminates protruding rails

Proven and Reliable Design

Conforms to all standard roofing industry requirements. More than two years of successful installation in new home communities.



SMART MOUNT RESIDENTIAL MOUNTING SYSTEM

THE SIMPLE, FAST, & RELIABLE SOLUTION FOR COMPOSITION SHINGLE ROOFS



The SunPower® Smart Mount Residential Mounting System is specifically designed for use on composition shingle roofs. It offers the easiest, fastest, and most flexible method for mounting solar panels onto residential rooftops.

Lower System Cost

Smart Mount significantly reduces installation time and material costs. Mounting the solar array directly to the roof sheathing eliminates the need to locate rafters, drill pilot holes, and drive lag bolts. It also enables greater flexibility in array positioning because rafter points are not required.

Smart Mount feet connect directly to the panel frame, eliminating the need for rails. A patented, UL-listed grounding clip easily secures the panels to the mounting feet, removing the need for grounding conductors between panels.

Proven Reliability

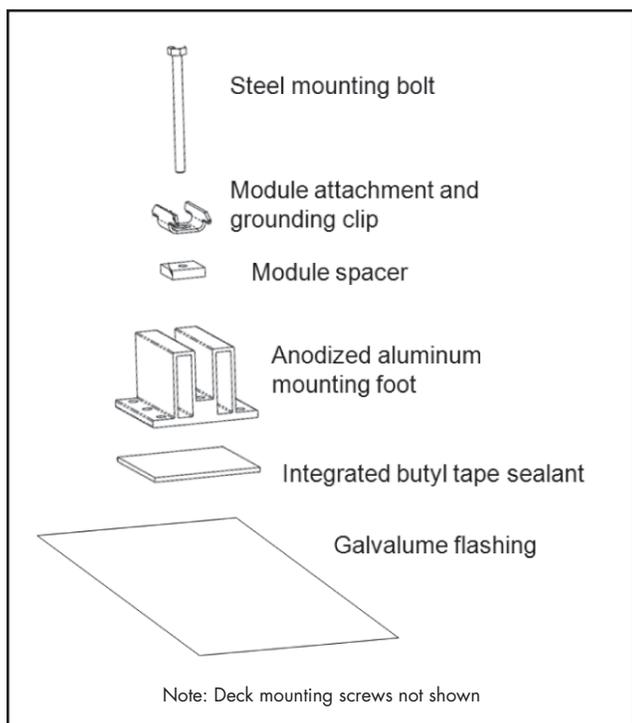
Designed to withstand wind speeds up to 120 mph, Smart Mount uses standard roofing materials with proven reliability. Each mounting foot is flashed and sealed to protect the roof surface and prevent leaks.

SunPower has successfully installed Smart Mount systems onto new home community rooftops since 2006. Installation crews cut installation time by up to 30% with Smart Mount. With minimal training, a three-person crew can fully install up to three Smart Mount systems in one day!

Complete System Solution

Smart Mount is included in the SunPower® SmartPack along with the panels, inverter, and monitoring components—with direct-to-site delivery. Smart Mount accessories include an aluminum layout tool and height-adjustable shims for mounting on nearly all types of composition shingle roofs.

Smart Mount Components



SunPower® Smart Mount technology is patent protected.

Reliable and Robust Design



Reliability Tests Passed (partial list)

- Dade County hurricane resistance test with wind-driven rain at 120 mph and 8.8 inches per hour (no leaks or roof damage)
- Building envelope flood test of mounting foot attachment point (no leaks or roof damage)
- Accelerated life cycle testing of butyl seal between flashing and mounting foot, followed by submersion test (no leaks or roof damage)
- System ground path integrity testing on UL-approved integrated grounding clip
- Deck mounting screw pullout strength testing
- Professional Engineer (PE) stamp awarded for structural calculation set for entire load path

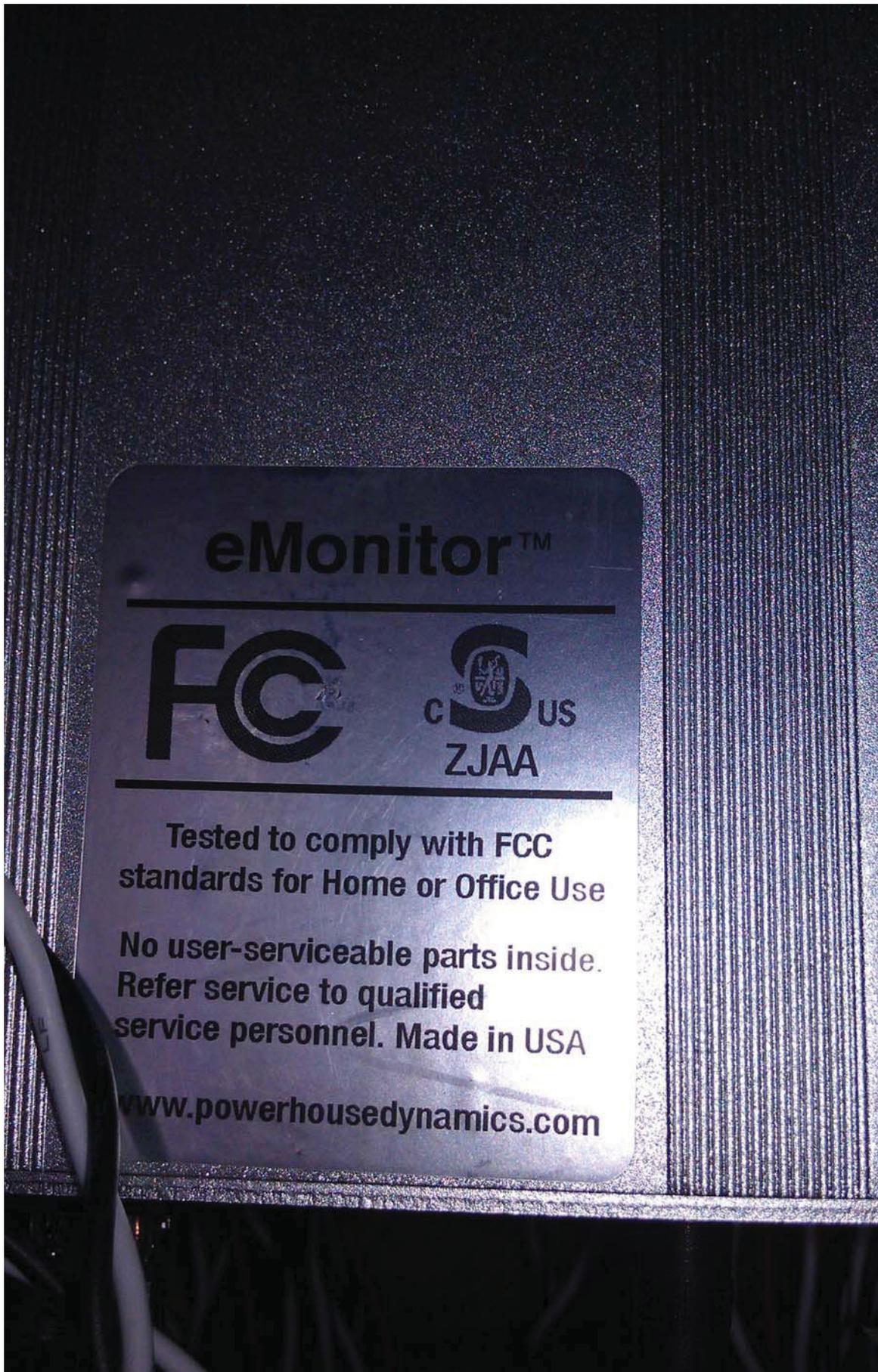
About SunPower

SunPower designs, manufactures, and delivers high-performance solar electric technology worldwide. Our high-efficiency solar cells generate up to 50 percent more power than conventional solar cells. Our high-performance solar panels, roof tiles, and trackers deliver significantly more energy than competing systems.

Specifications included in this datasheet are subject to change without notice.

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Document #001-50177 Rev**



eMonitor™



**Tested to comply with FCC
standards for Home or Office Use**

**No user-serviceable parts inside.
Refer service to qualified
service personnel. Made in USA**

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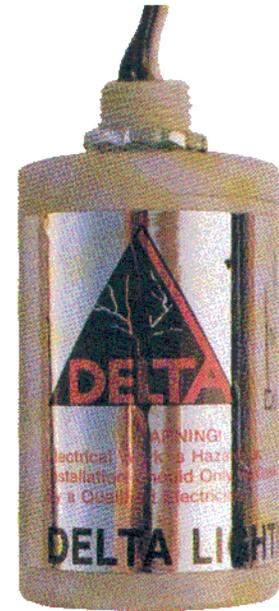


OILFIELD ARRESTORS

Rapid Response, High Current Delta Arrestors™ For Industrial Use Help Prevent Voltage Surge and Lightning Damage to Motors and Control Equipment.

600 SERIES SPECIFICATIONS

Type of design	Silicon Oxide Varistor
Maximum current	100,000 amps
Maximum energy	3000 joules
Maximum number of surges	Unlimited
Response time one milliamp test	5 nanoseconds
Response time to clamp 10,000 amps	10 nanoseconds
Response time to clamp 50,000 amps	25 nanoseconds
Leak current at double the rated voltage	none
Leads	36" #12 THHN
Case material	PVC
Locknut and Washer furnished	



NIPPLE
1/2" Thread

CASE DIMENSIONS: 4 1/2" High
2 1/4" Diameter

SIMPLE INSTALLATION

Fasten the arrestor to the service entrance equipment. Connect the black wires to the lines below the main disconnect. Connect the white wire to the grounded neutral bus.

LA 603 for 440-600 Volt 3 Phase 3 or 4 Wire Service

LA 602 for 440-600 Volt Single Phase 3 Wire Service

LA 601 for 440-600 Volt Single Phase 2 Wire Service

Conduction Characteristics		8 X 20 microsecond wave shape ANSI IEEE NEMA STANDARD						
		5000 A	10000 A	20000 A	40000 A	60000 A	80000 A	100000 A
Discharge Current		5000 A	10000 A	20000 A	40000 A	60000 A	80000 A	100000 A
Clamping Voltage		450 V	920 V	1040 V	1500 V	2300 V	4000 V	5000 V
		Unlimited Operations					One Operation	
DELTA LIGHTNING ARRESTORS,™ INC.		P. O. BOX 750 BIG SPRING, TEXAS 79721						



Generated by REScheck-Web Software
Compliance Certificate

Energy Code:	Project Title: Purdue INhome	
Location:	2009 IECC	
Construction Type:	Tippecanoe County, Indiana	
Glazing Area Percentage:	Single Family	
Heating Degree Days:	15%	
Climate Zone:	6499	
	5	
Construction Site:	Owner/Agent:	Designer/Contractor:
1400 West State Street		
West Lafayette, Indiana 47906		
Permit # 31774		
Permit Date: April 14, 2011		

Compliance: Passes using UA trade-off

Compliance: **15.4% Better Than Code** Maximum UA: **195** Your UA: **165**

The % Better or Worse Than Code index reflects how close to compliance the house is based on code trade-off rules.
It DOES NOT provide an estimate of energy use or cost relative to a minimum-code home.

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Glazing or Door U-Factor	UA
Ceiling: Structural Insulated Panels	1022		50.0		21
Wall: Structural Insulated Panels	1315		24.0		50
Window: Metal, Thermal Break, 3 Pane w/ Low-E	114			0.200	23
Door: Glass	80			0.350	28
Floor: All-Wood Joist/Truss Over Outside Air	984	21.0	0.0		43

Compliance Statement: The proposed building design described here is consistent with the building plans, specifications, and other calculations submitted with the permit application. The proposed building has been designed to meet the 2009 IECC requirements in REScheck-Web and to comply with the mandatory requirements listed in the REScheck Inspection Checklist.

Name - Title	Signature	Date
--------------	-----------	------



Generated by REScheck-Web Software

Inspection Checklist

Ceilings:

- Ceiling: Structural Insulated Panels, R-50.0 assembly R-value

Comments: _____

Above-Grade Walls:

- Wall: Structural Insulated Panels, R-24.0 assembly R-value

Comments: _____

Windows:

- Window: Metal, Thermal Break, 3 Pane w/ Low-E, U-factor: 0.200

For windows without labeled U-factors, describe features:

#Panes _____ Frame Type _____ Thermal Break? Yes ____ No ____

Comments: _____

Doors:

- Door: Glass, U-factor: 0.350

Comments: _____

Floors:

- Floor: All-Wood Joist/Truss Over Outside Air, R-21.0 cavity insulation

Comments: _____

Floor insulation is installed in permanent contact with the underside of the subfloor decking.

Air Leakage:

- Joints (including rim joist junctions), attic access openings, penetrations, and all other such openings in the building envelope that are sources of air leakage are sealed with caulk, gasketed, weatherstripped or otherwise sealed with an air barrier material, suitable film or solid material.
- Air barrier and sealing exists on common walls between dwelling units, on exterior walls behind tubs/showers, and in openings between window/door jambs and framing.
- Recessed lights in the building thermal envelope are 1) type IC rated and ASTM E283 labeled and 2) sealed with a gasket or caulk between the housing and the interior wall or ceiling covering.
 - Access doors separating conditioned from unconditioned space are weather-stripped and insulated (without insulation compression or damage) to at least the level of insulation on the surrounding surfaces. Where loose fill insulation exists, a baffle or retainer is installed to maintain insulation application.
 - Wood-burning fireplaces have gasketed doors and outdoor combustion air.

Air Sealing and Insulation:

- Building envelope air tightness and insulation installation complies by either 1) a post rough-in blower door test result of less than 7 ACH at 33.5 psf OR 2) the following items have been satisfied:
 - Air barriers and thermal barrier: Installed on outside of air-permeable insulation and breaks or joints in the air barrier are filled or repaired.
 - Ceiling/attic: Air barrier in any dropped ceiling/soffit is substantially aligned with insulation and any gaps are sealed.
 - Above-grade walls: Insulation is installed in substantial contact and continuous alignment with the building envelope air barrier.
 - Floors: Air barrier is installed at any exposed edge of insulation.
 - Plumbing and wiring: Insulation is placed between outside and pipes. Batt insulation is cut to fit around wiring and plumbing, or sprayed/blown insulation extends behind piping and wiring.
 - Corners, headers, narrow framing cavities, and rim joists are insulated.
 - Shower/tub on exterior wall: Insulation exists between showers/tubs and exterior wall.

Sunrooms:

- Sunrooms that are thermally isolated from the building envelope have a maximum fenestration U-factor of 0.50 and the maximum skylight U-factor of 0.75. New windows and doors separating the sunroom from conditioned space meet the building thermal envelope requirements.

Materials Identification and Installation:

- Materials and equipment are installed in accordance with the manufacturer's installation instructions.
- Insulation is installed in substantial contact with the surface being insulated and in a manner that achieves the rated R-value.
 - Materials and equipment are identified so that compliance can be determined.
- Manufacturer manuals for all installed heating and cooling equipment and service water heating equipment have been provided.
 - Insulation R-values and glazing U-factors are clearly marked on the building plans or specifications.

Duct Insulation:

- Supply ducts in attics are insulated to a minimum of R-8. All other ducts in unconditioned spaces or outside the building envelope are insulated to at least R-6.

Duct Construction and Testing:

- Building framing cavities are not used as supply ducts.
- All joints and seams of air ducts, air handlers, filter boxes, and building cavities used as return ducts are substantially airtight by means of tapes, mastics, liquid sealants, gasketing or other approved closure systems. Tapes, mastics, and fasteners are rated UL 181A or UL 181B and are labeled according to the duct construction. Metal duct connections with equipment and/or fittings are mechanically fastened. Crimp joints for round metal ducts have a contact lap of at least 1 1/2 inches and are fastened with a minimum of three equally spaced sheet-metal screws.

Exceptions:

- Joint and seams covered with spray polyurethane foam.
- Where a partially inaccessible duct connection exists, mechanical fasteners can be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
- Continuously welded and locking-type longitudinal joints and seams on ducts operating at less than 2 in. w.g. (500 Pa).

- Duct tightness test has been performed and meets one of the following test criteria:
 - Postconstruction leakage to outdoors test: Less than or equal to 78.7 cfm (8 cfm per 100 ft² of conditioned floor area).
 - Postconstruction total leakage test (including air handler enclosure): Less than or equal to 118.1 cfm (12 cfm per 100 ft² of conditioned floor area) pressure differential of 0.1 inches w.g.
 - Rough-in total leakage test with air handler installed: Less than or equal to 59.0 cfm (6 cfm per 100 ft² of conditioned floor area) when tested at a pressure differential of 0.1 inches w.g.
 - Rough-in total leakage test without air handler installed: Less than or equal to 39.4 cfm (4 cfm per 100 ft² of conditioned floor area).

Heating and Cooling Equipment Sizing:

- Additional requirements for equipment sizing are included by an inspection for compliance with the International Residential Code.
- For systems serving multiple dwelling units documentation has been submitted demonstrating compliance with 2009 IECC Commercial Building Mechanical and/or Service Water Heating (Sections 503 and 504).

Circulating Service Hot Water Systems:

- Circulating service hot water pipes are insulated to R-2.
- Circulating service hot water systems include an automatic or accessible manual switch to turn off the circulating pump when the system is not in use.

Heating and Cooling Piping Insulation:

- HVAC piping conveying fluids above 105 degrees F or chilled fluids below 55 degrees F are insulated to R-3.

Swimming Pools:

- Heated swimming pools have an on/off heater switch.
- Pool heaters operating on natural gas or LPG have an electronic pilot light.
 - Timer switches on pool heaters and pumps are present.

Exceptions:

- Where public health standards require continuous pump operation.
- Where pumps operate within solar- and/or waste-heat-recovery systems.



- Heated swimming pools have a cover on or at the water surface. For pools heated over 90 degrees F (32 degrees C) the cover has a minimum insulation value of R-12.

Exceptions:

Covers are not required when 60% of the heating energy is from site-recovered energy or solar energy source.

Lighting Requirements:

- A minimum of 50 percent of the lamps in permanently installed lighting fixtures can be categorized as one of the following:

- Compact fluorescent
- T-8 or smaller diameter linear fluorescent
- 40 lumens per watt for lamp wattage ≤ 15
- 50 lumens per watt for lamp wattage > 15 and ≤ 40
- 60 lumens per watt for lamp wattage > 40

Other Requirements:

- Snow- and ice-melting systems with energy supplied from the service to a building shall include automatic controls capable of shutting off the system when a) the pavement temperature is above 50 degrees F, b) no precipitation is falling, and c) the outdoor temperature is above 40 degrees F (a manual shutoff control is also permitted to satisfy requirement 'c').

Certificate:

- A permanent certificate is provided on or in the electrical distribution panel listing the predominant insulation R-values; window U-factors; type and efficiency of space-conditioning and water heating equipment. The certificate does not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels.

NOTES TO FIELD: (Building Department Use Only)



2009 IECC Energy Efficiency Certificate

Insulation Rating	R-Value
Ceiling / Roof	50.00
Wall	24.00
Floor / Foundation	21.00
Ductwork (unconditioned spaces):	_____

Glass & Door Rating	U-Factor	SHGC
Window	0.20	
Door	0.35	NA

Heating & Cooling Equipment	Efficiency
Heating System: _____	_____
Cooling System: _____	_____
Water Heater: _____	_____

--	--

Name: _____ Date: _____
Comments: _____

INhome

DETAILED STRUCTURAL
CALCULATIONS



ASCE 7-05 Seismic Factor Determination

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Lic. # : KW-06090096 - Educational Version

Licensed User :

Description : In-Home Structural Calcs

Occupancy Category

Calculations per IBC 2006 & ASCE 7-05

Occupancy Category of Building or Other Structure : "II" : All Buildings and other structures except those listed as Category I, III, and IV ASCE 7-05, Page 3, Table 1-1

Occupancy Importance Factor = 1 ASCE 7-05, Page 116, Table 11.5-1

Ground Motion, Using USGS Database values

ASCE 7-05 9.4.1.1

Max. Ground Motions, 5% Damping :
 $S_S = 0.1739$ g, 0.2 sec response
 $S_1 = 0.07714$ g, 1.0 sec response
 Longitude = 86.925 deg West
 Latitude = 40.453 deg North
 Location : WEST LAFAYETTE, IN 47906

Site Class, Site Coeff. and Design Category

Site Classification "D" : Shear Wave Velocity 600 to 1,200 ft/sec = **D** ASCE 7-05 Table 20.3-1

Site Coefficients F_a & F_v ASCE 7-05 Table 11.4-1 & 11.4-2
 (using straight-line interpolation from table values)
 $F_a = 1.60$
 $F_v = 2.40$

Maximum Considered Earthquake Acceleration
 $S_{MS} = F_a * S_s = 0.278$ ASCE 7-05 Table 11.4-3
 $S_{M1} = F_v * S_1 = 0.185$

Design Spectral Acceleration
 $S_{DS} = S_{MS}^{2/3} = 0.185$ ASCE 7-05 Table 11.4-4
 $S_{D1} = S_{M1}^{2/3} = 0.123$

Seismic Design Category = **B** (*SD1 is most severe*) ASCE 7-05 Table 11.6-1

Resisting System

ASCE 7-05 Table 12.2-1

Basic Seismic Force Resisting System . . . **Bearing Wall Systems**
Light-framed walls with shear panels of all other materials
 Response Modification Coefficient "R" = 2.00 Building height Limits :
 System Overstrength Factor "Wo" = 2.50 Category "A & B" Limit: No Limit
 Deflection Amplification Factor "Cd" = 2.00 Category "C" Limit: No Limit
 Category "D" Limit: Limit = 35
 Category "E" Limit: Not Permitted
 Category "F" Limit: Not Permitted
NOTE! See ASCE 7-05 for all applicable footnotes.

Redundancy Factor

ASCE 7-05 Section 12.3.4

Seismic Design Category of A, B, or C therefore Redundancy Factor "p" = 1.0

Lateral Force Procedure

ASCE 7-05 Section 12.8

Equivalent Lateral Force Procedure

The "Equivalent Lateral Force Procedure" is being used according to the provisions of ASCE 7-05 12.8

Determine Building Period

Use ASCE 12.8-7

Structure Type for Building Period Calculation : All Other Structural Systems
 "Ct" value = 0.020 "hn" : Height from base to highest level = 18.0 ft
 "x" value = 0.75
 "Ta" Approximate fundamental period using Eq. 12.8-7 : $T_a = C_t * (h_n^x) = 0.175$ sec
 "TL" : Long-period transition period per ASCE 7-05 Maps 22-15 -> 22-20 8.000 sec
 Building Period "Ta" Calculated from Approximate Method selected = 0.175 sec

"Cs" Response Coefficient

ASCE 7-05 Section 12.8.1.1

S_{DS} : Short Period Design Spectral Response = 0.185 From Eq. 12.8-2, Preliminary C_s = 0.093
 "R" : Response Modification Factor = 2.00 From Eq. 12.8-3 & 12.8-4, C_s need not exceed = 0.353
 "I" : Occupancy Importance Factor = 1 From Eq. 12.8-5 & 12.8-6, C_s not be less than = 0.010

C_s : Seismic Response Coefficient = $S_{DS} / (R/I) * 0.70 = 0.0649$

Educational Version

ASCE 7-05 Seismic Factor Determination

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Licensed User :

Description : In-Home Structural Calcs

Seismic Base Shear

Calculated for Allowable Stress Design Load Combinations ASCE 7-05 Section 12.8.3

$C_s = 0.0649$ from 12.8.1.1 W (see Sum W_i below) = 106.06 k
Vertical Distribution of Seismic Forces Seismic Base Shear $V = C_s * W = 6.89$ k
"k" : hx exponent based on $T_a = 1.00$

Table of building Weights by Floor Level...

Level #	Wi : Weight	Hi : Height	(Wi * Hi) ^k	Cvx	Fx=Cvx * V	Sum Story Shear	Sum Story Moment
2	76.46	10.00	764.60	0.93	6.39	6.39	0.00
1	29.60	2.00	59.20	0.07	0.49	6.89	51.13
Sum Wi =	106.06 k	Sum Wi * Hi =	823.80 k-ft		Total Base Shear =	6.89 k	Base Moment = 64.9 k-ft

Diaphragm Forces : Seismic Design Category "B" & "C"

ASCE 7-05 9.5.2.6.2.7

W_p : Weight at level of diaphragm and other structure elements attached to it.

$F_p = 0.2 SDS I W_p + V_{px}$

V_{px} : Portion of seismic shear at level needing to be transferred because of offsets.

Level #	W_p	F_p : Final
2	76.46	5.67
1	29.60	1.10

Wall Anchorage

Concrete & Masonry Wall Normal Force : Seismic Design Category "B" per ACSE 7-05 12.11.1

Minimum Factor : $0.40 * SDS * Importance * Weight = 0.1000 * Weight$

Concrete & Masonry Wall Anchorage : Seismic Design Category "B" per ACSE 7-05 12.11.2

Actual Wall Weight Tributary to Anchor = lbs/ lin. ft

Minimum #1 : $0.40 * SDS * Importance * Trib. Weight = 0.00$ lbs/ lin. ft

Minimum #2 : $400 * SDS * Importance = 74.20$ lbs/ lin. ft

F_p : Anchorage Design Force = 74.20 lbs/ lin. ft

Combination of Load Effects

ASCE 7-05 12.4.2.3

Load Description	D	Qe	E
	Dead Load	Seismic Load	H & V Load Effect
	0.000	0.000	$E = p * Q_e + 0.20 * SDS * D = 0.000$
	0.000	0.000	$E = p * Q_e + 0.20 * SDS * D = 0.000$
	0.000	0.000	$E = p * Q_e + 0.20 * SDS * D = 0.000$
	0.000	0.000	$E = p * Q_e + 0.20 * SDS * D = 0.000$
	0.000	0.000	$E = p * Q_e + 0.20 * SDS * D = 0.000$
	0.000	0.000	$E = p * Q_e + 0.20 * SDS * D = 0.000$
	0.000	0.000	$E = p * Q_e + 0.20 * SDS * D = 0.000$
	0.000	0.000	$E = p * Q_e + 0.20 * SDS * D = 0.000$
	0.000	0.000	$E = p * Q_e + 0.20 * SDS * D = 0.000$

Commercial Use Not Allowed

Wood Beam

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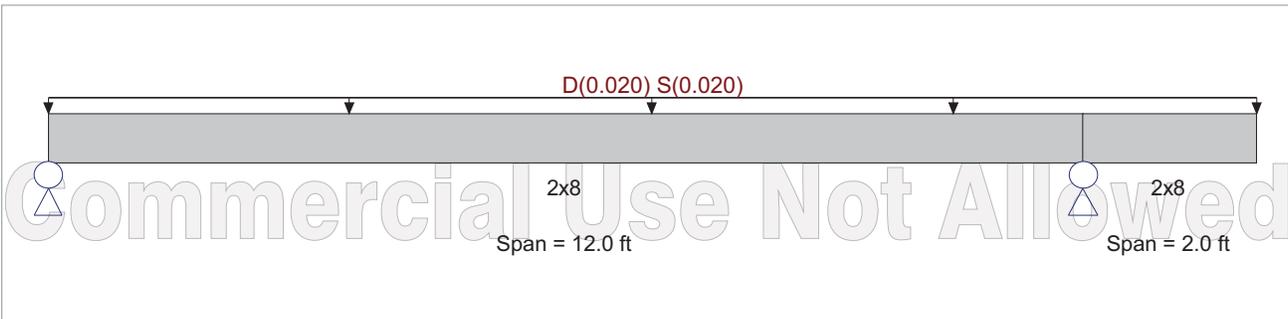
Licensed User :

Description : (RB1) Sip Panel Roof (Bedroom, Kitchen)

Material Properties

Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method : Allowable Stress Design	Fb - Tension	875.0 psi	E : Modulus of Elasticity	
Load Combination 2006IBC&ASCE7-05	Fb - Compr	875.0 psi	Ebend- xx	1,400.0 ksi
	Fc - Prll	1,150.0 psi	Eminbend - xx	510.0 ksi
Wood Species : Spruce - Pine - Fir	Fc - Perp	425.0 psi		
Wood Grade : No. 1/No. 2	Fv	135.0 psi		
	Ft	450.0 psi	Density	27.060 pcf
Beam Bracing : Beam is Fully Braced against lateral-torsion buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...

Uniform Load on ALL spans : D = 0.020, S = 0.020 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.592	1	Maximum Shear Stress Ratio =	0.229	: 1
Section used for this span	2x8		Section used for this span	2x8	
fb : Actual =	621.48	psi	fv : Actual =	30.97	psi
FB : Allowable =	1,050.00	psi	Fv : Allowable =	135.00	psi
Load Combination =	+D+S+H		Load Combination =	+D+S+H	
Location of maximum on span =	5.815	ft	Location of maximum on span =	11.446	ft
Span # where maximum occurs =	Span # 1		Span # where maximum occurs =	Span # 1	
Maximum Deflection					
Max Downward L+Lr+S Deflection	0.132	in	Ratio =	1088	
Max Upward L+Lr+S Deflection	-0.065	in	Ratio =	734	
Max Downward Total Deflection	0.264	in	Ratio =	544	
Max Upward Total Deflection	-0.131	in	Ratio =	366	

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+S	1	0.2645	6.000		0.0000	0.000
	2	0.0000	6.000	D+S	-0.1306	2.000

Vertical Reactions - Unfactored

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.233	0.327	
D Only	0.117	0.163	
S Only	0.117	0.163	
D+S	0.233	0.327	

Support notation : Far left is #1
Values in KIPS

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Wood Beam

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Description: (RB2) Sip Panel Roof (Living Room)

Material Properties

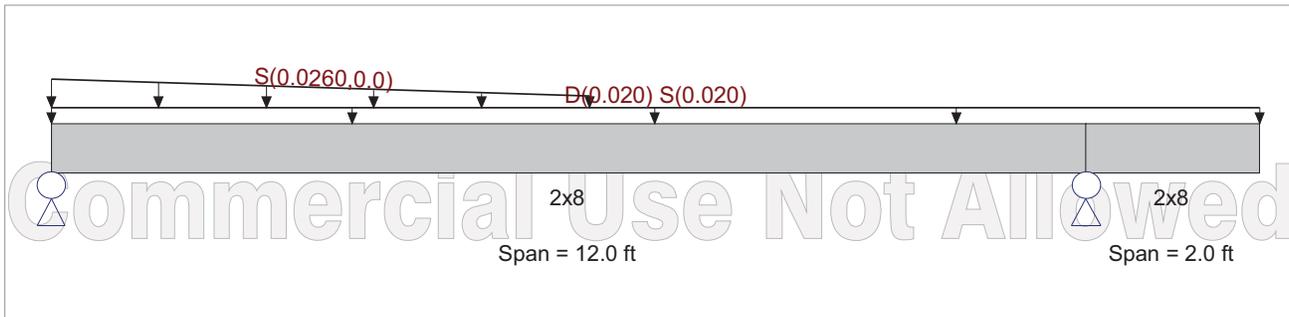
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method: Allowable Stress Design
Load Combination: 2006IBC&ASCE7-05

Fb - Tension	875.0 psi	E : Modulus of Elasticity	
Fb - Compr	875.0 psi	Ebend- xx	1,400.0 ksi
Fc - Prll	1,150.0 psi	Eminbend- xx	510.0 ksi
Fc - Perp	425.0 psi		
Fv	135.0 psi		
Ft	450.0 psi	Density	27.060 pcf

Wood Species : Spruce - Pine - Fir
Wood Grade : No. 1/No. 2

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...

Uniform Load on ALL spans : D = 0.020, S = 0.020 k/ft, Tributary Width = 1.0 ft
Varying Uniform Load : D(S,E) = 0.0->0.0, S(S,E) = 0.0260->0.0 k/ft, Extent = 0.0 --> 6.250 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.669 : 1	Maximum Shear Stress Ratio =	0.270 : 1
Section used for this span	2x8	Section used for this span	2x8
fb : Actual =	702.90 psi	fv : Actual =	36.49 psi
FB : Allowable =	1,050.00 psi	Fv : Allowable =	135.00 psi
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	5.538 ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward L+Lr+S Deflection	0.168 in	Ratio =	856
Max Upward L+Lr+S Deflection	-0.081 in	Ratio =	588
Max Downward Total Deflection	0.300 in	Ratio =	479
Max Upward Total Deflection	-0.147 in	Ratio =	326

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "+" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+S	1	0.3003	5.908	D+S	0.0000	0.000
	2	0.0000	5.908		-0.1467	2.000

Vertical Reactions - Unfactored

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.300	0.341	
D Only	0.117	0.163	
S Only	0.184	0.177	
D+S	0.300	0.341	

Support notation: Far left is #1 Values in KIPS

Commercial Use Not Allowed

Wood Beam

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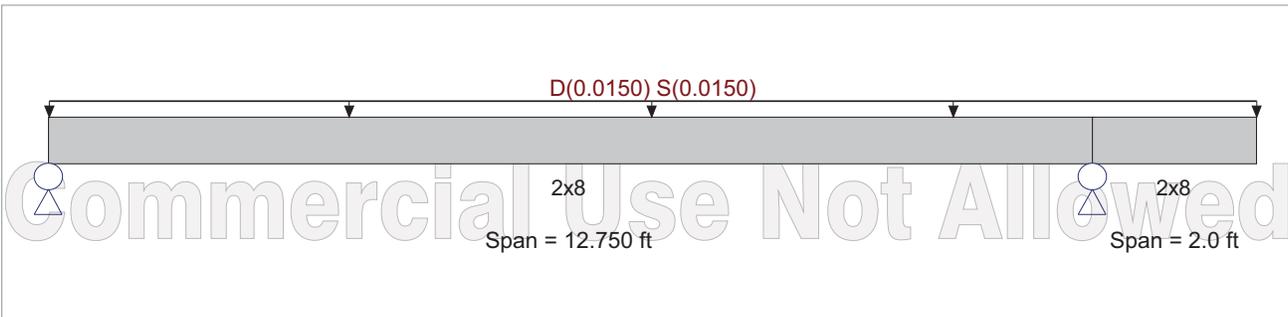
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Description: (RB3) Structural Fascia @ Upper Roof

Material Properties

Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method : Allowable Stress Design	Fb - Tension	1,100.0 psi	E : Modulus of Elasticity	
Load Combination 2006IBC&ASCE7-05	Fb - Compr	1,100.0 psi	Ebend- xx	1,400.0 ksi
	Fc - Prll	1,450.0 psi	Eminbend - xx	510.0 ksi
Wood Species : Southern Pine	Fc - Perp	480.0 psi		
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 8" Wid	Fv	175.0 psi		
	Ft	600.0 psi	Density	35.440 pcf
Beam Bracing : Beam is Fully Braced against lateral-torsion buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads

Loads on all spans...

Uniform Load on ALL spans : D = 0.0150, S = 0.0150 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.524 : 1	Maximum Shear Stress Ratio =	0.168 : 1
Section used for this span	2x8	Section used for this span	2x8
fb : Actual =	576.86 psi	fv : Actual =	29.44 psi
FB : Allowable =	1,100.00 psi	Fv : Allowable =	175.00 psi
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span =	6.179 ft	Location of maximum on span =	12.750 ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward L+Lr+S Deflection	0.127 in	Ratio =	1200
Max Upward L+Lr+S Deflection	-0.060 in	Ratio =	802
Max Downward Total Deflection	0.278 in	Ratio =	551
Max Upward Total Deflection	-0.130 in	Ratio =	368

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "+" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+S	1	0.2776	6.375	D+S	0.0000	0.000
	2	0.0000	6.375		-0.1302	2.000

Vertical Reactions - Unfactored

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.203	0.279	
D Only	0.110	0.151	
S Only	0.093	0.128	
D+S	0.203	0.279	

Support notation: Far left is #1
Values in KIPS

Commercial Use Not Allowed

Wood Beam

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Lic. #: KW-06090096 - Educational Version

Licensed User:

Description: (RB4) SE Porch Bearing Beam

Material Properties

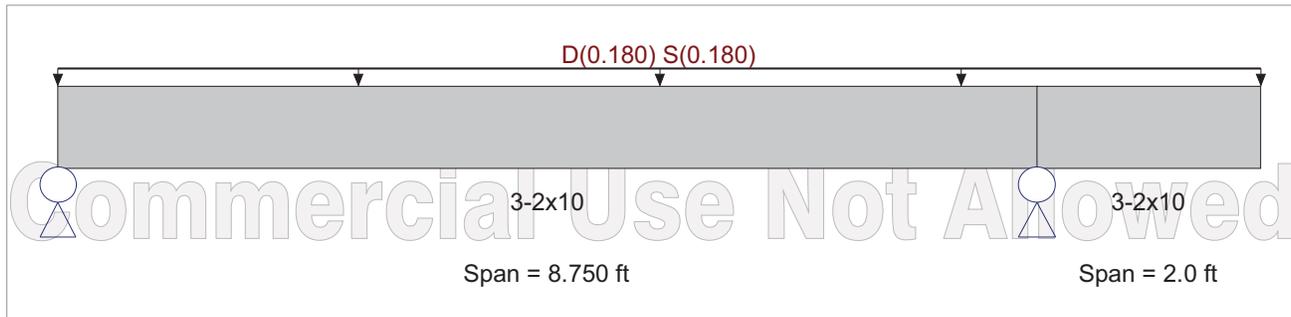
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method: Allowable Stress Design
Load Combination: 2006IBC&ASCE7-05

Fb - Tension	950.0 psi	E : Modulus of Elasticity	
Fb - Compr	950.0 psi	Ebend- xx	1,400.0 ksi
Fc - Prll	1,400.0 psi	Eminbend - xx	510.0 ksi
Fc - Perp	480.0 psi		
Fv	175.0 psi		
Ft	550.0 psi	Density	35.440 pcf

Wood Species : Southern Pine
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 10" Wi

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads

Loads on all spans...

Uniform Load on ALL spans : D = 0.180, S = 0.180 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.626 : 1	Maximum Shear Stress Ratio =	0.351 : 1
Section used for this span	3-2x10	Section used for this span	3-2x10
fb : Actual =	595.15 psi	fv : Actual =	61.42 psi
FB : Allowable =	950.00 psi	Fv : Allowable =	175.00 psi
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	4.173 ft	Location of maximum on span	8.750 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward L+Lr+S Deflection	0.051 in	Ratio =	2073
Max Upward L+Lr+S Deflection	-0.032 in	Ratio =	1520
Max Downward Total Deflection	0.104 in	Ratio =	1008
Max Upward Total Deflection	-0.065 in	Ratio =	738

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "+" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+S	1	0.1041	4.308	D+S	0.0000	0.000
	2	0.0000	4.308		-0.0649	2.000

Vertical Reactions - Unfactored

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	1.535	2.445	
D Only	0.789	1.256	
S Only	0.746	1.189	
D+S	1.535	2.445	

Support notation: Far left is #1 Values in KIPS

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Wood Beam

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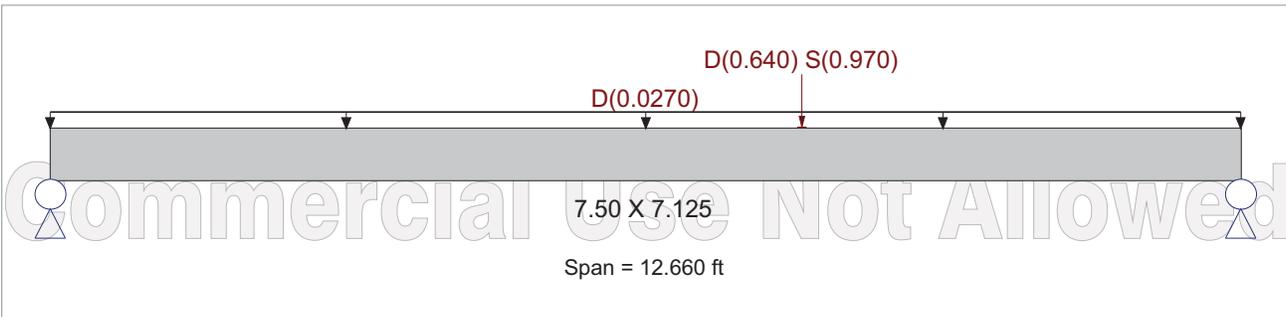
Licensed User:

Description: (RB6) W Porch Pony Wall Bearing Beam

Material Properties

Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method: Allowable Stress Design	Fb - Tension	1,100.0 psi	E : Modulus of Elasticity	
Load Combination: 2006IBC&ASCE7-05	Fb - Compr	1,100.0 psi	Ebend- xx	1,400.0 ksi
Wood Species : Southern Pine	Fc - Prll	1,450.0 psi	Eminbend - xx	510.0 ksi
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 8" Wid	Fc - Perp	480.0 psi	Fv	175.0 psi
Beam Bracing : Beam is Fully Braced against lateral-torsion buckling	Ft	600.0 psi	Density	35.440 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Loads on all spans...

Uniform Load on ALL spans : D = 0.0270 k/ft, Tributary Width = 1.0 ft
Point Load : D = 0.640, S = 0.970 k, Starting at : 8.0 ft and placed every 0.0 ft thereafter

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.942	1	Maximum Shear Stress Ratio =	0.200	: 1
Section used for this span	7.50 X 7.125		Section used for this span	7.50 X 7.125	
fb : Actual =	1,035.66	psi	fv : Actual =	35.05	psi
FB : Allowable =	1,100.00	psi	Fv : Allowable =	175.00	psi
Load Combination =	+D+S+H		Load Combination =	+D+S+H	
Location of maximum on span =	7.976ft		Location of maximum on span =	12.090 ft	
Span # where maximum occurs =	Span # 1		Span # where maximum occurs =	Span # 1	
Maximum Deflection					
Max Downward L+Lr+S Deflection	0.205	in	Ratio =	739	
Max Upward L+Lr+S Deflection	0.000	in	Ratio =	0	<360
Max Downward Total Deflection	0.414	in	Ratio =	366	
Max Upward Total Deflection	0.000	in	Ratio =	0	<180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+S	1	0.4144	6.773		0.0000	0.000

Vertical Reactions - Unfactored

Load Combination	Support 1	Support 2
Overall MAXimum	0.847	1.272
D Only	0.490	0.659
S Only	0.357	0.613
D+S	0.847	1.272

Commercial Use Not Allowed

Educational Version

Wood Beam

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Licensed User :

Description : (RB7) W Porch Lower Ridge Beam

Material Properties

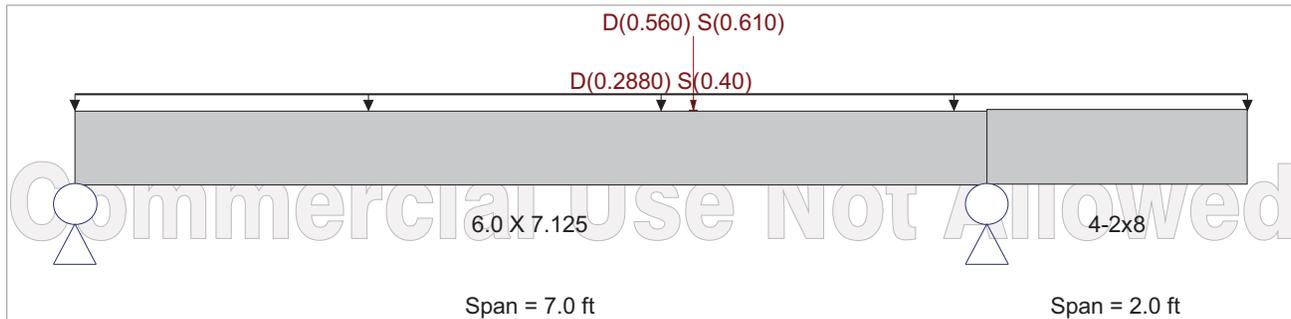
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method : Allowable Stress Design
Load Combination : 2006IBC&ASCE7-05

Fb - Tension	1,350.0 psi	E : Modulus of Elasticity	
Fb - Compr	1,350.0 psi	Ebend- xx	1,600.0 ksi
Fc - Prll	1,550.0 psi	Eminbend - xx	580.0 ksi
Fc - Perp	480.0 psi		
Fv	175.0 psi		
Ft	725.0 psi	Density	35.440 pcf

Wood Species : Southern Pine
Wood Grade : No.1 Non-Dense: 2" - 4" Thick : 8" Wid

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads

Loads on all spans...

Uniform Load on ALL spans : D = 0.2880, S = 0.40 k/ft, Tributary Width = 1.0 ft

Point Load : D = 0.560, S = 0.610 k, Starting at : 4.750 ft and placed every 0.0 ft thereafter

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.861 : 1	Maximum Shear Stress Ratio =	0.606 : 1
Section used for this span	6.0 X 7.125	Section used for this span	6.0 X 7.125
fb : Actual =	1,162.56 psi	fv : Actual =	106.13 psi
FB : Allowable =	1,350.00 psi	Fv : Allowable =	175.00 psi
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span =	3.769ft	Location of maximum on span =	6.408 ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward L+Lr+S Deflection	0.083 in	Ratio =	1015
Max Upward L+Lr+S Deflection	-0.063 in	Ratio =	758
Max Downward Total Deflection	0.148 in	Ratio =	566
Max Upward Total Deflection	-0.114 in	Ratio =	420

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+S	1	0.1482	3.554		0.0000	0.000
	2	0.0000	3.554	D+S	-0.1142	2.000

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	2.621	4.836	
D Only	1.139	2.108	
S Only	1.482	2.728	
D+S	2.621	4.836	

Commercial Use Not Allowed

Wood Beam

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Licensed User:

Description: (RB8) W Porch Bearing Beam (S)

Material Properties

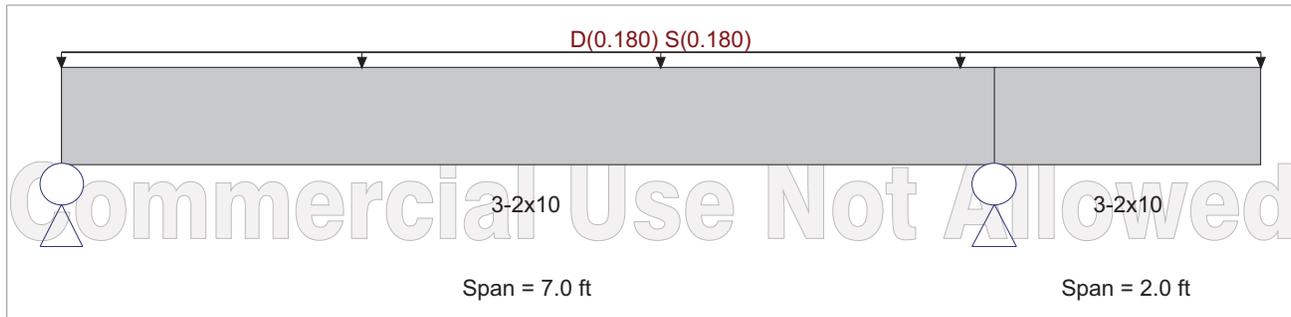
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method: Allowable Stress Design
Load Combination: 2006IBC&ASCE7-05

Fb - Tension	950.0 psi	E : Modulus of Elasticity	
Fb - Compr	950.0 psi	Ebend- xx	1,400.0 ksi
Fc - Prll	1,400.0 psi	Eminbend - xx	510.0 ksi
Fc - Perp	480.0 psi		
Fv	175.0 psi		
Ft	550.0 psi	Density	35.440 pcf

Wood Species : Southern Pine
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 10" Wi

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads

Loads on all spans...

Uniform Load on ALL spans : D = 0.180, S = 0.180 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.376	1	Maximum Shear Stress Ratio	=	0.289	: 1
Section used for this span		3-2x10		Section used for this span		3-2x10	
fb : Actual	=	357.65 psi		fv : Actual	=	50.51 psi	
FB : Allowable	=	950.00 psi		Fv : Allowable	=	175.00 psi	
Load Combination		+D+S+H		Load Combination		+D+S+H	
Location of maximum on span	=	3.231 ft		Location of maximum on span	=	7.000 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward L+Lr+S Deflection		0.019 in	Ratio = 4401				
Max Upward L+Lr+S Deflection		-0.013 in	Ratio = 3714				
Max Downward Total Deflection		0.039 in	Ratio = 2139				
Max Upward Total Deflection		-0.027 in	Ratio = 1806				

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "+" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+S	1	0.0393	3.392	D+S	0.0000	0.000
	2	0.0000	3.392		-0.0266	2.000

Vertical Reactions - Unfactored

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	1.190	2.142	
D Only	0.611	1.101	
S Only	0.579	1.041	
D+S	1.190	2.142	

Commercial Use Not Allowed

Wood Beam

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Licensed User:

Description: (RB8a) W Porch Bearing Beam (N)

Material Properties

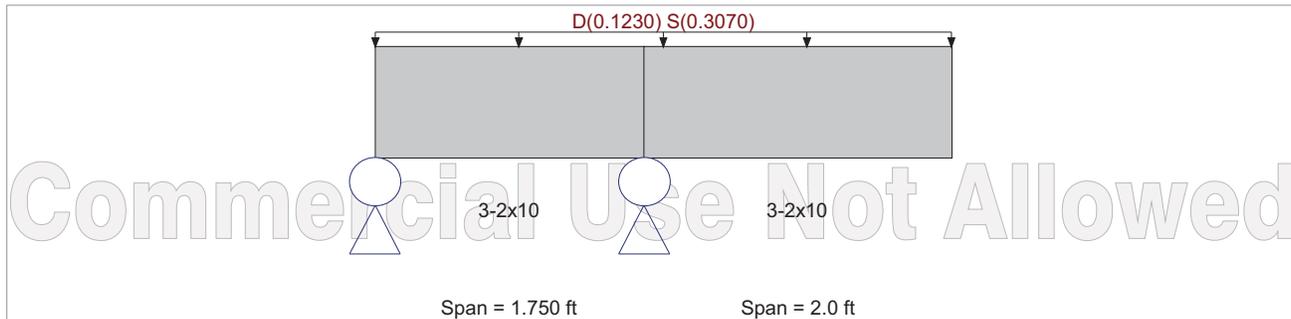
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method: Allowable Stress Design
Load Combination: 2006IBC&ASCE7-05

Fb - Tension	950.0 psi	E : Modulus of Elasticity	
Fb - Compr	950.0 psi	Ebend- xx	1,400.0 ksi
Fc - Prll	1,400.0 psi	Eminbend - xx	510.0 ksi
Fc - Perp	480.0 psi		
Fv	175.0 psi		
Ft	550.0 psi	Density	35.440 pcf

Wood Species : Southern Pine
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 10" Wi

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads

Loads on all spans...

Uniform Load on ALL spans: D = 0.1230, S = 0.3070 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.173 : 1	Maximum Shear Stress Ratio =	0.183 : 1
Section used for this span	3-2x10	Section used for this span	3-2x10
fb : Actual =	164.65 psi	fv : Actual =	32.01 psi
FB : Allowable =	950.00 psi	Fv : Allowable =	175.00 psi
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	1.750 ft	Location of maximum on span	1.750 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward L+Lr+S Deflection	0.005 in	Ratio =	9698
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 < 360
Max Downward Total Deflection	0.007 in	Ratio =	6762
Max Upward Total Deflection	-0.001 in	Ratio =	41207

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "+" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+S	1	0.0000	0.000	D+S	-0.0005	1.077
	2	0.0071	2.000		0.0000	1.077

Vertical Reactions - Unfactored

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-0.118	1.769	
D Only	-0.036	0.535	
S Only	-0.082	1.233	
D+S	-0.118	1.769	

Commercial Use Not Allowed

Wood Beam

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Licensed User:

Description: (L2) Bedroom to Kitchen Hallway Lintels

Material Properties

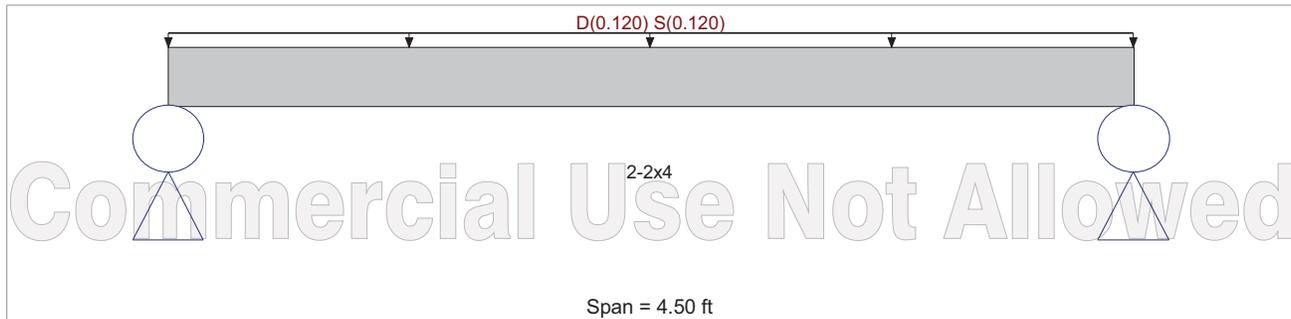
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method: Allowable Stress Design
Load Combination: 2006IBC&ASCE7-05

Fb - Tension	1,350.0 psi	E : Modulus of Elasticity	
Fb - Compr	1,350.0 psi	Ebend- xx	1,400.0 ksi
Fc - Prll	1,600.0 psi	Eminbend - xx	510.0 ksi
Fc - Perp	480.0 psi		
Fv	175.0 psi		
Ft	775.0 psi	Density	35.440 pcf

Wood Species : Southern Pine
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 2" - 4"

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads

Loads on all spans...

Uniform Load on ALL spans : D = 0.120, S = 0.120 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.891 : 1	Maximum Shear Stress Ratio =	0.392 : 1
Section used for this span	2-2x4	Section used for this span	2-2x4
fb : Actual =	1,203.02 psi	fv : Actual =	68.62 psi
FB : Allowable =	1,350.00 psi	Fv : Allowable =	175.00 psi
Load Combination	+D+S+H	Load Combination	+D+S+H
Location of maximum on span	2.250ft	Location of maximum on span	4.230 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward L+Lr+S Deflection	0.074 in	Ratio =	726
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 < 360
Max Downward Total Deflection	0.150 in	Ratio =	359
Max Upward Total Deflection	0.000 in	Ratio =	0 < 180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "+" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+S	1	0.1503	2.273		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.546	0.546
D Only	0.276	0.276
S Only	0.270	0.270
D+S	0.546	0.546

Commercial Use Not Allowed

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Wood Beam

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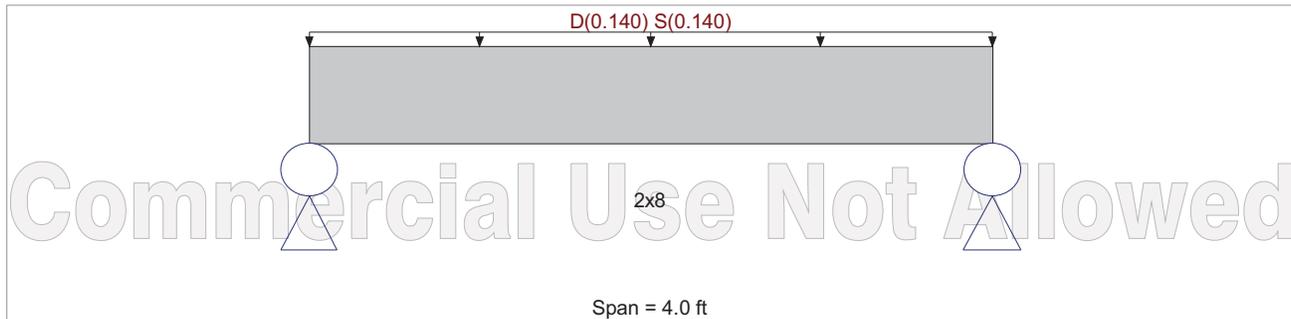
Licensed User:

Description: (L4) Clerestory Window Lintels

Material Properties

Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method: Allowable Stress Design	Fb - Tension	1,100.0 psi	E : Modulus of Elasticity	
Load Combination: 2006IBC&ASCE7-05	Fb - Compr	1,100.0 psi	Ebend- xx	1,400.0 ksi
	Fc - Prll	1,450.0 psi	Eminbend - xx	510.0 ksi
Wood Species : Southern Pine	Fc - Perp	480.0 psi		
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 8" Wid	Fv	175.0 psi		
	Ft	600.0 psi	Density	35.440 pcf
Beam Bracing : Beam is Fully Braced against lateral-torsion buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads

Loads on all spans...

Uniform Load on ALL spans : D = 0.140, S = 0.140 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.469	1	Maximum Shear Stress Ratio =	0.312	: 1
Section used for this span	2x8		Section used for this span	2x8	
fb : Actual =	516.28 psi		fv : Actual =	54.59 psi	
FB : Allowable =	1,100.00 psi		Fv : Allowable =	175.00 psi	
Load Combination =	+D+S+H		Load Combination =	+D+S+H	
Location of maximum on span =	2.000ft		Location of maximum on span =	0.000ft	
Span # where maximum occurs =	Span # 1		Span # where maximum occurs =	Span # 1	
Maximum Deflection					
Max Downward L+Lr+S Deflection	0.012 in	Ratio =	3938		
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0	<360	
Max Downward Total Deflection	0.025 in	Ratio =	1950		
Max Upward Total Deflection	0.000 in	Ratio =	0	<180	

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "+" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+S	1	0.0246	2.020		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.565	0.565
D Only	0.285	0.285
S Only	0.280	0.280
D+S	0.565	0.565

Educational Version

Wood Beam

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Licensed User:

Description: (L9) Garage Overhead Door Lintel

Material Properties

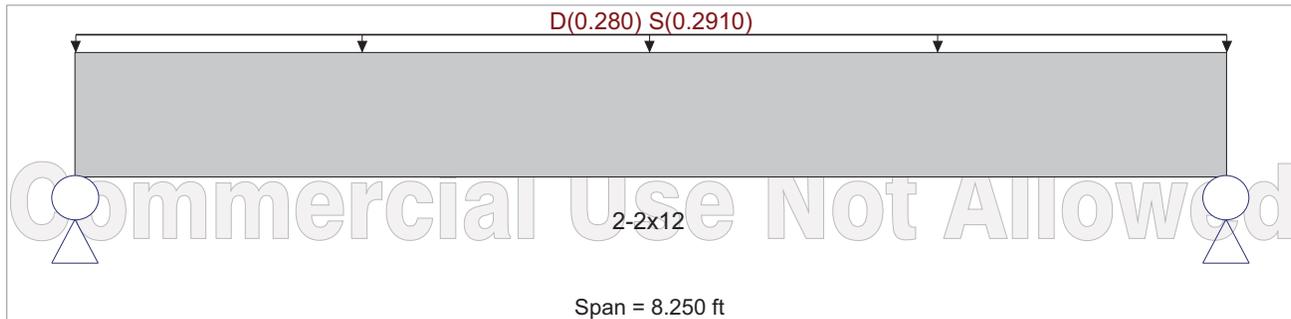
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method: Allowable Stress Design
Load Combination: 2006 IBC & ASCE 7-05

Fb - Tension	1,100.0 psi	E : Modulus of Elasticity	
Fb - Compr	1,100.0 psi	Ebend- xx	1,400.0 ksi
Fc - Prll	1,450.0 psi	Eminbend - xx	510.0 ksi
Fc - Perp	480.0 psi		
Fv	175.0 psi		
Ft	600.0 psi	Density	35.440 pcf

Wood Species : Southern Pine
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 8" Wid

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...

Uniform Load on ALL spans : D = 0.280, S = 0.2910 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.837 : 1	Maximum Shear Stress Ratio =	0.467 : 1
Section used for this span	2-2x12	Section used for this span	2-2x12
fb : Actual =	921.21 psi	fv : Actual =	81.65 psi
FB : Allowable =	1,100.00 psi	Fv : Allowable =	175.00 psi
Load Combination =	+D+S+H	Load Combination =	+D+S+H
Location of maximum on span =	4.125ft	Location of maximum on span =	7.343 ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward L+Lr+S Deflection	0.061 in	Ratio =	1613
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.120 in	Ratio =	822
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+S	1	0.1204	4.166		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.355	2.355
D Only	1.155	1.155
S Only	1.200	1.200
D+S	2.355	2.355

Commercial Use Not Allowed

Wood Beam

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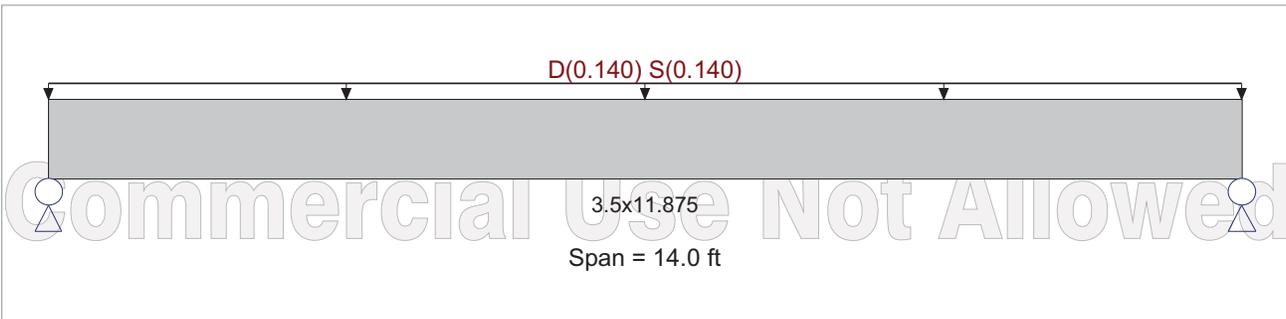
Licensed User:

Description: (WB1) Kitchen Vault Beam

Material Properties

Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method: Allowable Stress Design	Fb - Tension	2,600.0 psi	E: Modulus of Elasticity	
Load Combination: 2006IBC&ASCE7-05	Fb - Compr	2,600.0 psi	Ebend-xx	1,900.0 ksi
	Fc - Prll	2,510.0 psi	Eminbend-xx	965.71 ksi
Wood Species: iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade: MicroLam LVL 1.9 E	Fv	285.0 psi		
	Ft	1,555.0 psi	Density	32.210 pcf
Beam Bracing: Beam is Fully Braced against lateral-torsion buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads

Loads on all spans...

Uniform Load on ALL spans: D = 0.140, S = 0.140 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.397	1	Maximum Shear Stress Ratio =	0.220	1
Section used for this span	3.5x11.875		Section used for this span	3.5x11.875	
fb: Actual =	1,033.11 psi		fv: Actual =	62.83 psi	
FB: Allowable =	2,600.00 psi		Fv: Allowable =	285.00 psi	
Load Combination =	+D+S+H		Load Combination =	+D+S+H	
Location of maximum on span =	7.000ft		Location of maximum on span =	13.020ft	
Span # where maximum occurs =	Span # 1		Span # where maximum occurs =	Span # 1	
Maximum Deflection					
Max Downward L+Lr+S Deflection	0.131 in	Ratio =	1279		
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0	<360	
Max Downward Total Deflection	0.271 in	Ratio =	619		
Max Upward Total Deflection	0.000 in	Ratio =	0	<180	

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "+" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+S	1	0.2713	7.070		0.0000	0.000

Vertical Reactions - Unfactored

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.025	2.025
D Only	1.045	1.045
S Only	0.980	0.980
D+S	2.025	2.025

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Wood Beam

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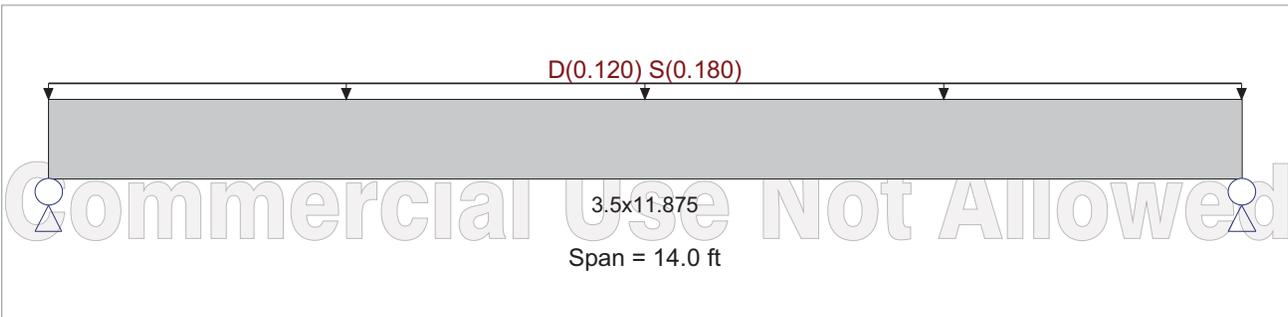
Licensed User:

Description: (WB2) Living Room Vault Beam

Material Properties

Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method: Allowable Stress Design	Fb - Tension	2,600.0 psi	E: Modulus of Elasticity	
Load Combination: 2006IBC&ASCE7-05	Fb - Compr	2,600.0 psi	Ebend- xx	1,900.0 ksi
	Fc - Prll	2,510.0 psi	Eminbend - xx	965.71 ksi
Wood Species: iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade: MicroLam LVL 1.9 E	Fv	285.0 psi		
	Ft	1,555.0 psi	Density	32.210 pcf
Beam Bracing: Beam is Fully Braced against lateral-torsion buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads

Loads on all spans...

Uniform Load on ALL spans: D = 0.120, S = 0.180 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.425	1	Maximum Shear Stress Ratio =	0.236	: 1
Section used for this span	3.5x11.875		Section used for this span	3.5x11.875	
fb: Actual =	1,104.53 psi		fv: Actual =	67.17 psi	
FB: Allowable =	2,600.00 psi		Fv: Allowable =	285.00 psi	
Load Combination =	+D+S+H		Load Combination =	+D+S+H	
Location of maximum on span =	7.000 ft		Location of maximum on span =	13.020 ft	
Span # where maximum occurs =	Span # 1		Span # where maximum occurs =	Span # 1	
Maximum Deflection					
Max Downward L+Lr+S Deflection	0.169 in	Ratio =	995		
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0	<360	
Max Downward Total Deflection	0.290 in	Ratio =	579		
Max Upward Total Deflection	0.000 in	Ratio =	0	<180	

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "+" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+S	1	0.2900	7.070		0.0000	0.000

Vertical Reactions - Unfactored

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.165	2.165
D Only	0.905	0.905
S Only	1.260	1.260
D+S	2.165	2.165

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Steel Column

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Description : (C1) Knee Brace @ Upper Roof

General Information

Calculations per AISC 360-05, IBC 2009, CBC 2010, ASCE 7-05

Steel Section Name : **Pipe1/2 Std**
Analysis Method : 2006 IBC & ASCE 7-05
Steel Stress Grade
Fy : Steel Yield 36.0 ksi
E : Elastic Bending Modulus 29,000.0 ksi
Load Combination : Allowable Stress

Overall Column Height 2.50 ft
Top & Bottom Fixity Top & Bottom Pinned

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 2.5 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 2.5 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

AXIAL LOADS . . .
Axial Load at 2.50 ft, D = 0.2690, S = 0.2410 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.2033** : 1
Load Combination **+D+S+H**
Location of max.above base 0.0 ft
At maximum location values are . . .
Pu : Axial 0.510 k
Pn / Omega : Allowable 2.509 k
Mu-x : Applied 0.0 k-ft
Mn-x / Omega : Allowable 0.1006 k-ft
Mu-y : Applied 0.0 k-ft
Mn-y / Omega : Allowable 0.1006 k-ft

Maximum SERVICE Load Reactions . .

Top along X-X 0.0 k
Bottom along X-X 0.0 k
Top along Y-Y 0.0 k
Bottom along Y-Y 0.0 k

Maximum SERVICE Load Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination :
Along X-X 0.0 in at 0.0 ft above base
for load combination :

PASS Maximum Shear Stress Ratio = **0.0** : 1
Load Combination 0.0
Location of max.above base 0.0 ft
At maximum location values are . . .
Vu : Applied 0.0 k
Vn / Omega : Allowable 0.0 k

Maximum Reactions - Unfactored

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		Y-Y Axis Reaction		Axial Reaction
	@ Base	@ Top	@ Base	@ Top	@ Base
D Only		k			0.269 k
S Only		k			0.241 k
D+S		k			0.510 k

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
D+S	0.0000 in	0.000 ft	0.000 in	0.000 ft

Steel Section Properties : **Pipe1/2 Std**

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Steel Column

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Description : (C1) Knee Brace @ Upper Roof

Steel Section Properties : Pipe1/2 Std

Depth	=	0.840 in	I xx	=	0.02 in^4	J	=	0.032 in^4
Web Thick	=	0.000 in	S xx	=	0.04 in^3			
Flange Width	=	0.840 in	R xx	=	0.264 in			
Flange Thick	=	0.109 in						
Area	=	0.230 in^2	I yy	=	0.016 in^4			
Weight	=	0.850 plf	S yy	=	0.039 in^3			
			R yy	=	0.264 in			

Ycg = 0.000 in

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Wood Column

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Description : (C3) Lintel Trimmers (L9)

General Information

Calculations per 2005 NDS, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method :	Allowable Stress Design			Wood Section Name	2-2x4	
End Fixities	Top & Bottom Pinned			Wood Grading/Manuf.	Graded Lumber	
Overall Column Height	7.0 ft			Wood Member Type	Sawn	
<i>(Used for non-slender calculations)</i>						
Wood Species	Spruce - Pine - Fir			Exact Width	3.0 in	
Wood Grade	No. 1/No. 2			Exact Depth	3.50 in	
Fb - Tension	875.0 psi	Fv	135.0 psi	Area	10.50 in ²	
Fb - Compr	875.0 psi	Ft	450.0 psi	Ix	10.719 in ⁴	
Fc - Prll	1,150.0 psi	Density	27.060 pcf	Iy	7.875 in ⁴	
Fc - Perp	425.0 psi					
E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial	Allowable Stress Modification Factors		
	Basic	1,400.0	1,400.0	1,400.0 ksi	Cf or Cv for Bending	1.50
	Minimum	510.0	510.0		Cf or Cv for Compression	1.150
					Cf or Cv for Tension	1.50
					Cm : Wet Use Factor	1.0
					Ct : Temperature Factor	1.0
					Cfu : Flat Use Factor	1.0
					Kf : Built-up columns	1.0 <small>NDS 15.3.2</small>
					Use Cr : Repetitive ?	No <small>(non-glb only)</small>
Load Combination	2006 IBC & ASCE 7-05			Brace condition for deflection (buckling) along columns :		
				X-X (width) axis : Fully braced against buckling along X-X Axis		
				Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 7 ft, K = 1.0		

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

AXIAL LOADS . . .
Axial Load at 7.0 ft, D = 1.170, S = 1.240 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =	0.370 : 1	Maximum SERVICE Lateral Load Reactions . .	
Load Combination	+D+S+H	Top along Y-Y	0.0 k
Governing NDS Formula	Comp Only, fc/Fc'	Bottom along Y-Y	0.0 k
Location of max. above base	0.0 ft	Top along X-X	0.0 k
Bottom along X-X		Bottom along X-X	0.0 k
At maximum location values are . . .		Maximum SERVICE Load Lateral Deflections . .	
Applied Axial	2.410 k	Along Y-Y	0.0 in at ft above base
Applied Mx	0.0 k-ft	for load combination :	
Applied My	0.0 k-ft	Along X-X	in at ft above base
Fc : Allowable	620.28 psi	for load combination :	
PASS Maximum Shear Stress Ratio =	0.0 : 1	Other Factors used to calculate allowable stresses . .	
Load Combination	+D+0.750L+0.750S+0.5250E+H	Bending	1.500
Location of max. above base	7.0 ft	Compression	1.150
Applied Design Shear	0.0 psi	Tension	
Allowable Shear	135.0 psi	Cf or Cv : Size based factors	1.500 1.150

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
	Stress Ratio	Status	Location	Stress Ratio	Status	Location

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
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Wood Column

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Description : (C4) Wall Column for RB4 & RB10 (SE Porch/Front Entry)

General Information

Calculations per 2005 NDS, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method :	Allowable Stress Design	Wood Section Name	2x4
End Fixities	Top & Bottom Pinned	Wood Grading/Manuf.	Graded Lumber
Overall Column Height	8.0 ft	Wood Member Type	Sawn
<i>(Used for non-slender calculations)</i>			
Wood Species	Spruce - Pine - Fir	Exact Width	1.50 in
Wood Grade	No. 1/No. 2	Exact Depth	3.125 in
Fb - Tension	875.0 psi	Area	5.250 in ²
Fb - Compr	875.0 psi	Ix	5.359 in ⁴
Fc - Prll	1,150.0 psi	Iy	0.9844 in ⁴
Fc - Perp	425.0 psi		
E : Modulus of Elasticity . . .			
	x-x Bending	y-y Bending	Axial
	Basic	1,400.0	1,400.0
	Minimum	510.0	510.0
			1,400.0 ksi
Load Combination	2006 IBC & ASCE 7-05		

Allowable Stress Modification Factors	
Cf or Cv for Bending	1.50
Cf or Cv for Compression	1.150
Cf or Cv for Tension	1.50
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 <small>NDS 15.3.2</small>
Use Cr : Repetitive ?	No <small>(non-glb only)</small>

Brace condition for deflection (buckling) along columns :
 X-X (width) axis : Fully braced against buckling along X-X Axis
 Y-Y (depth) axis : Fully braced against buckling along Y-Y Axis

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

AXIAL LOADS . . .
 Axial Load at 8.0 ft, D = 1.180, S = 1.090 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.3662 : 1**
 Load Combination +D+S+H
 Governing NDS Formula **Comp Only, fc/Fc'**
 Location of max.above base 0.0 ft
 At maximum location values are . . .
 Applied Axial 2.270 k
 Applied Mx 0.0 k-ft
 Applied My 0.0 k-ft
 Fc : Allowable 1,322.50 psi

Maximum SERVICE Lateral Load Reactions . . .
 Top along Y-Y 0.0 k Bottom along Y-Y 0.0 k
 Top along X-X 0.0 k Bottom along X-X 0.0 k

Maximum SERVICE Load Lateral Deflections . . .
 Along Y-Y 0.0 in at ft above base
 for load combination :
 Along X-X in at ft above base
 for load combination :

PASS Maximum Shear Stress Ratio = **0.0 : 1**
 Load Combination +D+0.750L+0.750S+0.5250E+H
 Location of max.above base 8.0 ft
 Applied Design Shear 0.0 psi
 Allowable Shear 135.0 psi

Other Factors used to calculate allowable stresses . . .

	<u>Bending</u>	<u>Compression</u>	<u>Tension</u>
Cf or Cv : Size based factors	1.500	1.150	

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
	Stress Ratio	Status	Location	Stress Ratio	Status	Location

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
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Wood Column

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Description : (C5) Exterior Column for RB4 (SE Porch)

General Information

Calculations per 2005 NDS, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned

Wood Section Name : 6x6
Wood Grading/Manuf. : Graded Lumber
Wood Member Type : Sawn

Overall Column Height : 8.0 ft
(Used for non-slender calculations)

Wood Species : Southern Pine
Wood Grade : No.25R

Exact Width : 5.50 in
Exact Depth : 5.50 in

Fb - Tension : 850.0 psi
Fb - Compr : 850.0 psi
Fc - Prll : 525.0 psi
Fc - Perp : 375.0 psi
Fv : 165.0 psi
Ft : 550.0 psi
Density : 35.440 pcf

Area : 30.250 in²
Ix : 76.255 in⁴
Iy : 76.255 in⁴

Allowable Stress Modification Factors
Cf or Cv for Bending : 1.0
Cf or Cv for Compression : 1.0
Cf or Cv for Tension : 1.0
Cm : Wet Use Factor : 1.0
Ct : Temperature Factor : 1.0
Cfu : Flat Use Factor : 1.0
Kf : Built-up columns : 1.0 NDS 15.3.2
Use Cr : Repetitive ? : No (non-glb only)

E : Modulus of Elasticity . . .
Basic : 1,200.0
Minimum : 440.0
x-x Bending : 1,200.0
y-y Bending : 1,200.0
Axial : 1,200.0 ksi

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 8 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 8 ft, K = 1.0

Load Combination : 2006 IBC & ASCE 7-05

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

AXIAL LOADS . . .
Axial Load at 8.0 ft, D = 1.270, S = 1.190 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.1750 : 1**
Load Combination : +D+S+H
Governing NDS Formula : Comp Only, fc/Fc'
Location of max. above base : 0.0 ft
At maximum location values are . . .
Applied Axial : 2.460 k
Applied Mx : 0.0 k-ft
Applied My : 0.0 k-ft
Fc : Allowable : 464.81 psi

Maximum SERVICE Lateral Load Reactions . . .
Top along Y-Y : 0.0 k
Top along X-X : 0.0 k
Bottom along Y-Y : 0.0 k
Bottom along X-X : 0.0 k

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y : 0.0 in at . . . ft above base
for load combination :
Along X-X : . . . in at . . . ft above base
for load combination :

PASS Maximum Shear Stress Ratio = **0.0 : 1**
Load Combination : +D+0.750L+0.750S+0.5250E+H
Location of max. above base : 8.0 ft
Applied Design Shear : 0.0 psi
Allowable Shear : 165.0 psi

Other Factors used to calculate allowable stresses . . .
Cf or Cv : Size based factors : 1.000 (Bending), 1.000 (Compression), 1.000 (Tension)

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
	Stress Ratio	Status	Location	Stress Ratio	Status	Location

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
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Description : (C6) Exterior Column for RB5 (W Porch)

General Information

Calculations per 2005 NDS, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method :	Allowable Stress Design	Wood Section Name	2x4
End Fixities	Top & Bottom Pinned	Wood Grading/Manuf.	Graded Lumber
Overall Column Height	3.0 ft	Wood Member Type	Sawn
<i>(Used for non-slender calculations)</i>			
Wood Species	Spruce - Pine - Fir	Exact Width	1.50 in
Wood Grade	No. 1/No. 2	Exact Depth	3.50 in
Fb - Tension	875 psi	Area	5.250 in ²
Fb - Compr	875 psi	Ix	5.359 in ⁴
Fc - Prll	1150 psi	Iy	0.9844 in ⁴
Fc - Perp	425 psi		
E : Modulus of Elasticity . . .			
	x-x Bending	y-y Bending	Axial
	Basic	1400	1400
	Minimum	510	510
			1400 ksi
Load Combination	2006IBC&ASCE7-05		

Allowable Stress Modification Factors	
Cf or Cv for Bending	1.50
Cf or Cv for Compression	1.150
Cf or Cv for Tension	1.50
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 <small>NDS 15.3.2</small>
Use Cr : Repetitive ?	No <small>(non-glb only)</small>

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Fully braced against buckling along X-X Axis
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 3 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

AXIAL LOADS . . .
Axial Load at 3.0 ft, D = 0.640, S = 0.970 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.2523 : 1**
 Load Combination +D+S+H
 Governing NDS Formula **Comp Only, fc/Fc'**
 Location of max. above base 0.0 ft
 At maximum location values are . . .
 Applied Axial 1.610 k
 Applied Mx 0.0 k-ft
 Applied My 0.0 k-ft
 Fc : Allowable 1,215.39 psi

Maximum SERVICE Lateral Load Reactions . . .
 Top along Y-Y 0.0 k Bottom along Y-Y 0.0 k
 Top along X-X 0.0 k Bottom along X-X 0.0 k

Maximum SERVICE Load Lateral Deflections . . .
 Along Y-Y 0.0 in at ft above base
 for load combination :
 Along X-X in at ft above base
 for load combination :

PASS Maximum Shear Stress Ratio = **0.0 : 1**
 Load Combination +D+0.750L+0.750S+0.5250E+H
 Location of max. above base 3.0 ft
 Applied Design Shear 0.0 psi
 Allowable Shear 135.0 psi

Other Factors used to calculate allowable stresses . . .
 Cf or Cv : Size based factors Bending 1.500 Compression 1.150 Tension

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
	Stress Ratio	Status	Location	Stress Ratio	Status	Location

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
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Wood Column

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Description : (C8) Exterior Column for RB7 (W Porch)

General Information

Calculations per 2005 NDS, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method :	Allowable Stress Design	Wood Section Name	6x6
End Fixities	Top & Bottom Pinned	Wood Grading/Manuf.	Graded Lumber
Overall Column Height	8.0 ft	Wood Member Type	Sawn
<i>(Used for non-slender calculations)</i>			
Wood Species	Spruce - Pine - Fir	Exact Width	5.50 in
Wood Grade	No. 1/No. 2	Exact Depth	5.50 in
Fb - Tension	875.0 psi	Area	30.250 in ²
Fb - Compr	875.0 psi	Ix	76.255 in ⁴
Fc - Prll	1,150.0 psi	Iy	76.255 in ⁴
Fc - Perp	425.0 psi	Density	27.060 pcf
E : Modulus of Elasticity . . .			
Basic	1,400.0	x-x Bending	1,400.0
Minimum	510.0	y-y Bending	1,400.0
		Axial	1,400.0 ksi
		Fv	135.0 psi
		Ft	450.0 psi

Allowable Stress Modification Factors	
Cf or Cv for Bending	1.0
Cf or Cv for Compression	1.0
Cf or Cv for Tension	1.0
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 <small>NDS 15.3.2</small>
Use Cr : Repetitive ?	No <small>(non-glb only)</small>

Brace condition for deflection (buckling) along columns :
 X-X (width) axis : Unbraced Length for X-X Axis buckling = 8 ft, K = 1.0
 Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 8 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

AXIAL LOADS . . .
Axial Load at 8.0 ft, D = 2.730, S = 2.730 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =	0.2093 : 1	Maximum SERVICE Lateral Load Reactions . .	
Load Combination	+D+S+H	Top along Y-Y	0.0 k
Governing NDS Formula	Comp Only, fc/Fc'	Bottom along Y-Y	0.0 k
Location of max.above base	0.0 ft	Top along X-X	0.0 k
Bottom along X-X		Bottom along X-X	0.0 k
At maximum location values are . . .		Maximum SERVICE Load Lateral Deflections . .	
Applied Axial	5.460 k	Along Y-Y	0.0 in at ft above base
Applied Mx	0.0 k-ft	for load combination :	
Applied My	0.0 k-ft	Along X-X	in at ft above base
Fc : Allowable	862.47 psi	for load combination :	
PASS Maximum Shear Stress Ratio =	0.0 : 1	Other Factors used to calculate allowable stresses . . .	
Load Combination	+D+0.750L+0.750S+0.5250E+H	Bending	1.000
Location of max.above base	8.0 ft	Compression	1.000
Applied Design Shear	0.0 psi	Tension	
Allowable Shear	135.0 psi	Cf or Cv : Size based factors	1.000 1.000

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
	Stress Ratio	Status	Location	Stress Ratio	Status	Location

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
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Wood Column

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Description : (C10) Exterior Column for RB8 (W Porch, S Side)

General Information

Calculations per 2005 NDS, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned

Wood Section Name : 6x6
Wood Grading/Manuf. : Graded Lumber
Wood Member Type : Sawn

Overall Column Height : 8.0 ft
(Used for non-slender calculations)

Wood Species : Southern Pine
Wood Grade : No.25R
Fb - Tension : 850.0 psi
Fb - Compr : 850.0 psi
Fc - Prll : 525.0 psi
Fc - Perp : 375.0 psi
Fv : 165.0 psi
Ft : 550.0 psi
Density : 35.440 pcf

Exact Width : 5.50 in
Exact Depth : 5.50 in
Area : 30.250 in²
Ix : 76.255 in⁴
Iy : 76.255 in⁴

Allowable Stress Modification Factors
Cf or Cv for Bending : 1.0
Cf or Cv for Compression : 1.0
Cf or Cv for Tension : 1.0
Cm : Wet Use Factor : 1.0
Ct : Temperature Factor : 1.0
Cfu : Flat Use Factor : 1.0
Kf : Built-up columns : 1.0 NDS 15.3.2
Use Cr : Repetitive ? : No (non-glb only)

E : Modulus of Elasticity . . .
Basic : 1,200.0
Minimum : 440.0
x-x Bending : 1,200.0
y-y Bending : 440.0
Axial : 1,200.0 ksi

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 8 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 8 ft, K = 1.0

Load Combination : 2006IBC&ASCE7-05

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

AXIAL LOADS . . .
Axial Load at 8.0 ft, D = 1.430, S = 2.60 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.2866 : 1**
Load Combination : +D+S+H
Governing NDS Formula : Comp Only, fc/Fc'
Location of max. above base : 0.0 ft
At maximum location values are . . .
Applied Axial : 4.030 k
Applied Mx : 0.0 k-ft
Applied My : 0.0 k-ft
Fc : Allowable : 464.81 psi

Maximum SERVICE Lateral Load Reactions . . .
Top along Y-Y : 0.0 k
Bottom along Y-Y : 0.0 k
Top along X-X : 0.0 k
Bottom along X-X : 0.0 k

Maximum SERVICE Load Lateral Deflections . . .
Along Y-Y : 0.0 in at . . . ft above base
for load combination :
Along X-X : . . . in at . . . ft above base
for load combination :

PASS Maximum Shear Stress Ratio = **0.0 : 1**
Load Combination : +D+0.750L+0.750S+0.5250E+H
Location of max. above base : 8.0 ft
Applied Design Shear : 0.0 psi
Allowable Shear : 165.0 psi

Other Factors used to calculate allowable stresses . . .
Cf or Cv : Size based factors : Bending : 1.000, Compression : 1.000, Tension : 1.000

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
	Stress Ratio	Status	Location	Stress Ratio	Status	Location

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
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Wood Column

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Licensed User :

Description : (C11) Exterior Column for RB8a (W Porch, N Side)

General Information

Calculations per 2005 NDS, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method :	Allowable Stress Design			Wood Section Name	6x6	
End Fixities	Top & Bottom Pinned			Wood Grading/Manuf.	Graded Lumber	
Overall Column Height	8.0 ft			Wood Member Type	Sawn	
<i>(Used for non-slender calculations)</i>						
Wood Species	Southern Pine			Exact Width	5.50 in	
Wood Grade	No.25R			Exact Depth	5.50 in	
Fb - Tension	850.0 psi	Fv	165.0 psi	Area	30.25 in ²	
Fb - Compr	850.0 psi	Ft	550.0 psi	Ix	76.255 in ⁴	
Fc - Prll	525.0 psi	Density	35.440 pcf	Iy	76.255 in ⁴	
Fc - Perp	375.0 psi					
E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial	Allowable Stress Modification Factors		
	Basic	1,200.0	1,200.0	1,200.0 ksi	Cf or Cv for Bending	1.0
	Minimum	440.0	440.0		Cf or Cv for Compression	1.0
					Cf or Cv for Tension	1.0
					Cm : Wet Use Factor	1.0
					Ct : Temperature Factor	1.0
					Cfu : Flat Use Factor	1.0
					Kf : Built-up columns	1.0 <small>NDS 15.3.2</small>
					Use Cr : Repetitive ?	No <small>(non-glb only)</small>
Load Combination	2006IBC&ASCE7-05			Brace condition for deflection (buckling) along columns :		
				X-X (width) axis : Unbraced Length for X-X Axis buckling = 8 ft, K = 1.0		
				Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 8 ft, K = 1.0		

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

AXIAL LOADS . . .

Axial Load at 8.0 ft, D = 0.850, S = 1.230 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.1479 : 1**

Load Combination +D+S+H

Governing NDS Formula **Comp Only, fc/Fc'**

Location of max. above base 0.0 ft

At maximum location values are . . .

Applied Axial	2.080 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	464.81 psi

Maximum SERVICE Lateral Load Reactions . . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	ft	above base
for load combination :				
Along X-X	in	at	ft	above base
for load combination :				

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination +D+0.750L+0.750S+0.5250E+H

Location of max. above base 8.0 ft

Applied Design Shear 0.0 psi

Allowable Shear 165.0 psi

Other Factors used to calculate allowable stresses . . .

	<u>Bending</u>	<u>Compression</u>	<u>Tension</u>
Cf or Cv : Size based factors	1.000	1.000	

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
	Stress Ratio	Status	Location	Stress Ratio	Status	Location

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
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Wood Column

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Description : (C12) Wall Columns for RB10 (Front Entry)

General Information

Calculations per 2005 NDS, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method :	Allowable Stress Design			Wood Section Name	2x4	Allowable Stress Modification Factors	
End Fixities	Top & Bottom Pinned			Wood Grading/Manuf.	Graded Lumber	Cf or Cv for Bending	1.50
Overall Column Height	8.0 ft			Wood Member Type	Sawn	Cf or Cv for Compression	1.150
<i>(Used for non-slender calculations)</i>							
Wood Species	Spruce - Pine - Fir			Exact Width	1.50 in	Cf or Cv for Tension	1.50
Wood Grade	No. 1/No. 2			Exact Depth	3.125 in	Cm : Wet Use Factor	1.0
Fb - Tension	875.0 psi	Fv	135.0 psi	Area	5.25 in ²	Ct : Temperature Factor	1.0
Fb - Compr	875.0 psi	Ft	450.0 psi	Ix	5.359 in ⁴	Cfu : Flat Use Factor	1.0
Fc - Prll	1,150.0 psi	Density	27.060 pcf	Iy	0.9844 in ⁴	Kf : Built-up columns	1.0 <small>NDS 15.3.2</small>
Fc - Perp	425.0 psi					Use Cr : Repetitive ?	No <small>(non-glb only)</small>
E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial	Brace condition for deflection (buckling) along columns :			
	Basic	1,400.0	1,400.0	1,400.0 ksi	X-X (width) axis : Fully braced against buckling along X-X Axis		
	Minimum	510.0	510.0		Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 8 ft, K = 1.0		
Load Combination	2006 IBC & ASCE 7-05						

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

AXIAL LOADS . . .

Axial Load at 8.0 ft, D = 0.380, S = 0.340 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.3757 : 1**

Load Combination +D+S+H

Governing NDS Formula **Comp Only, fc/Fc'**

Location of max. above base **0.0 ft**

At maximum location values are . . .

Applied Axial	0.720 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	408.87 psi

Maximum SERVICE Lateral Load Reactions . . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	ft	above base
for load combination :				
Along X-X	in	at	ft	above base
for load combination :				

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination +D+0.750L+0.750S+0.5250E+H

Location of max. above base **8.0 ft**

Applied Design Shear **0.0 psi**

Allowable Shear **135.0 psi**

Other Factors used to calculate allowable stresses . . .

	<u>Bending</u>	<u>Compression</u>	<u>Tension</u>
Cf or Cv : Size based factors	1.500	1.150	

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
	Stress Ratio	Status	Location	Stress Ratio	Status	Location

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
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Wood Column

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Description : (C13) Exterior Columns for RB10 (Front Entry)

General Information

Calculations per 2005 NDS, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method :	Allowable Stress Design	Wood Section Name	6x6
End Fixities	Top & Bottom Pinned	Wood Grading/Manuf.	Graded Lumber
Overall Column Height	8.0 ft	Wood Member Type	Sawn
<i>(Used for non-slender calculations)</i>			
Wood Species	Southern Pine	Exact Width	5.50 in
Wood Grade	No.25R	Exact Depth	5.50 in
Fb - Tension	850.0 psi	Area	30.25 in ²
Fb - Compr	850.0 psi	Ix	76.255 in ⁴
Fc - Prll	525.0 psi	Iy	76.255 in ⁴
Fc - Perp	375.0 psi	Density	35.440 pcf
E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
	Basic	1,200.0	1,200.0
	Minimum	440.0	440.0
			1,200.0 ksi
Load Combination	2006IBC&ASCE7-05	Brace condition for deflection (buckling) along columns :	
		X-X (width) axis : Unbraced Length for X-X Axis buckling = 8 ft, K = 1.0	
		Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 8 ft, K = 1.0	

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

AXIAL LOADS . . .
Axial Load at 8.0 ft, D = 0.680, S = 0.610 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =	0.09175 : 1	Maximum SERVICE Lateral Load Reactions . .	
Load Combination	+D+S+H	Top along Y-Y	0.0 k
Governing NDS Formula	Comp Only, fc/Fc'	Bottom along Y-Y	0.0 k
Location of max.above base	8.0 ft	Top along X-X	0.0 k
Bottom along X-X	0.0 k		
At maximum location values are . . .		Maximum SERVICE Load Lateral Deflections . .	
Applied Axial	1.290 k	Along Y-Y	0.0 in at ft above base
Applied Mx	0.0 k-ft	for load combination :	
Applied My	0.0 k-ft	Along X-X	in at ft above base
Fc : Allowable	464.81 psi	for load combination :	
PASS Maximum Shear Stress Ratio =	0.0 : 1	Other Factors used to calculate allowable stresses . . .	
Load Combination	+D+0.750L+0.750S+0.5250E+H	Bending	1.000
Location of max.above base	8.0 ft	Compression	1.000
Applied Design Shear	0.0 psi	Tension	
Allowable Shear	165.0 psi	Cf or Cv : Size based factors	1.000 1.000

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
	Stress Ratio	Status	Location	Stress Ratio	Status	Location

Maximum Deflections for Load Combinations - Unfactored Loads

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
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Wood Beam

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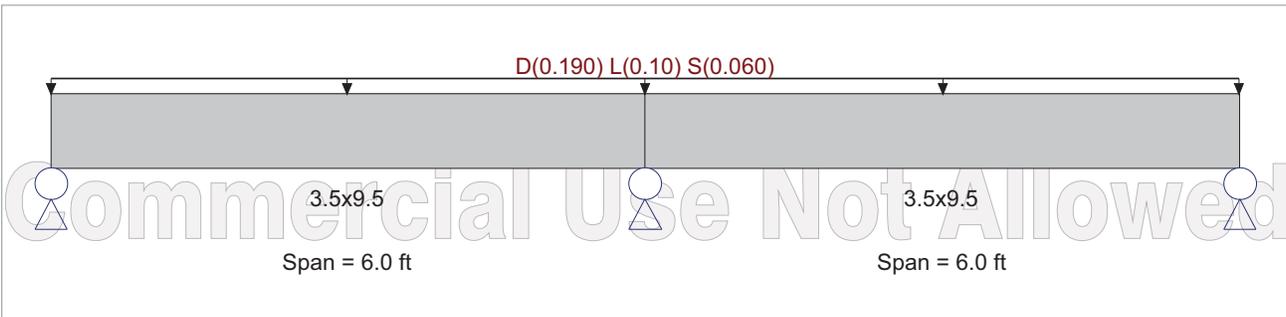
Licensed User :

Description : (FB1) Floor Beam 1 (Private Mod, W Side)

Material Properties

Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method : Allowable Stress Design	Fb - Tension	2,600.0 psi	E : Modulus of Elasticity	
Load Combination 2006IBC&ASCE7-05	Fb - Compr	2,600.0 psi	Ebend- xx	1,900.0 ksi
	Fc - Prll	2,510.0 psi	Eminbend - xx	965.71 ksi
Wood Species : iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade : MicroLam LVL 1.9 E	Fv	285.0 psi		
	Ft	1,555.0 psi	Density	32.210 pcf
Beam Bracing : Beam is Fully Braced against lateral-torsion buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads

Loads on all spans...

Uniform Load on ALL spans : D = 0.190, L = 0.10, S = 0.060 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.125	1	Maximum Shear Stress Ratio =	0.149	: 1
Section used for this span	3.5x9.5		Section used for this span	3.5x9.5	
fb : Actual =	325.60 psi		fv : Actual =	42.47 psi	
FB : Allowable =	2,600.00 psi		Fv : Allowable =	285.00 psi	
Load Combination =	+D+0.750L+0.750S+H		Load Combination =	+D+0.750L+0.750S+H	
Location of maximum on span =	6.000 ft		Location of maximum on span =	6.000 ft	
Span # where maximum occurs =	Span # 1		Span # where maximum occurs =	Span # 1	
Maximum Deflection					
Max Downward L+Lr+S Deflection	0.004 in	Ratio =	17369		
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0	<360	
Max Downward Total Deflection	0.009 in	Ratio =	7774		
Max Upward Total Deflection	0.000 in	Ratio =	0	<180	

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "+" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.0093	2.538		0.0000	0.000
D+L+S	2	0.0091	3.508		0.0000	0.000

Vertical Reactions - Unfactored

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.804	2.681	0.804
D Only	0.444	1.481	0.444
L Only	0.225	0.750	0.225
S Only	0.135	0.450	0.135
L+S	0.360	1.200	0.360
D+L	0.669	2.231	0.669
D+S	0.579	1.931	0.579
D+L+S	0.804	2.681	0.804

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Wood Beam

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Description : (FB3) Floor Beam 3 (Wet Mod, W Side)

Material Properties

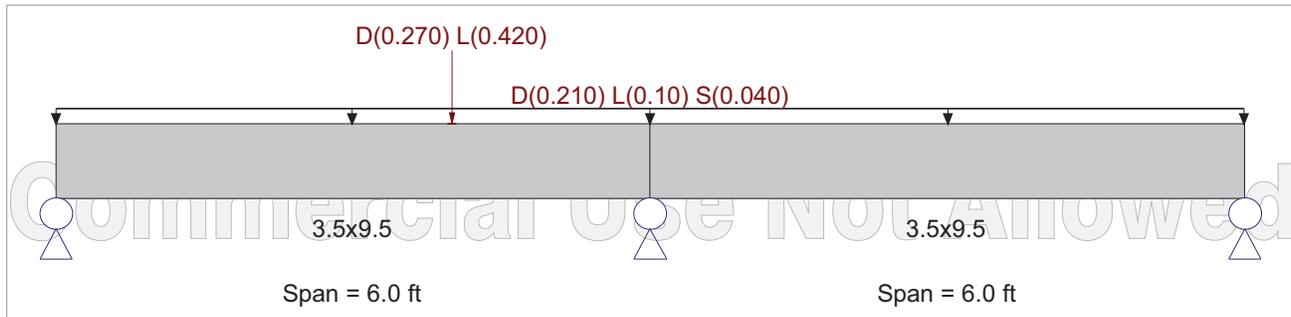
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method : Allowable Stress Design
Load Combination : 2006IBC&ASCE7-05

Fb - Tension	2,600.0 psi	E : Modulus of Elasticity	
Fb - Compr	2,600.0 psi	Ebend- xx	1,900.0 ksi
Fc - Prll	2,510.0 psi	Eminbend - xx	965.71 ksi
Fc - Perp	750.0 psi		
Fv	285.0 psi		
Ft	1,555.0 psi	Density	32.210 pcf

Wood Species : iLevel Truss Joist
Wood Grade : MicroLam LVL 1.9 E

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Loads on all spans...

Uniform Load on ALL spans : D = 0.210, L = 0.10, S = 0.040 k/ft, Tributary Width = 1.0 ft
Point Load : D = 0.270, L = 0.420 k, Starting at : 4.0 ft and placed every 0.0 ft thereafter

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.159	1	Maximum Shear Stress Ratio	=	0.232	: 1
Section used for this span	=	3.5x9.5		Section used for this span	=	3.5x9.5	
fb : Actual	=	412.98 psi		fv : Actual	=	66.10 psi	
FB : Allowable	=	2,600.00 psi		Fv : Allowable	=	285.00 psi	
Load Combination	=	+D+L+H		Load Combination	=	+D+L+H	
Location of maximum on span	=	6.000ft		Location of maximum on span	=	5.215 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward L+Lr+S Deflection		0.008 in	Ratio =	9589			
Max Upward L+Lr+S Deflection		0.000 in	Ratio =	0 <360			
Max Downward Total Deflection		0.016 in	Ratio =	4617			
Max Upward Total Deflection		-0.001 in	Ratio =	98142			

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.0156	2.769		0.0000	0.000
D+L+S	2	0.0062	3.738	L Only	-0.0007	0.923

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.970	3.269	0.740
D Only	0.554	1.861	0.464
L Only	0.326	1.108	0.186
S Only	0.090	0.300	0.090
L+S	0.416	1.408	0.276
D+L	0.880	2.969	0.650
D+S	0.644	2.161	0.554
D+L+S	0.970	3.269	0.740

Educational Version

Wood Beam

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Licensed User :

Description : (FB4) Floor Beam 4 (Wet Mod, E Side)

Material Properties

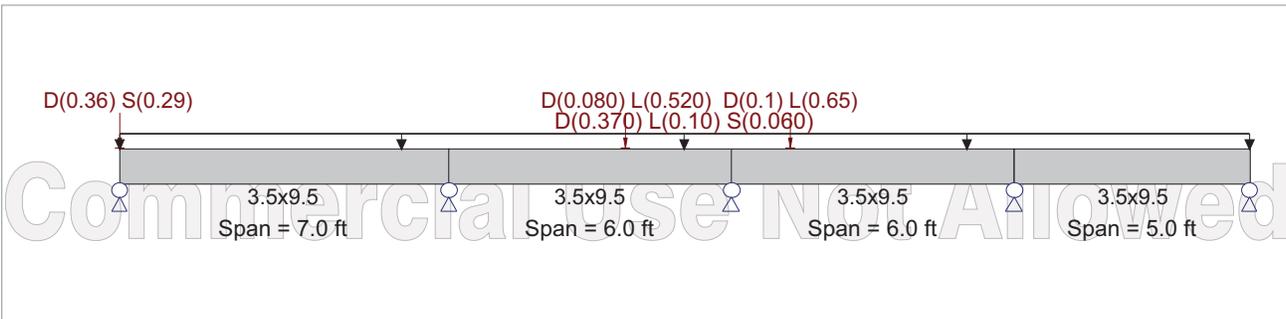
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method : Allowable Stress Design
Load Combination : 2006IBC&ASCE7-05

Fb - Tension	2,600.0 psi	E : Modulus of Elasticity	
Fb - Compr	2,600.0 psi	Ebend- xx	1,900.0 ksi
Fc - Prll	2,510.0 psi	Eminbend- xx	965.71 ksi
Fc - Perp	750.0 psi		
Fv	285.0 psi		
Ft	1,555.0 psi	Density	32.210 pcf

Wood Species : iLevel Truss Joist
Wood Grade : MicroLam LVL 1.9 E

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads

Loads on all spans...

Uniform Load on ALL spans : D = 0.080, L = 0.520 k, Tributary Width = 1.0 ft
Point Load : D = 0.080, L = 0.520 k, Starting at : 10.750 ft and placed every 0.0 ft thereafter

Load for Span Number 1

Point Load : D = 0.360, S = 0.290 k @ 0.0 ft

Load for Span Number 3

Point Load : D = 0.10, L = 0.650 k @ 1.250 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.218 : 1	Maximum Shear Stress Ratio =	0.275 : 1
Section used for this span	3.5x9.5	Section used for this span	3.5x9.5
fb : Actual =	565.98 psi	fv : Actual =	78.52 psi
FB : Allowable =	2,600.00 psi	Fv : Allowable =	285.00 psi
Load Combination	+D+0.750L+0.750S+H	Load Combination	+D+0.750L+0.750S+H
Location of maximum on span =	7.000ft	Location of maximum on span =	6.286 ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward L+Lr+S Deflection	0.009 in	Ratio =	9334
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 < 360
Max Downward Total Deflection	0.033 in	Ratio =	2562
Max Upward Total Deflection	-0.002 in	Ratio =	34057

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.0328	3.143		0.0000	0.000
D+L+S	2	0.0037	3.429	D+S	-0.0021	0.980
D+L+S	3	0.0096	2.939		0.0000	0.980
D+L+S	4	0.0060	2.959	L Only	-0.0001	0.306

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4	Support 5
Overall MAXimum	2.145	4.226	4.102	3.440	0.986
D Only	1.420	2.878	2.229	2.371	0.701
L Only	0.266	0.894	1.542	0.694	0.173

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Wood Beam

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Licensed User :

Description : (FB4) Floor Beam 4 (Wet Mod, E Side)

Vertical Reactions - Unfactored	Support notation : Far left is #1					Values in KIPS
Load Combination	Support 1	Support 2	Support 3	Support 4	Support 5	
S Only	0.459	0.454	0.330	0.375	0.112	
L+S	0.725	1.349	1.872	1.069	0.285	
D+L	1.686	3.772	3.772	3.065	0.874	
D+S	1.879	3.332	2.560	2.746	0.812	
D+L+S	2.145	4.226	4.102	3.440	0.986	

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Wood Beam

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Lic. #: KW-06090096 - Educational Version

Licensed User:

Description: (FB6a) Floor Beam 6 (Private/Wet Marriage Wall) - West 24ft

Material Properties

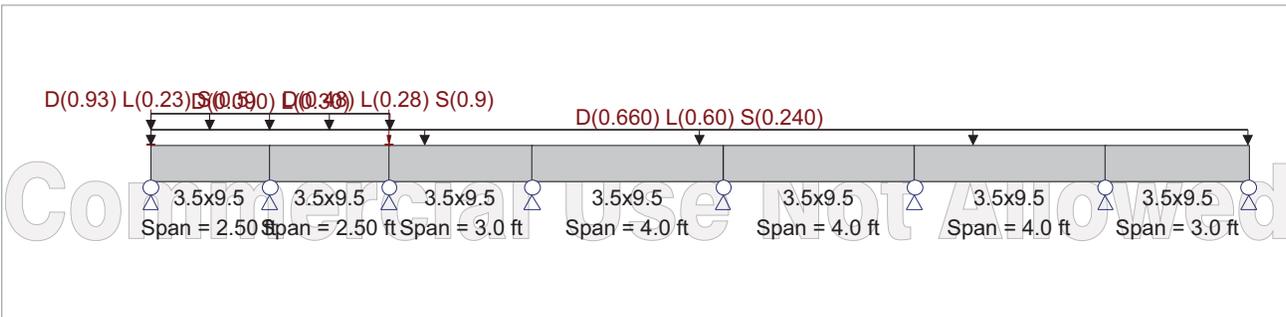
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method: Allowable Stress Design
Load Combination: 2006IBC&ASCE7-05

Fb - Tension	2,600.0 psi	E : Modulus of Elasticity	
Fb - Compr	2,600.0 psi	Ebend- xx	1,900.0 ksi
Fc - Prll	2,510.0 psi	Eminbend- xx	965.71 ksi
Fc - Perp	750.0 psi		
Fv	285.0 psi		
Ft	1,555.0 psi	Density	32.210 pcf

Wood Species : iLevel Truss Joist
Wood Grade : MicroLam LVL 1.9 E

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads

Loads on all spans...

Uniform Load on ALL spans : D = 0.660, L = 0.60, S = 0.240 k/ft, Tributary Width = 1.0 ft
Partial Length Uniform Load : D = 0.090, L = 0.30 k/ft, Extent = 0.0 --> 5.0 ft

Load for Span Number 1

Point Load : D = 0.930, L = 0.230, S = 0.50 k @ 0.0 ft

Load for Span Number 3

Point Load : D = 0.480, L = 0.280, S = 0.90 k @ 0.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.158 : 1	Maximum Shear Stress Ratio	=	0.274 : 1
Section used for this span		3.5x9.5	Section used for this span		3.5x9.5
fb : Actual	=	410.29 psi	fv : Actual	=	78.15 psi
FB : Allowable	=	2,600.00 psi	Fv : Allowable	=	285.00 psi
Load Combination	=	+D+0.750L+0.750S+H	Load Combination	=	+D+0.750L+0.750S+H
Location of maximum on span	=	4.000ft	Location of maximum on span	=	3.265 ft
Span # where maximum occurs	=	Span # 4	Span # where maximum occurs	=	Span # 4
Maximum Deflection					
Max Downward L+Lr+S Deflection		0.003 in	Ratio =		18371
Max Upward L+Lr+S Deflection		0.000 in	Ratio =		0 <360
Max Downward Total Deflection		0.005 in	Ratio =		10281
Max Upward Total Deflection		-0.000 in	Ratio =		182905

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.0018	1.122		0.0000	0.000
D+L+S	2	0.0005	1.378	D+L+S	-0.0001	0.204
D+L+S	3	0.0007	1.286	D+L+S	-0.0002	2.694
D+L+S	4	0.0047	1.959		0.0000	2.694
D+L+S	5	0.0033	2.041	D+L+S	-0.0000	0.082
D+L+S	6	0.0041	2.041		0.0000	0.082
D+L+S	7	0.0021	1.837	D+L+S	-0.0001	0.122

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Wood Beam

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Licensed User :

Description : (FB6a) Floor Beam 6 (Private/Wet Marriage Wall) - West 24ft

Load Combination	Support notation : Far left is #1							
	Support 1	Support 2	Support 3	Support 4	Support 5	Support 6	Support 7	Support 8
Overall MAXimum	3.524	5.416	5.857	5.441	6.152	6.051	5.862	1.637
D Only	1.676	2.150	2.245	2.417	2.722	2.680	2.595	0.725
L Only	1.111	2.591	2.113	2.152	2.452	2.408	2.333	0.652
S Only	0.737	0.676	1.499	0.872	0.978	0.964	0.933	0.261
L+S	1.848	3.266	3.611	3.024	3.430	3.371	3.266	0.912
D+L	2.787	4.740	4.358	4.569	5.174	5.087	4.928	1.377
D+S	2.414	2.826	3.744	3.290	3.701	3.643	3.528	0.986
D+L+S	3.524	5.416	5.857	5.441	6.152	6.051	5.862	1.637

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Wood Beam

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Licensed User :

Description : (FB8) Floor Beam 8 (Living Mod, S Side)

Material Properties

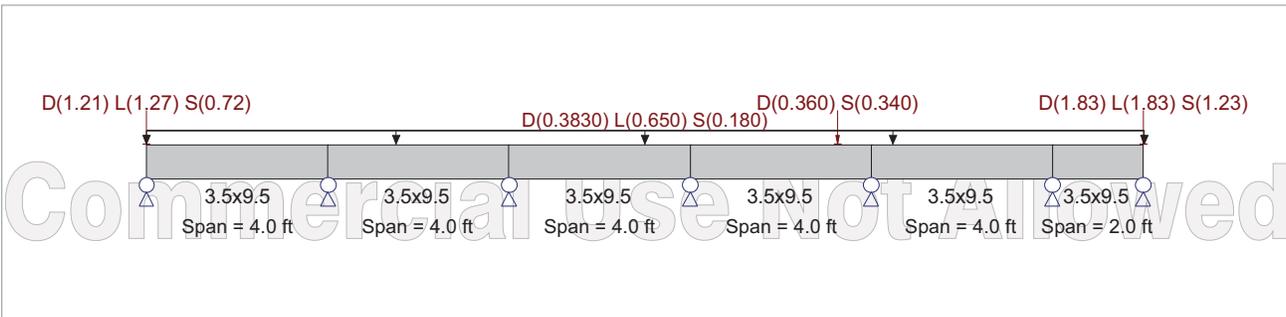
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method : Allowable Stress Design
Load Combination : 2006IBC&ASCE7-05

Fb - Tension	2,600.0 psi	E : Modulus of Elasticity	
Fb - Compr	2,600.0 psi	Ebend- xx	1,900.0 ksi
Fc - Prll	2,510.0 psi	Eminbend- xx	965.71 ksi
Fc - Perp	750.0 psi		
Fv	285.0 psi		
Ft	1,555.0 psi	Density	32.210 pcf

Wood Species : iLevel Truss Joist
Wood Grade : MicroLam LVL 1.9 E

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads

Loads on all spans...

Uniform Load on ALL spans : D = 0.3830, L = 0.650, S = 0.180 k/ft, Tributary Width = 1.0 ft
Point Load : D = 0.360, S = 0.340 k, Starting at : 15.250 ft and placed every 0.0 ft thereafter

Load for Span Number 1

Point Load : D = 1.210, L = 1.270, S = 0.720 k @ 0.0 ft

Load for Span Number 6

Point Load : D = 1.830, L = 1.830, S = 1.230 k @ 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.154	1	Maximum Shear Stress Ratio	=	0.288	: 1
Section used for this span		3.5x9.5		Section used for this span		3.5x9.5	
fb : Actual	=	401.26 psi		fv : Actual	=	82.18 psi	
FB : Allowable	=	2,600.00 psi		Fv : Allowable	=	285.00 psi	
Load Combination		+D+L+H		Load Combination		+D+0.750L+0.750S+H	
Location of maximum on span	=	4.000ft		Location of maximum on span	=	3.265 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 4	
Maximum Deflection							
Max Downward L+Lr+S Deflection		0.005 in	Ratio = 9146				
Max Upward L+Lr+S Deflection		0.000 in	Ratio = 0 < 360				
Max Downward Total Deflection		0.008 in	Ratio = 6225				
Max Upward Total Deflection		-0.000 in	Ratio = 74629				

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.0077	1.796		0.0000	0.000
D+L+S	2	0.0018	2.204	D+L+S	-0.0003	0.327
D+L+S	3	0.0031	1.959		0.0000	0.327
D+L+S	4	0.0034	2.122		0.0000	0.327
D+L+S	5	0.0035	2.204	D+S	-0.0001	0.163
D+L+S	6	0.0000	2.204	D+L+S	-0.0003	0.490

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4	Support 5	Support 6	Support 7
Overall MAXimum	5.124	5.542	4.683	5.021	5.675	4.081	5.513

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Description : (FB8) Floor Beam 8 (Living Mod, S Side)

Load Combination	Support notation : Far left is #1							Values in KIPS
	Support 1	Support 2	Support 3	Support 4	Support 5	Support 6	Support 7	
D Only	1.825	1.775	1.492	1.632	1.943	1.287	2.035	
L Only	2.296	2.947	2.512	2.604	2.673	2.224	2.145	
S Only	1.003	0.820	0.679	0.786	1.059	0.570	1.332	
L+S	3.299	3.767	3.191	3.389	3.732	2.794	3.477	
D+L	4.121	4.721	4.004	4.236	4.616	3.511	4.180	
D+S	2.829	2.595	2.171	2.418	3.002	1.858	3.368	
D+L+S	5.124	5.542	4.683	5.021	5.675	4.081	5.513	

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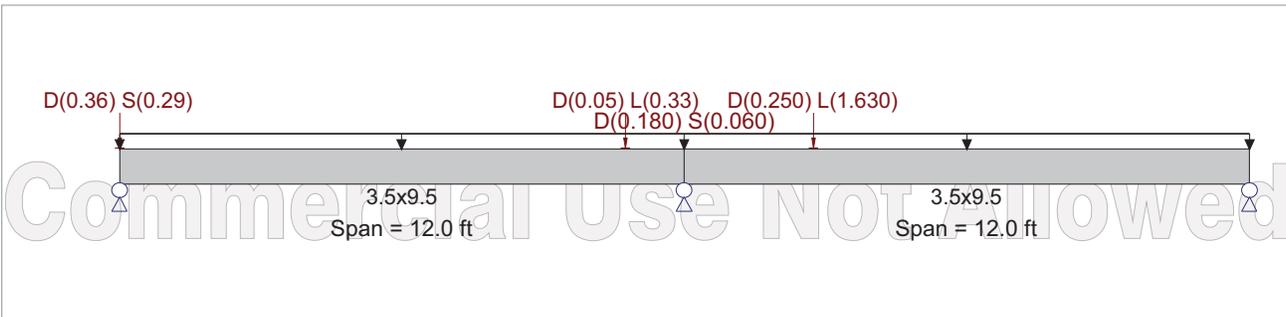
Licensed User :

Description : (FB11) Floor Beam 11 (Garage Mod, E Side)

Material Properties

Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method : Allowable Stress Design	Fb - Tension	2,600.0 psi	E : Modulus of Elasticity	
Load Combination 2006IBC&ASCE7-05	Fb - Compr	2,600.0 psi	Ebend- xx	1,900.0 ksi
	Fc - Prll	2,510.0 psi	Eminbend- xx	965.71 ksi
Wood Species : iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade : MicroLam LVL 1.9 E	Fv	285.0 psi		
	Ft	1,555.0 psi	Density	32.210 pcf
Beam Bracing : Beam is Fully Braced against lateral-torsion buckling				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads

Loads on all spans...

Uniform Load on ALL spans : D = 0.180, S = 0.060 k/ft, Tributary Width = 1.0 ft

Point Load : D = 0.250, L = 1.630 k, Starting at : 14.750 ft and placed every 0.0 ft thereafter

Load for Span Number 1

Point Load : D = 0.360, S = 0.290 k @ 0.0 ft

Point Load : D = 0.050, L = 0.330 k @ 10.750 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.502 1	Maximum Shear Stress Ratio =	0.456 : 1
Section used for this span	3.5x9.5	Section used for this span	3.5x9.5
fb : Actual =	1,304.64 psi	fv : Actual =	129.94 psi
FB : Allowable =	2,600.00 psi	Fv : Allowable =	285.00 psi
Load Combination	+D+0.750L+0.750S+H	Load Combination	+D+L+H
Location of maximum on span =	12.000ft	Location of maximum on span =	12.000ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward L+Lr+S Deflection	0.105 in	Ratio =	1368
Max Upward L+Lr+S Deflection	-0.044 in	Ratio =	3266
Max Downward Total Deflection	0.192 in	Ratio =	750
Max Upward Total Deflection	-0.044 in	Ratio =	3266

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "+" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+S	1	0.0965	4.985	L Only	-0.0358	9.323
D+L+S	2	0.1919	6.369		0.0000	9.323

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	1.747	5.829	1.380
D Only	1.187	3.093	0.879
L Only	-0.108	1.836	0.231
S Only	0.560	0.900	0.270
L+S	0.452	2.736	0.501
D+L	1.079	4.929	1.110

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Wood Beam

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Description : (FB11) Floor Beam 11 (Garage Mod, E Side)

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
D+S	1.747	3.993	1.149
D+L+S	1.639	5.829	1.380

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Description : Deck Hand Rail

Material Properties

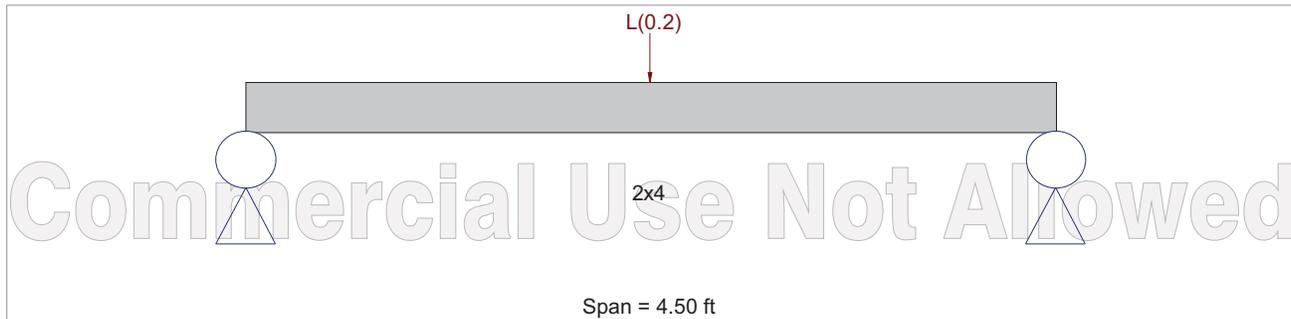
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method : Allowable Stress Design
Load Combination : 2006 IBC & ASCE 7-05

Fb - Tension	875.0 psi	E : Modulus of Elasticity	
Fb - Compr	875.0 psi	Ebend- xx	1,400.0 ksi
Fc - Prll	1,150.0 psi	Eminbend - xx	510.0 ksi
Fc - Perp	425.0 psi		
Fv	135.0 psi		
Ft	450.0 psi	Density	27.060 pcf

Wood Species : Spruce - Pine - Fir
Wood Grade : No. 1/No. 2

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...

Point Load : L = 0.20 @ Center of each Span

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.672	1	Maximum Shear Stress Ratio =	0.212	: 1
Section used for this span	2x4		Section used for this span	2x4	
fb : Actual =	881.63	psi	fv : Actual =	28.57	psi
FB : Allowable =	1,312.50	psi	Fv : Allowable =	135.00	psi
Load Combination =	+D+L+H		Load Combination =	+D+L+H	
Location of maximum on span =	2.250 ft		Location of maximum on span =	0.000 ft	
Span # where maximum occurs =	Span # 1		Span # where maximum occurs =	Span # 1	
Maximum Deflection					
Max Downward L+Lr+S Deflection	0.088	in	Ratio =	612	
Max Upward L+Lr+S Deflection	0.000	in	Ratio =	0	<360
Max Downward Total Deflection	0.088	in	Ratio =	612	
Max Upward Total Deflection	0.000	in	Ratio =	0	<180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "+" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.0881	2.250		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.100	0.100
L Only	0.100	0.100
D+L	0.100	0.100

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Licensed User:

Description: (DJ2) Deck Joist - 9 ft max span

Material Properties

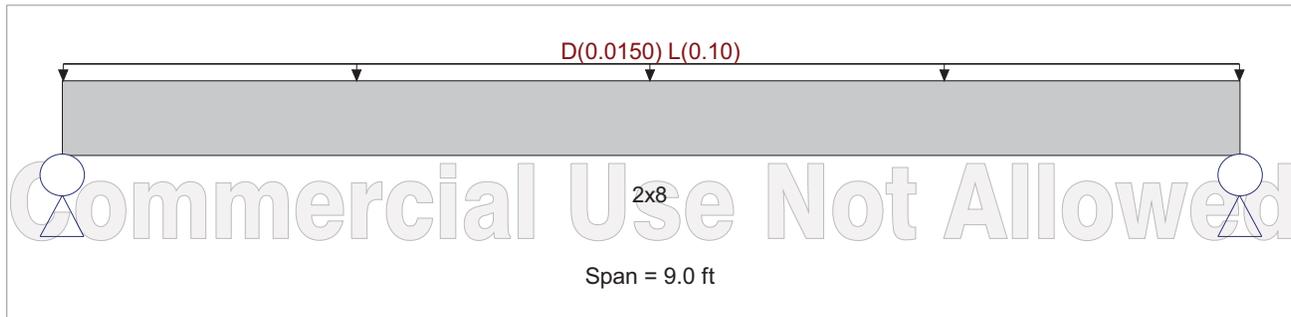
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method: Allowable Stress Design
Load Combination: 2006 IBC & ASCE 7-05

Fb - Tension	1,100.0 psi	E : Modulus of Elasticity	
Fb - Compr	1,100.0 psi	Ebend-xx	1,400.0 ksi
Fc - Prll	1,450.0 psi	Eminbend-xx	510.0 ksi
Fc - Perp	480.0 psi		
Fv	175.0 psi		
Ft	600.0 psi	Density	35.440 pcf

Wood Species : Southern Pine
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 8" Wid

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...

Uniform Load on ALL spans : D = 0.0150, L = 0.10 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.967 : 1	Maximum Shear Stress Ratio =	0.355 : 1
Section used for this span	2x8	Section used for this span	2x8
fb : Actual =	1,063.31 psi	fv : Actual =	62.10 psi
FB : Allowable =	1,100.00 psi	Fv : Allowable =	175.00 psi
Load Combination =	+D+L+H	Load Combination =	+D+L+H
Location of maximum on span =	4.500ft	Location of maximum on span =	8.415ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward L+Lr+S Deflection	0.223 in	Ratio =	484
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 < 360
Max Downward Total Deflection	0.257 in	Ratio =	420
Max Upward Total Deflection	0.000 in	Ratio =	0 < 180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.2566	4.545		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.518	0.518
D Only	0.068	0.068
L Only	0.450	0.450
D+L	0.518	0.518

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Wood Beam

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Licensed User:

Description: (DJ3) Deck Joist - 12 ft max span

Material Properties

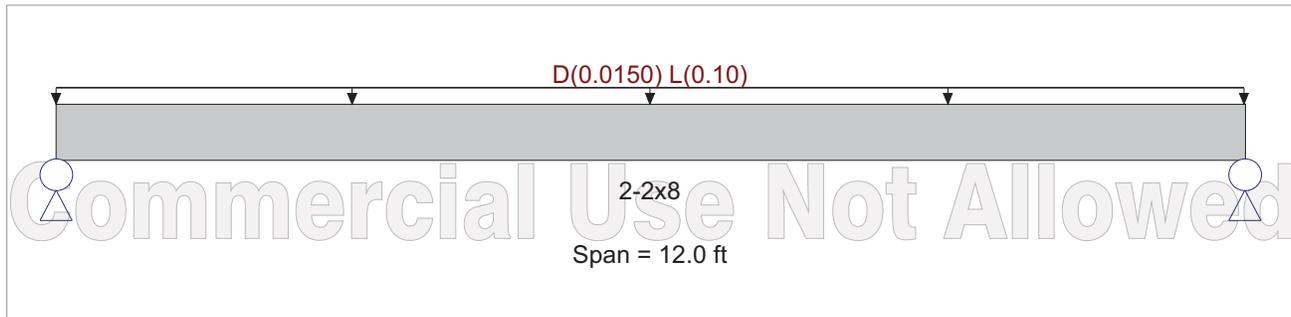
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method: Allowable Stress Design
Load Combination: 2006 IBC & ASCE 7-05

Fb - Tension	1,100.0 psi	E : Modulus of Elasticity	
Fb - Compr	1,100.0 psi	Ebend-xx	1,400.0 ksi
Fc - Prll	1,450.0 psi	Eminbend-xx	510.0 ksi
Fc - Perp	480.0 psi		
Fv	175.0 psi		
Ft	600.0 psi	Density	35.440 pcf

Wood Species : Southern Pine
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 8" Wid

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...

Uniform Load on ALL spans : D = 0.0150, L = 0.10 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.859 : 1	Maximum Shear Stress Ratio =	0.245 : 1
Section used for this span	2-2x8	Section used for this span	2-2x8
fb : Actual =	945.16 psi	fv : Actual =	42.83 psi
FB : Allowable =	1,100.00 psi	Fv : Allowable =	175.00 psi
Load Combination =	+D+L+H	Load Combination =	+D+L+H
Location of maximum on span =	6.000 ft	Location of maximum on span =	0.000 ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward L+Lr+S Deflection	0.353 in	Ratio =	408
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 < 360
Max Downward Total Deflection	0.405 in	Ratio =	355
Max Upward Total Deflection	0.000 in	Ratio =	0 < 180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.4055	6.060		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.690	0.690
D Only	0.090	0.090
L Only	0.600	0.600
D+L	0.690	0.690

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Wood Beam

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Licensed User :

Description : (DB1) Deck Bearing Beam 1

Material Properties

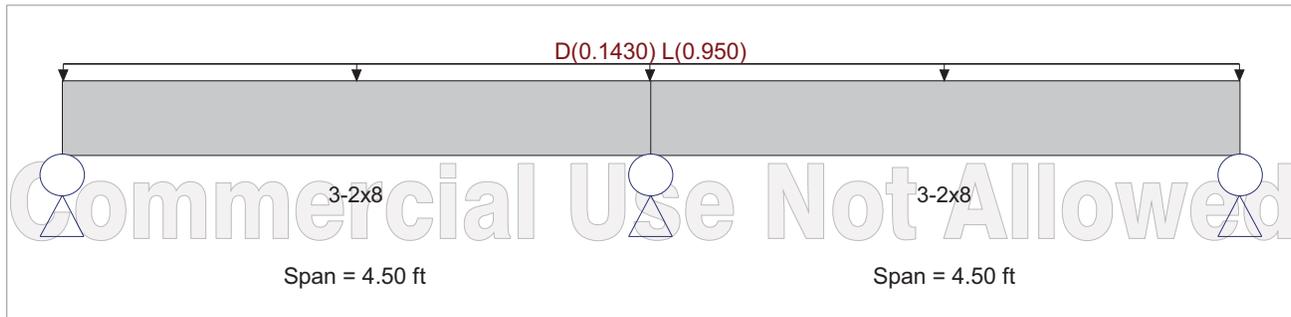
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method : Allowable Stress Design
Load Combination : 2006 IBC & ASCE 7-05

Fb - Tension	1,100.0 psi	E : Modulus of Elasticity	
Fb - Compr	1,100.0 psi	Ebend-xx	1,400.0 ksi
Fc - Prll	1,450.0 psi	Eminbend-xx	510.0 ksi
Fc - Perp	480.0 psi		
Fv	175.0 psi		
Ft	600.0 psi	Density	35.440 pcf

Wood Species : Southern Pine
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 8" Wid

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...

Uniform Load on ALL spans : D = 0.1430, L = 0.950 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.766	1	Maximum Shear Stress Ratio =	0.639	: 1
Section used for this span	3-2x8		Section used for this span	3-2x8	
fb : Actual =	842.17 psi		fv : Actual =	111.76 psi	
FB : Allowable =	1,100.00 psi		Fv : Allowable =	175.00 psi	
Load Combination	+D+L+H		Load Combination	+D+L+H	
Location of maximum on span	4.500ft		Location of maximum on span	3.912ft	
Span # where maximum occurs	Span # 1		Span # where maximum occurs	Span # 1	
Maximum Deflection					
Max Downward L+Lr+S Deflection	0.018 in	Ratio =	2919		
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0	<360	
Max Downward Total Deflection	0.021 in	Ratio =	2537		
Max Upward Total Deflection	0.000 in	Ratio =	0	<180	

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.0213	1.904		0.0000	0.000
D+L	2	0.0210	2.631		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	1.844	6.148	1.844
D Only	0.241	0.804	0.241
L Only	1.603	5.344	1.603
D+L	1.844	6.148	1.844

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Wood Beam

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Description : (DB2) Deck Bearing Beam 2

Material Properties

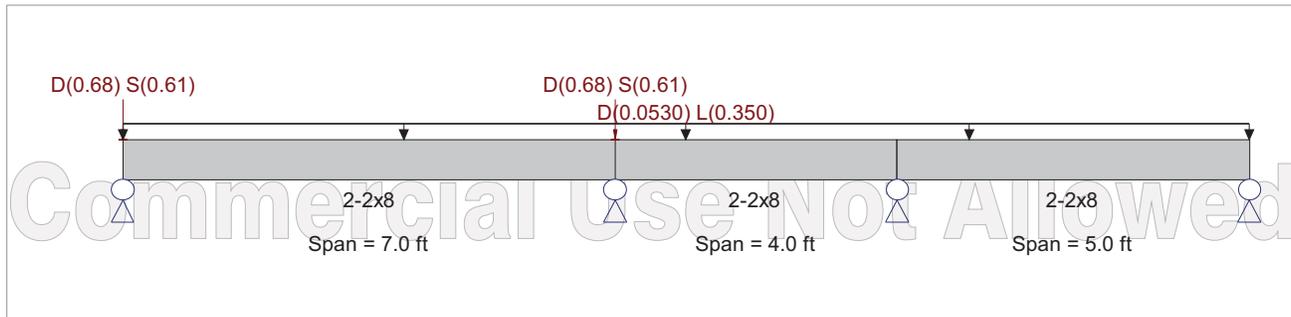
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method : Allowable Stress Design
Load Combination : 2006 IBC & ASCE 7-05

Fb - Tension	1,100.0 psi	E : Modulus of Elasticity	
Fb - Compr	1,100.0 psi	Ebend- xx	1,400.0 ksi
Fc - Prll	1,450.0 psi	Eminbend- xx	510.0 ksi
Fc - Perp	480.0 psi		
Fv	175.0 psi		
Ft	600.0 psi	Density	35.440 pcf

Wood Species : Southern Pine
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 8" Wid

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...

Uniform Load on ALL spans : D = 0.0530, L = 0.350 k/ft, Tributary Width = 1.0 ft

Load for Span Number 1

Point Load : D = 0.680, S = 0.610 k @ 0.0 ft

Point Load : D = 0.680, S = 0.610 k @ 7.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.723 : 1	Maximum Shear Stress Ratio	=	0.569 : 1
Section used for this span		2-2x8	Section used for this span		2-2x8
fb : Actual	=	795.36 psi	fv : Actual	=	99.66 psi
FB : Allowable	=	1,100.00 psi	Fv : Allowable	=	175.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	7.000ft	Location of maximum on span	=	6.468 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward L+Lr+S Deflection		0.084 in	Ratio =		994
Max Upward L+Lr+S Deflection		-0.013 in	Ratio =		3713
Max Downward Total Deflection		0.097 in	Ratio =		863
Max Upward Total Deflection		-0.015 in	Ratio =		3225

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "+" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.0973	3.190		0.0000	0.000
	2	0.0000	3.190	D+L+S	-0.0149	1.620
D+L	3	0.0295	2.658		0.0000	1.620

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Overall MAXimum	2.452	4.023	1.680	0.873
D Only	0.833	1.039	0.221	0.115
L Only	1.009	2.374	1.459	0.758
S Only	0.610	0.610	0.000	-0.000
L+S	1.619	2.984	1.459	0.758
D+L	1.842	3.413	1.680	0.873
D+S	1.443	1.649	0.221	0.115

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Description : (DB2) Deck Bearing Beam 2

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
D+L+S	2.452	4.023	1.680	0.873

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Description: (DB4) Deck Bearing Beam 4

Material Properties

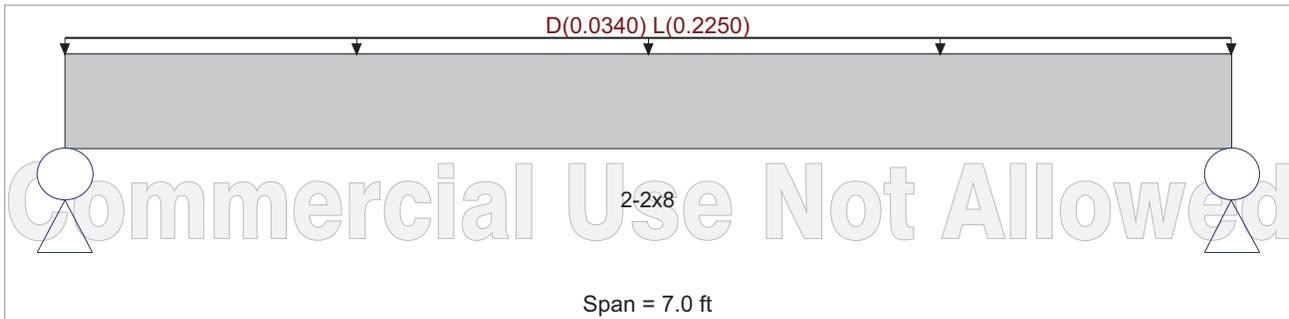
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method: Allowable Stress Design
Load Combination: 2006 IBC & ASCE 7-05

Fb - Tension	1,100.0 psi	E : Modulus of Elasticity	
Fb - Compr	1,100.0 psi	Ebend-xx	1,400.0 ksi
Fc - Prll	1,450.0 psi	Eminbend-xx	510.0 ksi
Fc - Perp	480.0 psi		
Fv	175.0 psi		
Ft	600.0 psi	Density	35.440 pcf

Wood Species : Southern Pine
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 8" Wid

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...

Uniform Load on ALL spans : D = 0.0340, L = 0.2250 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.658 1	Maximum Shear Stress Ratio =	0.297 : 1
Section used for this span	2-2x8	Section used for this span	2-2x8
fb : Actual =	724.34 psi	fv : Actual =	51.89 psi
FB : Allowable =	1,100.00 psi	Fv : Allowable =	175.00 psi
Load Combination =	+D+L+H	Load Combination =	+D+L+H
Location of maximum on span =	3.500ft	Location of maximum on span =	6.405ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward L+Lr+S Deflection	0.092 in	Ratio =	914
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.106 in	Ratio =	794
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.1057	3.535		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.907	0.907
D Only	0.119	0.119
L Only	0.788	0.788
D+L	0.907	0.907

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Wood Beam

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Description: (DB5) Deck Bearing Beam 5

Material Properties

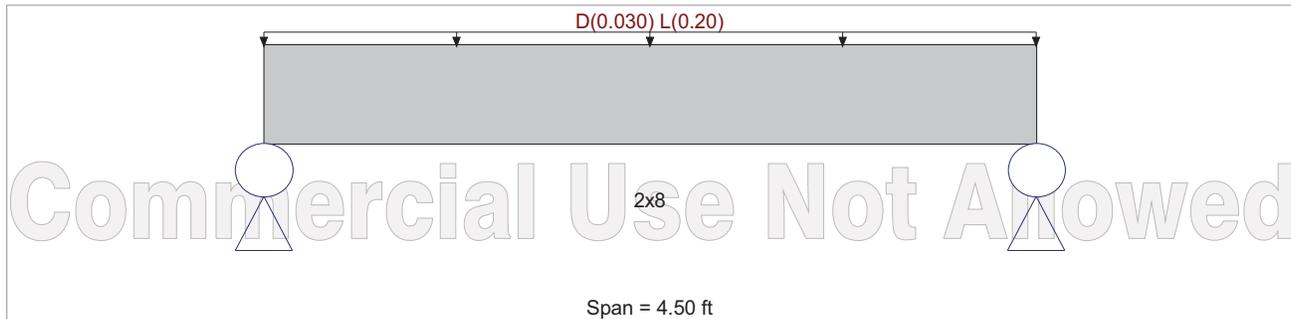
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method: Allowable Stress Design
Load Combination: 2006 IBC & ASCE 7-05

Fb - Tension	1,100.0 psi	E : Modulus of Elasticity	
Fb - Compr	1,100.0 psi	Ebend-xx	1,400.0 ksi
Fc - Prll	1,450.0 psi	Eminbend-xx	510.0 ksi
Fc - Perp	480.0 psi		
Fv	175.0 psi		
Ft	600.0 psi	Density	35.440 pcf

Wood Species : Southern Pine
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 8" Wid

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...

Uniform Load on ALL spans : D = 0.030, L = 0.20 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.483 : 1	Maximum Shear Stress Ratio =	0.302 : 1
Section used for this span	2x8	Section used for this span	2x8
fb : Actual =	531.65 psi	fv : Actual =	52.82 psi
FB : Allowable =	1,100.00 psi	Fv : Allowable =	175.00 psi
Load Combination =	+D+L+H	Load Combination =	+D+L+H
Location of maximum on span =	2.250 ft	Location of maximum on span =	3.915 ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward L+Lr+S Deflection	0.028 in	Ratio =	1936
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.032 in	Ratio =	1683
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.0321	2.273		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.518	0.518
D Only	0.068	0.068
L Only	0.450	0.450
D+L	0.518	0.518

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Wood Beam

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Description: (DB6) Deck Bearing Beam 6

Material Properties

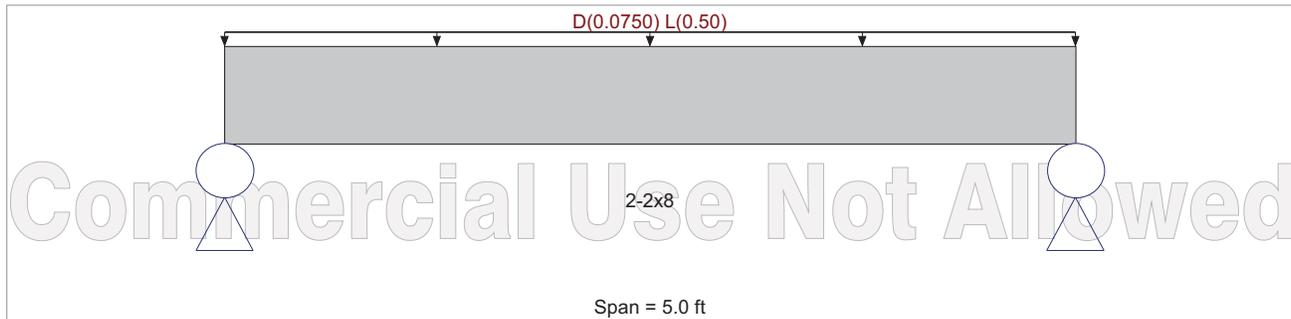
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method: Allowable Stress Design
Load Combination: 2006 IBC & ASCE 7-05

Fb - Tension	1,100.0 psi	E : Modulus of Elasticity	
Fb - Compr	1,100.0 psi	Ebend- xx	1,400.0 ksi
Fc - Prll	1,450.0 psi	Eminbend - xx	510.0 ksi
Fc - Perp	480.0 psi		
Fv	175.0 psi		
Ft	600.0 psi	Density	35.440 pcf

Wood Species : Southern Pine
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 8" Wid

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...

Uniform Load on ALL spans : D = 0.0750, L = 0.50 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.746 : 1	Maximum Shear Stress Ratio =	0.431 : 1
Section used for this span	2-2x8	Section used for this span	2-2x8
fb : Actual =	820.45 psi	fv : Actual =	75.34 psi
FB : Allowable =	1,100.00 psi	Fv : Allowable =	175.00 psi
Load Combination	+D+L+H	Load Combination	+D+L+H
Location of maximum on span	2.500 ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward L+Lr+S Deflection	0.053 in	Ratio =	1129
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.061 in	Ratio =	981
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.0611	2.525		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.438	1.438
D Only	0.188	0.188
L Only	1.250	1.250
D+L	1.438	1.438

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Wood Beam

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Description: (DB8) Deck Bearing Beam 8

Material Properties

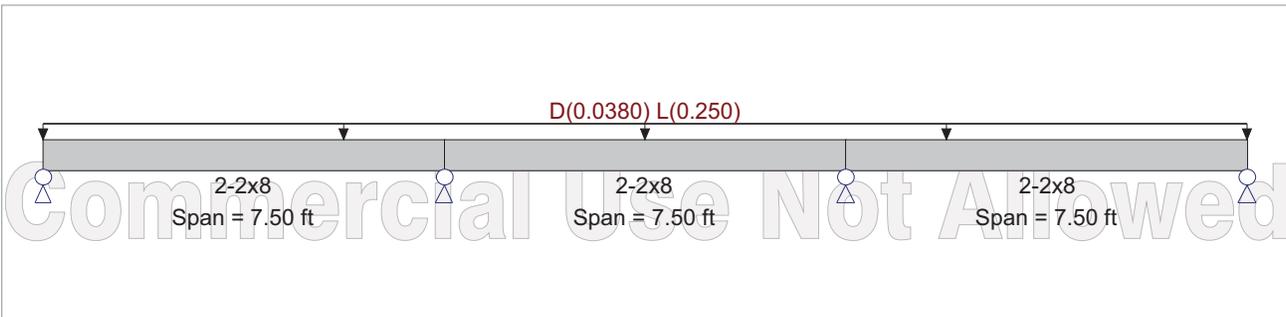
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method: Allowable Stress Design
Load Combination: 2006 IBC & ASCE 7-05

Fb - Tension	1,100.0 psi	E : Modulus of Elasticity	
Fb - Compr	1,100.0 psi	Ebend- xx	1,400.0 ksi
Fc - Prll	1,450.0 psi	Eminbend- xx	510.0 ksi
Fc - Perp	480.0 psi		
Fv	175.0 psi		
Ft	600.0 psi	Density	35.440 pcf

Wood Species : Southern Pine
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 8" Wid

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...

Uniform Load on ALL spans : D = 0.0380, L = 0.250 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.672	1	Maximum Shear Stress Ratio =	0.446	: 1
Section used for this span	2-2x8		Section used for this span	2-2x8	
fb : Actual =	739.69	psi	fv : Actual =	78.07	psi
FB : Allowable =	1,100.00	psi	Fv : Allowable =	175.00	psi
Load Combination =	+D+L+H		Load Combination =	+D+L+H	
Location of maximum on span =	7.500	ft	Location of maximum on span =	6.930	ft
Span # where maximum occurs =	Span # 1		Span # where maximum occurs =	Span # 1	
Maximum Deflection					
Max Downward L+Lr+S Deflection	0.072	in	Ratio =	1246	
Max Upward L+Lr+S Deflection	-0.005	in	Ratio =	18671	
Max Downward Total Deflection	0.083	in	Ratio =	1082	
Max Upward Total Deflection	-0.006	in	Ratio =	16207	

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.0832	3.418		0.0000	0.000
D+L	2	0.0055	3.797	D+L	-0.0056	0.854
D+L	3	0.0819	4.177		0.0000	0.854

Vertical Reactions - Unfactored

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Overall MAXimum	0.864	2.376	2.376	0.864
D Only	0.114	0.313	0.313	0.114
L Only	0.750	2.062	2.062	0.750
D+L	0.864	2.376	2.376	0.864

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Wood Beam

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Description : (DB9) Deck Bearing Beam 9

Material Properties

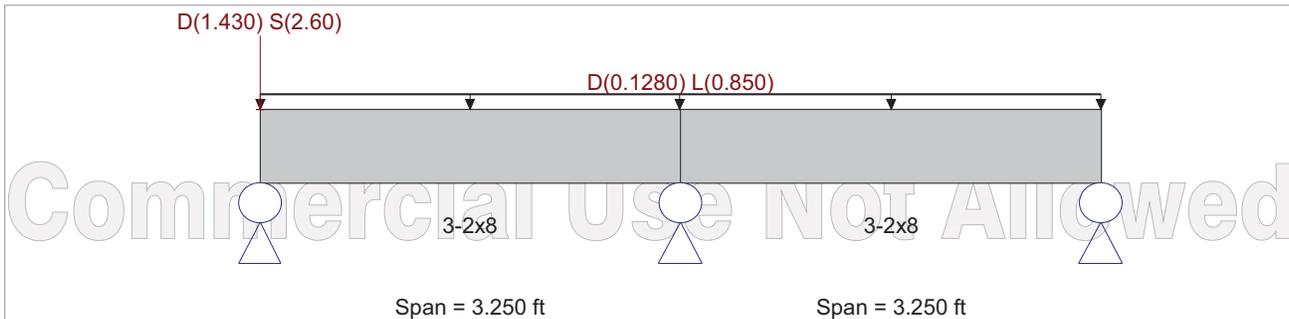
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method : Allowable Stress Design
Load Combination : 2006 IBC & ASCE 7-05

Fb - Tension	1,100.0 psi	E : Modulus of Elasticity	
Fb - Compr	1,100.0 psi	Ebend- xx	1,400.0 ksi
Fc - Prll	1,450.0 psi	Eminbend- xx	510.0 ksi
Fc - Perp	480.0 psi		
Fv	175.0 psi		
Ft	600.0 psi	Density	35.440 pcf

Wood Species : Southern Pine
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 8" Wid

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...

Uniform Load on ALL spans : D = 0.1280, L = 0.850 k/ft, Tributary Width = 1.0 ft
Point Load : D = 1.430, S = 2.60 k, Starting at : 0.0 ft and placed every 0.0 ft thereafter

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.357 : 1	Maximum Shear Stress Ratio =	0.368 : 1
Section used for this span	3-2x8	Section used for this span	3-2x8
fb : Actual =	393.06 psi	fv : Actual =	64.36 psi
FB : Allowable =	1,100.00 psi	Fv : Allowable =	175.00 psi
Load Combination	+D+L+H	Load Combination	+D+L+H
Location of maximum on span	3.250 ft	Location of maximum on span	2.650 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward L+Lr+S Deflection	0.005 in	Ratio =	8662
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 < 360
Max Downward Total Deflection	0.005 in	Ratio =	7528
Max Upward Total Deflection	0.000 in	Ratio =	0 < 180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "+" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.0052	1.375		0.0000	0.000
D+L	2	0.0051	1.900		0.0000	0.000

Vertical Reactions - Unfactored

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	5.222	3.973	1.192
D Only	1.586	0.520	0.156
L Only	1.036	3.453	1.036
S Only	2.600	0.000	-0.000
L+S	3.636	3.453	1.036
D+L	2.622	3.973	1.192
D+S	4.186	0.520	0.156
D+L+S	5.222	3.973	1.192

Commercial Use Not Allowed

Wood Beam

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Description: (DB10) Deck Bearing Beam 10

Material Properties

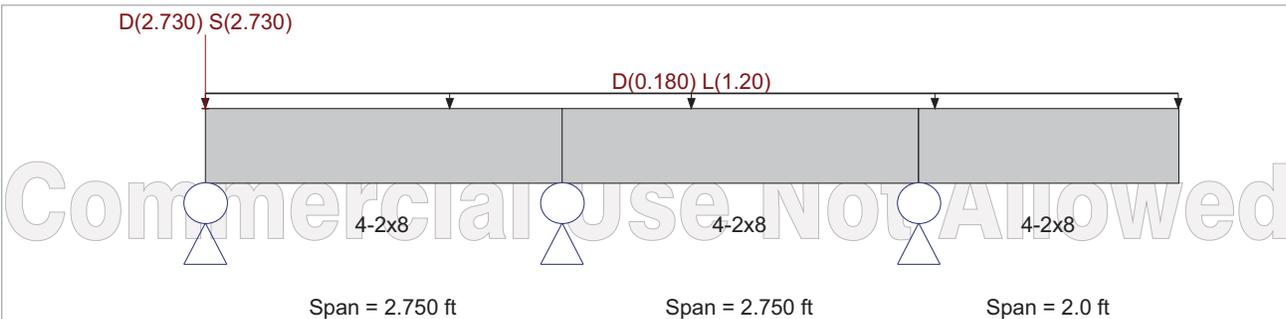
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method: Allowable Stress Design
Load Combination: 2006 IBC & ASCE 7-05

Fb - Tension	1,100.0 psi	E : Modulus of Elasticity	
Fb - Compr	1,100.0 psi	Ebend-xx	1,400.0 ksi
Fc - Prll	1,450.0 psi	Eminbend-xx	510.0 ksi
Fc - Perp	480.0 psi		
Fv	175.0 psi		
Ft	600.0 psi	Density	35.440 pcf

Wood Species : Southern Pine
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 8" Wid

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...

Uniform Load on ALL spans : D = 0.180, L = 1.20 k/ft, Tributary Width = 1.0 ft
Point Load : D = 2.730, S = 2.730 k, Starting at : 0.0 ft and placed every 0.0 ft thereafter

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.573 : 1	Maximum Shear Stress Ratio =	0.386 : 1
Section used for this span	4-2x8	Section used for this span	4-2x8
fb : Actual =	630.11 psi	fv : Actual =	67.46 psi
FB : Allowable =	1,100.00 psi	Fv : Allowable =	175.00 psi
Load Combination	+D+L+H	Load Combination	+D+L+H
Location of maximum on span	2.750 ft	Location of maximum on span	2.750 ft
Span # where maximum occurs	Span # 2	Span # where maximum occurs	Span # 2
Maximum Deflection			
Max Downward L+Lr+S Deflection	0.034 in	Ratio =	1426
Max Upward L+Lr+S Deflection	-0.004 in	Ratio =	9207
Max Downward Total Deflection	0.039 in	Ratio =	1240
Max Upward Total Deflection	-0.004 in	Ratio =	8006

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "+" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.0049	1.323		0.0000	0.000
	2	0.0000	1.323	D+L+S	-0.0041	1.810
D+L+S	3	0.0387	2.000		0.0000	1.810

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Overall MAXimum	7.134	3.238	5.438	
D Only	2.948	0.422	0.709	
L Only	1.456	2.816	4.728	
S Only	2.730	0.000	-0.000	
L+S	4.186	2.816	4.728	
D+L	4.404	3.238	5.438	
D+S	5.678	0.422	0.709	
D+L+S	7.134	3.238	5.438	

Commercial Use Not Allowed

Wood Beam

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Description : (DB12) Deck Bearing Beam 12

Material Properties

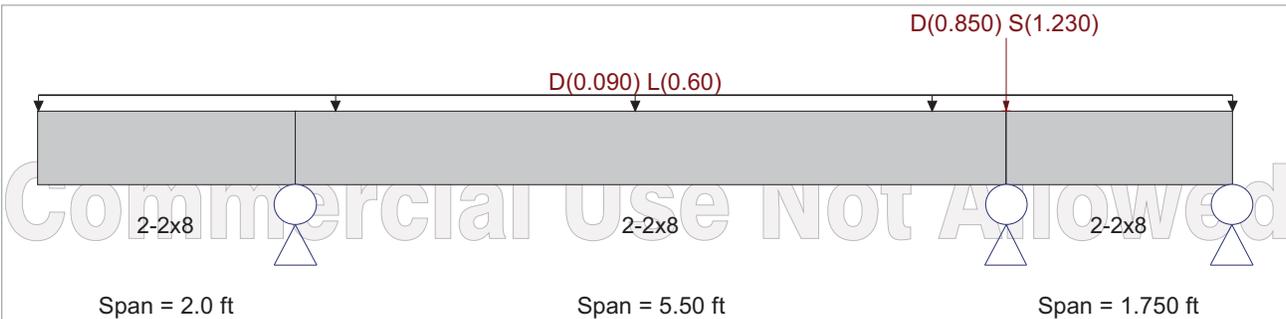
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method : Allowable Stress Design
Load Combination : 2006 IBC & ASCE 7-05

Fb - Tension	1,100.0 psi	E : Modulus of Elasticity	
Fb - Compr	1,100.0 psi	Ebend-xx	1,400.0 ksi
Fc - Prll	1,450.0 psi	Eminbend-xx	510.0 ksi
Fc - Perp	480.0 psi		
Fv	175.0 psi		
Ft	600.0 psi	Density	35.440 pcf

Wood Species : Southern Pine
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 8" Wid

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...

Uniform Load on ALL spans : D = 0.090, L = 0.60 k/ft, Tributary Width = 1.0 ft
Point Load : D = 0.850, S = 1.230 k, Starting at : 7.50 ft and placed every 0.0 ft thereafter

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.631 : 1	Maximum Shear Stress Ratio =	0.606 : 1
Section used for this span	2-2x8	Section used for this span	2-2x8
fb : Actual =	693.85 psi	fv : Actual =	106.11 psi
FB : Allowable =	1,100.00 psi	Fv : Allowable =	175.00 psi
Load Combination	+D+L+H	Load Combination	+D+L+H
Location of maximum on span =	5.500 ft	Location of maximum on span =	4.943 ft
Span # where maximum occurs =	Span # 2	Span # where maximum occurs =	Span # 2
Maximum Deflection			
Max Downward L+Lr+S Deflection	0.031 in	Ratio =	2115
Max Upward L+Lr+S Deflection	-0.003 in	Ratio =	8254
Max Downward Total Deflection	0.036 in	Ratio =	1839
Max Upward Total Deflection	-0.003 in	Ratio =	7177

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "+" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L+S	1	0.0000	0.000	D+L+S	-0.0047	0.810
	2	0.0359	2.785	D+L+S	0.0000	0.810
	3	0.0000	2.785	D+L+S	-0.0029	0.687

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Overall MAXimum		3.252	5.475	-0.265
D Only		0.424	1.293	-0.035
L Only		2.828	2.952	-0.230
S Only		0.000	1.230	0.000
L+S		2.828	4.182	-0.230
D+L		3.252	4.245	-0.265
D+S		0.424	2.523	-0.035
D+L+S		3.252	5.475	-0.265

Commercial Use Not Allowed

Wood Beam

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Description: (DB13) Deck Bearing Beam 13

Material Properties

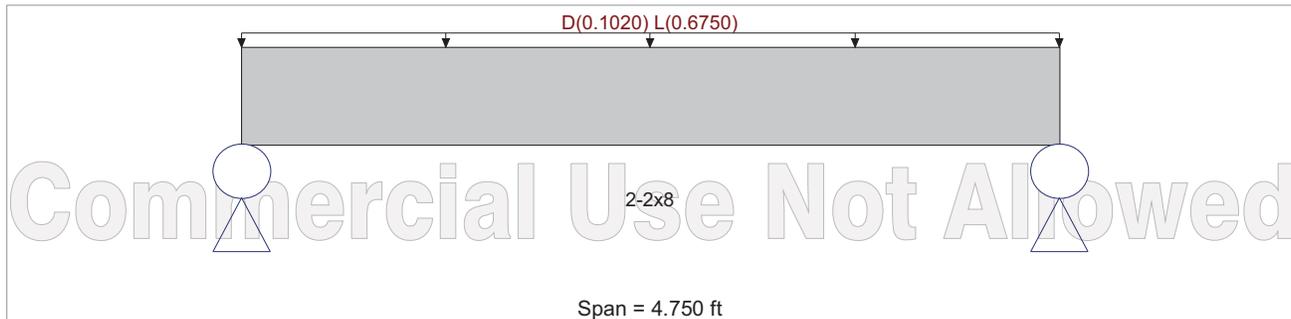
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method: Allowable Stress Design
Load Combination: 2006 IBC & ASCE 7-05

Fb - Tension	1,100.0 psi	E : Modulus of Elasticity	
Fb - Compr	1,100.0 psi	Ebend-xx	1,400.0 ksi
Fc - Prll	1,450.0 psi	Eminbend-xx	510.0 ksi
Fc - Perp	480.0 psi		
Fv	175.0 psi		
Ft	600.0 psi	Density	35.440 pcf

Wood Species : Southern Pine
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 8" Wid

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...

Uniform Load on ALL spans : D = 0.1020, L = 0.6750 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.910 : 1	Maximum Shear Stress Ratio =	0.545 : 1
Section used for this span	2-2x8	Section used for this span	2-2x8
fb : Actual =	1,000.58 psi	fv : Actual =	95.45 psi
FB : Allowable =	1,100.00 psi	Fv : Allowable =	175.00 psi
Load Combination =	+D+L+H	Load Combination =	+D+L+H
Location of maximum on span =	2.375 ft	Location of maximum on span =	0.000 ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward L+Lr+S Deflection	0.058 in	Ratio =	975
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.067 in	Ratio =	847
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.0673	2.399		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.845	1.845
D Only	0.242	0.242
L Only	1.603	1.603
D+L	1.845	1.845

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Wood Beam

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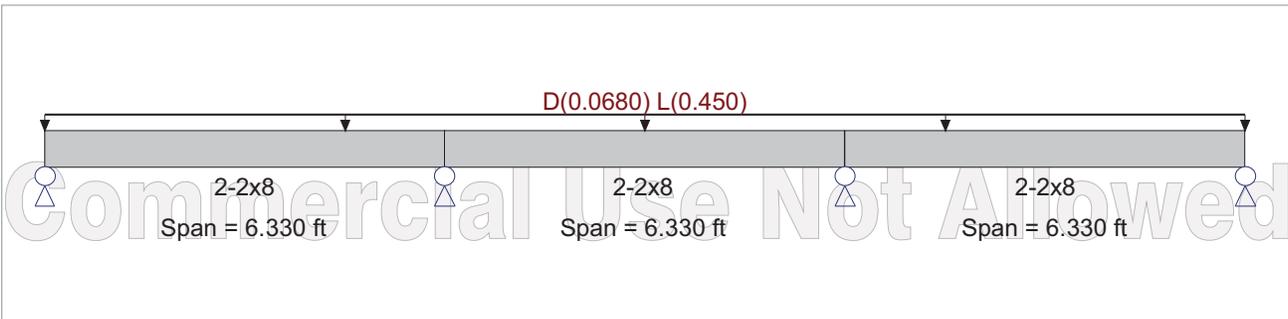
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Description: (DB14) Deck Bearing Beam 14

Material Properties

Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method : Allowable Stress Design	Fb - Tension	1,100.0 psi	E : Modulus of Elasticity	
Load Combination 2006 IBC & ASCE 7-05	Fb - Compr	1,100.0 psi	Ebend-xx	1,400.0 ksi
Wood Species : Southern Pine	Fc - Prll	1,450.0 psi	Eminbend-xx	510.0 ksi
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 8" Wid	Fc - Perp	480.0 psi	Fv	175.0 psi
Beam Bracing : Beam is Fully Braced against lateral-torsion buckling	Ft	600.0 psi	Density	35.440 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...

Uniform Load on ALL spans : D = 0.0680, L = 0.450 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.862	1	Maximum Shear Stress Ratio =	0.661	: 1
Section used for this span	2-2x8		Section used for this span	2-2x8	
fb : Actual =	947.70	psi	fv : Actual =	115.64	psi
FB : Allowable =	1,100.00	psi	Fv : Allowable =	175.00	psi
Load Combination =	+D+L+H		Load Combination =	+D+L+H	
Location of maximum on span =	6.330	ft	Location of maximum on span =	6.330	ft
Span # where maximum occurs =	Span # 1		Span # where maximum occurs =	Span # 2	
Maximum Deflection					
Max Downward L+Lr+S Deflection	0.066	in	Ratio =	1152	
Max Upward L+Lr+S Deflection	-0.004	in	Ratio =	17253	
Max Downward Total Deflection	0.076	in	Ratio =	1000	
Max Upward Total Deflection	-0.005	in	Ratio =	14988	

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.0759	2.885		0.0000	0.000
D+L	2	0.0050	3.205	D+L	-0.0051	0.721
D+L	3	0.0748	3.526		0.0000	0.721

Vertical Reactions - Unfactored

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Overall MAXimum	1.312	3.607	3.607	1.312
D Only	0.172	0.473	0.473	0.172
L Only	1.139	3.133	3.133	1.139
D+L	1.312	3.607	3.607	1.312

Commercial Use Not Allowed

Wood Beam

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Description: (DB15) Deck Bearing Beam 15

Material Properties

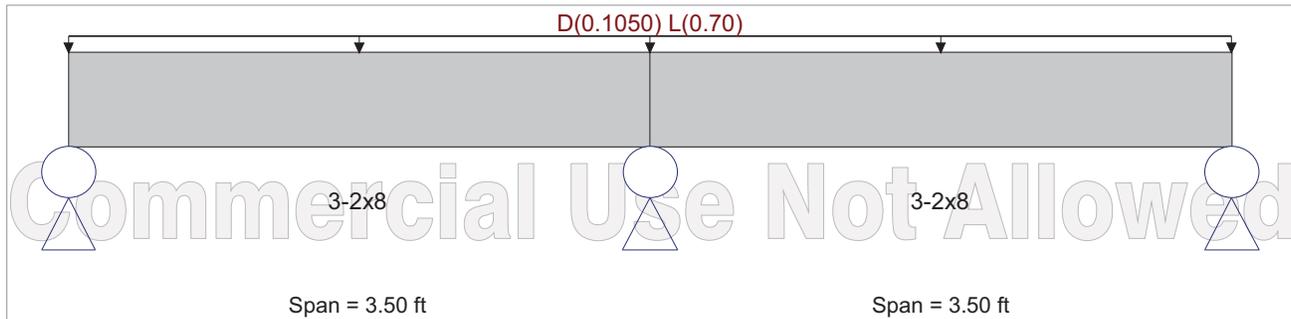
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method: Allowable Stress Design
Load Combination: 2006 IBC & ASCE 7-05

Fb - Tension	1,100.0 psi	E : Modulus of Elasticity	
Fb - Compr	1,100.0 psi	Ebend- xx	1,400.0 ksi
Fc - Prll	1,450.0 psi	Eminbend - xx	510.0 ksi
Fc - Perp	480.0 psi		
Fv	175.0 psi		
Ft	600.0 psi	Density	35.440 pcf

Wood Species : Southern Pine
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 8" Wid

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...

Uniform Load on ALL spans : D = 0.1050, L = 0.70 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.341 : 1	Maximum Shear Stress Ratio =	0.337 : 1
Section used for this span	3-2x8	Section used for this span	3-2x8
fb : Actual =	375.22 psi	fv : Actual =	59.04 psi
FB : Allowable =	1,100.00 psi	Fv : Allowable =	175.00 psi
Load Combination =	+D+L+H	Load Combination =	+D+L+H
Location of maximum on span =	3.500 ft	Location of maximum on span =	3.500 ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward L+Lr+S Deflection	0.005 in	Ratio =	8421
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.006 in	Ratio =	7323
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.0057	1.481		0.0000	0.000
D+L	2	0.0057	2.046		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	1.057	3.522	1.057
D Only	0.138	0.459	0.138
L Only	0.919	3.062	0.919
D+L	1.057	3.522	1.057

Commercial Use Not Allowed

Educational Version

Wood Beam

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Description: (DB16) Deck Bearing Beam 16

Material Properties

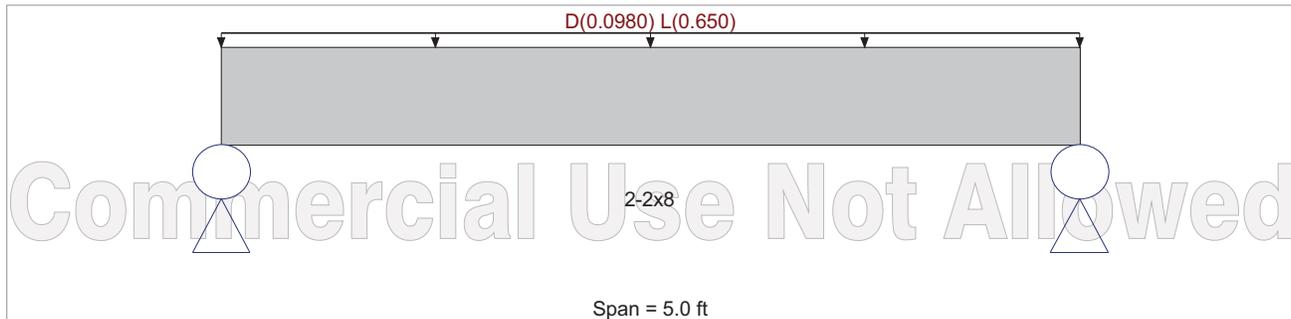
Calculations per NDS 2005, IBC 2009, CBC 2010, ASCE 7-05

Analysis Method: Allowable Stress Design
Load Combination: 2006 IBC & ASCE 7-05

Fb - Tension	1,100.0 psi	E : Modulus of Elasticity	
Fb - Compr	1,100.0 psi	Ebend- xx	1,400.0 ksi
Fc - Prll	1,450.0 psi	Eminbend - xx	510.0 ksi
Fc - Perp	480.0 psi		
Fv	175.0 psi		
Ft	600.0 psi	Density	35.440 pcf

Wood Species : Southern Pine
Wood Grade : No.2 Non-Dense: 2" - 4" Thick : 8" Wid

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...

Uniform Load on ALL spans : D = 0.0980, L = 0.650 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.970 : 1	Maximum Shear Stress Ratio =	0.560 : 1
Section used for this span	2-2x8	Section used for this span	2-2x8
fb : Actual =	1,067.30 psi	fv : Actual =	98.01 psi
FB : Allowable =	1,100.00 psi	Fv : Allowable =	175.00 psi
Load Combination =	+D+L+H	Load Combination =	+D+L+H
Location of maximum on span =	2.500 ft	Location of maximum on span =	0.000 ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward L+Lr+S Deflection	0.069 in	Ratio =	868
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.079 in	Ratio =	754
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	0.0795	2.525		0.0000	0.000

Vertical Reactions - Unfactored

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.870	1.870
D Only	0.245	0.245
L Only	1.625	1.625
D+L	1.870	1.870

Commercial Use Not Allowed



GE Profile™ and Cafe™
Advantium® Oven

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Write the model and serial numbers here:

Model # _____

Serial # _____

Find these numbers on a label inside the oven.

IMPORTANT SAFETY INSTRUCTIONS

READ ALL INSTRUCTIONS BEFORE USING

Advantium Oven

When using electrical appliances basic safety precautions should be followed, including the following:

⚠ WARNING: To reduce the risk of burns, electric shock, fire, injury to persons, or exposure to excessive microwave energy:

PRECAUTIONS TO AVOID POSSIBLE EXPOSURE TO EXCESSIVE MICROWAVE ENERGY

- (a) **Do Not Attempt** to operate this oven with the door open since open-door operation can result in harmful exposure to microwave energy. It is important not to defeat or tamper with the safety interlocks.
- (b) **Do Not Place** any object between the oven front face and the door or allow soil or cleaner residue to accumulate on sealing surfaces.
- (c) **Do Not Operate** the oven if it is damaged. It is particularly important that the oven door close properly and that there is no damage to the:
- (1) door (bent),
 - (2) hinges and latches (broken or loosened),
 - (3) door seals and sealing surfaces.
- (d) **The Oven Should Not** be adjusted or repaired by anyone except properly qualified service personnel.

- **Read all instructions before using this appliance. When using electrical appliances, basic safety precautions should be followed, including the following:**
- Read and follow the specific precautions in the Precautions to Avoid Possible Exposure to Excessive Microwave Energy section above.
- This appliance must be grounded. Connect only to a properly grounded outlet. See the Grounding Instructions section on page 8.
- This microwave oven is UL listed for installation over both gas (less than 60,000BTU) and electric ranges.
- This over-the-range oven is designed for use over ranges no wider than 36." It may be installed over both gas and electric cooking equipment.
- Do not operate this appliance if it has a damaged power cord or plug, if it is not working properly, or if it has been damaged or dropped. If the power cord is damaged, it must be replaced by General Electric Service or an authorized service agent using a power cord available from General Electric.
- To reduce the risk of fire in the oven cavity:
 - Do not overcook food. Carefully attend appliance when paper, plastic or other combustible materials are placed inside the oven while cooking.
 - Remove wire twist-ties and metal handles from paper or plastic containers before placing them in the oven.
 - Do not use the oven for storage purposes. Do not leave paper products, cooking utensils or food in the oven when not in use.
 - Do not pop popcorn in your microwave oven unless in a special microwave popcorn accessory or unless you use popcorn labeled for use in microwave ovens.
 - If materials inside the oven ignite, keep the oven door closed, turn the oven off and disconnect the power cord, or shut off power at the fuse or circuit breaker panel. If the door is opened, the fire may spread.
 - Do not use the Sensor Features twice in succession on the same food portion. If food is undercooked after the first countdown, use **COOK BY TIME** for additional cooking time.
 - Do not use the oven to dry newspaper.

SAVE THESE INSTRUCTIONS

IMPORTANT SAFETY INSTRUCTIONS

READ ALL INSTRUCTIONS BEFORE USING

Advantium Oven

IMPORTANT SAFETY INSTRUCTIONS

- Be sure your appliance is properly installed and grounded by a qualified technician in accordance with the provided installation instructions.
- Install or locate this appliance only in accordance with the provided installation instructions.
- Some products such as whole eggs and sealed containers—for example, closed jars—are able to explode and should not be heated in this oven. Such use of the oven could result in injury.
- Do not mount this appliance over a sink.
- This oven is not approved or tested for marine use.
- This oven is UL listed for standard wall installation above 36 inches.
- Do not operate this appliance if it has been damaged or dropped.
- As with any appliance, close supervision is necessary when used by children.
- Use this appliance only for its intended use as described in this manual.
- Do not use corrosive chemicals or vapors in this appliance.
- This oven is specifically designed to heat, dry or cook food, and is not intended for laboratory or industrial use.
- This appliance must only be serviced by qualified service personnel. Contact nearest authorized service facility for examination, repair or adjustment.
- Do not cover or block any openings on the appliance.
- Do not store this appliance outdoors. Do not use this product near water—for example, in a wet basement, near a swimming pool, near a sink or in similar locations.
- See door surface cleaning instructions in the *Care and Cleaning of the Oven* section of this manual.
- If materials inside the oven ignite, keep the oven door closed, turn the oven off and shut off power at the fuse or circuit breaker panel. If the door is opened, the fire may spread.
- The wire oven rack should not be used for speedcook or microwave cooking to prevent arcing.
- Do not cover racks or any other part of the oven with metal foil. This will cause overheating of the oven.
- Oversized foods or oversized metal utensils should not be used in oven as they may create a fire or risk of electric shock.
- Do not use paper products when appliances is operated in modes other than microwave.

SAVE THESE INSTRUCTIONS

IMPORTANT SAFETY INSTRUCTIONS

READ ALL INSTRUCTIONS BEFORE USING

Advantium Oven

IMPORTANT SAFETY INSTRUCTIONS

- Thermometer—Do not use regular cooking or oven thermometers when cooking by microwave. The metal and mercury in these thermometers could cause arcing and possible damage to the oven. Do not use a thermometer in food you are microwaving unless the thermometer is designed or recommended for use in the microwave oven.
- Do not clean with metal scouring pads. Pieces can burn off the pad and touch electrical parts involving risk of electric shock.
- Do not store any materials, other than our recommended accessories, in this oven when not in use.
- Do not let cord hang over edge of table or counter.
- Keep power cord away from heated surfaces.
- Do not immerse power cord or plug in water.
- Do not operate the oven without the turntable in place. The turntable must be unrestricted so it can turn.
- During and after use, do not touch, or let clothing or other flammable materials contact any interior area of the oven; allow sufficient time for cooling first.
- Potentially hot surfaces include the oven door, floor, walls, oven rack and turntable.
- It is important to keep the area clean where the door seals against the microwave. Use only mild, non-abrasive detergents applied with a clean sponge or soft cloth. Rinse well.
- Do not store anything directly on top of the microwave oven surface when the microwave oven is in operation.
- Keep the oven free from grease buildup.
- Per USDA, cook meat to an INTERNAL temperature of at least 160°F, and poultry to an INTERNAL temperature of at least 180°F. Cooking to these temperatures usually protects against foodborne illness. For more information, see www.foodsafety.gov.

ARCING

Arcing can occur during both speedcooking and microwave cooking. If you see arcing, press the CLEAR/OFF pad and correct the problem.

Arcing is the microwave term for sparks in the oven. Arcing is caused by:

Do not store rack in microwave. Rack is ONLY to be used for Convection Bake, Warm and Proof.

- Metal or foil touching the side of the oven.
- Foil not molded to food (upturned edges act like antennas).
- Use foil only as recommended in this manual.
- Metal, such as twist-ties, poultry pins, or gold-rimmed dishes, in the oven.
- Metal cookware or the wire oven rack used during either speedcook or microwave cooking (except for the pans provided with the oven).
- Recycled paper towels containing small metal pieces being used in the oven.

SAVE THESE INSTRUCTIONS

IMPORTANT SAFETY INSTRUCTIONS

READ ALL INSTRUCTIONS BEFORE USING

Advantium Oven

FOODS

- When microwaving, place all foods and containers on the clear glass tray.
- Do not pop popcorn in your oven unless in a special microwave popcorn accessory or unless you use popcorn labeled for use in microwave ovens.
- Do not boil eggs in this oven. Pressure will build up inside egg yolk and will cause it to burst, possibly resulting in injury.
- Do not operate oven without food inside. This may cause damage to the oven. It increases the heat around the magnetron and can shorten the life of the oven.
- Foods with unbroken outer “skin” such as potatoes, hot dogs, sausages, tomatoes, apples, chicken livers and other giblets, and egg yolks should be pierced to allow steam to escape during cooking.
- Don’t defrost frozen beverages in narrow-necked bottles (especially carbonated beverages). Even if the container is open, pressure can build up. This can cause the container to burst, possibly resulting in injury.
- Foods cooked in liquids (such as pasta) may tend to boil more rapidly than foods containing less moisture. Should this occur, refer to the Care and Cleaning of the oven section for instructions on how to clean the inside of the oven.
- Hot foods and steam can cause burns. Be careful when opening any containers of hot food, including popcorn bags, cooking pouches and boxes. To prevent possible injury, direct steam away from hands and face.
- Do not overcook potatoes. They could dehydrate and catch fire, causing damage to your oven.
- Avoid heating baby food in glass jars, even with the lid off. Make sure all infant food is thoroughly cooked. Stir food to distribute the heat evenly. Be careful to prevent scalding when warming formula. The container may feel cooler than the formula really is. Always test the formula before feeding the baby.
- Do not attempt to deep fry in the oven.
- **SUPERHEATED WATER**
Liquids, such as water, coffee or tea, are able to be overheated beyond the boiling point without appearing to be boiling. Visible bubbling or boiling when the container is removed from the microwave oven is not always present. THIS COULD RESULT IN VERY HOT LIQUIDS SUDDENLY BOILING OVER WHEN THE CONTAINER IS DISTURBED OR A SPOON OR OTHER UTENSIL IS INSERTED INTO THE LIQUID.

To reduce the risk of injury to persons:

- Do not overheat the liquid.
- Stir the liquid both before and halfway through heating it.
- Do not use straight-sided containers with narrow necks.
- After heating, allow the container to stand in the microwave oven for a short time before removing the container.
- Use extreme care when inserting a spoon or other utensil into the container.

SAVE THESE INSTRUCTIONS

IMPORTANT SAFETY INSTRUCTIONS

READ ALL INSTRUCTIONS BEFORE USING

Advantium Oven

Microwave-safe cookware

⚠ WARNING!

Make sure to use suitable cookware during microwave cooking. Most glass casseroles, cooking dishes, measuring cups, custard cups, pottery or china dinnerware which does not have metallic trim or glaze with a metallic sheen can be used. Some cookware is labeled "suitable for microwaving."

- Do not use the wire oven rack for microwave.
- Place food or microwavable container directly on the clear glass tray to cook your food.
- Use of a metal tray during microwave cooking will result in inferior cooking performance.

- If you are not sure if a dish is microwave-safe, use this test: Place both the dish you are testing and a glass measuring cup filled with 1 cup of water in the oven. Set the measuring cup either in or next to the dish. Microwave 30-45 seconds at high. If the dish heats, it should not be used for microwaving. If the dish remains cool and only the water in the cup heats, then the dish is microwave-safe.

⚠ CAUTION: Burn Risk

- Cookware may become hot because of heat transferred from the heated food. Oven mitts may be needed to handle the cookware.
- Use foil only as directed in this manual. When using foil in the oven, keep the foil at least 1" away from the sides of the oven.
- If you use a meat thermometer while cooking, make sure it is safe for use in microwave ovens.
- Some foam trays (like those that meat is packaged on) have a thin strip of metal embedded in the bottom. When microwaved, the metal can burn the floor of the oven or ignite a paper towel.

- Do not use recycled paper products. Recycled paper towels, napkins and waxed paper can contain metal flecks which may cause arcing or ignite. Paper products containing nylon or nylon filaments should be avoided, as they may also ignite.
- Paper towels, waxed paper and plastic wrap can be used to cover dishes in order to retain moisture and prevent spattering. Be sure to vent plastic wrap so steam can escape.
- Not all plastic wrap is suitable for use in microwave ovens. Check the package for proper use.
- "Boilable" cooking pouches and tightly closed plastic bags should be slit, pierced or vented as directed by package instructions. If they are not, plastic could burst during or immediately after cooking, possibly resulting in injury. Also, plastic storage containers should be at least partially uncovered because they form a tight seal. When cooking with containers tightly covered with plastic wrap, remove covering carefully and direct steam away from hands and face.
- Plastic cookware—Plastic cookware designed for microwave cooking is very useful, but should be used carefully. Even microwave-safe plastic may not be as tolerant of overcooking conditions as glass or ceramic materials. Plastic may soften or char if subjected to short periods of overcooking. In longer exposures to overcooking, the food and cookware could ignite.

Follow these guidelines:

1. Use microwave-safe plastics only, and use them in strict compliance with the cookware manufacturer's recommendations.
2. Do not microwave empty containers.
3. Do not permit children to use plastic cookware without adult supervision.



The turntable must always be in place when using the oven.



The clear glass tray should always be in place when microwaving.



How to test for a microwave-safe dish.

SAVE THESE INSTRUCTIONS

IMPORTANT SAFETY INSTRUCTIONS

READ ALL INSTRUCTIONS BEFORE USING

Advantium Oven

Oven-safe cookware for Speedcooking



The turntable must always be in place when using the oven.



Put food directly on the metal tray to speedcook, convection bake, warm or toast.

▲ CAUTION: Burn Risk

- The oven and door will get very hot when speedcooking.
- Cookware will become hot. Oven mitts will be needed to handle the cookware.

▲ WARNING: Fire Risk

- Do not use coverings, containers or cooking/roasting bags made of foil, plastic, wax or paper when speedcooking.
- Do not cover the turntable, metal trays or any part of the oven with metal foil. This will cause arcing in the oven.
- Use the metal tray in the same way you would use a shallow baking pan or baking tray.
- Do not use the wire oven rack for speedcook.

- Place food directly on the metal trays when cooking unless prompted by the oven to do otherwise.
- Any non-metal oven-safe dish can be used in your oven. Place them directly on the trays.
- Use of the clear glass tray when speedcooking will result in inferior cooking performance and possible cracking of the glass tray.
- Use only the metal trays specified for use with this oven. Other metal trays are not designed for use with this oven and will result in inferior cooking performance.

Oven-safe cookware for Convection Baking, Broiling, Warming, Proofing & Toasting

▲ CAUTION: Burn Risk

- The oven and door will get very hot when convection baking, broiling, warming or toasting.
- Cookware will become hot. Oven mitts will be needed to handle the cookware.

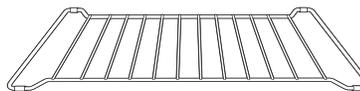
▲ WARNING: Fire Risk

- Do not cover dishes or use plastic containers, plastic cooking/roasting bags, plastic wrap, wax paper or paper when broiling or toasting.
- Use the metal tray in the same way you would use a shallow baking pan or baking tray.

- Use the wire oven rack when convection baking or warming.
- Place food directly on the metal trays when cooking unless the recipe requires a dish.
- Any oven-safe dish can be used in your oven. Place them directly on the trays.
- Use of the clear glass tray when convection baking, broiling, warming or toasting will result in inferior cooking performance.



The turntable must always be in place when using the oven.



Put food directly on the metal tray or in the appropriate dish and place on wire oven rack when baking or warming.



Put food or oven-safe cookware directly on the metal tray to convection bake, warm or toast.

SAVE THESE INSTRUCTIONS

IMPORTANT SAFETY INSTRUCTIONS

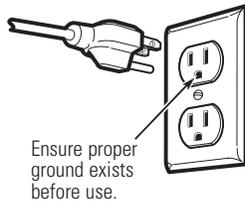
READ ALL INSTRUCTIONS BEFORE USING

Advantium Oven

Grounding Instructions

⚠ WARNING!

Improper use of the grounding plug can result in a risk of electric shock.



Ensure proper ground exists before use.

This appliance must be grounded. In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current.

This appliance is equipped with a power cord having a grounding wire with a grounding plug. The plug must be plugged into an outlet that is properly installed and grounded.

Consult a qualified electrician or service technician if the grounding instructions are not completely understood, or if doubt exists as to whether the appliance is properly grounded.

If the outlet is a standard 2-prong wall outlet, it is your personal responsibility and obligation to have it replaced with a properly grounded 3-prong wall outlet.

Do not under any circumstances cut or remove the third (ground) prong from the power cord.

Do not use an adapter plug with this appliance.

Do not use an extension cord with this appliance. If the power cord is too short, have a qualified electrician or service technician install an outlet near the appliance.

For best operation, plug this appliance into its own electrical circuit to prevent flickering of lights, blowing of fuse or tripping of circuit breaker.

The Vent Fan

The fan will operate automatically under certain conditions (see Vent Fan section). Take care to prevent the starting and spreading of accidental cooking fires while the vent fan is in use.

- Clean the underside of the Advantium often. Do not allow grease to build up on the Advantium or the fan filters.
- In the event of a grease fire on the surface units below the Advantium, smother a flaming pan on the surface unit by covering the pan completely with a lid, a cookie sheet or a flat tray.

- Use care when cleaning the vent fan filters. Corrosive cleaning agents, such as lye-based oven cleaners, may damage the filters.
- When preparing flaming foods under the Advantium, turn the fan on.
- Never leave surface units beneath your Advantium unattended at high heat settings. Boilovers cause smoking and greasy spillovers that may ignite and spread if the Advantium vent fan is operating. To minimize automatic fan operation, use adequate sized cookware and use high heat on surface units only when necessary.

SAVE THESE INSTRUCTIONS

IMPORTANT SAFETY INSTRUCTIONS

READ ALL INSTRUCTIONS BEFORE USING

Advantium Oven

⚠ WARNING

PACEMAKERS

Most pacemakers are shielded from interference from electronic products, including microwaves. However, patients with pacemakers may wish to consult their physicians if they have concerns.

READ AND FOLLOW THIS SAFETY INFORMATION CAREFULLY.

SAVE THESE INSTRUCTIONS

Optional kits

Available at extra cost from your GE supplier.

Filler Panel Kits

- *JX52WH—White*
- *JX52BL—Black*

When replacing a 36" range hood, filler panel kits fill in the additional width to provide a custom built-in appearance.

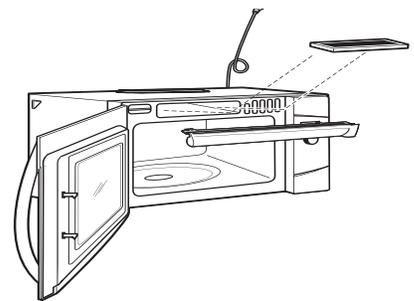
For installation between cabinets only; not for end-of-cabinet installation. Each kit contains two 3" wide filler panels.

Filter Kits

- *JX81D—Recirculating Charcoal Filter Kit*

Filter kits are used when the oven cannot be vented to the outside.

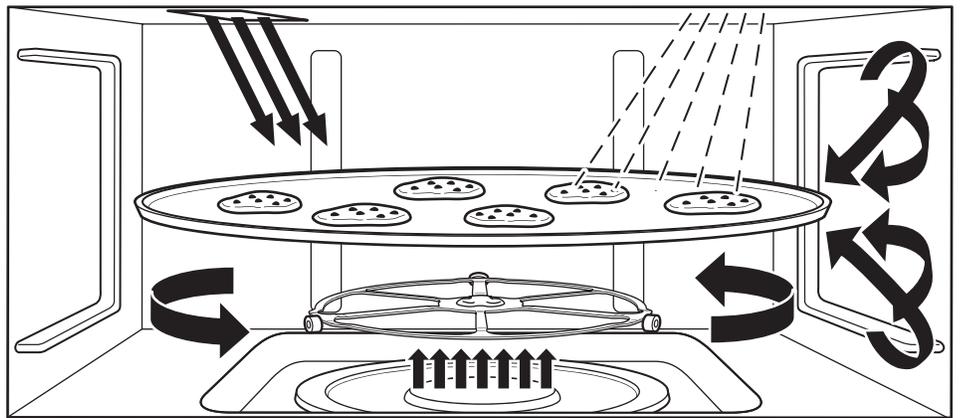
See back cover to order by phone or at ge.com.



Getting to know the Advantium

The Advantium oven uses breakthrough Speedcook technology to harness the power of light. The Advantium oven cooks the outside of foods much like conventional radiant heat, while also penetrating the surface so the inside cooks simultaneously.

While halogen light is the primary source of power, a ceramic heater assists in the cooking, with a "microwave boost" added in some cooking algorithms. Food cooks evenly and fast, retaining its natural moisture.



The Advantium oven is capable of speedcooking, convection baking, broiling, toasting, warming, proofing and microwaving. The Speedcook feature is the biggest benefit of the Advantium oven.

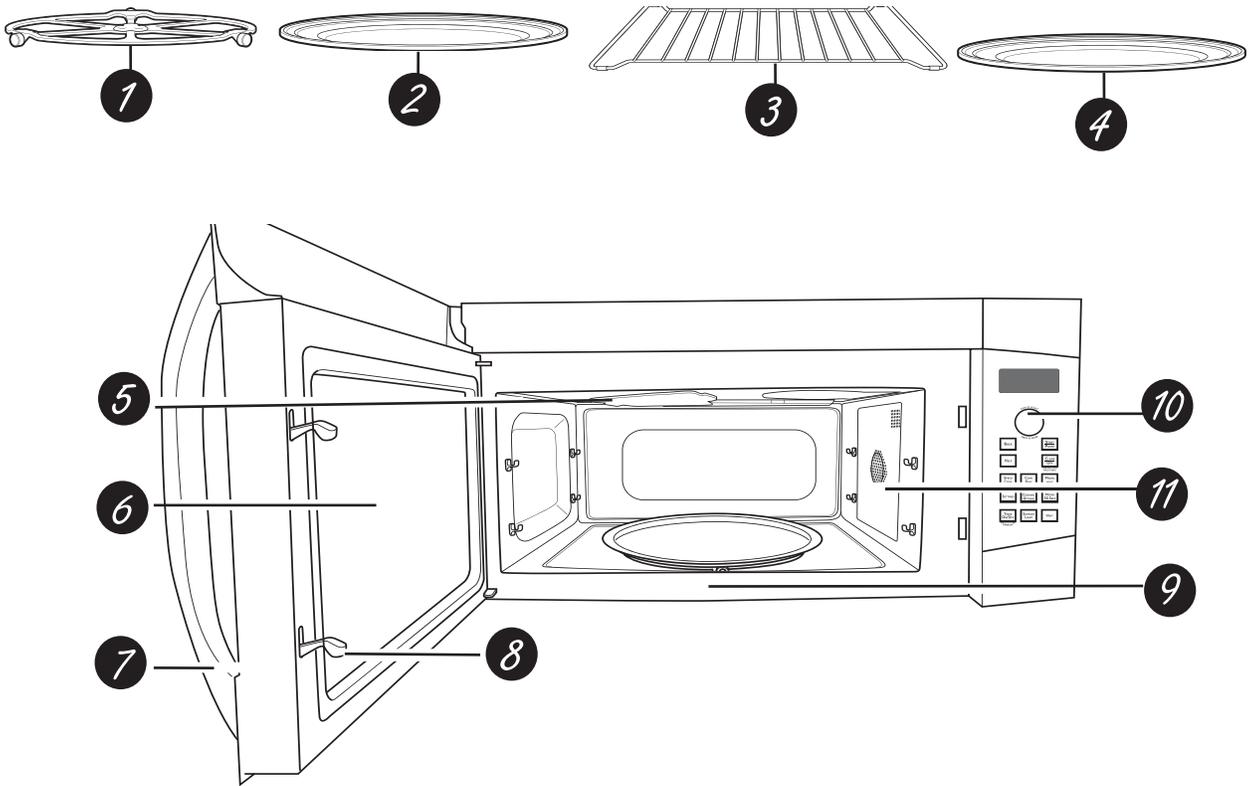
No preheating is required to speedcook. Place the food in the oven and start cooking immediately. Time is saved because there is no preheat and because speedcook cooks faster.

Oven Features

Advantium Oven

Oven features

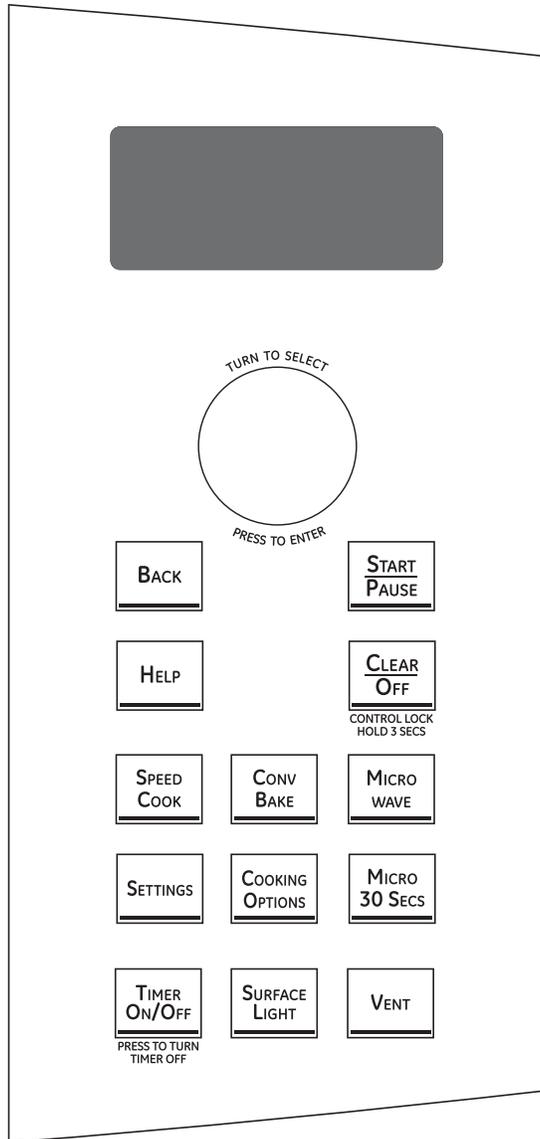
Throughout this manual, features and appearance may vary from your model.



- 1** *Turntable*
The turntable must always be in place, on the oven floor, for all cooking. Be sure the turntable is seated securely over the spindle in the center of the oven.
- 2** *Metal Tray*
Put food directly on the metal tray and place on the turntable when using the speedcook, broil, and toast.
- 3** *Wire Oven Rack*
Put food directly on a metal tray or in an oven-safe dish on the wire oven rack only when convection baking or warming.
- 4** *Clear Glass Tray*
Place on turntable when using microwave features. Place food or microwave-safe cookware directly on tray.
- 5** *Upper Halogen Lamp & Ceramic Heater*
A 500W halogen lamp and 700W ceramic heater cook food from above in speedcook, broil and toast.
- 6** *Window*
Allows food to be viewed during cooking.
- 7** *Door Handle*
Pull to open the door.
- 8** *Door Latches*
The door must be securely latched for the oven to operate.
- 9** *Lower Ceramic Heater*
One 375W ceramic heater cooks food from the bottom in speedcook, broil and toast.
- 10** *Control Panel*
The pads used to operate the oven are located on the control panel.
- 11** *Convection System*
One 1550W heating element cooks food with a convection fan circulating the hot air throughout the cavity in convection bake and warm.

Cooking controls

With your Advantium oven, you can cook with high-intensity halogen lights, ceramic heaters, convection heating element, and/or conventional microwave energy.



SELECTOR DIAL

Turn to select. Press to enter.
Turn to select food, power level, or temperature selections. Also use the dial to increase (turn clockwise) or decrease (turn counterclockwise) time. Simply press the button to enter the selection.

BACK

Press this pad to step back one or more levels in the programming process.

HELP

Press this pad to find out more about your oven's features.

DISPLAY

Shows feature selections and information about the oven when in use.

START/PAUSE

Press this pad to start or pause any cooking function.

CLEAR/OFF

Press this pad to cancel ALL oven programs except clock, auto night light, timer, vent fan, and surface light.

SPEEDCOOK

Press this pad to access the pre-set speedcook menu or to set your own speedcook program.

CONV BAKE

Press this pad to use convection bake.

MICROWAVE

Press this pad to access the microwave menu or to set your own microwave program.

SETTINGS

Press this pad to set the clock and access Turntable On/Off, Auto Conversion, Auto Nightlight, Beeper Volume, Display On/Off, Reminder, and Temperature Units.

COOKING OPTIONS

Press this pad to access Repeat Last, Broil, Proof, Toast, Warm and Delay Start.

MICRO 30 SECS

Starts the microwave for 30 seconds of cooking time. An additional 30 seconds is added to the remaining cooking time each time the pad is pressed.

TIMER ON/OFF

Press this pad to set a minute and seconds timer.

SURFACE LIGHT

Press this pad to turn the cooktop light on and off.

VENT

Press this pad to turn the vent fan on and off.

Using speedcook features

⚠ CAUTION: Burn Risk

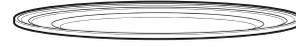
When using speedcook programs, remember that the oven, door and dishes will be very hot!

Prior to the first use of your oven, the clock must be set. See the Clock section.

Before you begin, make sure the turntable is in place. Use the metal tray and your own glass or ceramic cookware, if needed.



The turntable must always be in place when using the oven.



Put food directly on the metal tray to speedcook.

- If the door is opened during cooking, the oven will stop and PAUSE will appear in the display. Close the door and press the START/PAUSE pad to resume cooking.
- At any time during cooking you can change time or power levels by selecting EDIT.
- Speedcooking meats in the oven may produce smoke.
- To cook for additional time after a cooking cycle has been completed, use the Resume feature as instructed on the display.

Things that are normal

Cooking Times

- When speedcooking pre-set menu foods, you may see OPTIMIZING COOK TIME in the display several seconds after you press START/PAUSE. The oven automatically senses the electrical voltage level in your home and adjusts the cooking time up or down for proper cooking.

Cooling Fans

- The fans will be on during cooking. At the end of cooking, the fans may continue to run for a short time to cool internal components. The fans will automatically shut off when the internal parts of the oven have cooled. The screen will display "Oven is Cooling".
- The oven vent will emit warm air while the oven is on.
- The exhaust fan may come on automatically if the oven becomes hot. See Automatic fan section.

Lights

- When the oven is on, light may be visible around the door or outer case.
- The halogen lights will dim and cycle on and off during a speedcook cycle, sometimes even at full power levels. This is normal. The oven senses the heat level and adjusts automatically.

Oven Heat

- No preheating time is required during speedcook cycles. The oven begins cooking immediately.
- The door and inside of the oven will be very hot. Use caution when opening the door and removing food. Be cautious of steam or vapor that may escape from around the door.
- Do not use cookware or coverings made of paper, plastic, or foil when speedcooking.
- When cooking for an extended period of time, the oven may automatically reduce the power levels to maintain the appropriate level of oven heat.

Sounds

- Clicks and a fan blowing are normal sounds during cooking. The electronic control is turning components on and off.

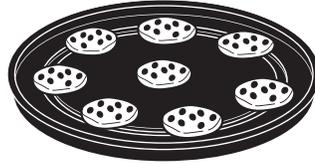
Interference

- TV/radio interference might be noticed while using the microwave, similar to the interference caused by other small appliances. It does not indicate a problem with the microwave. Move the radio or TV as far away from the microwave as possible, or check the position of the TV/radio antenna.

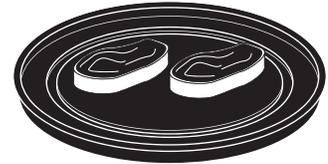
Cooking tips for best results

Arrange food on the metal trays as shown to ensure consistent and even browning.

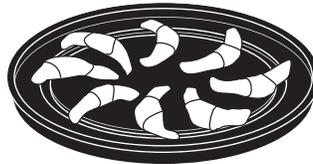
Foods can touch but should not overlap.



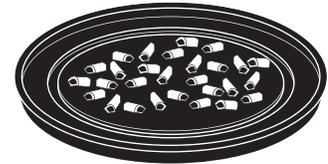
Circular pattern
(Example: biscuits, cookies)



Side by side pattern
(Example: meats and poultry)



Spoke pattern
(Example: crescent rolls, breadsticks)



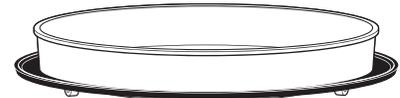
Single layer
(Example: appetizers)

Fresh meat, chicken, fish or seafood that has been frozen should be thawed before cooking. (The microwave defrost feature can be used.) For other frozen prepackaged foods, follow package directions.

Speedcook cookware

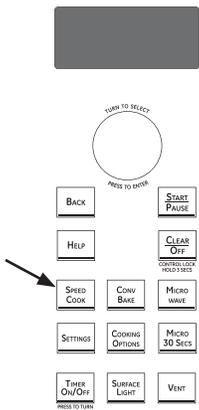
⚠ CAUTION: Burn Risk

- Cookware will become hot. Oven mitts will be needed to handle the cookware.
- Follow cookware suggestions on the oven display or in the cookbook.
- Place food directly on the metal tray when cooking, unless prompted by the oven to do otherwise.
- Use the metal tray in the same way you would use a shallow baking pan or baking tray.
- In addition to the cookware provided, you can use non-metal casserole dishes, pie plates and other heat-safe cookware. Place them directly on the metal tray.



- Be sure to select a size that will rotate easily.
- Place the metal tray on the turntable. Place glass or ceramic cookware on the tray.
- Do not use cookware or coverings made of paper, plastic, or foil when cooking during a speedcook cycle.

Using the pre-set speedcook menu



The Advantium is already pre-set to cook over 175 popular foods.

1. Press the SPEEDCOOK pad.
If no selection is made within 15 seconds, the display will revert back to the time of day.
2. Turn the selector dial to select the type of food category you want. Press the dial to enter.
3. Turn the selector dial to select the specific food (menu selection). Press the dial to enter.
4. Turn the selector dial to select amount, size and/or doneness (if required, the oven will prompt you). Press the dial after each selection.

5. Once the display shows: EDIT, SAVE or START press the START/PAUSE pad or the selector dial to start cooking.

Turn the food over when the oven signals TURN FOOD OVER (for certain foods).

When the oven signals CHECK for DONENESS, check to see if your food is done to your liking (for certain foods).

To review settings during cooking, press the selector dial.

If you enter an undesired selection at any time, simply press the BACK pad and re-enter the desired selections.

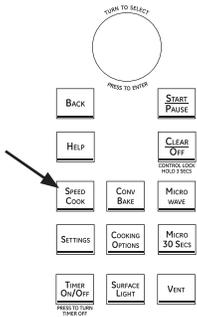
Speedcooking meats in the oven may produce smoke.

Pre-set speedcook menu selections

Per USDA Guidelines, cook meat to an INTERNAL temperature of at least 160°F, and poultry to an INTERNAL temperature of at least 180°F. Cooking to these temperatures usually protects against foodborne illness. For more information, see www.foodsafety.gov.

Food Category	Menu Selection	Food Category	Menu Selection	Food Category	Menu Selection
Appetizers	Bagel Bites	Chicken	Bone-In	Sandwich	Corn Dog (frozen)
	Cheese Sticks		Boneless		Crescent Roll Hot Dog
	Egg Rolls (Frozen)		Fillet (frozen)		Grilled Sandwich
	Jalapeño Poppers		Finger (frozen)		Pocket Sandwich
	Meat Balls (Frozen)		Fried (frozen)		Seafood
	Nachos		Nugget (frozen)	Fish Sticks (frozen)	
	Nuts, Roasted		Patty (frozen)	Frozen Breaded	
	Onion Rings		Tender (frozen)	Orange Roughy Fillet	
	Pizza Rolls		Wings (frozen)	Salmon	
	Soft Pretzels (frozen)		Whole	Shellfish	
Taquito (frozen)	Desserts		Brownie Mix	Swordfish Steak (1")	
Breads			Biscuits	Cookies	Talapia
			Bread Sticks	Pie (fresh fruit)	Tuna Steaks
			Cheese Bread	Pie Crust	Whitefish/Cod
		Crescent Rolls	Rolls (refrigerated)	Side Dish	Casserole
	Dinner Rolls	Turnovers	Refried Beans (16 oz)		
	Garlic Bread	Entree	Egg Rolls (frozen)		Roasted Asparagus
	Texas Toast		Meatloaf (9x5)		Roasted Bell Pepper
Breakfast	Belgian Waffles		Taquito (frozen)		Roasted Chilies (3-6)
	Breakfast Pizza	Meats	Roasted Corn (1-4)		
	French Toast		Filet Mignon		Roasted Garlic
	Hashbrown Patties		Hamburger		Roasted Mixed Vegetables
	Pancakes (frozen)		Lamb Chops		Scalloped Potatoes
	Rolls (refrigerated)		Pork Chops		Pizza
	Sausage Biscuit		Ribeye Steak	Frozen Pizza	
	Sausage Links		Sirloin Steak	Use Precooked Crust	
	Sausage Patties	Strip Steak	Potatoes	Baked Potato	
	Strudel (frozen)	T-Bone Steak		Hashbrown Patties	
	Turnovers	Tenderloin		Frozen Fries	
Waffles (frozen)	Pizza	Deli/Fresh	Frozen Nugget		
Breakfast		Frozen Pizza	Sweet Potato/Yam		
		Use Precooked Crust	Potatoes	Baked Potato	
		Hashbrown Patties		Hashbrown Patties	
		Frozen Fries		Frozen Fries	
	Frozen Nugget	Frozen Nugget			
Sweet Potato/Yam	Sweet Potato/Yam				

Speedcook power level



The Advantium uses power from high intensity halogen lamps, a ceramic heater, and microwaves to cook food from the top, bottom and interior simultaneously to seal in moisture and flavor.

When using the pre-set menu foods, the power levels are already selected for you. However, power levels can be adjusted when using pre-set menu foods and MY RECIPE.

Each power level gives you halogen lamp or ceramic heater power and microwave energy for a certain percentage of the time.

For example:

- U-07 Upper halogen lamp and ceramic heater on 70% of the time.
- L-07 Lower ceramic heater on 70% of the time.
- M-03 Microwave on 30% of the time.

NOTE: Be careful when adjusting power levels so that you do not overcook or undercook food.

1. Press the SPEEDCOOK pad and select your food (follow instructions from Using the pre-set speedcook menu).
2. When display shows EDIT, SAVE or START, turn the dial to select EDIT.

If you do not want to change one of the settings, just press the dial to move to the next selection.

3. Press the dial if you do not want to adjust cooking time.
4. Turn the dial clockwise to increase or counterclockwise to decrease the upper power level. Press the dial to enter.
5. Turn the dial to change the lower power level. Press the dial to enter.
6. Turn the dial to change the microwave power level. Press the dial to enter.

Note that the upper and lower level settings limit the microwave power level. For example, if the upper or lower power level is set to a 7, the microwave can be set no higher than a 3.

7. Press the START/PAUSE pad or the selector dial to start cooking.

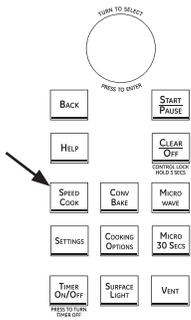
Follow these general guidelines when selecting the best U=, L=, and M= settings for your favorite recipes:

U = Select a higher setting for thin foods requiring a golden brown top (example: fish fillets, toast, boneless chicken breasts). Select a lower setting for thicker foods and foods with high sugar or fat content (example: muffins, roasts, casseroles) or that require a longer cook time.

M = Select a higher setting to shorten cooking time for dense or heavy foods (example: casseroles, whole chicken). Select a lower setting for delicate foods (example: breads) or foods requiring longer cook times for tender results (example: stew, pot roast).

L = Select a higher setting for thick or dense foods that may not cook quickly in the center (example: steaks, casseroles). Select a lower setting for thin foods (example: cookies).

My Recipe - Custom speedcooking



The Advantium gives you the flexibility to cook your favorite dishes.

If you want to cook a food item that is not among the pre-set selections, use My Recipe to custom speedcook.

1. Press the SPEEDCOOK pad and select MY RECIPE. Press the dial to enter. Select NEW RECIPE.

If no entries are made within 15 seconds, the display will revert back to the time of day.

2. Turn the selector dial to select the cooking time. Press the dial to enter.

The display will prompt you to select the power level(s).

3. Turn the dial to select the upper power level. Turn the dial clockwise to increase or counterclockwise to decrease the upper power level. Press the dial to enter.

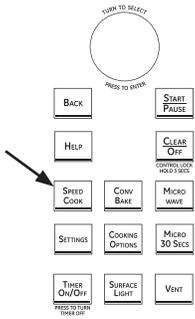
4. Turn the dial to select the lower power level. Press the dial to enter.

5. Turn the dial to select the microwave power level. Press the dial to enter.

6. Press the START/PAUSE pad or press the selector dial to start cooking.

For power level and cooking time suggestions, use your cooking guide, cookbook and the pre-set speedcook menu selections.

My Recipe— to enter and save



Add and save up to 30 of your own Speedcook or microwave recipes, or pre-set Speedcook menu recipes as a favorite recipe. Once it's done, you can quickly recall your favorite so that your food cooks just the way you want it every time!

1. Press the SPEEDCOOK or MICROWAVE pad.
2. Turn the dial to select MY RECIPE. Press the dial to enter.
3. Turn the dial until NEW RECIPE appears. Press the dial to enter.
4. ENTER COOK TIME appears. Turn the dial to select the cooking time. Press the dial to enter.

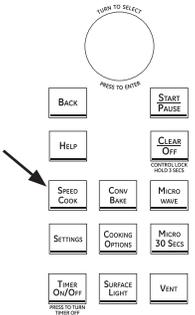
The display will prompt you to select the power level(s).

5. Turn the dial clockwise to increase or counterclockwise to decrease the power level(s). Press the dial to enter.

For power level and cooking time suggestions, use your cooking guide or cookbook.

6. Select SAVE from the summary screen.
7. SPELL THE FOOD NAME appears. Turn the dial to the first letter of your food description and press the dial to enter. Continue this process to spell the rest of the food name. Press the START/PAUSE pad to save the recipe and its name.

My Recipe— to find and use

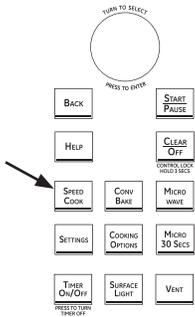


To find and use stored recipes:

1. Press the SPEEDCOOK or MICROWAVE pad.
2. Turn the dial to select MY RECIPE.

3. The recipe names you entered will appear.
4. Turn dial until the recipe you want is displayed and press the dial to enter.
5. Press the START/PAUSE pad or press the selector dial to start cooking.

My Recipe— to adjust or change



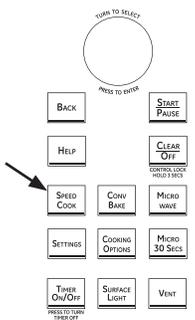
To adjust or change stored recipes:

1. Press the SPEEDCOOK or MICROWAVE pad.
2. Turn the dial to select MY RECIPE.
3. Turn the dial to the recipe you want to change. Press the dial to enter. Current settings appear.
4. Select EDIT.
5. Turn the dial to adjust the cooking time and press the dial to enter.
6. Turn the dial to change the power level(s) and press the dial to enter each power level.

7. Turn the dial to change the recipe name. Press the dial to enter each letter change.
8. Press the START/PAUSE pad to save the revised recipe.

For power level and cooking time suggestions, use your cooking guide or cookbook.

My Recipe— to delete



To delete stored recipes:

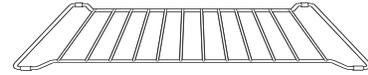
1. Press the SPEEDCOOK or MICROWAVE pad.
2. Turn the dial to select MY RECIPE.
3. Select the recipe you would like to delete.
4. Turn the dial to select DELETE.

Convection Baking

Convection baking allows you to cook foods the same way as a conventional oven, using an element to heat the air inside the oven. Any oven temperature from 250°F to 450°F may be set.

A fan gently circulates heated air throughout the oven, over and around the food. Because the heated air is kept constantly moving, some foods cook slightly faster than in regular oven cooking.

Before you begin, make sure the metal rack is in place. Both racks may be used for two level cooking.



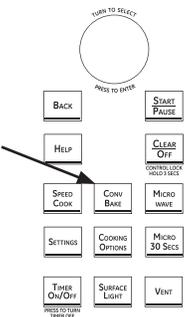
Put food directly on the metal tray or in the appropriate dish and place on wire oven rack when baking or warming.

CAUTION: Burn Risk

When baking, remember that the oven, door and dishes will be very hot!

Per USDA Guidelines, cook meat to an INTERNAL temperature of at least 160°F, and poultry to an INTERNAL temperature of at least 180°F. Cooking to these temperatures usually protects against foodborne illness. For more information, see www.foodsafety.gov.

How to Convection Bake



1. Press CONV BAKE pad.
2. Turn the dial to set the temperature and press the dial to enter.
3. Press the dial to enter and confirm the selection.

To start immediately without setting a cook time, select START or press the START/PAUSE pad:

To set a cook time:

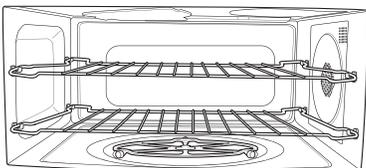
1. Turn the dial and select COOK TIME.
2. Turn the dial to set the cook time and press the dial to enter.
3. To start the cook time immediately, place the food in the oven and select START COOK TIME. Then press the dial or the START/PAUSE pad to start. The cook time will immediately start to count down.

To start cook time after preheat, select START PREHEAT. The oven will signal once the oven reaches the cooking temperature. Place the food in the oven and press the START/PAUSE pad. The cook time will begin to count down.

If the oven door is opened during cooking, "Pause" will appear in the display. Close the door and press START/PAUSE pad.

Cook times are shown in hours and minutes and can be set to a maximum of 2 hours 59 minutes. Time can be changed during cooking by turning the dial.

Cooking Tips for Convection Baking



- Metal pans are recommended for all types of baked products, but especially where browning is important.
- Dark or dull finish metal pans are best for breads and pies because they absorb heat and produce crisper crust.
- Shiny aluminum pans are better for cakes, cookies or muffins because they reflect heat and help produce a light tender crust.
- Glass or glass-ceramic casserole or baking dishes are best suited for egg and cheese recipes due to the cleanability of glass.
- When baking on one level, use the lower level. The top clips are to only be used in two level baking.

Broiling and Toasting

Broil and toast use the upper lamps and lower heater to broil or toast food similar to a conventional oven.

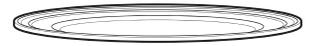
Before you begin, make sure the turntable is in place. Use the metal tray when toasting and when broiling.

CAUTION: Burn Risk

When broiling or toasting, remember that the oven cavity, the oven door and dishes will be very hot!

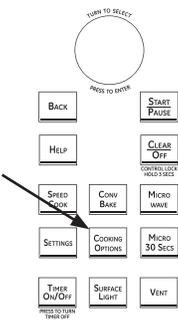


The turntable must always be in place when using the oven.



Put food directly on the metal tray.

How to Broil



1. Press the COOKING OPTIONS pad.
2. Turn the dial to BROIL and press to enter.
3. Place the food in the oven and select START or press the START/PAUSE pad to start.

If the oven door is opened during cooking, "Pause" will appear in the display. Close the door and press the START/PAUSE pad.

Cooking Tips for Broiling

- Broiling times may be shorter in the Advantium oven because of the use of halogen lamps. Make sure to monitor food closely to get the desired results.
- For best results when broiling, place food directly on the metal tray.
- Broiling meats in the oven may produce smoke.
- If preheating the oven to broil meat, preheat with the metal tray in the oven and place food on the hot metal tray for best searing of meat.
- For best performance, preheat the oven for 5 minutes when broiling meat. Chicken performs best with no preheating.
- Foods should be turned halfway through broiling time.
- Remove thinner pieces as needed to prevent overcooking and drying.

How to Toast

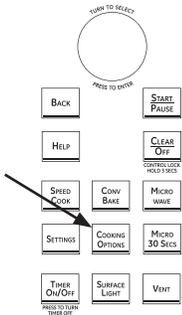
1. Press the COOKING OPTIONS pad.
2. Turn the dial to TOAST and press to enter.
3. Turn the dial to set the toast time, place the food in the oven and select START or press the START/PAUSE pad to start.

If the oven door is opened during cooking, "Pause" will appear in the display. Close the door and press the START/PAUSE pad.

Cooking Tips for Toasting

- For best results when toasting, use the metal tray.
- No turning is necessary for most foods.
- When toasting nuts, stir halfway through the cooking time.
- Toast thicker pieces a longer time, thinner pieces a shorter time.

Warming



The WARM feature will keep hot, cooked foods at serving temperature. Always start with hot food. Use cookware and utensils that can withstand temperatures up to 230°F.

1. Press the COOKING OPTIONS pad.
2. Turn the dial to select WARM. Press the dial to enter.
3. Turn the dial to select the level of moisture you want. See the chart and tips below. Press the dial to enter.
4. Select START or press the START/PAUSE pad to start. The oven starts warming immediately and shows the amount of warming time to complete.

If the oven door is opened during warming, "Pause" will appear in the display. Close the door and press the START/PAUSE pad.

To Crisp Stale Items:

- Select the CRISP setting. Preheat the oven for 10 minutes.
 - NOTE:** Only preheat when crisping stale items.
- Place food or dishes directly on the metal tray.
- Check crispness after 45 minutes. Add time as needed.



The turntable must always be in place when using the oven.



Put food or oven-safe cookware directly on the metal tray to warm.

Temperature and Moisture Selection Chart

Food Type	Moisture Setting
Casseroles	MOIST
Chili/Soup	MOIST
Pancakes, waffles	MOIST
Pizza	CRISP
Potatoes, baked	CRISP
Chips/Crackers	CRISP

Tips for Crisp Foods:

- Leave food uncovered.
- Do not use plastic containers or plastic wrap.
- Preheating is not necessary except for crisping stale items. (See To Crisp Stale Items.)

Tips for Moist Foods:

- Cover food with lid or aluminum foil.
- Do not use plastic containers or plastic wrap.
- Preheating is not necessary.

Proofing



The turntable must always be in place when using the oven.



Put bread dough in a bowl/bread pan and place on the metal tray to proof.

The proofing feature automatically provides an appropriate temperature for the proofing process, and therefore does not have a temperature adjustment.

1. Press the COOKING OPTIONS pad.
 2. Turn the dial to select PROOF and press to enter.
 3. Select START or press the START/PAUSE pad to start. The oven starts proofing immediately and shows the amount of proofing time to complete.
- Check bread products early to avoid over-proofing.

- To avoid lowering the oven temperature and lengthening proofing time, do not open the oven door unnecessarily.

NOTES:

- Do not use the proofing mode for warming food or keeping food hot. The proofing oven temperature is not hot enough to hold foods at safe temperatures. Use the WARM feature to keep food warm.
- Proofing will not operate if the oven is too hot. Allow the oven to cool before proofing.

Using the microwave features

Make sure the turntable is in place. Use the clear glass tray.

Place food or microwavable container directly on the clear glass tray to cook your food.



The turntable must always be in place when using the oven.



The clear glass tray should always be in place when microwaving.

Cookware

- Make sure that cookware is suitable for microwaving.

MICROWAVE PRE-SET SELECTIONS		
<ul style="list-style-type: none"> ■ Cook <ul style="list-style-type: none"> -By Food Type -By Time -By Time 1 & 2 ■ Defrost <ul style="list-style-type: none"> -1.0 lb Quick -By Time -By Food Type -By Weight -Melt -Soften 	<ul style="list-style-type: none"> ■ Beverage <ul style="list-style-type: none"> -Water (8 oz) -Coffee (8 oz) -Tea (8 oz) -Milk (8 oz) -Hot Cocoa (8 oz) ■ Popcorn <ul style="list-style-type: none"> (2.9 or 3.5 oz) ■ Melt <ul style="list-style-type: none"> -Butter -Caramel -Cheese -Chocolate Chips -Marshmallow ■ Simmer ■ Soften <ul style="list-style-type: none"> -Butter -Cream Cheese -Frosting (16 oz) -Ice Cream 	<ul style="list-style-type: none"> ■ Reheat <ul style="list-style-type: none"> -Beverage -Casserole -Chicken -Pasta -Pizza -Plate of Food -Rice -Soup -Steaks/Chops -Vegetables

Things that are normal

Interference

- TV/radio interference might be noticed while using the microwave, similar to the interference caused by other small appliances. It does not indicate a problem with the microwave. Move the radio or TV as far away from the microwave as possible, or check the position of the TV/radio antenna.

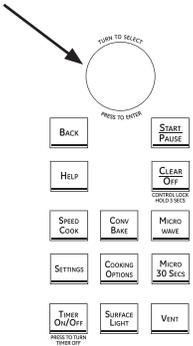
Oven Heat

- Cookware may become hot because of heat transferred from the heated food. Oven mitts may be needed to handle the cookware.
- Steam or vapor may escape from around the door.

Cooking tips

- When cooking bacon, layer strips on a plate. Cover each layer with a paper towel.
- When cooking vegetables, use a microwave-safe casserole or bowl. Cover with a microwave-safe lid or vented plastic wrap.
- For frozen vegetables, follow the package instructions for adding water.
- For fresh vegetables, add 2 tablespoons of water for each serving.

Microwave power level(s)



The microwave power level is automatically set on all microwave features but you can change it for COOK BY TIME, COOK BY TIME 1&2, MICRO 30 SECS, and DEFROST BY TIME.

1. First, follow directions for COOK BY TIME, COOK BY TIME 1 & 2, MICRO 30, or DEFROST BY TIME.
2. Select START or press the START/PAUSE pad to start.
3. Press EDIT to change the cooking time and then the microwave power level. Press the dial to enter cooking time and power level changes.

Here are some examples of uses for various power levels:

High 10: Fish, bacon, vegetables, boiling liquids.

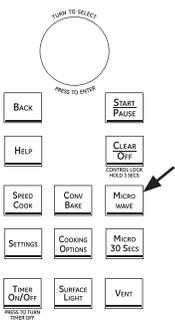
Med-High 7: Gentle cooking of meat and poultry; baking casseroles and reheating.

Medium 5: Slow cooking and tenderizing for stews and less tender cuts of meat.

Low 2 or 3: Defrosting; simmering; delicate sauces.

Warm 1: Keeping food warm; softening butter.

How to use pre-set microwave selections



1. Press the MICROWAVE pad.

If no selection is made within 15 seconds, the display will revert back to the time of day.

2. Turn the dial to select COOK, DEFROST, BEVERAGE, POPCORN, MELT, REHEAT, SIMMER and SOFTEN.
3. Turn the dial to find the food you want to cook, defrost or reheat. Press the dial to enter.
4. Turn the selector dial to select the type, amount, weight and/or size as prompted by the oven. Press the dial after each selection.

5. Press the dial or the START/PAUSE pad to start cooking.

To review settings during cooking, press the selector dial.

If the door is opened during cooking, the oven will stop and PAUSE will appear in the display. Close the door and press START/ PAUSE to resume cooking.

If you enter an undesired selection at any time, simply press the BACK pad and re-enter the desired selections.

Cook By Time

Use COOK BY TIME to microwave food that is not in the pre-set microwave selections.

1. Press the MICROWAVE pad.
2. Turn the dial to select COOK BY TIME and press the dial to enter.
3. Turn the dial to set the cook time and press the dial to enter.

4. Turn the dial to set the power level and press the dial to enter.

5. Press the dial or the START/ PAUSE pad to start cooking.

You may open the door during COOK BY TIME to check the food. Close the door and press START/PAUSE to resume cooking.

Cook By Time 1 & 2

Use COOK BY TIME 1 & 2 to microwave food that requires two different times and power levels.

1. Press the MICROWAVE pad.
2. Turn the dial to select COOK and press the dial to enter.
3. Turn the dial to select COOK BY TIME 1 & 2 and press the dial to enter.

4. Turn the dial to set the first time and press the dial to enter. Repeat for the first power level, the second time, and the second power level.

5. Press the dial or the START/PAUSE pad to start cooking.

Micro 30 Secs

Press MICRO 30 SECS repeatedly for 30 second increments of microwave cooking time. Oven starts immediately.

The power level is automatically set at high, but you can change it for more flexibility. See *Microwave power levels* section for instructions.

My Recipes

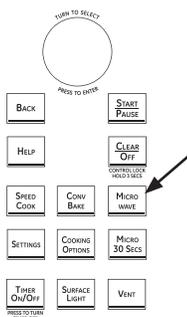
See the MY RECIPE sections in the Speedcook section of this book for instructions on how to save, use, change or delete a microwave custom recipe.

Defrosting tips

Use DEFROST BY FOOD TYPE for meat, poultry, fish, and bread. Use DEFROST BY TIME for most other frozen foods.

- Foods frozen in paper or plastic can be defrosted in the package when using DEFROST BY TIME. Meats should be taken out of the package when using DEFROST BY FOOD TYPE. Closed packages should be slit, pierced or vented after food has partially defrosted. Plastic storage containers should be partially uncovered.
- Family-size, prepackaged frozen dinners can be defrosted and microwaved. If the food is in a foil container, transfer it to a microwave-safe dish.
- Foods that spoil easily should not be allowed to sit out for more than one hour after defrosting. Room temperature promotes the growth of harmful bacteria.
- When defrosted, food should be cool but softened in all areas. If still slightly icy, return to the microwave very briefly, or let it stand a few minutes.
- When defrosting 3 or more pounds of ground or cubed meat, remove defrosted portions at the turn signals.

Defrost by time



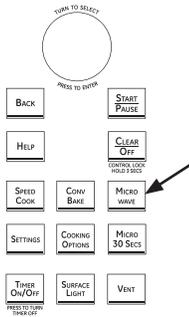
Use DEFROST BY TIME to defrost for a selected length of time.

1. Press the MICROWAVE pad.
2. Turn the selector dial to DEFROST. Press the dial to enter.
3. Turn the dial to DEFROST BY TIME. Press the dial to enter.
4. Turn the dial to select the time you want. Press the dial to enter.
5. Press the dial or START/PAUSE pad to start defrosting.
6. Turn the food over when the oven signals TURN FOOD OVER.

Power level is automatically set at 3, but can be changed. To change the power levels, see Microwave power levels for instructions.

You can defrost small items quickly by raising the power level after entering the time. Power level 7 cuts the total defrosting time in about half; power level 10 cuts the total time to about 1/3. When defrosting at high power levels, food will need more frequent attention than usual and may have some cooking.

Defrost by food type



DEFROST BY FOOD TYPE automatically sets the defrosting times and power levels to give even defrosting results for meats, poultry and fish weighing up to 6 pounds.

1. Remove meat from the package and place it on a microwave-safe dish. Bread should be left in the package with any metal twist-ties removed.
2. Press the MICROWAVE pad.
3. Turn the dial to DEFROST. Press the dial to enter.
4. Turn the dial to DEFROST BY FOOD TYPE. Press the dial to enter.
5. Turn the dial to select food type. Press the dial to enter.
6. Turn the dial to the food weight, using the Conversion Guide at right. For example, dial 1.2 for 1.2 pounds (1 pound, 3 oz.) Press the dial to enter.
7. Press the dial or START/PAUSE pad to start defrosting.
8. Turn the food over when the oven signals TURN FOOD OVER.

- Remove defrosted meat or shield warm areas with small pieces of foil for even defrosting.
- After defrosting, most meats need to stand 5 minutes to complete defrosting. Large roasts should stand for about 30 minutes.

Conversion Guide

If the weight of food is stated in pounds and ounces, the ounces must be converted to tenths (.1) of a pound.

Weight of Food in Ounces	Enter Food Weight (tenths of a pound)
1-2	.1
3	.2
4-5	.3
6-7	.4
8	.5
9-10	.6
11	.7
12-13	.8
14-15	.9

Microwave sensor cooking tips

The Advantium’s microwave mode features sensor cooking and reheating. The oven automatically senses when food is done and shuts itself off—eliminating the need to program cook times and power levels.

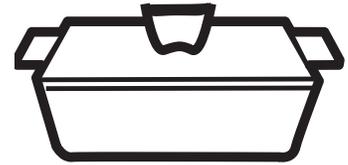
The sensor feature detects the increasing humidity released during cooking. The oven automatically adjusts the cooking time to various types and amounts of food.

**▲ WARNING:
Fire Risk**

*Do not use the sensor features twice in succession on the same food portion—it may result in severely overcooked or burnt food. If food is undercooked after the first countdown, use **COOK BY TIME** for additional cooking time.*

The proper containers and covers are essential for best sensor cooking.

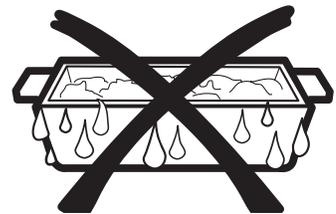
- Always use microwave-safe containers and cover them with lids or vented plastic wrap. Never use tight sealing plastic containers—they can prevent steam from escaping and cause food to overcook.
- Be sure the outside of the cooking containers and the inside of the oven are dry before placing food in the oven. Beads of moisture turning into steam can mislead the sensor.
- Popcorn and Potatoes are best heated uncovered.



Covered



Vented

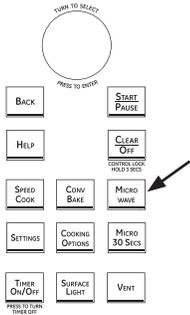


Dry off dishes so they don't mislead the sensor.

MICROWAVE SENSOR PROGRAMS

- | | |
|---|------------------------|
| ■ Ground Meat | ■ Chicken Reheat |
| ■ Popcorn (Prepackaged microwave popcorn, 2.9 oz. to 3.5 oz.) | ■ Pasta Reheat |
| ■ Potato | ■ Plate of Food Reheat |
| ■ Rice | ■ Soup Reheat |
| ■ Soup | ■ Vegetable Reheat |
| ■ Vegetables (Canned, Fresh, Frozen) | ■ Simmer |

To use all sensor programs



To use the sensor features:

1. Press the MICROWAVE pad.
2. Turn the dial to select COOK BY FOOD (located under COOK), REHEAT, or SIMMER.
3. For COOK BY FOOD and REHEAT, select a food and press the dial to enter. For SIMMER, set the time to simmer after the soup, sauce or stew has come to a boil.
4. Press the dial or press the START/ PAUSE pad to start cooking.

Do not open the oven door until time is counting down on the display. If you open the door while sensor cooking, "Sensor Error - Close door and press START" will appear. Close the door immediately and press the START/PAUSE pad to begin again.

⚠ WARNING:
Fire Risk

Do not use a sensor feature twice in succession on the same food portion—it may result in severely overcooked or burnt food. If the food is not done enough at the end of the sensor cook time, use COOK BY TIME in the microwave selector to cook for more time.

- If you have been cooking and the oven is hot, it may indicate that it is too hot for sensor cooking. In that case, the oven will automatically change to time cooking and may prompt for weights or amounts of food.
- To shorten or lengthen the cook time, wait until the time countdown shows in the display. Then turn the dial to add or subtract time.

Notes about the Reheat program:

Reheated foods may have wide variations in temperature. Some areas may be extremely hot.

It is best to use COOK BY TIME and not REHEAT for these foods:

- Bread products
- Food that must be reheated uncovered
- Foods that need to be stirred or turned
- Foods calling for a dry look or crisp surface after reheating

How to adjust the oven's automatic COOK BY FOOD and REHEAT settings for a shorter or longer cook time (not available for all food types):

To reduce the automatic cooking times: Right after the oven starts, turn the dial counterclockwise until a minus ("-") sign or a double minus ("--") sign appears and press the dial to enter. A minus ("-") sign is a 10% reduction of cooking time and a double minus ("--") sign is a 20% reduction of cooking time.

To increase the automatic cooking times: Right after the oven starts, turn the dial clockwise until a plus ("+") sign or a double plus ("++") sign appears and press the dial to enter. A plus ("+") sign is a 10% increase of cooking time and a double plus ("++") sign is a 20% increase of cooking time.

Cooking Complete

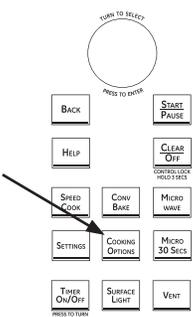
To remind you that you have food in the oven, the oven will display the cooking mode and COOKING COMPLETE and beep

once a minute until you either open the oven door or press the CLEAR/OFF pad.

Repeat last

Use this time saving feature for cooking repetitive items like cookies or appetizers. This feature will repeat the last cooking cycle used, including time, temperature, power levels, and turntable settings

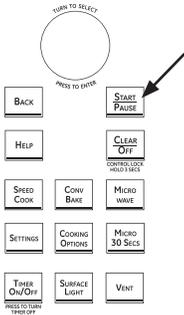
NOTE: The last program used is stored for two hours.



1. Press COOKING OPTIONS and select REPEAT LAST.
2. The last cooking cycle will be displayed.

3. Press the START/PAUSE pad or the selector dial to start cooking.

Resume feature



1. If your food needs to cook a bit longer, you can restart the oven by pressing the START/PAUSE pad or selector dial.
2. RESUME COOKING will be displayed and the oven will restart immediately at 10% of the original time.

The program stays in memory for 5 minutes. After that you will need to begin the program again.

Clock

The clock must be set before you can use your oven for the first time. When setting the clock time for the first time go directly to step two.

1. To change the clock time, press the SETTINGS pad and turn the dial to CLOCK SETTINGS. Select SET TIME.
2. Turn the dial to set hours. Press the dial to enter. Note: Setting hours sets AM/PM.
3. Turn the dial to set minutes. Press the dial to enter.

Auto Conversion

Auto conversion automatically reduces the convection baking temperature. You still input the recipe temperature and the oven control does the rest.

To change the setting, press the SETTINGS pad and turn the dial to AUTO CONVERSION. Press the dial to enter. Turn the dial to change the setting to CONVERSION ON or CONVERSION OFF. Press the dial to enter.

Display On/Off

Use this feature to turn your clock display on or off.

Press the SETTINGS pad, turn the dial to select DISPLAY ON/OFF. Turn the dial to select CLOCK DISPLAY ON or CLOCK DISPLAY OFF. Press the dial to enter.

Beeper Volume

Use this feature to adjust the volume of the beeper. You can even turn it off.

Press the SETTINGS pad, turn the dial to select BEEPER VOLUME, press the dial to enter. Select the beeper volume, press the dial to enter.

Reminder

Use this feature to set an alarm beep to sound at a specific time of day.

1. Press the SETTINGS pad, turn the dial to select REMINDER and press the dial to enter.
2. Select SET REMINDER and press the dial to enter.
3. Turn the dial to set the time hour and minutes, press the dial to enter. NOTE: Setting the hours set AM/PM.

To turn off the Reminder, press the SETTINGS pad, turn the dial to select REMINDER and press the dial to enter. Turn the dial to select CLEAR REMINDER and press the dial to enter.

To check the Reminder time, press the SETTINGS pad, turn the dial to select REMINDER and press the dial to enter. Turn the dial to select REVIEW REMINDER and press the dial to enter. The display will show the Reminder time.

Turntable On/OFF

Use this feature to keep the turntable from turning when using a dish is too large to rotate in the cavity.

TURNTABLE ON/OFF is not a permanent setting.

Press the SETTINGS pad, turn the dial to select TURNTABLE ON/OFF and press the dial to enter. Turn the dial to select TURNTABLE ON or TURNTABLE OFF, press the dial to enter.

Note:

- The turntable will not turn off in Speedcook, Broil, Toast, or Microwave Sensor modes.
- A cooking cycle must be started within 5 minutes of turning the turntable off, or the turntable will reset to the on setting.
- The turntable will also remain off for cooking cycles started within 5 minutes of the end of any cooking cycle for which the turntable was off.

Auto Night Light

Use this feature to set the surface light to come on and go off at a certain time.

1. Press the SETTINGS pad, turn the dial to select AUTO NIGHT LIGHT and press the dial to enter.
2. Select SET ON TIME and press the dial to enter.
3. Turn the dial to set on time hour and minutes, press the dial to enter. Turn the dial to set off time hour and minutes, press the dial to enter. Note: Setting the hours sets AM/PM.

To disable the Auto Night Light feature, press the SETTINGS pad, turn the dial to select AUTO NIGHT LIGHT and press the dial to enter. Turn the dial to select DEACTIVATE and press the dial to enter.

To check the Auto Night Light on and off times, press the SETTINGS pad, turn the dial to select AUTO NIGHT LIGHT and press the dial to enter. Turn the dial to select REVIEW ON/OFF TIMES and press the dial to enter. The display will show the on and off time for the Auto Night light.

Note:

- Auto Night Light will turn on the surface light to the night setting, when the clock time matches the Auto Night Light on time, even if the surface light is on the bright setting.
- Auto Night Light will always turn the surface light off when the clock time matches the Auto Night Light off time if the surface light is turned on.

Temperature Units

To change temperature units, press the SETTINGS pad and select TEMPERATURE UNITS. Turn the dial to select F or C and press the dial to enter.

Delay Start

Use this feature to delay when the oven will start cooking in CONV BAKE, COOK BY TIME, COOK BY TIME 1&2, DEFROST BY TIME, or DEFROST BY WEIGHT.

1. Press the COOKING OPTIONS pad.
2. Turn the dial to select DELAY START and press the dial to enter.

3. Turn the dial to set the start time hour and minutes, press the dial to enter. NOTE: Setting the hours sets AM/PM.
4. Set the cooking mode.

The oven will start the programmed cooking mode when the clock time and the delay start time are the same.

Help

Use this feature to find out more about your oven and its features.

The display will show a description for the program you have chosen. Use the dial to scroll up or down to read the description.

1. Press the HELP pad.
2. Turn the dial to select the feature name. Press the dial to enter.

Features found in the HELP function.

Adding Time	Cooking Options	Repeat Last
Auto Conversion	Defrost	Resume
Auto Night Light	Defrost by Food	Sensor Cooking
Back	Defrost by Time	Simmer
Beeper Volume	Defrost by Weight	Soften
Beverage	Delay Start	Speed Cook
Broil	Display ON/OFF	Start/PAUSE
Clear/Off	Edit	Temperature Units
Clock	Help	Timer On/Off
Control Lockout	Melt	Turntable ON/OFF
Conv Bake	Micro 30 Secs	Toast
Cook by Food Type	Microwave	Warm
Cook by Time	My Recipes	
Cook by Time 1 & 2	Proof	
	Reheat	
	Reminder	

Control lock-out

You may lock the control panel to prevent the oven from being accidentally started during cleaning or being used by children.

When the control panel is locked, CONTROL IS LOCKED will be displayed briefly anytime a pad or dial is pressed.

Press and hold CLEAR/OFF for 3 seconds to lock and unlock.

Timer

Use this feature anytime you need a general purpose timer. It can even be used while cooking in the oven.

3. Turn the dial to select the seconds. Press the dial to enter.

1. Press the TIMER pad.
2. Turn the dial to select the minutes. Press the dial to enter.

To cancel, press the TIMER pad.

Automatic fans

Cooling fans automatically turn on as required to keep the internal oven components and control from overheating.

The vent fan may come on automatically if the oven gets too hot, even if the oven isn't running. The screen will display: "Normal Operation. Fan is on due to high heat. Fan will shut off automatically."

Surface Light

Use to light your cooktop.
Press the SURFACE LIGHT pad to change from bright to night to off.

Vent Fan

The vent fan removes steam and other vapors from surface cooking.
Press the VENT FAN pad to change from high to medium to low to off.

The vent fan may come on automatically if the oven gets too hot, even if the oven isn't running. The screen will display: "Normal Operation. Fan is on due to high heat. Fan will shut off automatically."

How to clean the inside of the oven

Be certain the oven control is turned off and the oven is warm or cool to the touch before cleaning any part of this oven.

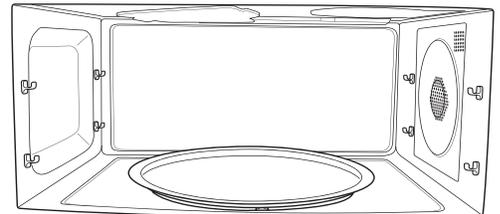
Clean the inside of the oven often for proper heating performance.

Some spatters can be removed with a paper towel, others may require a warm soapy cloth. Remove greasy spatters with a sudsy cloth, then rinse with a damp cloth.

If the dirt and spatter do not come off easily with a warm sudsy cloth, place a medium sized bowl full of water in the unit on the metal tray and press the SPEEDCOOK pad. Select MY RECIPE and set for 10 minutes at U=3, L=3, M=7. This should loosen the dirt in the oven so that it can be removed with a warm sudsy cloth.

If you notice yellowing on the metal inside the oven that cannot be removed with a warm sudsy cloth, use a stainless steel cleaner that removes heat discoloration and/or tarnishing. You can then clean the inside of the oven as you normally do.

Do not use abrasive cleaners or sharp utensils on oven walls.



Never use a commercial oven cleaner on any part of your oven.

Do not clean the inside of the oven with metal scouring pads. Pieces can break off the pad inside the oven, causing electrical shock as well as damaging the inside surface finish of the oven.

Removable turntable

The area underneath the turntable should be cleaned frequently to avoid odors and smoking during a cooking cycle.

The turntable can be broken if dropped. Wash carefully in warm, sudsy water. Dry completely and replace.

To replace the turntable, place its center over the spindle in the center of the oven and turn it until it seats into place.



Turntable

Do not use the oven without the turntable in place.

Cooking trays and wire oven rack

To prevent breakage, allow the trays to cool completely before cleaning. Wash carefully in hot, sudsy water or in the dishwasher.

Do not use abrasives to clean the glass tray or wire oven rack, as they may damage the finish.

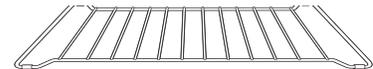
A plastic scrubbing pad may be used to clean the metal trays.



Clear glass tray



Metal tray

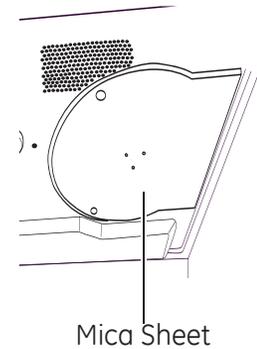


Wire oven rack

Mica sheet

Do not remove the mica sheet.

To clean the mica sheet: Allow the oven to cool completely. Wipe clean with a warm soapy cloth.



How to clean the outside of the oven

We recommend against using cleaners with ammonia or alcohol, as they can damage the appearance of the oven. If you choose to use a common household cleaner, first apply the cleaner directly to a clean cloth, then wipe the soiled area.

Case

Clean the outside of the microwave with a sudsy cloth. Rinse and then dry. Wipe the window clean with a damp cloth.

Control Panel

Wipe with a damp cloth. Dry thoroughly. Do not use cleaning sprays, large amounts of soap and water, abrasives or sharp objects on the panel - they can damage it. Some paper towels can also scratch the control panel.

Stainless Steel Surfaces (on some models)

The stainless steel panel can be cleaned with Stainless Steel Magic or a similar product using a clean, soft cloth. Apply stainless cleaner carefully, avoiding the surrounding plastic or glass parts. Do not use appliance wax, polish, bleach or products containing chlorine on stainless steel.

Plastic Color Panels (on some models)

Use a clean, soft, lightly dampened cloth, then dry thoroughly.

Door Seal

It's important to keep the area clean where the door seals against the oven. Use only mild, non-abrasive detergents applied with a clean sponge or soft cloth. Rinse well.

Bottom

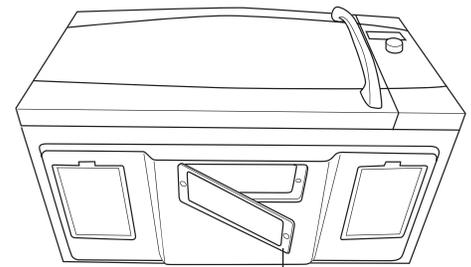
Clean off the grease and dust on the bottom often. Use a solution of warm water and detergent.

Replacing the surface light

1. To replace the surface light, first disconnect the power at the main fuse or circuit breaker panel or unplug the oven.
2. Remove the screw from the side of the light compartment cover and lower the cover until it stops.
3. Be sure the bulb to be replaced is cool before removing. Gently pull the bulb from the receptacle.

Replace with a 130 volt, 50-watt halogen bulb. Order WB08X10051 from your GE supplier.

4. Raise the light cover and replace the screw. Connect electrical power to the oven.



Remove screw

Removing and cleaning the filters

1. The metal filters trap grease released by foods on the cooktop. They also prevent flames from foods on the cooktop from damaging the inside of the oven.
2. For this reason, the filters must always be in place when the hood is used. The vent filters should be cleaned once a month, or as needed.
3. To remove, slide them to the rear using the tabs. Pull down and out.
4. To clean the vent filters, soak them and then swish around in hot water and detergent. Don't use ammonia or ammonia products because they will darken the metal. Light brushing can be used to remove embedded dirt.
5. Rinse, shake and let dry before replacing.
6. To replace, slide the filters into the frame slots on the back of each opening. Press up and to the front to lock into place.

Replacing the oven cavity lamp

1. Disconnect power at the main fuse or circuit breaker panel.
2. Remove the top grill by removing the two screws that hold it in place.
3. Remove charcoal filter if present. Slide the filter toward the left and pull toward the front to remove.
NOTE: Charcoal filter is an optional kit, you may not have one.
4. Remove the screw holding the lamp shield in place.
5. Pull the lamp shield out. Pull the light bulb out and replace with the 120V-130V, 20-watt halogen bulb. Order WB25X10019 from your GE supplier.
6. Return the lamp and lamp shield to original position and replace screw and charcoal filter.
7. Replace the grill and 2 screws. Reconnect power to the oven

Charcoal filter (JX81D - optional kit)

If the model is not vented to the outside, the air will be recirculated through a disposable charcoal filter that helps remove smoke and odors.

The charcoal filter cannot be cleaned. It must be replaced. Order Part No. WB2X9883 from your GE supplier.

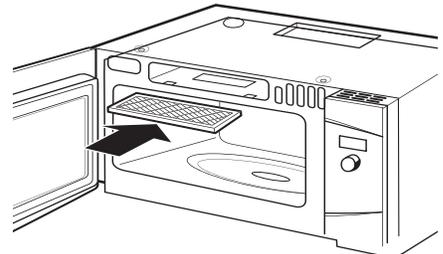
The charcoal filter should be replaced when it is noticeably dirty or discolored (usually after 6 to 12 months, depending on usage).

To install the charcoal filter

To install a new filter:

1. Remove plastic and other outer wrapping from the new filter.
2. Remove the top grill by removing the two screws that hold it in place.
3. Insert the filter into the top opening of the oven as shown.
4. It will rest at an angle on two back support tabs and in front by two tabs.
5. Replace the grill and two screws.

To remove the filter, repeat step 2 above, remove the filter and repeat step 5.



Questions?
Use this
problem
solver

Problem	Possible Causes	What To Do/Explanation
LIGHTS		
Light during a speedcook cycle dims and cycles on and off, even at full power levels.	This is normal. Power level has been automatically reduced because the oven is hot.	<ul style="list-style-type: none"> This is normal. The oven senses the heat level and adjusts automatically.
Light visible around the door and outer case while speedcooking.	This is normal.	<ul style="list-style-type: none"> When the oven is on, light may be visible around the door and outer case.
FAN		
Fan continues to run after cooking stops.	The oven is cooling.	<ul style="list-style-type: none"> The fan will automatically shut off after when the internal parts of the oven have cooled.
Oven vent emits warm air while oven is on.	This is normal.	
Vent fan comes on automatically when oven not in use.	This is normal.	<ul style="list-style-type: none"> If the cooktop or oven gets hot enough the vent fan comes on. (see <i>Automatic Fan</i> section.)
Fan comes on automatically when using the microwave.	This is normal.	<ul style="list-style-type: none"> If the microwave is used after speedcook and the oven senses that it is too hot, the vent fan comes on to cool the oven.
The oven makes unusual sounds while cooking.	Clicks and fans blowing are normal. The relay board is turning the components on and off.	<ul style="list-style-type: none"> These sounds are normal.
Fan sound changes while cooking.	This is normal.	<ul style="list-style-type: none"> Fan may turn on or off during cooking to maintain cooking temperature.
COOKING		
Smoke comes out of oven when the door is opened.	Food is high in fat content. Aerosol spray used on the pans.	<ul style="list-style-type: none"> Smoke is normal when cooking high-fat foods. Use vegetable oil or olive oil on the meat itself instead of coating the entire pan.
Food is not fully cooked or browned at the end of a cooking program.	Programmed times may not match the size or amount of food you are cooking.	<ul style="list-style-type: none"> Increase or decrease time for doneness or adjust the upper or lower lamps for browning.
Oven has turned off in Warm, Proof, or Convection Bake	The maximum cooking time of 179 minutes has been reached	<ul style="list-style-type: none"> This is normal. The control will automatically turn off the oven and indicate that cooking is complete when the maximum cooking time is reached. The cooking time is not always displayed.
	A cooking time was set for Convection Bake to start after preheat and the door was not opened at the end of preheat.	<ul style="list-style-type: none"> This is normal. The control will automatically turn off the oven after one hour and indicate that cooking is complete if the door is not opened after preheat.

Questions?
Use this
problem
solver

Problem	Possible Causes	What To Do/Explanation
DISPLAY		
The display is blank.	The display has been turned off.	<ul style="list-style-type: none"> Check the SETTINGS menu for clock display settings. Turn the display on.
“Control Panel LOCKED” appears in display.	The control has been locked.	<ul style="list-style-type: none"> Press and hold CLEAR/OFF for about 3 seconds to unlock the control. See <i>Other Features Section</i>.
Control display is lighted yet oven will not start.	Clock is not set.	<ul style="list-style-type: none"> Follow prompts to set the clock.
	Door not securely closed.	<ul style="list-style-type: none"> Open the door and close securely.
	START/PAUSE pad not pressed after entering cooking selection.	<ul style="list-style-type: none"> Follow prompts
	Delay Start was accidentally set.	<ul style="list-style-type: none"> Press CLEAR/OFF and reset.
	Oven is in DEMO Mode	<ul style="list-style-type: none"> Unplug the oven for 1 minute, plug the oven back into the wall DO NOT set the oven clock, press and hold the HELP and START/PAUSE pads for 3 seconds. The control should exit DEMO mode. Set clock and continue.
	CLEAR/OFF was pressed accidentally.	<ul style="list-style-type: none"> Reset cooking program and press START/PAUSE.
OTHER PROBLEMS		
The door and inside of the oven feels hot.	The oven produces intense heat in a small space.	<ul style="list-style-type: none"> This is normal. Use oven mitts to remove food when ready.
Floor of the oven is warm, even when the oven has not been used.	The cooktop light is located below the oven floor. When the light is on, the heat it produces may make the oven floor get warm.	<ul style="list-style-type: none"> This is normal.
Oven will not start.	A fuse in your home may be blown or the circuit breaker tripped.	<ul style="list-style-type: none"> Replace fuse or reset circuit breaker.
	Power surge.	<ul style="list-style-type: none"> Unplug the oven, then plug it back in.
	Plug not fully inserted into wall outlet.	<ul style="list-style-type: none"> Make sure the plug on the oven is fully inserted into wall outlet.
Glass microwave tray does not lock into center hub.		<ul style="list-style-type: none"> Align the protrusions on the bottom of the glass microwave tray with the indentation in the turntable. This fit is not tight, some movement is normal.

Advantium Oven Warranty

Advantium Oven

All warranty service provided by our Factory Service Centers, or an authorized Customer Care® technician. To schedule service, online, contact us at GEAppliances.com, or call 800.GE.CARES (800.432.2737). Please have serial and model numbers available when calling for service.

Staple your receipt here. Proof of the original purchase date is needed to obtain service under the warranty.

For The Period Of:	GE Will Replace:
One Year <i>From the date of the original purchase</i>	Any part of the oven which fails due to a defect in materials or workmanship. During this limited one-year warranty , GE will also provide, free of charge , all labor and related service costs to replace the defective part.
Five Years <i>From the date of the original purchase</i>	The magnetron tube, if the magnetron tube fails due to a defect in materials or workmanship. During this five-year limited warranty, you will be responsible for any labor or in-home service costs.

What GE Will Not Cover:

- | | |
|--|--|
| <ul style="list-style-type: none"> ■ Service trips to your home to teach you how to use the product. ■ Improper installation, delivery or maintenance. ■ Product not accessible to provide required service. ■ Failure of the product or damage to the product if it is abused, misused (for example, cavity arcing from wire rack or metal/foil), or used for other than the intended purpose or used commercially. | <ul style="list-style-type: none"> ■ Replacement of house fuses or resetting of circuit breakers. ■ Replacement of the cooktop light bulbs. ■ Damage to the product caused by accident, fire, floods or acts of God. ■ Incidental or consequential damage caused by possible defects with this appliance. ■ Damage caused after delivery. |
|--|--|

EXCLUSION OF IMPLIED WARRANTIES—Your sole and exclusive remedy is product repair as provided in this Limited Warranty. Any implied warranties, including the implied warranties of merchantability or fitness for a particular purpose, are limited to one year or the shortest period allowed by law.

This warranty is extended to the original purchaser and any succeeding owner for products purchased for home use within the USA. If the product is located in an area where service by a GE Authorized Servicer is not available, you may be responsible for a trip charge or you may be required to bring the product to an Authorized GE Service Location for service. In Alaska, the warranty excludes the service calls to your home.

Some states do not allow the exclusion or limitation of incidental or consequential damages. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. To know what your legal rights are, consult your local or state consumer affairs office or your state's Attorney General.

Warrantor: General Electric Company, Louisville, KY 40225



Profile Dryers

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**Owner's Manual &
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- PFDN440
- PFDN445
- PFMS450
- PFMS455
- PFMN440
- PFMN445

Sécheuses Profile

**Manuel d'utilisation
et d'installation**

La section française commence à la page 51

Secadoras Profile

**Manual del propietario
e instalación**

La sección en español empieza en la página 103

SAVE THESE INSTRUCTIONS

Write the model and serial
numbers here:

Model # _____

Serial # _____

They are on the label on the front
of the dryer behind the door.

IMPORTANT SAFETY INFORMATION. READ ALL INSTRUCTIONS BEFORE USING.

⚠ WARNING!

For your safety, the information in this manual must be followed to minimize the risk of fire or explosion, electric shock, or to prevent property damage, personal injury, or death.

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.

WHAT TO DO IF YOU SMELL GAS:

- 1 Do not try to light a match, or cigarette, or turn on any gas or electrical appliance.
- 2 Do not touch any electrical switch; do not use any phone in your building.
- 3 Clear the room, building or area of all occupants.
- 4 Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions carefully.
- 5 If you cannot reach your gas supplier, call the fire department.

California Safe Drinking Water and Toxic Enforcement Act

This act requires the governor of California to publish a list of substances known to the state to cause cancer, birth defects or other reproductive harm and requires businesses to warn customers of potential exposure to such substances.

Gas appliances can cause minor exposure to four of these substances, namely benzene, carbon monoxide, formaldehyde and soot, caused primarily by the incomplete combustion of natural gas or LP fuels.

Properly adjusted dryers will minimize incomplete combustion. Exposure to these substances can be minimized further by properly venting the dryer to the outdoors.



PROPER INSTALLATION

This dryer must be properly installed and located in accordance with the Installation Instructions before it is used. Installation Instructions are included in the back of this manual.

- Properly ground dryer to conform with all governing codes and ordinances. Follow details in Installation Instructions.
- Install or store where it will not be exposed to temperatures below freezing or exposed to water or weather.
- Connect to a properly rated, protected and sized power supply circuit to avoid electrical overload.
- Remove all sharp packing items and dispose of all shipping materials properly.

Exhaust/Ducting

- 1 Dryers **MUST** be exhausted to the outside to prevent large amounts of moisture and lint from being blown into the room.
- 2 Use only rigid metal 4" diameter ductwork inside the dryer cabinet. Use only UL approved rigid metal or flexible metal 4-in diameter ductwork for exhausting to the outdoors. Never use plastic or other combustible, easy-to-puncture ductwork.

For complete details, follow the Installation Instructions.

⚠ WARNING!



YOUR LAUNDRY AREA

- Keep the area underneath and around your appliances free of combustible materials, (lint, paper, rags, etc.), gasoline, chemicals and other flammable vapors and liquids.
- Keep the floor around your appliances clean and dry to reduce the possibility of slipping.
- Close supervision is necessary if this appliance is used by or near children. Do not allow children to play on, with or inside this or any other appliance.
- Keep the area around the exhaust opening and adjacent surrounding areas free from the accumulation of lint, dust and dirt.
- Keep all laundry aids (such as detergents, bleaches, etc.) out of the reach of children, preferably in a locked cabinet. Observe all warnings on container labels to avoid injury.
- Never climb on or stand on the dryer top.



WHEN USING YOUR DRYER

- Never reach into the dryer while the drum is moving. Before loading, unloading or adding clothes, wait until the drum has completely stopped.
- Clean the lint filter before each load to prevent lint accumulation inside the dryer or in the room. **DO NOT OPERATE THE DRYER WITHOUT THE LINT FILTER IN PLACE.**
- Do not wash or dry articles that have been cleaned in, washed in, soaked in or spotted with combustible or explosive substances (such as wax, oil, paint, gasoline, degreasers, dry-cleaning solvents, kerosene, etc.). These substances give off vapors that may ignite or explode. Do not add these substances to the wash water. Do not use or place these substances around your washer or dryer during operation.
- Do not place items exposed to cooking oils in your dryer. Items contaminated with cooking oils may contribute to a chemical reaction that could cause a clothes load to catch fire.
- Any article on which you have used a cleaning solvent or that contains flammable materials (such as cleaning cloths, mops, towels used in beauty salons, restaurants or barber shops, etc.) must not be placed in or near the dryer until solvents or flammable materials have been removed. There are many highly flammable items used in homes such as acetone, denatured alcohol, gasoline, kerosene, some household cleaners, some spot removers, turpentine, waxes, wax removers and products containing petroleum distillates.
- The laundry process can reduce the flame retardancy of fabrics. To avoid such a result, carefully follow the garment manufacturer's care instructions.
- Do not dry articles containing rubber, plastic or similar materials such as padded bras, tennis shoes, galoshes, bath mats, rugs, bibs, baby pants, plastic bags, pillows, etc. that may melt or burn. Some rubber materials, when heated, can under certain circumstances produce fire by spontaneous combustion.
- Do not store plastic, paper or clothing that may burn or melt on top of the dryer during operation.
- Garments labeled *Dry Away from Heat* or *Do Not Tumble Dry* (such as life jackets containing Kapok) must not be put in your dryer.
- Do not dry fiberglass articles in your dryer. Skin irritation could result from the remaining particles that may be picked up by clothing during subsequent dryer uses.
- To minimize the possibility of electric shock, unplug this appliance from the power supply or disconnect the dryer at the household distribution panel by removing the fuse or switching off the circuit breaker before attempting any maintenance or cleaning (except the removal and cleaning of the lint filter). **NOTE: Pressing START/PAUSE or POWER does NOT disconnect the appliance from the power supply.**
- If you see water on the floor around the dryer, call for service.

IMPORTANT SAFETY INFORMATION. READ ALL INSTRUCTIONS BEFORE USING.

WARNING!



WHEN USING YOUR DRYER (cont.)

- Never attempt to operate this appliance if it is damaged, malfunctioning, partially disassembled, or has missing or broken parts, including a damaged cord or plug.
- The interior of the machine and the exhaust duct connection inside the dryer should be cleaned at least once a year by a qualified technician. See the *Sorting and Loading Hints* section on page 12.
- If yours is a gas dryer, it is equipped with an automatic electric ignition and does not have a pilot light. **DO NOT ATTEMPT TO LIGHT WITH A MATCH.** Burns may result from having your hand in the vicinity of the burner when the automatic ignition turns on.
- Do not open the dryer door during steam cycles. The steam is very hot and it will continue to exhaust from the port for several seconds after opening. Do not touch the steam port after a steam cycle.
- Do not use a steam cycle with items such as wool, leather, silk, lingerie, foam products or electric blankets.
- Do not use steam cycles on new clothes without first washing.
- You may wish to soften your laundered fabrics or reduce the static electricity in them by using a dryer-applied fabric softener or an anti-static conditioner. We recommend you use either a fabric softener in the wash cycle, according to the manufacturer's instructions for those products, or try a dryer-added product for which the manufacturer gives written assurance on the package that their product can be safely used in your dryer. Service or performance problems caused by use of these products are the responsibility of the manufacturers of those products and are not covered under the warranty of this appliance.
- Never attempt to use the Steam Dewrinkle or Steam Refresh cycles without clothes in the drum. Additionally, it is highly recommended to select the appropriate load size for best results. Selecting large load cycles for small loads may result in wetting of clothes, and selecting small load cycles for large loads may result in poor dewrinkling performance.



WHEN NOT USING YOUR DRYER

- Grasp the plug firmly when disconnecting this appliance to avoid damage to the cord while pulling. Place the cord away from traffic areas so it will not be stepped on, tripped over or subjected to damage.
- Do not attempt to repair or replace any part of this appliance or attempt any servicing unless specifically recommended in this Owner's Manual or in published user-repair instructions that you understand and have the skills to carry out.
- Before discarding a dryer, or removing it from service, remove the dryer door to prevent children from hiding inside.
- Do not tamper with controls.



**READ AND FOLLOW THIS SAFETY INFORMATION CAREFULLY.
SAVE THESE INSTRUCTIONS**

About the dryer control panel.

▲ WARNING! To reduce the risk of fire, electric shock, or injury to persons, read the **IMPORTANT SAFETY INSTRUCTIONS** before operating this appliance.

Throughout this manual, features and appearance may vary from your model.

Quick Start

If the screen is dark, press the **POWER** button to “wake up” the display.

1 Press the **POWER** button.



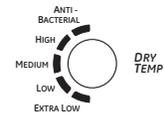
2 Select a cycle by turning the **Cycle Knob**.



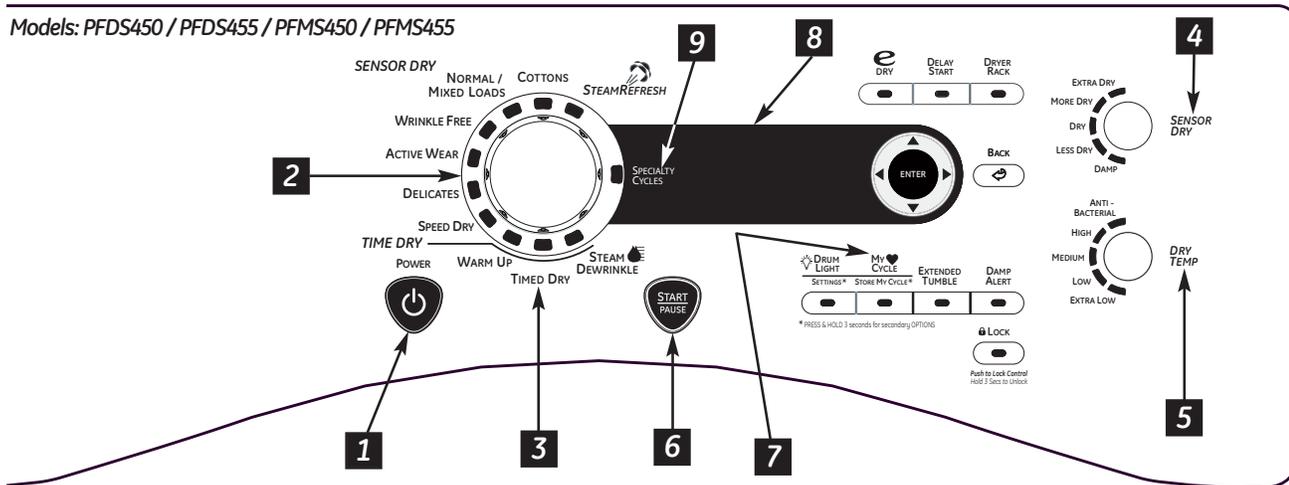
3 If you selected a **SENSOR CYCLE** – just press the **START/PAUSE** button.



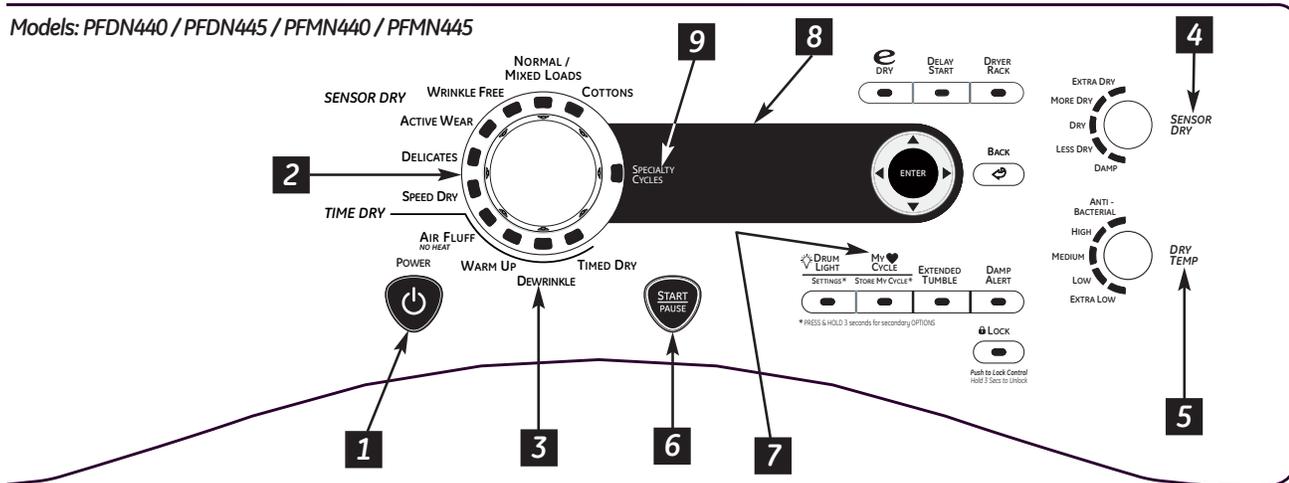
If you selected a **TIME DRY CYCLE** – select your heat setting and the amount of time you want your items to dry by using the cursor buttons. Then press the **START/PAUSE** button.



Models: PFDS450 / PFDS455 / PFMS450 / PFMS455



Models: PFDN440 / PFDN445 / PFMN440 / PFMN445



1 Power
Press to “wake up” the display. If the display is active, press to turn the dryer off.

NOTE: Pressing **POWER** does not disconnect the appliance from the power supply.

About the dryer control panel.

Dry Cycles

The dry cycle controls the cycle time for the drying process. The chart below will help you match the dry setting with the loads.

2 Sensor Cycles

COTTONS	For cottons and most linens.
NORMAL/ MIXED LOAD	For loads consisting of cottons and poly-blends.
WRINKLE FREE	For wrinkle-free/easy care and permanent press items.
ACTIVE WEAR	Clothing worn for active sports exercise and some casual wear. Fabrics include new technology finishes and stretch fibers such as Spandex.
DELICATES	For lingerie and special-care fabrics.
SPEED DRY	For small loads that are needed in a hurry, such as sports or school uniforms. Can also be used if the previous cycle left some items damp, such as collars or waistbands.

Timed Dry Cycles

STEAM REFRESH <i>(on some models)</i>	For slightly wrinkled dry garments. Significantly reduces wrinkles on 1–5 garments. Selecting a higher number of garments for the cycle (e.g., selecting 5-garment load for a 1-garment load) may result in excessive wetting of clothes. After the STEAM REFRESH Cycle, the unit will beep and display “Garments Ready” and “0:00.” If the unit is not turned off or if the door is not opened, the dryer will continue to tumble for 30 minutes. At the end of 30 minutes, it will display “0:00” and “Cycle Complete.” NOTE: When STEAM REFRESH is selected, “EXTENDED TUMBLE” will automatically turn on and cannot be turned off. A single extremely light fabric item may need to have an additional item included in the steam refresh cycle to achieve optimum results.
DEWRINKLE <i>(on some models)</i>	For removing wrinkles from items that are dry or slightly damp. This cycle is not recommended for delicate fabrics.
STEAM DEWRINKLE <i>(on some models)</i>	For use with larger loads than STEAM REFRESH . Ideal for loads left in dryer for an extended time. Selecting a larger cycle than needed (e.g., selecting Large Load for a half-full dryer) may result in excessive wetting of clothes.
WARM UP	Provides 10 minutes of warming time to warm up clothes.

My Cycle *(on some models)*

MY CYCLE	Press to use, create or modify custom dry cycles.
-----------------	---

3 Timed Dry

Use to set your own dry time. **TIMED DRY** is also recommended for small loads.

To use **TIMED DRY**:

1. Turn dry cycle dial to **TIMED DRY**.
2. Select the drying time by pressing the ▲ and ▼ buttons. You can increase the time in 10-minute increments up to 2 hours, 5 minutes.
3. Select the **DRY TEMP**.
4. Close the door.
5. Press **START/PAUSE**.

4 Sensor Dry

The sensor continuously monitors the amount of moisture in the load. When the moisture in your clothes reaches your selected dry level, the dryer will stop.

EXTRA DRY	Use for heavy-duty fabrics or items that should be very dry, such as towels.
MORE DRY	Use for heavy or mixed type of fabrics.
DRY	Use for normal dryness level suitable for most loads. This is the preferred cycle for energy saving.
LESS DRY	Use for lighter fabric (ideal for ironing).
DAMP	For leaving items partially damp.

5 Dry Temp

You can change the temperature of your dry cycle.

ANTI-BACTERIAL This option may only be used with **COTTONS** or **MIXED LOAD** cycles. This option reduces certain types of bacteria by 99.9%, including: *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Klebsiella pneumoniae**. The anti-bacterial process occurs when high heat is used during a portion of this drying cycle.

NOTE: Do not use this cycle on delicate fabrics.

* The Anti-Bacterial Cycle is Certified by NSF International (formerly National Sanitation Foundation) to NSF Protocol P154 Sanitization Performance of Residential Clothes Dryers.



NSF Protocol P154
Sanitization Performance of
Residential Clothes Dryers

HIGH For regular to heavy cottons.

MEDIUM For synthetics, blends and items labeled permanent press.

LOW For delicates, synthetics and items labeled *Tumble Dry Low*.

EXTRA LOW For lingerie and special-care fabrics.

6 START/PAUSE

Press to start a dry cycle. If the dryer is running, press it once and it will pause the dryer. Press it again to resume the dry cycle.

7



My Cycle (on some models)

Set up your favorite combination of settings and save them here for one touch recall. These custom settings can be set while a cycle is in progress.



To store a MY CYCLE combination of settings:

1. Select your drying cycle.
2. Change **DRY TEMP** and **SENSOR DRY** settings to fit your needs.
3. Select any drying **OPTIONS** you want.
4. Press and hold the **MY CYCLE** button for 3 seconds to store your selection. A beep will sound the button will light up, and the unit will display "My cycle is now programed with the current cycle settings".

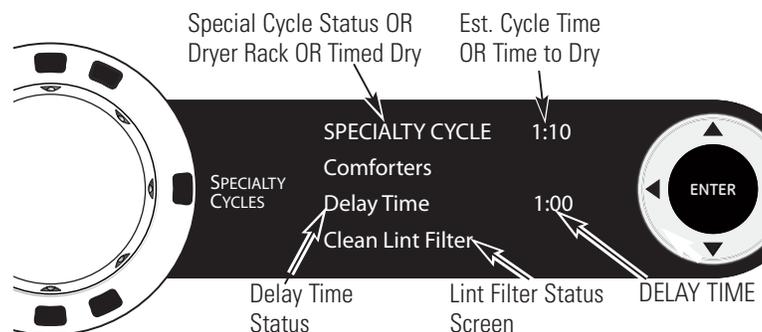
To recall your stored MY CYCLE combination:

Press the **MY CYCLE** button before drying a load. The light in the center of the button will light up when **MY CYCLE** is selected.

To change your stored MY CYCLE combination:

Follow Steps 1–4 in "To store a MY CYCLE combination of settings."

8 Display



"CLEAN LINT FILTER" (message)

This message appears periodically. It is only a reminder.

About the dryer control panel.

9 Specialty Cycles

1. Turn the **CYCLE** knob to **SPECIALTY CYCLES**. A list of cycle options will appear in the display.
2. Using the cursor buttons, select a **CATEGORY**.
3. Using the cursor buttons, select a **CYCLE**.
Press the **BACK** button to take you back to the **CATEGORIES**.
4. Press **ENTER** to select.
5. Press the **START/PAUSE** button.

SPECIALTY CYCLES include:

Garment

- Coats
- Hosiery/Bras (use mesh bag)
- Jeans
- Khakis

Bed and Bath

- Blankets (Cotton)
- Comforters
- Sheets
- Towels

Specialty Cycles

- Air Fluff
- Dryel
- Fleece
- Fragile Cottons
- Performance Fabrics
- Pet Bedding
- Play Clothes
- Rack Dry
- Sleeping Bag
- Throw Rugs

Washer Communicated Cycles

To turn on communication, press the **SETTINGS** button on the washer control panel. When "DRYER LINK" appears in the display, press **ENTER**. Using the arrow keys, select ON; then press **ENTER**.

When the washer cycle is completed, the washer will communicate with the dryer when any button on the control panel is touched or the door is opened.

The washer will display, "TRANSFERRING CYCLE INFORMATION TO THE DRYER" and the dryer will display, "RECEIVING CYCLE INFORMATION TO THE DRYER".

The dryer will only communicate with the washer if the dryer is not running a cycle.

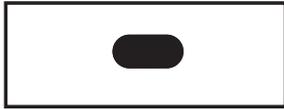
If the washer starts a new cycle before the dryer has a chance to communicate with it, the information will be lost.

About cycle options.

NOTE: Not all features are available on all dryer models.

GEAppliances.com

EXTENDED TUMBLE



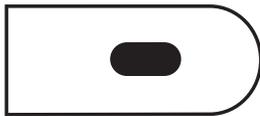
Extended Tumble

Minimizes wrinkles by adding approximately 60 minutes of no-heat tumbling after clothes are dry.

The light in center of the button will light up when **EXTENDED TUMBLE** is on.

Extended Tumble is automatically selected for the SteamRefresh cycle and cannot be deselected. Dryer will beep and display “Garments Ready” when SteamRefresh is complete. The dryer will continue in Extended Tumble until the door is opened.

DAMP ALERT



Damp Alert

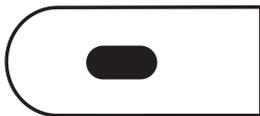
This option causes the dryer to beep when clothes have dried to a damp level. Remove items that you wish to hang dry. The **DAMP ALERT** will only beep when this option is selected.

Removing clothes and hanging them when they are damp can reduce the need to iron some items.

The light in center of the button will light up when **DAMP ALERT** is on.

DRUM LIGHT

SETTINGS*



Drum Light

Press this button to turn on the light in the dryer.

Press the button again to turn the light off.

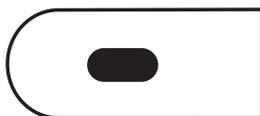
This only controls the light when the door is shut. **NOTE: The light will turn off by itself after one minute when the door is shut.**

When the door is opened, the light comes on automatically.

The light in center of the button will light up when **DRUM LIGHT** is on.

NOTE: Hold down the DRUM LIGHT button for 3 seconds to access the SETTINGS menu. (See page 10 for more details)

e DRY



e-Dry

Reduces the total energy consumption of specific dryer cycles by adjusting certain heat settings.

NOTE: Cycle times will change when e-DRY is selected

This cycle can be used with **DELICATES, ACTIVE WEAR, EASY CARE, NORMAL/MIXED LOADS** and **COTTONS**.

DELAY START



Delay Start

Use to delay the start of your dryer.

1. Choose your dry cycle and any options.
2. Press **DELAY START**. You can change the delay time in 1/2-hour increments, using the ▲ or ▼ arrow pads.
3. Press the **START/PAUSE** button to start the countdown.

The countdown time will be shown in the **ESTIMATED TIME REMAINING** display.

NOTES:

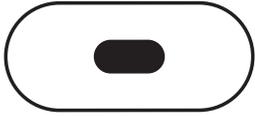
- If the door is opened while the dryer is in **DELAY**, the countdown time will not restart unless the door is closed and **START/PAUSE** button has been pressed again.
- You can delay the start of a dry cycle up to 24 hours.

The light in center of the button will light up when **DELAY START** is on.

About cycle options.

NOTE: Not all features are available on all dryer models.

LOCK



Push to Lock Control
Hold 3 Secs to Unlock

Lock

You can lock the controls to prevent any selections from being made. Or you can lock the controls after you have started a cycle.

Children cannot accidentally start the dryer by touching pads with this option selected.

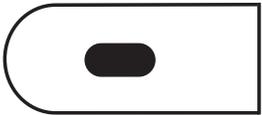
To lock the dryer, press the **LOCK** button. To unlock the dryer, press and hold the **LOCK** button for 3 seconds.

The light in center of the **LOCK** button will light up when the controls are locked.

Even though the controls are locked, the **POWER** button is still active in case you have to turn the unit off.

DRUM LIGHT

SETTINGS*



Press & hold for 3 seconds for secondary options

Settings

Under the **SETTINGS** option, you can adjust the volume or the brightness of the display.

VOLUME

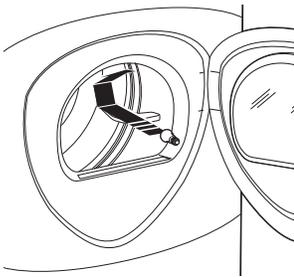
- End of Cycle (signal) volume can be set from **HIGH, MED, LOW** or **OFF**.
- Control Sounds volume can be set from **HIGH, MED, LOW** or **OFF**.

DISPLAY BRIGHTNESS can be set from **HIGH, MED** or **LOW**.

After you have made your selection, press **ENTER**.

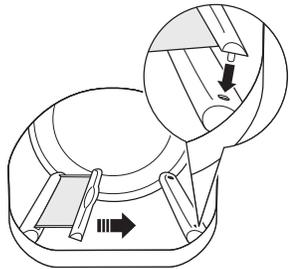
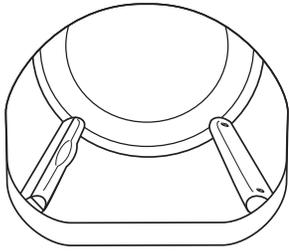
NOTE: To access the SETTINGS menu, hold down the DRUM LIGHT button for 3 seconds.

About dryer features.

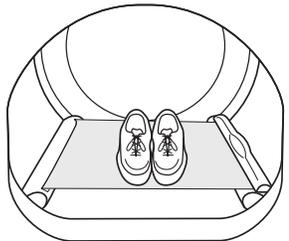


Drum Lamp

Before replacing the light bulb, be sure to unplug the dryer power cord or disconnect the dryer at the household distribution panel by removing the fuse or switching off the circuit breaker. Reach above dryer opening from inside the drum. Remove the bulb and replace with the same size bulb.



Engage the handle posts



Built-In Rack Dry System

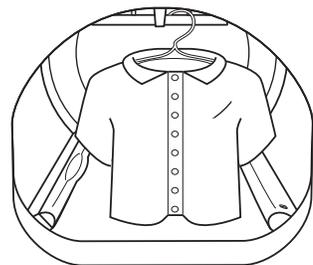
A handy drying rack may be used for drying items such as tennis shoes. Place items flat on the drying rack and block such items as wool sweaters and delicate fabrics. Dry with low heat.

To install the Built-In Rack Dry System

1. Make sure the drum of the dryer is oriented so the rack drying system is on the left side of the dryer.
2. Pull the drying rack screen out from the left side and engage the handle "posts" in the opposite baffle slots.
3. Place the garment on the rack and close the door.
4. Press the **DRYER RACK** button.
5. Select desired time.
6. Press the **START/PAUSE** button.

NOTE:

- Do not use this drying rack when there are other clothes in the dryer.
- Make sure to detach the drying rack at the end of the cycle and fully retract the screen back into the baffle.



To Use the Built-In Hook for Hanging Garments

1. Make sure the drum of the dryer is oriented so the hook is on the top center of the dryer.
2. Using your finger, pull the hook out of the baffle.
3. Hang the garment on a hanger, hang the hanger on the hook and close the door.
4. Press the **DRYER RACK** button.
5. Select the desired time.
6. Press the **START/PAUSE** button.

Reverse Tumble™

All Profile front-load matching dryers are equipped with the Reverse Tumble™ feature, as part of the Duo Dry Plus system™. By reversing the direction of drum rotation during the drying cycle, your dryer will tangle the clothes load less, dry more evenly and improve drying times. Typical loads such as bed and bath mixed loads, where sheets, towels and pillow cases are laundered together, benefit from this capability. When the dryer reverses direction, there will be a slight pause and sound change. This is normal.

All dryer cycles utilize this feature, except when the rack dry option is selected, in which case the drum does not tumble.

Using the dryer.

Always follow fabric manufacturer's care label when laundering.

Sorting and Loading Hints

As a general rule, if clothes are sorted properly for the washer, they are sorted properly for the dryer. Try also to sort items according to size. For example, do not dry a sheet with socks or other small items.

Do not add fabric softener sheets once the load has become warm. They may cause fabric softener stains. Bounce® Fabric Conditioner Dryer Sheets have

been approved for use in this dryer when used in accordance with the manufacturer's instructions.

See below for lint filter cleaning instructions.

Do not overload. This wastes energy and causes wrinkling.

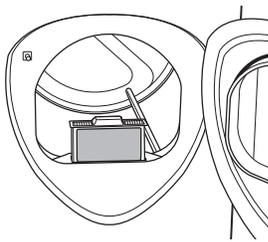
Do not dry the following items: fiberglass items, woolens, rubber-coated items, plastics, items with plastic trim and foam-filled items.

Fabric Care Labels

Below are fabric care label "symbols" that affect the clothing you will be laundering.

Dry Labels

Tumble dry								
	Dry	Normal	Permanent Press/ wrinkle resistant	Gentle/ delicate	Do not tumble dry	Do not dry (used with do not wash)		
	Heat setting							
		High	Medium	Low	No heat/air			
		Special instructions						
			Line dry/ hang to dry	Drip dry	Dry flat	In the shade		



Care and Cleaning of the Dryer

Dryer Interior and Duct: The interior of the appliance and exhaust duct should be cleaned once a year by qualified service personnel.

The Exterior: Wipe or dust any spills or washing compounds with a damp cloth. Dryer control panel and finishes may be damaged by some laundry pretreatment soil and stain remover products. Apply these products away from the dryer. The fabric may then be washed and dried normally. Damage to your dryer caused by these products is not covered by your warranty. Do not touch the surface or the display with sharp objects.

The Lint Filter: Clean the lint filter before each use. Remove by pulling straight up. Run your fingers across the filter. A waxy buildup may form on the lint filter from using dryer-added fabric softener sheets. To remove this buildup, wash the lint screen in warm, soapy water. Dry thoroughly and

replace. Do not operate the dryer without the lint filter in place.

Vacuum the lint from the dryer lint filter if you notice a change in dryer performance.

Stainless Steel: To clean stainless steel surfaces, use a damp cloth with a mild, nonabrasive cleaner suitable for stainless steel surfaces. Remove the cleaner residue, and then dry with a clean cloth.

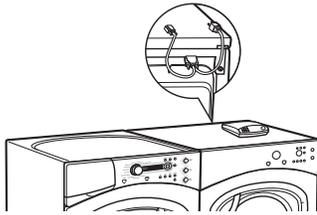
The stainless steel used to make the dryer drum provides the highest reliability available in a GE dryer. If the dryer drum should be scratched or dented during normal use, the drum will not rust or corrode. These surface blemishes will not affect the function or durability of the drum.

The Exhaust Hood: Check with a mirror that the inside flaps of the hood move freely when operating. Make sure that there is no wildlife (birds, insects, etc.) nesting inside the duct or hood.

Models PFDS450, PFDS455, PFDN440, PFDN445 are compatible with the GE Smart Appliance Module (SAM) which can be purchased separately. Contact your local utility or visit www.GEAppliances.com/smart-appliances to see if your area is using Demand Response (DR) technology.

Installation

The preferred location for the module installation is on top of the clothes dryer. Details on how to connect the cables to the module are in the instructions that come with the module.



Wait 5 minutes; then press the Settings button. Scroll and look for the energy management screen as seen below.



This screen means the module is attached correctly and you can begin to use your Smart Appliance following the instructions below.

If the Energy Management Screen is not available, refer to the SAM module troubleshooting guide.

Quick Guide

There are 4 power levels available: Critical, High, Medium and Low. On the Medium and Low levels, the unit runs as normal. The following steps show how the unit reacts during startup at Critical and High power levels.

Option 1 (Delay EP)

During startups at Critical and High levels, the unit will delay starting until the level becomes Medium or Low. Press the **START/PAUSE** button.



Option 2 (Override Delay EP)

To start the unit when Delay EP is shown, press the **DELAY START** button to turn the delay off. Then press **START/PAUSE** to begin the cycle. During a Critical Rate period, the Critical Response Mode** will also be activated to maximize energy savings. EP will be displayed.



Option 3 (Override "e" DRY)

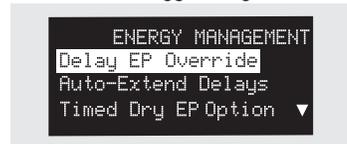
After overriding the delay function, pressing the **"e" DRY** button will disable the **"e" DRY** setting. Pressing the **START/PAUSE** key will begin the selected cycle.

During a Critical Rate period, the Critical Response Mode** will be activated to maximize energy savings. EP will be displayed.

Note: The Critical Response Mode can be disabled at any time by pressing and holding the **"e" DRY Button for 3 seconds. EP will be removed from the display

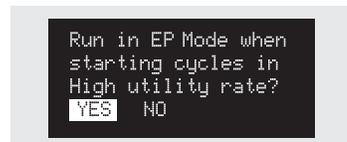
Settings Menu

Press **SETTINGS**; then select Energy Management.



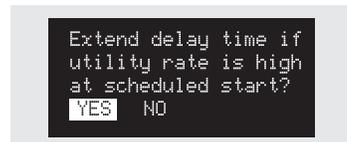
Delay EP Override

If you are starting a cycle in a Critical or High utility rate, this option allows the unit to automatically run on an EP Cycle. This setting will operate with less energy than normal cycles. Default setting is YES.



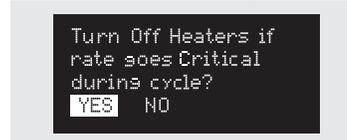
Auto-Extend Delays

If a timed delay is selected, this option allows for the scheduled start to extend if the utility rate is Critical or High at the scheduled start. The default setting will automatically extend these cycles.



Critical Rate Option

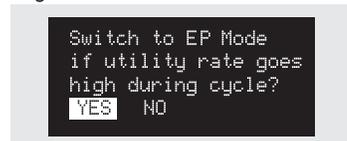
This option allows your smart appliance to respond to Critical Rate information by automatically engaging the Critical Response Mode. The Critical Response Mode is designed to maximize energy savings when a cycle is run during a Critical Rate period. The default setting is YES. Setting this option to NO will disable the Critical Response Mode.



Timed Dry EP Option

If the unit is running in Timed Dry Mode and the utility rate switches to Critical or High, the unit will conserve energy by decreasing heat if YES (default) is selected. If NO is selected, the unit will operate normally.

NOTE: When YES (default) is selected, your load may be damp at the end of the cycle.



In order for the Smart Appliance features on the appliance to work, additional equipment is required to be installed to interface with the local utility. Such equipment may be sold separately and/or is available through your utility as part of the pilot test program. Check with your utility company to see if a pilot test program is available in your area and for full details.

PLEASE NOTE: If you move to an area where the program is not available, the demand response features cannot be activated and utilized on the appliance. The appliance will function as normal after the demand response equipment has been deactivated or disconnected.

Installation Instructions

Dryer

PFDS450 / PFDS455 / PFDN440 / PFDN445 /
PFMS450 / PFMS455 / PFMN440 / PFMN445

Questions? Call 800.GE.CARES (800.432.2737) or visit our Web site at: GEAppliances.com
In Canada, call 1.800.561.3344 or visit www.GEAppliances.ca

BEFORE YOU BEGIN

Read these instructions completely and carefully.

- **IMPORTANT** – Save these instructions for local electrical inspector's use.
- **IMPORTANT** – Observe all governing codes and ordinances.
- Install the clothes dryer according to the manufacturer's instructions and local codes.
- **Note to Installer** – Be sure to leave these instructions with the Consumer.
- **Note to Consumer** – Keep these instructions for future reference.
- Clothes dryer installation must be performed by a qualified installer.
- This dryer **must** be exhausted to the outdoors.
- Before the old dryer is removed from service or discarded, remove the dryer door.
- Service information and the wiring diagram are located in the control console.
- Do not allow children on or in the appliance. Close supervision of children is necessary when the appliance is used near children.
- Proper installation is the responsibility of the installer.
- Product failure due to improper installation is not covered under the Warranty.
- Install the dryer where the temperature is above 50°F for satisfactory operation of the dryer control system.
- Remove and discard existing plastic or metal foil duct and replace with UL-listed duct.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT

This act requires the governor of California to publish a list of substances known to the state to cause cancer, birth defects or other reproductive harm and requires businesses to warn customers of potential exposure to such substances. Gas appliances can cause minor exposure to four of these substances, namely benzene, carbon monoxide, formaldehyde and soot, caused primarily by the incomplete combustion of natural gas or LP fuels. Properly adjusted dryers will minimize incomplete combustion. Exposure to these substances can be minimized further by properly venting the dryer to the outdoors.

FOR YOUR SAFETY:

WARNING – Risk of Fire

- To reduce the risk of severe injury or death, follow all installation instructions.
- Clothes dryer installation must be performed by a qualified installer.
- Install the clothes dryer according to these instructions and in accordance with local codes.
- This dryer must be exhausted to the outdoors.
- Use only rigid metal 4" diameter ductwork inside the dryer cabinet and use only UL approved transition ducting between the dryer and the home duct.
- DO NOT install a clothes dryer with flexible plastic ducting materials. If flexible metal (semi-rigid or foil-type) duct is installed, it must be UL-listed and installed in accordance with the instructions found in "Connecting the Dryer to House Vent" on page 26 of this manual. Flexible ducting materials are known to collapse, be easily crushed and trap lint. These conditions will obstruct dryer airflow and increase the risk of fire.
- Do not install or store this appliance in any location where it could be exposed to water and/or weather.
- Save these instructions. (Installers: Be sure to leave these instructions with the customer.)

FOR GAS MODELS ONLY:

NOTE: Installation and service of this dryer must be performed by a qualified installer, service agency or the gas supplier.

In the Commonwealth of Massachusetts:

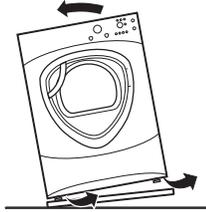
- This product must be installed by a licensed plumber or gas fitter.
- When using ball-type gas shut-off valves, they shall be T-handle-type.
- A flexible gas connector, when used, must not exceed 3 feet.

Installation Instructions

UNPACKING YOUR DRYER

Tilt the dryer sideways and remove the foam shipping pads by pulling at the sides and breaking them away from the dryer legs. Be sure to remove all of the foam pieces around the legs.

Remove the bag containing the literature and serial cable.



LOCATION OF YOUR DRYER

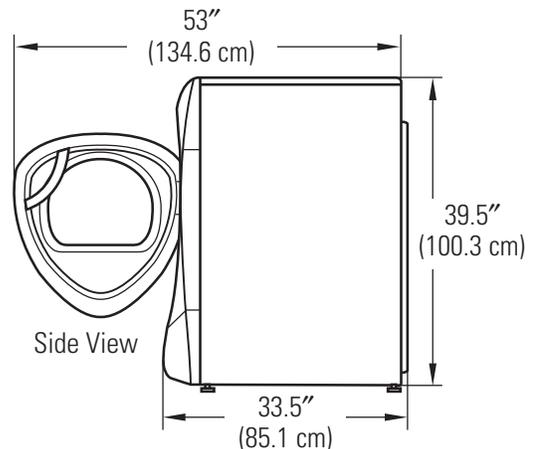
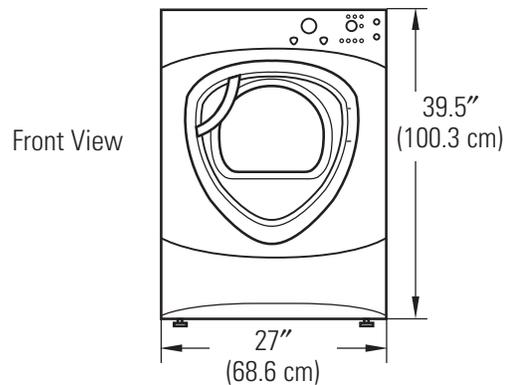
MINIMUM CLEARANCE OTHER THAN ALCOVE OR CLOSET INSTALLATION

Minimum clearance to combustible surfaces and for air openings are:

- 0 inch clearance both sides
- 1 inch front
- 3 inches rear

Consideration **must** be given to provide adequate clearance for proper operation and service.

DRYER DIMENSIONS



Installation Instructions

REQUIREMENTS FOR ALCOVE OR CLOSET INSTALLATION

- Your dryer is approved for installation in an alcove or closet, as stated on a label on the dryer back.
- The dryer MUST be vented to the outdoors. See the EXHAUSTING THE DRYER section.
- Minimum clearance between dryer cabinet and adjacent walls or other surfaces is:
 - 0" either side
 - 3" front and rear
- Minimum vertical space from floor to overhead shelves, cabinets, ceilings, etc., is 52".
- Closet doors must be louvered or otherwise ventilated and have at least 60 square inches of open area equally distributed. If the closet contains both a washer and a dryer, doors must contain a minimum of 120 square inches of open area equally distributed.
- The closet should be vented to the outdoors to prevent gas pocketing in case of gas in the supply line.
- No other fuel-burning appliance shall be installed in the same closet with the dryer (gas models only).

NOTE: WHEN THE EXHAUST DUCT IS LOCATED AT THE REAR OF THE DRYER, MINIMUM CLEARANCE FROM THE WALL IS 5.5 INCHES.

BATHROOM OR BEDROOM INSTALLATION

- The dryer MUST be vented to the outdoors. See EXHAUSTING THE DRYER.
- The installation must conform with local codes or, in the absence of local codes, with the NATIONAL ELECTRICAL CODE, ANSI/NFPA NO. 70 (for electric dryers) or NATIONAL FUEL GAS CODE, ANSI Z223 (for gas dryers).

MOBILE OR MANUFACTURED HOME INSTALLATION

- The installation must conform to the MANUFACTURED HOME CONSTRUCTION & SAFETY STANDARD, TITLE 24, PART 32-80 or, when such standard is not applicable, with AMERICAN NATIONAL STANDARD FOR MOBILE HOME, NO. 501B.
- The dryer MUST be vented to the outdoors with the termination securely fastened to the mobile home structure. (See EXHAUSTING THE DRYER.)
- The vent MUST NOT be terminated beneath a mobile or manufactured home.
- The vent duct material MUST BE METAL.
- FOR GAS MODELS ONLY: KIT 14-D346-33 MUST be used to attach the dryer securely to the structure.
- FOR GAS MODELS ONLY: The vent MUST NOT be connected to any other duct, vent or chimney.
- Do not use sheet metal screws or other refastening devices which extend into the interior of the exhaust vent.
- Provide an opening with a free area of at least 25 sq. in. for introduction of outside air into the dryer room.

RESIDENTIAL GARAGE INSTALLATION

- Dryers installed in residential garages must be elevated 18 inches (46cm) above the floor.

Installation Instructions

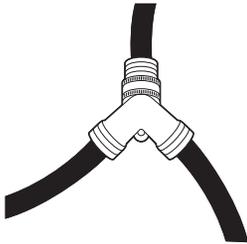
CONNECTING INLET HOSES

CONNECTING INLET HOSES

To produce steam, the dryer must connect to the cold water supply. Since the washer must also connect to the cold water, a “Y” connector is inserted to allow both inlet hoses to make that connection at the same time.

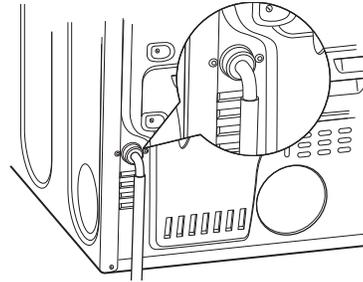
NOTE: Use the new inlet hoses provided; never use old hoses.

1. Turn the cold water faucet off. Remove the washer inlet hose from the washer fill valve connector (cold).
2. Ensure the rubber flat washer is in place and screw the female coupling of the short hose onto the washer fill valve connector. Tighten by hand until firmly seated.
3. Attach the female end of the “Y” connector to the male coupling of the short hose. Ensure the rubber flat washer is in place. Tighten by hand until firmly seated.



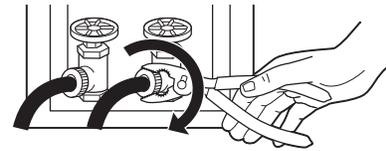
4. Insert the filter screen in the coupling of the **washer's** inlet hose. If a rubber flat washer is already in place remove it before installing the filter screen. Attach this coupling to one male end of the “Y” connector. Tighten by hand until firmly seated.
5. Ensure the rubber flat washer is in place and attach the **dryer's** long inlet hose to the other male end of the “Y” connector. Tighten by hand until firmly seated.
6. Ensure the rubber flat washer is in place and attach the other end of the **dryer's** long inlet hose to the fill valve connector at the bottom of the dryer back panel. Tighten by hand until firmly seated.

CONNECTING INLET HOSES (cont.)



7. Using pliers, tighten all the couplings with an additional two-thirds turn.

NOTE: Do not overtighten. Damage to the couplings may result.



8. Turn the water faucet on.
9. Check for leaks around the “Y” connector, faucet and hose couplings.

WATER SUPPLY REQUIREMENTS

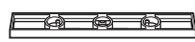
Hot and cold water faucets **MUST** be installed within 42 in. (107 cm) of your washer's water inlet. The faucets **MUST** be 3/4 in. (1.9 cm) garden hose-type so inlet hoses can be connected. Water pressure **MUST** be between 10 and 120 pounds per square inch. Your water department can advise you of your water pressure.

NOTE: A water softener is recommended to reduce buildup of scale inside the steam generator if the home water supply is very hard.

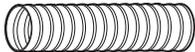
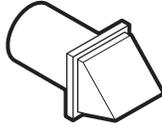
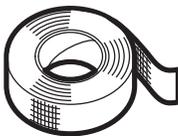
Installation Instructions

CONNECTING A GAS DRYER (skip for electric dryers)

TOOLS YOU WILL NEED

-  10" Adjustable wrenches (2)
-  Flat-blade screwdriver
-  8" Pipe wrench
-  Level
-  Slip-joint pliers

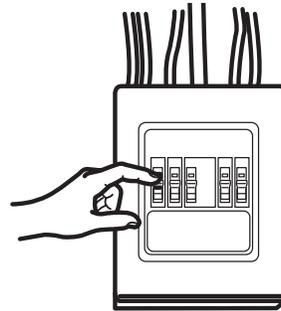
MATERIALS YOU WILL NEED

-  4" dia. metal elbow
-  4" dia., UL-listed flexible metal duct (if needed)
-  Pipe compound
-  Gloves
-  Flexible gas line connector
-  Soap solution for leak detection
-  Duct clamps (2) or Spring clamps (2)
-  Exhaust hood
-  Safety glasses
-  4" dia. metal duct (recommended)
-  Duct tape

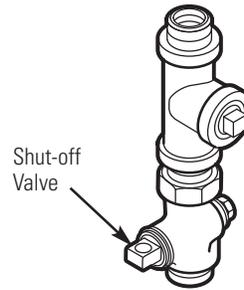
FOR YOUR SAFETY:

⚠ WARNING

Before beginning the installation, turn off the circuit breaker(s) or remove the dryer's circuit fuse(s) at the electrical box. Be sure the dryer cord is unplugged from the wall.



Turn the dryer's gas shut-off valve in the supply line to the OFF position.



Disconnect and discard old flexible gas connector and ducting material.



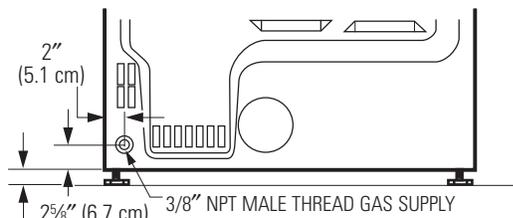
Installation Instructions

GAS REQUIREMENTS

⚠ WARNING

- Installation must conform to local codes and ordinances, or in their absence, the NATIONAL FUEL GAS CODE, ANSI Z223.
- This gas dryer is equipped with a Valve and Burner Assembly for use only with natural gas. Using conversion kit 14-A048, your local service organization can convert this dryer for use with propane (LP) gas. ALL CONVERSIONS MUST BE MADE BY PROPERLY TRAINED AND QUALIFIED PERSONNEL AND IN ACCORDANCE WITH LOCAL CODES AND ORDINANCE REQUIREMENTS.
- The dryer must be disconnected from the gas supply piping system during any pressure testing of that system at a test pressure in excess of 0.5 PSI (3.4 KPa).
- The dryer must be isolated from the gas supply piping system by closing the equipment shut-off valve during any pressure testing of the gas supply piping of test pressure equal to or less than 0.5 PSI (3.4KPa).

DRYER GAS SUPPLY CONNECTION



NOTE: Add to vertical dimension the distance between cabinet bottom to floor.

GAS SUPPLY

- A 1/8" National Pipe Taper thread plugged tapping, accessible for test gauge connection, must be installed immediately upstream of the gas supply connection to the dryer. Contact your local gas utility should you have questions on the installation of the plugged tapping.
- Supply line is to be 1/2" rigid pipe and equipped with an accessible shutoff within 6 feet of, and in the same room with, the dryer.
- Use pipe thread compound appropriate for natural or LP gas or use Teflon® tape.
- Connect flexible metal connector to dryer and gas supply.

IN THE COMMONWEALTH OF MASSACHUSETTS

- This product must be installed by a licensed plumber or gas fitter.
- When using ball-type gas shut-off valves, they shall be the T-handle type.
- A flexible gas connector, when used, must not exceed 3 feet.

ADJUSTING FOR ELEVATION

- Gas clothes dryers input ratings are based on sea level operation and need not be adjusted for operation at or below 2000 ft. elevation. For operation at elevations above 2000 ft., input ratings should be reduced at a rate of 4 percent for each 1000 ft. above sea level.
- Installation must conform to local codes and ordinances or, in their absence, the NATIONAL FUEL GAS CODE, ANSI Z223.

Installation Instructions

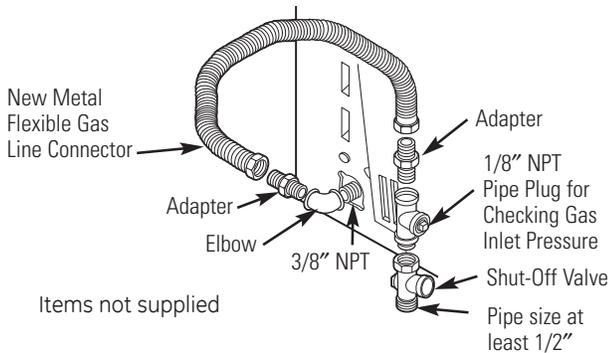
CONNECTING A GAS DRYER (cont.)

CONNECTING THE DRYER TO THE GAS SUPPLY

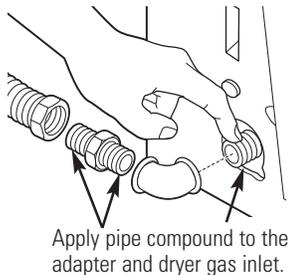
- A** Install a female 3/8" NPT elbow at the end of the dryer gas inlet.
Install a 3/8" flare union adapter to the female elbow.

IMPORTANT: Use a pipe wrench to securely hold on to the end of the dryer gas inlet to prevent twisting the inlet.

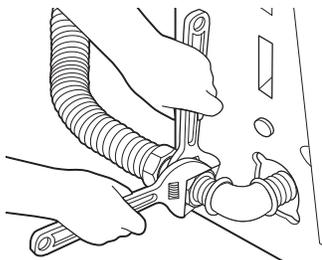
NOTE: Apply pipe compound or Teflon® tape to the threads of the adapter and dryer gas inlet.



- B** Attach the flexible metal gas line connector to the adapter.



- C** Tighten the flexible gas line connection, using two adjustable wrenches.

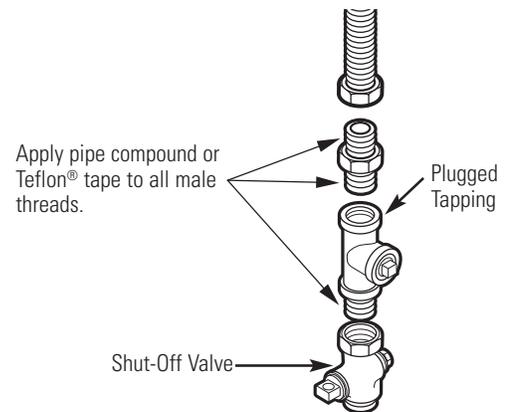


CONNECTING THE DRYER TO THE GAS SUPPLY (cont.)

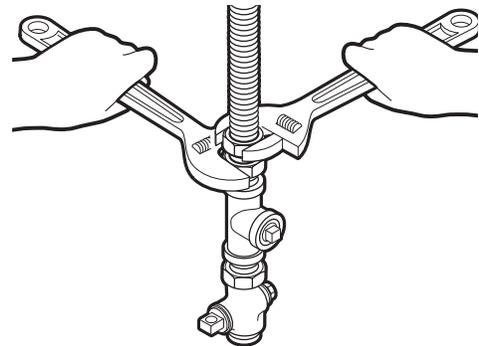
- D** Install a 1/8" NPT plugged tapping to the dryer gas line shut-off valve for checking gas inlet pressure.

Install a flare union adapter to the plugged tapping.

NOTE: Apply pipe compound or Teflon® tape to the threads of the adapter and plugged tapping.



- E** Tighten all connections, using two adjustable wrenches. **Do not overtighten.**



- F** Open the gas shut-off valve.



Installation Instructions

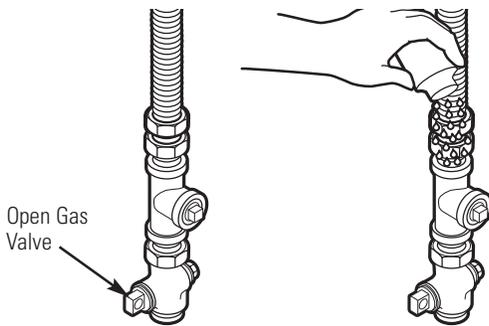
TEST FOR LEAKS

⚠ WARNING – Never use an open flame to test for gas leaks.

Check all connections for leaks with soapy solution or equivalent.

Apply a soap solution. The leak test solution must not contain ammonia, which could cause damage to the brass fittings.

If leaks are found, close the valve, retighten the joint and repeat the soap test.



ELECTRICAL CONNECTION INFORMATION FOR GAS DRYERS

⚠ WARNING – To reduce the risk of fire, electrical shock and personal injury:

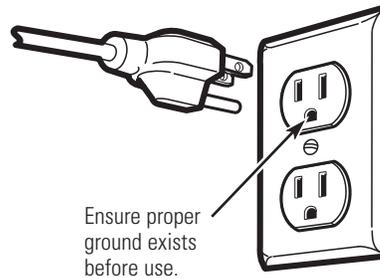
- Do not use an extension cord or an adapter plug with this appliance.
- The dryer must be electrically grounded in accordance with local codes and ordinances, or in the absence of local codes, in accordance with the NATIONAL ELECTRICAL CODE, ANSI/NFPA NO. 70.

ELECTRICAL REQUIREMENTS FOR GAS DRYERS

This appliance must be supplied with 120V, 60Hz, and connected to a properly grounded branch circuit, protected by a 15- or 20-amp circuit breaker or time-delay fuse.

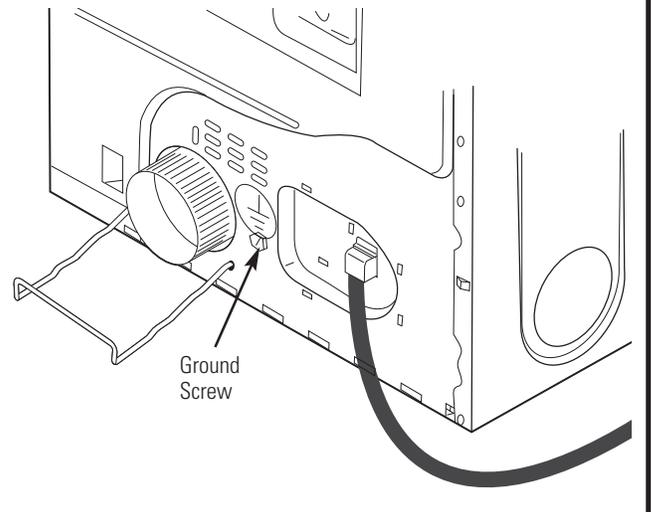
If electrical supply provided does not meet the above specifications, it is recommended that a licensed electrician install an approved outlet.

⚠ WARNING – This dryer is equipped with a three-prong (grounding) plug for your protection against shock hazard and should be plugged directly into a properly grounded three-prong receptacle. Do not cut or remove the grounding terminal from this plug.



If local codes permit, an external ground wire (not provided), which meets local codes, may be added by attaching to the green ground screw on the rear of the dryer, and to an alternate established ground.

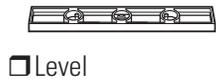
Ensure proper ground exists before use.



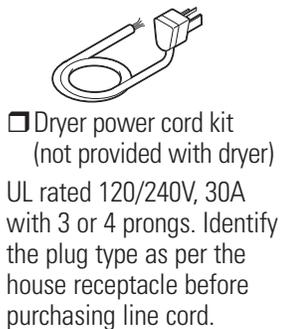
Installation Instructions

CONNECTING AN ELECTRIC DRYER (skip for gas dryers)

TOOLS YOU WILL NEED



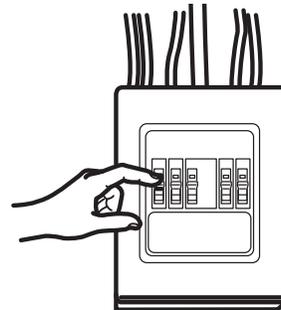
MATERIALS YOU WILL NEED



FOR YOUR SAFETY:

⚠ WARNING

Before making the electrical connection, turn off the circuit breaker(s) or remove the dryer's circuit fuse(s) at the electrical box. Be sure the dryer cord is unplugged from the wall. NEVER LEAVE THE ACCESS COVER OFF THE TERMINAL BLOCK.



ELECTRICAL CONNECTION INFORMATION FOR ELECTRIC DRYERS

⚠ WARNING – To reduce the risk of fire, electrical shock and personal injury:

- Do not use an extension cord or an adapter plug with this appliance.
- The dryer must be electrically grounded in accordance with local codes and ordinances or, in the absence of local codes, in accordance with the NATIONAL ELECTRICAL CODE, ANSI/NFPA NO. 70.

Installation Instructions

ELECTRICAL REQUIREMENTS FOR ELECTRIC DRYERS

This dryer must be connected to an individual branch circuit, protected by the required time-delay fuses or circuit breakers. A three- or four-wire, single-phase, 120/240V, 60Hz, 30-amp circuit is required.

If the electric supply does not meet the above specifications, then call a licensed electrician.

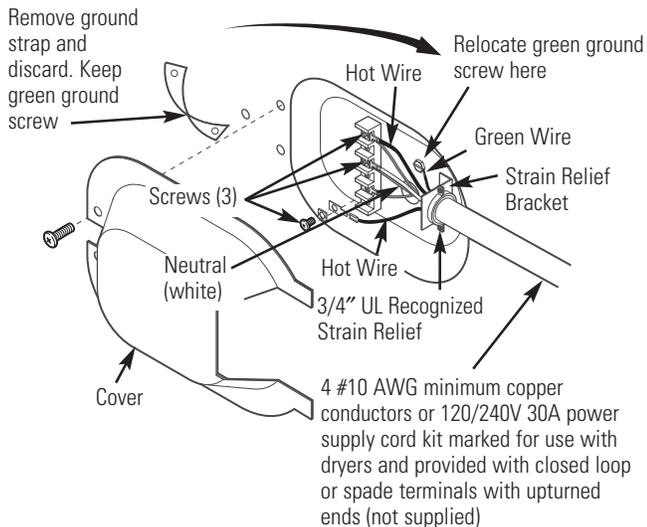
GROUNDING INSTRUCTIONS

This dryer must be connected to a grounded metal, permanent wiring system, or an equipment-grounding conductor must be run with the circuit conductors and connected to the equipment grounding terminal on the appliance.

CONNECTING DRYER USING 4-WIRE CONNECTION (MUST BE USED FOR MOBILE HOME INSTALLATION)

NOTE: Since January 1, 1996, the National Electrical Code requires that new constructions utilize a 4-wire connection to an electric dryer. A 4-wire cord must also be used where local codes do not permit grounding through the neutral.

3-wire connection is NOT for use on new construction.



CONNECTING DRYER USING 4-WIRE CONNECTION (MUST BE USED FOR MOBILE HOME INSTALLATION) (cont.)

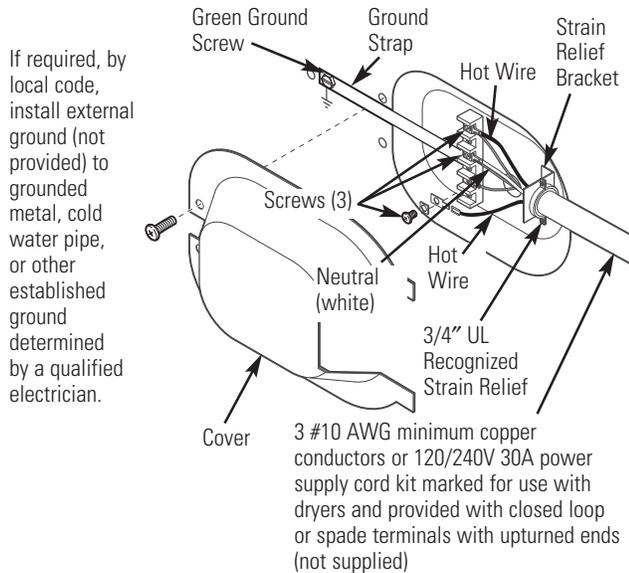
1. Turn off the circuit breaker(s) (30 amp) or remove the dryer's circuit fuse at the electrical box.
2. Be sure the dryer cord is unplugged from the wall receptacle.
3. Remove the power cord cover located at the lower back.
4. Remove and discard ground strap. Keep the green ground screw for Step 7.
5. Install 3/4 in. UL-recognized strain relief to power cord entry hole. Bring power cord through strain relief.
6. Connect power cord as follows:
 - A. Connect the 2 hot lines to the outer screws of the terminal block (marked L1 and L2).
 - B. Connect the neutral (white) line to the center of the terminal block (marked N).
7. Attach ground wire of power cord with the green ground screw (hole above strain relief bracket). Tighten all terminal block screws (3) completely.
8. Properly secure power cord to strain relief.
9. Reinstall the cover.

⚠ WARNING – NEVER LEAVE THE COVER OFF OF THE TERMINAL BLOCK.

Installation Instructions

CONNECTING AN ELECTRIC DRYER (cont.)

CONNECTING DRYER USING 3-WIRE CONNECTION



1. Turn off the circuit breaker(s) (30 amp) or remove the dryer's circuit fuse at the electrical box.
2. Be sure the dryer cord is unplugged from the wall receptacle.
3. Remove the power cord cover located at the lower back.
4. Install 3/4-in. UL-recognized strain relief to power cord entry hole. Bring power cord through strain relief.
5. Connect power cord as follows:
 - A. Connect the 2 hot lines to the outer screws of the terminal block (marked L1 and L2).
 - B. Connect the neutral (white) line to the center of the terminal block (marked N).
6. Be sure ground strap is connected to neutral (center) terminal of block and to green ground screw on cabinet rear. Tighten all terminal block screws (3) completely.
7. Properly secure power cord to strain relief.
8. Reinstall the cover.

⚠ WARNING – NEVER LEAVE THE COVER OFF OF THE TERMINAL BLOCK.

Installation Instructions

EXHAUSTING THE DRYER

⚠ WARNING – To reduce the risk of fire or personal injury:

- This clothes dryer must be exhausted to the outdoors.
- Use only 4" rigid metal ducting for the home exhaust duct.
- Use only 4" rigid metal or UL-listed flexible metal (semi-rigid or foil-type) duct to connect the dryer to the home exhaust duct. It must be installed in accordance with the instructions found in "Connecting the Dryer to House Vent" on page 26 of this manual.
- Do not terminate exhaust in a chimney, a wall, a ceiling, gas vent, crawl space, attic, under an enclosed floor, or in any other concealed space of a building.
- Never terminate the exhaust into a common duct with a kitchen exhaust system. A combination of grease and lint creates a potential fire hazard.
- Do not use duct longer than specified in the exhaust length table. Longer ducts can accumulate lint, creating a potential fire hazard.
- Never install a screen in or over the exhaust duct. This will cause lint to accumulate, creating a potential fire hazard.
- Do not assemble ductwork with any fasteners that extend into the duct. These fasteners can accumulate lint, creating a potential fire hazard.
- Do not obstruct incoming or exhausted air.
- Provide an access for inspection and cleaning of the exhaust system, especially at turns and joints. Exhaust system shall be inspected and cleaned at least once a year.
- This dryer comes ready for rear exhausting. If space is limited, use the instructions on pages 29–31 to exhaust directly from the sides or bottom of the cabinet.

EXHAUST SYSTEM CHECKLIST

HOOD OR WALL CAP

- Terminate in a manner to prevent back drafts or entry of birds or other wildlife.
- Termination should present minimal resistance to the exhaust airflow and should require little or no maintenance to prevent clogging.
- Never install a screen in or over the exhaust duct.
- Wall caps must be installed at least 12" above ground level or any other obstruction with the opening pointed down.

SEPARATION OF TURNS

- For best performance, separate all turns by at least 4 ft. of straight duct, including distance between last turn and dampened wall cap.

SEALING OF JOINTS

- All joints should be tight to avoid leaks. The male end of each section of duct must point away from the dryer.
- Do not assemble the ductwork with fasteners that extend into the duct. They will serve as a collection point for lint.
- Duct joints should be made air- and moisture-tight by wrapping the overlapped joints with duct tape or aluminum tape.
- Horizontal runs should slope down towards the outdoors 1/4" per foot.

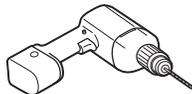
INSULATION

- Ductwork that runs through an unheated area or is near air conditioning should be insulated to reduce condensation and lint buildup.

TOOLS AND MATERIALS YOU WILL NEED TO INSTALL EXHAUST DUCT



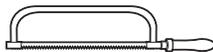
Phillips-head screwdriver



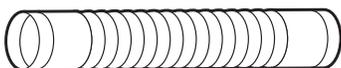
Drill with 1/8" drill bit (for bottom venting)



Duct tape or duct clamp



Hacksaw



Rigid or UL-listed flexible metal 4" (10.2 cm) duct



Vent hood

Installation Instructions

EXHAUSTING THE DRYER (cont.)

CONNECTING THE DRYER TO HOUSE VENT

RIGID METAL TRANSITION DUCT

- For best drying performance, a rigid metal transition duct is recommended.
- Rigid metal transition ducts reduce the risk of crushing and kinking.

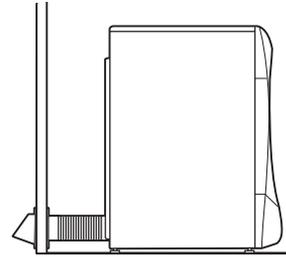
UL-LISTED FLEXIBLE METAL (SEMI-RIGID) TRANSITION DUCT

- If rigid metal duct cannot be used, then UL-listed flexible metal (semi-rigid) ducting can be used (Kit WX08X10077).
- Never install flexible metal duct in walls, ceilings, floors or other enclosed spaces.
- Total length of flexible metal duct should not exceed 8 feet (2.4 m).
- For many applications, installing elbows at both the dryer and the wall is highly recommended (see illustrations at right). Elbows allow the dryer to sit close to the wall without kinking and/or crushing the transition duct, maximizing drying performance.
- Avoid resting the duct on sharp objects.

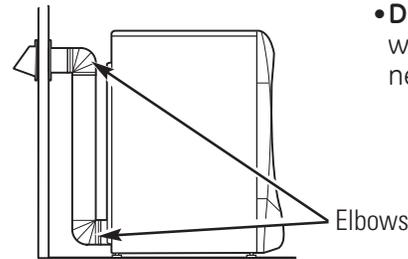
UL-LISTED FLEXIBLE METAL (FOIL-TYPE) TRANSITION DUCT

- In special installations, it may be necessary to connect the dryer to the house vent using a flexible metal (foil-type) duct. A UL-listed flexible metal (foil-type) duct may be used **ONLY** in installations where rigid metal or flexible metal (semi-rigid) ducting cannot be used **AND** where a 4" diameter can be maintained throughout the entire length of the transition duct.
- In Canada and the United States, only the flexible metal (foil-type) ducts that comply with the "Outline for Clothes Dryer Transition Duct Subject 2158A" shall be used.
- Never install flexible metal duct in walls, ceilings, floors or other enclosed spaces.
- Total length of flexible metal duct should not exceed 8 feet (2.4 m).
- Avoid resting the duct on sharp objects.
- For best drying performance:
 1. Slide one end of the duct over the clothes dryer outlet pipe.
 2. Secure the duct with a clamp.
 3. With the dryer in its permanent position, extend the duct to its full length. Allow 2" of duct to overlap the exhaust pipe. Cut off and remove excess duct. Keep the duct as straight as possible for maximum airflow.
 4. Secure the duct to the exhaust pipe with the other clamp.

FOR TRANSITION VENTING (DRYER TO WALL), DO:

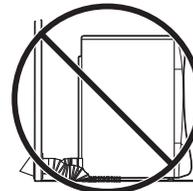


- **DO** cut duct as short as possible and install straight into wall.

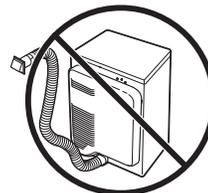


- **DO** use elbows when turns are necessary.

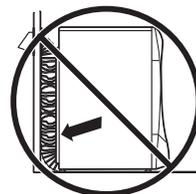
DO NOT:



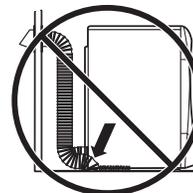
- **DO NOT** bend or collapse ducting. Use elbows if turns are necessary.



- **DO NOT** use excessive exhaust length. Cut duct as short as possible.



- **DO NOT** crush duct against the wall.



- **DO NOT** set dryer on duct.

Installation Instructions

⚠ WARNING – USE ONLY METAL 4" DUCT. DO NOT USE DUCT LONGER THAN SPECIFIED IN THE EXHAUST LENGTH TABLE.

Using exhaust longer than specified length will:

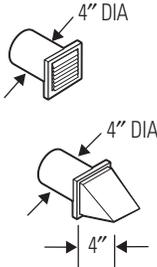
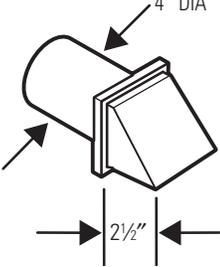
- Increase the drying times and the energy cost.
- Reduce the dryer life.
- Accumulate lint, creating a potential fire hazard.

The correct exhaust installation is YOUR RESPONSIBILITY.

Problems due to incorrect installation are not covered by the warranty.

The MAXIMUM ALLOWABLE length of the exhaust system depends upon the type of duct, number of turns, the type of exhaust hood (wall cap) and all conditions noted below.

EXHAUST LENGTH

RECOMMENDED MAXIMUM LENGTH		
Exhaust Hood Types		
	Recommended	Use only for short-run installations
		
No. of 90° Elbows	Rigid Metal	Rigid Metal
0	150 Feet	125 Feet
1	135 Feet	115 Feet
2	125 Feet	105 Feet
3	115 Feet	95 Feet
4	105 Feet	85 Feet
5	95 Feet	75 Feet

EXHAUST SYSTEM CHECKLIST HOOD OR WALL CAP

- Terminate in a manner to prevent back drafts or entry of birds or other wildlife.
- Termination should present minimal resistance to the exhaust airflow and should require little or no maintenance to prevent clogging.
- **Never** install a screen in or over the exhaust duct. This could cause lint buildup.
- Wall caps must be installed at least 12" above ground level or any other obstruction with the opening pointed down.

SEPARATION OF TURNS

For best performance, separate all turns by at least 4 ft. of straight duct, including the distance between the last turn and the exhaust hood.

TURN OTHER THAN 90°

- One turn of 45° or less may be ignored.
- Two 45° turns should be treated as one 90° turn.
- Each turn over 45° should be treated as one 90° turn.

SEALING OF JOINTS

- All joints should be tight to avoid leaks. The male end of each section of duct must point away from the dryer.
- Do not assemble the ductwork with fasteners that extend into the duct. They will serve as a collection point for lint.
- Duct joints can be made air- and moisture-tight by wrapping the overlapped joints with duct tape.
- Horizontal runs should slope down toward the outdoors 1/2" per foot.

INSULATION

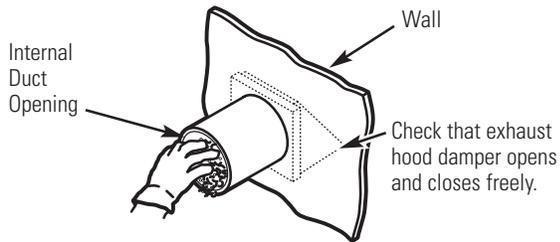
Ductwork that runs through an unheated area or is near air conditioning should be insulated to reduce condensation and lint buildup.

Installation Instructions

EXHAUSTING THE DRYER (cont.)

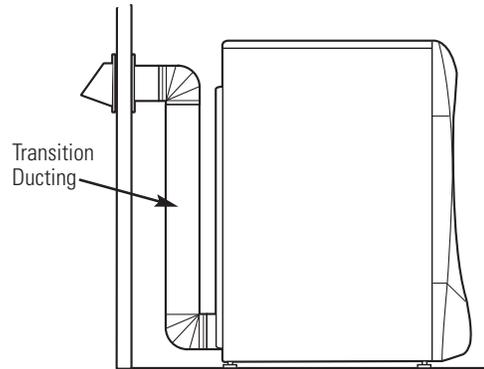
BEFORE YOU BEGIN

- Remove and discard existing plastic or metal foil duct and replace with UL-listed duct.
- Remove any lint from the wall exhaust opening.



RECOMMENDED CONFIGURATION TO MINIMIZE EXHAUST BLOCKAGE

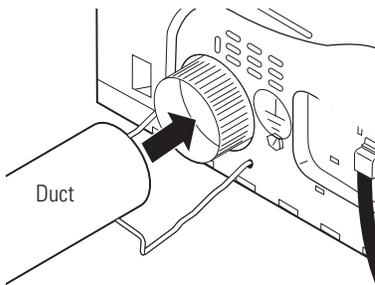
Using duct elbows will prevent duct kinking and collapsing.



STANDARD REAR EXHAUST

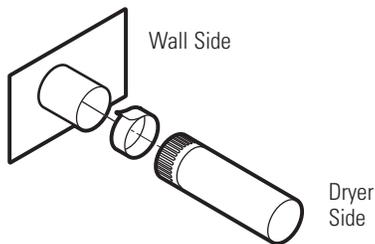
We recommend that you install your dryer before installing your washer. This will permit direct access for easier exhaust connection.

Slide the end of the exhaust duct on the back of the dryer and secure with duct tape or a hose clamp.



NOTE: We strongly recommend using rigid metal exhaust duct.

- For straight-line installation, connect the dryer exhaust to the wall, using duct tape.



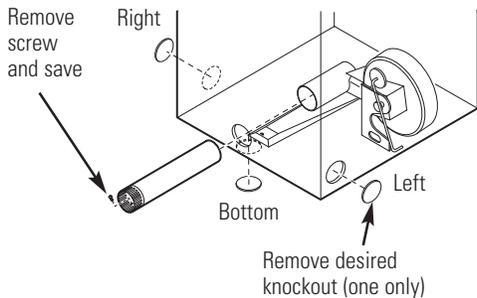
Installation Instructions

SIDE VENTING:

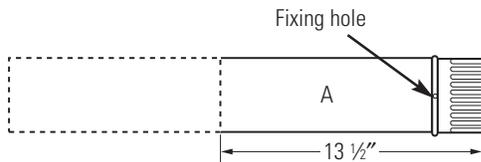
Dryer Exhaust to right of cabinet for Electric models only.

Dryer Exhaust to left of cabinet for Gas and Electric models.

⚠ WARNING – BEFORE PERFORMING THIS EXHAUST INSTALLATION, BE SURE TO DISCONNECT THE DRYER FROM ITS ELECTRICAL SUPPLY. PROTECT YOUR HANDS AND ARMS FROM SHARP EDGES WHEN WORKING INSIDE THE CABINET. BE SURE TO WEAR GLOVES.

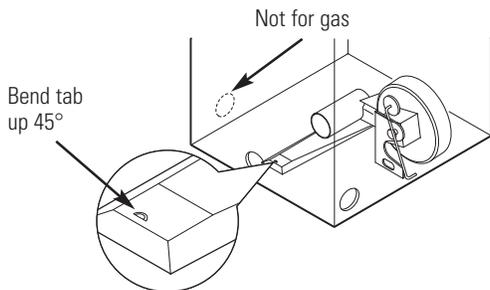


Detach and remove the bottom, right or left side knockout as desired. Remove the screw inside the dryer exhaust duct and save. Pull the duct out of the dryer.



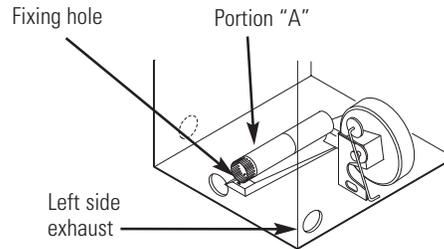
Cut the duct as shown and keep portion A.

TAB LOCATION



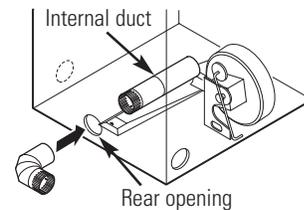
Through the rear opening, locate the tab in the middle of the appliance base. Lift the tab to about 45°, using a flat-blade screwdriver.

ADDING A NEW DUCT

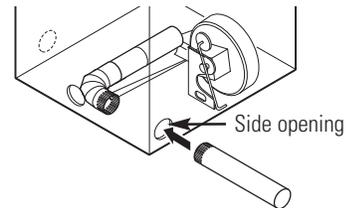


Reconnect the cut portion (A) of the duct to the blower housing. Make sure that the shortened duct is aligned with the tab in the base. Use the screw saved previously to secure the duct in place through the tab on the appliance base.

ADDING ELBOW AND DUCT FOR EXHAUST TO LEFT OR RIGHT SIDE OF CABINET



- Insert the 4" elbow through the rear opening and connect the elbow to the dryer internal duct.



- Insert the 4" duct through the side opening and connect it to the elbow.

⚠ CAUTION: Do not pull or damage the electrical wires and do not remove the vinyl cover from the electrical components inside the dryer when inserting the duct. A slight interference may occur between the exhaust and the wire components.

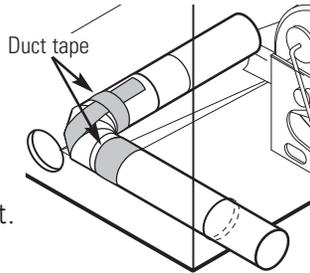
Installation Instructions

EXHAUSTING THE DRYER (cont.)

SIDE VENTING (cont.)

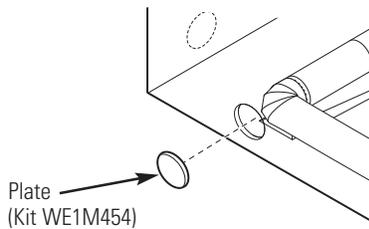
ADDING ELBOW AND DUCT FOR EXHAUST TO LEFT OR RIGHT SIDE OF CABINET (cont.)

- Apply duct tape as shown on the joint between the dryer internal duct and the elbow, and also the joint between the elbow and the side duct.



⚠ CAUTION: Use 4" rigid metal ducting only inside the dryer. Internal duct joints must be secured with tape, otherwise they may separate and cause a safety hazard.

ADDING COVER PLATE TO REAR OF CABINET (SIDE EXHAUST)



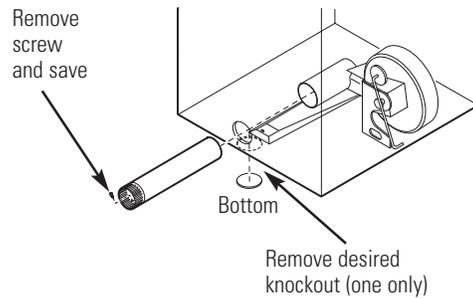
Connect standard metal elbows and ducts to complete the exhaust system. Cover back opening with a plate (Kit WE1M454) available from your local service provider. Place dryer in final location.

⚠ WARNING – NEVER LEAVE THE BACK OPENING WITHOUT THE PLATE.
(Kit WE1M454)

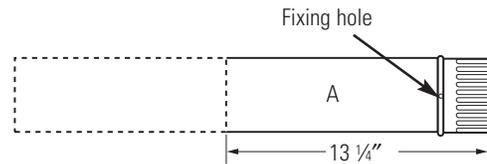
BOTTOM VENTING:

Dryer Exhaust to the bottom of cabinet for Gas and Electric models.

⚠ WARNING – BEFORE PERFORMING THIS EXHAUST INSTALLATION, BE SURE TO DISCONNECT THE DRYER FROM ITS ELECTRICAL SUPPLY. PROTECT YOUR HANDS AND ARMS FROM SHARP EDGES WHEN WORKING INSIDE THE CABINET. BE SURE TO WEAR GLOVES.



Remove the screw inside the dryer exhaust duct and save. Pull the duct out of the dryer. Detach and remove the bottom knockout.



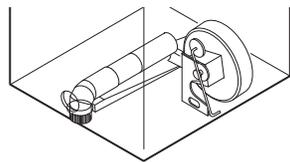
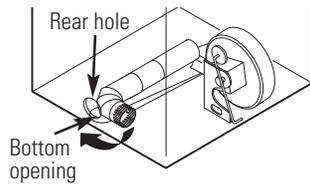
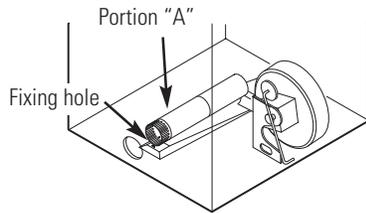
Cut the duct as shown and keep portion A.

Installation Instructions

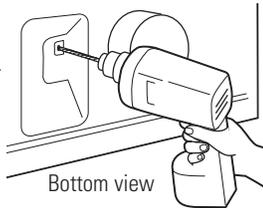
BOTTOM VENTING (cont.)

ADDING A NEW DUCT

- Reconnect the cut portion A of the duct to the blower housing.
- Tape the elbow in a 90-degree position to prevent rotation.
- Insert the elbow through the rear hole and connect it to portion A. Rotate the elbow through the bottom opening.



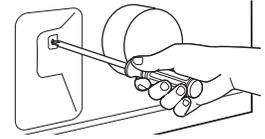
- While holding down the pipe and elbow, using your hand through the rear opening, drill a 1/8" hole through the bottom tab hole and the pipe as shown in the illustration.



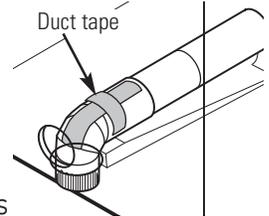
NOTE: Make sure the hole is drilled all the way through the elbow and pipe.

⚠ CAUTION: Be sure not to pull or damage the electrical wires inside the dryer when inserting the duct.

- While still holding down the pipe and elbow from the rear opening, screw the pipes in place with the previously saved screw.



- Apply duct tape as shown on the joint between the dryer internal duct and the elbow.

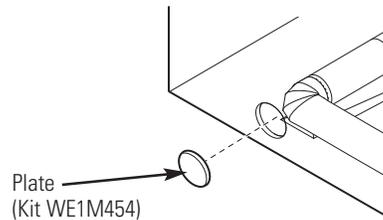


NOTE: Make sure the tape covers the screw hole in portion A where it connects to the elbow.

⚠ CAUTION: Internal duct joints must be secured with tape; otherwise, they may separate and cause a safety hazard.

Dryer Exhaust to the bottom of cabinet for Gas and Electric models.

ADDING COVER PLATE TO REAR OF CABINET (BOTTOM EXHAUST)



Connect standard metal elbows and ducts to complete the exhaust system. Cover back opening with a plate (Kit WE1M454) available from your local service provider. Place dryer in final location.

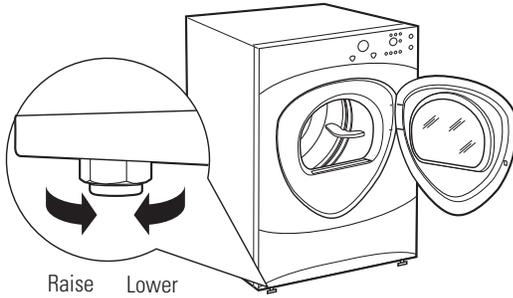
⚠ WARNING – NEVER LEAVE THE BACK OPENING WITHOUT THE PLATE.
(Kit WE1M454)

Installation Instructions

FINAL SETUP

1 LEVEL THE DRYER

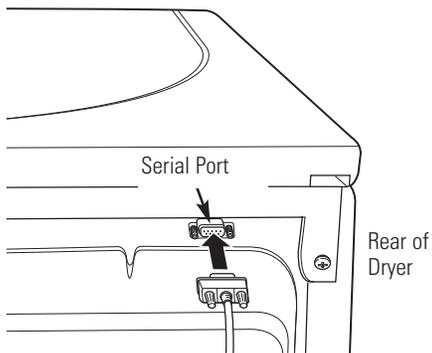
Stand the dryer upright near the final location and adjust the four leveling legs at the corners to ensure that the dryer is level from side to side and front to rear.



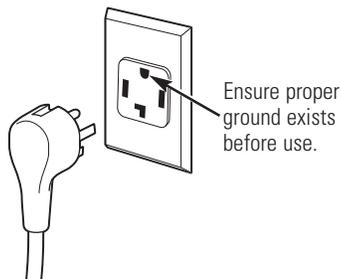
2 ATTACH SERIAL CABLE

Attach the serial cable for washer and dryer connection to the serial port on the back of the dryer.

Attach the other end of the cable to the washer before pushing the washer into its final position.



3 PLUG DRYER IN



4 GROUNDING INSTRUCTIONS

This appliance must be grounded. In the event of malfunction or breakdown, grounding will reduce the risk of electric shock by providing a path of least resistance for electric current. This appliance is equipped with a cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into an appropriate outlet that is properly installed and grounded in accordance with all local codes and ordinances.

5 DRYER STARTUP

Press the **POWER** button.



NOTE: If the dryer has been exposed to temperatures below freezing for an extended period of time, allow it to warm up before pressing **POWER**. Otherwise, the display will not come on. The dryer is now ready for use.

SERVICING

⚠ WARNING – Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation after servicing/installation.

For replacement parts and other information, refer to the back cover for servicing phone numbers.

Installation Instructions

REVERSING THE DOOR SWING (if desired)

IMPORTANT NOTES

- Read the instructions all the way through before starting.
- Handle parts carefully to avoid scratching paint.
- Provide a non-scratching work surface for the doors.
- Set screws down by their related parts to avoid using them in the wrong places.
- All screws must be hand-tightened.
- Normal completion time to reverse the door swing is 30–60 minutes.

IMPORTANT: Once you begin, do not move the cabinet until door-swing reversal is completed.

These instructions are for changing the hinges from the right side to the left side—if you ever want to switch them back to the right side, follow these same instructions and reverse all references to the left and right.

TOOLS YOU WILL NEED

- Phillips-head screwdriver or quadrex head screwdriver



- Putty knife or thin-blade screwdriver



- Pliers



STANDARD REVERSIBILITY KIT

- Chrome door cap



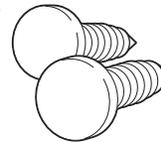
- Chrome door hinge cap



- Inner door cap



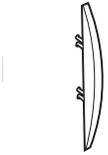
- 2 Plug buttons



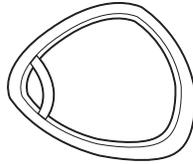
Installation Instructions

REVERSING THE DOOR SWING (if desired)

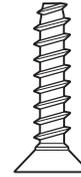
DOOR PARTS



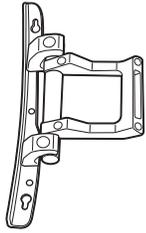
□ Hinge cap



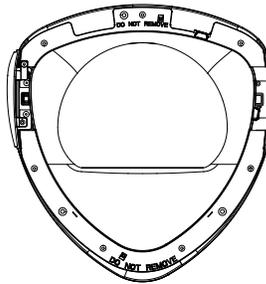
□ Chrome door cover



□ A Large tapping screws
7 – #10 x 1.125"



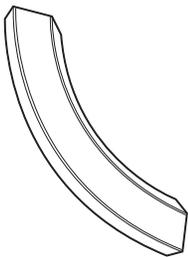
□ Hinge assembly



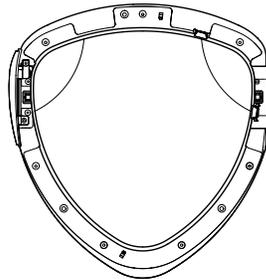
□ Inner cover (Mask)



□ B Large tapping screws
2 – #10 x 0.750"



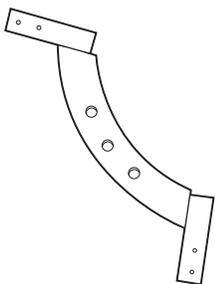
□ Outer handle



□ Outer window



□ C Small tapping screw
1 – #8 x 0.375"



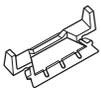
□ Inner handle



□ Chrome door cap



□ D Small tapping screws
11 – #8 x 0.625"



□ 2 Handle caps



□ Inner door cap



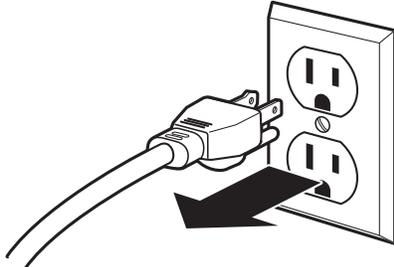
□ E Machine screws
4 – #8 x 0.50"

Installation Instructions

REVERSING THE DOOR SWING (if desired)

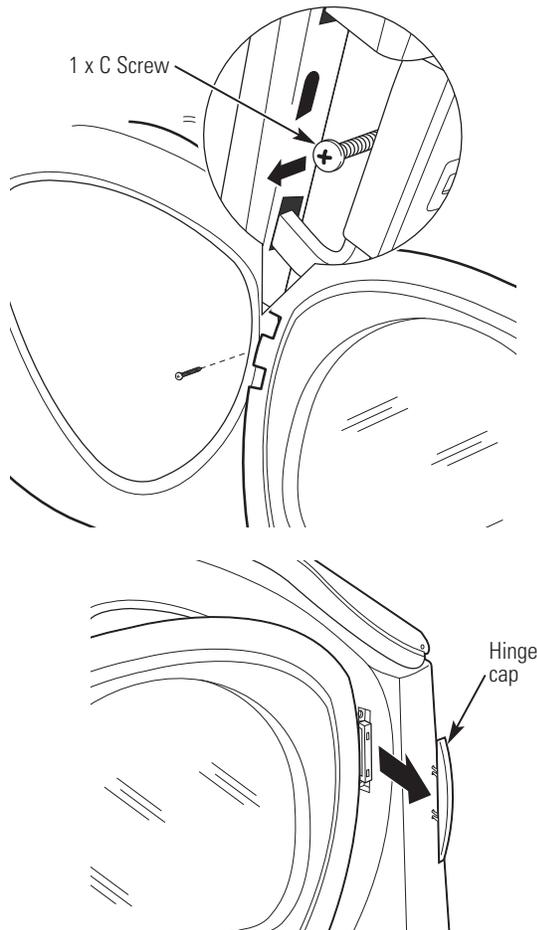
BEFORE YOU START

Unplug the dryer from its electrical outlet.



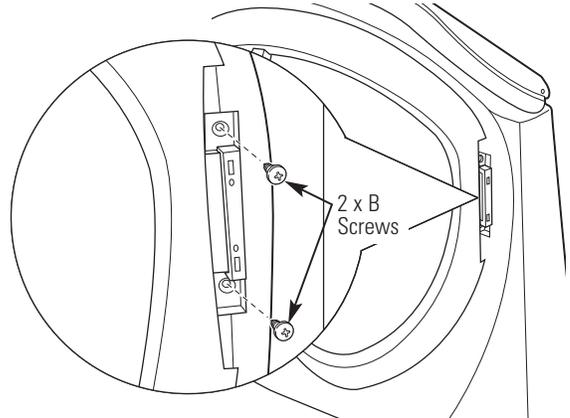
1 REMOVE THE DOOR ASSEMBLY

Remove the side hinge cap by opening the dryer door and removing the screw from behind the hinge (#8 x .375" tapping screw). Then using your hand, pop the hinge cap off the dryer.



1 REMOVE THE DOOR ASSEMBLY (cont.)

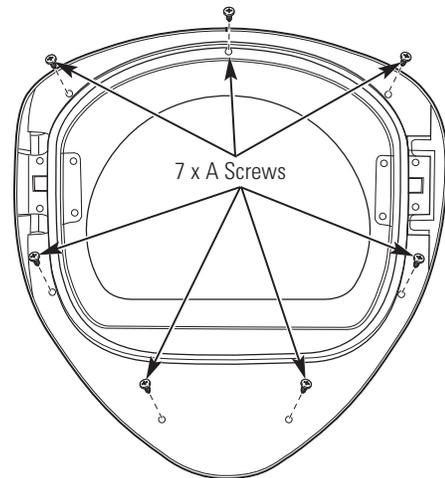
Close and hold the door, remove the 2 hinge screws (#10 x 0.75" tapping screws). Pull the door away from the dryer front panel.



2 DISASSEMBLE THE DOOR ASSEMBLY

Lay the door down on a soft, protected, flat surface so that the inner part faces upward (door resting on the handle side).

Remove the 7 screws (#10 x 1.125" tapping screws) located around the perimeter of the door.



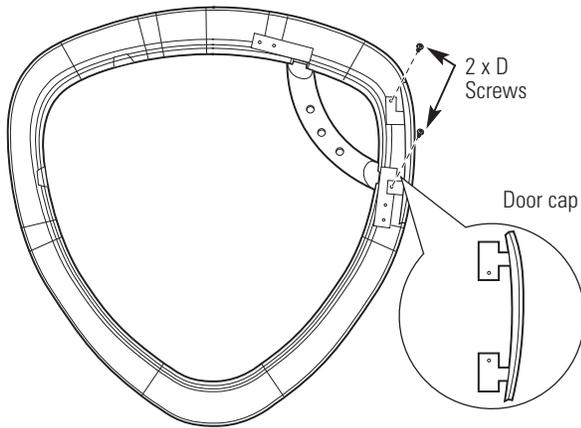
Turn the door assembly over and separate the chrome cover from the inner door. Put the inner door aside on a soft, protected flat surface.

Installation Instructions

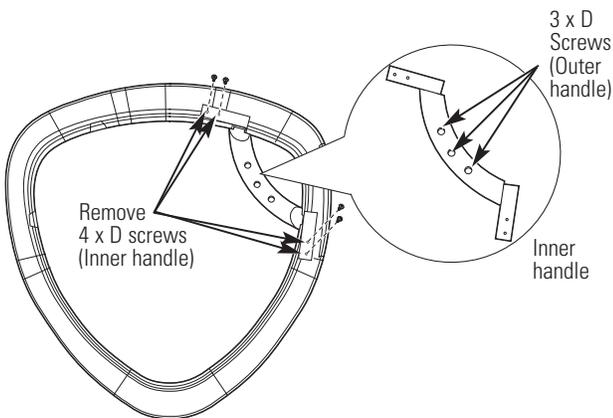
REVERSING THE DOOR SWING (if desired)

3 REVERSE DOOR HANDLE AND CAPS

A Lay the chrome cover down on a soft, protected, flat surface so that the inner part faces upward (resting on the handle side). Disassemble the door cap from the chrome cover on the handle side by removing 2 screws (#8 x 0.625" tapping screws).

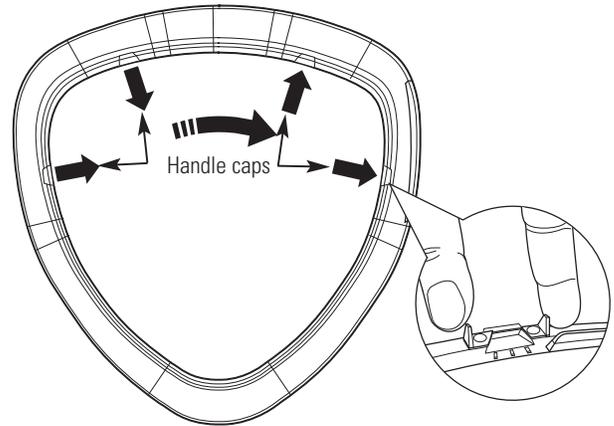


B Disassemble the outer handle from the inner handle by removing 3 screws (#8 x 0.625" tapping screws). Disassemble the inner handle from the chrome cover by removing 4 screws (#8 x 0.625" tapping screws).

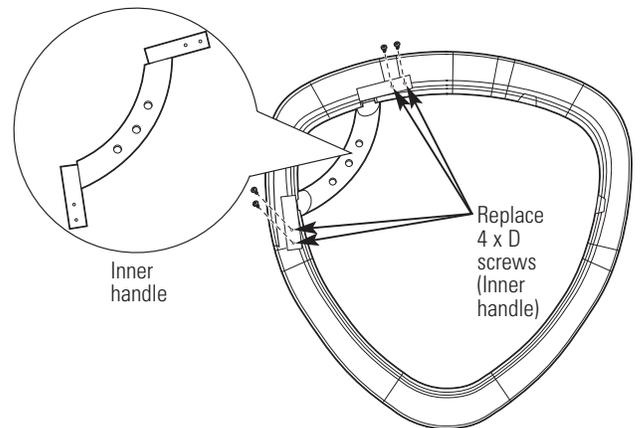


3 REVERSE DOOR HANDLE AND CAPS (CONT.)

C Pop the 2 handle caps out toward you and reassemble on the opposite side of the chrome cover, where you removed the outer handle.



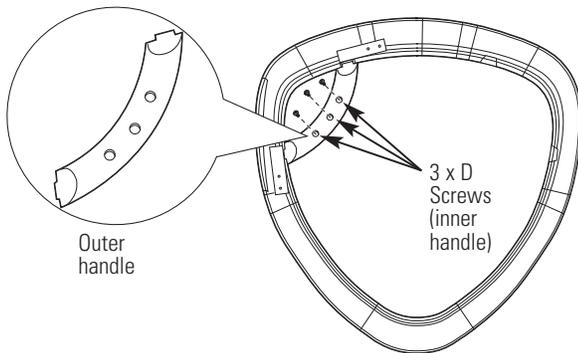
D Assemble the inner handle onto the opposite side of the chrome cover, using 4 screws (#8 x 0.625" tapping screws).



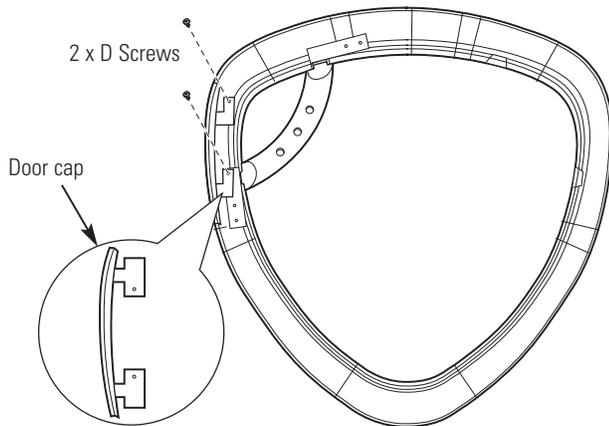
Installation Instructions

3 REVERSE DOOR HANDLE AND CAPS (CONT.)

E Reassemble the outer handle to the inner handle, using 3 screws (#8 x 0.625" tapping screws).



F Assemble the new right-side door cap (from reversibility kit), using 2 screws (#8 x 0.625" tapping screws).

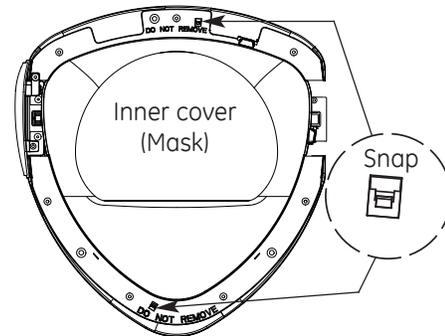
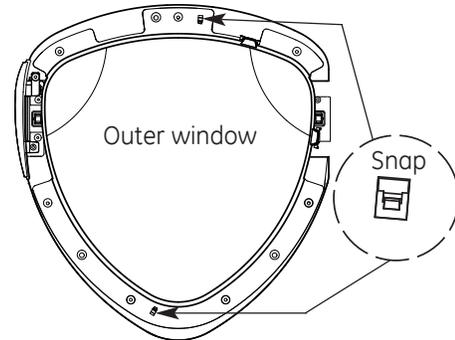


Put the chrome cover aside on a soft, protected flat surface.

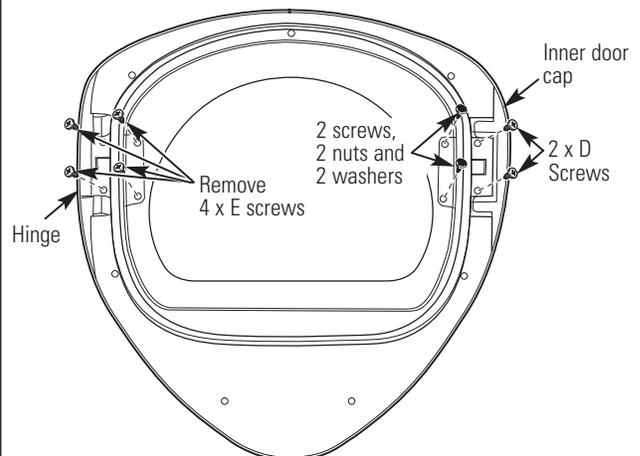
4 REVERSE HINGE AND CAPS

- Lay the inner door down on a soft, protected flat surface so that the inner part faces down. Disassemble the outer window by opening 2 snaps, lay the outer window on a soft, protected flat surface.
- Disassemble the inner cover (mask) by opening 2 snaps, lay the inner cover (mask) on a soft, protected flat surface.

REVERSE HINGE AND CAPS (CONT.)



- Turn the inner door on a soft, protected flat surface so that the inner part faces up.
- Remove the screws, nuts and washers on the opposite side of the hinge, using a quadrex screwdriver.
- Disassemble the inner door cap from the inner door by removing 2 screws (#8 x 0.75" tapping screws).
- Disassemble the hinge from the inner door by removing 4 screws (#8-32 x 0.50" machine screws).

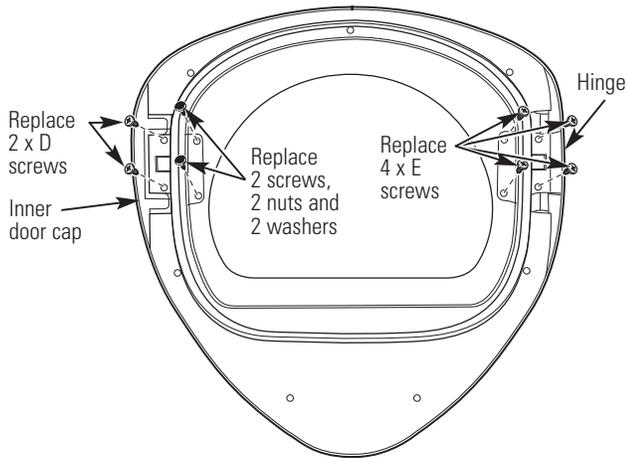


Installation Instructions

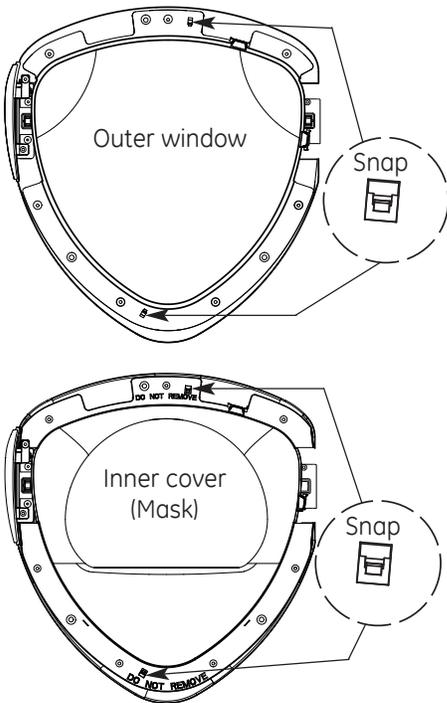
REVERSING THE DOOR SWING (if desired)

REVERSE HINGE AND CAPS (CONT.)

- Assemble the hinge to the opposite side of the inner door, using 4 screws (#8-32 x 0.50" machine screws).
- Assemble the new inner door cap (from reversibility kit) on the opposite side of the hinge, using 2 screws (#8 x 0.75" tapping screws).
- Install the the screws, nuts and washers on the opposite side of the hinge in the 2 remaining holes.

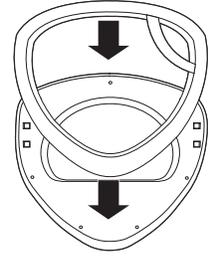


- Flip the inner door so that the inner part faces down. Assemble the inner cover (mask), be sure the snaps have clamped the inner cover. Assemble the outer window, be sure the 2 snaps have clamped the outer window.

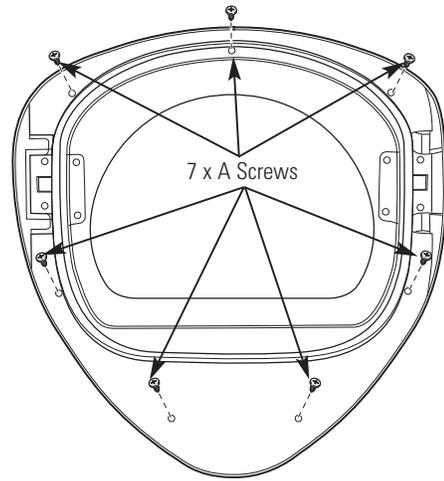


5 REASSEMBLE DOOR ASSEMBLY

Turn the inner door over and place on a soft, protected flat surface so that the inner part is facing down. Assemble the chrome cover to the inner door by placing them together.

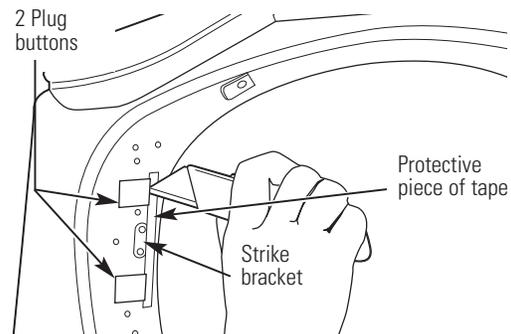


Flip the door assembly over and assemble, using 7 screws (#10 x 1.125" tapping screws).



6 REVERSE FRONT PANEL PLUG BUTTONS AND STRIKE PLATE

Remove the 2 plug buttons on the dryer front panel, using a putty knife or other flat tool as shown, and reinstall on the opposite side. Switch the strike bracket and its cover by removing 2 screws (#8 x 0.625" tapping screws) for each and reinstalling on opposite sides.



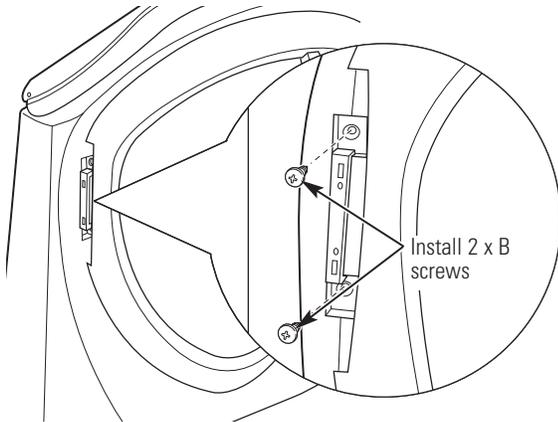
NOTE: Apply a protective piece of tape to the side of the plug button where the putty knife blade will be inserted to prevent scratching.

Installation Instructions

REVERSING THE DOOR SWING (if desired)

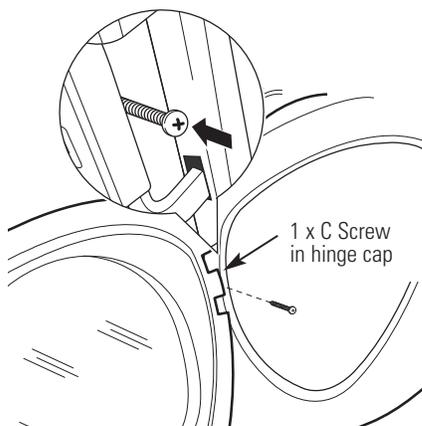
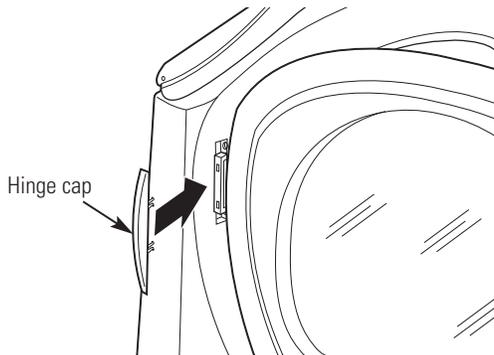
7 REINSTALL DOOR ASSEMBLY

Place the door back on the dryer front panel, making sure the latch is engaged and the hinge is sitting in the two openings in the dryer front. Assemble the door to the front cabinet, using 2 screws (#10 x 0.75" tapping screws).



Install the new left-hand hinge cap (from the reversibility kit) onto the hinge, by opening the dryer door and screwing the hinge cap into place.

NOTE: Save the remaining caps and covers in case you want to reverse the hinge again.



Installation Instructions

STACKING THE WASHER AND DRYER (if desired)

BEFORE YOU BEGIN

Read these instructions completely and carefully.

- **IMPORTANT** – Save these instructions for local electrical inspector's use.
- **IMPORTANT** – Observe all governing codes and ordinances.
- **Note to Installer** – Be sure to leave these instructions with the Consumer.
- **Note to Consumer** – Keep these instructions for future reference.
- Service **must** be performed by a qualified installer.
- Proper installation is the responsibility of the installer.

FOR YOUR SAFETY:

WARNING –

- Electric Shock Hazard. Disconnect power before installing. Failure to do so could result in serious injury or death.
- **Potential Personal Injury. More than two people are recommended to lift the dryer into position because of its weight and size. Failure to do so could result in personal injury or death.**
- Avoid Tipping and Rupture of Utility Services. Dryer must be securely attached to the washer. DO NOT place the washer on top of the dryer. Failure to do so could result in personal injury/death or property damage.
- Mobile Home or Manufactured Home Installation – Stacking of a gas dryer is not permitted in a mobile home or manufactured home.

MINIMUM CLEARANCE OTHER THAN ALCOVE OR CLOSET INSTALLATION

Minimum clearance to combustible surfaces and for air opening are: 0" both sides, 1" front and 3" rear. Consideration must be given to provide adequate clearance for installation and service.

REQUIREMENTS FOR ALCOVE OR CLOSET INSTALLATION

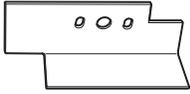
- Your dryer is approved for installation in an alcove or closet, as stated on a label on the dryer back.
- The dryer **MUST** be vented to the outdoors. See the EXHAUSTING THE DRYER section.
- Minimum clearance between dryer cabinet and adjacent walls or other surfaces is:
 - 0" either side
 - 3" front and rear
- Minimum vertical space from floor to overhead shelves, cabinets, ceilings, etc., is 52".
- Closet doors must be louvered or otherwise ventilated and have at least 60 square inches of open area equally distributed. If the closet contains both a washer and a dryer, doors must contain a minimum of 120 square inches of open area equally distributed.
- The closet should be vented to the outdoors to prevent gas pocketing in case of gas in the supply line.
- No other fuel-burning appliance shall be installed in the same closet with the dryer (gas models only).

NOTE: WHEN THE EXHAUST DUCT IS LOCATED AT THE REAR OF THE DRYER, MINIMUM CLEARANCE FROM THE WALL IS 5.5 INCHES.

Installation Instructions

STACKING THE WASHER AND DRYER (if desired) (cont.)

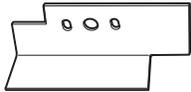
KIT CONTENTS



☐ Right hand bracket



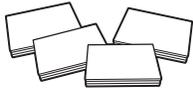
☐ 4 #12 x 1" screws



☐ Left hand bracket



☐ 4 #8 x 1/2" screws



☐ 4 rubber pads

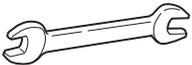
TOOLS YOU WILL NEED



☐ Phillips screwdriver



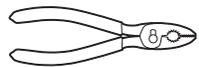
☐ Gloves



☐ Open-ended wrench



☐ Level



☐ Pliers

INSTALLATION PREPARATION

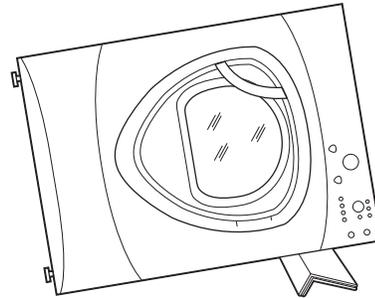
Remove the packaging.

Flatten the product carton to use as a pad to lay the dryer down on its side. Continue using the carton to protect the finished floor in front of the installation location.

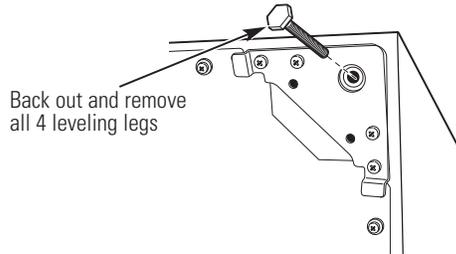
INSTALLING THE STACK BRACKET KIT

1 REMOVE THE DRYER LEVELING LEGS

A. Carefully lay the dryer on its side. Use the packing material so you don't scratch the finish on the dryer.

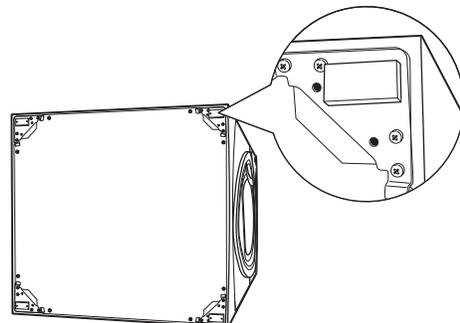


B. Use an open-end wrench or pliers to remove the dryer leveling legs.



2 INSTALL RUBBER PADS TO DRYER BASE

Locate the 4 rubber pads in the parts package. Remove the adhesive backing and firmly place over on the bracket where you removed the leveling legs.

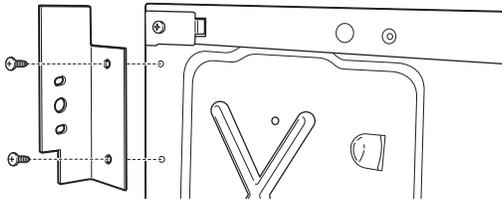


Installation Instructions

3 INSTALL BRACKET TO DRYER

- A. Align the holes in the left bracket with the holes in the bottom left corner of the dryer. Use a Phillips screwdriver to install the 2 #12 x 1" tapping screws.
- B. Repeat the above step with the right bracket on the bottom right corner of the dryer.
- C. Set the dryer upright.

NOTE: Make sure to set the dryer on a piece of packing material so the brackets that are attached to the bottom of the dryer do not damage the floor.

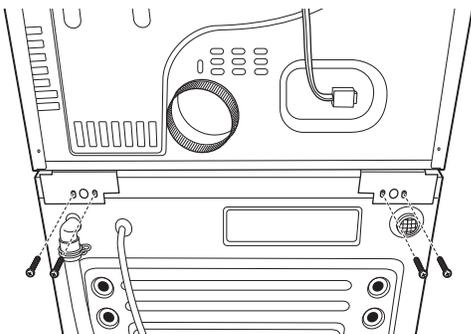


4 INSTALL DRYER AND BRACKET ON WASHER

- A. Lift the dryer on top of the washer. Be careful not to scratch the top of the washer with the brackets. Protect the washer control panel with cardboard or other protection. Be sure to lift the dryer high enough to clear the washer control panel.

⚠ WARNING – Potential Personal Injury. More than two people are recommended to lift the dryer into position because of its weight and size. Failure to do so could result in personal injury or death.

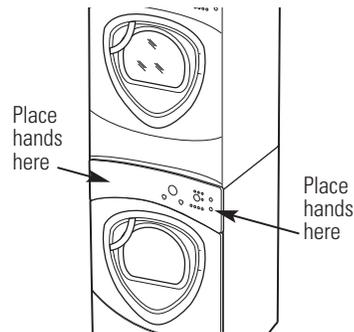
- B. Align the holes in the bracket with the holes in the back of the washer. Using a Phillips screwdriver, attach the 2 #8 x 1/2" tapping screws. Repeat on both sides of the washer.



5 FINALIZE THE INSTALLATION

- A. Refer to the washer Installation Instructions to complete the washer installation.
- B. Refer to the dryer Installation Instructions to complete the dryer installation.
- C. Carefully slide or walk the stacked washer and dryer into place. Use felt pads or other sliding device to assist moving and to protect flooring.

⚠ WARNING – Potential Personal Injury. Do not push on the dryer once installed to top of the washer. Pushing on the dryer may result in pinched fingers.



Installation Instructions

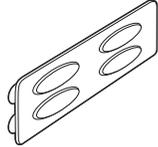
INSTALLING THE PEDESTAL (if desired)

⚠ CAUTION — Due to the size and weight of these products, and to reduce the risk of personal injury or damage to the product, **TWO PEOPLE ARE REQUIRED FOR PROPER INSTALLATION.**

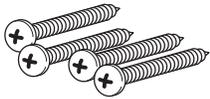
KIT CONTENTS



☐ 4 Support pads



☐ Drawer divider

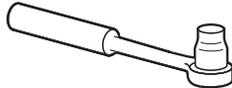


☐ 4 Mounting screws

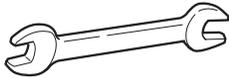
TOOLS YOU WILL NEED



☐ Phillips-head screwdriver



☐ 7 mm Socket wrench



☐ 9/16" Open-end wrench or adjustable wrench

INSTALLATION PREPARATION

Remove the packaging.

The drawer divider is taped at the top of the shipping carton. Remove the divider and set aside for final installation.

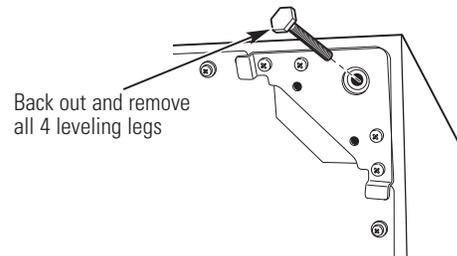
Flatten the product carton to use as a pad to lay the washer or dryer down on its side. Continue using the carton to protect the finished floor in front of the installation location.

1 REMOVE THE LEVELING LEGS

A Carefully lay the washer or dryer on its side to access the leveling legs on the bottom of the appliance.

IMPORTANT: Do not lay the washer or dryer on its back! Do not remove the shipping bolts on the back side of the washer. The bolts must remain in place until the washer is returned to an upright position.

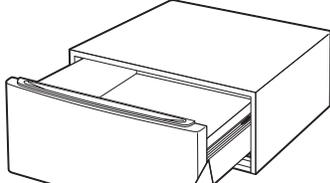
B Use an open-end wrench to remove the washer or dryer leveling legs.



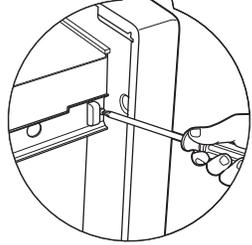
Installation Instructions

2 PREPARE THE PEDESTAL

A Pull the drawer out as far as it will go.

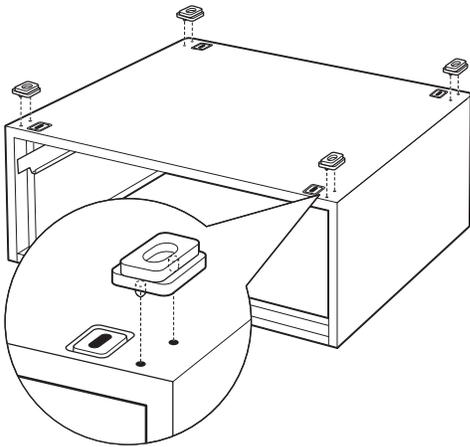


B Remove screws from drawer slides. Slide drawer out of the base and set aside.



FOR DRYERS ONLY:

C Locate the 4 support pads from the parts package. Each pad has 2 protrusions that fit into the holes on top of the pedestal. Press the rubber pads into each set of corner holes on the top of the pedestal as shown.

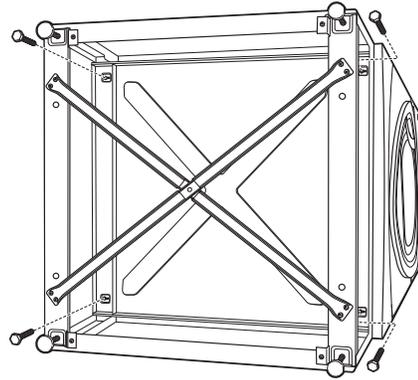


NOTE: The support pads should be installed on the dryer only. DO NOT INSTALL THESE PADS ON THE WASHER PEDESTAL.

3 INSTALL THE PEDESTAL TO THE WASHER OR DRYER

A Place the pedestal against the bottom of the unit. Check to be sure the drawer front is at the front of the washer.

B Align the holes in the pedestal with the holes in the bottom of the unit. Use a Phillips screwdriver to install the 4 bolts through the pedestal and into the unit—do not tighten.



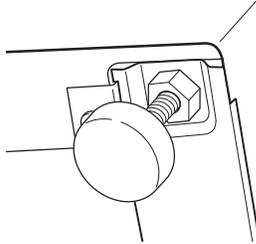
C Slide the pedestal toward the unit, until it is aligned front to back. Use a 7 mm socket wrench to securely tighten the bolts.

Installation Instructions

INSTALLING THE PEDESTAL (if desired) (cont.)

4 LEVEL THE WASHER OR DRYER

- A** Stand the washer or dryer upright. Move it close to its final location.
- B** Make sure that the washer or dryer is level by placing a level on top. Check side to side and front to back.
- C** Use an open ended wrench to adjust the legs in and out. Tighten the lock nut against the bottom of the pedestal.



NOTE: To minimize vibration, the locking nuts must be tight.

6 REMOVE SHIPPING SCREWS

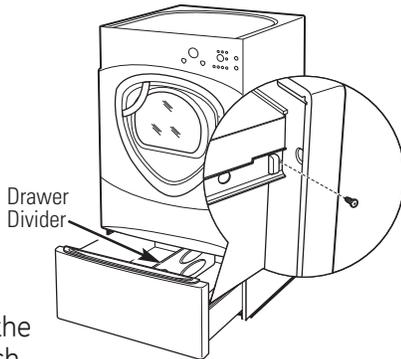
Remove the 4 shipping screws on the back side of the washer.

7 FINALIZE THE INSTALLATION

Refer to the washer or dryer Installation Instructions to complete the installation.

5 REINSTALL THE DRAWER

- A** Check to be sure the slides are closed.
- B** Slide the drawer into the opening. Align the drawer supports to the slides on each side.
- C** Reinstall the original screws into each drawer slide. Tighten both screws.
- D** Open the drawer fully. Slide drawer divider into slots in the center of the drawer. The drawer should slide smoothly when you push it closed.



Before you call for service...



Troubleshooting Tips
Save time and money! Review the charts on the following pages, or visit GEAppliances.com. You may not need to call for service.

PROBLEM	Possible Causes	What To Do
Dryer shakes or makes noise	Some shaking/noise is normal. Dryer may be sitting unevenly	<ul style="list-style-type: none"> • Move dryer to an even floor space, or adjust leveling legs as necessary until even.
Clothes take too long to dry	Improper or obstructed ducting	<ul style="list-style-type: none"> • Check the Installation Instructions to make sure the dryer venting is correct. • Make sure ducting is clean, free of kinks and unobstructed. • Check to see if outside wall damper operates easily.
	Improper sorting	<ul style="list-style-type: none"> • Separate heavy items from lightweight items (generally, a well-sorted washer load is a well-sorted dryer load).
	Large loads of heavy fabrics (like beach towels)	<ul style="list-style-type: none"> • Large, heavy fabrics contain more moisture and take longer to dry. Separate large, heavy fabrics into smaller loads to speed drying time.
	Controls improperly set	<ul style="list-style-type: none"> • Match control settings to the load you are drying.
	Lint filter is full	<ul style="list-style-type: none"> • Clean lint filter before every load.
	Blown fuses or tripped circuit breaker	<ul style="list-style-type: none"> • Replace fuses or reset circuit breakers. Since most dryers use 2 fuses/breakers, make sure both are operating.
	Overloading/combining loads	<ul style="list-style-type: none"> • Do not put more than one washer load in the dryer at a time.
The DRY dryness level was chosen but load is still damp	Underloading	<ul style="list-style-type: none"> • If you are drying only one or two items, add a few items to ensure proper tumbling.
	Load consists of a mixture of heavy and light fabrics	<ul style="list-style-type: none"> • When combining heavy and light fabrics in a load, choose MORE DRY.
Control pads not responding	Exhaust system is blocked	<ul style="list-style-type: none"> • Inspect and clean exhaust system.
	Controls accidentally put in service mode	<ul style="list-style-type: none"> • Press START/PAUSE.
	Controls accidentally put in lock mode	<ul style="list-style-type: none"> • Hold the LOCK button for 3 seconds to unlock the dryer.
Dryer doesn't start	Controls performed an incorrect operation	<ul style="list-style-type: none"> • Reset the in-house breaker.
	Control panel is "asleep"	<ul style="list-style-type: none"> • This is normal. Press POWER to activate the control panel.
	Dryer is unplugged	<ul style="list-style-type: none"> • Make sure the dryer plug is pushed completely into the outlet.
	Fuse is blown/circuit breaker is tripped	<ul style="list-style-type: none"> • Check the building's fuse/circuit breaker box and replace fuse or reset breaker. NOTE: Electric dryers use two fuses or breakers.
No numbers displayed during cycle, only lights	Dryer was accidentally paused when starting Delay Start	<ul style="list-style-type: none"> • If the light on the START/PAUSE button is flashing, the dryer is paused. Press START/PAUSE to restart the countdown.
	Dryer is continuously monitoring the amount of moisture in the clothes	<ul style="list-style-type: none"> • This is normal. When the dryer senses a low level of moisture in the load, the dryer will display the dry time remaining.

Before you call for service...

PROBLEM	Possible Causes	What To Do
<i>Time Remaining jumped to a lower number</i>	The estimated time may change when a smaller load than usual is drying	<ul style="list-style-type: none"> This is normal.
<i>Cannot make a selection and the dryer beeps twice</i>	The DRYNESS LEVEL , TEMP or OPTION that you are trying to select is incompatible with the chosen dry cycle	<ul style="list-style-type: none"> This is normal.
<i>Dryer is running but 00 is displayed in Time Remaining</i>	The EXTEND TUMBLE option was chosen	<ul style="list-style-type: none"> This is normal. During extended tumbling, the time remaining is not displayed. The extended tumbling option lasts approximately 20 minutes.
<i>Clean Lint Filter (message)</i>	POWER button was activated	<ul style="list-style-type: none"> Press START/PAUSE to begin a dry cycle and the message will disappear.
<i>Dryer doesn't heat</i>	Fuse is blown/circuit breaker is tripped; the dryer may tumble but not heat	<ul style="list-style-type: none"> Check the building's fuse/circuit breaker box and replace both fuses or reset both breakers. Your dryer may tumble if only one fuse is blown or one breaker tripped.
	Gas service is off	<ul style="list-style-type: none"> Make sure gas shutoff at dryer and main shutoff are fully open.
	LP gas supply tank is empty or there has been a utility interruption of natural gas (gas models)	<ul style="list-style-type: none"> Refill or replace tank. Dryer should heat when utility service is restored.
<i>Inconsistent drying times</i>	Type of heat	<ul style="list-style-type: none"> Drying time will vary according to the type of heat used. If you recently changed from an electric to a gas (natural or LP) dryer, or vice versa, the drying time could be different.
	Type of load and drying conditions	<ul style="list-style-type: none"> The load size, types of fabric, wetness of clothes and the length and condition of the exhaust system will affect drying times.
<i>Glow at the rear of the drum</i>	Heaters behind the drum	<ul style="list-style-type: none"> This is normal. Under certain drying conditions and room ambient lighting, the glow of the heaters may be visible at the rear of the drum.
<i>Clothes are still wet and dryer shut off after a short time</i>	The door was opened mid-cycle. The load was then removed from the dryer and a new load put in without selecting a new cycle	<ul style="list-style-type: none"> A dry cycle must be reselected each time a new load is put in.
	Small load	<ul style="list-style-type: none"> When drying 3 items or less, choose SPEED DRY or TIMED DRY.
	Load was already dry except for collars and waistbands	<ul style="list-style-type: none"> Choose SPEED DRY or TIMED DRY to dry damp collars and waistbands. In the future, when drying a load with collars and waistbands, choose MORE DRY.
	Dryer is not level	<ul style="list-style-type: none"> Move dryer to an even floor space or adjust leveling legs as necessary until even.
<i>Clothes are wrinkled</i>	Overdrying	<ul style="list-style-type: none"> Select a shorter drying time. Remove items while they still hold a slight amount of moisture. Select a LESS DRY or DAMP setting.
	Letting items sit in dryer after cycle ends	<ul style="list-style-type: none"> Remove items when cycle ends and fold or hang immediately, or use the EXTEND TUMBLE option.
	Overloading	<ul style="list-style-type: none"> Separate large loads into smaller ones.

Before you call for service...

PROBLEM	Possible Causes	What To Do
<i>Clothes shrink</i>	Some fabrics will naturally shrink when washed. Others can be safely washed, but will shrink in the dryer	<ul style="list-style-type: none"> To avoid shrinkage, follow garment care labels exactly. Some items may be pressed back into shape after drying. If you are concerned about shrinkage in a particular item, do not machine wash or tumble dry it.
<i>Greasy spots on clothes</i>	Improper use of fabric softener	<ul style="list-style-type: none"> Follow directions on fabric softener package.
	Drying dirty items with clean ones	<ul style="list-style-type: none"> Use your dryer to dry only clean items. Dirty items can stain clean items and the dryer.
	Clothes were not completely clean	<ul style="list-style-type: none"> Sometimes stains which cannot be seen when the clothes are wet <i>appear</i> after drying. Use proper washing procedures before drying.
<i>Lint on clothes</i>	Lint filter is full	<ul style="list-style-type: none"> Clean lint screen before each load.
	Improper sorting	<ul style="list-style-type: none"> Sort lint producers (like chenille) from lint collectors (like corduroy).
	Static electricity can attract lint	<ul style="list-style-type: none"> See suggestions in this section under STATIC.
	Overloading	<ul style="list-style-type: none"> Separate large loads into smaller ones.
	Paper, tissue, etc., left in pockets	<ul style="list-style-type: none"> Empty all pockets before laundering clothes.
<i>Static occurs</i>	No fabric softener was used	<ul style="list-style-type: none"> Try a fabric softener. Bounce® Fabric Conditioner Dryer Sheets have been approved for use in all GE Dryers when used in accordance with the manufacturer's instructions.
	Overdrying	<ul style="list-style-type: none"> Try a fabric softener. Adjust setting to LESS DRY or DAMP.
	Synthetics, permanent press and blends can cause static	<ul style="list-style-type: none"> Try a fabric softener.
<i>Collars and waistbands still wet at end of cycle</i>	The dryness monitor senses that the body of the clothes is dry	<ul style="list-style-type: none"> Choose SPEED DRY or TIMED DRY to dry damp collars and waistbands. In the future, when drying a load with collars and waistbands, choose MORE DRY.
<i>Slight variation in metallic color</i>	This is normal	<ul style="list-style-type: none"> Due to the metallic properties of paint used for this unique product, slight variations of color may occur due to viewing angles and lighting conditions.
<i>Door is too foggy to see clothes during a steam cycle</i>	Steam condenses on inner door	<ul style="list-style-type: none"> This is normal.
<i>Water seen on inside of door and top of lint filter when opening door after steam cycle</i>	Steam condenses on these surfaces	<ul style="list-style-type: none"> This is normal.
<i>Small areas on clothes are damp after steam cycle</i>	Steam condenses on inner drum	<ul style="list-style-type: none"> Select a shorter cycle.
	Cycle or cycle time selected too long for size of load	<ul style="list-style-type: none"> Manually reduce cycle time for given cycle.

Before you call for service...

PROBLEM	Possible Causes	What To Do
<i>Small amount of water on floor in front of dryer</i>	Inadequate load size for steam cycle selected, excess steam condenses inside cabinet and leaks out	<ul style="list-style-type: none">• Select a shorter cycle. Manually reduce cycle time for given cycle.
<i>Water on floor in back of dryer</i>	Loose water hose connection to valve	<ul style="list-style-type: none">• Tighten connection.
	Hose missing rubber washer at connection with valve	<ul style="list-style-type: none">• Install rubber washer provided with hose.
<i>Dryer makes water noises</i>	Water valve is open filling steam generator	<ul style="list-style-type: none">• This is normal.
	Steam generator is dispensing steam into drum	<ul style="list-style-type: none">• This is normal.
<i>Water drips from door when opened after a Steam Cycle</i>	Steam condenses on inner door	<ul style="list-style-type: none">• This is normal.
<i>Cannot see steam at beginning of cycle</i>	Steam released at different	<ul style="list-style-type: none">• This is normal.
<i>Cannot see steam at any time during cycle</i>	The steam nozzle might be clogged with debris from your water supply	<ul style="list-style-type: none">• Call 800.GE.CARES to order nozzle replacement kit WE25M71 or to request a technician to replace this for you.
<i>Garments still wrinkled after steam cycle</i>	Too many garments	<ul style="list-style-type: none">• Load fewer garments; manually increase time.
<i>Dryer continues to tumble after display says Complete</i>	Extend Tumble was selected	<ul style="list-style-type: none">• Ensure Extend Tumble option is not selected.

GE Dryer Warranty. *(For customers in the United States)*



All warranty service provided by our Factory Service Centers, or an authorized Customer Care® technician. To schedule service, on-line, visit us at GEAppliances.com, or call 800.GE.CARES (800.432.2737).

Please have serial number and model number available when calling for service.

Staple your receipt here. Proof of the original purchase date is needed to obtain service under the warranty.

For The Period Of:	We Will Replace:
One Year <i>From the date of the original purchase</i>	Any part of the dryer which fails due to a defect in materials or workmanship. During this limited one-year warranty , GE will also provide, free of charge , all labor and related service costs to replace the defective part.
Second Year <i>From the date of the original purchase</i>	Any part of the dryer which fails due to a defect in materials or workmanship. During this additional one-year limited warranty , you will be responsible for any labor or related service costs.
Second through Fifth Year <i>From the date of the original purchase</i>	The extra-large or super-capacity dryer drum and main electronic control board if any of these parts should fail due to a defect in materials or workmanship. During this additional three-year limited warranty , you will be responsible for any labor or related service costs.

What Is Not Covered (in the United States):

- Service trips to your home to teach you how to use the product.
- Improper installation, delivery or maintenance.
- Failure of the product if it is abused, misused or used for other than the intended purpose or used commercially.
- Replacement of the light bulb after its expected useful life.
- Replacement of house fuses or resetting of circuit breakers.
- Damage to the product caused by accident, fire, floods or acts of God.
- Incidental or consequential damage caused by possible defects with this appliance.
- Damage caused after delivery.
- Product not accessible to provide required service.

EXCLUSION OF IMPLIED WARRANTIES—Your sole and exclusive remedy is product repair as provided in this Limited Warranty. Any implied warranties, including the implied warranties of merchantability or fitness for a particular purpose, are limited to one year or the shortest period allowed by law.

This warranty is extended to the original purchaser and any succeeding owner for products purchased for home use within the USA. If the product is located in an area where service by a GE Authorized Servicer is not available, you may be responsible for a trip charge or you may be required to bring the product to an Authorized GE Service location for service. In Alaska, the warranty excludes the cost of shipping or service calls to your home.

Some states do not allow the exclusion or limitation of incidental or consequential damages. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. To know what your legal rights are, consult your local or state consumer affairs office or your state's Attorney General.

Warrantor: General Electric Company. Louisville, KY 40225



Profile SmartDispense™ Pedestals

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As an **ENERGY STAR**® partner, GE has determined that this product meets the **ENERGY STAR**® guidelines for energy efficiency.

Write the model and serial numbers here:

Model # _____

Serial # _____

You can find them on a label on the side of the washer.

Owner's Manual & Installation Instructions

Model SPBD880

**Profile SmartDispense™
Piédestals**

**Manuel d'utilisation
et d'installation**

La section française commence à la page 25

**Profile SmartDispense™
Pedestales**

**Manual del propietario
e instalación**

La sección en español empieza en la página 45

IMPORTANT SAFETY INFORMATION. READ ALL INSTRUCTIONS BEFORE USING.

⚠️ WARNING!

For your safety, the information in this manual must be followed to minimize the risk of fire or explosion, electric shock, or to prevent property damage, personal injury, or loss of life.

The instructions in this manual and all other literature included with this washer are not meant to cover every possible condition and situation that may occur. Good, safe practices and caution **MUST** be applied when installing, operating, and maintaining any appliance.



WATER HEATER SAFETY

Under certain conditions, hydrogen gas may be produced in a water heater that has not been used for two weeks or more. Hydrogen gas can be explosive under these circumstances.

If the hot water has not been used for two weeks or more, prevent the possibility of damage or injury by turning on all hot water faucets and allowing them to run for several minutes. Do this before using any electrical appliance which is connected to the hot water system. This simple procedure will allow any built-up hydrogen gas to escape. Since the gas is flammable, do not smoke or use an open flame or appliance during this process.



PROPER INSTALLATION

This pedestal must be properly installed and located in accordance with the Installation Instructions before it is used.

- Install or store where it will not be exposed to temperatures below freezing or exposed to the weather, which could cause permanent damage and invalidate the warranty.
- Properly ground washer to conform with all governing codes and ordinances. Follow details in Installation Instructions.
- This appliance must be grounded. In the event of malfunction or breakdown, grounding will reduce the risk of electric shock by providing a path of least resistance for electric current. The washer is equipped with a cord having an equipment-grounding conductor and a grounding plug. The washer plug must be plugged into an appropriate outlet that is properly installed and grounded in accordance with all local codes and ordinances.

⚠️ WARNING: Improper connection of the equipment-grounding conductor can result in a risk of electric shock. Check with a qualified electrician or serviceman if you are in doubt as to whether the appliance is properly grounded.



YOUR LAUNDRY AREA

- Keep the area underneath and around your appliances free of combustible materials such as lint, paper, rags and chemicals.
- Do not leave the washer door open. An open door could entice children to hang on the door or crawl inside the washer.
- Close supervision is necessary if this appliance is used by or near children. Do not allow children to play on, with or inside this or any other appliance.



Use this appliance only for its intended purpose as described in this Owner's Manual.

WHEN USING THE SMARTDISPENSE™ PEDESTAL

- Do not wash articles that have been previously cleaned in, washed in, soaked in or spotted with gasoline, dry-cleaning solvents or other flammable or explosive substances, as they give off vapors that could ignite or explode.
- Do not add gasoline, dry-cleaning solvent or other flammable or explosive substances to the tanks. These substances give off vapors that could ignite or explode.
- Never reach into drawer while the washer is moving. Wait until the machine has completely stopped before opening the drawer.
- Do not store liquid chlorine bleach in tanks. Use manual flow-through dispenser on the washing machine for dispensing chlorine bleach.
- Do not refill tanks with different brands or concentrations of liquid HE (High Efficiency) detergents and concentrated liquid fabric softeners, as this could cause the fluids to congeal and lead to blockage of the SmartDispense system.
- Remove and wash tanks thoroughly before using a different brand or concentration of liquid HE (High Efficiency) detergent and concentrated liquid fabric softener.
- Do not slam the pedestal drawer closed. This could result in damage to the SmartDispense system.
- Never attempt to operate this appliance if it is damaged, malfunctioning, partially disassembled, or has missing or broken parts, including a damaged cord or plug.
- To minimize the possibility of electric shock, unplug this appliance from the power supply or disconnect the washer at the building's distribution panel by removing the fuse or switching off the circuit breaker before attempting any maintenance or cleaning. **NOTE:** Pressing the power button does **NOT** disconnect the appliance from the power supply.
- Do not tamper with controls.
- Do not repair or replace any part of the appliance or attempt any servicing unless specifically recommended in the owner's manual or in published user-repair instructions that you understand and have the skill to carry out.

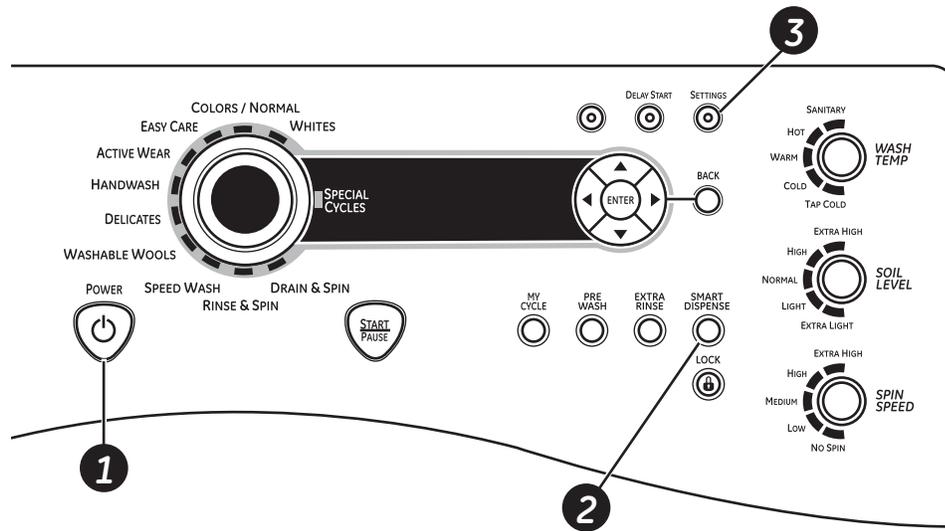


**READ AND FOLLOW THIS SAFETY INFORMATION CAREFULLY.
SAVE THESE INSTRUCTIONS**

About the washer control panel.

You can locate your model number on a label on the side of the washer.

When you use **SmartDispense**, it will automatically distribute detergent and fabric softener according to the soil level, water hardness and load size detected.



- 1 Power**
Press to turn on the display. If the display is active, press to put the washer into standby mode.
NOTE: Pressing **POWER** does not disconnect the appliance from the power supply.

2 SmartDispense

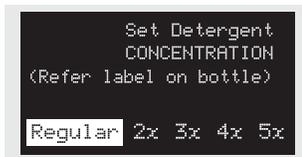
The **SmartDispense** feature allows you to set your liquid HE (High Efficiency) detergent and/or softener dispensing preferences for your load. This feature can be used with

any wash cycle, except for Rinse & Spin, Drain & Spin and Washer Cleaning cycles.

To use SmartDispense:

1. Select your desired Wash Cycle.
2. Press the **SMART DISPENSE** button (button will light up when it is on).
3. Use the left and right arrows to select which tank your liquid HE (High Efficiency) detergent is located in (or choose "off" if you do not want to dispense detergent).
4. Press **ENTER** to select liquid HE (High Efficiency) detergent container.
5. Use the left and right arrows to select liquid HE (High Efficiency) detergent concentration (located on your liquid HE [High Efficiency] detergent bottle).
6. Press **ENTER** to select detergent concentration.
7. Use the left and right arrows to select how much liquid HE (High Efficiency) detergent you would like to dispense ("Norm" corresponds to a standard dose).
8. Press **ENTER** to select liquid HE (High Efficiency) detergent dispense level.
9. Use the left and right arrows to select whether you would like to use fabric softener.
10. Press **ENTER** to select softener.
11. Use the left and right arrows to select how much softener you would like to dispense ("Norm" corresponds to a standard dose).
12. Press **ENTER** to select softener dispense level.
13. The screen will show **SMART DISPENSE ON**.
14. Press **START** to start the cycle.
15. During your wash cycle, the display will show the current status and options for **SmartDispense**.

NOTE: To turn off **SmartDispense**, press **SMART DISPENSE** again; to select different dispense options, press **SMART DISPENSE** twice.



About the SmartDispense™ pedestal features.

3 Setting Your Water Hardness Level

The **SmartDispense** feature allows you to input the hardness of your water into the control panel. This helps optimize the performance of your **SmartDispense** unit.

SmartDispense™ Detergent Dispenser Water Hardness Calibration

Prior to the first use, the washer needs to be calibrated for water hardness. Please follow directions below to calibrate the washer to the hardness of your tap water.

Determine the Hardness of Your Tap Water

In the bag that contained these instructions, you should find a water hardness test strip package. Read the instructions on the package, remove the test strip and follow the instructions to determine the hardness level of your tap water. You will use this information to calibrate your washer to dispense the optimal amount of detergent.

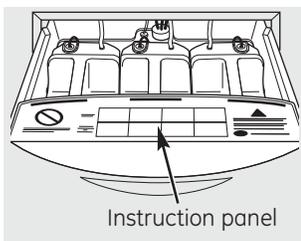
Water Hardness Test Strip Indication

			Value to Enter into Washer
SOFT	0 RED		1
	1 RED		2
	2 RED		3
	3 RED		4
HARD	4 RED		5

To calibrate your water hardness:

1. Press the **POWER** button.
2. Press the **SETTINGS** button.
3. Use the down arrow to select the **WATER HARDNESS SETUP**, and press the **ENTER** button.
4. The display will show numbers 1 to 5. The washer defaults to setting 3.
5. Use the left and right arrows to select the number determined with the test strip from the table above, and press the **ENTER** button.





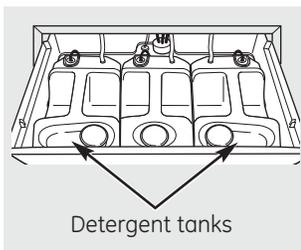
Instruction panel

The Instruction Panel

Press the tabs on the sides of the instruction panel. Slowly rotate the instruction panel toward you until it stops. Finally, slide the panel down in front of the tanks into the slot available.

After adding laundry product, lift the panel out of its resting position; then rotate the panel closed until it snaps into its horizontal position.

NOTE: The drawer will not fully close if the panel is in its open position.



Detergent tanks

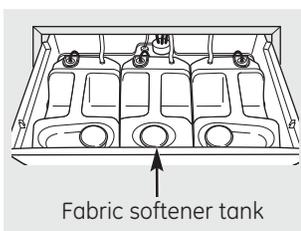
The Detergent Tanks

To remove either of the two outer tanks, grasp the sensor at the rear of the tank, using the grip provided, and pull the sensor straight up. Loosen the supply tube by rotating 1/4 turn the tube and fitting until the tube can be pulled straight up.

- Each tank can hold 350 ounces of liquid HE (High Efficiency) laundry detergent—approximately 100 washes of regular concentration detergent. The system requires that at least 100 ounces of new detergent must be added to the tank to recognize that it has been filled.
- Detergent is pumped to the washer at the beginning of the wash cycle.

- Do not put any other substance into the tanks besides liquid HE (High Efficiency) detergent.
- Do not fill the tank while it is removed from the drawer.
- The **SmartDispense™** system determines how much detergent to supply to the washer, depending on the load size, soil level and water hardness.
- Do not dilute with water.

NOTE: Use only HE (High Efficiency) detergent.



Fabric softener tank

The Fabric Softener Tank

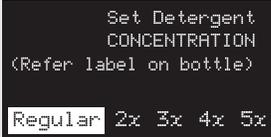
To remove the center tank, grasp the sensor at the rear of the tank, using the grip provided, and pull the sensor straight up. Loosen the supply tube by rotating 1/4 turn the tube and fitting until the tube can be pulled straight up. Remove the tank by tilting slightly toward the washer and pulling straight up.

- Each tank can hold 95 ounces of concentrated liquid fabric softener, enough for approximately 75 loads of concentrated liquid fabric softener.
- **Do not dilute with water.**

- If desired, concentrated liquid fabric softener is pumped to the washer at the correct time in the wash cycle.
- Do not put any other substance into the tank besides concentrated liquid fabric softener.
- The **SmartDispense™** system determines how much softener to supply to the washer, depending on user inputs for the wash cycle.

NOTE: Use only concentrated liquid fabric softener.

About the SmartDispense™ pedestal features.

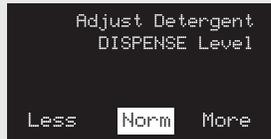


Concentration Level

SmartDispense™ can use any liquid HE (High Efficiency) detergent, regardless of its concentration level.

Many liquid HE (High Efficiency) detergents can be found in a concentrated form, meaning that it has more active ingredients in each drop, taking up less space as it uses less fluid per wash.

- The concentration level can usually be found on the label or cap of the liquid HE (High Efficiency) detergent bottle.
- You can select the concentration of your detergent every time you change the settings for the **SmartDispense** feature.
- If the concentration is not explicitly identified on the bottle, select “Regular” as the concentration level when setting the **SmartDispense™** options.



Dispense Level

SmartDispense™ can dispense a little more or less liquid HE (High Efficiency) detergent or concentrated liquid fabric softener, depending on your preferred washing habits.

- You can adjust the dosage level every time you change the settings for the **SmartDispense** feature in order to customize it to the way you normally wash your clothes.
- A dispense level of “Norm” corresponds to a standard dose, as recommended by the liquid HE (High Efficiency) detergent and concentrated liquid fabric softener manufacturers.
- A dispense level of “More” will add 50% more liquid HE (High Efficiency) detergent or 100% more concentrated liquid fabric softener than a standard dose.
- A dispense level of “Less” will use 25% less liquid HE (High Efficiency) detergent or 25% less concentrated liquid fabric softener than a standard dose.

The **SmartDispense™** Pedestal automatically dispenses liquid HE (High Efficiency) detergent and/or concentrated liquid fabric softener into each cycle based on load size, soil level and water hardness.

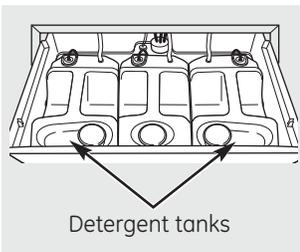
To utilize the **SmartDispense** Detergent Dispenser, it must first be filled. Although any liquid HE (High Efficiency) laundry detergent and concentrated liquid fabric softener can be used in the **SmartDispense** system, all liquid HE (High Efficiency) detergents and concentrated liquid fabric softeners are not the same.

Do not mix any liquid HE (High Efficiency) detergents of unlike brands, concentrations or scents within the detergent tanks, as this could cause the detergents to congeal and lead to blockage of the SmartDispense system. Do not mix any concentrated liquid fabric softeners of unlike brands or scents within the fabric softener tank. Do not mix any liquid HE (High Efficiency) detergents with concentrated liquid fabric softeners in any of the tanks. Remove and wash tanks thoroughly before using a different brand, concentration or scent of liquids.

CAUTION! Absolutely do not store liquid chlorine bleach, powder detergent, non-HE (High Efficiency) liquid detergent, nonconcentrated liquid fabric softener or other laundry additives in any of the three tanks. Use only liquid HE (High Efficiency) detergent, which has been specifically designed for use in front-load washers.

To open the **SmartDispense™** Pedestal for filling, slide open the pedestal drawer to the maximum possible distance. Open the instruction panel by pressing the tabs at the sides of the panel, rotate the panel toward you and slide it down in the slot available.

NOTE: The first time your washer recognizes that the **SmartDispense** system has been activated, it will automatically fill the supply lines with detergent and/or fabric softener for all active tanks. This process will last approximately two minutes and will only occur at the beginning of the first cycle that uses the **SmartDispense** system.



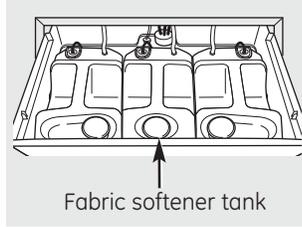
To Fill Your Detergent Tank:

1. Select which of the two outer tanks you wish to fill. Open the tank for filling by turning the cap counterclockwise until the cap is loose. Lift the cap off.
NOTE: Do not fill the tank while it is removed from the drawer. Fluid may be lost while reattaching the tank to the **SmartDispense** system.
2. Aim the detergent bottle at the opening in the tank and begin to fill. Each detergent tank will hold 350 oz. of liquid HE (High Efficiency) detergent (the largest available detergent bottle is 300 oz.). The system requires that at least 100 ounces of new detergent must be added to the tank to recognize that it has been filled.
3. When full, replace the cap and turn clockwise until tight to ensure proper sealing. If residue is left on the tank, wipe clean with a moist cloth, using a mild soap.



4. An indicator will appear on the washer control panel to notify you when the dispenser needs to be filled again. After filling the tank, the warning message will turn off when the washer is powered on for the next cycle. A full tank using regular concentrated detergent will last approximately 3 months for the average user.

Using the SmartDispense™ pedestal.

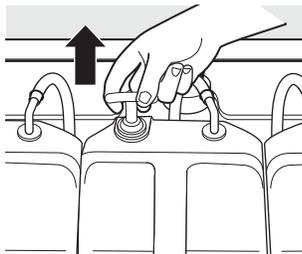


To Fill Your Fabric Softener Tank:

1. Open the tank for filling by turning the cap counterclockwise until the cap is loose. Lift the cap off.

NOTE: Do not fill the tank while it is removed from the drawer. Fluid may be lost while reattaching the tank to the **SmartDispense** system.

2. Aim the fabric softener bottle at the opening in the tank and begin to fill. The fabric softener tank will hold 95 oz. of concentrated liquid fabric softener. The system requires that at least 30 ounces of new fabric softener must be added to the tank to recognize that it has been filled.
3. When full, replace the cap and turn clockwise until tight to ensure proper sealing. If residue is left on the tank, wipe clean with a moist cloth, using a mild soap.
4. An indicator will appear on the washer control panel to notify you when the dispenser needs to be filled again. After filling the tank, the warning message will turn off when the washer is powered on for the next cycle. A full tank using concentrated liquid fabric softener will last approximately 3 months for the average user.



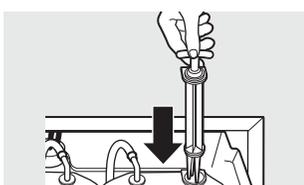
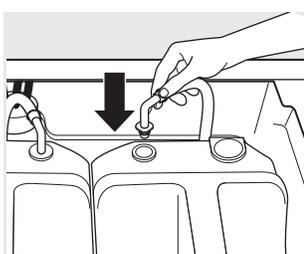
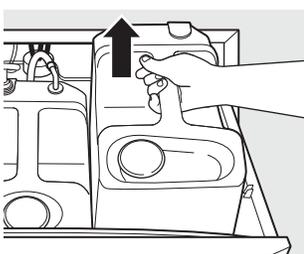
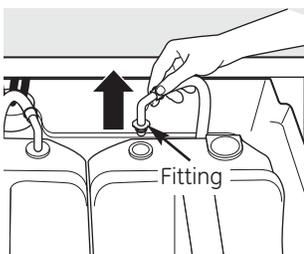
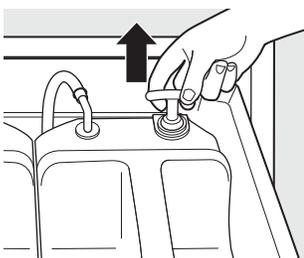
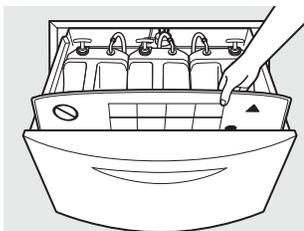
NOTE: The fabric softener sensor should be wiped clean every time the tank needs to be refilled. To remove the fabric softener sensor while the drawer is fully opened, grasp the sensor at the rear of the tank, using the grip provided, and pull the sensor straight up. Wipe the surface of the sensor, using a moist cloth with a mild soap; then replace the sensor back in its original position.

Cleaning the SmartDispense™ Detergent and Fabric Softener Tanks:

Detergent and fabric softener may build up in the bottom of the **SmartDispense** tanks or on the fluid sensors. Residue should be removed before refilling tanks.

1. Open the pedestal drawer to the maximum possible distance.
2. Press the tabs on the sides of the instruction panel. Slowly rotate the instruction panel until it stops. Then, slide the panel down in front of the tanks into the slot available.
3. Select the tank that you wish to remove for cleaning. Grasp the sensor at the rear of the tank, using the grip provided, and pull the sensor straight up.
4. Wipe the surface of the sensor, using a moist cloth with a mild soap; then place the sensor on the back surface of the drawer or an adjacent tank.
5. Loosen the supply tube by rotating the fitting 90° until the tube can be pulled straight up.
6. Wipe the surface of the tube and place it on the back surface of the drawer or an adjacent tank.
7. Remove the tank by tilting it slightly toward the washer and pulling straight up.
8. Rinse the inside of the tank, using hot water only to remove the residue.
9. Once the tank has been rinsed thoroughly, replace the tank in the drawer before refilling the tank.
10. Reattach the supply tube by inserting it into the tank and tightening the fitting by rotating toward the back.
11. Replace the sensor by inserting it into the tank in its original position.

12. Open the tank cap and refill with the desired detergent or fabric softener.
13. Close the information panel and the pedestal drawer.
14. Adjust the setting in the **SmartDispense** menu if any changes were made to the concentration of the detergent selected or to the location of the tank that is being used.



Installation Instructions

Pedestal

Model SPBD880

If you have any questions, call 800.GE.CARES (800.432.2737) or visit our Website at: ge.com
In Canada, call 1.800.561.3344 or Visit our Website at: www.geappliances.ca

BEFORE YOU BEGIN

Read these instructions completely and carefully.

- **IMPORTANT** – Save these instructions for local inspector's use.
- **IMPORTANT** – Observe all governing codes and ordinances.
- **Note to Consumer** – Keep these instructions with your Owner's Manual for future reference.
- **Completion time** – 1 to 2 hours
- Proper installation is the responsibility of the installer.
- Product failure due to improper installation is not covered under the Warranty.

⚠ CAUTION – Due to the size and weight of these products, and to reduce the risk of personal injury or damage to the product, **TWO PEOPLE ARE REQUIRED FOR PROPER INSTALLATION.**

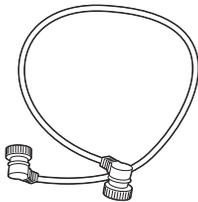
- See washer installation instructions for additional installation requirements and guidelines.

KIT CONTENTS

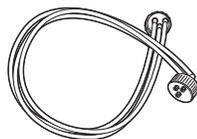
4 Mounting Screws



Electric Cord



Quick Connect Hose



TOOLS YOU WILL NEED

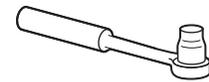
Phillips Head Screwdriver



9/16" Open-End Wrench
or Adjustable Wrench



8 mm Socket Wrench



INSTALLATION PREPARATION

Remove the packaging.

The Installation Kit is taped at the top of the shipping carton. Remove the kit and set aside for final installation.

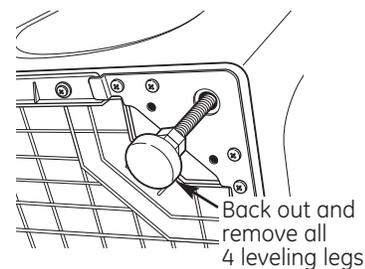
Flatten the product carton to use as a pad to lay the washer down on its side. Continue using the carton to protect the finished floor in front of the installation location.

1 REMOVE THE LEVELING LEGS

A Carefully lay the washer on its side to access the leveling legs on the bottom of the appliance.

IMPORTANT: Do not lay the washer on its back. Do not remove the shipping bolts on the back side of the washer. The bolts must remain in place until the washer is returned to an upright position.

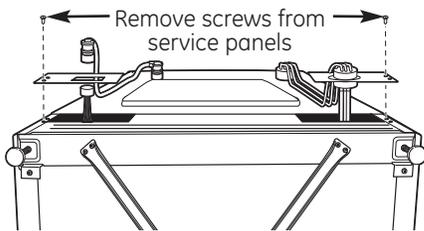
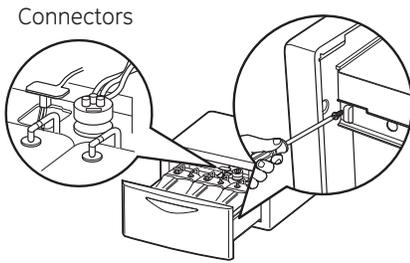
B Use an open-end wrench to remove the washer leveling legs.



Installation Instructions

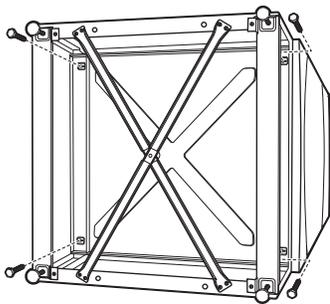
2 PREPARE THE PEDESTAL

- A** Pull the drawer out as far as it will go.
- B** Remove the screws from the drawer slides. Detach the wiring connector and the hose connector at the back of the drawer. Slide the drawer out of the base and set aside.
- C** Remove the screws from the service panels at the rear of the pedestal and place the panels within the pedestal.



3 INSTALL THE PEDESTAL TO THE WASHER

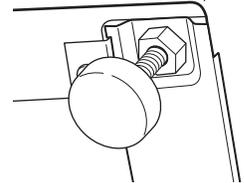
- A** Place the pedestal against the bottom of the unit. Check to be sure the drawer front is at the front of the unit.
- B** Align the holes in the pedestal with the holes in the bottom of the unit. Use a Phillips screwdriver to install the 4 screws through the front of the pedestal and through the rear panels and into the unit—do not tighten.



- C** Slide the pedestal toward the unit, until it is aligned front to back. Use an 8 mm socket wrench to securely tighten the screws.
- D** Replace the service panels on the back and tighten the screws.

4 LEVEL THE WASHER

- A** Stand the washer upright. Move it close to its final location.
- B** Make sure that the washer is level by placing a spirit level on top. Check side to side and front to back.
- C** Use an open-ended wrench to adjust the legs in and out. Tighten the locknut against the bottom of the pedestal.

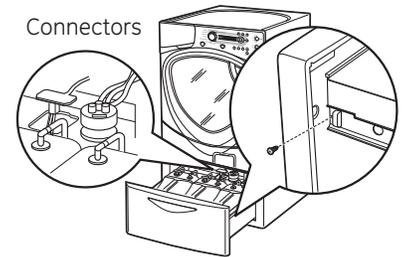


NOTES:

- To minimize vibration, the locking nuts must be tight.
- To reduce vibration, ensure that all four rubber leveling legs are firmly touching the floor. Push and pull on the back right and then back left of your washer.

5 REINSTALL THE DRAWER

- A** Check to be sure the slides are closed.
- B** Slide the drawer into the opening. Align the drawer supports to the slides on each side.
- C** Open the drawer fully. Reattach the hose connector and wiring connector at the rear of the drawer. Make sure both connections are secure.
- D** Reinstall the original screws into each drawer slide. Tighten both screws. The drawer should slide smoothly when you push it closed.



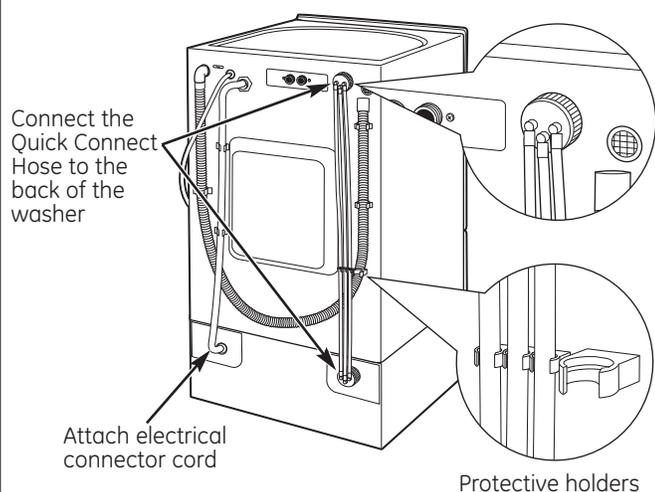
6 REMOVE SHIPPING SCREWS

Remove the 4 shipping screws, plastic support tubes and rubber grommets on the back side of the washer.

Installation Instructions

7 ATTACH THE HOSE CONNECTORS AND ELECTRIC CONNECTORS

- A** Remove 4 protective caps from the rear of the washer and **SmartDispense™** Pedestal.
- B** Attach the electric connector to the rear of the washer and the rear of the pedestal. Press the cord into the protective holders along the back of the washer.
- C** Attach the hose connector to the rear of the washer and the rear of the pedestal. Press all three tubes into the three protective holders along the back of the washer.



8 FINALIZE THE INSTALLATION

Refer to the washer Installation Instructions to complete the installation.

9 PREFERRED CONFIRMATION OF INSTALLATION

- A** Fill your detergent tank with liquid HE (High Efficiency) laundry detergent and softener tank with concentrated liquid fabric softener.
- B** Set your **SmartDispense** settings (see page 5 of the Owner's Manual).
- C** Run a Speed Wash. This will fill your **SmartDispense** supply lines with detergent and/or fabric softener for all active tanks selected in Step B.

NOTE: If the machine could not run a Speed Wash, check the following:

1. Screw the hose and electrical connectors in tightly on the back of the washer and pedestal.
2. Make sure all 3 sensors are plugged into the connector on the back of the drawer inside the pedestal.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Before you call for service...



Troubleshooting Tips
 Save time and money! Review the charts on the following pages, or visit **ge.com** (in U.S.) or **www.geappliances.ca** (in Canada). You may not need to call for service.

Problem	Possible Causes	What To Do
Low Detergent/Fabric Softener message is on	The <i>SmartDispense™</i> system has approximately 10 cycles worth of liquid HE (High Efficiency) detergent/concentrated liquid fabric softener left in the <i>SmartDispense</i> pedestal (20 cycles of 2x liquid HE [High Efficiency] detergent, 30 cycles of 3x liquid HE [High Efficiency] detergent, etc.)	<ul style="list-style-type: none"> Fill the <i>SmartDispense</i> reservoir with liquid HE (High Efficiency) detergent/concentrated liquid fabric softener if using the same brand and concentration of liquid HE (High Efficiency) detergent/concentrated liquid fabric softener. If using a different brand or concentration of liquid HE (High Efficiency) detergent/concentrated liquid fabric softener, follow the steps to remove and rinse the tank and clean fabric softener sensor before refilling. After filling the tanks, adjust the <i>SmartDispense</i> settings if changes were made to the detergent concentration. The Low indicator will turn OFF the next time the controls are powered.
	<i>SmartDispense</i> system was incorrectly set to draw from an empty tank	<ul style="list-style-type: none"> Adjust the <i>SmartDispense</i> settings to draw from the correct tank. The Low Indicator will turn OFF the next time the controls are powered.
	<i>SmartDispense</i> system was filled with less than 100 ounces of concentrated liquid HE (High Efficiency) detergent	<ul style="list-style-type: none"> Add additional liquid HE (High Efficiency) detergent to the tank. The Low Indicator will turn OFF the next time the controls are powered.
Cycle will not start and Empty Detergent/Fabric Softener message is on	The <i>SmartDispense</i> system has no usable cycles worth of liquid HE (High Efficiency) detergent/concentrated liquid fabric softener left in the <i>SmartDispense</i> pedestal. Some residual liquid HE (High Efficiency) detergent/concentrated liquid fabric softener will remain in the bottom of the tank to prevent air from entering the <i>SmartDispense</i> supply lines	<ul style="list-style-type: none"> Fill the <i>SmartDispense</i> reservoir with liquid HE (High Efficiency) detergent/concentrated liquid fabric softener if using the same brand and concentration of liquid HE (High Efficiency) detergent/concentrated liquid fabric softener. If using a different brand or concentration of liquid HE (High Efficiency) detergent/concentrated liquid fabric softener, follow the steps to remove and rinse the tank and clean fabric softener sensor before refilling. After filling the tanks, adjust the <i>SmartDispense</i> settings if changes were made to the detergent concentration. The Empty indicator will turn OFF the next time the controls are powered.
	<i>SmartDispense</i> system was filled with less than 100 ounces of concentrated liquid HE (High Efficiency) detergent	<ul style="list-style-type: none"> Add additional liquid HE (High Efficiency) detergent to the tank. The Empty Indicator will turn OFF the next time the controls are powered.
"SmartDispense pedestal not connected" message appears on screen	Hose and electrical connectors not installed correctly on the back of the machine	<ul style="list-style-type: none"> Make sure the 2 hose and electrical connections on the back of the washer and pedestal are made. Remove and reinstall each connection if needed, making sure to tighten the connector down as much as possible.
	Sensor connections are not made	<ul style="list-style-type: none"> Make sure all 3 sensors are plugged securely into the connector at the rear of the drawer inside the pedestal. Lift up on the sensor cover at the rear of the drawer to make sure these connections are made.
Washer waits two minutes before adding water at the beginning of the first cycle	Washer is priming the lines of the <i>SmartDispense</i> system	<ul style="list-style-type: none"> The first time your washer recognizes that the <i>SmartDispense</i> system has been activated, it will automatically fill the supply lines with detergent and/or fabric softener for all active tanks. This process will last approximately two minutes and will only occur at the beginning of the first cycle that uses the <i>SmartDispense</i> system.
Washer starts to spin at the beginning of the wash cycle before water is added	Washer is sensing the size of the load in the basket	<ul style="list-style-type: none"> The washer will spin for a short time at the beginning of every cycle when <i>SmartDispense</i> has been selected. By sensing the size of the load in the basket, the washer will be able to determine how much liquid HE (High Efficiency) detergent/concentrated liquid fabric softener to dispense.

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Before you call for service...



Troubleshooting Tips

Problem	Possible Causes	What To Do
Suds in the washer	The <i>SmartDispense</i> system detergent tanks were filled with non-HE detergents	<ul style="list-style-type: none"> Use only liquid HE (High Efficiency) detergents to avoid sudsing. Tide 2x HE Laundry Detergent has been approved for use in all GE washing machines and laundry <i>SmartDispense</i> systems. Follow the steps to remove and rinse tank before refilling. After filling the tanks, adjust the <i>SmartDispense</i> setting if changes were made to the detergent concentration.
	Manual washer dispenser was filled with non-HE detergent	<ul style="list-style-type: none"> Use only liquid HE (High Efficiency) detergents to avoid sudsing. Any HE (High Efficiency) Laundry Detergent has been approved for use in all GE washing machines and laundry <i>SmartDispense</i> systems.
Clothes are not clean after a cycle	Not enough detergent	<ul style="list-style-type: none"> Adjust the <i>SmartDispense</i>™ settings to increase the amount of detergent dispensed during each cycle. Check that the selected detergent concentration matches the concentration of the detergent in the tank.
	Not using liquid HE (High Efficiency) detergent	<ul style="list-style-type: none"> Use liquid HE (High Efficiency) detergent.
	Tanks have been filled with powder detergent	<ul style="list-style-type: none"> Use only liquid HE (High Efficiency) detergent. Follow the steps to remove and rinse the tank before refilling.
	Manual washer dispenser was filled with a different detergent than is in the selected tank	<ul style="list-style-type: none"> Turn off the <i>SmartDispense</i> system if you want to use a different detergent in the manual dispenser. Additional detergent may be stored in the second detergent tank, but <i>SmartDispense</i> settings must be adjusted before a cycle to select the desired tank.
	<i>SmartDispense</i> system detergent tanks were filled with two different liquid HE (High Efficiency) detergents	<ul style="list-style-type: none"> Follow the steps to remove and rinse the tank before refilling. After filling the tank, adjust the <i>SmartDispense</i> settings if changes were made to the detergent concentration.
	<i>SmartDispense</i> system detergent tanks were filled with a liquid HE (High Efficiency) detergent and a concentrated liquid fabric softener	<ul style="list-style-type: none"> Follow the steps to remove and rinse the tank before refilling. After filling the tank, adjust the <i>SmartDispense</i> settings if changes were made to the detergent concentration.
Clothes do not feel soft after a cycle in which concentrated liquid fabric softener dispense was enabled	Not enough fabric softener	<ul style="list-style-type: none"> Adjust the <i>SmartDispense</i> settings to increase the amount of concentrated liquid fabric softener during each cycle.
	<i>SmartDispense</i> system fabric softener tank was filled with nonconcentrated fabric softener	<ul style="list-style-type: none"> Follow the steps to remove and clean fabric softener sensor and rinse softener tank before refilling with concentrated liquid fabric softener.
	<i>SmartDispense</i> system detergent tanks were filled with two different concentrated liquid fabric softeners	<ul style="list-style-type: none"> Follow the steps to remove and clean fabric softener sensor and rinse softener tank before refilling with concentrated liquid fabric softener.
	<i>SmartDispense</i> softener sensor has developed a film of dried fabric softener	<ul style="list-style-type: none"> Follow the steps to remove and clean fabric softener.

GE Service Protection Plus™

GE, a name recognized worldwide for quality and dependability together with Assurant Solutions, offers you Service Protection Plus™—comprehensive protection on your appliances.*

Benefits Include:

- Prompt, reliable service from GE Authorized Servicers
- Convenient hours designed to suit your busy schedule
- Quality replacement parts
- The dependability of GE, a name recognized and trusted worldwide
- Ask about our interest-free payment plans

With Service Protection Plus you can expect:

- An extended service plan that limits unexpected repair bills
- Service coverage for most major brands
- Unlimited service calls for the length of your contract, or credit toward a replacement product
- Service coverage for covered operating parts and labor on appliances and home electronics that fail during normal single family household use
- Your satisfaction is our goal. We strive to provide you with excellent service in a professional and timely manner.

Place your confidence in GE and call us in the U.S. toll-free at **1.800.626.2224** for more information.

*Most brands covered up to 15 years old in the continental U.S.

SPP is a trademark of General Electric Company.



Please place in envelope and mail to:

General Electric Company
Warranty Registration Department
P.O. Box 32150
Louisville, KY 40232-2150

Consumer Product Ownership Registration

Dear Customer:

Thank you for purchasing our product and thank you for placing your confidence in us.

We are proud to have you as a customer!

Follow these three steps to protect your new appliance investment:

1

Complete and mail your Consumer Product Ownership Registration today. Have the peace of mind of knowing we can contact you in the unlikely event of a safety modification.

2

After mailing the registration below, store this document in a safe place. It contains information you will need should you require service. Our service number is 800.GE.CARES (800.432.2737).

3

Read your Owner's Manual carefully. It will help you operate your new appliance properly.

Model Number

Serial Number

Important: If you did not get a registration card with your product, detach and return the form below to ensure that your product is registered, or register online at ge.com.



Consumer Product Ownership Registration



Model Number

Serial Number

Mr. Ms. Mrs. Miss

First Name

Last Name

Street Address

Apt. #

E-mail Address*

City

State

Zip Code

Date Placed In Use
Month

Day

Year

Phone Number --

* Please provide your e-mail address to receive, via e-mail, discounts, special offers and other important communications from GE Appliances (GEA).

Check here if you do not want to receive communications from GEA's carefully selected partners.

FAILURE TO COMPLETE AND RETURN THIS CARD DOES NOT DIMINISH YOUR WARRANTY RIGHTS.

For more information about GEA's privacy and data usage policy, go to ge.com and click on "Privacy Policy" or call 800.626.2224.



GE Consumer & Industrial
Appliances
General Electric Company
Louisville, KY 40225
ge.com

Please place in envelope and mail to:
Veuillez mettre dans une enveloppe et envoyez à :

**OWNERSHIP REGISTRATION
P.O. BOX 1780
MISSISSAUGA, ONTARIO
L4Y 4G1**

(FOR CANADIAN CONSUMERS ONLY)



For Canadian
Customers



Pour les
Consommateurs
Canadiens

CUT ALONG THIS LINE AND RETURN CARD—THANKS

OWNERSHIP REGISTRATION CERTIFICATE – FICHE D'INSCRIPTION DU PROPRIÉTAIRE

Please register your product to enable us to contact you in the remote event a safety notice is issued for this product and to allow for efficient communication under the terms of your warranty, should the need arise.

Veillez enregistrer votre produit afin de nous permettre de communiquer avec vous si jamais un avis de sécurité concernant ce produit était émis et de communiquer facilement avec vous en vertu de votre garantie, si le besoin s'en fait sentir.

REGISTER ON-LINE: ENREGISTREMENT SUR INTERNET À :		www.geappliances.ca		MAIL TO: POSTER À :	P.O. BOX 1780, MISSISSAUGA ONTARIO, L4Y 4G1
<input type="checkbox"/> MR./M <input type="checkbox"/> MISS/MLE.	<input type="checkbox"/> MRS./MME. <input type="checkbox"/> MS.	FIRST NAME / PRÉNOM		LAST NAME / NOM	
STREET NO / N° RUE		STREET NAME / RUE			APT. NO / APP. / RR#
CITY / VILLE				PROVINCE	POSTAL CODE / POSTAL
AREA CODE / IND. RÉG.	TELEPHONE	E-MAIL			
DID YOU PURCHASE A SERVICE CONTRACT FOR THIS APPLIANCE? AVEZ-VOUS ACHETÉ UN CONTRAT DE SERVICE POUR CET APPAREIL ?				YES / OUI <input type="checkbox"/> NO / NON <input type="checkbox"/>	IF YES / SI OUI: EXPIRATION Y/A M D/J
NAME OF SELLING DEALER / NOM DU MARCHAND				MODEL / MODÈLE	
INSTALLATION DATE / DATE D'INSTALLATION Y/A M D/J		CORRESPONDENCE CORRESPONDANCE	<input type="checkbox"/> ENGLISH <input type="checkbox"/> FRANÇAIS	SERIAL / SÉRIE	
<input type="checkbox"/> I do not wish to receive any promotional offers regarding this product. <input type="checkbox"/> Je ne désire pas recevoir d'offres promotionnelles concernant ce produit.					

GE SmartDispense™ Pedestal Warranty. (For customers in the United States)



All warranty service provided by our Factory Service Centers, or an authorized Customer Care® technician. To schedule service, on-line, visit us at ge.com, or call 800.GE.CARES (800.432.2737). Please have serial number and model number available when calling for service.

Staple your receipt here.
Proof of the original purchase date is needed to obtain service under the warranty.

For The Period Of: We Will Replace:

One Year

From the date of the original purchase

Any part of the SmartDispense pedestal which fails due to a defect in materials or workmanship. During this **limited one-year warranty**, GE will also provide, **free of charge**, all labor and related service costs to replace the defective part.

What Is Not Covered (in the United States):

- Service trips to your home to teach you how to use the product.
- Improper installation, delivery or maintenance.
- Failure of the product if it is abused, misused, or used for other than the intended purpose or used commercially.
- Damage after delivery.
- Replacement of house fuses or resetting of circuit breakers.
- Damage to the product caused by accident, fire, floods or acts of God.
- Incidental or consequential damage caused by possible defects with this appliance.
- Product not accessible to provide required service.

EXCLUSION OF IMPLIED WARRANTIES—Your sole and exclusive remedy is product repair as provided in this Limited Warranty. Any implied warranties, including the implied warranties of merchantability or fitness for a particular purpose, are limited to one year or the shortest period allowed by law.

This warranty is extended to the original purchaser and any succeeding owner for products purchased for home use within the USA. If the product is located in an area where service by a GE Authorized Servicer is not available, you may be responsible for a trip charge or you may be required to bring the product to an Authorized GE Service location for service. In Alaska, the warranty excludes the cost of shipping or service calls to your home.

Some states do not allow the exclusion or limitation of incidental or consequential damages. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. To know what your legal rights are, consult your local or state consumer affairs office or your state's Attorney General.

Warrantor: General Electric Company, Louisville, KY 40225

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As an ENERGY STAR® partner, GE has determined that this product meets the ENERGY STAR® guidelines for energy efficiency.

Write the model and serial numbers here:

Model # _____

Serial # _____

You can find them on a label on the side of the washer.

Owner's Manual & Installation Instructions

- PFWS4605
- PFWS4600
- PFWH4405
- PFWH4400

Laveuses Profile

Manuel d'utilisation et d'installation

La section française commence à la page 30

Lavadoras Profile

Manual del propietario e instalación

La sección en español empieza en la página 55

IMPORTANT SAFETY INFORMATION. READ ALL INSTRUCTIONS BEFORE USING.

⚠ WARNING! For your safety, the information in this manual must be followed to minimize the risk of fire or explosion, electric shock, or to prevent property damage, personal injury or loss of life.

The instructions in this manual and all other literature included with this washer are not meant to cover every possible condition and situation that may occur. Good, safe practices and caution **MUST** be applied when installing, operating and maintaining any appliance.



WATER HEATER SAFETY

Under certain conditions, hydrogen gas may be produced in a water heater that has not been used for two weeks or more. Hydrogen gas can be explosive under these circumstances.

If the hot water has not been used for two weeks or more, prevent the possibility of damage or injury by turning on all hot water faucets and allowing them to run for several minutes. Do this before using any electrical appliance which is connected to the hot water system. This simple procedure will allow any built-up hydrogen gas to escape. Since the gas is flammable, do not smoke or use an open flame or appliance during this process.



PROPER INSTALLATION

This washer must be properly installed and located in accordance with the Installation Instructions before it is used.

- Install or store where it will not be exposed to temperatures below freezing or exposed to the weather, which could cause permanent damage and invalidate the warranty.
- Properly ground washer to conform with all governing codes and ordinances. Follow details in Installation Instructions.



YOUR LAUNDRY AREA

- Keep the area underneath and around your appliances free of combustible materials such as lint, paper, rags and chemicals.
- Do not leave the washer door open. An open door could entice children to hang on the door or crawl inside the washer.
- Close supervision is necessary if this appliance is used by or near children. Do not allow children to play on, with or inside this or any other appliance.



WHEN USING THE WASHER

Use this appliance only for its intended purpose as described in this Owner's Manual.

- Never reach into washer while it is moving. Wait until the machine has completely stopped before opening the door.
- Do not mix chlorine bleach with ammonia or acids such as vinegar and/or rust remover. Mixing different chemicals can produce a toxic gas which may cause death.
- Do not wash or dry articles that have been cleaned in, washed in, soaked in or spotted with combustible or explosive substances (such as wax, oil, paint, gasoline, degreasers, dry-cleaning solvents, kerosene, etc.) which may ignite or explode. Do not add these substances to the wash water. Do not use or place these substances around your washer or dryer during operation.
- The laundry process can reduce the flame retardancy of fabrics. To avoid such a result, carefully follow the garment manufacturer's wash and care instructions.
- To minimize the possibility of electric shock, unplug this appliance from the power supply or disconnect the washer at the building's distribution panel by removing the fuse or switching off the circuit breaker before attempting any maintenance or cleaning. NOTE: Pressing the power button does NOT disconnect the appliance from the power supply.
- Never attempt to operate this appliance if it is damaged, malfunctioning, partially disassembled, or has missing or broken parts, including a damaged cord or plug.
- Do not slam the washer door closed. Do not try to force the door open when locked (LOCKED indicator ON). This could result in damage to the washer.
- The washer is equipped with an electrical overload protector. The motor will stop if it becomes overheated. The washer will automatically restart after a cool-down period of up to 2 hours, if the washer has not been manually turned off during this time.



WHEN NOT IN USE

- Turn off water faucets to relieve pressure on hoses and valves and to minimize leakage if a break or rupture should occur. Check the condition of the fill hoses; they should be replaced every 5 years.
- Before discarding a washer, or removing it from service, remove the washer door to prevent children from hiding inside.
- Do not attempt to repair or replace any part of this appliance unless specifically recommended in this Owner's Manual, or in published user-repair instructions that you understand and have the skills to carry out.
- Do not tamper with controls.



**READ AND FOLLOW THIS SAFETY INFORMATION CAREFULLY.
SAVE THESE INSTRUCTIONS**

About the washer control panel.

You can locate your model number on a label on the side of the washer.

⚠ WARNING! To reduce the risk of fire, electric shock, or injury to persons, read the IMPORTANT SAFETY INSTRUCTIONS before operating this appliance.

Quick Start

If the screen is dark, press the POWER button to “wake up” the display.

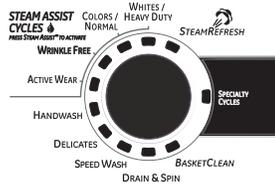
1 Press the POWER button.



3 If you selected a cycle other than the SPECIALTY CYCLE, press the START/PAUSE button.

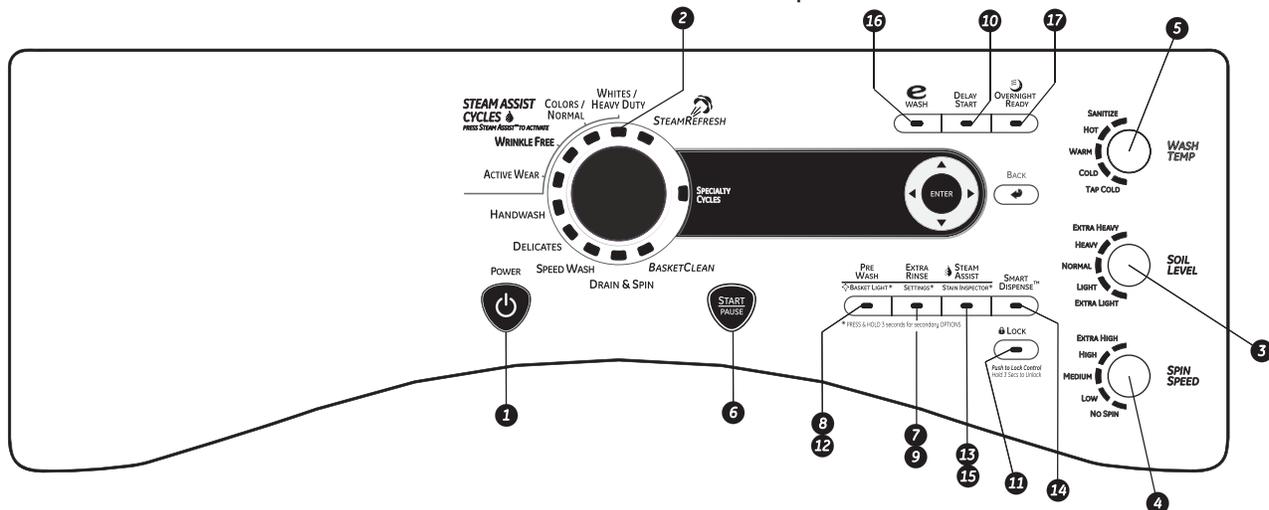


2 Select a wash cycle or Steam Refresh cycle. (Defaults are set for each cycle. These default settings can be changed. See Control settings for more information.)

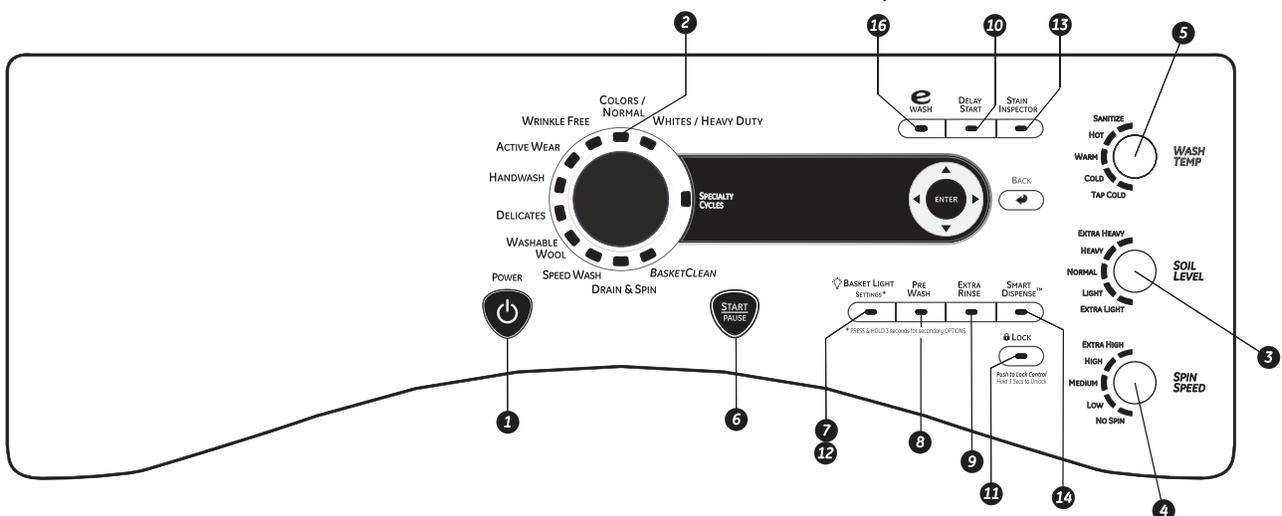


If you selected SPECIALTY CYCLE, choose between Rinse and Spin, Garments, Bed and Bath, and Other Specialty for your specific needs before pressing START/PAUSE. See specialty cycles for more information."

PFWS4600, PFWS4605 – Profile HA Steam Washer w/ SmartDispense™



PFWH4400, PFWS4405 – Profile HA Washer w/o Steam, w/ SmartDispense™



1 Power
Press to “wake up” the display. If the display is active, press to put the washer into standby mode. NOTE: Pressing POWER does not disconnect the appliance from the power supply.

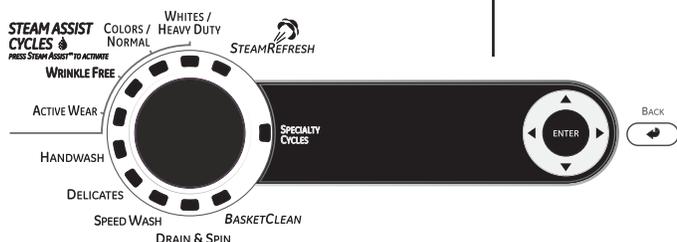
2 Wash Cycles

The wash cycles are optimized for specific types of wash loads. The chart below will help you match the wash setting with the loads. The GentleClean™ lifters lightly tumble the clothes into the water and detergent solution to clean the load.

WHITES/HEAVY DUTY	For heavily to lightly soiled white cottons, household linens, work and play clothes. Can use the STEAM ASSIST option with this cycle.
COLORS/NORMAL	For heavy to lightly soiled colorfast cottons, household linens, work and play clothes. Can use the STEAM ASSIST option with this cycle.
WRINKLE FREE (PERMA PRESS)	For heavy soiled colorfast cottons, household linens, work and play clothes.
STEAM REFRESH (some models)	To de-wrinkle 1 to 5 cotton blend items. This is not a wash cycle, but a cycle that applies only steam to the garments. Select the correct number of garments using the arrow keys and press Enter. The washer will beep upon completion of the cycle, and will continue to tumble for 30 minutes to keep wrinkles from setting in. Press Start/Pause to remove clothes. If clothes are slightly damp after completion of the cycle, hang dry clothes for 10 minutes before wearing.
HANDWASH	For items labeled hand-washable with light soils. Provides gentle rocking to mimic the handwashing action.
DELICATES	For lingerie and special-care fabrics with light to normal soil. Provides gentle tumbling and soak during wash and rinse.
ACTIVE WEAR	For active sports, exercise and some casual wear clothes. Fabrics include modern technology finishes and fibers such as spandex, stretch and micro-fibers.
WASHABLE WOOL (some models)	For the washing of machine washable wool products, provided that they are washed according to the instructions on the garment label. When selecting this cycle, you must use a detergent suitable for washing wool.
SPEED WASH	For lightly soiled items that are needed in a hurry. Cycle time is approximately 30 minutes, depending on selected options.
DRAIN & SPIN	To quickly drain and spin out any items at any time.
BASKET CLEAN	Use for cleaning the basket of residue and odor. Recommended use of once per month.
SPECIALTY CYCLES	For unique garments that may need special treatment.

Specialty Cycles

Rinse & SPIN	GARMENTS	BED and BATH	SPECIALIZED CYCLES
Quickly rinse out any items at any time.	Coats Dress Shirts Hosiery/Bras Jeans Khakis Sweaters	Blankets (cotton) Comforters Sheets Towels	Athletic Shoes Energy Savings Fabric Refresh Fleece Fragile Cottons Performance Fabrics Pet Bedding Play Clothes Single Item Wash Sleeping Bag Soak Super Clean Throw Rugs



While in the Specialty Cycle, use the ▲ and ▼ arrow keys to scroll between the different options. Press ENTER to select the cycle. Press BACK to go to the previous menu.

Control settings.

- 3 Soil Level**
 Changing the SOIL LEVEL increases or decreases the wash time to remove different amounts of soil. To change the SOIL LEVEL, press the SOIL LEVEL button until you have reached the desired setting. You can choose between Extra Light, Light, Normal, Heavy or Extra Heavy soil.
- 4 Spin Speed**
 Changing the SPIN SPEED changes the final spin speed of the cycles. Always follow the garment manufacturer's care label when changing the SPIN SPEED. To change the SPIN SPEED, press the SPIN SPEED button until you have reached the desired setting. You can choose between No Spin, Low, Medium, High or Extra High Spin. Higher spin speeds are not available on certain cycles, such as Delicates. Higher spin speeds remove more water from the clothes and will help reduce dry time, but may also increase the possibility of setting wrinkles on some fabrics.
- 5 Wash Temp**
 Adjust to select the proper water temperature for the wash cycle. The prewash and rinse water is always cold to help reduce energy usage and reduce setting of stains and wrinkles. Follow the fabric manufacturer's care label when selecting the wash temperature. To change the wash temperature, press the WASH TEMP button until you have reached the desired setting. You can choose between Tap Cold, Cold, Warm, Hot or Sanitize. The Sanitized wash temperature is not available on certain cycles, such as Delicates. When selecting the Sanitize wash temperature, the washer increases the water temperature to sanitize and kill more than 99% of many common bacteria found in home laundry. The sanitize wash temperature is only available on the Whites/Heavy Duty wash cycle. For best results, select the heavy soil setting when using the Sanitize wash temperature setting. NOTE: The first 10 seconds of the wash fill is always cold. This feature assists in conditioning the fabric and preventing stains from setting on garments.

- 6 START/PAUSE**
 Press to start a wash cycle. If the washer is running, pressing it once will pause the washer and unlock the door. It will take a few seconds for the door to unlock after pressing PAUSE. Press again to restart the wash cycle. NOTE: If the washer is paused and the cycle is not restarted within 15 minutes, the current wash cycle will be cancelled. NOTE: In some cycles the washer will drain first, then unlock the door when it is paused. NOTE: The washer performs automatic system checks after pressing the START button. Water will flow in 45 seconds or less. You may hear the door lock and unlock before water flows; this is normal.

7

EXTRA RINSE
SETTINGS*



BASKET LIGHT
SETTINGS*



Settings
 Press & hold for 3 seconds for SETTINGS. Use the SETTINGS button to adjust the following features:

Dryer Link:
 Press the SETTINGS button. When "DRYER LINK" appears in the display, press ENTER. Using the ◀/▶ arrow keys, select ON and press ENTER. When the washer cycle is completed, the washer will communicate with the dryer when any button on the control panel is touched or the door is opened. The washer will display, "TRANSFERRING CYCLE INFORMATION TO THE DRYER" and the dryer will display, "RECEIVING CYCLE INFORMATION TO THE DRYER". The dryer will only communicate with the washer if the dryer is not running a cycle. If the washer starts a new cycle before the dryer has a chance to communicate with it, the information will be lost.

End-of-Cycle Volume:
 Press the SETTINGS button. When "VOLUME" appears in the display, press ENTER, then select "End of Cycle". Using the ◀/▶ arrow keys, select High, Medium, Low or Off.

Control Sounds:
 Press the SETTINGS button, then select "Volume". When "CONTROL SOUNDS" appears in the display, press ENTER. Using the ◀/▶ arrow keys, select High, Medium, Low or Off.

Display Brightness:
 Press the SETTINGS button. When "DISPLAY BRIGHTNESS" appears in the display, press ENTER. Using the ◀/▶ arrow keys, select High, Medium or Low.

Water Hardness
 (Selectable only when SMART DISPENSER Pedestal Accessory is connected to washer): This will adjust the amount of detergent dispensed automatically for the SMART DISPENSER. See the Owner's Manual supplied with the SMART DISPENSER for instructions for use.

8



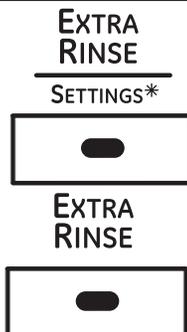
Prewash

Prewash is an extra wash before the main wash. Use it for heavily soiled clothes or for clothes with a care label that recommends prewashing before washing. Be sure to add high-efficiency detergent, or the proper wash additive to the prewash dispenser.

The prewash feature will fill the washer (adding the prewash detergent), tumble the clothes, drain and spin. Then the washer will run the selected wash cycle.

NOTE: In some special cycles, the prewash is selected automatically as the default. You can modify this selection at any time.

9



Extra Rinse

Use an extra rinse when additional rinsing is desired to remove excess dirt and detergent from soiled loads.

NOTE: In some special cycles, the extra rinse is selected automatically as the default. You can modify this selection at any time. Some cycles have additional rinses done automatically.

10



Delay Start

You can delay the start of a wash cycle for up to 24 hours. Press the DELAY START button to choose the number of hours you want to delay the start of the cycle. Use the ▲ and ▼(up and down) arrows to find the desired delay time; then press ENTER to select the delay time. Finally, press the START button after the desired cycle is selected. The machine will count down and start automatically at the correct time.

NOTE: If you forget to fully close the door, a reminder signal will beep reminding you to do so.

NOTE: If you open the door when the delay is counting down, the machine will enter the pause state. You must close the door and press START again in order to restart the countdown.

11



Lock

You can lock the controls to prevent any selections from being made. Or you can lock or unlock the controls after you have started a cycle.

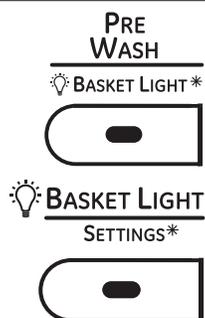
press and hold the LOCK button for 3 seconds. A sound is made to indicate the lock/unlock status.

Children cannot accidentally start the washer by touching pads with this option selected. To lock the washer, press and hold the LOCK button for 3 seconds. To unlock the washer controls,

The control lock icon on the display will light up when it is on.

NOTE: The POWER button can still be used when the machine is locked.

12



BASKET LIGHT

The basket light will turn on and remain on for 5 minutes when the door opens, start/pause button is pressed, or by pressing and holding the basket light button for 3 seconds. The basket light can be turned off by pressing and holding the basket light button for 3 seconds. The basket light can not be turned off while the unit is idle.

Control settings.

13



Stain Inspector

PFWS4600, 4605 Press & hold for 3 seconds for STAIN INSPECTOR.

The STAIN INSPECTOR feature allows you to indicate what stains are on the garments in your load. This feature can be used with any wash cycle.

To use STAIN INSPECTOR:

1. Select the wash cycle.
2. Press the STAIN INSPECTOR button (the button will light up when it is on).
3. Check the wash instructions on your garment.

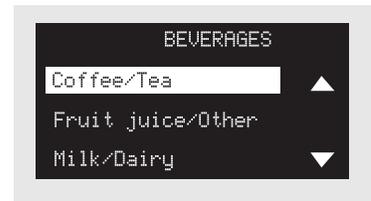


4. Press the ENTER button to continue.

5. Use the ▲ and ▼ arrows to find the desired stain category.



6. Press the ENTER button to select the stain category.
7. Use the ▲ and ▼ arrows to select the desired stain.



You have the following stains available to choose from:

OUTDOOR	COSMETICS	BEVERAGES	FOOD/COOKING
Clay Grass Mud/Dirt Rust Iron Tree Sap	Lipstick/Lip Balm Deodorant Lotions Makeup (water-based) Oil (hair/mineral)	Grape Juice Coffee/Tea Fruit Juice Other Milk/Dairy Wine (red/white)	Butter/Margarine Cooking/Vegetable Oil Chocolate Tomato Based Barbecue Sauce

PERSONAL	SCHOOL/OFFICE/HOME	LAUNDRY	OIL/GREASE/WAX
Blood Perspiration Urine/Feces Mouthwash Vomit	Adhesive Tape Ballpoint Ink Glue (white common) Pencil Mark Correction Fluid	Dingy White Socks Collar/Cuff Soil Dye Transfer Fabric Softener Yellowing	Motor Oil/Lube Ointment/Salve Candle Wax Crayon Chapstick™

8. Press the ENTER button to select the stain.
9. Your selected stain will appear on the display.
10. Press the START button to start the cycle.

NOTE: To turn off STAIN INSPECTOR or to select a different stain, press the STAIN INSPECTOR button again.

NOTE: Prewash is selected automatically as the default for some stains. When selected automatically, the PREWASH button will light. For optimum stain removal, it is recommended to add high-efficiency detergent or proper wash additive to the prewash dispenser. You can turn off the prewash option if you do not want to add the prewash to the cycle.

14

SMART
DISPENSE™



SMART DISPENSE™ - optional accessory (on some models)

If you have purchased the PROFILE SMART DISPENSE System, refer to the Owner's Manual that comes with the SMART DISPENSE System.

If you have not purchased the PROFILE SMART DISPENSE System, you will not have bulk-dispensing capability. If you select the SMART DISPENSE option, a message will be displayed advising that your unit does not have the capability. You should then put

detergent and other selected additive in the flow-through dispenser drawer located at the top left of the unit. To purchase the PROFILE SMART DISPENSE System, go online to GEAppliances.com or contact your local retailer.

15

STEAM
ASSIST
STAIN INSPECTOR*



STEAM ASSIST (on some models)

STEAM ASSIST adds steam into the washer during WHITES/HEAVY DUTY, COLORS/NORMAL, WRINKLE FREE or ACTIVE WEAR cycles.

To use:

1. Turn power ON and select a wash cycle.
The STEAM ASSIST option is only available on WHITES/HEAVY DUTY, COLORS/NORMAL, WRINKLE FREE or ACTIVE WEAR cycles.

2. Select the STEAM ASSIST button to activate Steam.
3. Press the START/PAUSE button.

16

e
WASH



ENERGY SAVINGS WASH

Use "e" WASH to save energy on specified wash cycles. "e" WASH cannot be used with STEAM REFRESH, ENERGY SAVING, ATHLETIC SHOES, BASKET CLEAN, and WASH CARE w/ SOAK.

17

OVERNIGHT
READY



OVERNIGHT READY

(on some models)

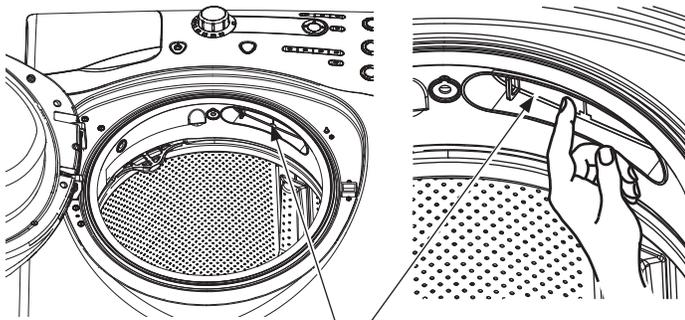
OVERNIGHT READY is intended for smaller loads only. This feature is intended for use when clothes need to be washed and ready to hang or finished the next morning. This feature will tumble clothes and introduce a constant stream of air into the machine compartment upon completion of select wash cycles. Clothes can be removed at any time by pressing pause. To use the feature, press the Overnight Ready button and follow the prompts on the screen. After use, check the lint filter located at the top of the rubber

door gasket, cleaning as needed. High wear or delicate articles are not recommended for this cycle.

The table below describes example loads that can be used with this feature:

2-3 athletic uniforms
2 sets of scrubs
2 sets of baby's crib sheets
1 dress shirt, 1 pair of dress pants
3 dress shirts

Control settings.



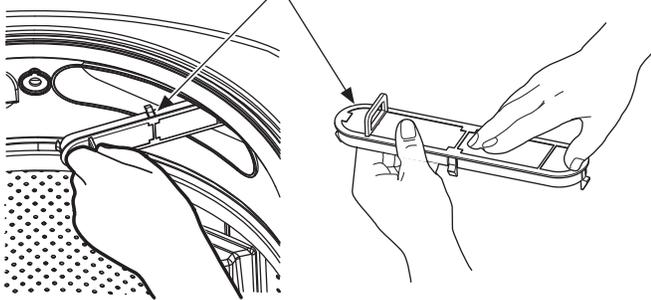
CLEANING OVERNIGHT READY LINT FILTER

(on some models)

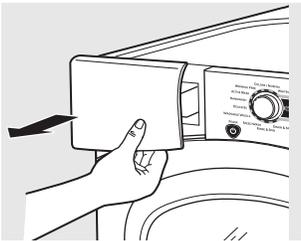
The filter is located in the top right portion of the washer gasket. For best performance, clean this filter after every Overnight Ready cycle by running your fingers over the filter to remove lint.

For further cleaning, the filter can be removed by pulling forward on the tab. Replace the filter after cleaning.

Overnight Ready Lint Filter



About the washer features.



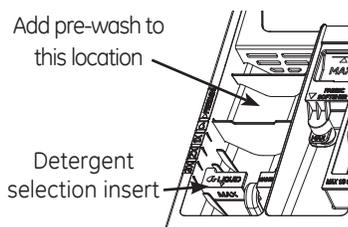
The Dispenser Drawer

Slowly open the dispenser drawer by pulling it out until it stops.

After adding laundry products, slowly close the dispenser drawer. Closing the drawer too quickly could result in early dispensing of the bleach, fabric softener or detergent.

You may see water in the bleach and fabric softener compartments at the end of the cycle. This is a result of the flushing/siphoning action and is part of the normal operation of the washer.

Use only HE High-Efficiency detergent.



The Prewash Compartment

■ Only use the Prewash Compartment if you are selecting the Prewash cycle for heavily soiled clothes. Add measured detergent or prewash additive to the back left prewash compartment of the dispenser drawer.

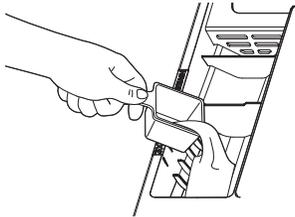
■ Detergent or prewash additive is flushed from the dispenser in the prewash cycle (if selected).

NOTE: Liquid detergent will drain into the washer basket as it is added.

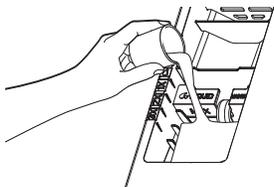
■ Detergent usage may need to be adjusted for water temperature, water hardness, size and soil level of the load. Avoid using too much detergent in your washer as it can lead to over sudsing and detergent residue being left on the clothes.



Adjustment Rails



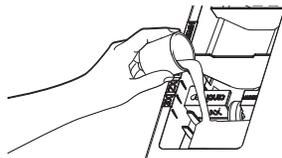
For HE powder detergent remove the Detergent selection insert and add powder here



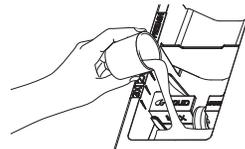
For HE liquid detergent that is non-concentrated, place the insert in the "1X" position

The Detergent Compartment

- **Only use high-efficiency detergent in this washer. DO NOT fill high-efficiency detergent over the MAX line. Use detergent manufacturer's recommended amount.**
- Powder Detergent – Remove the Detergent selection insert and place it in a safe location outside of the washer. Follow the detergent manufacturer's instructions when measuring the amount of powder to use.
- Liquid Detergent – Locate the concentration of your detergent on the bottle. Place the Detergent selection insert in the corresponding location depending on the concentration.
- Move the insert by pulling it up and replace it by sliding it down between two detergent compartment rails. Make sure to push the insert to the bottom of the compartment so that it is flush to the bottom of the compartment. It is not an issue if the detergent leaks past the insert to the back of the compartment.
- Detergent usage may need to be adjusted for water temperature, water hardness, size and soil level of the load. Avoid using too much detergent in your washer as it can lead to oversudsing, detergent residue being left on the clothes, and could extend wash times.
- Do not put clumped detergent in the dispenser. Clumped detergent can cause a leak.



For HE 2X liquid detergent, place the insert in the "2X" position



For HE 3X liquid detergent, place the insert in the "3X" position



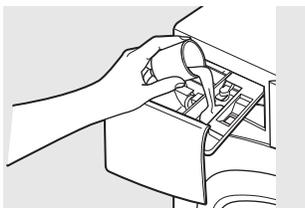
The Liquid Bleach Compartment

If desired, measure out the recommended amount of liquid bleach, not to exceed 1/3 cup (80 ml) and pour into the center compartment labeled "LIQUID BLEACH" marked with this symbol .

It is recommended to use High-Efficiency (HE) bleach in this front-load washer.

Do not exceed the maximum fill line. Overfilling can cause early dispensing of the bleach which could result in damaged clothes.

NOTE: Do not use powdered bleach in the dispenser.



The Fabric Softener Compartment

If desired, pour the recommended amount of liquid fabric softener into the compartment labeled "FABRIC SOFTENER."

Use only liquid fabric softener in the dispenser. Dilute with water to the maximum fill line.

Do not exceed the maximum fill line. Overfilling can cause early dispensing of the fabric softener, which could stain clothes.

NOTE: Do not pour fabric softener directly on the wash load.

Loading and using the washer.

Always follow fabric manufacturer's care label when laundering.



Sorting Wash Loads

Colors	Soil	Fabric	Lint
Whites	Heavy	Delicates	Lint Producers
Lights	Normal	Easy Care	Lint Collectors
Darks	Light	Sturdy Cottons	

- Combine large and small items in a load. Load large items first. Large items should not be more than half the total wash load.
- Washing single items is not recommended. This may cause an out-of-balance load. Add one or two similar items.
- Pillows and comforters should not be mixed with other items. This may cause an out-of-balance load.
- Sort dark-colored clothes from light-colored clothes to prevent dye transfer. This is a high-efficiency washer, so it uses less water, making dye transfer more common.



Loading the Washer

The wash drum may be fully loaded with loosely added items. Do not wash garments containing flammable materials (waxes, cleaning fluids, etc.).

To add items after the washer has started, press START/PAUSE and wait until the door is unlatched. The washer may take up to 30 seconds to unlock the door after pressing START/PAUSE, depending on the machine conditions. Do not try to force the door open when it is locked. After the door unlocks, open gently. Add items, close the door and press START/PAUSE to restart.

Loading Examples*

WORKWEAR	LINENS	MIXED LOAD	DELICATES*	SPEED WASH (2-4 GARMENTS)
4 Jeans 5 Work Wear Shirts 5 Work Wear Pants	2 Bath Sheets 10 Bath Towels/ 12 Washcloths 7 Hand Towels/ 2 Terrycloth Bath Mats OR 2 Flat Queen-Sized Sheets 2 Fitted Queen-Sized Sheets 4 Pillowcases	4 Pillowcases 2 Hand Towels 2 Flat Sheets/ 2 Fitted Sheets 2 Bath Towels/ 4 Washcloths OR 6 Shirts (Men's or Women's) 4 Pair Pants (Khakis or Twills) 5 T-shirts 7 Pairs of Boxers 4 Pairs of Shorts OR 6 T-shirts 4 Pairs of Sweatpants 4 Sweatshirts 2 Hoodies 7 Pairs of Socks	7 Bras 7 Panties 3 Slips 2 Camisoles 4 Nightgowns *Using a nylon mesh bag for small items is recommended.	2 Casual Wear Work Shirts 1 Pair Casual Wear Work Pants OR 3 Soccer Uniforms

*Using a nylon mesh bag for small items is recommended.

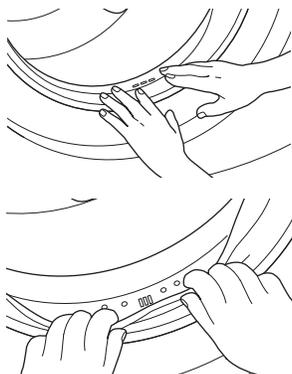
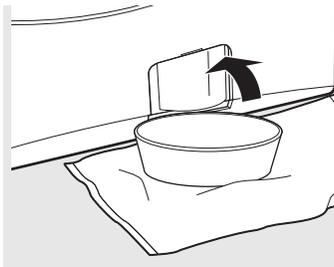
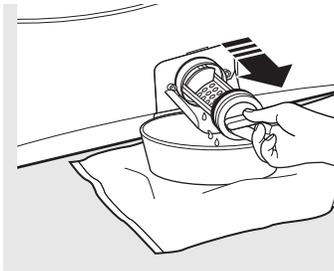
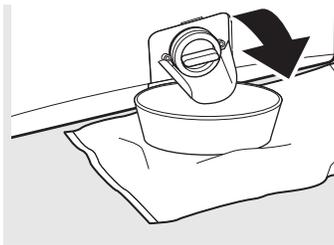
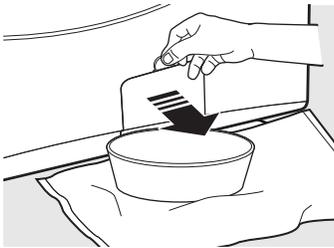
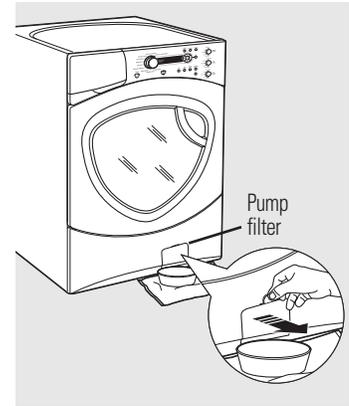


Care and Cleaning/General Maintenance

Cleaning the Pump Filter

Due to the nature of the front-load washer, it is sometimes possible for small articles to pass to the pump. The washer has a filter to capture lost items so they are not dumped to the drain. To retrieve lost items, clean out the pump filter.

1. Using a small flathead screwdriver, open the access door.
2. Place a shallow pan or dish under the pump access door and towels on the floor in front of the washer to protect the floor. It is normal to catch about a cup of water when the filter is removed.
3. Pull down the pour spout.
4. Turn the pump filter counterclockwise and remove the filter slowly, controlling the flow of the draining water.
5. Remove the filter and clean the debris from the filter.
6. Replace the filter and turn clockwise. Tighten securely.
7. Flip up the pour spout.
8. Close the access door by hooking the bottom tabs first, then rotating the access door shut.



Cleaning the Door Gasket

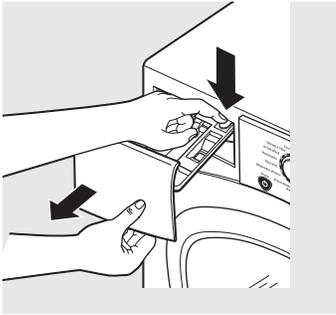
Open the washer door. Using both hands, press down the door gasket. Remove any foreign objects if found trapped inside the gasket. Make sure there is nothing blocking the holes behind the gasket.

While holding down the door gasket, inspect the interior gasket by pulling it down with your fingers. Remove any foreign objects if found trapped inside this gasket. Make sure there is nothing blocking the holes behind the gasket.

When you are finished cleaning the door gasket, remove your hands and the gaskets will return to the operating position.

Loading and using the washer.

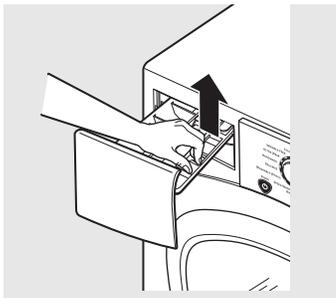
Always follow fabric manufacturer's care label when laundering.



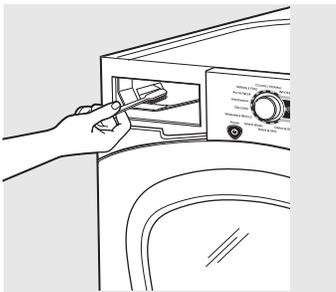
Lock tab is visible only after drawer has been pulled out

Dispenser Drawer Area: Detergent and fabric softener may build up in the dispenser drawer. Residue should be removed once or twice a month.

- Remove the drawer by first pulling it out until it stops. Then reach back into the right rear corner of the drawer cavity and press down firmly on the lock tab, pulling out the drawer.



- Remove the insert from the bleach and fabric softener compartments and the detergent insert. Rinse the inserts and the drawer with hot water to remove traces of accumulated laundry products.



- To clean the drawer opening, use a small brush to clean the recess. Remove all residue from the upper and lower parts of the recess.
- Return inserts to the proper compartments. Replace the dispenser drawer.

- To reduce buildup in the Dispenser Drawer area:

Use only HE
High-Efficiency
detergent.





Fabric Care Labels

Below are fabric care label "symbols" that affect the clothing you will be laundering.

WASH LABELS

Machine wash cycle						
	Normal	Permanent Press/ wrinkle resistant	Gentle/ delicate	Hand wash	Do not wash	Do not wring
Water temperature						
	Hot (50°C/120°F)			Warm (40°C/105°F)		Cold/cool (30°C/85°F)

BLEACH LABELS

Bleach symbols			
	Any bleach (when needed)	Only non-chlorine bleach (when needed)	Do not bleach

DETERGENT LABELS

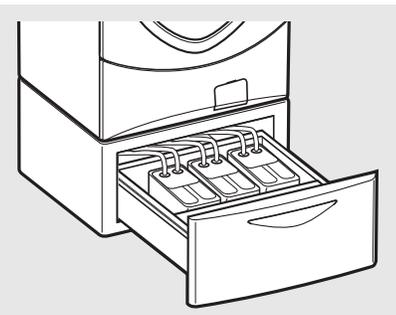
	Use only HE High-Efficiency detergent.
--	--

Available accessories.



Pedestal

There is a pedestal available for your washer. This pedestal gives the washer more height and gives storage for your washing necessities. Included with the pedestal is a divider that allows you to store liquid laundry detergent out of sight. See the pedestal installation instructions.



Profile Smart Dispense System

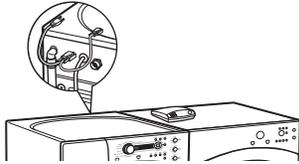
The Profile SMART DISPENSE System lets you store laundry detergent and fabric softener to be dispensed automatically during the wash and rinse cycles of this washer. NO BLEACH may be used in this dispense system. See the Owner's Manual that is included with the Profile SMART DISPENSE System for installation instructions.

Models PFWS4600/5 AND 4400/5 are compatible with the GE Smart Appliance Module (SAM) which can be purchased separately. Contact your local utility or visit www.GEAppliances.com/smart-appliances to see if your area is using Demand Response (SAM) technology.

INSTALLATION

The preferred location for the module installation is on top of the clothes dryer.

Details on how to connect the cables to the module are in the instructions that come with the module.



Wait 5 minutes; then press the Settings button. Scroll and look for the energy management screen as seen below.



This screen means the module is attached correctly and you can begin to use your Smart appliance following the instructions below.

If the Energy Management Screen is not available, refer to the SAM module troubleshooting guide.

QUICK GUIDE

There are 4 power levels available: Critical, High, Normal and Low. On the Normal and Low levels, the unit runs as normal. The following steps show how the unit reacts during startup at Critical and High power levels.

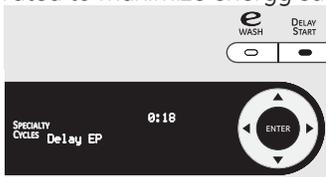
Option 1 (Delay EP)

During startups at Critical and High levels, the unit will delay starting until the level becomes Medium or Low. Press the START/PAUSE button.

Option 2 (Override Delay EP)

When Delay EP is shown, the delay function can be overridden by pressing the DELAY START button. Pressing the START/PAUSE key will begin the selected cycle with "e" WASH enabled. The "e" WASH indicator will be illuminated.

During a Critical Rate period, the Critical Response Mode** will also be activated to maximize energy savings. EP will be displayed.



Option 3 (Override "e" WASH)

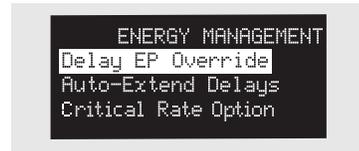
After overriding the delay function, pressing the "e" WASH button will disable the "e" WASH setting. Pressing the START/PAUSE key will begin the selected cycle.

During a Critical Rate period, the Critical Response Mode** will be activated to maximize energy savings. EP will be displayed.

**Note: The Critical Response Mode can be disabled at any time by pressing and holding the "e" WASH Button for 3 seconds. EP will be removed from the display

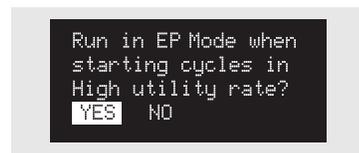
SETTINGS MENU

Press SETTINGS; then select Energy Management.



Delay EP Override

This option allows your smart washer to automatically engage the "e" WASH setting when overriding a Delay EP and starting a cycle during a Critical or High Rate period. The default setting is YES.



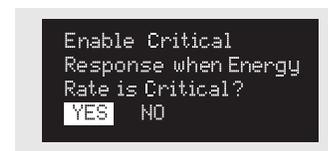
Auto-Extend Delays

If a timed delay is selected, this option allows for the scheduled start to extend if the utility rate is Critical or High at the scheduled start. The default setting will automatically extend these cycles.



Critical Rate Option

This option allows your smart appliance to respond to Critical Rate information by automatically engaging the Critical Response Mode. The Critical Response Mode is designed to maximize energy savings when a cycle is run during a Critical Rate period. The default setting is YES. Setting this option to NO will disable the Critical Response Mode.



In order for the demand response features on the appliance to work, additional equipment is required to be installed to interface with the local utility. Such equipment may be sold separately and/or is available through your utility as part of the pilot test program. Check with your utility company to see if a pilot test program is available in your area and for full details.

PLEASE NOTE: If you move to an area where the program is not available, the demand response features cannot be activated and utilized on the appliance. The appliance will function as normal after the demand response equipment has been deactivated or disconnected.

Installation Instructions

Washer

PFWS4605, PFWS4600
PFWH4405, PFWH4400

If you have any questions, call 800.GE.CARES (800.432.2737)
or visit our Website at: GEAppliances.com
In Canada, call 1.800.561.3344 or visit www.GEAppliances.ca

BEFORE YOU BEGIN

Read these instructions completely and carefully.

- **IMPORTANT** – Save these instructions for local inspector's use.
- **IMPORTANT** – Observe all governing codes and ordinances.
- **Note to Installer** – Be sure to leave these instructions with the Consumer.
- **Note to Consumer** – Keep these instructions for future reference.
- **Skill level** – Installation of this appliance requires basic mechanical and electrical skills.
- **Completion time** – 1-3 hours
- Proper installation is the responsibility of the installer.
- Product failure due to improper installation is not covered under the Warranty.

FOR YOUR SAFETY:

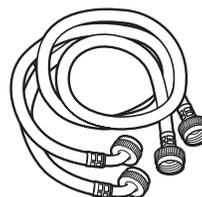
WARNING

- This appliance must be properly grounded and installed as described in these Installation Instructions.
- Do not install or store appliance in an area where it will be exposed to water/weather. See Location of Your Washer section.
- **NOTE: This appliance must be properly grounded, and electrical service to the washer must conform with local codes and ordinances and the latest edition of the National Electrical Code, ANSI/NFPA 70.**

TOOLS REQUIRED FOR WASHER INSTALLATION

- 1/4" nut driver
- 3/8" socket with ratchet
- 3/8" open-end wrench
- Adjustable wrench or 7/16" socket with ratchet
- Adjustable wrench or 9/16" open-end wrench
- Channel-lock adjustable pliers
- Carpenter's level

PARTS SUPPLIED



- Water Hoses (2)



- Cable Tie

Installation Instructions

LOCATION OF YOUR WASHER

Do Not Install the Washer:

1. In an area exposed to dripping water or outside weather conditions. The ambient temperature should never be below 60°F (15.6°C) for proper washer operation.
2. In an area where it will come in contact with curtains or drapes.
3. On carpet. The floor **MUST** be a hard surface with a maximum slope of 1/2" per foot (1.27 cm per 30 cm). To make sure the washer does not vibrate or move, you may have to reinforce the floor.

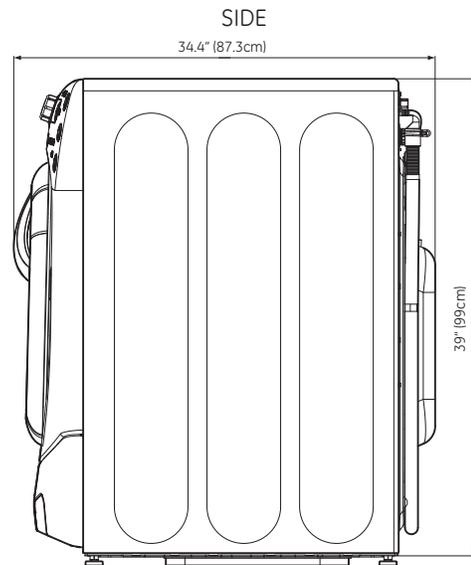
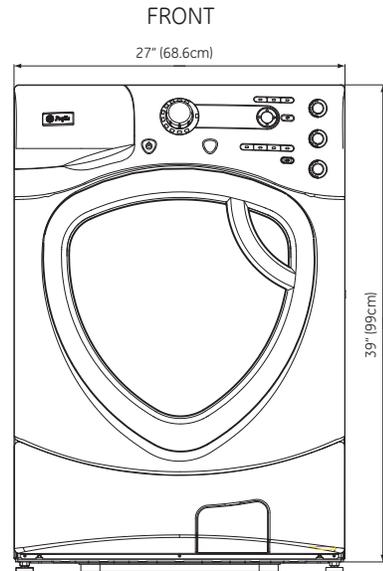
NOTE: If floor is in poor condition, use 3/4" impregnated plywood sheet solidly attached to existing floor covering.

IMPORTANT:

Minimum Installation Clearances

- When installed in alcove: Sides, Rear, Top = 0" (0 cm)
- When installed in closet: Sides, Rear, Top = 0" (0 cm), Front = 1" (2.54 cm)
- Closet door ventilation openings required: 2 louvers each 60 square in. (387 cm²), located 3" (7.6 cm) from top and bottom of door

ROUGH-IN DIMENSIONS



***NOTE:**

With Washer Legs: 40.5" (102.5 cm)
(0.75" adjustability)

With Pedestal: 53.75" (136.6 cm)
(0.75" adjustability)

Stacked: 82.75" (209.8 cm)

Installation Instructions

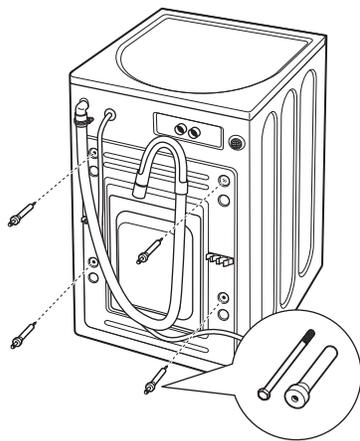
UNPACKING THE WASHER

⚠ WARNING: Recycle or destroy the carton and plastic bags after the washer is unpacked. Make materials inaccessible to children. Children might use them for play. Cartons covered with rugs, bedspreads or plastic sheets can become airtight chambers causing suffocation.

1. Cut and remove the top and bottom packaging straps.
2. While it is in the carton, carefully lay the washer on its side. **DO NOT** lay the washer on its front or back.
3. Turn down the bottom flaps—remove all base packaging, including the cardboard, styrofoam base and styrofoam tub support (inserted in center of base). Save the stacking brackets located on the styrofoam pad that covered the top of the washer.

NOTE: If you are installing a pedestal, proceed to the installation instructions that come with the pedestal.

4. Carefully return the washer to an upright position and remove the carton.
5. Carefully move the washer to within 4 feet (122 cm) of the final location.
6. Remove the following from the back side of the washer:
 - 4 bolts
 - 4 plastic spacers (including rubber grommets)
 - 4 power cord retainers
7. Remove the shipping bolt. Insert plug into shipping bolt hole.



NOTE: Failure to remove the shipping braces can cause the washer to become severely unbalanced.

Save all bolts for future use.

NOTE: If you must transport the washer at a later date, you must reinstall the shipping support hardware to prevent shipping damage. Keep the hardware in the plastic bag provided.

ELECTRICAL REQUIREMENTS

Read these instructions completely and carefully.

⚠ WARNING—TO REDUCE THE RISK OF FIRE, ELECTRICAL SHOCK AND PERSONAL INJURY:

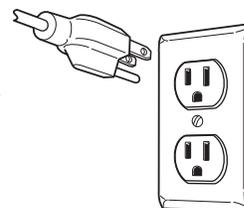
- **DO NOT USE AN EXTENSION CORD OR AN ADAPTER PLUG WITH THIS APPLIANCE.**

Washer must be electrically grounded in accordance local codes and ordinances, or in the absence of local codes, in accordance with the NATIONAL ELECTRICAL CODE, ANSI/NFPA NO. 70.

CIRCUIT – Individual, properly polarized and grounded 15-amp branch circuit fused with 15-amp time-delay fuse or circuit breaker.

POWER SUPPLY – 2-wire, with ground, 120-volt, single-phase, 60-Hz, Alternating Current.

OUTLET RECEPTACLE – Properly grounded 3-prong receptacle to be located so the power supply cord is accessible when the washer is in an installed position.



GROUNDING REQUIREMENTS

⚠ WARNING: Improper connection of the equipment grounding conductor can result in a risk of electrical shock. Check with a licensed electrician if you are in doubt as to whether the appliance is properly grounded.

1. The washer **MUST** be grounded. In the event of malfunction or breakdown, grounding will reduce the risk of electrical shock by providing a path of least resistance for electrical current.
2. Since your washer is equipped with a power supply cord having an equipment-grounding conductor and a grounding plug, the plug **MUST** be plugged into an appropriate, copper-wired receptacle that is properly installed and grounded in accordance with all local codes and ordinances or in the absence of local codes, with the National Electrical Codes, ANSI/NFPA 70 (latest edition). If in doubt, call a licensed electrician. **DO NOT** cut off or alter the grounding prong on the power supply cord. In situations where a two-slot receptacle is present, it is the owner's responsibility to have a licensed electrician replace it with a **properly grounded** three-prong grounding-type receptacle.

Installation Instructions

WATER SUPPLY REQUIREMENTS

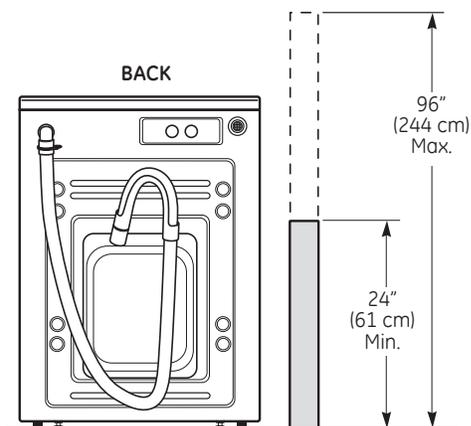
Hot and cold water faucets **MUST** be installed within 42 inches (107 cm) of your washer's water inlet. The faucets **MUST** be 3/4" (1.9 cm) garden hose-type so inlet hoses can be connected. Water pressure **MUST** be between 10 and 120 pounds per square inch. Your water department can advise you of your water pressure. The hot water temperature should be set to deliver water at 120° to 140°F (48°–60°C) to provide proper Automatic Temperature Control (ATC) performance.

NOTE: A water softener is recommended to reduce buildup of scale inside the steam generator if the home water supply is very hard.

DRAIN REQUIREMENTS

1. Drain capable of eliminating 17 gals (64.3 L) per minute.
2. A standpipe diameter of 1 1/4" (3.18 cm) minimum.
3. The standpipe height above the floor should be:

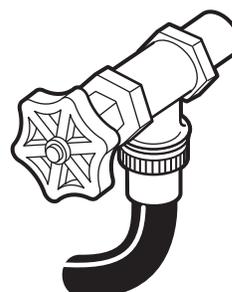
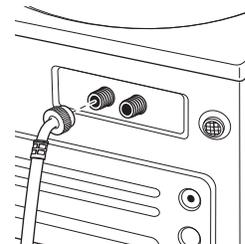
Minimum height: 24" (61 cm)
Maximum height: 96" (244 cm)



NOTE: The drain hose attached to the washer can reach a 58" (147 cm) high standpipe. For a higher standpipe, contact an authorized parts distributor.

INSTALLING THE WASHER

1. Run some water from the hot and cold faucets to flush the water lines and remove particles that might clog the water valve screens.
2. Remove the inlet hoses from the plastic bag.
3. (90° elbow end) Carefully connect the inlet hose marked HOT to the outside "H" outlet of the water valve. Tighten by hand, then tighten another 2/3 turn with pliers. Carefully connect the other inlet hose to the inside "C" outlet of the water valve. Tighten by hand; then tighten another 2/3 turn with pliers. **Do not crossthread or over-tighten these connections.**
4. Connect the inlet hose ends to the HOT and COLD water faucets tightly by hand, then tighten another 2/3 turn with pliers. Turn the water on and check for leaks.



5. Carefully move the washer to its final location. Gently rock the washer into position. It is important not to damage the rubber leveling legs when moving your washer to its final location. Damaged legs can increase washer vibration. It may be helpful to spray window cleaner on the floor to help move your washer into its final position.

NOTE: To reduce vibration, ensure that all four rubber leveling legs are firmly touching the floor. Push and pull on the back right and then back left of your washer.

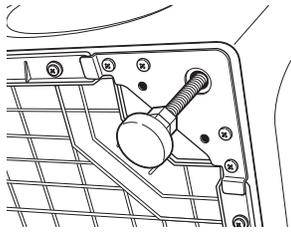
NOTE: Do not use the dispenser drawer or door to lift the washer.

NOTE: If you are installing into a drain pan, you can use a 24-inch long 2x4 to lever the washer into place.

Installation Instructions

INSTALLING THE WASHER (cont.)

6. With the washer in its final position, place a level on top of the washer (if the washer is installed under a counter, the washer should not be able to rock). Adjust the front leveling legs up or down to ensure the washer is resting solidly. Turn the lock nuts on each leg up toward the base of the washer and snug with a wrench.

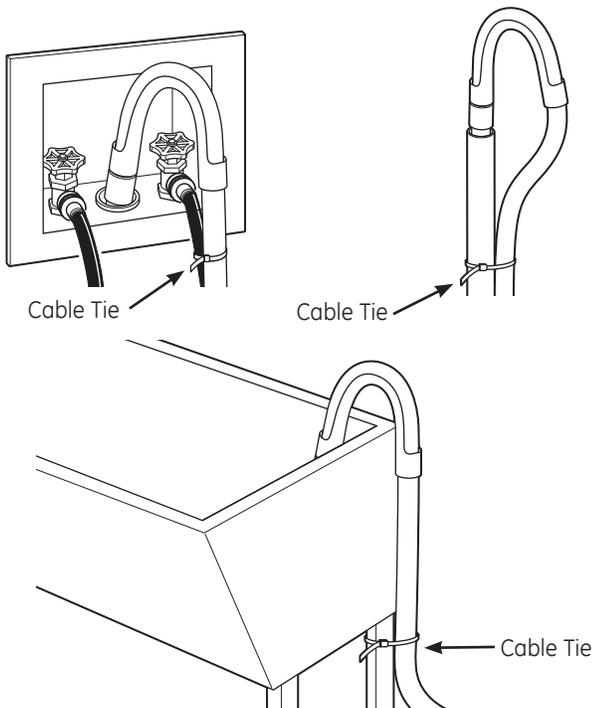


NOTE: Keep the leg extension at a minimum to prevent excessive vibration. The farther out the legs are extended, the more the washer will vibrate.

If the floor is not level or is damaged, you may have to extend the rear leveling legs.

7. Attach U-shaped hose guide to the end of the drain hose. Place the hose in a laundry tub or standpipe and secure it with the cable tie provided in the enclosure package.

NOTE: Placing the drain hose too far down the drain pipe can cause a siphoning action. No more than 7 inches of hose should be in the drain pipe. There must be an air gap around the drain hose. A snug fit can cause a siphoning action.



8. Plug the power cord into a grounded outlet.

NOTE: Check to be sure the power is off at the circuit breaker/fuse box before plugging the power cord into an outlet.

9. Turn on the power at the circuit breaker/fuse box.
10. Read the rest of this Owner's Manual. It contains valuable and helpful information that will save you time and money.

11. **Before starting the washer, check to make sure:**

- Main power is turned on.
- The washer is plugged in.
- The water faucets are turned on.
- The unit is level and all four leveling legs are firmly on the floor.
- The shipping support hardware is removed and saved.
- The drain hose is properly tied up.
- There are no leaks at the faucet, drain line or washer.

12. Run the washer through a complete cycle. Check for water leaks and proper operation.

13. If your washer does not operate, please review the Before You Call For Service section before calling for service.

14. Place these instructions in a location near the washer for future reference.

REPLACEMENT PARTS

If replacement parts are needed for your washer, they can be ordered in the United States by visiting our Website at GEAppliances.com or by calling 800.GE.CARES. In Canada, visit geappliances.ca or call 1.800.561.3344.

Installation Instructions

ADAPTIVE VIBRATION CONTROL

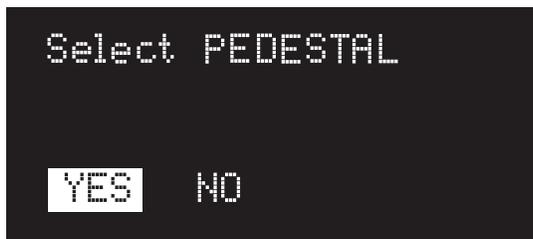
Your GE washer is equipped with Adaptive Vibration Control Technology. Using information about the floor, this system can reduce vibration and improve spin performance in some installations by adapting the spin cycle. The DEFAULT configuration is specially designed to provide optimal performance across the widest range of floor types. Follow the procedure below to enable more specific adaptive settings. Your washer can be returned quickly and easily to the DEFAULT configuration at any time using the same procedure.

Floor Type Selection

1. In the settings menu, select "floor type setup".



2. Select Yes or No for Pedestal.

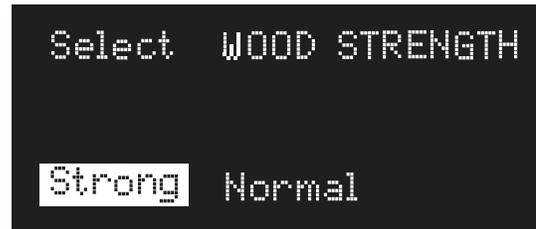


3. Select either Default, Concrete or Wood for floor type.

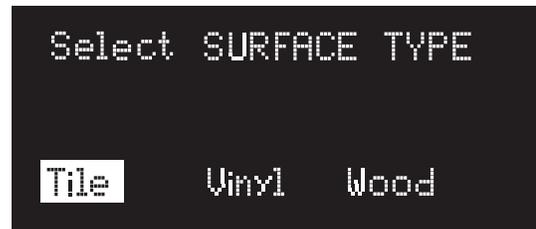


**Default selection is acceptable for most installations.

4. Select the type of wood floor.



5. Select the floor type.





Troubleshooting Tips
 Save time and money! Review the charts on the following pages first and you may not need to call for service.

Problem	Possible Cause	What To Do
Not draining Not spinning Not agitating	Load is out of balance Pump clogged Drain hose is kinked or improperly connected Household drain may be clogged Drain hose siphoning; drain hose pushed too far down the drain	<ul style="list-style-type: none"> • Redistribute clothes and run drain & spin or rinse & spin. • Increase load size if washing small load containing heavy and light items. • See page 12 on how to clean the Pump Filter. • Straighten drain hose and make sure washer is not sitting on it. • Check household plumbing. You may need to call a plumber. • Ensure there is an air gap between hose and drain.
Leaking water	Door gasket is damaged Door gasket not damaged Check back left of washer for water Fill hoses or drain hose is improperly connected Household drain may be clogged Dispenser clogged Incorrect use of detergent Dispenser box crack	<ul style="list-style-type: none"> • Check to see if gasket is seated and not torn. Objects left in pockets may cause damage to the washer (nails, screws, pens, pencils) • Water may drip from the door when the door is opened. This is a normal operation. • Carefully wipe off rubber door seal. Sometimes dirt or clothing is left in this seal and can cause a small leak • If this area is wet, you have oversudsing condition. Use less detergent. • Make sure hose connections are tight at washer and faucets and make sure end of drain hose is correctly inserted in and secured to drain facility. • Check household plumbing. You may need to call a plumber. • Powder soap may cause clogs inside the dispenser and cause water to leak out the front of the dispenser. Remove drawer and clean both drawer and inside of dispenser box. Please refer to Cleaning the Washer section. • Use HE and correct amount of detergent. • If new installation, check for crack on inside of dispenser box.
Clothes too wet	Load is out of balance Pump clogged Overloading Drain hose is kinked or improperly connected Household drain may be clogged Drain hose siphoning; drain hose pushed too far down the drain	<ul style="list-style-type: none"> • Redistribute clothes and run drain & spin or rinse & spin. • Increase load size if washing small load containing heavy and light items. • The machine will slow the spin speed down to 410 rpm if it has a hard time balancing the load. This speed is normal. • See page 12 on how to clean the Pump Filter. • The dry weight of the load should be less than 16 lb. • Straighten drain hose and make sure washer is not sitting on it. • Check household plumbing. You may need to call a plumber. • Ensure there is an air gap between hose and drain.

Before you call for service...

Problem	Possible Cause	What To Do
Incomplete cycle or timer not advancing	Automatic load redistribution Pump clogged Drain hose is kinked or improperly connected Household drain may be clogged Drain hose siphoning; drain hose pushed too far down the drain	<ul style="list-style-type: none"> • Timer adds 3 minutes to cycle for each rebalance. 11 or 15 rebalances may be done. This is normal operation. Do nothing; the machine will finish the wash cycle. • See page 12 on how to clean the Pump Filter. • Straighten drain hose and make sure washer is not sitting on it. • Check household plumbing. You may need to call a plumber. • Ensure there is an air gap between hose and drain.
Loud or unusual noise; vibration or shaking	Cabinet moving All rubber leveling legs are not firmly touching the floor Unbalanced load Pump clogged	<ul style="list-style-type: none"> • Washer is designed to move 1/4" to reduce forces transmitted to the floor. This movement is normal. • Push and pull on the back right and then back left of your washer to check if it is level. If the washer is uneven, adjust the rubber leveling legs so they are all firmly touching the floor and locked in place. Your installer should correct this problem. • Open door and manually redistribute load. To check machine, run rinse and spin with no load. If normal, unbalance was caused by load. • See page 12 on how to clean the Pump Filter.
No power/ washer not working or dead	Washer is unplugged Water supply is turned off Circuit breaker/fuse is tripped/ blown Automatic self system checks	<ul style="list-style-type: none"> • Make sure cord is plugged securely into a working outlet. • Turn both hot and cold faucets fully on. • Check house circuit breakers/fuses. Replace fuses or reset breaker. Washer should have separate outlet. • First time the washer is plugged in, automatic checks occur. It may take up to 20 seconds before you can use your washer. This is normal operation.
Snags, holes, tears, rips or excessive wear	Overloaded Pens, pencils, nails, screws or other objects left in pockets Pins, snaps, hooks, sharp buttons, belt buckles, zippers and sharp objects left in pockets	<ul style="list-style-type: none"> • Do not exceed maximum recommended load sizes. See recommended maximum load sizes on page 10. • Remove loose items from pockets. • Fasten snaps, hooks, buttons and zippers.
Control time wrong or changes	This is normal	<ul style="list-style-type: none"> • During spin the washer may need to rebalance the load sometimes to reduce vibrations. When this happens, the estimated time is increased causing time left to increase or jump.
Not enough water	This is normal	<ul style="list-style-type: none"> • Horizontal washers do not require the tub to fill with water like top-load washers.
Washer pauses or has to be restarted, or washer door is locked and will not open	Pump clogged	<ul style="list-style-type: none"> • See page 12 on how to clean the Pump Filter.
Door unlocks or press START and machine doesn't operate	This is normal Incorrect operation	<ul style="list-style-type: none"> • Front-load washers start up differently than top-load washers, and it takes 30 seconds to check the system. The door will lock and unlock. • Simply open and close the door firmly; then press START.

Problem	Possible Cause	What To Do
Water does not enter washer or enters slowly	Automatic self system checks Water supply is turned off Water valve screens are stopped up	<ul style="list-style-type: none"> • After START is pressed, the washer does several system checks. Water will flow 60 seconds after START is pressed. • Turn on both hot and cold faucets fully. • Turn off the water source and remove the water connection hoses from the upper back of the washer. Use a brush or toothpick to clean the screens in the machine. Reconnect the hoses and turn the water back on.
Wrinkling	Improper sorting Overloading Incorrect wash cycle Repeated washing in water that is too hot	<ul style="list-style-type: none"> • Avoid mixing heavy items (like work clothes) with light items (like blouses). • Load your washer so clothes have enough room to move freely. • Match cycle selection to the type of fabric you are washing (especially for easy care loads). • Wash in warm or cold water.
Grayed or yellowed clothes	Not enough detergent Not using HE (high efficiency) detergent Hard water Water is not hot enough Detergent is not dissolving Dye transfer	<ul style="list-style-type: none"> • Use correct amount of detergent. • Use HE detergent. • Use hottest water safe for fabric. • Use a water conditioner like Calgon brand or install a water softener. • Make sure water heater is delivering water at 120°–140°F (48°–60°C). • Try a liquid detergent. • Sort clothes by color. If fabric label states wash separately, unstable dyes may be indicated.
Colored spots	Incorrect use of fabric softener Dye transfer	<ul style="list-style-type: none"> • Check fabric softener package for instructions and follow directions for using dispenser. • Sort whites or lightly colored items from dark colors. • Promptly remove wash load from washer.
Water temperature is incorrect	Water supply is improperly connected House water heater is not set properly	<ul style="list-style-type: none"> • Make sure hoses are connected to correct faucets. • Make sure house water heater is delivering water at 120°–140°F (48°–60°C).
Slight variation in metallic color	This is normal	<ul style="list-style-type: none"> • Due to the metallic properties of paint used for this unique product, slight variations of color may occur due to viewing angles and lighting conditions.
Bad odor inside your Washer	Washer unused for a long time, not using recommended quality of HE detergent or used too much detergent	<ul style="list-style-type: none"> • Run a BasketClean cycle. • In case of strong odor, you may need to run the BasketClean cycle more than once. • Use only the amount of detergent recommended on the detergent container. • Use only HE (high efficiency) detergent. • Always remove wet items from the washer promptly after machine stops running. • Leave the door slightly open for the water to air dry. Close supervision is necessary if this appliance is used by or near children. Do not allow children to play on, with or inside this or any other appliance.

Before you call for service...

Problem	Possible Cause	What To Do
Detergent leak	<p>Incorrect placement of detergent insert</p> <p>This is normal</p>	<ul style="list-style-type: none"> • Make sure detergent insert is properly located and fully seated. Never put detergent above max line. • It is normal operation to see detergent leak on door gasket about 20 seconds after filling the dispenser.
Improper dispensing of softener or bleach	<p>Dispenser clogged</p> <p>Softener or bleach is filled above the max line</p> <p>Softener or bleach cap issue</p>	<ul style="list-style-type: none"> • Monthly clean the dispenser drawer to remove buildup of chemicals. • Make sure to have the correct amount of softener or bleach. • Make sure softener and bleach cap for dispenser are seated or they will not work.

GE Washer Warranty. (For customers in the United States)



All warranty service provided by our Factory Service Centers, or an authorized Customer Care® technician. To schedule service, on-line, visit us at GEAppliances.com, or call 800.GE.CARES (800.432.2737). Please have serial number and model number available when calling for service.

Staple your receipt here. Proof of the original purchase date is needed to obtain service under the warranty.

For The Period Of:	We Will Replace:
One Year From the date of the original purchase	Any part of the washer which fails due to a defect in materials or workmanship. During this limited one-year warranty, GE will also provide, free of charge, all labor and related service costs to replace the defective part.
Second through Fifth Year From the date of the original purchase	The suspension strut assembly, motor and motor controller if any of these parts should fail due to a defect in materials or workmanship. GE will also replace the washer top panel, front panel or service panel if they should rust under operating conditions. During this additional three-year limited warranty, you will be responsible for any labor or related service costs.
Second through Tenth Year From the date of the original purchase	The outer tub and driven pulley if any of these parts should fail due to a defect in materials or workmanship. During this additional eight-year limited warranty, you will be responsible for any labor or related service costs.
Lifetime of Product From the date of the original purchase	The washer basket if it should fail due to a defect in materials or workmanship. During this product lifetime limited warranty, you will be responsible for any labor or related service costs.

What Is Not Covered (in the United States):

- Service trips to your home to teach you how to use the product.
- Improper installation, delivery or maintenance.
- Failure of the product if it is abused, misused, or used for other than the intended purpose or used commercially.
- Damage after delivery.
- Replacement of house fuses or resetting of circuit breakers.
- Damage to the product caused by accident, fire, floods or acts of God.
- Incidental or consequential damage caused by possible defects with this appliance.
- Product not accessible to provide required service.

EXCLUSION OF IMPLIED WARRANTIES—Your sole and exclusive remedy is product repair as provided in this Limited Warranty. Any implied warranties, including the implied warranties of merchantability or fitness for a particular purpose, are limited to one year or the shortest period allowed by law.

This warranty is extended to the original purchaser and any succeeding owner for products purchased for home use within the USA. If the product is located in an area where service by a GE Authorized Servicer is not available, you may be responsible for a trip charge or you may be required to bring the product to an Authorized GE Service location for service. In Alaska, the warranty excludes the cost of shipping or service calls to your home.

Some states do not allow the exclusion or limitation of incidental or consequential damages. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. To know what your legal rights are, consult your local or state consumer affairs office or your state's Attorney General.

Warrantor: General Electric Company. Louisville, KY 40225

GE Washer Warranty. (For customers in Canada)



All warranty service provided by our Factory Service Centres or an authorized technician. For service, call 1.800.561.3344.

Please have serial number and model number available when calling for service.

For The Period Of:	We Will Replace:
One Year From the date of the original purchase	Any part of the washer which fails due to a defect in materials or workmanship. During this limited one-year warranty, GE will also provide, free of charge, all labour and related service costs to replace the defective part.
Second through Fifth Year From the date of the original purchase	The suspension strut assembly, motor and motor controller if any of these parts should fail due to a defect in materials or workmanship. GE will also replace the washer top panel, front panel or service panel if they should rust under operating conditions. During this additional three-year limited warranty, you will be responsible for any labour or related service costs.
Second through Tenth Year From the date of the original purchase	The outer tub and driven pulley if any of these parts should fail due to a defect in materials or workmanship. During this additional eight-year limited warranty, you will be responsible for any labour or related service costs.
Lifetime of Product From the date of the original purchase	The washer basket if it should fail due to a defect in materials or workmanship. During this product lifetime limited warranty, you will be responsible for any labour or related service costs.

What Is Not Covered (in Canada):

- Service trips to your home to teach you how to use the product.
- Improper installation, delivery or maintenance.
- Failure of the product if it is abused, misused, or used for other than the intended purpose or used commercially.
- Damage after delivery.
- Replacement of house fuses or resetting of circuit breakers.
- Damage to the product caused by accident, fire, floods or acts of God.
- Incidental or consequential damage caused by possible defects with this appliance.
- Product not accessible to provide required service.

EXCLUSION OF IMPLIED WARRANTIES—Your sole and exclusive remedy is product repair as provided in this Limited Warranty. Any implied warranties, including the implied warranties of merchantability or fitness for a particular purpose, are limited to one year or the shortest period allowed by law.

This warranty is extended to the original purchaser and any succeeding owner for products purchased in Canada for home use within Canada. In-home warranty service will be provided in areas where it is available and deemed reasonable by Mabe to provide.

WARRANTOR IS NOT RESPONSIBLE FOR CONSEQUENTIAL DAMAGES.

Warrantor: MABE CANADA INC.

Consumer Support.



GE Appliances Website

GEAppliances.com

Have a question or need assistance with your appliance? Try the GE Appliances Website, 24 hours a day, any day of the year! For greater convenience and faster service, you can now download Owner's Manuals, order parts or even schedule service on-line.



Schedule Service

GEAppliances.com

Expert GE repair service is only one step away from your door. Get on-line and schedule your service at your convenience any day of the year! Or call 800.GE.CARES (800.432.2737) during normal business hours.



Real Life Design Studio

GEAppliances.com

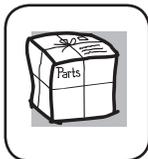
GE supports the Universal Design concept—products, services and environments that can be used by people of all ages, sizes and capabilities. We recognize the need to design for a wide range of physical and mental abilities and impairments. For details of GE's Universal Design applications, including kitchen design ideas for people with disabilities, check out our Website today. For the hearing impaired, please call 800.TDD.GEAC (800.833.4322).



Extended Warranties

GEAppliances.com

Purchase a GE extended warranty and learn about special discounts that are available while your warranty is still in effect. You can purchase it on-line anytime, or call 800.626.2224 during normal business hours. GE Consumer Home Services will still be there after your warranty expires.



Parts and Accessories

GEAppliances.com

Individuals qualified to service their own appliances can have parts or accessories sent directly to their homes (VISA, MasterCard and Discover cards are accepted). Order on-line today, 24 hours every day or by phone at 800.626.2002 during normal business hours.

Instructions contained in this manual cover procedures to be performed by any user. Other servicing **generally should be referred to qualified service personnel. Caution must be exercised, since improper servicing may cause unsafe operation.**



Contact Us

GEAppliances.com

If you are not satisfied with the service you receive from GE, contact us on our Website with all the details including your phone number, or write to:

General Manager, Customer Relations
GE Appliances, Appliance Park
Louisville, KY 40225



Register Your Appliance

GEAppliances.com

Register your new appliance on-line—at your convenience! Timely product registration will allow for enhanced communication and prompt service under the terms of your warranty, should the need arise. You may also mail in the pre-printed registration card included in the packing material.



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Write the model and serial numbers here:

Model # _____

Serial # _____

You can find them on a label under the cooktop.

IMPORTANT SAFETY INFORMATION. READ ALL INSTRUCTIONS BEFORE USING.

⚠ WARNING!

For your safety, the information in this manual must be followed to minimize the risk of fire or explosion, electric shock, or to prevent property damage, personal injury, or loss of life.

This unit has been tested and found to comply with the limits for a class B digital device, pursuant to Part 18 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This unit generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this unit does cause harmful interference to radio or television reception, which can be determined by turning the unit off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antennae.
- Increase the distance between the unit and receiver.
- Connect the unit into an outlet or a circuit different from that to which the receiver is connected.

⚠ CAUTION:

Persons with a pacemaker or similar medical device should exercise caution when using or standing near an induction unit while it is in operation. The electromagnetic field may affect the working of the pacemaker or similar medical device. It is advisable to consult your doctor or the pacemaker manufacturer about your particular situation.

IMPORTANT SAFETY NOTICE

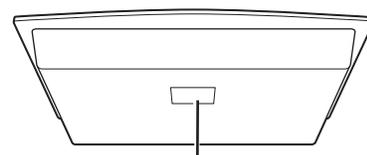
The California Safe Drinking Water and Toxic Enforcement Act requires the Governor of California to publish a list of substances known to the state to cause cancer, birth defects or other reproductive harm, and requires businesses to warn customers of potential exposure to such substances.

- Use proper pan size. This appliance is equipped with one or more COOKING ELEMENTS of different sizes. Select utensils having flat bottoms large enough to cover the Cooking Elements. The pan detection sensors will not allow the affected Cooking Element to operate without a pan present.

- Utensil handles should be turned inward and should not extend over adjacent cooking elements to reduce the risk of burns, ignition of flammable materials and spillage due to unintentional contact with the utensil.
- Never leave prepared food on the cooking elements unattended. Boilovers cause smoking and greasy spillovers that may ignite, or a pan that has boiled dry may melt or become damaged.
- Protective liners: Do not use aluminum foil to line any part of the cooktop. Only use aluminum foil as recommended after the cooking process, if used as a cover to be placed over the food. Any other use of aluminum foil may result in the risk of electric shock, fire or short circuit.
- Avoid placing any objects on or near the keypads in order to prevent accidental activation of the cooktop controls.
- Know which touch key pad controls each surface element.
- Clean the appliance regularly to keep all parts free of grease that could catch fire. Exhaust fan ventilation hoods and grease filters should be kept clean. Do not allow grease to accumulate on hood or filter. Greasy deposits in the fan could catch fire. When flaming food under the hood, turn fan on. Refer to hood manufacturer's instructions for cleaning.

Serial Plate Location

You will find the model and serial number printed on the serial plate. The serial plate is located under the cooktop. Please see the illustration for exact location. Remember to record the serial number BEFORE INSTALLATION of the cooktop (See Product Registration on the front cover). The serial plate is located under the burner box of the cooktop.



Name plate location

IMPORTANT SAFETY INFORMATION. READ ALL INSTRUCTIONS BEFORE USING.

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⚠ WARNING!

For your safety, the information in this manual must be followed to minimize the risk of fire or explosion, electric shock, or to prevent property damage, personal injury, or loss of life.



SAFETY PRECAUTIONS

When using electrical appliances, basic safety precautions should be followed, including the following:

- Use this appliance only for its intended use as described in this manual.
- Do not attempt to repair or replace any part of your cooktop unless it is specifically recommended in this manual. All other servicing should be referred to a qualified technician.
- Before performing any service, disconnect the cooktop power supply at the household distribution panel by removing the fuse or switching off the circuit breaker.
- Be sure your appliance is properly installed and grounded by a qualified technician in accordance with the provided installation instructions.
- Have the installer show you the location of the circuit breaker or fuse. Mark it for easy reference.
- Do not leave children alone—children should not be left alone or unattended in an area where an appliance is in use. They should never be allowed to sit or stand on any part of the appliance.
- Teach children not to play with the controls or any other part of the cooktop.
- Do not allow anyone to climb, stand or hang on the cooktop.
- **CAUTION:** Items of interest to children should not be stored in cabinets above a cooktop—children climbing on the cooktop to reach items could be seriously injured.
- Always keep combustible wall coverings, curtains or drapes a safe distance from your cooktop.
- Always keep dish towels, dishcloths, pot holders and other linens a safe distance away from your cooktop.
- Always keep wooden and plastic utensils and canned food a safe distance away from your cooktop. They may become hot and could cause burns.
- Never wear loose-fitting or hanging garments while using the appliance. Flammable material could be ignited if brought in contact with hot surface elements and may cause severe burns.
- Use only dry pot holders—moist or damp pot holders on hot surfaces may result in burns from steam. Do not let pot holders touch hot surface elements. Do not use a towel or other bulky cloth. Such cloths can catch fire on a hot surface element.
- Do not use water on grease fires. Never pick up a flaming pan. Turn the controls off. Smother a flaming pan on a surface element by covering the pan completely with a well-fitting lid, cookie sheet or flat tray. Use a multi-purpose dry chemical or foam-type extinguisher.
- Flaming grease outside a pan can be put out by covering with baking soda or, if available, by using a multi-purpose dry chemical or foam-type fire extinguisher.
- When preparing flaming foods under the hood, turn the fan on.



COOK MEAT AND POULTRY THOROUGHLY...

Cook meat and poultry thoroughly—meat to at least an INTERNAL temperature of 160°F and poultry to at least an INTERNAL temperature of 180°F. Cooking to these temperatures usually protects against foodborne illness.

Safety Instructions

Operating Instructions

Care and Cleaning

Troubleshooting Tips

Consumer Support

IMPORTANT SAFETY INFORMATION. READ ALL INSTRUCTIONS BEFORE USING.



WARNING! SAFETY PRECAUTIONS

- Do not touch glass ceramic surface elements while cooking. This surface may be hot enough to burn even though it may appear dark in color. During and after use, do not touch, or let clothing or other flammable materials contact the cooking surface. Note the hot indicator lights and allow sufficient time for cooling first.

Hot surfaces may include both the cooktop and areas facing the cooktop.
- To minimize the possibility of burns, ignition of flammable materials and spillage, the handle of a container should be turned toward the center of the cooktop without extending over any nearby surface elements.
- Always turn off the surface element control before removing the cookware.
- Never leave surface elements unattended at high heat settings. Boilovers may cause smoking and greasy spillovers may ignite.
- Keep an eye on foods being fried at high or medium-high heat settings.
- Foods for frying should be as dry as possible. Frost on frozen foods or moisture on fresh foods can cause hot fat to bubble up and over the sides of the pan.
- Use little fat for effective shallow or deep-fat frying. Filling the pan too full of fat can cause spillovers when food is added.
- If a combination of oils or fats will be used in frying, stir together before heating, or as fats melt slowly.
- Always heat fat slowly, and watch as it heats.
- Use a deep-fat thermometer whenever possible to prevent overheating fat beyond the smoking point.
- Never try to move a pan of hot fat, especially a deep-fat fryer. Wait until the fat is cool.
- Do not store flammable materials near the cooktop.
- Keep the hood and grease filters clean to maintain good venting and to avoid grease fires.
- Do not store or use combustible materials, gasoline or other flammable vapors and liquids in the vicinity of this or any appliance.
- Clean only parts listed in this Owner's Manual.
- Do not leave paper products, cooking utensils or food on the cooktop when not in use.
- Keep cooktop clean and free of accumulation of grease or spillovers which may ignite.
- Never heat unopened food containers. Pressure buildup may make container burst and cause injury.
- Never leave jars or cans of fat drippings on or near your cooktop.
- Never use your appliance for warming or heating the room.

! WARNING!**INDUCTION SURFACE ELEMENTS**

Use care when touching the cooktop. The glass surface of the cooktop will retain heat after the controls have been turned off.

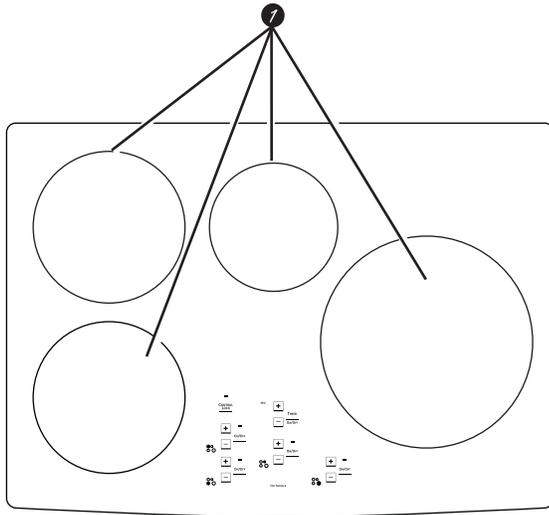
- Avoid scratching the glass cooktop. The cooktop can be scratched with items such as sharp instruments, rings or other jewelry.
 - Never use the glass cooktop surface as a cutting board.
 - Do not place or store items on top of the glass cooktop surface when it is not in use.
 - Be careful when placing spoons or other stirring utensils on glass cooktop surface when it is in use. They may become hot and could cause burns.
 - Avoid heating an empty pan. Doing so may damage the cooktop and the pan.
 - Do not allow water, other liquids or grease to remain on the cooktop.
 - Do not operate the glass surface elements if the glass is broken. Spillovers or cleaning solution may penetrate a broken cooktop and create a risk of electrical shock. Contact a qualified technician immediately should your glass cooktop become broken.
 - Spilled or burnt-on foods may cause accidental activation or deactivation of the keypad. Clean the keypad thoroughly, and controls will resume normal operation.
 - Clean the cooktop with caution. Always lock the control panel using the control lock feature and wait until the entire glass surface is cool before attempting to clean the cooktop. See the *Locking the Cooktop* section for details. If a wet sponge or cloth is used to wipe spills on a hot surface element, be careful to avoid steam burns. Some cleansers can produce noxious fumes if applied to a hot surface.
- NOTE:** We recommend that you avoid wiping any surface element areas until they have cooled and the indicator light has gone off. **Sugar spills are the exception to this.** Please see the *Cleaning the glass cooktop* section.
- To avoid possible damage to the cooking surface, do not apply the cleaning cream to the glass surface when it is hot.
 - After cleaning, use a dry cloth or paper towel to remove all the cleaning cream residue.
 - Read and follow all instructions and warnings on the cleaning cream labels.
 - Large scratches or impacts to cooktops can lead to broken or shattered glass.
 - Use care when touching the cooktop. The glass surface of the cooktop will retain heat after the controls have been turned **OFF**.
 - Do not stand on the glass cooktop.
 - When a self-cleaning oven is installed below the cooktop and the oven is in the self clean mode, it is not recommended that the induction cooktop be used during the oven self clean cycle.



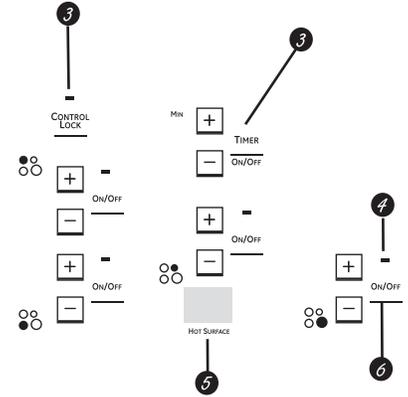
READ AND FOLLOW THIS SAFETY INFORMATION CAREFULLY.
SAVE THESE INSTRUCTIONS

Features of your cooktop.

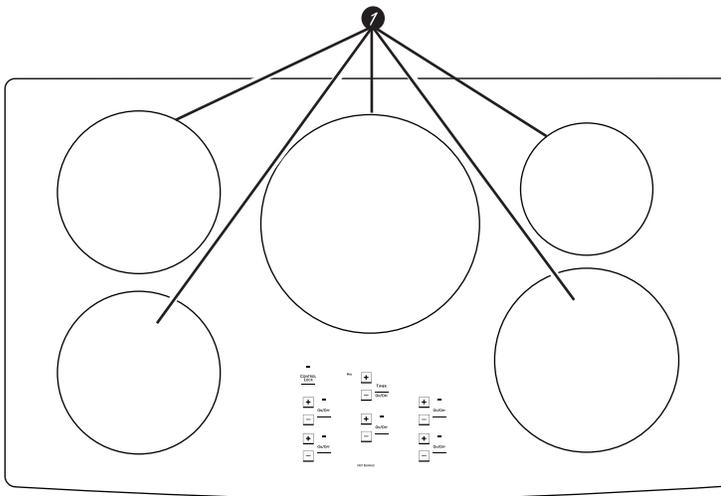
Throughout this manual, features and appearance may vary from your model.



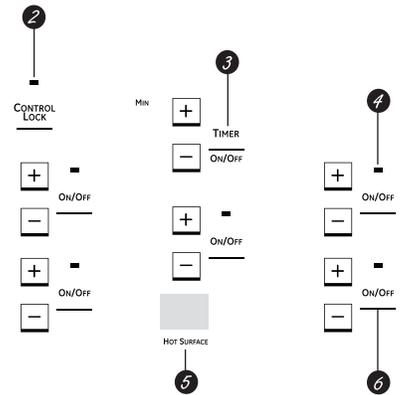
PHP900 30" Cooktops



NOTE: 30" models have cooking element location indicators next to each control.



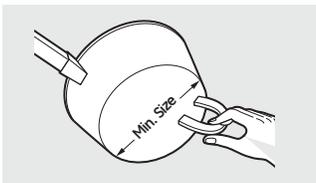
PHP960 36" Cooktops



<i>Feature Index (Features and appearances may vary.)</i>	<i>Explained on page</i>
1 Cooking Elements	10
2 Control Lock	13
3 Kitchen Timer	12
4 ON Indicator Light (one for each element)	10
5 Hot Surface Indicator Light Area	12
6 Cooking Element ON/OFF Control	10

How induction cooking works.

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Use the minimum size pan for the element. The pan material is correct if a magnet sticks to the bottom.

The elements beneath the cooking surface produce a magnetic field that causes the electrons in the ferrous metal pan to vibrate and produce heat.

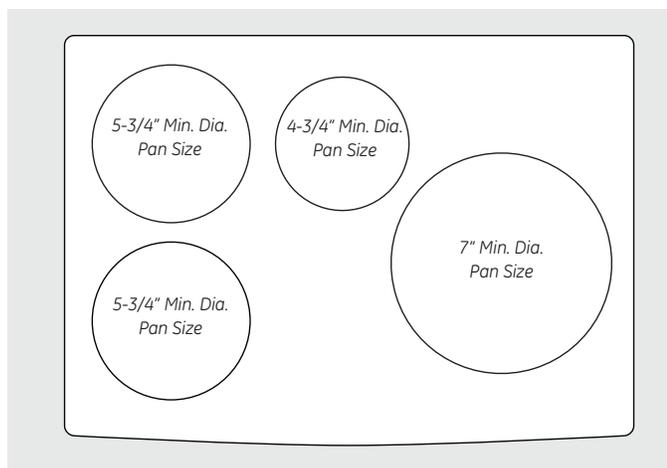
The cooking surface itself does not heat. Heat is produced in the cooking pan, and cannot be generated until a pan is placed on the cooking surface.

When the element is activated, the pan begins to heat immediately and in turn heats the contents of the pan.

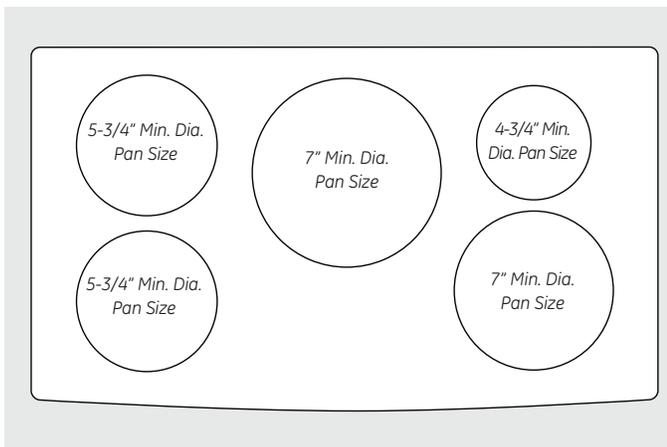
Magnetic induction cooking requires the use of cookware made of ferrous metals—metals to which magnets will stick, such as iron or steel.

Use pans that fit the element size. The pan must be large enough for the safety sensor to activate an element.

The cooktop will not start if a very small steel or iron utensil (less than the minimum size across the bottom) is placed on the cooking surface when the unit is turned on—items such as steel spatulas, cooking spoons, knives and other small utensils.



30" Wide Cooktop. Use the minimum size pan shown for each cooking element.



36" Wide Cooktop. Use the minimum size pan shown for each cooking element.

Using the correct size cookware

Each cooking element requires a MINIMUM pan size. If the pan is properly centered, and of the correct material, but is too small for the cooking element, the element cannot be activated. The display will flash "F" along with the power level selected.

Cookware larger than the element ring may be used; however, heat will only occur above the element.

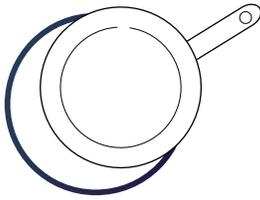
For best results, the cookware must make FULL contact with the glass surface.

Do not allow the bottom of the pan or cookware to touch the surrounding metal cooktop trim or to overlap the cooktop controls.

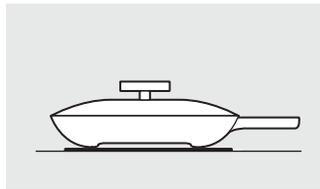
For best performance, match the pan size to the element size. Using a smaller pot on a larger burner will generate less power at any given setting.

Choosing the correct cookware to use.

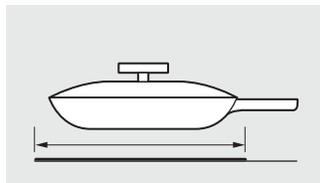
INCORRECT



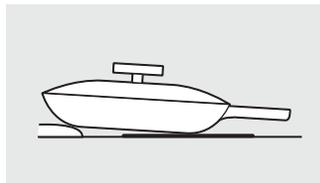
Cookware not centered on cooking element surface.



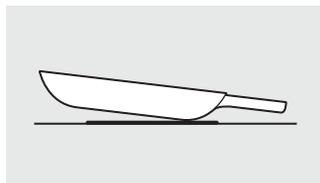
Curved or warped pan bottoms or sides.



Pan does not meet the minimum size required for the cooking element used.



Pan bottom rests on cooktop trim or does not rest completely on the cooktop surface.

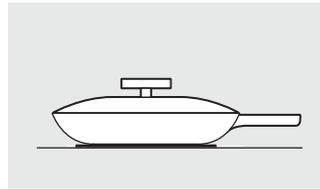


Heavy handle tilts pan.

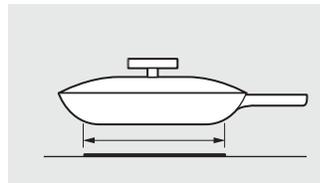
CORRECT



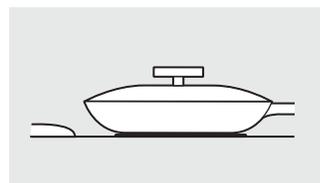
Cookware centered correctly on cooking element surface.



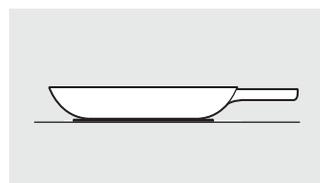
Flat pan bottom.



Pan size meets or exceeds the recommended minimum size for the cooking element used.



Pan bottom rests completely on the cooktop surface.



Pan is properly balanced.

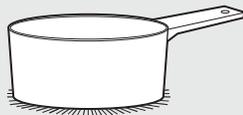
Cookware recommendations

Cookware must fully contact the surface of the cooking element.

Use flat-bottomed pans sized to fit the cooking element and also to the amount of food being prepared.

CAUTION:

- The cooking elements may appear to be cool while turned ON and after they have been turned OFF. The glass surface may be HOT from residual heat transferred from the cookware and burns may occur.
- DO NOT TOUCH HOT COOKWARE or PANS directly with hands. Always use mitts or pot holders to protect hands from burns.
- DO NOT SLIDE cookware across the cooktop surface. Doing so may permanently damage the appearance of the ceramic cooktop.



Use flat-bottomed pans.



Use a griddle.



Use a flat-bottomed wok.

Suitable Cookware

Use quality cookware with heavier bottoms for better heat distribution and even cooking results. Choose cookware made of magnetic stainless steel, enamel coated cast iron, enameled steel and combinations of these materials.

Some cookware is specifically identified by the manufacturer for use with induction cooktops. Use a magnet to test if the cookware will work.

Flat-bottomed pans give best results. Pans with rims or slight ridges can be used.

Round pans give best results. Pans with warped or curved bottoms will not heat evenly.

For wok cooking, use a flat-bottomed wok. Do not use a wok with a support ring.

Cookware "noise"

Slight sounds may be produced by different types of cookware. Heavier pans such as enameled cast iron produce less noise than a lighter weight multi-ply stainless steel pan. The size of the pan, and the amount of contents, can also contribute to the sound level.

When using adjacent elements that are set at certain power level settings, magnetic fields may interact and produce a low whistle or intermitted "hum". These noises can be reduced or eliminated by lowering or raising the power level settings of one or both of the elements. Pans that completely cover the element ring will produce less noise.

A low "humming" noise is normal particularly on high settings.

For Best Results

- Do not place wet pans or lids on the cooking surface or induction rings.
- Do not place wet fingers on the glass cooktop. Wipe up spills on the controls with dry hands.
- Do not use woks with support rings. This type of wok will not heat on an induction element.
- Use only a flat-bottomed wok, available from many cookware manufacturers. The bottom of the wok should match the diameter of the induction ring to insure proper contact.
- Some special cooking procedures require specific cookware such as pressure cookers, deep-fat fryers, etc. Cookware with flat bottoms that match the size of the surface element being used will produce the best results.



Do not place wet pans on the glass cooktop.

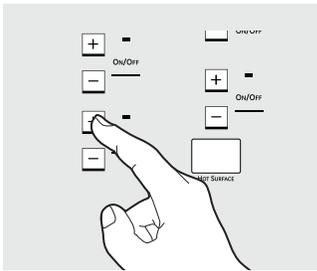


Do not use woks with support rings on the glass cooktop.



Use flat-bottomed woks on the glass cooktop.

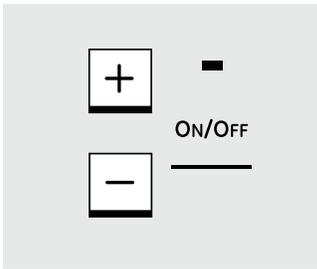
Setting the controls.



Using the Touch Control.

Touch the pad lightly with the flat part of your fingertip. Touch the center of the pad to ensure the cooktop response.

A "beep" sound can be heard with each touch to any pad.



Operating the Cooking Elements

Each of the cooking elements have separate **ON/OFF** pads and LED display.

Be sure to use cookware that meets the minimum pan size requirements.

To turn on a cooking element:

- 1 Place a pan with food onto the induction element. The pan size should match the indicator ring.
- 2 Touch the **ON/OFF** pad. "5" will flash in the display.
- 3 Touch the **(+)** or **(-)** pad to select power level and to activate the induction element. A sound will beep. The **(+)** or **(-)** pad must be pressed within 10 seconds to activate the element.

NOTE: You can also touch and hold the pad to scroll quickly to the desired setting.

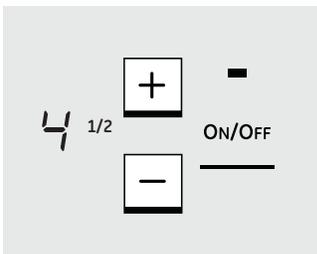
The induction circuit detects the pan and allows the element to be activated. Both the element ON indicator light and the cooktop HOT SURFACE light will illuminate. If no power level is selected within 10 seconds, the zone will be deactivated.

To turn the control to OFF, touch the **ON/OFF** pad. The induction element will be turned off and the display will be blank.

With an element control ON:

If a pan is removed or moved to off-center from the cooking ring, the control will flash "F" along with the power setting. After 30 seconds, the element will be deactivated and displays will turn off.

If the pan is placed back on the zone within 30 seconds, the flashing will stop and cooking will resume.



The power level with a fraction indicates the additional half-step setting.

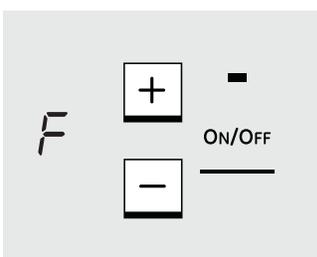
Power Level Settings

The cooktop offers 19 power levels, including a Boost setting. Power levels range from "L" to 9 in precise half-step increments. For example: 1, 1-1/2, 2, 2-1/2 and up to power level 9.

Power Level "L", the lowest setting, is recommended for "Keep Warm."

The power level increases one-half level with each touch.

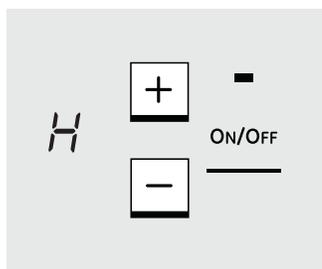
Power level 9 is the highest normal power setting.



Flashing "F" in the Display

If a pan is removed or moved off-center from the cooking ring during the cooking process, the control will flash "F" along with the power setting. The flashing "F" indicates that the pan is no longer detected. After 30 seconds, the element will be deactivated and the display will turn off.

If the pan is returned to the surface element within 30 seconds, the flashing "F" will disappear and cooking will resume.



"H" indicates that the Boost power level has been selected for rapid cooking and boiling.

Boost Setting

Boost is the highest power level, designed for large quantity rapid cooking and boiling. Boost will operate for a maximum of 10 minutes. After 10 minutes, it will automatically revert to power level 9.

Boost may be repeated after the initial 10 minute cycle.

CAUTION: Do not leave a pot unattended while in the Boost Mode.

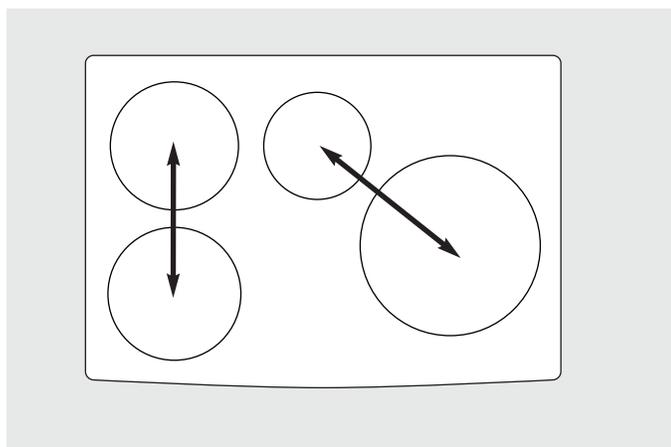
To start the Boost power setting:

- 1 Place a pan matching the size of the induction element over the selected indicator ring.
- 2 Touch the **ON/OFF** pad. "5" will flash in the display.
- 3 Touch and hold the **(+)** pad until the display reads "H."

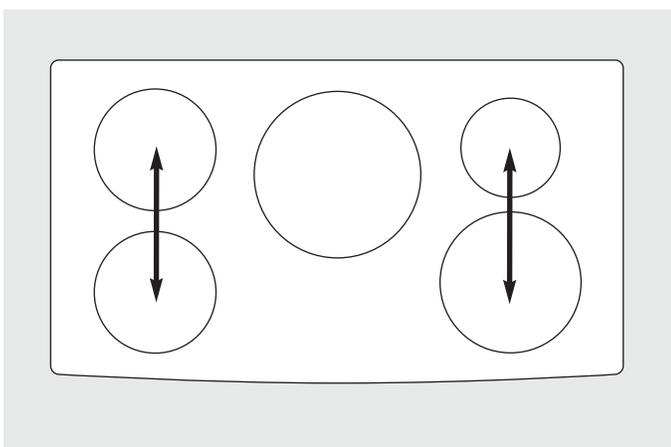
NOTE: If the pan is removed, the display will flash "F" alternating to "H". After 30 seconds, the elements will turn off automatically.

Sounds you may hear:

You may hear a slight "buzz" sound when cooking with the Boost or high mode. This is normal. The sound depends on the type of pot being used. Some pots will "buzz" louder depending on the material. A "buzz" sound may be heard if the pan contents are cold. As the pan heats, the sound will decrease. If the power level is reduced, the sound level will go down.



4 burner cooktops with right and left side (2) induction generators.



5 burner cooktops with right, left and center (3) induction generators.

Power Sharing

Four burner cooktops are divided into two separate heating zones. The right and left side cooking zones are powered by separate and independent induction generators. One generator controls 2 elements, or two cooking zones within a heating section share the power of one generator.

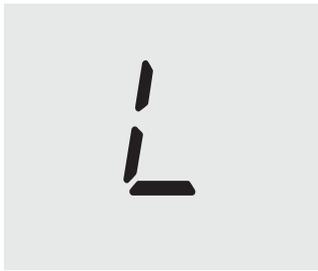
Five burner cooktops are divided into 3 zones. The right and left side have separate cooking zones and the large center element is another separate cooking zone.

Power Sharing is activated when both elements in the same cooking zone are activated and one element is set for Boost (H). The element that is not set for Boost will change to a lower power level. This is called Power Sharing. When Boost operation is complete (10 minutes), the other element may be reset to any power level. Both elements can operate simultaneously at normal power level settings of "L" to 9.

IMPORTANT NOTE FOR FOUR BURNER MODELS:

The elements on the right side share one generator. Both elements can operate at any non-Boost (level L to 9) power level at the same time. When the large 11" element is set for "H" or Boost, the smaller element is automatically shut off and cannot be activated. After 10 minutes, Boost (H) will revert to power level 9. At that time, the smaller element may be activated and set for any power level.

Setting the controls.



CAUTION: Do not warm food on the "L" power level for more than two hours.

Using the "L" Low Setting

- 1 Place a pan with food onto the induction element. The pan size should match the indicator ring.
- 2 Touch the **ON/OFF** pad. "5" will flash in the display.
- 3 Touch the **(-)** pad until the display reads "L." A sound will beep.

Do not use plastic wrap to cover food. Plastic may melt onto the surface and be very difficult to remove.

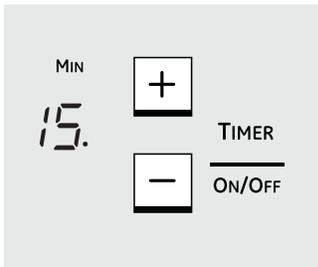
Use only cookware recommended for this cooktop.

The Low setting will keep hot, cooked food at serving temperature. Always start with hot food. Do not use to heat cold food.

Placing uncooked or cold food on surface element set for Low could result in food-borne illness.

For best results, all food set for Low should be covered with a lid or aluminum foil. Pastries or breads should be vented to allow moisture to escape.

Always use pot holders or oven mitts when removing food from the element set for Low as cookware and plates will be hot.



Using the Kitchen Timer

NOTE: Use the kitchen timer to measure cooking time or as a reminder. The kitchen timer does not control the cooking elements.

- 1 Touch the **TIMER** pad.
- 2 Touch the **(+)** or **(-)** pad to choose the desired number of minutes. When the **(+)** or **(-)** pad is held for several seconds, the timer will increase or decrease at a faster rate. The timer will automatically start to count down the minutes you have selected within 5 seconds of the last entry. The display will show the minutes and a "." will flash.

- 3 The timer displays minutes remaining until it reaches one minute. At one minute, the timer display changes to seconds and displays the seconds remaining.

When the timer counts down to zero time (00) remaining, the timer will signal with a long beep for three seconds and the display will flash "00". The flashing display will continue and a double beep will be heard every 10 seconds until you touch the **TIMER** pad. After 5 minutes, the flashing display and signal will be deactivated.

Touch the **TIMER** pad to turn the timer off at any time. Touch **(+)** or **(-)** to add or subtract to the set time.



Hot Surface Indicator Light

A **HOT SURFACE** indicator light (one for each cooking element) will glow immediately when any element is activated. The indicator light(s) glow when the glass surface is hot, and will remain on until the surface has cooled to a temperature that is safe to touch.



Error Alerts (Flashing "E"/"c" and "E" "o")

Error alerts indicate a temporary problem that may be corrected by the user.

Clear Keypad—If the display flashes "E" alternating to "c", the keypad is sensing continuous activation of one or more keypads. Clean or clear any obstructions on the keypad area. Obstructions may be water, food spills, a utensil or other objects.

To resume cooking, touch the **ON/OFF** pad, then select the power level.

Over Temperature—If the display flashes "E" alternating to "o", the cooktop sensor indicates that the induction element or electronics have overheated.

Overheating of the element is caused by placing an empty pan on the element and selecting a high power level. The element sensor detects very high temperatures (above normal cooking temperatures), turns off the power and displays the error. A second potential cause of this error is a lack of cooling air to the bottom of the cooktop, which can cause overheating of the electronics. If this situation occurs, make sure the air inlet below the cooktop is unobstructed.

Touch the **ON/OFF** pad and allow the cooktop to cool for 30 to 45 minutes before operation can begin again.

If either of these conditions persist, call for service.

IMPORTANT: If the "E" flashes alone, without alternating to a "c" or "o", a hardware error has occurred. Call for service.



Control Lock

IMPORTANT: As a convenience, you can lock the entire cooktop at any time when it is not in use or before cleaning. Locking the cooktop will prevent surface elements from being turned on accidentally.

To lock the cooktop:

Touch and hold the **CONTROL LOCK** pad for 5 seconds.

A two-beep signal will sound, and the **CONTROL LOCK** light will glow, indicating that the cooktop is locked.

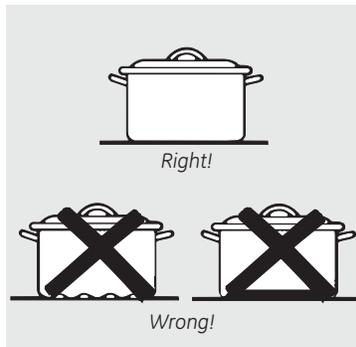
If the cooktop is locked while a surface element is in use, it will automatically turn off.

The **CONTROL LOCK** does not affect the timer. If Control Lock is set while the timer is counting down, it will continue to operate.

To unlock the cooktop:

Touch and hold the **CONTROL LOCK** pad again for 5 seconds. A two-beep signal will sound, and the **CONTROL LOCK** light will go out, indicating that the cooktop is unlocked.

Selecting types of cookware.



Note: Flat-bottomed canners are required for glass cooktops.

Observe the Following Points in Canning

When canning with water-bath or pressure canner, larger-diameter pots may be used. This is because boiling water temperatures (even under pressure) are not harmful to the cooktop surfaces surrounding the surface elements.

HOWEVER, DO NOT USE LARGE-DIAMETER CANNERS OR OTHER LARGE-DIAMETER POTS FOR FRYING OR BOILING FOODS OTHER THAN WATER. Most syrup or sauce mixtures—and all types of frying—cook at temperatures much higher than boiling water. Such temperatures could eventually harm the glass cooktop surfaces.

- 1 Be sure the canner fits over the center of the surface element. If your cooktop or its location does not allow the canner to be centered on the surface element, use smaller-diameter pots for good canning results.
- 2 Flat-bottomed canners must be used. Do not use canners with flanged or rippled bottoms (often found in enamelware) because they don't make enough contact with the surface elements and take a long time to boil water.
- 3 When canning, use recipes and procedures from reputable sources. Reliable recipes and procedures are available from the manufacturer of your canner; manufacturers of glass jars for canning, such as Ball and Kerr brand; and the United States Department of Agriculture Extension Service.

- 4 Remember that canning is a process that generates large amounts of steam. To avoid burns from steam or heat, be careful when canning.

NOTE: If your house has low voltage, canning may take longer than expected, even though directions have been carefully followed. The process time will be shortened by:

- (1) using a pressure canner, and
- (2) starting with **HOT** tap water for fastest heating of large quantities of water.

CAUTION:

- Safe canning requires that harmful microorganisms are destroyed and that the jars are sealed completely. When canning foods in a water-bath canner, a gentle but steady boil must be maintained for the required time. When canning foods in a pressure canner, the pressure must be maintained for the required time.
- After you have adjusted the controls, it is very important to make sure the prescribed boil or pressure levels are maintained for the required time.
- Since you must make sure to process the canning jars for the prescribed time, with no interruption in processing time, do not can on any cooktop surface element if your canner is not flat.

Care and cleaning of the cooktop.

ge.com

Be sure electrical power is off and all surfaces are cool before cleaning any part of the cooktop.

How to Remove Protective Shipping Film and Packaging Tape

Carefully grasp a corner of the protective shipping film with your fingers and slowly peel it from the appliance surface. Do not use any sharp items to remove the film. Remove all of the film before using the appliance for the first time.

NOTE: The adhesive must be removed from all parts before using the cooktop. It cannot be removed if it is baked on.

To assure no damage is done to the finish of the product, the safest way to remove the adhesive from packaging tape on new appliances is an application of a household liquid dishwashing detergent. Apply with a soft cloth and allow to soak.



Control Lock Pad

As a convenience, you can lock the entire cooktop at any time when it is not in use or before cleaning.

Locking the cooktop will prevent surface elements from being turned on accidentally.

Begin by locking the cooktop; see *Control Lock*, page 13.

Safety Instructions

Operating Instructions

Care and Cleaning

Troubleshooting Tips

Consumer Support

Cleaning the glass cooktop.



Clean your cooktop after each spill. Use CERAMA BRYTE® Ceramic Cooktop Cleaner.

Normal Daily Use Cleaning

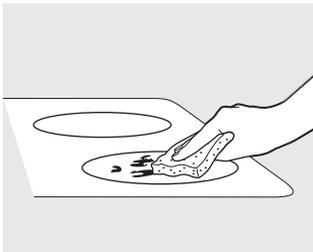
Use CERAMA BRYTE® Ceramic Cooktop Cleaner on the glass cooktop.

To maintain and protect the surface of your glass cooktop, follow these steps:

- 1 Before using the cooktop for the first time, clean it with CERAMA BRYTE® Ceramic Cooktop Cleaner. This helps protect the top and makes cleanup easier.
- 2 Daily use of CERAMA BRYTE® Ceramic Cooktop Cleaner will help keep the cooktop looking new.

- 3 Shake the cleaning cream well. Apply a few drops of CERAMA BRYTE® Ceramic Cooktop Cleaner directly to the cooktop.
- 4 Use a paper towel or CERAMA BRYTE® Cleaning Pad for Ceramic Cooktops to clean the entire cooktop surface.
- 5 Use a dry cloth or paper towel to remove all cleaning residue. No need to rinse.

NOTE: It is very important that you DO NOT heat the cooktop until it has been cleaned thoroughly.



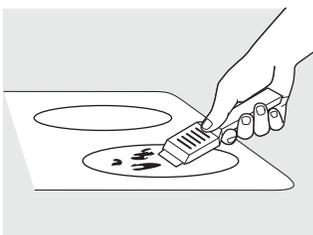
Use a CERAMA BRYTE® Cleaning Pad for Ceramic Cooktops or a Scotch-Brite® Multi-Purpose No Scratch blue scrub pad.

Burned-On Residue

WARNING: DAMAGE to your glass surface may occur if you use scrub pads other than the pad included with your cooktop.

- 1 Allow the cooktop to cool.
- 2 Spread a few drops of CERAMA BRYTE® Ceramic Cooktop Cleaner on the entire burned residue area.
- 3 Using the included CERAMA BRYTE® Cleaning Pad for Ceramic Cooktops, rub the residue area, applying pressure as needed.

- 4 If any residue remains, repeat the steps listed above as needed.
- 5 For additional protection, after all residue has been removed, polish the entire surface with CERAMA BRYTE® Ceramic Cooktop Cleaner and a paper towel.



The CERAMA BRYTE® Ceramic Cooktop Scraper and all recommended supplies are available through our Parts Center. See instructions under "To Order Parts" section on next page.

NOTE: Do not use a dull or nicked blade.

Heavy, Burned-On Residue

- 1 Allow the cooktop to cool.
- 2 Use a single-edge razor blade scraper at approximately a 45° angle against the glass surface and scrape the soil. It will be necessary to apply pressure to the razor scraper in order to remove the residue.
- 3 After scraping with the razor scraper, spread a few drops of CERAMA BRYTE® Ceramic Cooktop Cleaner on the entire burned residue area. Use the CERAMA BRYTE® Cleaning Pad to remove any remaining residue.

- 4 For additional protection, after all residue has been removed, polish the entire surface with CERAMA BRYTE® Ceramic Cooktop Cleaner and a paper towel.

Metal Marks and Scratches

- 1 Be careful not to slide pots and pans across your cooktop. It will leave metal markings on the cooktop surface.
These marks are removable using the CERAMA BRYTE® Ceramic Cooktop Cleaner with the CERAMA BRYTE® Cleaning Pad for Ceramic Cooktops.
- 2 If pots with a thin overlay of aluminum or copper are allowed to boil dry, the overlay may leave black discoloration on the cooktop.
This should be removed immediately before heating again or the discoloration may be permanent.

WARNING: Carefully check the bottom of pans for roughness that would scratch the cooktop.

Glass surface—potential for permanent damage.

Our testing shows that if you are cooking high sugar mixtures such as jelly or fudge and have a spillover, it can cause permanent damage to the glass surface unless the spillover is immediately removed.

Damage from Sugary Spills and Melted Plastic

- 1 Turn off all surface elements. Remove hot pans.
- 2 Wearing an oven mitt:
 - a. Use a single-edge razor blade scraper (CERAMA BRYTE® Ceramic Cooktop Scraper) to move the spill to a cool area on the cooktop.
 - b. Remove the spill with paper towels.
- 3 Any remaining spillover should be left until the surface of the cooktop has cooled.
- 4 Don't use the surface elements again until all of the residue has been completely removed.

NOTE: If pitting or indentation in the glass surface has already occurred, the cooktop glass will have to be replaced. In this case, service will be necessary.

To Order Parts

To order CERAMA BRYTE® Ceramic Cooktop Cleaner and the cooktop scraper, please call our toll-free number:

National Parts Center **800.626.2002**
CERAMA BRYTE® Ceramic Cooktop Cleaner# WX10X300
CERAMA BRYTE® Ceramic Cooktop Scraper# WX10X0302
Kit# WB64X5027
(Kit includes cream and cooktop scraper)
CERAMA BRYTE® Cleaning Pads for Ceramic Cooktops# WX10X350

Before you call for service...



Troubleshooting Tips

Save time and money! Review the charts on the following pages first and you may not need to call for service.

Problem	Possible Causes	What To Do
Surface elements will not maintain a rolling boil or cooking is slow	Improper cookware being used.	<ul style="list-style-type: none"> Use pans that are recommended for induction, have flat bottoms and match the size of the surface element.
Surface elements do not work properly	Cooktop controls improperly set.	<ul style="list-style-type: none"> Check to be sure the correct control is set for the surface element you are using.
Flashing "F"	Wrong pan type.	<ul style="list-style-type: none"> Use a magnet to check that cookware is induction compatible.
	Pan is too small.	<ul style="list-style-type: none"> Flashing "F"—pan size is below the minimum size for the element. See the <i>Using the correct size cookware</i> section.
	Pan not positioned correctly.	<ul style="list-style-type: none"> Center the pan in the cooking ring.
Scratches on cooktop glass surface	Incorrect cleaning methods being used.	<ul style="list-style-type: none"> Use recommended cleaning procedures. See the <i>Cleaning the glass cooktop</i> section.
	Cookware with rough bottoms being used or coarse particles (salt or sand) were between the cookware and the surface of the cooktop.	<ul style="list-style-type: none"> To avoid scratches, use the recommended cleaning procedures. Make sure bottoms of cookware are clean before use, and use cookware with smooth bottoms.
	Cookware has been slid across the cooktop surface.	
Areas of discoloration on the cooktop	Food spillovers not cleaned before next use.	<ul style="list-style-type: none"> See the <i>Cleaning the glass cooktop</i> section.
	Hot surface on a model with a light-colored glass cooktop.	<ul style="list-style-type: none"> This is normal. The surface may appear discolored when it is hot. This is temporary and will disappear as the glass cools.
Plastic melted to the surface	Hot cooktop came into contact with plastic placed on the hot cooktop.	<ul style="list-style-type: none"> See the <i>Glass surface – potential for permanent damage</i> section in the <i>Cleaning the glass cooktop</i> section.
Pitting (or indentation) of the cooktop	Hot sugar mixture spilled on the cooktop.	<ul style="list-style-type: none"> Call a qualified technician for replacement.
Unresponsive keypad	Keypad is dirty.	<ul style="list-style-type: none"> Clean the keypad.
	A fuse in your home may be blown or the circuit breaker tripped.	<ul style="list-style-type: none"> Replace the fuse or reset the circuit breaker.

Problem	Possible Causes	What To Do
Pan detection/sizing not working properly	Improper cookware being used.	<ul style="list-style-type: none"> Use a flat induction capable pan that meets the minimum size for the element being used. See the <i>Using the correct size cookware</i> section.
	Pan is improperly placed.	<ul style="list-style-type: none"> Make sure the pan is centered on the corresponding surface element.
	Cooktop control improperly set.	<ul style="list-style-type: none"> Check to see that the control is set properly.
Display flashing "E" alone (no other letter)	A hardware error has occurred.	<ul style="list-style-type: none"> Call for service.
Display flashing "E" alternating to "c"	Keypad Error, indicating keypad cleaning is needed.	<ul style="list-style-type: none"> Clean the keypad area. Wipe up spills or remove utensils from the keypad area.
Display flashing "E" alternating to "o"	Over Temperature, indicating over temperature of a surface element or electronics.	<ul style="list-style-type: none"> Remove an empty pan from the surface element. Allow the cooktop to cool down approximately 30 minutes. Check to be sure ventilation to the cooling system below the cooktop is not blocked.

Consumer Support	Troubleshooting Tips	Care and Cleaning	Operating Instructions	Safety Instructions
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Notes.

GE Service Protection Plus™

GE, a name recognized worldwide for quality and dependability, offers you Service Protection Plus™—comprehensive protection on all your appliances—**No Matter What Brand!**

Benefits Include:

- Backed by GE
- All brands covered
- Unlimited service calls
- All parts and labor costs included
- No out-of-pocket expenses
- No hidden deductibles
- One 800 number to call

***We'll Cover Any
Appliance. Anywhere.
Anytime.****

You will be completely satisfied with our service protection or you may request your money back on the remaining value of your contract. No questions asked. It's that simple.

Protect your refrigerator, dishwasher, washer and dryer, range, TV, VCR and much more—**any brand!** Plus there's no extra charge for emergency service and low monthly financing is available. Even icemaker coverage and food spoilage protection is offered. You can rest easy, knowing that all your valuable household products are protected against expensive repairs.

Place your confidence in GE and call us in the U.S. toll-free at **800.626.2224** for more information.

*All brands covered, up to 20 years old, in the continental U.S.



Please place in envelope and mail to:

General Electric Company
Warranty Registration Department
P.O. Box 32150
Louisville, KY 40232-2150

Consumer Product Ownership Registration

Dear Customer:

Thank you for purchasing our product and thank you for placing your confidence in us.

We are proud to have you as a customer!

Follow these three steps to protect your new appliance investment:

1

Complete and mail your Consumer Product Ownership Registration today. Have the peace of mind of knowing we can contact you in the unlikely event of a safety modification.

2

After mailing the registration below, store this document in a safe place. It contains information you will need should you require service. Our service number is 800.GE.CARES (800.432.2737).

3

Read your Owner's Manual carefully. It will help you operate your new appliance properly.

Model Number

Serial Number

Important: If you did not get a registration card with your product, detach and return the form below to ensure that your product is registered, or register online at ge.com.

 Cut here

Consumer Product Ownership Registration



Model Number

Serial Number

Mr. Ms. Mrs. Miss

First Name

Last Name

Street Address

Apt. #

E-mail Address*

City

State

Zip Code

Date Placed In Use
Month

Day

Year

Phone Number

* Please provide your e-mail address to receive, via e-mail, discounts, special offers and other important communications from GE Appliances (GEA).

Check here if you do not want to receive communications from GEA's carefully selected partners.

FAILURE TO COMPLETE AND RETURN THIS CARD DOES NOT DIMINISH YOUR WARRANTY RIGHTS.

For more information about GEA's privacy and data usage policy, go to ge.com and click on "Privacy Policy" or call 800.626.2224.



GE Consumer & Industrial Appliances
General Electric Company
Louisville, KY 40225
ge.com

Please place in envelope and mail to:
Veuillez mettre dans une enveloppe et envoyez à :

**OWNERSHIP REGISTRATION
P.O. BOX 1780
MISSISSAUGA, ONTARIO
L4Y 4G1**

(FOR CANADIAN CONSUMERS ONLY)



Geospring™ Hybrid Electric Residential Water Heaters

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Installation Instructions 14-18

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*ENERGY STAR® labeled product



As an ENERGY STAR® partner, GE has determined that this product meets the ENERGY STAR® guidelines for energy efficiency.

Write the model and serial numbers here:

Model # _____

Serial # _____

You can find them on the rating label on the front side of your water heater.

Owner's Manual & Installation Instructions

GEH50DNSRSA
GEH50DXSRGA

Chauffe-eau résidentiel hybride électrique

**Manuel d'utilisation
et d'installation**

La section française commence à la page 23

Calentadores de agua residenciales eléctricos híbridos

**Manual del propietario
e instalación**

La sección en español empieza en la página 51

IMPORTANT SAFETY INFORMATION. READ ALL INSTRUCTIONS BEFORE USING.

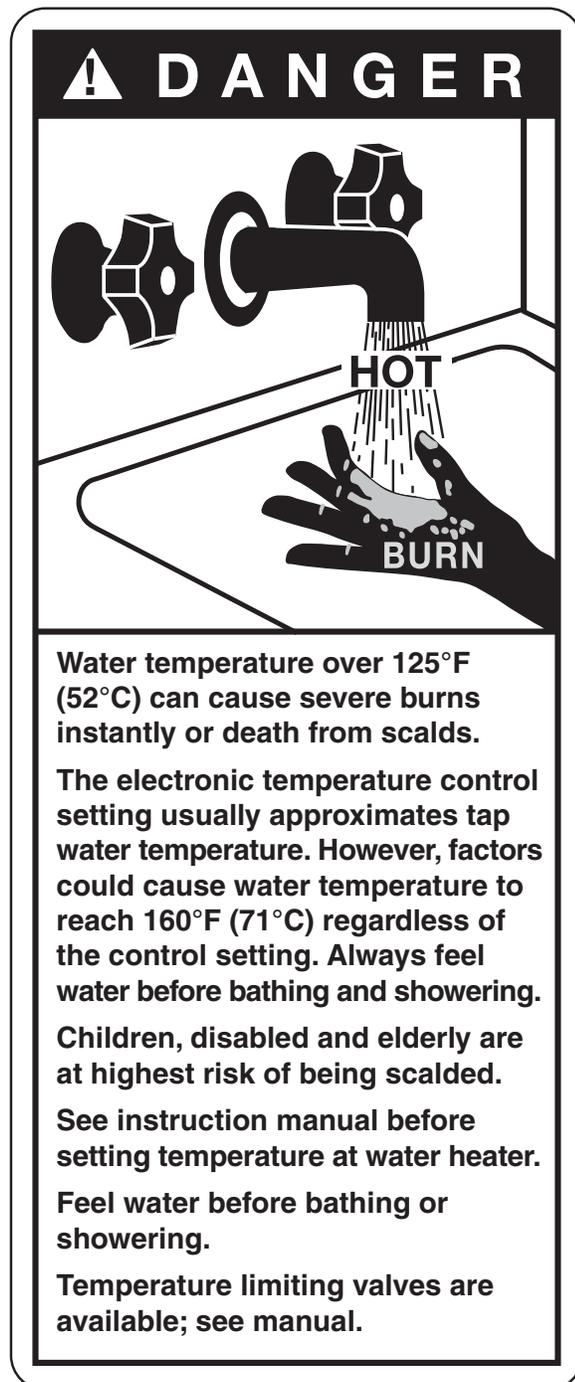
⚠ WARNING!

For your safety, the information in this manual must be followed to minimize the risk of fire or explosion, electric shock, or to prevent property damage, personal injury, or loss of life.

Be sure to read and understand the entire Owner's Manual before attempting to install or operate this water heater. It may save you time and cost. Pay particular attention to the Safety Instructions. Failure to follow these warnings could result in serious bodily injury or death. Should you have problems understanding the instructions in this manual, or have any questions, STOP and get help from a qualified service technician or the local electric utility.

WATER TEMPERATURE ADJUSTMENT

Safety and energy conservation are factors to be considered when selecting the water temperature setting via the water heater's user interface. Water temperatures above 125°F can cause severe burns or death from scalding. Be sure to read and follow the warnings outlined on the label pictured below. This label is also located on the water heater near the top of the tank.



⚠ DANGER

HOT

BURN

Water temperature over 125°F (52°C) can cause severe burns instantly or death from scalds.

The electronic temperature control setting usually approximates tap water temperature. However, factors could cause water temperature to reach 160°F (71°C) regardless of the control setting. Always feel water before bathing and showering.

Children, disabled and elderly are at highest risk of being scalded.

See instruction manual before setting temperature at water heater.

Feel water before bathing or showering.

Temperature limiting valves are available; see manual.

Mixing valves for reducing point-of-use water temperature by mixing hot and cold water in branch water lines are available. Contact a licensed plumber or the local plumbing authority for further information.

Time/Temperature Relationship in Scalds

Temperature	Time to Produce a Serious Burn
120°F (49°C)	More than 5 minutes
125°F (52°C)	1-1/2 to 2 minutes
130°F (54°C)	About 30 seconds
135°F (57°C)	About 10 seconds
140°F (60°C)	Less than 5 seconds
145°F (63°C)	Less than 3 seconds
150°F (66°C)	About 1-1/2 seconds
155°F (68°C)	About 1 second

Table courtesy of Shriners Burn Institute

The chart shown above may be used as a guide in determining the proper water temperature for your home.

NOTE: Households with small children, disabled or elderly persons may require a 120°F (49°C) or lower thermostat setting to prevent contact with "HOT" water.

⚠ DANGER: There is a Hot Water SCALD Potential if the control water temperature is set too high.

⚠ WARNING: Hydrogen gas can be produced in a hot water system served by this water heater that has not been used for a long period of time (generally two weeks or more). HYDROGEN GAS IS EXTREMELY FLAMMABLE!! To dissipate such gas and to reduce risk of injury, it is recommended that the hot water faucet be opened for several minutes at the kitchen sink before using any electrical appliance connected to the hot water system. If hydrogen is present, there will be an unusual sound such as air escaping through the pipe as the water begins to flow. Do not smoke or use an open flame near the faucet at the time it is open.

⚠ WARNING!

Risk of Fire - DO NOT store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance. Keep rags and other combustibles away.

⚠ FOR INSTALLATIONS IN THE STATE OF CALIFORNIA

California Law requires that residential water heaters must be braced, anchored or strapped to resist falling or horizontal displacement due to earthquake motions. For residential water heaters up to 52 gallon (236.4 L) capacity, a brochure with generic earthquake bracing instructions can be obtained from: Office of the State Architect, 400 P Street, Sacramento, CA 95814 or you may call 916.324.5315 or ask a water heater dealer.

However, applicable local codes shall govern installation. For residential water heaters of a capacity greater than 52 gallons (236.4 L) consult the local building jurisdiction for acceptable bracing procedures.

California Proposition 65 Warning: This product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.



**READ AND FOLLOW THIS SAFETY INFORMATION CAREFULLY.
SAVE THESE INSTRUCTIONS**

Operating the water heater.

⚠ WARNING:

If the water heater has been subjected to flood, fire, or physical damage, turn off power and water to the water heater.

Do not operate the water heater again until it has been thoroughly checked by qualified service personnel.

Safety Precautions

- A. Do** turn off power to water heater if it has been subjected to overheating, fire, flood or physical damage.
- B. Do Not** turn on water heater unless it is filled with water.
- C. Do Not** turn on water heater if cold water supply shut-off valve is closed.

NOTE: *Flammable vapors may be drawn by air currents from surrounding areas to the water heater.*

- D.** If there is any difficulty in understanding or following the Operating Instructions or the Care and Cleaning section, it is recommended that a qualified person or serviceman perform the work.

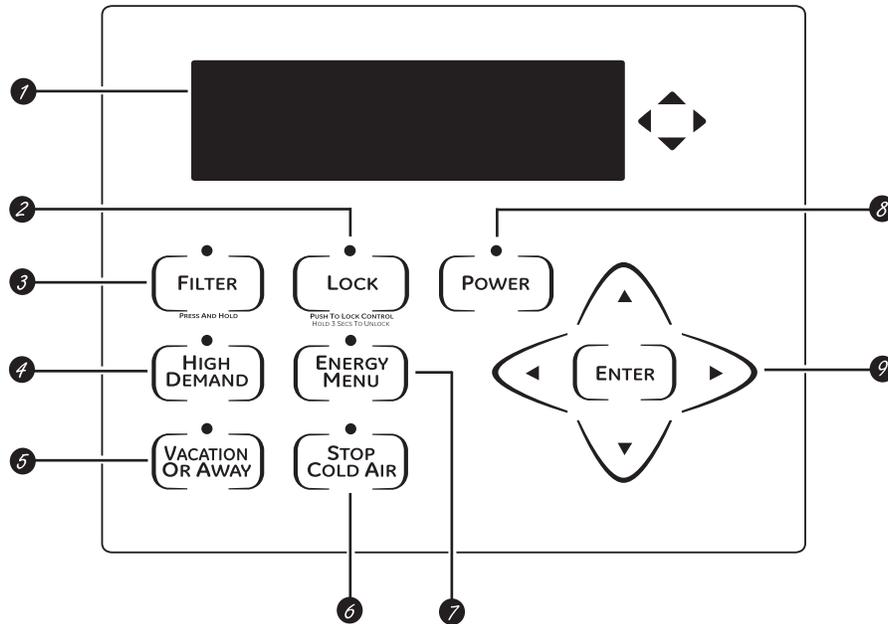
Safety Controls

The water heater is equipped with two temperature-limiting controls (TCOs) that are located above the heating element in contact with the tank surface. If for any reason the water temperature becomes excessively high, the temperature-limiting control (TCO) breaks the power circuit to the heating element. Once the control opens, it must be reset manually. Resetting of the temperature limiting controls should be done by a qualified service technician.

⚠ CAUTION: *The cause of the high temperature condition must be investigated by a qualified service technician and corrective action must be taken before placing the water heater in service again.*

To reset the temperature-limiting control:

- 1.** Turn off the power to the water heater.
- 2.** Remove the jacket access panel(s) and insulation.
The thermostat protective cover should not be removed.
- 3.** Press the red RESET button.
- 4.** Replace the insulation and jacket access panel(s) before turning on the power to the water heater.



Controls

1 *Display*

2 *Lock*

Press and hold this button for 3 seconds to lock or unlock the water heater touch button controls. Green light is illuminated when the controls are locked.

3 *Filter*

The filter is dirty and requires cleaning when the Red light is illuminated. Filter is located on top of the water heater. Press button to reset filter alarm.

4 *High Demand*

Use this button when extra hot water is needed. This feature increases the speed that the water is heated using more electricity. Green light is illuminated when feature is on.

5 *Vacation Or Away*

Use this button during times of no water usage, such as vacation for an extended period of time. Feature will reduce the energy used during the absence. Green light is illuminated when feature is on.

6 *Stop Cold Air*

Use this button to temporarily stop cold air coming from the unit or to stop fan noise. However, the unit will use more electricity, so this mode should generally be used only for short periods of time. Green light is illuminated when feature is on.

7 *Energy Menu*

Change the water heater Operating Modes by pressing this button. You can also change the temperature display from °F to °C and view FAQs.

8 *Power*

Use this button to activate or deactivate all heating sources on this product. **NOTE:** The user interface will still function when the power button is off.

9 *Arrow Pads*

Use the up, down, left and right arrows to navigate through menus or to change the water temperature.

Turning on the water heater.

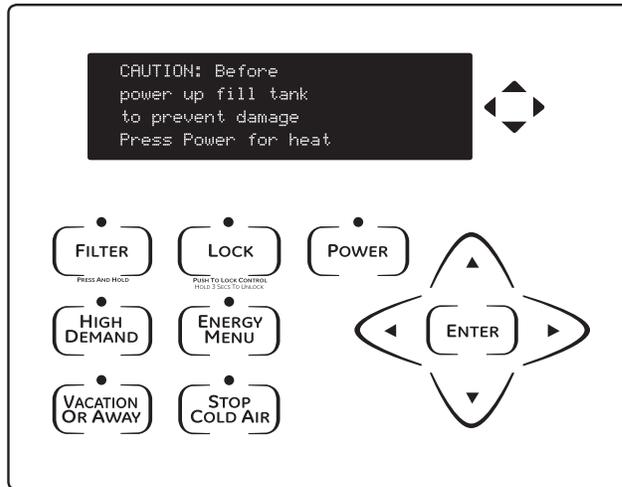
The first time you press the power button and the water heater is powered on, the screen will ask for confirmation that the tank has been filled with water. The tank must be full of water before the heater is turned on to prevent damage.

The water heater warranty does not cover damage or failure resulting from operation with an empty or partially empty tank. (Refer to the Certificate of Limited Warranty for complete terms and conditions.)

If the tank has NOT been filled, vent and fill tank with water before pressing the **POWER** button again.

- Make sure the drain valve is completely closed.
- Open the shut-off valve in the cold water supply line.
- Open each hot water faucet slowly to allow the air to vent from the water heater and piping.
- A steady flow of water from the hot water faucet(s) indicates a full water heater.

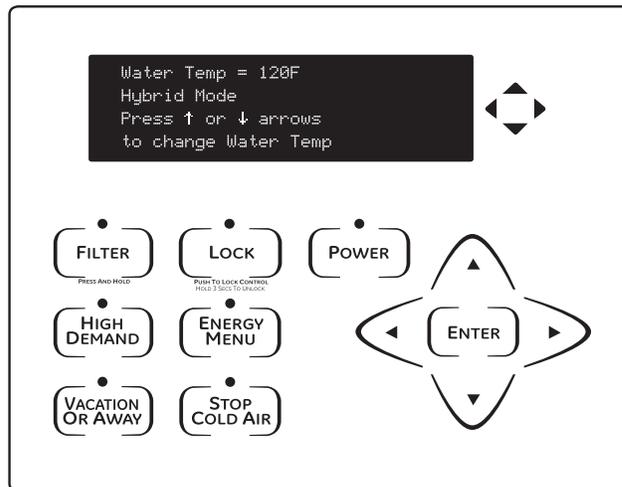
After the tank has been filled with water, press the **POWER** button again.



Once the water heater has been powered on, the main screen will be shown. The display will show the current water temperature setting and the current operating mode for the water heater.

To comply with safety regulations, the controls are factory preset to 120°F (49°C) and Hybrid Mode. It is recommended that the unit be set to eHeat™

mode to maximize energy savings. Operating in Hybrid mode provides a balance of energy savings and hot water use convenience. Reported energy consumption is based on operating the unit in Hybrid mode at a temperature setting of 135°F (57°C), and operation at lower temperature settings or in eHeat™ mode will provide even greater energy savings.



If the display goes blank, press any key to reactivate the display. To go back to the default (**HOME**) screen, press the left arrow button until the default (**HOME**) screen appears.

The temperature of the water in the water heater can be regulated by adjusting the temperature setting up or down using arrow keys on the control panel.

Safety, energy conservation and hot water capacity are factors to be considered when selecting the water temperature setting of the water heater. To comply with safety regulations, the water temperature setpoint is factory set at 120°F (49°C). This is the recommended starting temperature setting. NOTE: GE GeoSpring™ Hybrid Water heater's energy savings claims are based on a 135°F (57°C) temperature setting because, according to US Dept of Energy, the average residential water heater in the US is set at 135°F (57°C). Therefore, the water temperature setpoint can be raised from the factory setting of 120°F to 135°F (49°C to 57°C) without sacrificing the claimed energy savings. If a lower temperature setting than 135°F (57°C) is used, slightly greater savings in energy and operating costs may be achieved.

If more hot water capacity is desired, increasing the temperature from 120°F to 135°F (49°C to 57°C) will enable the same tank of hot water to last about 25% longer because more cold water is mixed in at the shower or faucet.

Adjust the water temperature setpoint as needed, always being aware of scald risk.

Water temperatures above 125°F (52°C) can cause severe burns or death from scalding. Be sure to read and follow the warnings outlined in this manual and on the label on the water heater. This label is located on the water heater near the upper element access panel.

Mixing valves for reducing point-of-use water temperature by mixing hot and cold water in branch water lines are available. Contact a licensed plumber or the local plumbing authority for further information.

The chart below may be used as a guide in determining the proper water temperature for your home.

⚠ DANGER: *There is a hot water scald potential if the water temperature is set too high. Households with small children, disabled, or elderly persons may require a 120°F (49°C) or lower thermostat setting to prevent contact with HOT water.*

Time/Temperature Relationship in Scalds

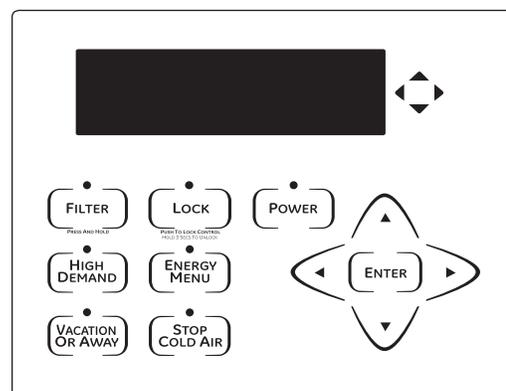
Temperature	Time to Produce a Serious Burn
120°F (49°C)	More than 5 minutes
125°F (52°C)	1-1/2 to 2 minutes
130°F (54°C)	About 30 seconds
135°F (57°C)	About 10 seconds
140°F (60°C)	Less than 5 seconds
145°F (63°C)	Less than 3 seconds
150°F (66°C)	About 1-1/2 seconds
155°F (68°C)	About 1 second

Table courtesy of Shriners Burn Institute

To Adjust the Temperature

Press the **UP** or **DOWN** arrow on the control panel key pad. You will be asked to press the **ENTER** key to acknowledge that increasing temperature increases scald risk. Then the temperature can be increased or decreased by pressing the **UP** or **DOWN** arrows. After the desired temperature setting has been achieved, you can press **ENTER** to accept or simply walk away. (After 3 seconds of no key presses, the control will accept the new temperature setting.)

⚠ DANGER: *There is a Hot Water SCALD Potential if the water temperature is set too high. 120°F (49°C) is the recommended starting point for water temperature setting, but it can be adjusted to any temperature between 100°F and 140°F (38°C and 60°C).*



Operational Modes.

This water heater defaults to the Hybrid operating mode. Available modes are listed below and can be found under the ENERGY MENU button.

eHeat™ Mode—RECOMMENDED FOR MAXIMUM SAVINGS

eHeat™ is the most energy-efficient mode for this water heater. It takes heat from the surrounding air to heat the water. The time it takes to heat the water is longer in this mode, so it may NOT be sufficient if you have a high-demand situation such as a large household or company.

Standard Electric Mode

This mode uses only the upper and lower heating resistance elements to heat the water. The time it takes to heat the water is less in this mode, but it is the LEAST energy-efficient mode.

Hybrid Mode

Hybrid mode combines the energy efficiency of eHeat™ with the recovery speed and power of the Standard Electric mode, with normal water usage. Hybrid mode will allow the unit to perform like a standard electric water heater while providing significant energy savings.

NOTE: Reported unit performance, energy consumption and savings are based on Hybrid Mode operation at a temperature setting of 135°F (57°C).

High Demand

This mode may be necessary if your household has a higher-than-average water usage or the unit is undersized for the household water demands. In this mode, the unit will use the electric heating

elements only when the water demand is higher than normal. When using the heating elements, the water temperature will recover at a faster rate but it will take more energy to heat it. Unlike Standard Electric mode, it will use the heating elements only when needed.

To access any of these modes:

- 1 Press the **ENERGY MENU** button and then press **ENTER**.
- 2 Select "Operating Modes" on the menu list and press **ENTER**.
- 3 Select the desired operating mode by using the **UP** and **DOWN** arrow buttons and then press **ENTER** again.

To cancel and return to the main energy menu:

Press the **LEFT** arrow button.

General navigation of energy menu:

- 1 For more information on each mode, while the mode is highlighted, press the **RIGHT** arrow button to read a description.
- 2 Use the **UP** and **DOWN** arrow buttons to scroll through the description screens.
- 3 Use the **LEFT** arrow button to return to the "Operating Modes" menu list.

Vacation Or Away

This feature is used when you will be away from the home for an extended period of time and hot water is not needed. In this mode, the unit will drop the water temperature down to 50°F (10°C) and will use the most efficient heating mode to conserve energy while the heater is sitting idle. The unit will automatically resume heating one day before your return, so that hot water will be available.

For example if you will be gone 14 days, press the **VACATION OR AWAY** button, press the **UP** arrow button until the display reads 14 days (the default is 7 days) and press **ENTER**. The unit will drop the water temperature down to 50°F (10°C) for 13 days. At the end of the 13th day, it will automatically return to the previous operating mode and heat the water to the original temperature setting.

The green light will be illuminated when this feature is on.

Stop Cold Air

The Hybrid and eHeat™ modes save energy by using heat from the air to heat the water. The warm air is pulled through the system by fans and is then cooled. That cool air then moves out the back of the heater.

You can temporarily stop the cold air and fan noise coming from the unit by pressing the **STOP COLD AIR** button.

To adjust the number of days this feature will be on, simply use the **UP** and **DOWN** arrow buttons and press **ENTER** (the default is 3 days). The unit will automatically return to the previous operating mode after the number of days selected has passed.

This mode should only be used on a temporary basis because you do NOT get the energy savings while in this mode.

The green light will be illuminated when this feature is on.

High Demand (on some models)

This mode may be necessary if your household has a higher-than-average water usage or the unit is undersized for the household water demands.

In this mode, the unit will use the electric heating elements only when the water demand is higher than normal. When using the heating elements, the water temperature will recover at a faster rate but it will take more energy to heat it.

Unlike Standard Electric mode, it will use the heating elements only when needed.

The green light will be illuminated when this feature is on.

Control Lock

The control pad can be locked out to prevent accidental key presses.

Simply press and hold the **LOCK** button for three seconds. The display will show "controls are locked" and the green light will be illuminated when this feature has been activated. No other key presses will be allowed when the controls are locked.

To deactivate the lock, press and hold the **LOCK** pad for three seconds. The green light will fade and the screen will go to the default display.

Using the Energy Menu.

The Energy Menu is also used to change the water heater operating modes, to convert the temperature display from °F to °C, or to view the FAQs. There is also a Diagnostic Menu that is only accessible to a certified service technician or plumber in the event service is needed.

Operating Modes

Use this option to change between eHeat™, Hybrid, Standard Electric and High Demand modes (described on page 8).

- 1 To access any of these modes, press the **ENERGY MENU** button and then press **ENTER**.
- 2 Select Operating Modes on the menu list and press **ENTER**.
- 3 Select the desired operating mode by using the **UP** or **DOWN** arrow buttons and then pressing **ENTER** again.
- 4 To cancel and return to the main Energy Menu, press the **LEFT** arrow button.
- 5 To get more information on each mode, while the mode is highlighted, press the **RIGHT** arrow button to read a description.
- 6 Use the **UP** or **DOWN** arrow buttons to scroll through the description screens.
- 7 Use the **LEFT** arrow button to return to the Operating Mode menu list.

°F and °C Conversion

The water temperature display will default to °F. To show the temperatures in °C, press the **ENERGY MENU** button; then press **ENTER**. These settings will be remembered and returned following a power outage.

- 1 Press the **DOWN** arrow button to go to "Choose °F and °C" and press **ENTER**.
- 2 Press **ENTER** to change from °F to °C. The main screen will then be shown with the temperature in °C.
- 3 To cancel and return to the main Energy Menu, press the **LEFT** arrow button.

NOTE: To change back to °F, repeat Steps 1 and 2.

Frequently Asked Questions

This menu item answers basic questions on cold air, the filter, operating modes and noise. All of this information is covered in this Use and Care manual. If this manual is misplaced, you can refer to this section for answers.

- 1 To access the FAQs, press the **ENERGY MENU** button and then press **ENTER**.
- 2 Press the **DOWN** arrow pad to go to "FAQs" and then press **ENTER**.

There are four question categories:

Cold Air:

Q: Why is there cold air?

A: Hybrid, eHeat™ and High Demand modes save energy by using heat from the air to heat the water and thereby cooling the surrounding air. This gives sizable energy savings.

Q: How to stop cold air?

A: Press the **STOP COLD AIR** button on the keypad. This reduces the efficiency of the heater. Unit will change back to previous mode after number of days selected.

Filter:

Q: Why is there a filter?

A: In Hybrid and eHeat™ the unit moves air through the system. The filter protects the unit from dirt. A clean air filter improves efficiency.

Q: How to clean the filter?

A: Leave power on and remove filter from top of unit. Filter can be wiped clean or rinsed with warm water. A dirty filter will reduce water heater efficiency!

Modes:

Q: What is High Demand?

A: High Demand can be used when hot water usage is higher than normal. The unit will be less efficient but will heat water faster in response to long water draws. For all normal draws, the unit will still use efficient eHeat™.

Q: What is Stop Cold Air?

A: This mode will stop cold air temporarily but reduces the efficiency of the heater. The unit will change back to the previous mode after the number of days selected.

Q: What is Vacation Or Away?

A: If you are gone for an extended period, this mode lowers the water temperature to reduce energy used. Unit will switch to the previous mode one day before you get back.

Q: What is eHeat™?

A: eHeat™ is the most-efficient mode. It takes heat from the air to heat water, thereby cooling the surrounding air. Slower recovery but most-efficient mode.

Q: What is Hybrid?

A: The Hybrid mode combines benefits of eHeat™ with the speed and power of Standard Electric. This provides great performance with less energy.

Q: What is Standard Electric?

A: Standard Electric mode uses only the resistance heaters to heat the water. This gives faster hot water recovery than Hybrid mode, but uses more energy.

Noise:

Q: Why is the unit noisy?

A: In the most energy-efficient modes, eHeat™, Hybrid and High Demand, the method used to heat the water generates some noise. Some amount of fan noise is normal.

3 Use the **UP** or **DOWN** arrow buttons to select the category that pertains to your question and press **ENTER**.

4 To cancel and return to the main Energy Menu, press the **LEFT** arrow button.

5 Once the category is selected, use the **UP** or **DOWN** arrow buttons to select the desired questions and press **ENTER**.

6 Use the **UP** or **DOWN** arrow buttons to read through the information screens.

7 When done, press the **LEFT** arrow button to return to the FAQs menu.

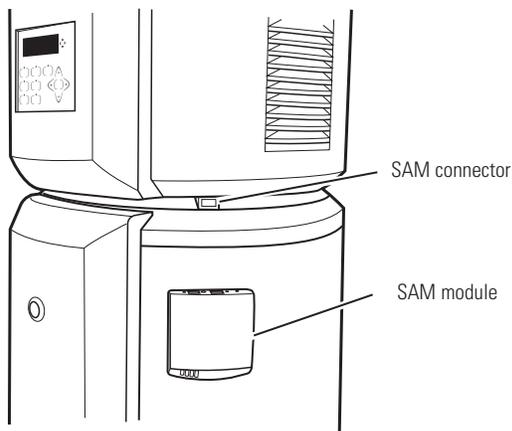
The Hybrid Electric heat pump water heater is compatible with the **GE Smart Appliance module (SAM)** which can be purchased separately. Contact your local utility or visit www.GEAppliances.com/Smart-Appliance to see if your area is using **SAM** technology.

The following demand response features are available as part of a pilot test program with the local utility company to help consumers reduce peak electricity usage in the home.

INSTALLATION

The SAM module is equipped with magnets in the base of the module that will enable it to be attached to the painted metal exterior of the heat pump water heater.

Details on how to connect the cables to the module are in the instructions that come with the module.



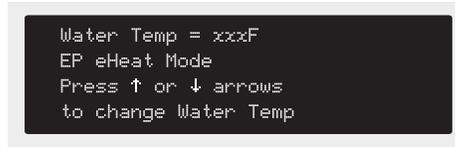
Once the cable from the SAM module is plugged into the water heater's connection, follow the power-up directions included with the SAM module. As soon as the SAM module is operating, the heat pump water heater is ready to receive the SAM signals.

QUICK GUIDE

If your local utility company is utilizing SAM technology, the SAM module will receive the signals sent from your utility company. One of four signals will be sent: "Low" represents that the lowest energy cost rate is available, "Medium" and "High" signals represent increasing energy cost steps, and the Critical signal represents "peak rate" energy. A heat pump water heater equipped with a SAM module will automatically recognize what energy cost rate is available and adjust its mode and temperature setting to use less energy when rates are medium, high and critical. When the heat pump water heater responds to these signals, it will display the letters "EP" in the screen, along with other information, indicating that energy pricing periods are in effect.

When the signal is low or when no SAM module is connected, the unit runs as normal. The following steps show how the unit reacts to Medium, High and Critical signal levels.

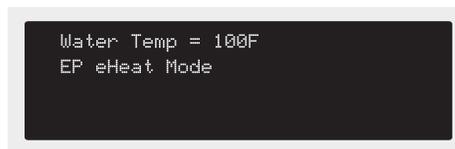
When the SAM signal is **Medium**, the control will operate in eHeat™ Mode and the water temperature will remain at the current user setting. The screen will display the following (where xxx is the current user temperature setting):



When the SAM signal is **High**, the control will operate in eHeat™ mode, with a water temperature setting of 110°F (43°C), and the screen will display:



When the SAM signal is **Critical**, the control will operate in eHeat™ mode, with a water temperature setting of 100°F (38°C), and the screen will display:



Notice: Appliance SAM connection carries voltage not compatible to computers or accessories. Do NOT plug laptops, modems, routers, etc into the Appliance RJ45 SAM connector. Use only with designated GE Appliance Accessories. Connection to computers and accessories may result in product damage.

Care and cleaning of the water heater.

Routine Preventive Maintenance

⚠ DANGER: Before manually operating the relief valve, make certain no one will be exposed to the danger of coming in contact with the hot water released by the valve. The water may be hot enough to create a scald hazard. The water should be released into a suitable drain to prevent injury or property damage.

NOTE: If the temperature and pressure-relief valve on the hot water heater discharges periodically, this may be due to thermal expansion in a closed water system. Contact the water supplier or your plumbing contractor on how to correct this. Do not plug the relief valve outlet.

Properly maintained, your water heater will provide years of dependable trouble-free service.

It is suggested that a routine preventive maintenance program be established and followed by the user.

Temperature and Pressure-Relief Valve:

At least once a year, lift and release the lever handle on the temperature and pressure-relief valve, located on the back-right side of the water heater, to make certain the valve operates freely. Allow several gallons to flush through the discharge line to an open drain.

Periodic Inspection:

It is further recommended that a periodic inspection of the operating controls, heating elements and wiring should be made by service personnel qualified in electric appliance repair.

Most electrical appliances, even when new, make some sound when in operation. If the hissing or singing sound level increases excessively, the electric heating element may require cleaning. Contact a qualified installer or plumber for inspection.

Flushing Tank:

A water heater's tank can act as a settling basin for solids suspended in the water. It is therefore not uncommon for hard water deposits to accumulate in the bottom of the tank. To clean the tank of these deposits, open the drain valve located under the large decorative cover near the bottom of the unit and drain a few quarts of water from the water heater every month. This should be done with the cold water supply open such that water removed through drain valve is replaced, and water supply flow helps to remove sediment.

Draining the Water Heater

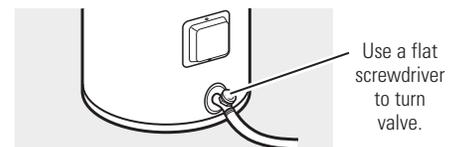
⚠ CAUTION: Shut off power to the water heater before draining water.

⚠ DANGER: Before manually operating the relief valve, make certain no one will be exposed to the hot water released by the valve. The water drained from the tank may be hot enough to present a scald hazard and should be directed to a suitable drain to prevent injury or damage.

Attach a garden hose to the drain valve located at the bottom of the unit and direct that hose to a drain. The decorative front cover must be removed to access the valve.

In order to drain the water heater completely, turn off the cold water supply. Open a hot water faucet or lift the handle on the relief valve to admit air to the tank.

Open the drain valve.



Vacation and Extended Shutdown

If the water heater is to remain idle for an extended period of time, the power and water to the appliance should be turned off to conserve energy and prevent a buildup of dangerous hydrogen gas.

The water heater and piping should be drained if they might be subjected to freezing temperatures.

After a long shutdown period, the water heater's operation and controls should be checked by qualified service personnel. Make certain the water heater is completely filled again before placing it in operation.

NOTE: Refer to the Hydrogen Gas Caution in the Operating Instructions.

Cleaning the Filter

In the Hybrid, eHeat™ and High Demand modes, the heater moves air through the system and out the back of the unit. The filter is in place to protect the evaporator from dirt and dust.

A clean air filter is important to get the highest efficiency. Occasionally this filter will need to be cleaned (minimum is once a year). When the filter requires cleaning, the Red light above the Filter button will be illuminated and an audible beep will sound. The screen will display instructions that the filter needs to be cleaned. When this screen is displayed, you can press the **RIGHT** arrow button for instructions on how to clean the filter.

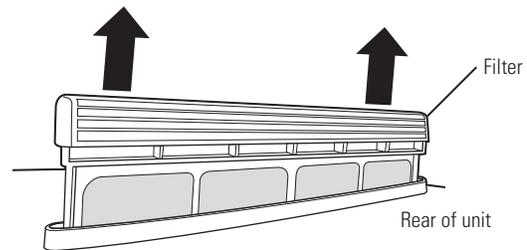
NOTE: If the filter gets too dirty, the unit will automatically switch to Standard Electric mode and energy savings will be lost.

Leave the power on and remove the filter from the top of the unit. It is located in the top of the unit behind the hot and cold inlet pipes. Grasp the plastic handle and slide the filter straight up until it clears the cover. Once it has been removed, the filter can be wiped clean with a damp rag or rinsed with warm water.

Once the filter has been cleaned, it can be replaced by aligning it into the slot in the top of the unit and sliding it down into place. When the handle is flush with the top of the cover, it is seated.

When the clean filter has been reinstalled, press the **FILTER** button and then press **ENTER**.

IMPORTANT: Filter must be cleaned when the alarm is displayed. A dirty filter will make the system work harder and result in a reduction of efficiency and possible damage to the system. In order to get the best energy efficiency available, make sure your filter is clean.



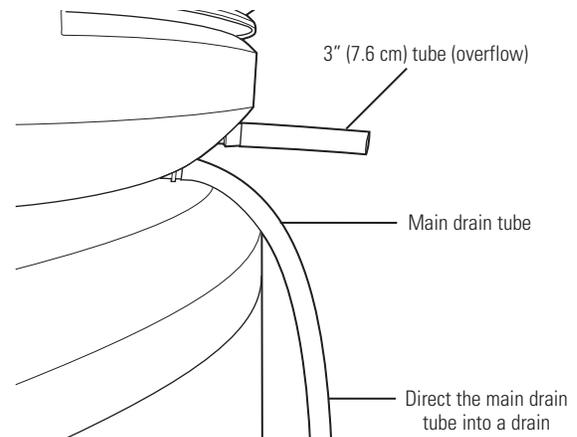
Clearing the Condensation Drain Tubes

There are two drain hoses that are attached to the back of the heater. If both of these get clogged, water will spill down the outside of the unit.

The primary drain is intended to carry all condensate away. If it is clogged or if the hose is kinked, the condensate will exit the secondary drain tube and onto the floor. This is intended as a notification to the user that the primary drain is clogged. Remove the drain hose, clear any debris and reattach.

Periodically inspect the drain lines and clear any debris that may have collected in the lines.

See Installation Instructions for more information.



Anode Rod

The anode rod should be removed from the water heater's tank and inspected annually, and replaced when more than 6" (15.2 cm) of core wire is exposed at either end of the rod.

Due to shock hazard and to prevent accidental water leaks, this inspection should be done by a qualified servicer or plumber, and requires that the cold water supply is turned off before removing the anode rod.

NOTICE: Do not remove the anode rod from the water heater's tank except for inspection and/or replacement, as operation with the anode rod removed will shorten the life of the glass-lined tank and will exclude warranty coverage.

Installation Instructions

Water Heater Models GEH50DNSRSA and GEH50DXSRGA

The location chosen for the water heater must take into consideration the following:

LOCAL INSTALLATION REGULATIONS

This water heater must be installed in accordance with these instructions, local codes, utility codes, utility company requirements or, in the absence of local codes, the latest edition of the National Electrical Code. It is available from some local libraries or can be purchased from the National Fire Prevention Association, Batterymarch park, Quincy, MA 02169 as booklet ANSI/NFPA 70.

POWER REQUIREMENTS

Check the markings on the rating plate of the water heater to be certain the power supply corresponds to the water heater requirements.

LOCATION

Locate the water heater in a clean dry area as near as practical to the area of greatest heated water demand. Long uninsulated hot water lines can waste energy and water.

NOTE: This unit is designed for any common indoor installation including: garage, utility room, attic, closet, etc. With the installation of a louvered door, it can be installed in rooms smaller than 10' x 10' x 7' (700 cu.ft.). Louvers should be 240 square inches (0.15 m²) or greater. If two louvers are used one should be near the top of the door.

Place the water heater in such a manner that the air filter, cover and front panels can be removed to permit inspection and servicing, such as removal of elements or cleaning of the filter.

The water heater and water lines should be protected from freezing temperatures and *high-corrosive atmospheres*. Do not install the water heater in outdoor, unprotected areas.

⚠ CAUTION: The water heater should not be located in an area where leakage of the tank or connections will result in damage to the area adjacent to it or to lower floors of the structure. Where such areas cannot be avoided, it is recommended that a suitable catch pan, adequately drained, be installed under the water heater.

LOCATION (CONT.)

WATER HEATER SIZING INFORMATION - READ BEFORE INSTALLING:

For existing home replacements:

- **Replacing an existing tank water heater?** If your current water heater has provided adequate hot water, and no other plumbing changes and/or renovations that would require additional hot water demand are in process or planned, then:
 - The GeoSpring Hybrid water heater can replace an equivalent size or smaller standard electric water heater.
 - If switching from gas to electric, the GeoSpring Hybrid water heater may replace the next size smaller gas tank water heater.

For new construction installation:

Residential Water Heater Sizing Guide

Family Size	Demand *	Gallon Capacity Recommended	
		Electric or GeoSpring	Gas
5+	High	100 (378.5 L)	75 (283.9 L)
	Avg or Low	80 (302.8 L)	50 (189.3 L)
3 to 4	High	80 (302.8 L)	50-75 (189.3-283.9 L)
	Avg or Low	50 (189.3 L)	40 (151.4 L)
2 to 3	High	50 (189.3 L)	40-50 (151.4-189.3 L)
	Avg or Low	40 (151.4 L)	40 (181.8 L)
1 to 2	High	40-50 (151.4-189.3 L)	40-50 (151.4-189.3 L)
	Avg or Low	30 (113.6 L)	30 (113.6 L)

*Assumptions for Avg or Low Demand household:

- Use of standard or low flow shower heads (2.5 gpm/11.4 L per minute or less)
- No showers with multiple shower heads and/or body jets.
- Standard bathtub (no oversized/jetted tubs)

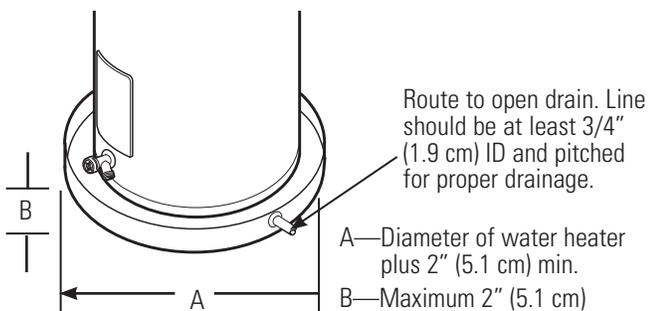
Water Heater Temperature Setpoint:

The water heater temperature setting strongly impacts the amount of hot water available for showers and baths.

- The average setting of water heaters in the USA is about 135°F (57°C), so energy consumption/savings and efficiency testing of water heaters, including the GeoSpring, is performed at a 135°F (57°C) setting.
- Safety regulations require a factory setting of 120°F to 125°F (49°C to 52°C) max for all new water heaters. Therefore, if your water heater is currently set at 130°F (54°C) or above and your new water heater is installed with a factory set setpoint of 120°F (49°C), the new water heater may seem to provide lower capacity than your existing water heater.
- The user can adjust the temperature setting to meet their needs. Always read and understand the safety instructions contained in the users manual before adjusting the temperature setpoint.

Installation Instructions

LOCATION (CONT.)

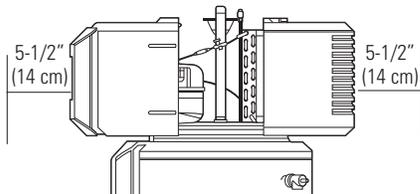


NOTE: Auxiliary catch pan **MUST** conform to local codes.

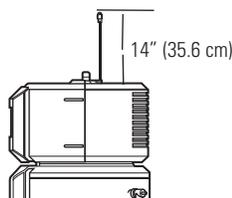
Catch Pan Kits are available from the store where the water heater was purchased, a builder store or any water heater distributor.

Required clearances:

There must be a 5-1/2" (14 cm) minimum (7"/17.8 cm recommended) clearance between any object and the Front and Rear covers in the event service is needed. A minimum of 3" (7.6 cm) clearance with the sides of the water heater is also recommended for service access.



A 14" (35.6 cm) minimum clearance is required to remove the filter for cleaning. The hot and cold water plumbing and electrical connections must not interfere with the removal of the filter.



Condensation drain

The unit has a condensate drain; therefore a drain must be available in close proximity to the unit. The drain must be no higher than 36" (91.4 cm) above the floor (laundry drain is acceptable).

If no drain is available, then a common condensate pump with a capacity no less than 1 gallon (3.8 L)/day must be purchased from a local builder supply store and installed.

THERMAL EXPANSION

Determine if a check valve exists in the inlet water line. It may have been installed in the cold water line as a separate backflow preventer, or it may be part of a pressure-reducing valve, water meter or water softener. A check valve located in the cold water inlet line can cause what is referred to as a "**closed water system.**" A cold water inlet line with no check valve or backflow prevention device is referred to as an "open" water system.

As water is heated, it expands in volume and creates an increase in the pressure within the water system. This action is referred to as "**thermal expansion.**" In an "open" water system, expanding water which exceeds the capacity of the water heater flows back into the city main where the pressure is easily dissipated.

A "**closed water system,**" however, prevents the expanding water from flowing back into the main supply line, and the result of "**thermal expansion**" can create a rapid and dangerous pressure increase in the water heater and system piping. This rapid pressure increase can quickly reach the safety setting of the relief valve, causing it to operate during each heating cycle. Thermal expansion, and the resulting rapid and repeated expansion and contraction of components in the water heater and piping system, can cause premature failure of the relief valve, and possibly the heater itself. Replacing the relief valve **will not** correct the problem!

The suggested method of controlling thermal expansion is to install an expansion tank in the cold water line between the water heater and the check valve (refer to the illustration on right). The expansion tank is designed with an air cushion built in that compresses as the system pressure increases, thereby relieving the over-pressure condition and eliminating the repeated operation of the relief valve. Other methods of controlling thermal expansion are also available. Contact your installing contractor, water supplier or plumbing inspector for additional information regarding this subject.

Installation Instructions

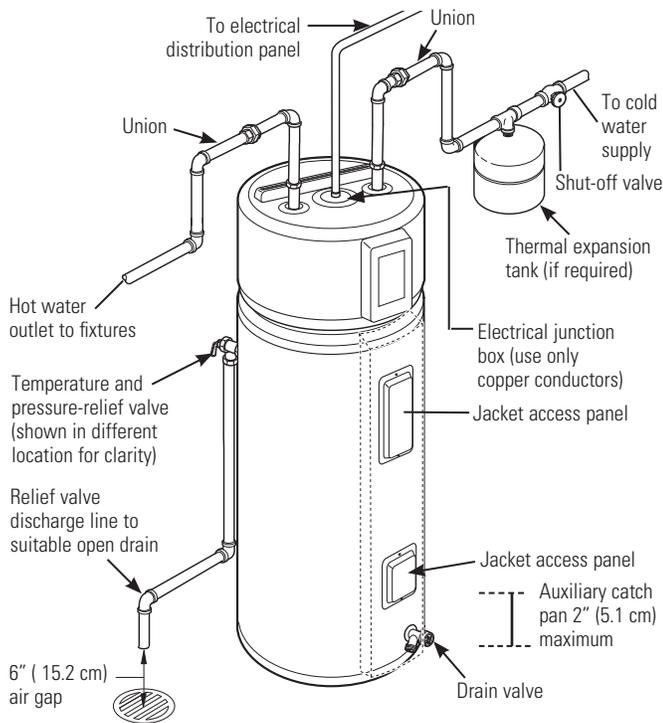
WATER SUPPLY CONNECTIONS

Refer to the illustration below for suggested typical installation. The installation of unions or flexible copper connectors is recommended on the hot and cold water connections so that the water heater may be easily disconnected for servicing if necessary. The HOT and COLD water connections are clearly marked and are 3/4" NPT on all models.

NOTE: Install a shut-off valve in the cold water line near the water heater. This will enable easier service or maintenance of the unit later.

IMPORTANT: Do not apply heat to the HOT or COLD water connections. If sweat connections are used, sweat tubing to adapter before fitting the adapter to the cold water connections on heater. Any heat applied to the hot or cold water connection will permanently damage the internal plastic lining in these ports.

TYPICAL INSTALLATION



A new combination temperature and pressure-relief valve, complying with the Standard for Relief Valves and Automatic Gas Shut-Off Devices for Hot Water Supply Systems, ANSI Z21.22, is supplied and must remain installed in the opening provided and marked for the purpose on the water heater. No valve of any type should be installed between the relief valve and the tank. Local codes shall govern the installation of relief valves.

RELIEF VALVE

⚠ WARNING: The pressure rating of the relief valve must not exceed 150 PSI (1.03 kPa), the maximum working pressure of the water heater as marked on the rating plate.

The BTUH rating of the relief valve must not be less than the input rating of the water heater as indicated on the rating label located on the front of the heater (1 watt=3.412 BTUH).

Connect the outlet of the relief valve to a suitable open drain so that the discharge water cannot contact live electrical parts or persons and to eliminate potential water damage.

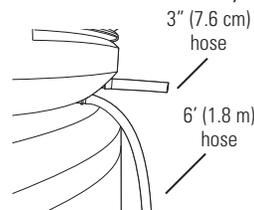
Piping used should be of a type approved for hot water distribution. The discharge line must be no smaller than the outlet of the valve and must pitch downward from the valve to allow complete drainage (by gravity) of the relief valve and discharge line. The end of the discharge line should not be threaded or concealed and should be protected from freezing. No valve of any type, restriction or reducer coupling should be installed in the discharge line.

⚠ CAUTION:

To reduce the risk of excessive pressures and temperatures in this water heater, install temperature and pressure protective equipment required by local codes and no less than a combination temperature and pressure relief valve certified by a nationally recognized testing laboratory that maintains periodic inspection of production of listed equipment or materials, as meeting the requirements for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems, ANSI Z21.22. This valve must be marked with a maximum set pressure not to exceed the marked maximum working pressure of the water heater. Install the valve into an opening provided and marked for this purpose in the water heater, and orient it or provide tubing so that any discharge from the valve exits only within 6 inches above, or at any distance below, the structural floor, and does not contact any live electrical part. The discharge opening must not be blocked or reduced in size under any circumstances.

CONDENSATION DRAIN TUBES

This unit has a condensation tray. The water collected in the tray drains out of the tube coming off the back of the unit. Two flexible hoses are included with this unit. It is important that both of these hoses are attached to the two drain ports coming off the back of the unit. Attach one end of the longer 6' (1.8 m) hose to the lower drain port on the back of the unit, underneath the rear cover. Direct the other end to a drain in the floor or no higher than 3' (0.9 m) above the floor. If such drain is unavailable, a condensate drain pump (not provided) must be purchased and installed. Attach the shorter 3' (7.6 cm) hose to the top drain port.



Installation Instructions

TO FILL THE WATER HEATER

⚠ WARNING: The tank must be full of water before heater is turned on. The water heater warranty does not cover damage or failure resulting from operation with an empty or partially empty tank.

Make certain the drain valve is completely closed.

Open the shut-off valve in the cold water supply line.

Open each hot water faucet slowly to allow the air to vent from the water heater and piping.

A steady flow of water from the hot water faucet(s) indicates a full water heater.

NOTICE:

Do not mis-wire electrical connections. 240V AC must be applied across L1 and L2 wires as shown in 'Water heater junction box' illustration. Failure to do so will VOID the warranty, and can result in 120V applied to water heater, which may damage the compressor or other electrical components.

If 4-conductor wire is supplied to the water heater, cap the neutral, and connect the remaining wires as illustrated.

NOTE REGARDING UTILITY POWER-MANAGEMENT DEVICES (Sometimes called Peak Load Reduction Switches):

Some power-management switching devices or even some basic timer switches exist that REDUCE voltage from 240V to 120V during high-electricity-demand periods. These devices must be removed from the circuit providing power to the water heater because of the potential unit damage noted above.

However, switching devices which cut power from 240V to 0V on a periodic basis are acceptable.

ELECTRICAL CONNECTIONS

A separate branch circuit with copper conductors, overcurrent protective device and suitable disconnecting means must be provided by a qualified electrician.

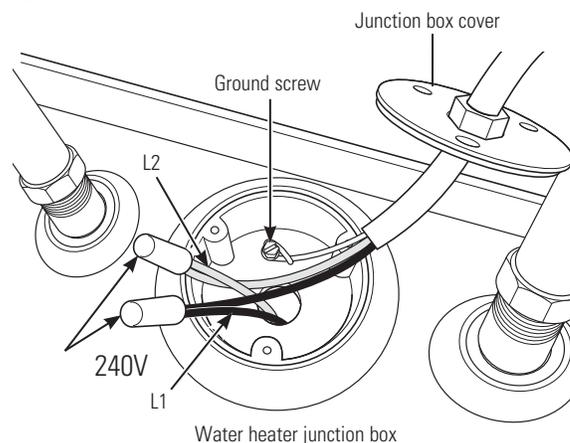
All wiring must conform to local codes or latest edition of National Electrical Code ANSI/NFPA 70.

The water heater is completely wired to the junction box at the top of the water heater. An opening for 1/2" or 3/4" electrical fitting is provided for field wiring connections.

The voltage requirements and wattage load for the water heater are specified on the rating label on the front of the water heater.

The branch circuit wiring should include either:

1. Metallic conduit or metallic sheathed cable approved for use as a grounding conductor and installed with fittings approved for the purpose.
2. Nonmetallic sheathed cable, metallic conduit or metallic sheathed cable not approved for use as a ground conductor shall include a separate conductor for grounding. It should be attached to the ground terminals of the water heater and the electrical distribution box.



⚠ WARNING: Proper ground connection is essential. The presence of water in the piping and water heater does not provide sufficient conduction for a ground. Nonmetallic piping, dielectric unions, flexible connectors, etc., can cause the water heater to be electrically isolated.

Installation Instructions

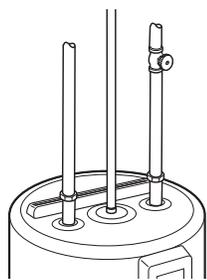
The manufacturer's warranty does not cover any damage or defect caused by installation, attachment or use of any type of energy-saving or other unapproved devices (other than those authorized by the manufacturer) into, onto or in conjunction with the water heater. The use of unauthorized energy-saving devices may shorten the life of the water heater and may endanger life and property.

The manufacturer disclaims any responsibility for such loss or injury resulting from the use of such unauthorized devices.

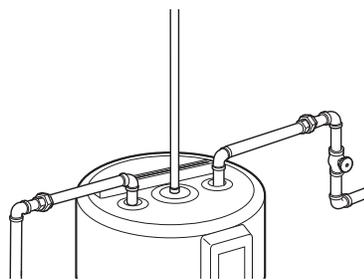
If local codes require external application of insulation blanket kits, the manufacturer's instructions included with the kit must be carefully followed.

Application of any external insulation, blankets or water pipe insulation to this water heater will require careful attention to the following:

- Do not cover the temperature and pressure-relief valve.
- Do not cover access panels to the heating elements.
- Do not cover the electrical junction box of the water heater.
- Do not cover the operating or warning labels attached to the water heater or attempt to relocate them on the exterior of the insulation blanket.
- Do not block the air inlet outlets below and in the top covers.



Typical vertical piping arrangement



Typical horizontal piping arrangement

NOTE: This guide recommends minimum branch circuit sizing based on the National Electric Code. Refer to wiring diagrams in this manual for field wiring connections.

BRANCH CIRCUIT SIZING GUIDE

Total Water Heater Wattage	Recommended Over-Current Protection (fuse or circuit breaker amperage rating)			
	208V	240V	277V	480V
3,000	20	20	15	15
4,000	25	25	20	15
4,500	30	25	25	15
5,000	30	30	25	15
5,500	35	30	25	15
6,000	40	35	30	20
8,000	50	45	40	25
9,000	-	50	45	25
10,000	-	-	50	30
11,000	-	-	50	30
12,000	-	-	-	35

Total Water Heater Wattage	Copper Wire Size AWG Based on N.E.C. Table 310-16 (167°F/75°C.)			
	208V	240V	277V	480V
3,000	12	12	14	14
4,000	10	10	12	14
4,500	10	10	10	14
5,000	10	10	10	14
5,500	8	10	10	14
6,000	8	8	10	12
8,000	8	8	8	10
9,000	-	8	8	10
10,000	-	-	8	10
11,000	-	-	8	10
12,000	-	-	-	8

Installation Instructions

INSTALLATION CHECKLIST

- 1. Tank location:**
 - Does room size require louvered door or similar ventilation? 10' x 10' x 7' (700 cu. ft.) or 240 square inches (0.15 m²) air-flow area needed.
 - Back of unit **away from wall** by 7 inches (17.8 cm), and sides have at least 3 inches (7.6 cm) clearance.
 - **Front** of unit is free and clear.
 - Is the water heater **level**? If no, add shims under the base of the unit.
- 2. Plumbing connections:**
 - Does not prevent **air filter** removal.
 - No leaks after **filling** the tank with water, either when water is flowing or not.
- 3. Condensate lines are in place:**
 - 1) Short tube on upper drain nozzle.
 - 2) Longer tube on lower drain nozzle and directed into a floor drain or a condensate pump.
- 4. Temperature and pressure-relief valve** is working and drain line completed per local code.
- 5. Electrical** connection does not prevent air filter removal.
- 6. Verify control panel** displays 120°F (49°C) Hybrid mode. Assist user in how to adjust temperature (see "About Setting the Water Temperature" section on page 5).
- 7. Front cover** is in place.

WHAT TO EXPECT FOR "NORMAL STARTUP"

After the unit has been installed, with all electrical and water connections secure and checked, then the unit should be filled with water (vent tank by opening a hot water faucet somewhere in home to allow tank to fully fill with water). Once tank is full and power is energized, the user must press the POWER button on the user interface. The unit will then remind the user to ensure tank has been filled, and to acknowledge by pressing POWER again.

Elapsed Time	HEWH Actions	Comments
0 to 1.5 minutes	Unit is silent	This 3-minute off-time prevents compressor damage.
1.5 to 3 minutes	Fans turn on	
3 to 8 minutes	Compressor turns on and runs for 5 minutes	This 5-minute period is used to ensure the tank is full of water (Dry-fire prevention algorithm).
8 to 30 minutes	Compressor turns off, and Upper Element turns on for about 20 minutes	To quickly provide initial amount of hot water for user (about 25 gallons/94.6 L).
30 minutes and beyond	Upper element turns off and compressor turns back on	Uses efficient heat pump for majority of heating

NOTE: The heat pump operating range is 45°F to 120°F (7°C to 49°C). If the ambient temperature is outside of this range, the heat pump will turn off and the backup electric elements will be used until the ambient temperature returns to within the operating range.

Before you call for service...



Troubleshooting Tips

Save time and money! Review the chart below first and you may not need to call for service.

Problem	Possible Causes	What To Do
<i>Water heater makes sounds</i>	Fans are used to move air through the system. The fan volume will vary as the water is heated.	<ul style="list-style-type: none"> Some amount of fan sound is normal (similar to the blower on a central heating and cooling system). If you hear an abnormal sound like a knocking or the sound level seems unusually loud, then contact service. If sound level has been increasing over the last weeks or months, the filter may be getting dirty, thus making the fans work harder. Check to see if filter needs to be cleaned. (See page 13 for instructions.)
<i>Water heater is making the room cooler</i>	Room is not vented properly or is too small.	<ul style="list-style-type: none"> If the room is smaller than 10' x 10' x 7' (3m x 3m x 2.1m), then it must have a louvered door or other means to allow air exchange with surrounding rooms.
<i>Water dripping down the outside of the heater</i>	Condensate drain hoses are not connected.	<ul style="list-style-type: none"> Two drain hoses are included with your water heater. Connect the longer 6' (1.8 m) hose to the lower condensate drain port. Connect the short 3' (7.6 cm) hose to the upper condensate drain port.
	Condensate drain hoses are kinked or clogged.	<ul style="list-style-type: none"> Remove each drain hose and clear any debris from the line. You can use a small wire like a hanger or a small screwdriver to clear out any debris in the drain port on the unit.
	Hot/Cold water connections are not tightened.	<ul style="list-style-type: none"> Tighten the inlet and outlet pipe connections.
<i>Not enough or no hot water</i>	Water usage may have exceeded the capacity of the water heater.	<ul style="list-style-type: none"> Wait for the water heater to recover after an abnormal demand.
	A fuse is blown or a circuit breaker tripped.	<ul style="list-style-type: none"> Replace fuse or reset circuit breaker.
	Electric supply may be off.	<ul style="list-style-type: none"> Make sure electric supply to water heater and disconnect switch, if used, are in the ON position.
	Water temperature may be set too low.	<ul style="list-style-type: none"> See the Water temperature setting section.
	Leaking or open hot water faucets.	<ul style="list-style-type: none"> Make sure all faucets are closed.
	Electric service to your home may be interrupted.	<ul style="list-style-type: none"> Contact the local electric utility.
	Improper wiring.	<ul style="list-style-type: none"> See the Installation Instructions section.
	Manual reset limit (TCO).	<ul style="list-style-type: none"> See the Water temperature setting section.
	Cold water inlet temperature may be colder during the winter months.	<ul style="list-style-type: none"> This is normal. The colder inlet water takes longer to heat.
<i>Water is too hot</i>	Water temperature is set too high.	<ul style="list-style-type: none"> See the Water temperature setting section.
	<p>⚠ CAUTION: For your safety, DO NOT attempt repair of electrical wiring, controls, heating elements or other safety devices. Refer repairs to qualified service personnel.</p> <p>Electronic control has failed.</p>	<ul style="list-style-type: none"> Call for service.
<i>Rumbling noise</i>	Water conditions in your home caused a buildup of scale or mineral deposits on the heating elements.	<ul style="list-style-type: none"> Remove and clean the heating elements.

Problem	Possible Causes	What To Do
<i>Relief valve producing popping sound or draining</i>	Pressure buildup caused by thermal expansion to a closed system.	<ul style="list-style-type: none"> This is an unacceptable condition and must be corrected. Contact the water supplier or plumbing contractor on how to correct this. Do not plug the relief valve outlet.
<i>The heater is beeping and the screen says "Attention! Tank not filled!"</i>	The water heater has not been filled with water before powering up. Powering up the heater without water will damage the electric heaters. The water heater warranty does not cover damage or failure resulting from operation with an empty or partially empty tank.	<ul style="list-style-type: none"> Fill the tank completely with water. Press ENTER to stop the alarm and then press POWER when the tank has been filled.
<i>The filter light is on.</i>	The filter requires cleaning. A clean filter is necessary for effective operation.	<ul style="list-style-type: none"> Follow the instructions on how to remove and clean the filter on page 13.
<i>The heater is beeping and the screen says "Heat Pump Failure"</i>	There is an issue with the heat pump system.	<ul style="list-style-type: none"> The unit will automatically switch to another available mode to ensure you continue to have hot water. Contact service immediately and give them the codes listed on the display screen.
<i>The heater is beeping and the screen says "Water Heater Failure"</i>	There is an issue with the water heater system.	<ul style="list-style-type: none"> The unit will automatically switch to another available mode to ensure you continue to have hot water. Contact service immediately and give them the codes listed on the display screen.
<i>The heater is beeping and the screen says "System Failure"</i>	There is an issue with the water heater that requires immediate attention.	<ul style="list-style-type: none"> The heater will need to turn off. Contact service immediately.
<i>The water heater is beeping and the screen says, "Wiring to unit incorrect. Must be 240V not 120V" or "Heat Pump Fault"</i>	Unit is not receiving 240VAC as intended	<ul style="list-style-type: none"> Turn off power to water heater (generally at the breaker panel). Then read "Electrical Connections" section of Installation Instructions, see page 17. Then, contact the installer to verify electrical input to the water heater.
<i>Hot Water has a rotten egg or sulfur smell</i>	Certain water supplies with high sulfate content will react with the anode rod that is present in all water heaters for corrosion protection of the tank.	<ul style="list-style-type: none"> The odor can be reduced or eliminated in most water heaters by replacing the anode rod with less-active material rod. In some cases, an added step of chlorinating the water heater and all hot water lines may be necessary, contact your local water professional or plumber for options and instructions. Call GE at 1.888.4GE.HEWH (1.888.443.4394) to learn how to purchase this replacement anode rod. A qualified servicer or plumber should do this replacement. Use of a non-GE approved anode rod, or operating the water heater without a GE approved anode rod will VOID the warranty.
<i>Unit is not making normal sounds</i>	If unit is using resistance elements, it will not make fan or compressor sounds.	<ul style="list-style-type: none"> Check mode of unit.

For Service, please call 1.888.4GE.HEWH (1.888.443.4394)

GE Hybrid Water Heater Warranty.



All warranty service provided by our Authorized Servicer Network. To schedule service, call 888.4GE.HEWH (888.443.4394). Please have serial number and model number available when calling for service.

Staple your receipt here. Proof of the original purchase date is needed to obtain service under the warranty.

For The Period Of: We Will Replace:

One Year

From the date of the original purchase

Any part of the Hybrid Water Heater which fails due to a defect in materials or workmanship.

During this **limited one-year warranty**, GE will also provide, **free of charge**, all labor and related service to replace the defective part.

Second through Tenth Year

From the date of the original purchase

Any part of the Hybrid Water Heater which fails due to a defect in materials or workmanship.

During this **limited ten-year parts warranty**, labor and related service to replace the defective part are not included.

What Is Not Covered:

- Service trips to your home to teach you how to use the product.
- Improper installation, delivery or maintenance.
- Failure of the product if it is abused, misused, altered, used commercially or used for other than the intended purpose.
- Use of this product where water is microbiologically unsafe or of unknown quality, without adequate disinfection before or after the system.
- Replacement of house fuses or resetting of circuit breakers.
- Damage to the product caused by accident, lightning, fire, flood or acts of God.
- Incidental or consequential damage caused by possible defects with this appliance, its installation or repair.
- Product not accessible to provide required service.
- If product removed from original installation location.
- Damages, malfunctions or failure caused by the use of repair service not approved by GE.
- Damages, malfunctions or failure caused by the use of unapproved parts or components.
- Damages, malfunctions or failure caused by operating the heat pump water heater with the anode rod removed.
- Damages, malfunctions or failure resulting from operating the heat pump with an empty or partially empty tank.
- Damages, malfunctions or failure caused by subjecting the tank to pressure greater than those shown on the rating label.
- Damages, malfunctions or failure caused by operating the heat pump water heater with electrical voltage exceeding those shown on the rating label.
- Water heater failure due to the water heater being operated in a corrosive atmosphere.

EXCLUSION OF IMPLIED WARRANTIES—Your sole and exclusive remedy is product repair as provided in this Limited Warranty. Any implied warranties, including the implied warranties of merchantability or fitness for a particular purpose, are limited to one year or the shortest period allowed by law.

This warranty is extended to the original purchaser and any succeeding owner for products purchased for home use within the USA. If the product is located in an area where service by a GE Authorized Servicer is not available, you may be responsible for a trip charge or you may be required to bring the product to an Authorized GE Service location for service. In Alaska, the warranty excludes the cost of shipping or service calls to your home.

Some states do not allow the exclusion or limitation of incidental or consequential damages. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. To know what your legal rights are, consult your local or state consumer affairs office or your state's Attorney General.

For product purchased outside of the US, contact your dealer for Warranty and Service information.

Warrantor for Products Purchased in the United States: General Electric Company, Louisville, KY 40225.

Indoor Unit (Air Handler) – Owner’s Information

Congratulations on the purchase of your new air handler. Your air handler is designed to work with a matched outdoor unit creating a system that delivers years of dependable service and performance.

Proper Maintenance*

Your system requires maintenance and repair by a properly trained service technician. “Do-it-yourself” repairs on an in-warranty unit may void your warranty.

Other than performing the simple maintenance recommended below, you should not attempt to make any adjustments or repairs to your system. Your dealer can assist you with questions or problems.

1) Replace the air filter(s)

A clean filter saves you money by helping ensure top system efficiency.

When replacing your filter(s), always use the same size and type that was originally supplied or consult with your dealer for recommendations. Be sure to replace it with the arrows pointing in the direction of the airflow.

Where disposable filters are used, they must be replaced every month with the same size as originally supplied. Clean or replace your filter twice a month during seasons when the unit runs more often.

Ask your dealer where the filter is located in your system and how to service it.

2) Maintain free outdoor coil airflow

Efficient operation of your system depends on the free flow of air over outdoor unit’s coil.

Do not plant flowers or shrubbery right next to the unit. Also, make sure that nothing is stacked against the sides of the unit or draped over it.

Buildup of snow and ice can restrict airflow. As soon as possible after accumulation, clean snow from the area around the outdoor unit.

3) Clean the finish

To keep your system looking new for years, clean the enamel finish with soap and water. For stubborn grease spots, use a household detergent. Do not use lacquer thinner or other synthetic solvents as they may damage the finish.

4) Call your dealer for additional routine maintenance

Your system should be inspected at least once per year by a properly trained service technician.

Ask your dealer about economical service or preventative maintenance agreements that cover seasonal inspections. **Optional extended warranties are also available.**

 WARNINGS
1. Disconnect all electrical power to the indoor air handler or furnace before removing access panels to perform any maintenance. Disconnect power to both the indoor and outdoor units. NOTE: There may be more than one electrical disconnect switch. Electric shock can cause personal injury or death.
2. Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause personal injury or property damage. Consult a qualified installer or service agency for information or assistance.

 CAUTIONS
1. To prevent injury, death, or property damage, read and follow all instructions and warnings, including labels shipped with or attached to unit before operating your new outdoor system.
2. Although special care has been taken to minimize sharp edges in the construction of your unit, be extremely careful when handling parts or reaching into the unit.
3. Condensate drains should be checked and cleaned periodically to assure condensate can drain freely from coil to drain. If condensate cannot drain freely, water damage could occur.
4. If heating system is not operational during the cold weather months, provisions must be taken to prevent freeze-up of all water pipes and water receptacles. This is very important during times of vacancy.

IMPORTANT: If the indoor air exceeds 60% relative humidity or simply feels uncomfortably humid, it is recommended that the indoor fan only be used in the AUTO mode.

*Visit the manufacturer’s website or ask your dealer for more information on:

- System operation
- Troubleshooting\Maintenance
- Optimizing system performance\Energy savings
- Warranties and Product Registration

Before you call for service, check the following:

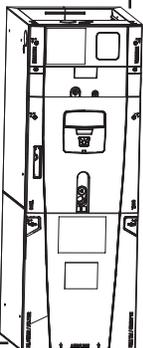
Problem	Possible cause	Remedy
Insufficient heating or cooling	a. dirty filters b. air not circulating freely c. blocked outdoor coil	a. clean or replace b. check supply registers and return grills for blockage c. clear away leaves or other debris
Failure to operate	a. power off b. open circuit breaker or burned-out fuses c. improperly adjusted thermostat	a. make sure main switch is in ON position b. reset circuit breaker, or replace burned-out fuses c. check setting, adjust thermostat
Auxiliary heat indicator on	When outdoor temperature falls, intermittent lighting is normal	Monitor light. If it stays on continuously when above 30°F, or if it comes on when 50°F outdoors, call for service.
No Heating or Cooling – Blower does not operate	Blower door removed or ajar	Close door securely to restore power to blower
Unusual Noise		Call your local servicer

Product Registration

Registered Limited Warranty terms are available if the product is registered within 60 days of installation. If the product is not registered within 60 days of installation, the manufacturer’s Base Limited Warranty terms will apply.

Registration can be completed online at the manufacturer’s website. Please take a few moments to record the following information to ensure your product registration process is quick and easy:

Indoor Unit Serial Number _____
 Indoor Unit Model Number _____
 Thermostat Model Number _____
 Installation/Startup Date _____
 Dealer _____
 Dealer Service Phone _____



BASE LIMITED WARRANTY AIR HANDLERS

***AM4, *AM7, *AM8 (PARTS ONLY)**

MODELS LESS THAN 20 TONS

Subject to the terms and conditions of this limited warranty, Trane U.S., Inc. ("Company") extends a limited warranty against manufacturing defects for the product(s) identified in Table 1 attached hereto ("Products") that are installed in a residential application (personal, family or household purposes) under normal use and maintenance in the United States and Canada.

This limited warranty applies to Products manufactured on or after August 1, 2011.

In order to maximize the available benefits under this limited warranty, the Purchaser (as defined below) should read it in its entirety. All repairs of Product parts covered under this limited warranty must be made with authorized service parts and by a licensed HVAC service provider. Additionally, commercial applications are treated differently under this limited warranty as stated in Table 1 attached hereto. For purposes of this limited warranty, "commercial applications" shall mean any application other than for personal, family, or household use.

TERM: The limited warranty period for Products is as stated in Table 1 attached hereto. If the Purchaser properly registers the Products, the limited warranty period shall be extended as stated in Table 1 attached hereto. Regardless of registration, the Commencement Date for a limited warranty period shall be the date that the original installation is complete and all Product start-up procedures have been properly completed and verified by an installer's invoice. If the installation and start-up date cannot be verified by the installer's invoice, the Commencement Date shall be sixty (60) days after the factory manufacture date which is verified by the Product serial number. Where a Product is installed in a newly constructed home, the Commencement Date is the date the Purchaser purchased the residence from the builder. Proof of Product purchase, installation, and/or closing date of the residence may be required to confirm the Commencement Date.

The installation of Product replacement parts under this limited warranty shall not extend the original warranty period. The warranty period for any Product part replaced under this limited warranty is the applicable warranty period remaining under the original Product warranty.

WHO IS COVERED: This limited warranty is provided only to the original owner and his or her spouse ("Purchaser") of the residence where the Products are originally installed. This warranty is not transferable except according to terms stated on the applicable website identified below under Registration Requirements. Company has the right to request any and all proof of Product purchase or installation and/or closing date of the residence.

WHAT COMPANY WILL DO: Company may request proof of Product purchase and/or installation in order to provide Product parts under this limited warranty. As Company's only responsibility and Purchaser's only remedy under this limited warranty, Company will furnish a replacement part to the licensed HVAC service provider, without charge for the part only, to replace any Product part that fails due to a manufacturing defect under normal use and maintenance. The Purchaser must pay for any and all shipping and handling charges and other costs of warranty service for the replacement part. If a Product part is not available, Company will, at its option, provide a free suitable substitute part or provide a credit in the amount of the then factory selling price for a new suitable substitute part to be used by the Purchaser towards the retail purchase price of a new Company product. Any new Product purchase shall be at Purchaser's sole cost and expense including, but not limited to, all shipping, removal, and installation costs and expenses.

REGISTRATION REQUIREMENTS: All Products must be properly registered online by the Purchaser within sixty (60) days after the Commencement Date to receive the registered limited warranty terms. To register online, go to:

<http://www.trane.com/Residential/Trane/Owners/Warranty-Information> or

<http://www.americanstandardair.com/servicesupport/pages/warranty.aspx>

and click "Begin Online Registration." If a Purchaser does not register within this stated time period, the base limited warranty terms shall apply.

ELIGIBILITY REQUIREMENTS: The following items are required in order for the Products to be covered under this limited warranty:

- The Products must be in the same location where they were originally installed.
- The Products must be properly installed, operated, and maintained by a licensed HVAC service provider in accordance with the Product specifications or installation, operation, and maintenance instructions provided by Company with each Product. Failure to conform to such specifications and/or instructions shall void this limited warranty. Company may request written documentation showing the proper preventative maintenance.
- All Product parts replaced by Company under this limited warranty must be given to the servicing provider for return to Company.

• Air handlers, air conditioners, heat pumps, cased or uncased coils and stand-alone furnaces must be part of an Air Conditioning, Heating, and Refrigeration Institute rated and matched system or a specification in a Company provided bulletin or otherwise approved in writing by a Company authorized representative.

EXCLUSIONS: The following are not covered by this limited warranty:

- Labor costs including, but not limited to, costs for diagnostic calls or the removal and reinstallation of Products and/or Product parts.
- Shipping and freight expenses required to ship Product replacement parts.
- Failures, defects, or damage (including, but not limited to, any loss of data or property) caused by (1) any third party product, service, or system connected or used in conjunction with the Products; (2) any use that is not designed or intended for the Products; (3) modification, alteration, abuse, misuse, negligence, or accident; (4) improper storage, installation, maintenance, or operation including, but not limited to, operation of electrical equipment at voltages other than the range specified on the Product nameplate; (5) any use in violation of written instructions or specifications provided by Company; (6) any acts of God including, but not limited to, fire, water, storms, lightning, or earthquakes; or any theft or riots; or (7) a corrosive atmosphere or contact with corrosive materials such as, but not limited to, chlorine, fluorine, salt (provided that indoor and outdoor coils will only be covered if a Sea Coast Kit is installed), sulfur, recycled waste water, urine, fertilizers, rust, or other damaging substances or chemicals.
- Products purchased direct including, but not limited to, Internet or auction purchases and purchases made on an uninstalled basis.
- 3 phase models, cabinets or cabinet pieces that do not affect product performance, air filters, refrigerant, refrigerant line sets, belts, wiring, fuses, surge protection devices, non-factory installed driers, and Product accessories.
- Increased utility usage costs.

REFRIGERANT POLICY: Beginning on January 1, 2010, R-22 refrigerant will no longer be used as a manufacturer-installed refrigerant as required by federal regulation. Any and all expenses or costs associated with replacing Product parts that are not R-410A compatible will not be covered by the terms and conditions of this limited warranty. In addition, all Products containing R-410A refrigerant include a liquid line filter drier which must be replaced when a compressor replacement is necessary. A suction line filter drier must be added for compressors defined as burnouts. Failure to comply with such filter drier requirements or the use of contaminated or alternate refrigerant or any non-approved refrigerant system additives including, but not limited to, dyes, will void this limited warranty.

ADDITIONAL TERMS:

THIS LIMITED WARRANTY AND LIABILITY SET FORTH HEREIN ARE IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, WHETHER IN CONTRACT OR IN NEGLIGENCE, EXPRESS OR IMPLIED, IN LAW OR IN FACT. THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED TO THE DURATION OF THE APPLICABLE PRODUCT WARRANTY. COMPANY DOES NOT AUTHORIZE ANY PERSON TO CREATE FOR IT ANY OBLIGATION OR LIABILITY IN CONNECTION WITH THE PRODUCTS.

NOTWITHSTANDING ANYTHING IN THIS LIMITED WARRANTY TO THE CONTRARY, COMPANY SHALL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, INDIRECT, SPECIAL AND/OR PUNITIVE DAMAGES, WHETHER BASED ON CONTRACT, WARRANTY, TORT (INCLUDING, BUT NOT LIMITED TO, STRICT LIABILITY OR NEGLIGENCE), PATENT INFRINGEMENT, OR OTHERWISE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. COMPANY'S MAXIMUM LIABILITY HEREUNDER IS LIMITED TO THE ORIGINAL PURCHASE PRICE OF THE PRODUCTS.

No action arising out of any claimed breach of this limited warranty may be brought by a Purchaser more than one (1) year after the cause of action has arisen.

This limited warranty gives you specific legal rights, and you may also have other rights as otherwise permitted by law. If this Product is considered a consumer product, please be advised that some local laws do not allow limitations on incidental or consequential damages, how long a warranty lasts based on registration, or how long an implied warranty lasts, so that the above limitations may not fully apply. Refer to your local laws for your specific rights under this limited warranty.

Residential Systems
6200 Troup Highway, Tyler, TX 75707
Attn: Customer Relations

Or visit our website at www.trane.com or www.americanstandardair.com

TABLE 1: Warranty Time Periods

COVERAGE TERMS FOR RESIDENTIAL APPLICATIONS: Pursuant to the Trane U.S., Inc. ("Company") limited warranty terms and conditions, the following Products are covered for the base time periods as stated below ("Base Limited Warranty Period"). If registered, the Base Limited Warranty Periods for certain Products will be extended as stated below ("Registered Limited Warranty Period").

SINGLE PHASE R410 OUTDOOR UNITS:

Base Limited Warranty Period: Compressor, Outdoor Coil, Parts: five (5) years.

Registered Limited Warranty Period:

TRANE: 4TTM3. ASD**: 4A7M3: Compressor – ten (10) years.

TRANE: 4TTB3, 4TTB4, 4TWB4, 4TWB3. ASD: 4A7B4, 4A6B4, 4A7B3, 4A6B3:

Compressor – ten (10) years.

TRANE: 4TTR5, 4TTR3, 4TWR5, 4TWR3. ASD: 4A7A5, 4A7A3, 4A6H5, 4A6H3:

Compressor, Outdoor Coil, Parts – ten (10) years.

TRANE: 4TTZ0, 4TTX6, 4TTX5, 4TWZ0, 4TWX6, 4TWX5. ASD: 4A7Z0, 4A7A6, 4A6Z0, 4A6H6:
compressor – twelve (12) years, Outdoor Coil and Parts –ten (10) years.

SINGLE PHASE R22 OUTDOOR UNITS:

Base Limited Warranty Period: Compressor, Outdoor Coil, Parts - one (1) year.

Registered Limited Warranty Period:

TRANE: 2TTB3, 2TWB3. ASD: 2A7B3, 2A6B3: Compressor, Outdoor Coil, Parts– five (5) years.

3- PHASE OUTDOOR UNITS:

Base Limited Warranty Period: Compressor, Outdoor Coil, Parts - one (1) year.

Registered Limited Warranty Period:

TRANE: 4TTA, 4TWA. ASD: 4A7C, 4A6C: Compressor, Outdoor Coil, Parts - five (5) years.

AIR HANDLERS:

Base Limited Warranty Period: Indoor Coil and Parts – one (1) year.

Registered Limited Warranty Period:

TRANE and ASD: 2/4TEE, 2/4TFE, GAM5, *AM4, *AM7, *AM8. Indoor Coil and Parts – ten (10) years.

TRANE and ASD: 2/4 TEC, GAT2, GAF2: Indoor Coil and Parts – five (5) years.

PACKAGED AIR CONDITIONERS and PACKAGED HEAT PUMPS:

TRANE and ASD: 4WCZ6:

Base Limited Warranty Period: Compressor, Outdoor Coil, and Parts – five (5) years.

Registered Limited Warranty Period: Compressor – twelve (12) years, Outdoor Coil and Parts – ten (10) years.

TRANE and ASD: 4DCZ6, 4YCZ6:

Base Limited Warranty Period: Compressor, Outdoor Coil, and Parts – five (5) years, Heat Exchanger – twenty (20) years.

Registered Limited Warranty Period: Compressor – twelve (12) years, Outdoor Coil and Parts – ten (10) years.

TRANE and ASD: 4DCY4, 4YCY4, 4YCX3:

Base Limited Warranty Period: Compressor, Outdoor Coil, and Parts – five (5) years, Heat Exchanger – twenty (20) years.

Registered Limited Warranty Period:

Compressor, Outdoor Coil, and Parts – ten (10) years.

TRANE and ASD: 4TCY4, 4TCX3, 4WCY4, 4WCX3:

Base Limited Warranty Period: Compressor, Outdoor Coil, and Parts – five (5) years.

Registered Limited Warranty Period:

Compressor, Outdoor Coil, and Parts – ten (10) years.

TRANE and ASD: 4YCC3:

Base Limited Warranty Period: Compressor – five (5) years, Outdoor Coil, and Parts – one (1) year, Heat Exchanger – ten (10) years.

Registered Limited Warranty Period:

Compressor – ten (10) years, Outdoor Coil and Parts – five (5) years.

TRANE and ASD: 4TCC3, 4WCC3:

Base Limited Warranty Period: Compressor – five (5) years, Outdoor Coil, and Parts - one (1) year.

Registered Limited Warranty Period: Compressor – ten (10) years, Outdoor Coil and Parts – five (5) years.

TRANE and ASD: 4WHC3:

Base Limited Warranty Period: Compressor, Outdoor Coil, and Parts – five (5) years.

FURNACES:

TRANE and ASD: *UE1*/DE1:

Base Limited Warranty Period: Parts – one (1) year, Heat Exchanger – twenty (20) years.

Registered Limited Warranty Period: Parts – five (5) years, Heat Exchanger: twenty (20) years.

TRANE and ASD: *UD1*/DD1; *UD2*/DD2; *UD1-H/ *DD1-H:

Base Limited Warranty Period: Parts: five (5) years, Heat Exchanger – twenty (20) years.

Registered Limited Warranty Period:

Parts – ten (10) years, Heat exchanger– twenty (20) years,

TRANE and ASD:*UD2-V*/DD2-V; *UD2-C-V*/DD2-C-V:

Base Limited Warranty Period: Parts: five (5) years, Heat Exchanger – twenty (20) years.

Registered Limited Warranty Period:

Parts – ten (10) years, Heat exchanger– Lifetime

TRANE and ASD: *UC1*/DC1:

Base Limited Warranty Period: Parts – one (1) year, Heat Exchanger – twenty (20) years.

Registered Limited Warranty Period:

Parts – five (5) years, Heat Exchanger - Lifetime.

TRANE and ASD: *UH1*/DH1;*UX1*/DX1; *UH2*/DH2; *UHM*/DHM:

Base Limited Warranty Period: Parts – five (5) years, Heat Exchanger – twenty (20) Years.

Registered Limited Warranty Period:

Parts– ten (10) years, Heat Exchanger– Lifetime.

*Note: First digit may be a "T" or an "A"

Note Regarding Heat Exchanger: If a heat exchanger fails because of a manufacturing defect within the sixth through twentieth year of the applicable warranty period, Company will, at its sole option, provide either a replacement heat exchanger without charge, or allow a credit in the amount of the then factory selling price of an equivalent heat exchanger toward the retail purchase price of a new heating unit.

CASED AND UNCASED COILS:

Base Limited Warranty Period: Coil and Parts –five (5) years.

Registered Limited Warranty Period:

TRANE and ASD: 2/4 TXC, 2/4 TXA, 4CXC, 4TXF-CC/CZ: Coil and Parts– ten (10) years.

SPECIFIC TERMS FOR COMMERCIAL APPLICATIONS:

Base Limited Warranty Period: Coil and Parts- one (1) year.

Base Limited Warranty Period: Compressor- five (5) years.

Base Limited Warranty Period for Packaged Unit Heat Exchanger: five (5) years.

Base Limited Warranty Period For All Heat Exchangers on All Other Furnace: twenty (20) years.

**ASD – American Standard Models

Notes:

INSTALLER'S & OWNER'S MANUAL

HVAC INSTALLER: PLEASE LEAVE MANUAL FOR HOMEOWNER

Ultra·Aire™ 70H



- **Energy Star efficient**
- **High capacity effective dehumidification:
up to 70 pints of water a day**
- **MERV-11 filtration standard; MERV-14 optional**
- **Compact design**
- **5 year warranty**

P/N 4029870 • Serial No. _____ Install Date: _____

Sold by:



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SAFETY PRECAUTIONS

Read the installation, operation and maintenance instructions carefully before installing and operating this device. Proper adherence to these instructions is essential to obtain maximum benefit from your Ultra-Aire 70H indoor air quality system.

READ AND SAVE THESE INSTRUCTIONS

- The device is designed to be installed **INDOORS IN A SPACE THAT IS PROTECTED FROM RAIN AND FLOODING.**
- Install the unit with space to access the front panel for maintenance and service. **DO NOT INSTALL UNIT WITH THE SERVICE PANEL INACCESSIBLE.**
- Avoid directing the discharge air at people, or over the water in pool areas.
- If used near a water source; be certain there is no chance the unit could fall into the water or get wet. The unit should also be plugged into a GFCI (Ground Fault Circuit Interrupt outlet).
- **DO NOT** use the device as a bench or table.
- **DO NOT** place the device directly on structural members.
- A drain pan **MUST** be placed under the unit if installed above a living area or above an area where water leakage could cause damage (see local regularity code for more information).

Read and Save These Instructions

 **WARNING!** — This symbol indicates important instructions. Failure to heed them can result in serious injury or death.

 **CAUTION!** — This symbol indicates important instructions. Failure to heed them can result in injury or material property damage.

1. Intended Application for Ultra-Aire 70H

For the ideal installation, draw air from the central part of the home and return it to isolated areas of the home like the bedrooms, den, utility room, or family room. The ductwork of the existing heating system can be used to supply air to the home.

2. Registrations

The Ultra-Aire 70H conforms to UL STD 474 and CSA Standard C22.2 No.92.

3. Specifications

Part Number:	4029870
Blower:	160 CFM @ 0.0" WG
Power:	600 Watts @ 80°F and 60% RH
Supply Voltage:	110-120 VAC – 1phase – 60 Hz
Current Draw:	5.3 Amps
Energy Factor:	2.32 L/kWh
Operating Temp.:	Between 45°F and 95°F Max (inlet air temp)
Sized for:	Up to 1800 Sq. Ft. - Typical
Minimum Performance at 80°F and 60% RH	
Water Removal:	70 pints/day
Efficiency:	4.9 Pints/kWh
Air Filter:	MERV-11
Efficiency:	Standard 65% Efficient ASHRAE Dust Spot Test
Size:	9" x 11" x 1"
Power Cord:	9', 110-120 VAC, Ground
Drain Connection:	3/4" Threaded NPT

Dimensions	Unit	Shipping
Width:	12"	27"
Height:	12"	17"
Depth:	28"	17"
Weight:	55 lbs	59 lbs

4. Installation

4.1 Installation Checklist

CAUTION

Prior to installation of the Ultra-Aire 70H, the following checklist should be reviewed. The Ultra-Aire 70H can be installed in a variety of locations to meet the owner's needs, and be integrated with existing forced air systems or existing ductwork if desired. The location choice is contingent on a variety of requirements not limited to: ease of service, controls access, drainage, filtration, power, fresh-air ventilation (optional), water damage prevention, and current regulatory codes (ASHRAE, fire, etc). Please address all of these issues before you select the location of the device.

■ 4.1A Power Accessibility

Unit should be located in an area where the cord's length (9') should easily reach a 110-120 VAC electrical outlet with a minimum of a 15 A circuit capacity.

FOR HVAC INSTALLER ONLY

■ 4.1B Space

Location should have enough clearance to handle the unit's overall dimensions as well as the necessary return/supply ductwork to the unit. Allow a minimum 12" clearance to the side of the unit to allow for filter removal and replacement. Refer to section 6.1.

■ 4.1C Low Voltage Wiring

Unit location should be in an area where field wiring the remote controls (low voltage) to the unit will be possible.

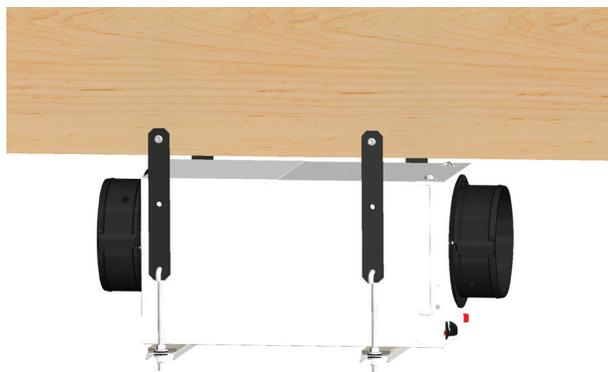
■ 4.1D Back-Draft Damper (P/N 4023647 or 4023646)

It is recommended that a back draft damper be used in the discharge duct of the Ultra-Aire 70H, especially when connecting to the supply ducting system. The backdraft damper prevents supply air from counter flowing through the Ultra-Aire 70H when it is not operating. The unit location should be chosen to allow installation of this accessory.

■ 4.1E Support Structure and Suspension

Place the Ultra-Aire 70H on supports to raise the base of the unit. Do not place the Ultra-Aire 70H directly on structural building members without vibration absorbers or unwanted noise may result.

The Ultra-Aire 70H may be suspended with a hang kit (4029908) or a suitable alternative from structural members, as long as the suspending assembly supports the Ultra-Aire 70H's base in its entirety. Do not hang the Ultra-Aire 70H from the cabinet. Remember to place a drain pan under the



Hang Kit (4029908) shown suspending a UA70H. Available from your dealer or Therma-Stor. Call 1-800-533-7533.

unit if it is suspended above a finished area or above an area where water leakage could cause damage.

4.2 Electrical Requirements

⚠ WARNING!

WARNING: DO NOT ALLOW THE YELLOW LEAD FROM THE ULTRA-AIRE TO CONTACT THE RED LEAD FROM THE ULTRA-AIRE OR DAMAGE TO THE TRANSFORMER WILL RESULT.

The Ultra-Aire 70H plugs into a common grounded 115VAC outlet. The device draws 5.3 Amps under normal operating conditions. If used in an area which may become wet, a ground fault interrupter (GFI) protected circuit is recommended. Please, consult local electrical codes for any further information.

Therma-Stor LLC offers a family of control devices for use with the Ultra-Aire 70H. The controls are to be located remotely from the unit and located in the space to be conditioned. The controls are low voltage (24 volt) and should be connected to the Ultra-Aire 70H with low voltage wire (thermostat or other appropriate).

⚠ CAUTION

Do not install the control panel where it may not accurately sense the relative humidity such as near HVAC supply registers, near exterior doors, on an outside wall, near a window, or near a water source.

The installer must supply the wiring between the Ultra-Aire 70H and the control panel. Be sure to safely route the control wiring to prevent damage during installation.

⚠ CAUTION

Do not cross wires when connecting the Ultra-Aire 70H and the remote control panel or damage to the transformer may result. The remote controls of the Ultra-Aire 70H are powered by a low voltage circuit (24VAC) and must NEVER contact or be connected to a high voltage circuit.

The control wires leaving the Ultra-Aire 70H and the remote control panels are numbered and color-coded to prevent confusion. Some of the control wires leaving the Ultra-Aire 70H may not be used with certain control panels and should be left unconnected with wire nuts taped onto the stripped ends for safety. Be sure to consult the electrical schematic in this manual or inside the access panel of the Ultra-Aire 70H before making control connections.

4.3 Condensate (Water) Removal

CAUTION

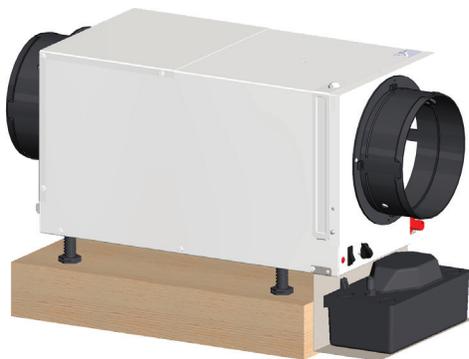
A trap in the drain line is preferred, but not required for the unit to drain properly. Local codes may require a trap. Use care to keep the pipe assembly as flat to the floor as possible. Kinks and/or humps will prevent proper drainage. The Ultra-Aire 70H generates condensate. Install a 3/4" male nominal pipe thread adapter to the drain pan. It is necessary to assemble your own drain pipe assembly utilizing 3/4" PVC pipe to get the condensate to a floor or other drain. Pipe is commonly available in 10' lengths from building supply, plumbing or hardware stores. Grade of pitch should be 1" per 10'.

4.3A Lifting Condensate

A condensate pump may be installed if lift is required to dispose of the condensate.

4.3B Condensate Pump Kit (4030113)

A condensate pump kit is available from the factory for use with the Ultra-Aire 70H and provides 15' of lift. Condensate is automatically pumped to a remote location when the water level in the pump's reservoir rises to close the float switch. The pump also contains a safety float switch. The white leads from this switch extend from beneath the pump cover. This switch should be installed in series with the field wire that connects the blue (#5) lead from the Ultra-Aire 70H to the control panel. If the pump fails, this switch opens the compressor control circuit and stops water production before the reservoir overflows. The Ultra-Aire 70H will continue to ventilate or circulate air as normal, but will not dehumidify until this switch closes.



Condensate Pump Kit (4030113) shown installed. Available from your dealer or Therma-Stor. Call 1-800-533-7533.

4.4 Ducting

For the ideal installation, draw air from the central part of the home and return it to the isolated areas of the home like the bedrooms, den, utility room, or family room. The ductwork of the existing heating system can be used to supply air to the home. If the existing supply goes to isolated areas of the home, discharge the supply of the Ultra-Aire 70H into the supply of the existing heating system. Installation of a separate supply duct to the Ultra-Aire 70H from a central area is recommended.

4.4A Supply Air

CAUTION

DO NOT draw air directly from the kitchen, laundry, or isolated basement.

You may draw air from a basement that is open to the home. All flexible ducting connected to the Ultra-Aire 70H should be UL listed.

A short piece of flexible ducting on all Ultra-Aire 70H duct connections is recommended to reduce noise and vibration transmitted to rigid ductwork in the structure. Ducting the Ultra-Aire 70H as mentioned requires consideration of the following points:

Duct Sizing: For total duct lengths up to 25', use a minimum 8" diameter round or equivalent rectangular. For longer lengths, use a minimum 10" diameter or equivalent. Grills or diffusers on the duct ends must not excessively restrict airflow.

Connecting to existing HVAC systems: An optional 8" check backdraft damper is available from the factory to prevent reverse air flow through the Ultra-Aire 70H. If the Ultra-Aire 70H is ducted to the supply of an air handler, the check damper should be placed in the Ultra-Aire 70H supply duct.

CAUTION

Contact the factory when connecting to a static pressure of greater than or equal to +.5" WG.

4.4B Ducting for Fresh Air — Option

Fresh air may be brought into the structure by connecting an insulated duct from outside the structure to a tee located in the inlet duct of the Ultra-Aire 70H. Advantages of this form of ventilation include:

1. Outside air is filtered before entering the building.
2. Outside air will be dehumidified before entering if the

FOR HVAC INSTALLER ONLY

Ultra-Aire 70H is running in dehumidification mode.

3. Drawing air from outside and blowing inside aids in slightly pressurizing the structure. This helps prevent dirty and humid air from entering elsewhere. It also reduces the potential for carcinogenic radon gas to enter and provides a small amount of make-up air for open combustion and exhaust devices like the clothes drier, fireplace, and water heater.
4. Exhaust fans are recommended in the bath rooms and kitchen.

In cold climates or areas where the outdoor dew point is low at times, ventilation can be used to dehumidify the structure, making the Ultra-Aire 70H capable of year-round drying. This is accomplished by bringing the dry, low dew point air into the structure during these times. This approach is often more economical than running the dehumidifier to remove excess moisture from the structure. In cold climates, adequately ventilating is critical to reduce the inside moisture content and avoid moisture accumulating in the wall cavities. TIP: if your house experiences condensation on the interior surface of the windows during the winter, increasing the amount of ventilation will often solve the problem.

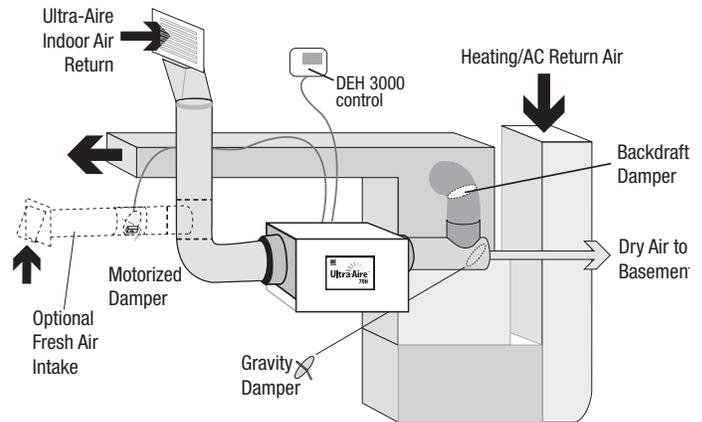
An insulated 6" diameter duct is generally sufficient to provide up to 55 CFM of outside air. Large quantities of outside air will impact Ultra-Aire 70H performance positively or negatively, depending upon the inside and outside air conditions. The outside air duct should be connected to the front of the unit. With a standard tee, the amount of outside air can be restricted with a blade damper.

4.4C Installation in a Basement or Crawlspace with an Existing Forced Air HVAC System.

Basement Installation: Install a separate 8" return for the Ultra-Aire 70H in a central area of the structure. Optional: Duct the supply of the Ultra-Aire to a 8" x 8" x 8" tee/damper, adjusted to 20% open to the basement. Duct the other side of the tee to the air supply of the existing HVAC system with a backdraft damper.

Crawlspace Installation: Install a separate return for the Ultra-Aire 70H in a central area of the structure. Optional: Duct the supply of the Ultra-Aire 70H to a 8" x 8" x 8" tee/damper that is 20% open to the crawlspace if desired. Duct the other side of the tee to the air supply of the existing HVAC system with a backdraft damper.

Instead of installing a separate return to the Ultra-Aire 70H, and if the existing system has multiple returns, it is possible to select one to disconnect from the existing forced air system and use it for the dedicated Ultra-Aire return. Always select a return from a central location in the structure in an area that is always open to the rest of the structure. Do not



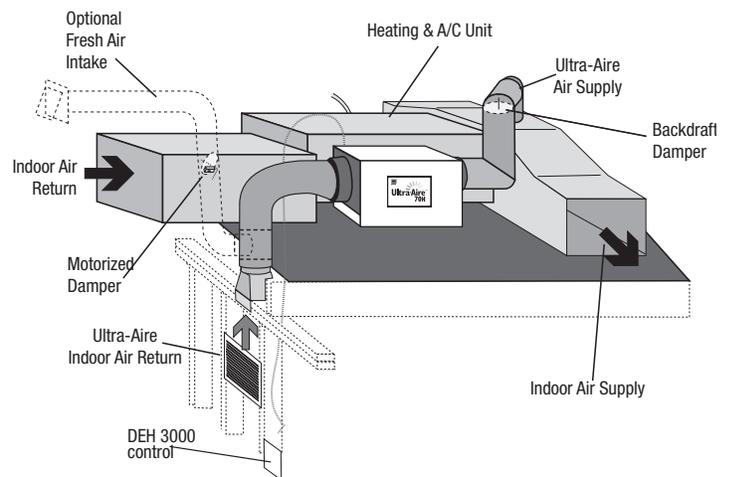
use a return from a room that may have its door closed much of the time or, alternatively, install a separate return from the open part of the house.

4.4D Installation in an Attic with an Existing Forced Air HVAC System

⚠ CAUTION

ALWAYS place a drain pan under the unit if it is suspended above a finished area or above an area where water leakage could cause damage.

When installing the UA70H above a finished area or where water leakage could cause damage, use a secondary drain pan with an overflow interrupter switch. The interrupt switch should be installed in series with the field wire that connects the blue (#5) lead from the Ultra-Aire 70H to the blue (#5) lead on the control panel. If overflow occurs, this switch opens the compressor control circuit and stops water production before the drain pan overflows. The Ultra-Aire 70H will continue to ventilate or circulate air as normal, but will not dehumidify until this switch closes.



FOR HVAC INSTALLER ONLY

The preferred method of installation is to create a separate return for the Ultra-Aire 70H in a central area of the structure. Duct the supply of the Ultra-Aire 70H to the air supply of the existing HVAC system.

4.4E Installation in a Structure with No Existing Forced Air HVAC System

When installing the Ultra-Aire 70H in a structure that does not have a forced air HVAC system, a single return for the Ultra-Aire 70H should be installed in central open area of the structure. DO NOT locate the return in a bathroom or a kitchen. The supplies of the Ultra-Aire 70H should be located in the remote areas of the structure (such as bedrooms, den, etc.). By ducting this way, the air inside the structure will circulate through the Ultra-Aire 70H to be filtered and dehumidified. A 6" diameter duct is recommended for branches to the bedrooms. A 8" diameter duct is recommended for branches to larger areas.

4.4F Ducting for High Efficiency Filtration

The Ultra-Aire 70H is equipped with a high efficiency MERV 11 media filter (P/N 4027158). For optimal performance it is recommended that the filter be replaced every 3-6 months.

Additional filtering options, including charcoal filtration and MERV 14 filtration, are available with the addition of an optional external filter housing that may be installed with the UA70H. The external filter housing is ducted to the inlet of the UA70H and intake ducting from the structure is ducted to the intake side of the filter housing. The external filter housing can accommodate a variety of filter combinations up to a total of 6" in thickness. Contact the factory or visit www.ultra-aire.com additional details.

4.4G Converting to Vertical Discharge Airflow

The UA70H is shipped from the factory with the exhaust panel of the cabinet configured for horizontal air discharge. The cabinet can be easily converted to vertical air discharge. To convert the air discharge from horizontal to vertical, follow these steps:

1. Using a 5/16" nut driver or a straight screwdriver, remove three (3) sheet metal screws that attach the exhaust panel from each side of the UA70H. There will be a total of six (6) screws. Do not remove the exhaust collar.



2. Remove the exhaust panel.



3. Rotate the exhaust panel so that the exhaust collar is located on the top of the unit. Align screw holes and snap the panel onto the base.



4. Secure the exhaust panel to the base by replacing the six (6) screws.



4.5 Noise Abatement

A length of 10 feet or more of flex ducting on the outlet of the Ultra-Aire 70H will reduce air noise from the fan. A length of flexible ducting on all Ultra-Aire 70H duct connections is recommended to reduce noise transmitted to rigid ductwork in the structure.

CAUTION

Replacing the filter requires the return duct to be removed. Failure to use flex duct will prevent filter access. Three feet of flex duct should be adequate to access the filter.

4.6 Controls

The UA70H features a built-in dehumidistat control as well as the ability to wire a remote mounted control to the unit. The control used to operate the unit should be located in an area where the control can accurately sense the humidity of the area where humidity control is desired.

If the UA70H is located in the area where humidity control is desired, consider using the built-in control. Adjust the humidity control so that the unit maintains the desired level of humidity.

If the UA70H is located outside of the area where humidity control is desired, consider using a remote wired humidity controller that is located in the area where humidity control is desired.

When using a remote wired dehumidistat, be sure the built-in dehumidistat is set to the off position by turning it counterclockwise until it stops. Failure to do so may cause the unit to sense the humidity from the wrong area.

WARNING: DO NOT allow the yellow lead from the unit to contact the red lead or the white lead from the unit or damage to the transformers will result.



(P/N 4028539; with remote: P/N 4028407)

The UA dehumidifier is controlled using five color-coded wires.

Green (or brown) = Fan control

Blue = Dehumidification (fan and compressor) control

Red = 24volt AC power transformer neutral side (common with white)

White = 24volt AC power transformer neutral side (common with red)

Yellow = transformer high side

Between the red/white lead and the yellow leads is a 40VA transformer. This low voltage power source powers the relay coils which control the fan and compressors. This 24VAC transformer can also be used to power HVAC accessories external to the dehumidifier.

- To turn the dehumidifier on make contact between yellow and blue wires.
- To turn the fan on make contact between yellow and green(or brown) wires.
- To power an HVAC accessory, connect the accessory to the white (or red) wire and the yellow wire.

ATTENTION INSTALLER

WARNING: Allowing yellow wire to contact red or white wire will destroy the transformer.

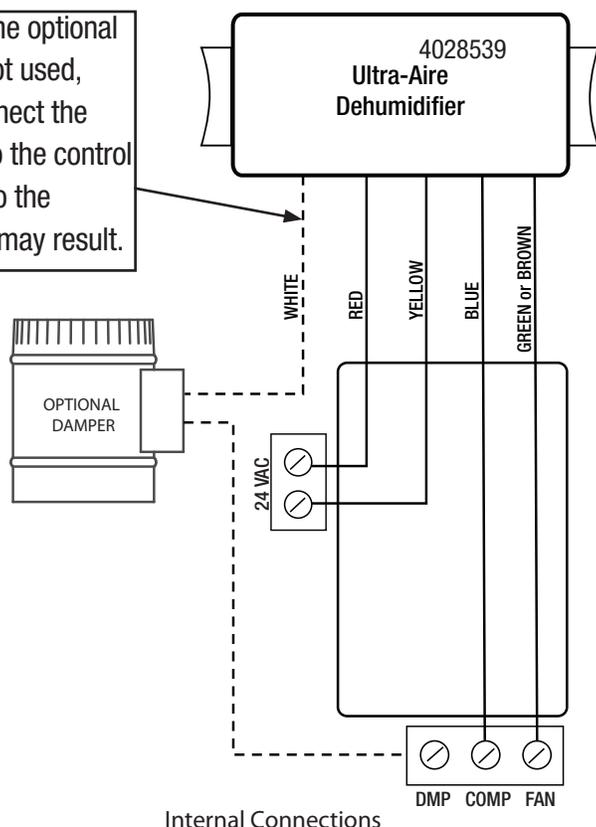
Dehumidifier on : Connect yellow and blue wires.

Fan only on : Connect yellow and green (or brown) wires.

Accessory power : 24volt AC power supply available for HVAC accessories between yellow and white(and/or red) wire. Red and white wires are common with each other.

Ultra-Aire DEH 3000 dehumidification & ventilation control

Warning: if the optional damper is not used, DO NOT connect the white wire to the control or damage to the transformer may result.



Control Part No. 4028539

Refer to DEH3000 manual for additional wiring diagrams. DEH300R (with remote wired sensor) is also available as a separate unit. Refer to the DEH300R manual for wiring details.

6. Maintenance

6.1 High Efficiency Air Filter

The Ultra-Aire 70H is equipped with a MERV 11 media filter. This filter should be checked every three months. Operating the unit with a dirty filter will reduce dehumidifier capacity and efficiency and may cause the compressor to cycle off and on unnecessarily on the defrost control.

DO NOT operate the unit without a filter or with a less effective filter. Operating the unit without a filter or with a less effective filter may cause internal damage to the unit and invalidate the product warranty.

To replace the filter, remove the filter door from one of the sides of the UA70 by pushing the snap button in and gently pulling to door away from the body of the unit, then pulling up to disengage the door flange from the slot, removing the door.



Remove the filter by gently pulling straight out of the unit. Insert new filter in the same manner, pushing it gently straight into the unit.



Replace filter door by inserting the bottom tab into the slot, aligning the door and pushing it gently against the unit until the snap button secures the door.

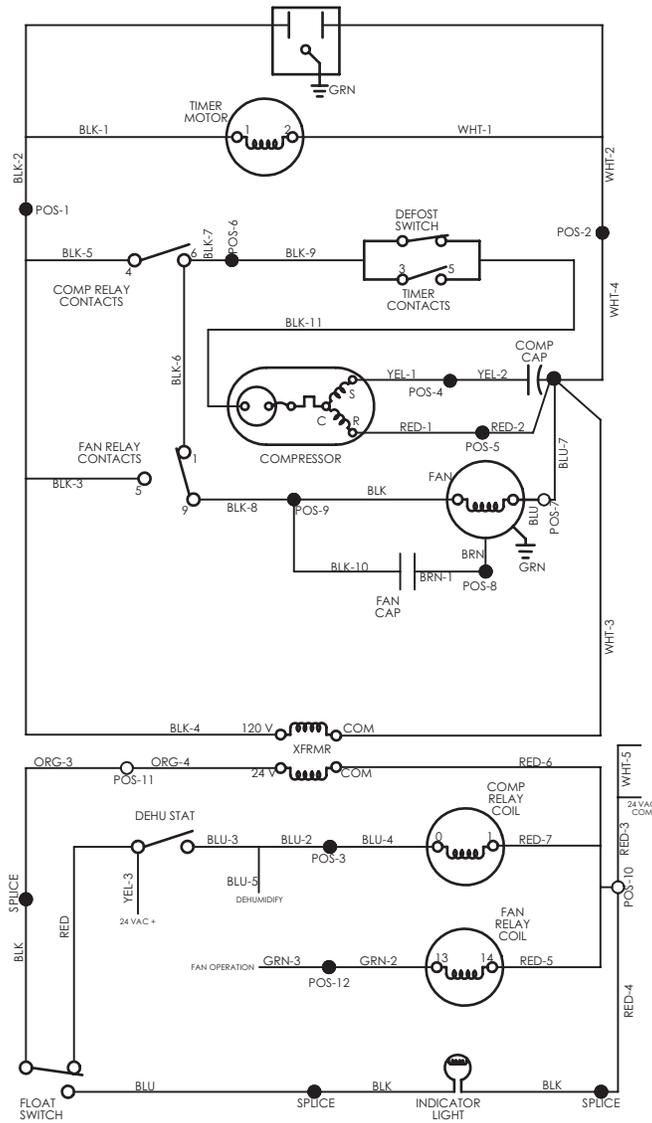
6.2 Optional Fresh Air Intake

Check and clean the screen on the outdoor fresh air intake port seasonally. The screen may become plugged during the seasons when there are many particles in the outdoor air.

Notes:

Ultra-Aire 70H WIRING SCHEMATIC

7. Wiring Schematic



8. Optional Parts List: Ultra-Aire 70H Indoor Air Quality System

Part No.	Description
4027158	Filter MERV 11
4030113	Pump Kit
4029908	Hang Kit
4023647	8" Gravity Damper
4020646	8" Butterfly Damper
4027415	8" Flex Duct
4020177	8" Flex Duct (insulated)

FOR HVAC INSTALLER ONLY

9. Service Parts List: Ultra-Aire 70H Indoor Air Quality System

Part No.	Description
4029567	Compressor
4029568	Compressor Overload
1970010	Compressor Relay
4027165	Run Capacitor
4029595	Coil Set
4029587	Impeller Fan
4020924	Fan Relay
4029594	Fan Capacitor
4029736	Defrost Thermostat
4028096	Defrost Timer
4029737	Indicator Light
4029735	Overflow Switch
4022487	Transformer

FOR HOMEOWNER - ROUTINE MAINTENANCE

Part No.	Description
4027158	Air Filter MERV 11
4027422	4 Pack
4027427	12 Pack

The Ultra-Aire 70H is equipped with a MERV 11 media filter. This filter should be checked every three months. Operating the unit with a dirty filter will reduce dehumidifier capacity and efficiency and may cause the compressor to cycle off and on unnecessarily on the defrost control. Refer to section 6.1 for filter replacement instructions.

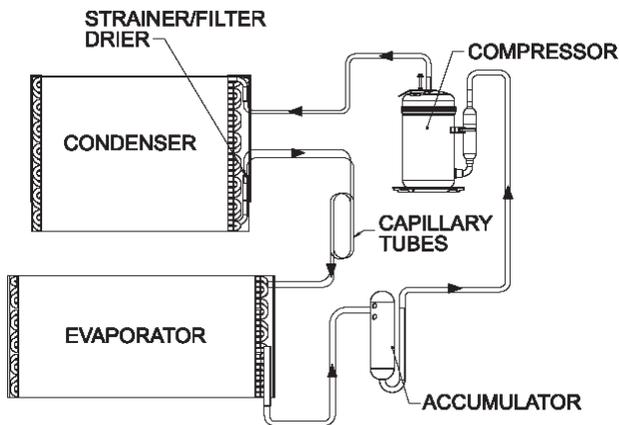
10. Service

CAUTION

CAUTION: Servicing the Ultra-Aire 70H with its high pressure refrigerant system and high voltage circuitry presents a health hazard which could result in death, serious bodily injury, and/or property damage. Please contact your HVAC professional.

10.1 Technical Description

The Ultra-Aire 70H uses a refrigeration system similar to an air conditioner's to remove heat and moisture from incoming air, and add heat to the air that is discharged. Hot, high-pressure refrigerant gas is routed from the compressor to the condenser coil (See Figure 1). The refrigerant is cooled and condensed by giving up its heat to the air that is about to be discharged from the unit. The refrigerant liquid then passes through a strainer and capillary tubing which causes the refrigerant pressure and temperature to drop. It next enters the evaporator coil where it absorbs heat from the incoming air and evaporates. The evaporator operates in a flooded condition, which means that all the evaporator tubes contain liquid refrigerant during normal operation. A flooded evaporator should maintain nearly constant pressure and



Refrigeration System of Ultra-Aire 70H

temperature across the entire coil, from inlet to outlet.

The mixture of gas and liquid refrigerant enter the accumulator after leaving the evaporator coil. The accumulator prevents any liquid refrigerant from reaching the compressor. The compressor evacuates the cool refrigerant gas from the accumulator and compresses it to a high pressure and temperature

10.2 Troubleshooting

Unit doesn't respond to humidity setpoint on remote wired dehumidistat.

1. Verify built-in dehumidistat is turned to the "off" position.
2. Check calibration of the control to determine if it is reading humidity level properly.
3. Verify control wiring is intact by connecting control directly to the pigtail of the unit.

Neither fan nor compressor running. Dehumidification is being called for. No fan call.

1. Unit unplugged or no power to outlet.
2. Humidity control set too high.
3. Loose connection in internal or control wiring.
4. Defective Compressor relay.
5. Defective control transformer.

Compressor is not running. Dehumidification is being called for. No fan call.

1. Defective compressor run capacitor (Sec. 7.6).
2. Loose connection in compressor circuit.
3. Defective compressor overload (Sec. 7.6A).
4. Defective compressor (Sec. 7.6).
5. Defrost thermostat open.

Compressor cycles on and off. Dehumidification is being called for. No fan call

1. Low ambient temperature and/or humidity causing unit to cycle through defrost mode.
2. Defective compressor overload (Sec. 7.6A).
3. Defective compressor (Sec. 7.6).
4. Defrost thermostat defective (Sec. 7.8).
5. Dirty air filter(s) or air flow restricted.

Fan is not running. Dehumidification or fan is being called for

1. Loose connection in fan circuit.
2. Obstruction prevents fan impeller rotation.
3. Defective fan.
4. Defective fan relay.

Low dehumidification capacity (evaporator is frosted continuously). Dehumidification is being called for

1. Defrost thermostat loose or defective (Sec. 7.8).
2. Low refrigerant charge
3. Dirty air filter(s) or air flow restricted.
4. Excessively restrictive ducting connected to unit.

No ventilation. Ventilation is being called for.

1. Loose connection in ventilation control circuit
2. Loose connection in damper power circuit.
3. Defective fresh air damper.

Unit removes some water, but not as much as expected.

1. Air temperature and/or humidity have dropped.
2. Humidity meter and or thermometer used are out of calibration.
3. Unit has entered defrost cycle.
4. Air filter dirty.
5. Defective defrost thermostat.
6. Low refrigerant charge.
7. Air leak such as loose cover or ducting leaks.
8. Defective compressor.
9. Restrictive ducting.
10. Optional Condensate Pump Safety Switch open.

Unit Test to determine problem:

1. Detach field control wiring connections from main unit.
2. Connect the yellow and green pigtails from the main unit together; only the fan should run. Disconnect the wires.
3. Connect the yellow and blue pigtails from the main unit together or turn the built-in dehumidistat all the way clockwise to the "on" position; the compressor and fan should run.
4. If these tests work, the main unit is working properly. You should check the control panel and field control wiring for problems next.
5. Remove the control panel from the mounting box and detach it from the field installed control wiring. Connect the blue, yellow, and green wires from the control panel directly to the corresponding colored pigtails on the main unit. Leave the green, white and red wires disconnected!
6. Engage the fan switch on the control; the fan should run. Turn off the fan switch.
7. Engage the dehumidistat of the control; the compressor and fan should run.
8. If these tests work, the problem is most likely in the field control wiring.

10.3 Refrigerant Charging

If the refrigerant charge is lost due to service or a leak, a new charge must be accurately weighed in. If any of the old charge is left in the system, it must be recovered before weighing in the new charge. Refer to the unit nameplate for the correct charge weight and refrigerant type.

10.4 Compressor/Capacitor Replacement

This compressor is equipped with a two terminal external overload and a run capacitor, but no start capacitor or relay.

CAUTION

CAUTION-ELECTRICAL SHOCK HAZARD: Electrical power must be present to perform some tests. These tests should be performed by a qualified service person.

10.5 Electric Ventilation Damper

The damper will open when the ventilation is called for, allowing fresh air into the structure through the fresh air inlet duct. The electric ventilation damper will remain closed when the ventilation is not activated in order to prevent over-ventilating the structure when the unit is dehumidifying or recirculating the indoor air. The electric ventilation damper operates on 24 Vac from the control circuit. DO NOT connect high voltage to the damper motor or damage to the motor will result. DO NOT force the blade of the damper by hand or damage to the damper motor may result.

The damper opens in one direction only. The damper rotates very slowly, allow sufficient time for the damper to cycle. The damper will take approximately one minute to cycle from closed to open or from open to closed.

If the electric ventilation damper fails to operate:

1. Check that the wiring is correct and that voltage is present at the damper motor.
2. Check for any obstruction inside the damper. If the electric ventilation damper fails to operate after performing these checks, it must be replaced.



Ultra-Aire™

DEH 3000/DEH 3000R

Part No. 4028539 Part No. 4028407



11. Optional Dehumidifier & Ventilation System Controller

When used with Ultra-Aire Whole House Ventilating Dehumidifiers, the DEH 3000/3000R allows homeowners the ability to monitor and control relative humidity levels in their home.

DEH3000 P/N:	4028539
DEH3000R (remote) P/N:	4028407
Model:	DEH 3000 DEH 3000R (remote)
Operating Voltage:	24 VAC
Max Current DMP, COMP, FAN:	1 AMP each
Humidity Sensing Range/Accuracy:	10 - 95% RH, ± 5%
Humidity Setpoint Range:	35 - 70%
Auxillary Relay Capacity:	5 Amps, 24VAC
Temp Range/Accuracy:	30°-90°F, 2%
Size:	4.95"L x 1.06"W x 4.19"H

Major Operations

- Digital control of Relative Humidity (Digital Set-Point)
- Fan/Filter Operation
- Programmable Ventilation Timer
- Large, easy-to-read backlit LCD display
- Easy interaction with air handler fan (Interlock/Lockout)
- High Temperature Cut-Out
- Dryout Cycle Timer
- Auto Reboot
- Remote Sensor (DEH 3000R Only)

**To order call Therma-Stor at
1-800-533-7533**



Ultra-Aire™ Limited Warranty 70H

Limited Warranty. Therma-Stor, LLC (“Therma-Stor”) warrants as follows: (i) the Ultra-Aire 70H dehumidifier (“Product”) will be free of material defects in workmanship or materials for a period of one (1) year (“One-Year Warranty”) following the date of initial purchase of such Product by an original customer purchasing from Therma-Stor or an authorized reseller (“Customer”); and (ii) the Product’s condenser, evaporator, and compressor will be free of material defects in workmanship or materials for a period of five (5) years following the date of initial purchase of such Product by a Customer.

Limitation of Remedies. CUSTOMER’S SOLE AND EXCLUSIVE REMEDY UNDER THE ABOVE LIMITED WARRANTY AND THERMA-STOR’S ENTIRE LIABILITY THEREUNDER, SHALL BE, AT THE SOLE OPTION OF THERMA-STOR, REPLACEMENT OR REPAIR OF SUCH PRODUCT OR ITS COMPONENTS (“COMPONENTS”) BY THERMA-STOR OR THERMA-STOR’S AGENTS ONLY. REFRIGERANT, PIPING, SUPPLIES, TRANSPORTATION COSTS, LABOR COSTS INCURRED IN REPAIR OR REPLACEMENT OF SUCH COMPONENTS ARE NOT INCLUDED. THIS DISCLAIMER AND EXCLUSION SHALL APPLY EVEN IF THE EXPRESS WARRANTY AND LIMITED REMEDY SET FORTH HEREIN FAILS OF ITS ESSENTIAL PURPOSE. CUSTOMER ACKNOWLEDGES THAT NO REPRESENTATIVE OF THERMA-STOR OR OF ITS AFFILIATES OR RESELLERS IS AUTHORIZED TO MAKE ANY REPRESENTATION OR WARRANTY ON BEHALF OF THERMA-STOR OR ANY OF ITS AFFILIATES OR RESELLERS THAT IS NOT IN THIS AGREEMENT. Notwithstanding the above, during the term of the One-Year Warranty only, Therma-Stor will provide, free of charge to Customer, all Components and labor (except costs related to removal and installation of Product) required to fulfill its obligations under such One-Year Warranty.

Disclaimer of Warranties. EXCEPT FOR ABOVE LIMITED WARRANTY, WHICH IS THE SOLE AND EXCLUSIVE WARRANTY PROVIDED WITH RESPECT TO THE PRODUCT AND ITS COMPONENTS, THERMA-STOR HEREBY DISCLAIMS ALL EXPRESS AND IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Warranty Limitations. The foregoing limited warranty extends only to a Customer and shall be null and void upon attempted assignment or transfer. A “defect” under the terms of the limited warranty shall not include problems resulting from Customer’s or Customer’s employees’, agents’, invitees’ or a third party’s misuse, improper installation, improper design of any system in which the Product is included, abuse, lack of normal care, failure to follow written instructions, tampering, improper repair, or freezing, corrosion, acts of nature or other causes not arising out of defects in Therma-Stor’s workmanship or material. If a Product or Component is replaced while under warranty, the applicable limited warranty period shall not be extended beyond the original warranty time period. The limited warranty does not cover any costs related to changes to a Product or Component that may be required by any codes, laws, or regulations that may become effective after initial purchase of the Product by Customer.

Customer Responsibilities. As a further condition to obtaining warranty coverage hereunder, the Customer must send a valid warranty claim to Therma-Stor such that Therma-Stor receives such claim prior to the end of the applicable warranty period. Therma-Stor shall have no obligation hereunder with respect to any claim received by Therma-Stor after the expiration of the applicable warranty period. As a further condition to obtaining warranty coverage hereunder, the Customer must present forms of invoices evidencing proof of purchase of a Product. If such invoices do not clearly indicate the date of initial purchase by a Customer, the applicable Product’s date of manufacture will be used instead of the date of initial purchase for the purpose of calculating the commencement of the applicable warranty period. Warranty service must be performed by Therma-Stor or a servicer authorized by Therma-Stor. In order to obtain warranty service, the Customer should call Therma-Stor at 1-800-533-7533 and ask for the Therma-Stor Products Service Department, which will then arrange for applicable warranty service. Warranty service will be performed during customary, daytime working hours. If the Product must be shipped for service, Customer shall be solely responsible for properly packaging the Product, for all freight charges, and for all risk of loss associated with shipment.

Limitation of Liability. IN NO EVENT SHALL THERMA-STOR, IN CONNECTION WITH THE DESIGN, SALE, INSTALLATION, USE, REPAIR, REPLACEMENT OR PERFORMANCE OF ANY PRODUCT, COMPONENT, PART THEREOF OR WRITTEN MATERIAL PROVIDED THEREWITH, BE LIABLE, TO THE EXTENT ALLOWED UNDER APPLICABLE LAW, UNDER ANY LEGAL THEORY FOR ANY SPECIAL, DIRECT, INDIRECT, COLLATERAL OR CONSEQUENTIAL DAMAGES OF ANY KIND. NOTWITHSTANDING THE ABOVE LIMITATIONS AND WARRANTIES, THE SOLE AND EXCLUSIVE LIABILITY OF THERMA-STOR, REGARDLESS OF THE NATURE OR THEORY OF THE CLAIM, SHALL UNDER NO CIRCUMSTANCES EXCEED THE PURCHASE PRICE OF THE PRODUCT, COMPONENT OR PART UPON WHICH THE CLAIM IS PREMISED.

Applicable Law and Venue. ANY ARBITRATION, ENFORCEMENT OF AN ARBITRATION OR LITIGATION RELATED TO THE PRODUCT WILL BE BROUGHT EXCLUSIVELY IN DANE COUNTY, WISCONSIN, AND CUSTOMER CONSENTS TO THE JURISDICTION OF THE FEDERAL AND STATE COURTS LOCATED THEREIN, SUBMITS TO THE JURISDICTION THEREOF AND WAIVES THE RIGHT TO CHANGE VENUE. CUSTOMER FURTHER CONSENTS TO THE EXERCISE OF PERSONAL JURISDICTION BY ANY SUCH COURT WITH RESPECT TO ANY SUCH PROCEEDING.

Miscellaneous. If any term or condition of this Limited Warranty is found by a court of competent jurisdiction to be invalid, illegal or otherwise unenforceable, the same shall not affect the other terms or conditions hereof or thereof or the whole of this Limited Warranty. Any delay or failure by Therma-Stor to exercise any right or remedy will not constitute a waiver of Therma-Stor to thereafter enforce such rights.



32-5042-03

User's Information Guide

Energy Recovery Ventilator (ERV)

***ERV100A9P00A**

***ERV200A9P00A**

***ERV300A9P00A**

*May be "A" or "T"



User's Information

GENERAL INFORMATION

Understand the signal words. **WARNING**, **AND CAUTION**. These words are safety alert words. **WARNING** indicates hazards which **could** result in personal injury or death. **CAUTION** is used to indicate unsafe practices which could result in minor injury or property damage.

WARNING

Disconnect Power Before Servicing. Failure to follow the electrical servicing instruction may cause Personal Injury or Death.

WARNING

Do Not Use This Unit if Any Part Has Been Under Water.

Immediately Call A Qualified Service Technician To Inspect The ERV and To Replace Any Part of The Control System Which Has Been Under Water.

CAUTION

PERSONAL INJURY HAZZARD

Failure to follow filter service instructions may cause personal injury. The access door swings down when unit is installed overhead. Carefully hold the access door while unlatching and lowering. The door should be removed prior to performing filter service.

FILTER SERVICE.

A Clean Filter Saves Money.

When the ERV provides fresh outdoor air into your home and exhausts indoor air to the outside, dust and dirt particles build up on the air filters. Excessive accumulation can block airflow, decreasing the ERV's performance and increase energy usage. To maintain top performance be sure to clean or replace the ERV filters according to the instructions in this manual.

Clean filters every three months when the unit is in regular use or as needed to keep them clean.

How to remove and clean your filter:

1. Release cam latches and carefully swing access door open. The access door may be removed for ease of service by sliding the access door off. Use caution when removing door
2. Remove the filter retainer springs. Pull the filters out. See Figure 1.
3. Vacuum filters off with a hose attachment.
4. Re-install filters and retainer spring
5. Re-install cover, and fasten cam latches.

FILTER SERVICE NOTES

A) The filters should be replaced after they have been cleaned several times. Contact your installing dealer for service and replacement filters. Replacement filter model numbers are as follows:

Model	Filter #
*ERVR100	BAYFLT10A1010A
*ERVR200	BAYFLT20A1020A
*ERVR300	BAYFLT20A1020A

B) Filters may be cut from a sheet or roll of ¾" - 1" firm, spun polyester filter "hog hair" media or material, similar to the existing, factory installed, green/blue filter in the unit.

The size of each filter (2 required per unit) is listed as follows:

*ERVR100	10½" x 10½"
*ERVR200/300	10½" x 21¾"

* First letter of model number may be an "A" or "T".

C) **Filters must always be used during unit operation** or the heat transfer core will become blocked by particulate matter. The filters supplied in the unit are typically able to keep the heat transfer core clear for many months. Finer filters may be used but must be cleaned more often.

HEAT TRANSFER CORE SERVICE.

(The Heat Transfer Core may also be referred to as the Energy Exchange Element or Heat Exchanger) ***Vacuum the Face of the Heat Transfer Core Yearly.***

Particulate matter collects only on the entering faces of the heat transfer core. The interior of the heat transfer core stays clean even if the element faces are covered particulates.

TO CLEAN THE HEAT TRANSFER CORE:

1. Remove filter retainer spring and the filters (see above).
2. Vacuum the exposed faces of the heat transfer core with a soft brush attachment.
3. After servicing the filters, re-install them and the filter retainer spring (see above).
4. Vacuum out dust from the rest of the unit case.

CAUTION

DO NOT WASH THE HEAT TRANSFER CORE. Always handle the core carefully. Keep it away from water or fire to avoid damaging it. The heat transfer core can be replaced but is expensive.

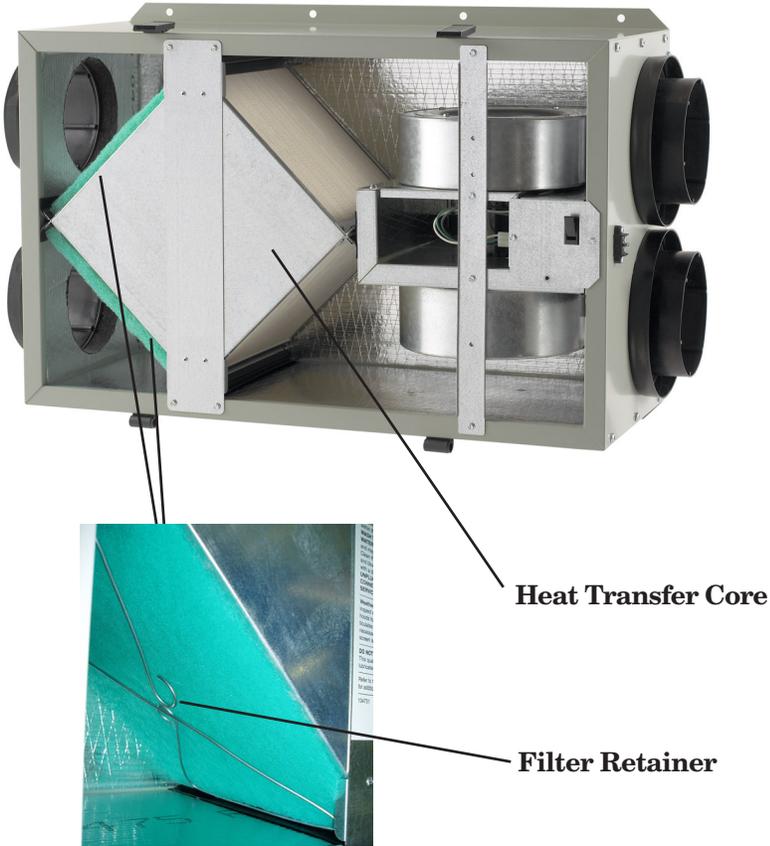


Figure 1
Energy Recovery Ventilator with cover removed

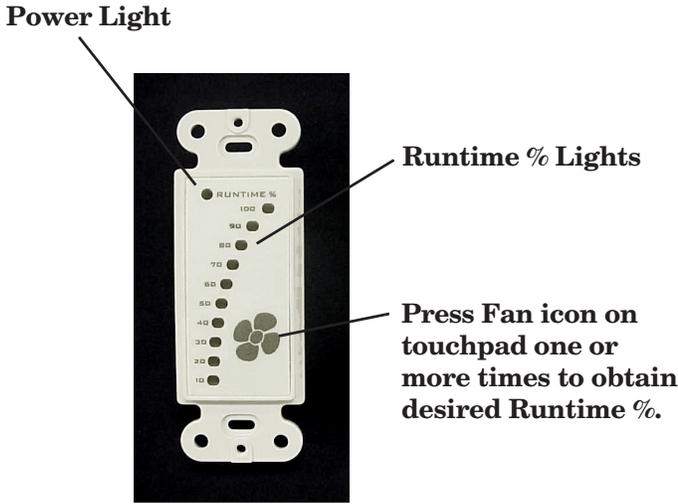


Figure 2
Percent Timer (P.T.) Control

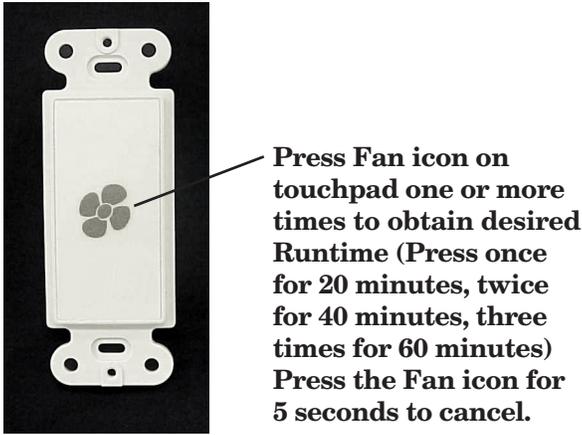


Figure 3
Optional Push Button Control

User's Information

PERCENT TIMER CONTROL (PT)

The Percent Timer Control automatically energizes and de-energizes the energy recovery ventilator every hour, ensuring ventilation for the home around-the-clock. The PT control has two status lights (See Figure 2). One is the power light located in the upper left hand corner of the control. The other light will be one of the Runtime % lights. The power light is on whenever the PT control is calling for the ERV to run. The Runtime % light is located along the right side of the control. The Runtime % light indicates the amount of time per hour the ERV will operate. Set the control per your local code or ASHRAE Std 62.2 and your ventilator will run once every hour.

FOR CONSTANT OPERATION: Press the fan icon until the 100% light is on. The "Runtime %" light turns on. The ERV unit will run continuously.

FOR MINIMUM VENTILATION REQUIREMENT OPERATION: Set the control at the percentage that meets local code or ASHRAE 62.2. Press the fan icon until the light for the percent desired is on.

TO TURN THE ERV OFF: Press the fan icon until all lights are off. The control is off. The ERV motor is de-energized. (Power is still present inside the unit. Always unplug cord from outlet before servicing!)

GENERAL SETTINGS: For systems installed in an area with high humidity. The Percent Timer should be set to deliver the Minimum Ventilation Requirements.

VACATION SETTINGS: For systems installed in an area with high humidity. If the A/C system thermostat setting is elevated or set up while on vacation or for extended periods of time (over 2 days), the Percent Timer and ERV should be turned OFF. After returning from vacation or when the system thermostat is lowered to normal daily setting, the Percent Timer and ERV should be reset to the previous runtime %.

WHEN WINDOWS ARE OPEN: When windows are open in your home the Percent Timer and ERV should be turned OFF.

NOTE for ERV systems with more than one control:

Another control may be causing your ventilator to run -even if the runtime % light on this control is off. If you wish to keep your ventilator from running, check that none of your controls are calling for unit operation.

Installation

1. Install control in a standard 2" x 4" electrical box, with a minimum depth of 1.5", with the two screws provided.
2. Wire Size: 18 gauge, no more than 500 feet. Wiring is non-polar.
3. The two wires from the ERV should be attached to the 'C' and 'R' positions on the terminal block on the back of the PT Control. See Figure 13.

4. Use Lutron Decora™ cover plate to complete the installation (supplied by installer).

PUSH BUTTON POINT-OF-USE CONTROL (OPTIONAL ACCESSORY)

For use with all ERV models

Operation

The Push Button (PB) Point-of-use Control lets you manually turn on your energy recovery ventilator for a short period of operation – for example, when you are using a bathroom. The PB Control must be connected to a PT control to operate.

20-40-60 minute ventilation control:

Press the fan icon and your ventilator will run for 20 minutes (See Figure 3). Press again and the unit will run 40 minutes. A third press provides for 60 minutes of operation. Percent Timer Control does not need to be on for the PB Control to operate the ERV unit.

You can cancel a cycle at anytime. Just press the fan icon and hold for about five seconds.

You can start another cycle by pressing the fan icon.

NOTE for ERV systems with more than one control:

Another control other than the push button may be causing your ventilator to run. If you wish to keep your ventilator from running, check that none of your controls are calling for unit operation.

Installation

4. Install control in a standard 2" x 4" electrical box, with a minimum depth of 1.5", with the two screws provided.
5. Wire Size: 18 gauge, no more than 500 feet. Wiring is non-polar.
6. Two wires from the PB Control should be attached to the 'PB' positions on the terminal block on the back of the Percent Timer Control.
7. For two PB controls, one wire from each can be twisted together and inserted into a single position on the terminal block on the Percent Timer Control. The wires must be a 18 gage solid wire. If more than two PB controls are attached or 18 gage stranded wire is used then pigtailed must be inserted into the 'PB' positions on the Percent Timer Control and the leads attached to the pigtailed with wire nuts.
8. Use Lutron Decora™ cover plate to complete installation.

Residential Systems
6200 Troup Highway
Tyler, TX 75707

*For more information contact
your local dealer (distributor)*

*Since the manufacturer has a policy of continuous product and product data improvement, it reserves the right to
change design and specifications without notice.*



ComfortLink™ II XL950 Control

*Amazingly versatile,
incredibly advanced*

*The ComfortLink™ II
control integrates home
comfort into your personal
lifestyle like nothing you've
ever seen before.*



Features Include...

- Large Color Display
- Simple Programming
- Weather Forecast (via wireless home network)
- Allergy Clean/Quick Clean Cycles
- Interactive Touchscreen
- 1-Touch Presets
- Built-in Help Screens
- Operating Runtime Analysis
- System Alerts
- Lock Screen Security
- Custom Screen Options
- Screen Savers
- Five Year Limited Warranty

Easy to use

The simple design and easy to follow functions of this control make it the most intuitive and easy to use control available. Just touch the screen to try out the functionality and make operational changes to the system in your home.

Help System

On-screen notes provide additional details. When more information is needed, context sensitive help is only a button touch away.

Scheduling

Scheduling setup is made easy with the use of an on-screen wizard that walks you through the process.

1-Touch Presets

Cooling and Heating presets allow you to change your in-home temperatures with the touch of a button.

Customizable

Customize the screen to suit your unique needs. You can setup shortcuts and an easy access dashboard on the Home screen. You can change the colors, and enjoy a photo slideshow.

⚠ CAUTION

Use only your fingertips to touch the touchscreen. Using any other implement can damage the screen.

⚠ CAUTION

Use only a soft damp cloth to clean the screen.

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Easy to use... Everything is just a touch away

See and adjust multiple zones or systems

Choose the shortcut items that show in this menu bar

See current system status

View big, bold at-a-glance system status

Choose the dashboard items that show in this section

Use context sensitive help

Change settings with just a few button touches

Manually change setpoints or use convenient Home, Away and Sleep presets

The interface shows a top menu bar with a home icon, the zone name "Upstairs", the date and time "Thu, Dec 16 10:23 AM", and system status icons. The main display is divided into three columns: "Indoor Temperature" showing 74° and "System Idle", "Cooling/Heating" controls with a "Cool to: 74°" setpoint and "Home/Away/Sleep" presets, and "Outdoor Temperature" showing 50° along with "Indoor Humidity" (50%) and "Air Filter Status" (Good). A bottom bar contains "Help", "Menu", and three "Auto" mode buttons (System Mode, Fan Mode, Air Cleaner Mode).

1 Buttons and Navigation

Pressing a button will display additional information or a new menu screen.

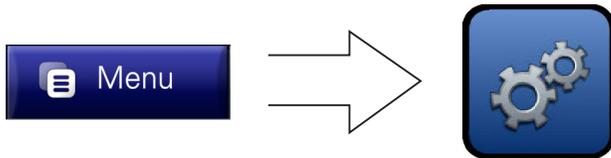
EXAMPLE: You may access the **Menu** screen by pressing the “Menu” button on the home screen.



You may access the **Settings Menu** by pressing the “Settings” button from the **Menu** screen.



EXAMPLE: In the following sections, button sequences will be shown with icons. For example, the sequence on this page would be represented this way:



2 System ON/OFF, Mode Selection

To the right of the Menu button are 3 Mode buttons:

- 1) The first sets **System Mode** (including OFF).
- 2) The second controls **Fan Mode**.
- 3) The third controls **Air Cleaner Mode**.

Each button has mode options to choose from. The chosen mode is conveniently displayed on its home screen button so you can see the functions your system is performing.



Mode Selection

1) System Mode

The “Auto” System Mode will switch between heating and cooling automatically.

“Heating” and “Cooling” modes are dedicated modes. For example, you may wish to set your system to “Heating” in winter months so your cooling unit does not run. Likewise, you may wish to set your system to “Cooling” in summer months so that your furnace does not run.

To completely turn off your system, select “Off”.

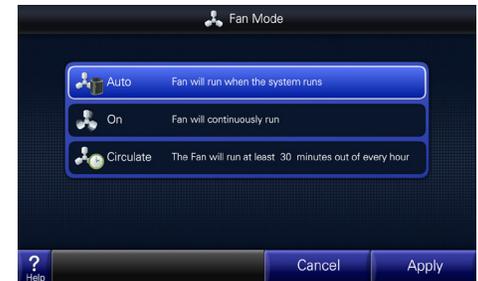


2) Fan Mode

In “Auto” Fan Mode the system’s fan will run only when the system runs.

The fan will run continuously when the Fan Mode is set to “On”.

The “Circulate” Fan Mode will run the fan at least 10-55 minutes out of every hour, decreasing hot/cool spots throughout your house.

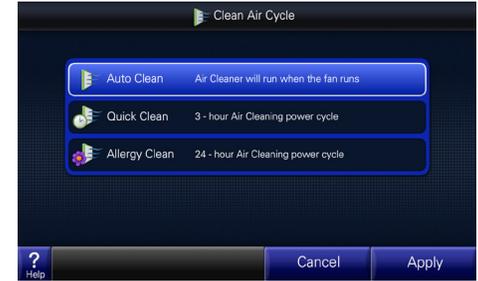


3) Air Cleaner Mode

Automatic means the air cleaner will run when the fan runs.

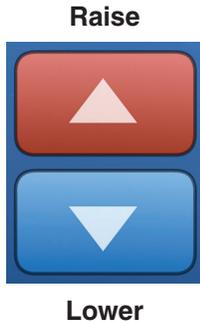
Quick Clean is a full power air cleaning cycle that increases the system fan speed setting (when not actively heating or cooling) to 100% for **three hours** to achieve maximum clean air delivery rate.

Allergy Clean is a full power air cleaning cycle that increases the system fan speed setting (when not actively heating or cooling) to 100% for **24 hours** to achieve maximum clean air delivery rate.



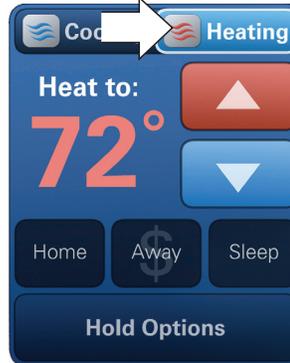
3 Setpoint Panel

A Setpoint is the desired temperature you would like your home heated or cooled to when in one of the three System Modes.



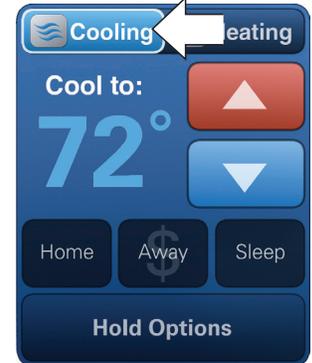
To adjust the Heating Setpoint, select "Heating" and raise or lower the temperature to reach your desired setpoint.

Heating Setpoint Panel



To adjust the Cooling Setpoint, select "Cooling" and raise or lower the temperature to reach your desired setpoint.

Cooling Setpoint Panel



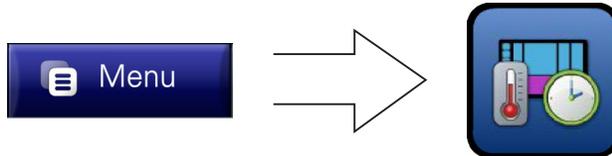
4 Manually Set up a Schedule

The procedure below describes setting up a manual schedule. Scheduling can also be set up via Guided Scheduling which creates a schedule by asking you a series of questions. Guided Scheduling can also be selected in the screen below.

1) Turn Scheduling On (and select Manual Scheduling)



2) Enter the Schedule Menu



3) Select a day or time period

By default the schedule shows the periods Wake, Away, Home and Sleep. Each day can have its own schedule and each schedule will be a unique color.

Default
Schedule



4) Select the days you would like to schedule

By selecting more than one day, you can set the schedule to be the same for those days. For example, you may keep the same hours each weekday.



5) Adjust the Time for each period

Select a period one at a time and set its beginning time by pressing the "Time" button.

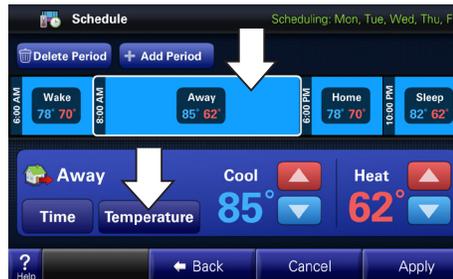
Press the "Temperature" button to adjust the setpoints for each period.

NOTE: Notice that you can delete or add periods (maximum 6 per day).



6) Adjust the Temperature for each period

Press the "Temperature" button to adjust setpoints for each period.



7) Press "Apply" when complete

Finished Examples:

Example A:

Example A is for someone who works and is out of the house during weekdays.



Example B:

Example B is for someone who is out of town Monday–Thursday.



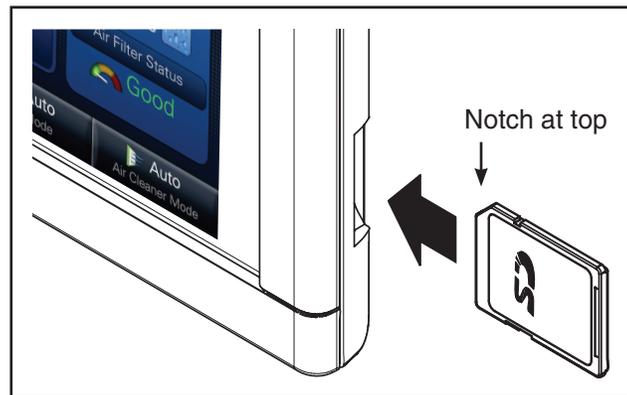
5 Using Photos

You can set up a photo album and a screen saver using your own photos.

Using an SD Card

Insert the SD Card at the bottom right hand side of the control, taking care to keep the card's "notch" in the orientation shown.

NOTE: The card must remain inserted to view the photos and the SD card must remain "unlocked."



Recommended SD Cards:

SD, SDHC
SD Adapter – microSD, miniSD, microSDHC, mini SDHC

Required Photo Formats:

Photos on your SD card must be in .jpg, .jpeg, .bmp, .png, or .gif formats and each photo must be less than 3MB in file size.

Photo Album

View and set up your photo album.



Load and Select Photos

- 1) If you do not yet have your SD card inserted or it is not inserted all the way, you will see this message.



- 2) Images will be loaded from your SD card into the viewer and sized to fit the screen.



- 3) Browse the album using the arrows on the right and left edges of the screen. Touch the image to see full size images.



Check the "Add to Slideshow" box to include the a photo in a slideshow.

- 4) In thumbnail view, you can view up to 15 photos at time. You can also see or select which photos will be included in a slideshow.

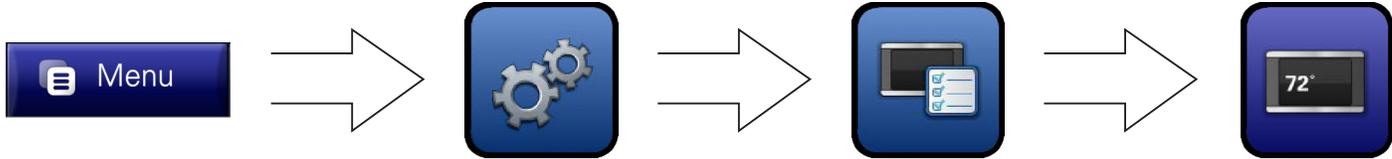


- 5) After you have selected which photos to include in your slideshow, press "Settings" to configure the Screen Saver.

(Or navigate to the Screen Saver menu using the path on the next page.)

Screen Saver

A standard or a custom photo screen saver can be selected.



- 1) If you desire, turn "On" the screen saver. Set the wait time until the screen saver starts.



- 2) The "Default Screen Saver" shows the current temperature as a floating icon over a darkened black screen.

Select "Image Screen Saver" if you have inserted an SD card and added photos to a slideshow.



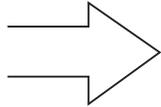
- 3) Set the number of seconds before the next photo will display.

6 Other Commonly Used Features

The following pages highlight some of the more common processes you will use.

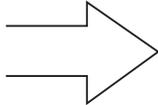
Name Your System

Give your system a name. This is very important if you have more than one system in your home.



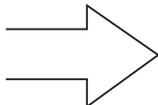
Events and Vacations

Set up how your system will operate for special events or when you are away from home for extended periods.



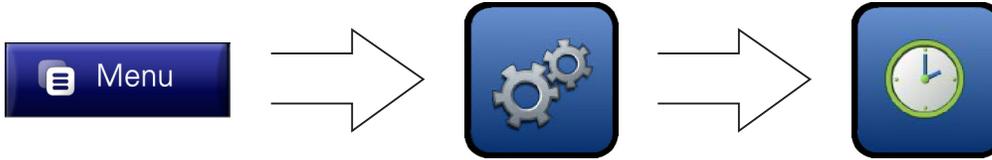
Dealer Information

Contact your dealer by using contact information in the Service menu.



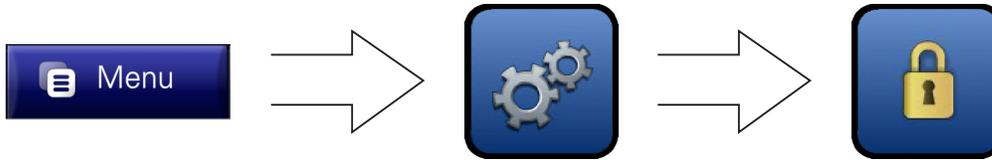
Time & Date

Set time, date and time zone. If a wireless network is set up, the time can be automatically synced via the internet.



Security

Protect your system from accidental or unwanted changes to your system by using a PIN lock.



1-Touch Presets

Set up these presets to make quick temperature setpoint changes from the Home Screen.

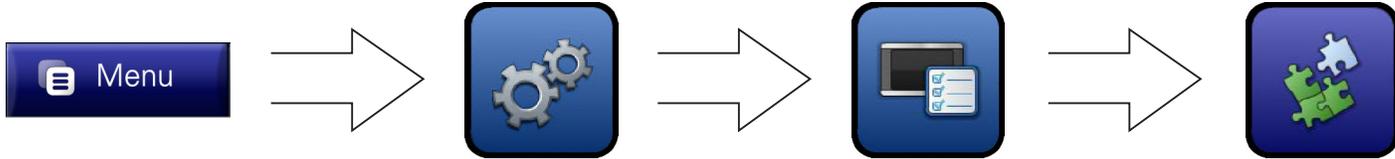


System Runtime History

System Runtime History monitors how much your system runs for both heating and cooling and also displays the average indoor temperature and outdoor high and low temperatures. This data allows you to better manage your utility costs by seeing when and how much your system is operating.

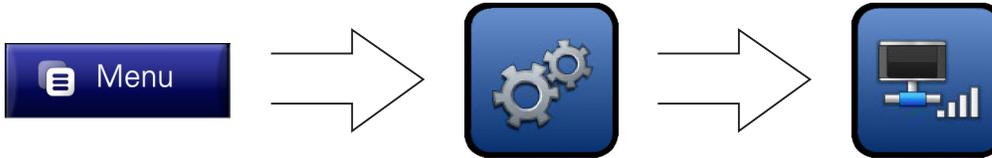
Customize your Home Screen

Add shortcuts and customize the dashboard.



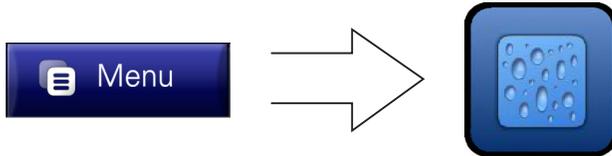
Wireless Network Setup

Set up a connection to your wireless network to enable weather and software update features. See the following section for setup details (802.11 B/G wireless router and internet required).



Humidity

You may see and adjust the humidity level in your home and adjust the humidity setpoints for both Heating and Cooling modes (for systems equipped with humidity control).



7 Optional Wireless Networking

Enabling wireless networking brings additional functionality to your control.

IMPORTANT:

After wireless networking is enabled, you will need to register your system with a valid email address before the weather data will be displayed.

NOTE: On a normally configured network, familiarity with a personal wireless network is helpful but not necessarily required for installation.

If your personal wireless network is a secure network, you will need the password.

1. Your control can access real-time weather conditions, forecasts and alerts.



2. When you have multiple systems in your home, each control can see and manage the others.

NOTE: In a Multi-System environment, it is recommended to name each control before enabling wireless networking.

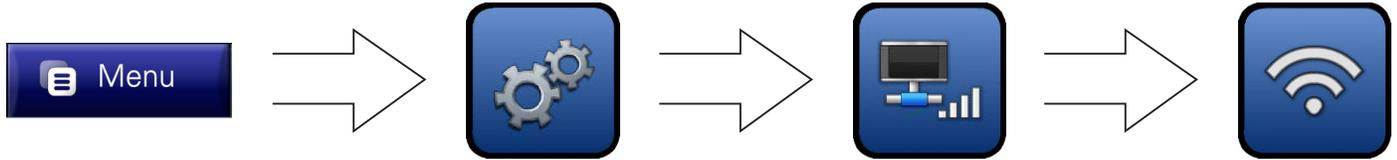


3. You can download software updates for efficient operation and the ability to use new features as soon as they are released.



7.1 Enabling Wireless Networking

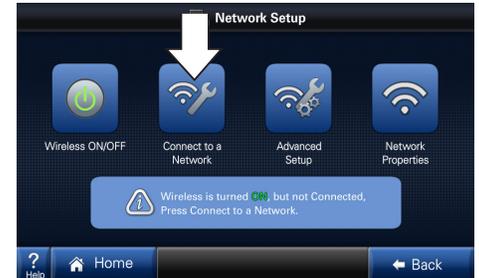
1) Enter the Wireless Network Setup Menu.



2) Enable the wireless radio by pressing “Wireless ON/OFF”.



3) After the wireless radio is enabled, press the “Connect to a Network” button to choose from a list of available wireless networks.



NOTE: If the router is configured to not broadcast its SSID, refer to Advanced Network Settings.

7.2 Selecting a Network



Available broadcasting networks with an adequate signal strength will display their SSIDs (Service Set Identifiers) in this screen.

A closed lock icon next to the SSID indicates a secure network. An open lock indicates a non-secure, “open” network.

Select your network and press “Connect”.

Signal Strength Indicators		
Indicator	Bars (Color)	Description
	One (Red)	Very Weak
	Two (Yellow)	Weak
	Three (Green)	Strong
	Four (Green)	Very Strong

The signal strength is indicated in bars. The more bars, the better the signal strength.

A minimum of three bars is required for stable network operation. The network will operate with one or two bars, but may result in intermittent or lost connections.

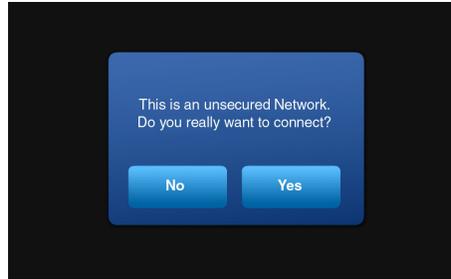
NOTE: Signal strength may be affected by router model, interference, obstructions and distance from the router. Consult router documentation for additional information.



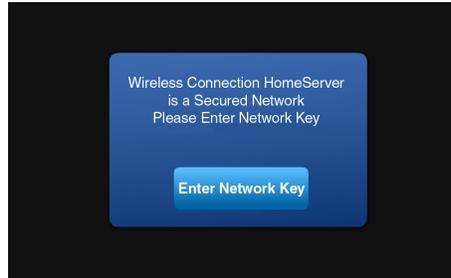
If a “Network Not Found” message is displayed, verify the wireless network is functioning and within range. Consult router documentation for additional information.

7.3 Enter Network Key/Password

1A) If the network is unsecured (with an “open” padlock), the following message will be displayed.



1B) If the network is secured (with a “closed” padlock), the following message will be displayed.



2) Enter the network key (case-sensitive password). You or your network administrator will need to provide the required information.



3) The control will connect to the wireless network.

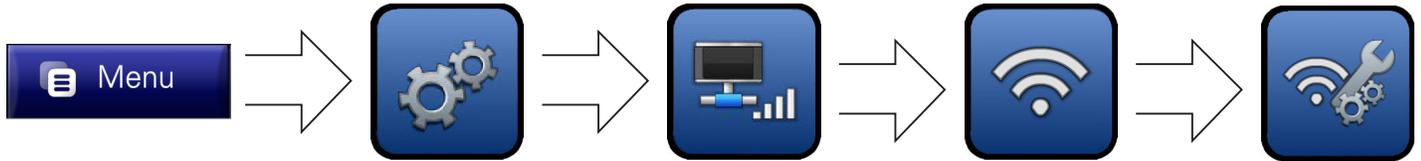


4) When the control has successfully joined the wireless network, the name of the network will be displayed with a green dot to the left and a signal strength indicator to the right.



7.4 Advanced Networking Information

Enter the Advanced Network Setup Menu.



Advanced networking will be required in the following two instances:

1. When connecting to a non-broadcast network
2. When configuring a static IP address

IMPORTANT:

The **Advanced Network** screens are intended for individuals with networking familiarity.

You or your network administrator will need to provide the required information.

If any of this information is unknown or for questions specific to the wireless router, please consult the router documentation or your network administrator.

7.5 Network Security

When the network's SSID is not broadcast (hidden), manual configuration in this screen is required.



1) The “Network Security” button in this **Advanced Network Settings** menu will be highlighted by default.



2) Press the “Enter SSID Name” button.



3) Enter the SSID Name using the on-screen keypad.



4) Select a network security type.*

*NOTE: WEP-Shared is not supported.



5) Press “Enter Network Key” button.



6) Enter the Network Key using the on-screen keypad.

7.6 Host Settings

This screen is used to manage how the control obtains network addresses and is needed when DHCP (Dynamic Host Configuration Protocol) has been turned off or is not available on the router. Otherwise, you may use DHCP to automatically obtain this information. This manual configuration is required if a static IP address is desired.

NOTE: No additional configuration may be required in a non-broadcast network where IP addresses are assigned by DHCP. You may connect to the network without modifying the Host Settings.



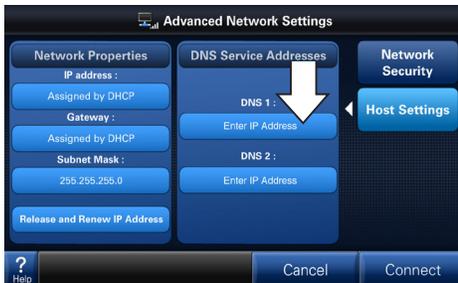
1) Select the “Host Settings” button to access the second screen of settings in this **Advanced Network Settings** menu.



2) Select IP Address, Gateway and Subnet Mask buttons as required.



3) Enter the IP address as required for each.



4) To manually select a DNS server, enter IP address(es).

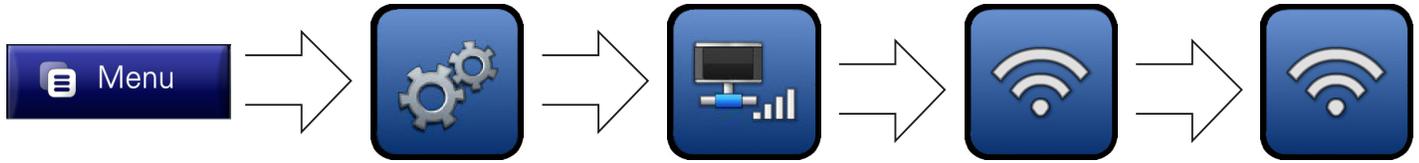


5) After all the addresses are assigned, Connect to the network.



6) To change a Static IP Address to a DHCP Address, press “Release and Renew IP Address”.

7.7 Network Properties



The **Network Properties** screen displays the control's current network information.



7.8 Disconnecting from a Network

Once a network has been joined, the control will reconnect to it after signal or power interruptions. When connected, a green dot will be shown.

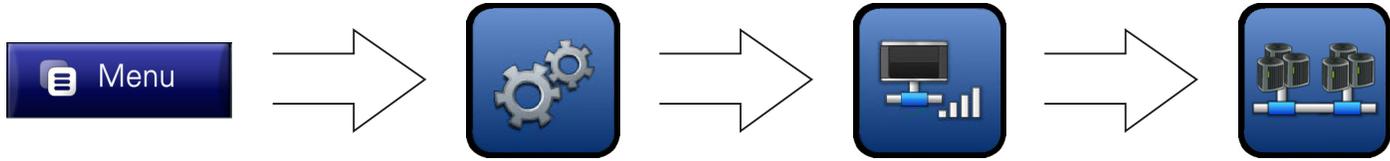
To disconnect from this network, enter the "Connect to a Network" menu and select "Disconnect".

NOTE: When joining a different network, the current router must be disconnected in this menu before a new one may be selected. In addition if settings are changed on the owner's router, the network may need to be disconnected and reconnected in this menu.

Repeat previous steps to connect to a different network.



7.9 Zoned and Multi-System Environments



- 1) In a multi-system environment each control can see and manage the others.

NOTE: The controls must have wireless enabled and be connected to the same personal wireless network.



- 3) In a multi-system environment where the systems are in the same Group, the "Zones" button will appear in place of the "System" button (see picture at right).



- 2) Each control belongs to an Access Control Group—set to "Group A" by default. Therefore, if two controls are connected to the same wireless network and have matching Group IDs (shown as Group A to the right), they will be able to communicate with each other.



- 4) The Zone Menu is shown at right.



Set the controls to the desired Group.

- 5) In zoned and multi-system environments, the main screen display will change to indicate the presence of multiple zones. (Notice the new zone button—labeled “Upstairs”—at right.)



Arrow buttons navigate between zone views.

- 6) The Zone Overview menu shows a quick view of each zone's current condition.



- 7) System wide settings for all zones can be seen at a glance in the System Status screen.



- 8) A schedule for one zone can be copied to another.



- 9) Each zone's schedule can be viewed by cycling through the zones using the arrows in the top left corner.



- 10) System and Zone Names may be set in the Zone Names screen. The “Rename System” and “Rename Zone” buttons allow entering custom names from a keypad.



Pre-configured names are also available.

8 Wireless Registration

Registration is required for Weather, Software Updates and Schlage LiNK integration. Registration ensures that your control is using the most up-to-date software and will also let you take advantage of exciting new features in the future. You will be notified via email when there is a software upgrade available. For complete privacy information see our Privacy Policy at trane.com.

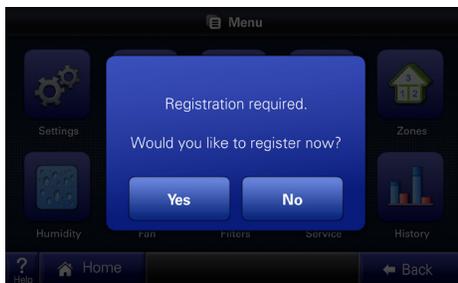
- 1A) In the Network Setup Screen, select the "Register Now" button to begin registration. Proceed to Step 2.



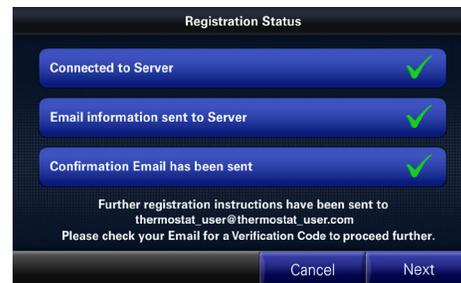
- 2) After reading and accepting the License Agreement, enter your email address.



- 1B) If instead you try to connect to Weather before you have registered, you will be prompted to register.



- 3) An email containing a verification code will automatically be sent to the email address you entered.



- 9) Enter the 5-digit verification code.

NOTE: This will only need to be done one time.



- 10) After entering your verification code, your additional features will now be enabled.



- 11) In the event your email address changes, you can update the email address with your new one. The process is similar to first-time registration.



9 Schlage LiNK Enrollment

The control can be managed remotely via an internet connected computer and most smart cell phones via Schlage LiNK. Schlage is a leader in home security and also offers digital locks, video cameras and light modules to help manage your home's safety, comfort and efficiency. Visit www.link.schlage.com to learn more.

- 1) Visit www.schlagelink.com to sign on and add your new control to your account or click on the "Just purchased a Schlage LiNK System link to set up a new Schlage LiNK account.

- 2) Follow the online instructions to add your control to your account.



- 3) When you add your control to your online account, a verification PIN code is generated.

Enter that PIN code to enroll your control and enjoy the comfort, savings and convenience Schlage LiNK offers.



10 Software Upgrades

Your control is built with the future in mind and has the ability to upgrade its operating system. Software upgrades ensure your control has the most up-to-date software optimizing its operation and providing exciting new features as they become available.

Requirements

- You must have a currently active internet connection.
- You must already have registered your control (see previous section).
- You must have an SD card with adequate memory available. Data for the upgrade will be stored on this card.

The **Software Upgrades** menu is accessed by navigating to *Menu --> Settings --> Network*. After pressing the “Software Upgrades” button, follow the guided instructions on the series of screens.

Upgrade the software by one of the following methods:

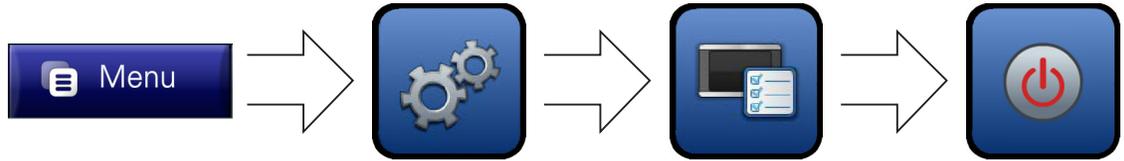
- 1) Select the “Check for updates on the internet” box as shown in the screen at right. This is the default setting and the easiest way to upgrade your control’s software.
- 2) Alternatively, using a web browser and your computer, download the latest software upgrade image from the trane.com website and place this computer file on an SD card. After transferring the SD card from your computer to the control, select “Check for upgrades on SD Card” as shown in the screen at right.

Follow the instructions to upgrade your control. Additional instructions are found on the trane.com website.

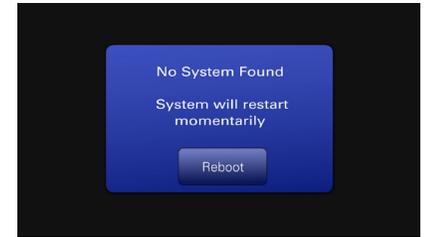


11 Troubleshooting

Slow response or unexpected operation:
Reboot your control at the following location.



“No System Found” displays on the screen:
If this message stays on your screen, press the “Reboot” button shown at right.

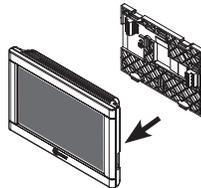


No response to any button presses:

Remove and re-install the control as shown below. The boot up process may take several minutes.

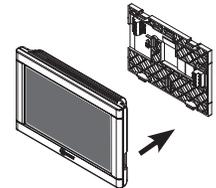
Remove Control

Remove control from its sub-base by grasping at edges and gently pulling the control straight towards you. It should release without much effort.



Re-Install Control

Re-install control flat onto sub-base being careful to align unit correctly with the sub-base before applying force. Control should fit snug and not “rock” when properly installed.



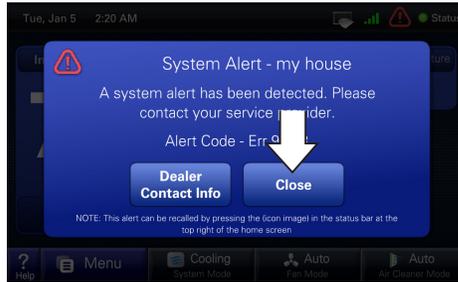
System Alerts

- 1) When your system indicates an issue with communication or operation, an alert will display on the screen.

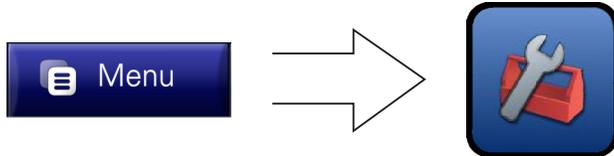
Click the “Dealer Contact Info” to retrieve your dealer’s phone numbers and website information.



- 2) Press “Close” to dismiss the alert. The error message can be recalled by pressing the Alert icon which will remain in the menu bar.



Dealer Information can also be accessed by this path:



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BASE LIMITED WARRANTY

Controls, Zoning Products, Humidifiers, Energy Recovery Ventilators, Air Cleaners and Oil Furnaces (Variable and Non-Variable Speed)

Subject to the terms and conditions of this limited warranty, Trane U.S., Inc. ("Company") extends a limited warranty against manufacturing defects for the product(s) identified in Table 1A attached hereto ("Products") that are installed in a residential application (personal, family or household purposes) under normal use and maintenance in the United States and Canada.

This limited warranty applies to Products manufactured on or after August 1, 2011.

In order to maximize the available benefits under this limited warranty, the Purchaser (as defined below) should read it in its entirety. All repairs of Product parts covered under this limited warranty must be made with authorized service parts and by a licensed HVAC service provider. Additionally, commercial applications are treated differently under this limited warranty as stated in Table 1A attached hereto. For purposes of this limited warranty, "commercial applications" shall mean any application other than for personal, family, or household use.

TERM: The limited warranty period for Products is as stated in Table 1A attached hereto. If the Purchaser properly registers the Products, the limited warranty period shall be extended as stated in Table 1A attached hereto. Regardless of registration, the Commencement Date for a limited warranty period shall be the date that the original installation is complete and all Product start-up procedures have been properly completed and verified by an installer's invoice. If the installation and start-up date cannot be verified by the installer's invoice, the Commencement Date shall be sixty (60) days after the factory manufacture date which is verified by the Product serial number. Where a Product is installed in a newly constructed home, the Commencement Date is the date the Purchaser purchased the residence from the builder. Proof of Product purchase, installation, and/or closing date of the residence may be required to confirm the Commencement Date.

The installation of Product replacement parts under this limited warranty shall not extend the original warranty period. The warranty period for any Product part replaced under this limited warranty is the applicable warranty period remaining under the original Product warranty.

WHO IS COVERED: This limited warranty is provided only to the original owner and his or her spouse ("Purchaser") of the residence where the Products are originally installed. This warranty is not transferable except according to terms stated on the applicable website identified below under Registration Requirements. Company has the right to request any and all proof of Product purchase or installation and/or closing date of the residence.

WHAT COMPANY WILL DO: Company may request proof of Product purchase and/or installation in order to provide Product parts under this limited warranty. As Company's only responsibility and Purchaser's only remedy under this limited warranty, Company will furnish a replacement part to the licensed HVAC service provider, without charge for the part only, to replace any Product part that fails due to a manufacturing defect under normal use and maintenance. The Purchaser must pay for any and all shipping and handling charges and other costs of warranty service for the replacement part. If a Product part is not available, Company will, at its option, provide a free suitable substitute part or provide a credit in the amount of the then factory selling price for a new suitable substitute part to be used by the Purchaser towards the retail purchase price of a new Company product. Any new Product purchase shall be at Purchaser's sole cost and expense including, but not limited to, all shipping, removal, and installation costs and expenses.

REGISTRATION REQUIREMENTS: All Products must be properly registered online by the Purchaser within sixty (60) days after the Commencement Date to receive the registered limited warranty terms. To register online, go to:

<http://www.trane.com/Residential/Trane/Owners/Warranty-Information> or

<http://www.americanstandardair.com/servicesupport/pages/warranty.aspx>

and click "Begin Online Registration." If a Purchaser does not register within this stated time period, the base limited warranty terms shall apply.

ELIGIBILITY REQUIREMENTS: The following items are required in order for the Products to be covered under this limited warranty:

- The Products must be in the same location where they were originally installed.
- The Products must be properly installed, operated, and maintained by a licensed HVAC service provider in accordance with the Product specifications or installation, operation, and maintenance instructions provided by Company with each Product. Failure to conform to such specifications and/or instructions shall void this limited warranty. Company may request written documentation showing the proper preventative maintenance.
- All Product parts replaced by Company under this limited warranty must be given to the servicing provider for return to Company.

EXCLUSIONS: The following are not covered by this limited warranty:

- Labor costs including, but not limited to, costs for diagnostic calls or the removal and reinstallation of Products and/or Product parts.
- Shipping and freight expenses required to ship Product replacement parts.
- Failures, defects, or damage (including, but not limited to, any loss of data or property) caused by (1) any third party product, service, or system connected or used in conjunction with the Products; (2) any use that is not designed or intended for the Products; (3) modification, alteration, abuse, misuse, negligence, or accident; (4) improper storage, installation, maintenance, or operation including, but not limited to, operation of electrical equipment at voltages other than the range specified on the Product nameplate; (5) any use in violation of written instructions or specifications provided by Company; (6) any acts of God including, but not limited to, fire, water, storms, lightning, or earthquakes; or any theft or riots; or (7) a corrosive atmosphere or contact with corrosive materials such as, but not limited to, chlorine, fluorine, salt, sulfur, recycled waste water, urine, fertilizers, rust, or other damaging substances or chemicals.
- Products purchased direct including, but not limited to, Internet or auction purchases and purchases made on an uninstalled basis.
- Increased utility usage costs.

ADDITIONAL TERMS:

THIS LIMITED WARRANTY AND LIABILITY SET FORTH HEREIN ARE IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, WHETHER IN CONTRACT OR IN NEGLIGENCE, EXPRESS OR IMPLIED, IN LAW OR IN FACT. THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED TO THE DURATION OF THE APPLICABLE PRODUCT WARRANTY. COMPANY DOES NOT AUTHORIZE ANY PERSON TO CREATE FOR IT ANY OBLIGATION OR LIABILITY IN CONNECTION WITH THE PRODUCTS.

NOTWITHSTANDING ANYTHING IN THIS LIMITED WARRANTY TO THE CONTRARY, COMPANY SHALL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, INDIRECT, SPECIAL AND/OR PUNITIVE DAMAGES, WHETHER BASED ON CONTRACT, WARRANTY, TORT (INCLUDING, BUT NOT LIMITED TO, STRICT LIABILITY OR NEGLIGENCE), PATENT INFRINGEMENT, OR OTHERWISE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. COMPANY'S MAXIMUM LIABILITY HEREUNDER IS LIMITED TO THE ORIGINAL PURCHASE PRICE OF THE PRODUCTS.

No action arising out of any claimed breach of this limited warranty may be brought by a Purchaser more than one (1) year after the cause of action has arisen.

This limited warranty gives you specific legal rights, and you may also have other rights as otherwise permitted by law. If this Product is considered a consumer product, please be advised that some local laws do not allow limitations on incidental or consequential damages, how long a warranty lasts based on registration, or how long an implied warranty lasts, so that the above limitations may not fully apply. Refer to your local laws for your specific rights under this limited warranty.

Residential Systems

6200 Troup Highway, Tyler, TX 75707

Attn: Customer Relations

Or visit our website at www.trane.com or www.americanstandardair.com

Table 1A: Warranty Time Periods

COVERAGE TERMS FOR RESIDENTIAL APPLICATIONS: Pursuant to the Trane U.S., Inc. ("Company") limited warranty terms and conditions, the following Products are covered for the base time periods as stated below ("Base Limited Warranty period"). If registered, the Base Limited Warranty Periods for certain products will be extended as stated below ("Registered Limited Warranty Period").

CONTROLS: *CONT200,*CONT401,*CONT402,*CONT600 &*CONT602

Base Limited Warranty Period: one (1) year
Registered Limited Warranty Period: five (5) years

CONTROLS: *ZEMT500*CONT800,*CONT802,*CONT803,*CONT900.*ZONE950

Base Limited Warranty Period: five (5) years
Registered Limited Warranty Period: ten (10) years

ZONING PRODUCTS: *ZONE950,*ZONE940,*ZONE930,ZZONEPNLAC52Z,ZZONEEXPAC52Z,ZZSENSAL0400,BAYSEN01ATEMPA,BAY24VRP,ZDAMPDR,ZDAMPSP,ZDAMPBM,ZDAMPRR

Base Limited Warranty Period: five (5) years
Registered Limited Warranty Period: ten (10) years

HUMIDIFIERS: *HUMD200,*HUMD300 &*HUMD500

Base Limited Warranty Period: five (5) years
Registered Limited Warranty Period: ten (10) years

ENERGY RECOVERY VENTILATOR (ERV): *ERVR100,*ERVR200 &*ERVR300

Base Limited Warranty Period: five (5) years
Registered Limited Warranty Period: ten (10) years

AIR CLEANERS: TFD & AFD

Base Limited Warranty Period: five (5) years
Registered Limited Warranty Period: ten (10) years

VARIABLE SPEED OIL FURNACE: *HV-V,*LF-V,*LR-V,*DF-V

Base Limited Warranty Period: Parts- five (5) years, Heat Exchanger - twenty (20) years
Registered Limited Warranty Period: Parts - ten (10) years, Heat Exchanger - Lifetime

NON-VARIABLE SPEED OIL FURNACE: *HV,*LF,*LR,*DF

Base Limited Warranty Period: Parts- five (5) years, Heat Exchanger - twenty (20) years
Registered Limited Warranty Period: Parts - five (5) years, Heat Exchanger - Lifetime

SPECIFIC TERMS FOR COMMERCIAL APPLICATIONS:

Base Limited Warranty Period Applies for all controls, zoning products, humidifiers and ERV's
All Oil Furnaces: Parts - one (1) year, Heat Exchanger - twenty (20) years

(*First letter may be A or T)



6200 Troup Highway
Tyler, TX 75707
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FCC Information

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- (1) Reorient or relocate the transceiver antenna.
- (2) Increase the separation between the equipment and transceiver.
- (3) Connect the equipment into an outlet on a circuit different from that to which the transceiver is connected.
- (4) Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules and Industry Canada. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

FCC/IC Caution: Any changes or modifications not expressly approved by Trane could void the user's authority to operate this equipment.

Important Note: To comply with the FCC RF exposure compliance requirements, no change to the antenna or the device is permitted. Any change to the antenna or the device could result in the device exceeding the RF exposure requirements and void user's authority to operate the device. This device has been designed to operate with an internal PCB trace antenna.

To comply with IC RF exposure limits for general population/uncontrolled exposure, the module with fixed internal antenna must be installed to provide a separation distance of at least 20 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter.

TRANE U. S. INC.
MODEL NUMBER
TZONE950AC52Z

FCC ID: XVRZONE950TRX
IC: 6178D-ZONE950TRX



08/11 32-5070-03

The manufacturer has a policy of continuous product and product data improvement and it reserves the right to change design and specifications without notice.



It's Hard To Stop a Trane.®

Congratulations on the purchase of your new Trane outdoor unit. Your outdoor unit is designed to work with a matched indoor unit creating a system that delivers years of dependable service and performance.

Proper Maintenance*

Your system requires maintenance and repair by a properly trained service technician. "Do-it-yourself" repairs on an in-warranty unit may void your warranty.

Other than performing the simple maintenance recommended below, you should not attempt to make any adjustments or repairs to your system. Your dealer can assist you with questions or problems.

1) Replace the air filter(s)

A clean filter saves you money by helping ensure top system efficiency.

When replacing your filter(s), always use the same size and type that was originally supplied or consult with your dealer for recommendations. Be sure to replace it with the arrows pointing in the direction of the airflow.

Where disposable filters are used, they must be replaced every month with the same size as originally supplied. Clean or replace your filter twice a month during seasons when the unit runs more often.

Ask your dealer where the filter is located in your system and how to service it.

2) Maintain free outdoor coil airflow

Efficient operation of your system depends on the free flow of air over outdoor unit's coil.

Do not plant flowers or shrubbery right next to the unit. Also, make sure that nothing is stacked against the sides of the unit or draped over it.

Buildup of snow and ice can restrict airflow. As soon as possible after accumulation, clean snow from the area around the outdoor unit.

3) Clean the finish

To keep your system looking new for years, clean the enamel finish with soap and water. For stubborn grease spots, use a household detergent. Do not use lacquer thinner or other synthetic solvents as they may damage the finish.

4) Call your dealer for additional routine maintenance

Your system should be inspected at least once per year by a properly trained service technician.

Ask your dealer about economical service or preventative maintenance agreements that cover seasonal inspections. **Optional extended warranties are also available.**

⚠ WARNINGS
1. Disconnect all electrical power to the indoor air handler or furnace before removing access panels to perform any maintenance. Disconnect power to both the indoor and outdoor units. NOTE: There may be more than one electrical disconnect switch. Electric shock can cause personal injury or death.
2. Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause personal injury or property damage. Consult a qualified installer or service agency for information or assistance.

⚠ CAUTIONS
1. To prevent injury, death, or property damage, read and follow all instructions and warnings, including labels shipped with or attached to unit before operating your new outdoor system.
2. Although special care has been taken to minimize sharp edges in the construction of your unit, be extremely careful when handling parts or reaching into the unit.
3. Condensate drains should be checked and cleaned periodically to assure condensate can drain freely from coil to drain. If condensate cannot drain freely, water damage could occur.
4. If heating system is not operational during the cold weather months, provisions must be taken to prevent freeze-up of all water pipes and water receptacles. This is very important during times of vacancy.

IMPORTANT: If the indoor air exceeds 60% relative humidity or simply feels uncomfortably humid, it is recommended that the indoor fan only be used in the AUTO mode.

Outdoor Unit – Owner's Information

***Visit trane.com or ask your dealer for more information on:**

- System operation
- Optimizing system performance\Energy savings
- Troubleshooting\Maintenance
- Warranties and Product Registration

Before you call for service, check the following:

Problem	Possible cause	Remedy
Insufficient heating or cooling	a. dirty filters b. air not circulating freely c. blocked outdoor coil	a. clean or replace b. check supply registers and return grills for blockage c. clear away leaves or other debris
Failure to operate	a. power off b. open circuit breaker or burned-out fuses c. improperly adjusted thermostat	a. make sure main switch is in ON position b. reset circuit breaker, or replace burned-out fuses c. check setting, adjust thermostat
Auxiliary heat indicator on	When outdoor temperature falls, intermittent lighting is normal	Monitor light. If it stays on continuously when above 30°F, or if it comes on when 50°F outdoors, call for service.
No Heating or Cooling – Blower does not operate	Blower door removed or ajar	Close door securely to restore power to blower
Unusual Noise		Call your local servicer

Product Registration

Registered Limited Warranty terms are available if the product is registered within 60 days of installation. If the product is not registered within 60 days of installation, Trane's Base Limited Warranty terms will apply.

Registration can be completed online at Trane.com. Please take a few moments to record the following information to ensure your product registration process is quick and easy:

Outdoor Unit Serial Number _____

Outdoor Unit Model Number _____

Thermostat Model Number _____

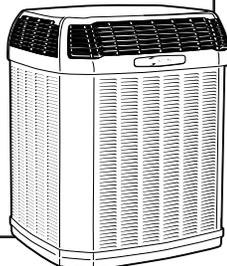
Installation/Startup Date _____

Dealer _____

Dealer Service Phone _____

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Doc. 22-5213-10



BASE LIMITED WARRANTY TRANE® OUTDOOR UNITS
4TTZ0, 4TTX6, 4TTX5, 4TWZ0, 4TWX6, 4TWX5 (PARTS ONLY)
MODELS LESS THAN 20 TONS

Subject to the terms and conditions of this limited warranty, Trane U.S., Inc. ("Company") extends a limited warranty against manufacturing defects for the product(s) identified in Table 1 attached hereto ("Products") that are installed in a residential application (personal, family or household purposes) under normal use and maintenance in the United States and Canada.

This limited warranty applies to Products manufactured on or after August 1, 2011.

In order to maximize the available benefits under this limited warranty, the Purchaser (as defined below) should read it in its entirety. All repairs of Product parts covered under this limited warranty must be made with authorized service parts and by a licensed HVAC service provider. Additionally, commercial applications are treated differently under this limited warranty as stated in Table 1 attached hereto. For purposes of this limited warranty, "commercial applications" shall mean any application other than for personal, family, or household use.

TERM: The limited warranty period for Products is as stated in Table 1 attached hereto. If the Purchaser properly registers the Products, the limited warranty period shall be extended as stated in Table 1 attached hereto. Regardless of registration, the Commencement Date for a limited warranty period shall be the date that the original installation is complete and all Product start-up procedures have been properly completed and verified by an installer's invoice. If the installation and start-up date cannot be verified by the installer's invoice, the Commencement Date shall be sixty (60) days after the factory manufacture date which is verified by the Product serial number. Where a Product is installed in a newly constructed home, the Commencement Date is the date the Purchaser purchased the residence from the builder. Proof of Product purchase, installation, and/or closing date of the residence may be required to confirm the Commencement Date.

The installation of Product replacement parts under this limited warranty shall not extend the original warranty period. The warranty period for any Product part replaced under this limited warranty is the applicable warranty period remaining under the original Product warranty.

WHO IS COVERED: This limited warranty is provided only to the original owner and his or her spouse ("Purchaser") of the residence where the Products are originally installed. This warranty is not transferable except according to terms stated on the applicable website identified below under Registration Requirements. Company has the right to request any and all proof of Product purchase or installation and/or closing date of the residence.

WHAT COMPANY WILL DO: Company may request proof of Product purchase and/or installation in order to provide Product parts under this limited warranty. As Company's only responsibility and Purchaser's only remedy under this limited warranty, Company will furnish a replacement part to the licensed HVAC service provider, without charge for the part only, to replace any Product part that fails due to a manufacturing defect under normal use and maintenance. The Purchaser must pay for any and all shipping and handling charges and other costs of warranty service for the replacement part. If a Product part is not available, Company will, at its option, provide a free suitable substitute part or provide a credit in the amount of the then factory selling price for a new suitable substitute part to be used by the Purchaser towards the retail purchase price of a new Company product. Any new Product purchase shall be at Purchaser's sole cost and expense including, but not limited to, all shipping, removal, and installation costs and expenses.

REGISTRATION REQUIREMENTS: All Products must be properly registered online by the Purchaser within sixty (60) days after the Commencement Date to receive the registered limited warranty terms. To register online, go to:

<http://www.trane.com/Residential/Trane/Owners/Warranty-Information> or
<http://www.americanstandardair.com/servicesupport/pages/warranty.aspx>
and click "Begin Online Registration." If a Purchaser does not register within this stated time period, the base limited warranty terms shall apply.

ELIGIBILITY REQUIREMENTS: The following items are required in order for the Products to be covered under this limited warranty:

- The Products must be in the same location where they were originally installed.
- The Products must be properly installed, operated, and maintained by a licensed HVAC service provider in accordance with the Product specifications or installation, operation, and maintenance instructions provided by Company with each Product. Failure to conform to such specifications and/or instructions shall void this limited warranty. Company may request written documentation showing the proper preventative maintenance.
- All Product parts replaced by Company under this limited warranty must be given to the servicing provider for return to Company.

• Air handlers, air conditioners, heat pumps, cased or uncased coils and stand-alone furnaces must be part of an Air Conditioning, Heating, and Refrigeration Institute rated and matched system or a specification in a Company provided bulletin or otherwise approved in writing by a Company authorized representative.

EXCLUSIONS: The following are not covered by this limited warranty:

- Labor costs including, but not limited to, costs for diagnostic calls or the removal and reinstallation of Products and/or Product parts.
- Shipping and freight expenses required to ship Product replacement parts.
- Failures, defects, or damage (including, but not limited to, any loss of data or property) caused by (1) any third party product, service, or system connected or used in conjunction with the Products; (2) any use that is not designed or intended for the Products; (3) modification, alteration, abuse, misuse, negligence, or accident; (4) improper storage, installation, maintenance, or operation including, but not limited to, operation of electrical equipment at voltages other than the range specified on the Product nameplate; (5) any use in violation of written instructions or specifications provided by Company; (6) any acts of God including, but not limited to, fire, water, storms, lightning, or earthquakes; or any theft or riots; or (7) a corrosive atmosphere or contact with corrosive materials such as, but not limited to, chlorine, fluorine, sulfur (provided that indoor and outdoor coils will only be covered if a Sea Coast Kit is installed), salt, recycled waste water, urine, fertilizers, rust, or other damaging substances or chemicals.
- Products purchased direct including, but not limited to, Internet or auction purchases and purchases made on an uninstalled basis.
- 3 phase models, cabinets or cabinet pieces that do not affect product performance, air filters, refrigerant, refrigerant line sets, belts, wiring, fuses, surge protection devices, non-factory installed driers, and Product accessories.
- Increased utility usage costs.

REFRIGERANT POLICY: Beginning on January 1, 2010, R-22 refrigerant will no longer be used as a manufacturer-installed refrigerant as required by federal regulation. Any and all expenses or costs associated with replacing Product parts that are not R-410A compatible will not be covered by the terms and conditions of this limited warranty. In addition, all Products containing R-410A refrigerant include a liquid line filter drier which must be replaced when a compressor replacement is necessary. A suction line filter drier must be added for compressors defined as burnouts. Failure to comply with such filter drier requirements or the use of contaminated or alternate refrigerant or any non-approved refrigerant system additives including, but not limited to, dyes, will void this limited warranty.

ADDITIONAL TERMS:

THIS LIMITED WARRANTY AND LIABILITY SET FORTH HEREIN ARE IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, WHETHER IN CONTRACT OR IN NEGLIGENCE, EXPRESS OR IMPLIED, IN LAW OR IN FACT. THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED TO THE DURATION OF THE APPLICABLE PRODUCT WARRANTY. COMPANY DOES NOT AUTHORIZE ANY PERSON TO CREATE FOR IT ANY OBLIGATION OR LIABILITY IN CONNECTION WITH THE PRODUCTS.

NOTWITHSTANDING ANYTHING IN THIS LIMITED WARRANTY TO THE CONTRARY, COMPANY SHALL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, INDIRECT, SPECIAL AND/OR PUNITIVE DAMAGES, WHETHER BASED ON CONTRACT, WARRANTY, TORT (INCLUDING, BUT NOT LIMITED TO, STRICT LIABILITY OR NEGLIGENCE), PATENT INFRINGEMENT, OR OTHERWISE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. COMPANY'S MAXIMUM LIABILITY HEREUNDER IS LIMITED TO THE ORIGINAL PURCHASE PRICE OF THE PRODUCTS.

No action arising out of any claimed breach of this limited warranty may be brought by a Purchaser more than one (1) year after the cause of action has arisen.

This limited warranty gives you specific legal rights, and you may also have other rights as otherwise permitted by law. If this Product is considered a consumer product, please be advised that some local laws do not allow limitations on incidental or consequential damages, how long a warranty lasts based on registration, or how long an implied warranty lasts, so that the above limitations may not fully apply. Refer to your local laws for your specific rights under this limited warranty.

Residential Systems
6200 Troup Highway, Tyler, TX 75707
Attn: Customer Relations

Or visit our website at www.trane.com or www.americanstandardair.com

TABLE 1: Warranty Time Periods

COVERAGE TERMS FOR RESIDENTIAL APPLICATIONS: Pursuant to the Trane U.S., Inc. ("Company") limited warranty terms and conditions, the following Products are covered for the base time periods as stated below ("Base Limited Warranty Period"). If registered, the Base Limited Warranty Periods for certain Products will be extended as stated below ("Registered Limited Warranty Period").

SINGLE PHASE R410 OUTDOOR UNITS:

Base Limited Warranty Period: Compressor, Outdoor Coil, Parts: five (5) years.

Registered Limited Warranty Period:

TRANE: 4TTM3. ASD**: 4A7M3: Compressor – ten (10) years.

TRANE: 4TTB3, 4TTB4, 4TWB4, 4TWB3. ASD: 4A7B4, 4A6B4, 4A7B3, 4A6B3:

Compressor – ten (10) years.

TRANE: 4TTR5, 4TTR3, 4TWR5, 4TWR3. ASD: 4A7A5, 4A7A3, 4A6H5, 4A6H3:

Compressor, Outdoor Coil, Parts – ten (10) years.

TRANE: 4TTZ0, 4TTX6, 4TTX5, 4TWZ0, 4TWX6, 4TWX5. ASD: 4A7Z0, 4A7A6, 4A6Z0, 4A6H6:

compressor – twelve (12) years, Outdoor Coil and Parts –ten (10) years.

SINGLE PHASE R22 OUTDOOR UNITS:

Base Limited Warranty Period: Compressor, Outdoor Coil, Parts - one (1) year.

Registered Limited Warranty Period:

TRANE: 2TTB3, 2TWB3. ASD: 2A7B3, 2A6B3: Compressor, Outdoor Coil, Parts– five (5) years.

3- PHASE OUTDOOR UNITS:

Base Limited Warranty Period: Compressor, Outdoor Coil, Parts - one (1) year.

Registered Limited Warranty Period:

TRANE: 4TTA, 4TWA. ASD: 4A7C, 4A6C: Compressor, Outdoor Coil, Parts - five (5) years.

AIR HANDLERS:

Base Limited Warranty Period: Indoor Coil and Parts – one (1) year.

Registered Limited Warranty Period:

TRANE and ASD: 2/4TEE, 2/4TFE, GAM5, *AM4, *AM7, *AM8. Indoor Coil and Parts – ten (10) years.

TRANE and ASD: 2/4 TEC, GAT2, GAF2: Indoor Coil and Parts – five (5) years.

PACKAGED AIR CONDITIONERS and PACKAGED HEAT PUMPS:

TRANE and ASD: 4WCZ6:

Base Limited Warranty Period: Compressor, Outdoor Coil, and Parts – five (5) years.

Registered Limited Warranty Period: Compressor – twelve (12) years, Outdoor Coil and Parts – ten (10) years.

TRANE and ASD: 4DCZ6, 4YCZ6:

Base Limited Warranty Period: Compressor, Outdoor Coil, and Parts – five (5) years, Heat Exchanger – twenty (20) years.

Registered Limited Warranty Period: Compressor – twelve (12) years, Outdoor Coil and Parts – ten (10) years.

TRANE and ASD: 4DCY4, 4YCY4, 4YCX3:

Base Limited Warranty Period: Compressor, Outdoor Coil, and Parts – five (5) years, Heat Exchanger – twenty (20) years.

Registered Limited Warranty Period:

Compressor, Outdoor Coil, and Parts – ten (10) years.

TRANE and ASD: 4TCY4, 4TCX3, 4WCY4, 4WCX3:

Base Limited Warranty Period: Compressor, Outdoor Coil, and Parts – five (5) years.

Registered Limited Warranty Period:

Compressor, Outdoor Coil, and Parts – ten (10) years.

TRANE and ASD: 4YCC3:

Base Limited Warranty Period: Compressor – five (5) years, Outdoor Coil, and Parts – one (1) year, Heat Exchanger – ten (10) years.

Registered Limited Warranty Period:

Compressor – ten (10) years, Outdoor Coil and Parts – five (5) years.

TRANE and ASD: 4TCC3, 4WCC3:

Base Limited Warranty Period: Compressor – five (5) years, Outdoor Coil, and Parts - one (1) year.

Registered Limited Warranty Period: Compressor – ten (10) years, Outdoor Coil and Parts – five (5) years.

TRANE and ASD: 4WHC3:

Base Limited Warranty Period: Compressor, Outdoor Coil, and Parts – five (5) years.

FURNACES:

TRANE and ASD: *UE1/*DE1:

Base Limited Warranty Period: Parts – one (1) year, Heat Exchanger – twenty (20) years.

Registered Limited Warranty Period: Parts – five (5) years, Heat Exchanger: twenty (20) years.

TRANE and ASD: *UD1/*DD1; *UD2/*DD2; *UD1-H/ *DD1-H:

Base Limited Warranty Period: Parts: five (5) years, Heat Exchanger – twenty (20) years.

Registered Limited Warranty Period:

Parts – ten (10) years, Heat exchanger– twenty (20) years,

TRANE and ASD:*UD2-V/*DD2-V; *UD2-C-V/*DD2-C-V:

Base Limited Warranty Period: Parts: five (5) years, Heat Exchanger – twenty (20) years.

Registered Limited Warranty Period:

Parts – ten (10) years, Heat exchanger– Lifetime

TRANE and ASD: *UC1/*DC1:

Base Limited Warranty Period: Parts – one (1) year, Heat Exchanger – twenty (20) years.

Registered Limited Warranty Period:

Parts – five (5) years, Heat Exchanger - Lifetime.

TRANE and ASD: *UH1/*DH1;*UX1/*DX1; *UH2/*DH2; *UHM/*DHM:

Base Limited Warranty Period: Parts – five (5) years, Heat Exchanger – twenty (20) Years.

Registered Limited Warranty Period:

Parts– ten (10) years, Heat Exchanger– Lifetime.

*Note: First digit may be a "T" or an "A"

Note Regarding Heat Exchanger: If a heat exchanger fails because of a manufacturing defect within the sixth through twentieth year of the applicable warranty period, Company will, at its sole option, provide either a replacement heat exchanger without charge, or allow a credit in the amount of the then factory selling price of an equivalent heat exchanger toward the retail purchase price of a new heating unit.

CASED AND UNCASD COILS:

Base Limited Warranty Period: Coil and Parts –five (5) years.

Registered Limited Warranty Period:

TRANE and ASD: 2/4 TXC, 2/4 TXA, 4CXC, 4TXF-CC/CZ: Coil and Parts– ten (10) years.

SPECIFIC TERMS FOR COMMERCIAL APPLICATIONS:

Base Limited Warranty Period: Coil and Parts- one (1) year.

Base Limited Warranty Period: Compressor- five (5) years.

Base Limited Warranty Period for Packaged Unit Heat Exchanger: five (5) years.

Base Limited Warranty Period For All Heat Exchangers on All Other Furnace: twenty (20) years.

**ASD – American Standard Models



It's Hard To Stop a Trane.®

Notes:

SUNPOWER™

PV-Inverter

SunPower

SPR-5000m / SPR-6000m / SPR-7000m / SPR-8000m

Installation Guide



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SunPower Corporation

3939N. First Street

San Jose, California 95134, USA

Tel 1-887-SUN-0123

Fax 408.877.1808

customercare@sunpowercorp.com

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important instructions that shall be followed during installation and maintenance of the following types of SunPower inverters:

- SPR-5000m
- SPR-6000m
- SPR-7000m
- SPR-8000m

The inverter is designed and tested according to international safety requirements, but as with all electrical and electronic equipment, certain precautions must be observed when installing and/or operating the inverter. To reduce the risk of personal injury and to ensure the safe installation and operation of the inverter, you must carefully read and follow all instructions, cautions and warnings in this Installation Guide.

Warnings

A Warning describes a hazard to equipment or personnel. It calls attention to a procedure or practice, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the SunPower equipment and/or other equipment connected to the SunPower equipment or personal injury.

	DANGER
DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.	

	WARNING
WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.	

	CAUTION
CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.	

NOTICE	
NOTICE is used to address practices not related to personal injury.	

Other symbols

In addition to the safety and hazard symbols described on the previous pages, the following symbol is also used in this Installation Guide:



This symbol accompanies notes that call attention to supplementary information that you should know and use to ensure optimal operation of the system.

Markings on this product

The following symbols are used as markings on this product with the following meanings.



Warning regarding dangerous voltage

The product works with high voltages. All work on the product may only be done as described in its documentation.



Beware of hot surface

The product can become hot during operation. Do not touch the product during operation.



Observe the operating instructions

Read the product's documentation before working on it. Follow all safety precautions and instructions as described in the documentation.



AC current



DC current



Earth Ground



This inverter is evaluated to UL 1741, which includes assessment to all of the requirements of IEEE1547 and IEEE1547.1, which are an outgrowth and further development of the IEEE recommended practices and guidelines contained in IEEE Std. 929-2000. IEEE 929-2000 provides recommendations regarding the proper equipment and functionality necessary to ensure compatible operation when power generation is connected to the utility grid.

General warnings



General Warnings

All electrical installations must be done in accordance with the local and National Electrical Code ANSI/NFPA 70.

The inverter contains no user-serviceable parts except for the fans on the bottom of the enclosure and the handle covers on the sides of the unit. For all repair and maintenance always return the unit to an authorized SunPower Service Center.

Before installing or using the inverter, read all of the instructions, cautions, and warnings on the inverter, the PV array, in this Installation Guide.

Before connecting the inverter to the electrical utility grid, contact the local utility company. This connection must be made only by qualified personnel.

PV arrays produce electrical energy when exposed to light and thus can create an electrical shock hazard. Wiring of the PV-arrays should only be performed by qualified personnel.

Warranty

All SunPower inverters sold in the USA have a ten-year warranty, as indicated on the warranty card included in the SunPower shipping container. For warranty coverage, or if you have questions about the SunPower warranty, contact SunPower at the address, telephone number or Web site listed on page 3 (to send E-mail, see the Contact section of the SunPower Web site).

SUNPOWER LIMITED WARRANTY FOR PV INVERTERS

SPR-5000m, SPR-6000m, SPR-7000m, SPR-8000m

1. Limited Product Warranty and exclusions

SunPower Corporation with offices at 3939 North First Street, San Jose CA 95134 ("SunPower") provides a limited warranty that covers defects of your SPR-3000m, SPR-4000m, SPR-5000m, SPR-6000m, SPR-7000m or SPR-8000m inverter (each, the "Inverter") caused by material or manufacturing faults. The warranty period is for 10 years and begins on the date of purchase by the original end user.

Warranty claims may only be made by, or on the behalf of, the original end customer or a person to whom title has been transferred for the home or premises on which the solar inverter were originally installed.

SunPower will, at its option, repair or replace the defective component(s) free of charge, provided that SunPower is notified of the defect during the warranty period and a dated proof of purchase is furnished. SunPower reserves the right to inspect the faulty component(s) and determine if the defect is due to material or manufacturing flaws. SunPower also reserves the right to charge for service time expended if the defect is not due to material or manufacturing flaws or is not for some other reason subject to this limited warranty.

SunPower does not warrant inverters from any and all defects or damage caused by:

- a) Normal wear and tear
- b) Shipping or transportation damages
- c) Improper installation
- d) Exposure to unsuitable environmental conditions (including but not limited to damage due to lightning strikes)
- e) Unauthorized or abnormal use or operation
- f) Negligence or accidents
- g) Material or workmanship not provided by SunPower or its authorized service centers
- h) This warranty does not cover costs related to the removal, installation, or troubleshooting of your electrical systems

SunPower will, at its option, use new and/or reconditioned parts in performing warranty repair and in building replacement products. SunPower reserves the right to use parts or products of original or improved design in the repair or replacement. If SunPower repairs or replaces a product, its warranty continues for the remaining portion of the original warranty period or 90 days from the date of the return shipment to the customer, whichever period expires later. All replaced products and all parts removed from repaired products become the property of SunPower. SunPower covers both parts and labor necessary to repair the product and return shipment to the customer, via a SunPower selected non-expedited surface freight carrier within the United States and Canada. The warranty does not cover any cost associated with installation, removal or re-installation of the Inverter.

2. Limitation of Warranty Scope

EXCEPT FOR THIS EXPRESS LIMITED WARRANTY, SUNPOWER EXPRESSLY EXCLUDES ALL WARRANTIES WITH RESPECT TO THE INVERTER, EXPRESS AND IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTY OF MERCHANTABILITY, THE WARRANTY OF FITNESS FOR PARTICULAR PURPOSE, AND ANY WARRANTIES THAT MAY HAVE ARISEN FROM COURSE OF DEALING OR USAGE OF TRADE.

TO THE MAXIMUM EXTENT PERMITTED BY LAW, SUNPOWER'S AGGREGATE MONETARY LIABILITY TO THE CUSTOMER FOR ANY REASON AND FOR ANY AND ALL CAUSES OF ACTION, WHETHER IN CONTRACT, TORT OR OTHERWISE, WILL NOT EXCEED THE AMOUNT PAID TO SUNPOWER FOR THE INVERTER. SUNPOWER WILL NOT BE LIABLE TO YOU UNDER ANY CAUSE OF ACTION, WHETHER IN CONTRACT, TORT OR OTHERWISE, FOR ANY INDIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR PUNITIVE DAMAGES. THE PRICE FOR THE INVERTER AND SUNPOWER'S OBLIGATIONS UNDER THIS EXPRESS LIMITED WARRANTY ARE CONSIDERATION FOR LIMITING SUNPOWER'S LIABILITY.

IF THIS PRODUCT IS A CONSUMER PRODUCT, FEDERAL LAW DOES NOT ALLOW AN EXCLUSION OF IMPLIED WARRANTIES. TO THE EXTENT YOU ARE ENTITLED TO IMPLIED WARRANTIES UNDER FEDERAL LAW, TO THE EXTENT PERMITTED BY APPLICABLE LAW THEY ARE LIMITED TO THE DURATION OF THIS LIMITED WARRANTY. SOME STATES AND PROVINCES DO NOT ALLOW LIMITATIONS OR EXCLUSIONS ON IMPLIED WARRANTIES OR ON THE DURATION OF AN IMPLIED WARRANTY OR ON THE LIMITATION OR EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION(S) OR EXCLUSION(S) MAY NOT APPLY TO YOU. THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS. YOU MAY HAVE OTHER RIGHTS WHICH MAY VARY FROM STATE TO STATE OR PROVINCE TO PROVINCE.

3. Obtaining Warranty Performance

If you feel you have a justified claim covered by this Limited Warranty, please notify the solar installer, from whom you purchased the Inverter.

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1 Introduction

This installation guide provides all the information needed to install, commission and operate SunPower grid-tied photovoltaic (PV) inverters of the following types:

- SPR-5000m
- SPR-6000m
- SPR-7000m
- SPR-8000m



To help avoid problems during the installation, familiarize yourself with the installation process by reading the entire Installation Guide before starting the installation.

1.1 Target group

This manual is for qualified personnel. Qualified personnel has received training and has demonstrated skills and knowledge in the construction and operation of the device. Qualified personnel is trained to deal with the dangers and hazards involved in installing electric devices.



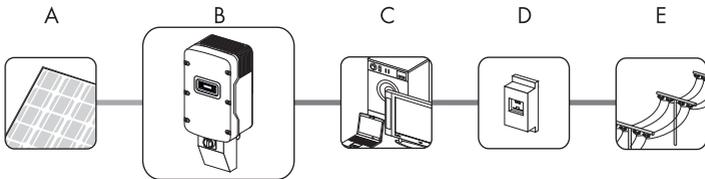
WARNING

Lethal voltages are present at various points in a PV system. For safety reasons only qualified personnel may install and operate this equipment.

1.2 Product overview

The SunPower SPR-5000m/SPR-6000m/SPR-7000m/SPR-8000m is a DC to AC grid-tied utility interactive inverter for use with photovoltaic (PV), fuel cell, wind turbine and other sources of DC power. For the use with a wind turbine

In general, the inverter takes power from a DC source (PV modules) and converts it to AC power for the utility grid. This power is delivered first to local loads (household appliances, lights, motor loads, etc.), with any excess power fed to the utility. The power consumed by the local loads reduces the power needed from the utility. Excess power may actually “spin the utility meter backwards” depending on the type of meter in your system. This power may also be recorded as power credits by the utility company depending on the interconnection agreement. An example of basic system components is shown in figure below.



Position	Description
A	PV array
B	Inverter with DC-Disconnect
C	Local loads
D	Meter
E	Utility grid



Policies vary from one utility company to another. Consult with a representative of the local utility company before designing and installing a PV system.

1.3 Safety

Anti-islanding protection

Islanding is a condition that can occur if the utility grid is disconnected while the inverter is operating and the remaining load is resonant at 60 Hz and matches the output of the inverter perfectly. This condition is highly unlikely and had never been witnessed outside of a controlled laboratory. Nevertheless, the inverter incorporates an advanced active islanding protection algorithm to ensure that the system will not export power into a balanced 60 Hz resonant load while the utility is disconnected. The inverter periodically injects both leading and lagging reactive current into the utility grid. This method has been proven by Underwriters Laboratories to effectively destabilize and disconnect from a balanced island condition.

PV ground fault detection and interruption

The inverter is equipped with a ground fault detection device. If a ground fault current greater than 1 A is detected, the inverter will shut down and display the fault condition on the user interface display. Once the ground fault is located and corrected, the ground fault error will need to be manually cleared and the inverter will then resume normal operation.

PV series fusing

Series fusing may be required depending on the type of PV module used in the system. See NEC 690.9

Interconnection code compliance

The inverter has been tested and listed by Underwriters Laboratories to meet the requirements of UL1741 Static Inverters and Charge Controllers for use in Photovoltaic Power Systems and UL1998 Software in Programmable Components, as well as IEEE-929-2000 Recommended Practice for Utility Interface of Photovoltaic Systems and IEEE 1547 Standard for Interconnecting Distributed Resources with Electric Power Systems. The inverter is cUL listed to CSA standard No. c22.2 107.1-01.



Contact the local utility and/or the authority having jurisdiction prior to connecting the inverter to the utility grid.

FCC compliance

The SunPower SPR-5000m/SPR-6000m/SPR-7000m/SPR-8000m has been tested and certified by a nationally recognized testing laboratory and conforms to all FCC Part 15 A & B EMI/EMC emissions regulations.

Feature overview

Over twenty years of inverter manufacturing experience has gone into the design of the SunPower SPR-5000m/SPR-6000m/SPR-7000m/SPR-8000m PV inverter. As a result, the inverter represents state-of-the-art technology, high reliability and over all ease of use - all the qualities you've come to expect from SunPower. Some of the features included are:

- High efficiency
- Auto line voltage detection and configuration
- Temperature regulated fan cooling with simplified fan replacement
- Advanced communication options
- LCD Display
- Powder coated die-cast enclosure
- Compatible with all SunPower inverter products
- Quiet operation
- Simple installation

Operating temperature

The inverter has been designed to maintain full power output at ambient temperatures as high as +113 °F (+45 °C). Fan cooling allows this level of output power to be achieved even in enclosed spaces. The inverter will continue to operate well beyond +113 °F (+45 °C) and de-rates as needed to maintain a safe internal component temperature.

1.4 Installation overview

This section provides a high-level overview of the installation process so you have an idea what to expect as you proceed through the rest of the installation guide.

The installation process is broken down into the following tasks:

Section 2: Unpacking and inspection

This section provides instructions and information for unpacking the inverter and inspecting it for shipping damage.

Section 3: AC voltage configuration

This section includes information on removing the lid, locating primary components within the inverter and selecting the appropriate voltage configuration for the installation.

Section 4: Mounting

This section includes guidelines to help you select the best mounting location, suggestions to insure optimum performance, cautions and warnings that you should follow to avoid injury and/or equipment damage and step-by-step instructions for mounting the inverter.

Section 5: Wiring the inverter

This section includes guidelines for selecting the correct wire sizes, cautions and warnings that you should follow to avoid injury and/or equipment damage and step-by-step instructions for wiring the inverter to a PV array, household electrical circuits and the utility grid. Procedures are also included for connecting optional data-communication cables.

Section 6: Commissioning

Commissioning involves applying DC input power to the inverter, observing the LED and LCD indicators on the front lid, and resolving any problems that occur.

Section 7: Displays and messages

This section provides troubleshooting tips and procedures for resolving problems that may occur during installation and operation.

Section 8: Troubleshooting

This section provides troubleshooting tips and procedures for resolving problems that may occur during installation and operation.

Section 9: Maintenance

This section includes maintenance and cleaning of the inverter and cautions and warnings you should follow to avoid injury and/or equipment damage.

Section 10: Technical specifications

This section includes technical data for the inverter, connection diagrams and torque specifications for the connection of cables and the screws of the inverter.

2 Unpacking and inspection

All inverters are thoroughly tested and inspected before they are packed and shipped. Although they are shipped in sturdy, recyclable packaging; damage can still occur during shipping. It is important to carefully inspect the shipping container prior to beginning the installation. If any external damage to the packaging makes you suspect the inverter itself could be damaged, or if you find that the inverter is damaged after unpacking it, report the damage immediately to your SunPower dealer and to the shipping company that delivered the inverter. If it becomes necessary to return the inverter, use the original packaging in which it was delivered.

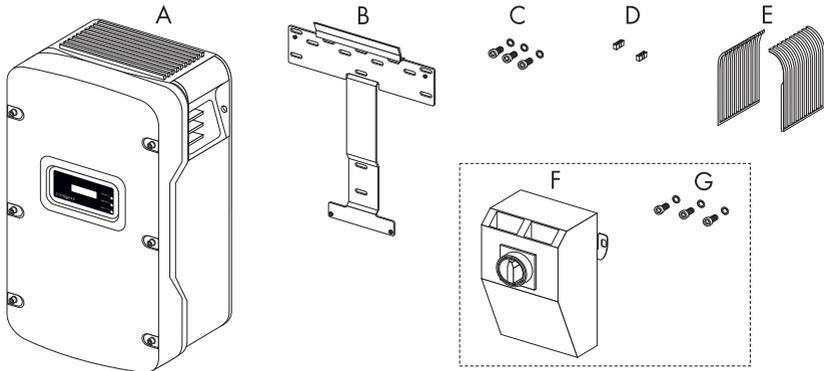
**WARNING**

The inverter weighs 148 lbs. (67 kg). To avoid injury, be sure to use proper lifting techniques and secure the help of someone to assist in the unpacking and installation of the inverter.

If you need assistance with a damaged inverter, contact your SunPower dealer or SunPower. Contact information for SunPower is provided below.

SunPower Corp.
3939N. First Street
San Jose, California 95134, USA
Tel 1-877-SUN-0123
Fax 408.877.1808
customer care@sunpowercorp.com

2.1 Scope of delivery



SunPower SPR-5000m/SPR-6000m/SPR-7000m/SPR-8000m PV inverter:

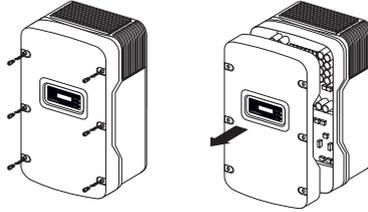
Position	Number	Description
A	1	Inverter
B	1	Wall-mounting bracket
C	3	1 Spare screw and washer for closing the inverter lid. 2 screws and washers for fastening the inverter to the wall-mounting bracket.
D	2	Spare jumpers for the fan test and for the grid configuration.
E	2	Handle covers for left and right side.

DC-Disconnect (if applicable):

Position	Number	Description
F	1	DC-Disconnect
G	3	1 screw and one washer for closing the DC-Disconnect lid. 2 screws and washers for fastening the DC-Disconnect to the wall-mounting bracket.

3 AC voltage configuration

3.1 Opening the inverter



1. Remove the 6 screws and lock washers from the enclosure lid and pull the lid forward smoothly.
2. Place the lid, screws, and lock washers aside where they will be out of your way while you are connecting wires and cables to the inverter.



CAUTION

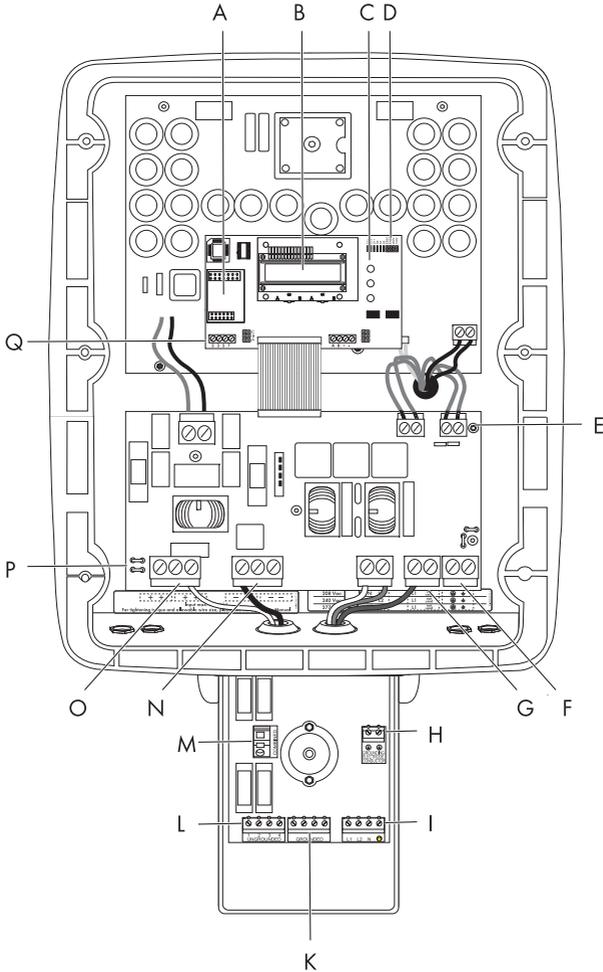
Be careful not to misplace the screws or the lock washers, as all six screws and lock washers are required to ensure that the lid is grounded properly and is fully sealed to the case. Handle the lid carefully, as even minor damage to the lid could result in an inadequate seal between the lid and the case, thus allowing moisture to enter the case and damage the sensitive electronic components.

NOTICE

Do not install the inverter during periods of precipitation or high humidity (>95 %). Moisture trapped within the enclosure may cause corrosion and damage to the electronic components.

3.2 Locating internal components

The figure below illustrates the locations of the major internal components of the inverter. Refer to this illustration as needed to locate particular components.



Position	Description
A	Sockets for communication Piggy-Back
B	Display
C	Status LEDs
D	Voltage Configuration Jumpers

Position	Description
E	Voltage Configuration Terminal Blocks
F	Ground Terminal (PE)
G	Output AC Line Terminals (N, L1 and L2)
H	PV Grounding + DC Grounding electrode conductor
I	Output AC Line Terminals (L1, L2, N and PE)
K	PV GROUNDED Terminal (input from PV array)
L	PV UNGROUNDED Terminal (input from PV array)
M	Combined UNGROUNDED Terminal
N	DC- Terminal (input from PV array)
O	DC+ Terminal (input from PV array)
P	Flat connection for grounding the cable shield for communication
Q	Terminal for communication

3.2.1 Configuring the AC voltage



The SPR-8000m may not be connected to a 208 V grid.

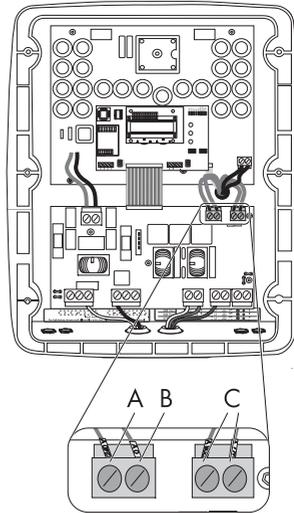
The inverter may be easily configured for the different grid types commonly found in the U.S. The inverter is compatible with:

- 208 V AC output (except for SPR-8000m)
- 240 V AC output
- 277 V AC output

The inverter comes from the factory pre-configured for utility interconnection at 240 V AC. The inverter may be reconfigured for other voltages by following the steps below and referring to figure to the right.

There are four wires coming into the main cabinet through a grommet. Each wire is labeled with its corresponding voltage and is connected to one of the two large terminal blocks located just below the grommet. Refer to the figure on the right and follow the instructions below:

1. The input voltage setting is determined by the jumper that is connected to the left terminal block (A). If the system is 240 V, no adjustment is necessary.
2. If adjustment is necessary, choose the wire with the correct voltage for your application from the right terminal block (C). Connect it to the left side of the left terminal block (A). Tighten all wires on the left terminal block.



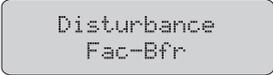
Torques for left AC configuration terminal block:

Grey Terminal Blocks (Weidmüller)	10 ... 6 AWG (6 mm ² ... 16 mm ²): 18 in-lbs. (2 Nm)
Green Terminal Blocks (Phoenix)	8 ... 6 AWG (10 mm ² ... 16 mm ²): 40 in-lbs. (4.5 Nm)
	10 AWG (8 mm ²): 22 in-lbs. (2.5 Nm)

3. Do not remove the wire in the left terminal block labeled 0 V (B). It remains connected to the right side of the left terminal block in all configurations.
4. Connect all unused wires to the right terminal block (C) and tighten them. Torques for right AC configuration terminal block (unused wires):

Grey Terminal Blocks (Weidmüller)	11 in-lbs. (1.2 Nm)
Green Terminal Blocks (Phoenix)	15 in-lbs. (1.7 Nm)

If the inverter is configured for the incorrect transformer voltage, (e.g. the inverter is configured for 240 V and then connected to a 208 V grid), the inverter will display the following error message:



Disturbance
Fac-Bfr

If this error message is encountered, recheck the input voltage configuration and confirm that it is set properly.

Automatic grid voltage detection

The inverter's software is designed to automatically detect which grid voltage it is feeding. Depending upon the voltage and phase angle between L1-N and L2-N, the inverter will determine if it is connected to a 208 V, 240 V or 277 V grid. If the inverter is configured for the incorrect transformer voltage (e. g. the inverter is configured for 240 V and then connected to a 208 V grid) the inverter will display an error message.

Table below lists the voltage limits for the AC connection with a frequency range of 59.3 Hz ... 60.5 Hz.

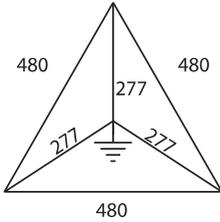
AC Connection Type	Voltage Range
208 V nominal, line to line (except SPR-8000m)	183 V ... 229 V
240 V nominal, line to line	211 V ... 264 V
277 V nominal, line to neutral	244 V ... 305 V

If the utility system has a neutral, the local Authority Having Jurisdiction (AHJ) may require that the neutral be connected to the inverter. Follow the procedure in chapter 3.3 "Utility configuration jumpers" (page 26) and chapter 5.5.2 "AC wiring without DC-disconnect" (page 49) to set the configuration jumpers and connect a neutral conductor to the inverter.

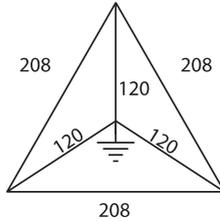
Common utility voltage configurations

The figure below illustrates commonly used transformer types. Remember, when connecting the inverter to the utility, the phase relationship is not important, but the voltage must be compatible.

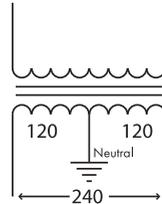
480 Delta: 277 WYE



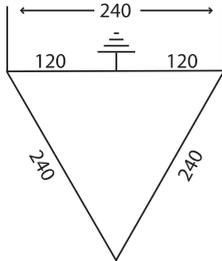
208 Delta: 120 WYE *



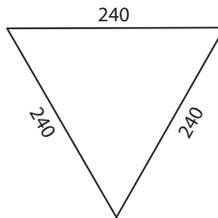
240: 120 Split Phase



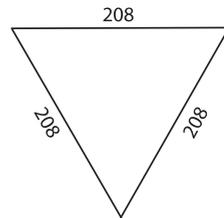
240 Delta: 120 Stinger



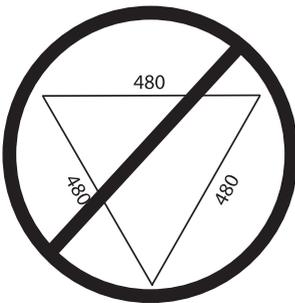
240 Delta



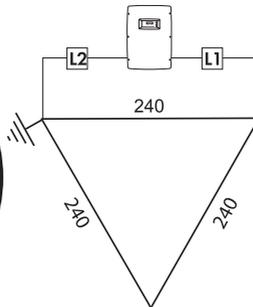
208 Delta *



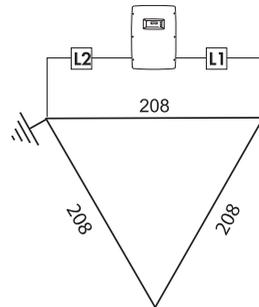
**480 Delta
DO NOT USE!**



**240 Delta:
Corner grounded**



**208 Delta:
Corner grounded***



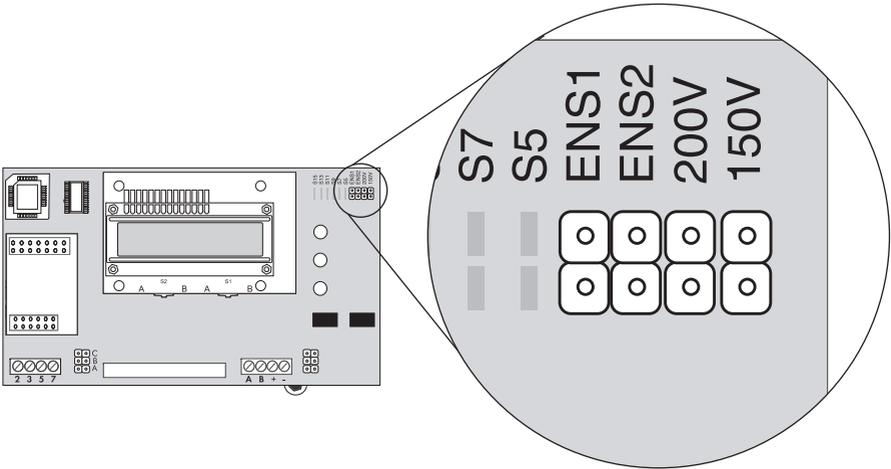
* The SPR-8000m inverter may not be connected to a 208 V grid.



When using 240 V delta corner grounded, or 208 V delta corner grounded grids connect the L2 terminal to the grounded corner.

3.3 Utility configuration jumpers

The utility configuration jumpers allow the inverter to be connected to transformers where the neutral is not present, such as the 208 V and 240 V delta, shown in Figure "Common utility voltage configurations" (page 25) above. The figure below shows an overview of default settings, settings for grids with no neutral, and fan test settings.



ENS1
ENS2
200V
150V

 Default settings:
(use Input Voltage Wires)

 208 V Delta, No Neutral or *
208 V Delta corner Grounded *

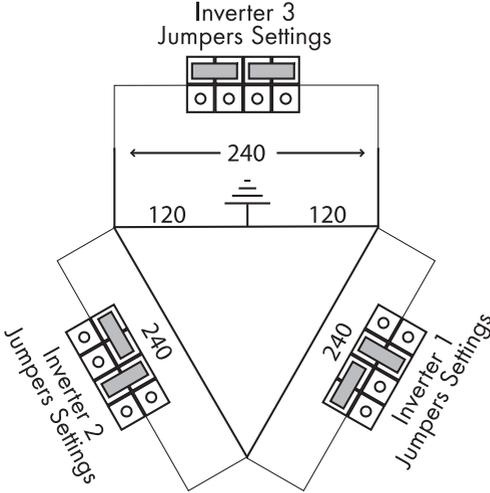
 240 V Delta, No Neutral or
240 V Delta corner Grounded

 Fan Test

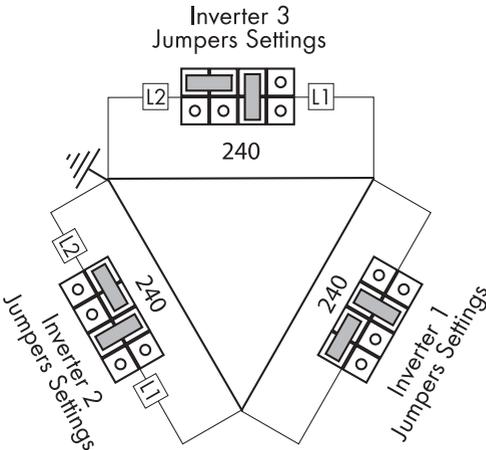
* The SPR-8000m inverter may not be connected to a 208 V grid.

The figures below illustrate the proper jumper settings when connecting to a 240 V delta: 120 V Stinger type transformer, or 240 V delta Corner grounded transformer, respectively. Note the order in which inverters are connected to the phases.

Configuration jumper examples for 240 V delta: 120 V stinger



Configuration jumper examples for 240 V delta corner grounded



i When using 240 V Delta corner grounded, or 208 V delta corner grounded grids connect the L2 terminal to the grounded corner.

4 Mounting

This section provides guidelines to help you select the best mounting location, suggestions to insure optimum performance, cautions and warnings that you should follow to avoid injury and/or equipment damage, and step-by-step instructions for mounting a SunPower SPR-5000m/SPR-6000m/SPR-7000m/SPR-8000m PV inverter.



WARNING

The inverter weighs 147 lbs. (67 kg). To avoid injury, be sure to use proper lifting techniques and secure the help of someone to assist in the unpacking and installation of the inverter.



Occasionally, refer to the rating label on the inverter. Mount the inverter so that the rating label on the side of the inverter is visible.

4.1 Choosing a mounting location

Consider the following guidelines, cautions, and warnings when choosing a mounting location for the inverter.

4.1.1 Selection of the mounting location



DANGER

Danger to life due to fire or explosion.

There is always a certain risk with electric devices that a fire can occur, even though greatest attention was paid to avoiding this during the development.

Do not install the inverter

- on flammable construction materials,
- in areas where highly flammable materials are stored,
- in potentially explosive areas!



CAUTION

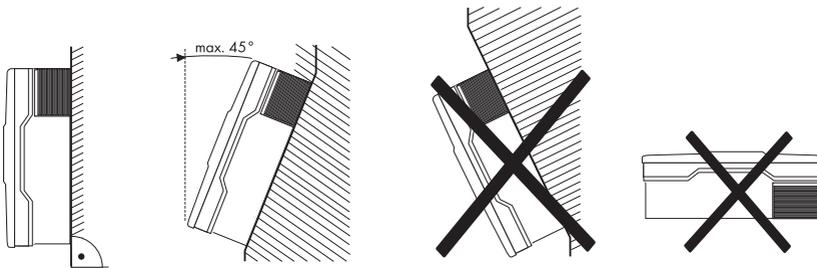
The inverter weighs 147 lbs. (67 kg). Ensure that the mounting surface is strong enough to hold the weight of the inverter. Do not mount the inverter on plasterboard (sheet-rock) or thin wood panelling.

- The inverter should be installed in a location that is inaccessible to children.
- The inverter emits a slight vibrating noise when operating. This vibration is normal and has no effect on performance, but it can be objectionable if the inverter is mounted on a wall in a living area, on the outside of a wall that is near a living area, or on certain types of materials, such as thin wood panelling or sheet metal.

4.1.2 Ambient conditions

- Do not install the inverter in direct sunlight. External heating from exposure to the sun may cause excessive internal heating. This can result in reduced output power to protect the internal components from damage.
- Install the inverter in a location that maintains an ambient air temperature that is less than +113 °F (+45 °C). To maintain a safe internal component temperature, the inverter may power reduce if the ambient air temperature exceeds +113 °F (+45 °C). The cooler the air temperature, the longer is the life expectancy of any power electronics device.
- The inverter is constructed in a rugged powder coated aluminum enclosure designed for outdoor installations. However, care should always be taken to minimize exposure to the elements. It is best to minimize exposure to rain, snow and ice, etc. Do not install the inverter in a location exposed to sources of direct water spray such as sprinklers or downspouts.

4.1.3 Position



- Vertical installation or tilted backward by max. 45°.
- Never install the inverter with a forward tilt.
- Do not install horizontally.
- Install at eye level to allow operating modes to be read at all times.

4.2 Dimensions and required clearances

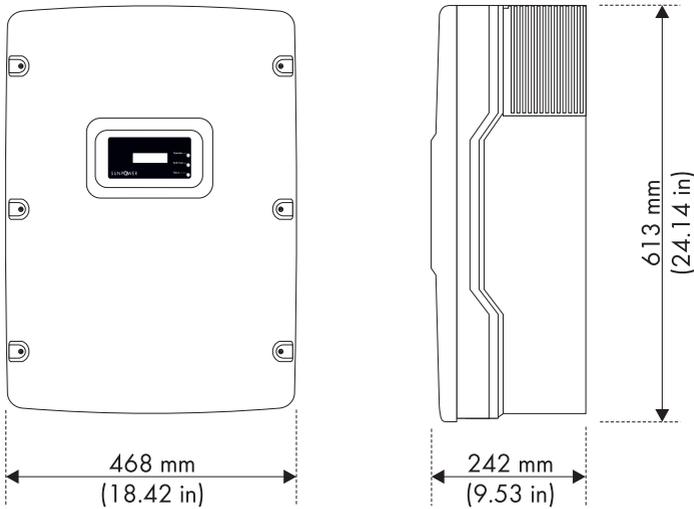


CAUTION

If you are installing the inverter in a cabinet, closet, or other relatively small enclosed area, you must provide sufficient air circulation to dissipate the heat generated by the inverter.

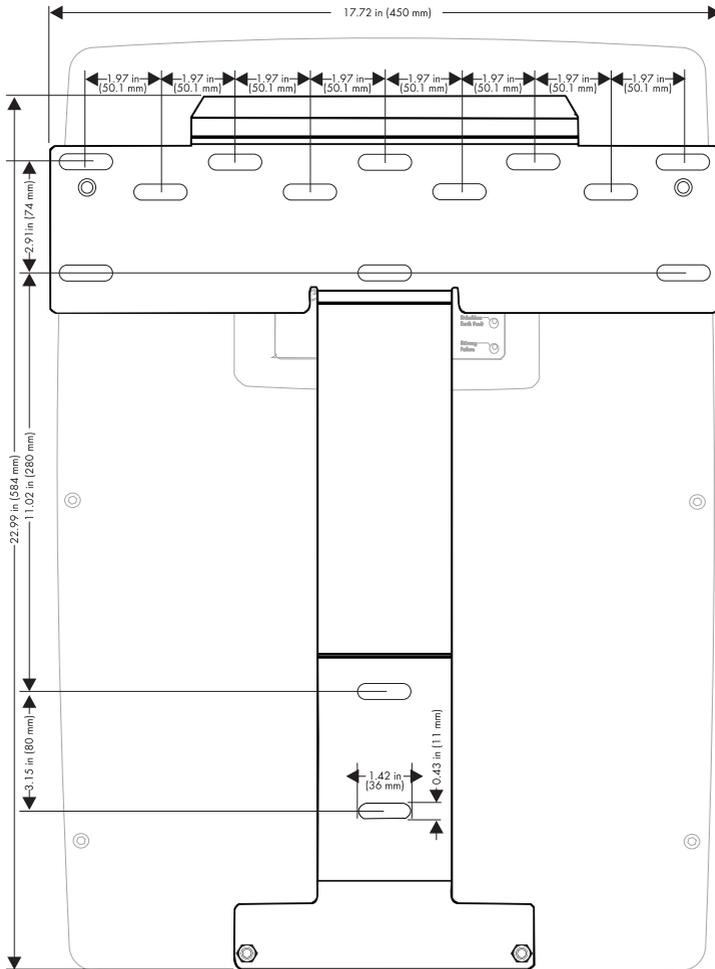
The outer dimensions of the inverter are shown in the figure below. Wall-mounted outdoor units are intended for mounting at least 3 feet of the ground.

Outer Dimensions of the Inverter

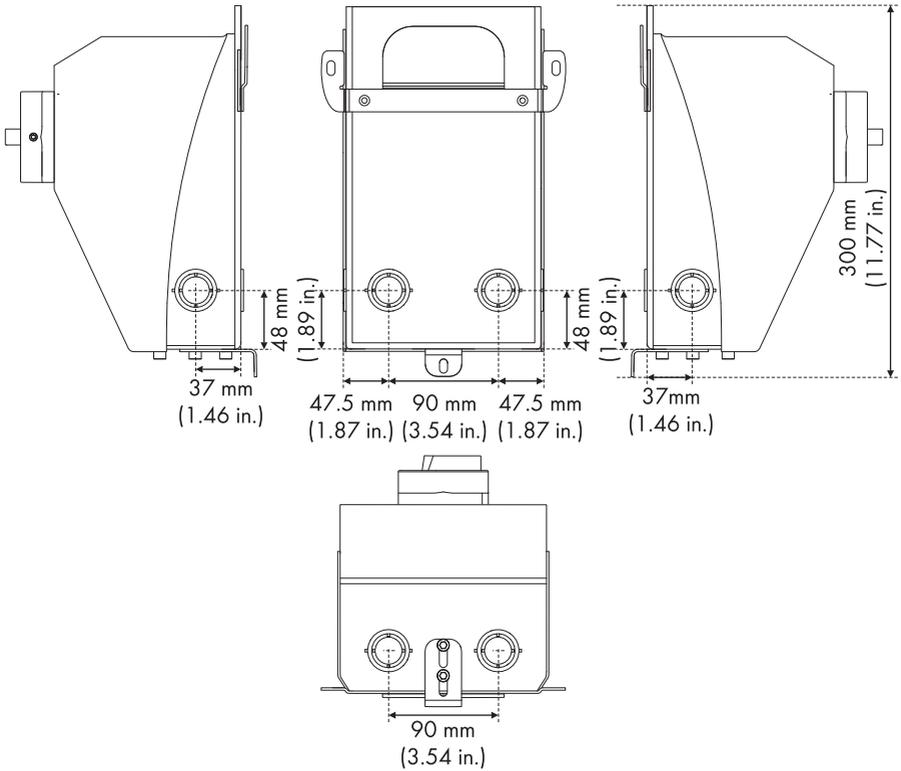


You must ensure that there is sufficient clearance for the airflow around the inverter! Eight inches of clearance is adequate in a normal operating environment with good ventilation. The National Electrical Code may require significantly larger working clearances (see NEC Section 110.26).

Dimensions of the wall mounting bracket



Dimensions for the installation of the conduits

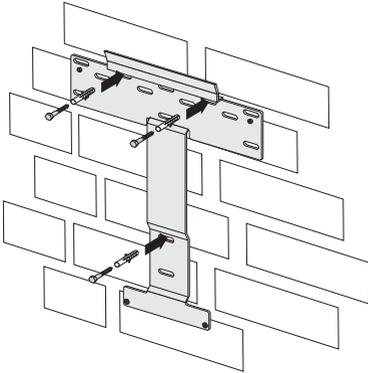


4.3 Mounting procedure

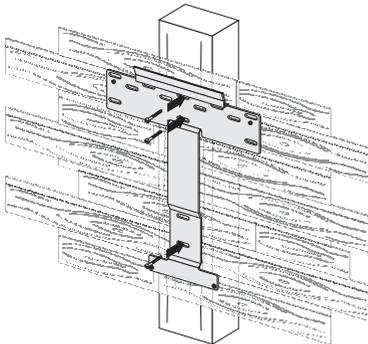
4.3.1 Mounting the wall-mounting bracket

The inverter is shipped with a T-shaped wall-mounting bracket that is suitable for use with most walls (see figures below). The horizontal part of the bracket has 12 holes. Use the 4 outermost holes of the wall-mounting bracket for mounting on wooden stud walls. Make sure that the wall you choose to mount the inverter on is sturdy enough to support its weight 147 lbs. (67 kg) over a long period of time and that the wall is plumb. The bracket may also be mounted on stone, brick or solid walls. Be sure to use the appropriate type of mounting hardware for the wall material and ensure that the hardware is no smaller than ¼ in.

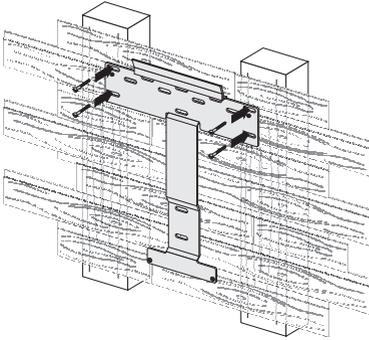
Mounting bracket - stone wall mounting



Mounting bracket - wood wall mounting with 1 stud



Mounting bracket - wood wall mounting with 2 studs



Use the following procedure to mount the wall-mounting bracket:



WARNING

To prevent electrical shock or other injury, check for existing electrical or plumbing installations in the walls before drilling mounting holes for the inverter.

1. Locate the T-shaped wall-mounting bracket included in the shipping container with the inverter.
2. Position the wall-mounting bracket against the wall where you intend to mount the inverter. (Try to mount the inverter so that the display is approximately at eye-level.) Place a level on the top edge of the bracket, and adjust the position of the bracket until it is level. The bottom of the bracket will be the approximate location of the bottom of the inverter.
3. Using the wall-mounting bracket as a template, mark the wall through at least three holes in the horizontal or vertical portion of the bracket.



CAUTION

Ensure that there are studs in the wall at the places where you intend to drill the mounting-holes. **DO NOT** use molly or toggle bolts to mount the inverter to sheet rock or panelling.

4. Set the bracket aside temporarily, and drill holes at the marks you made on the wall.



Tip for installing

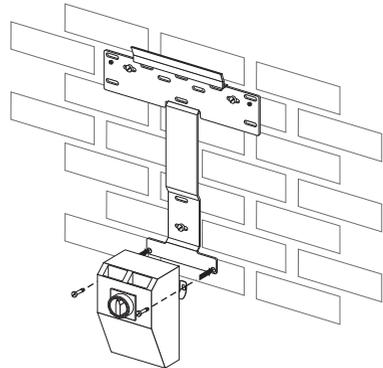
The diameter of the holes you drill must match the hardware you are using to mount the inverter.

For example, if you are mounting the inverter to a concrete wall, the hole diameter should be approximately the same as the outside diameter of the concrete anchors you intend to use. If you are mounting the inverter on a wall that has wooden studs inside it, the hole diameter should be the correct size for the lag screws you intend to use to mount the bracket. It is recommended that the lag screws be made of stainless steel, and the diameter of the screws closely match the diameter of the holes in the wall-mounting bracket. Make sure that the screws are long enough to penetrate the wall to a depth of 1.5 in.

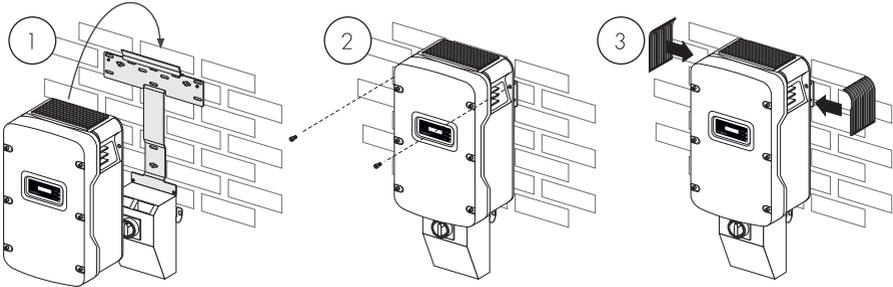
5. Insert the screws through the holes in the wall-mounting bracket and into the holes you drilled in the wall. Tighten the screws until the bracket is held firmly against the wall. Do not overtighten the screws.

4.3.2 Mounting the DC-disconnect (if applicable)

Attach the DC-Disconnect to the two lower holes of the wall-mounting bracket, using the two screws and washers provided. The teeth of the washers must face towards the wall in order to ensure proper grounding. Tighten the screw to a torque of 44 in-lbs. (5 Nm).



4.3.3 Mounting the inverter



Use the following procedure to mount the inverter:

1. Carefully lift the inverter onto the wall-mounting bracket. Hook the inverter using the enclosure opening in the back plate into the wall bracket (see # 1 in figure above).



WARNING

The inverter weighs 147 lbs. (67 kg). To avoid injury, be sure to use proper lifting techniques and secure the help of someone to assist in the unpacking and installation of the inverter.

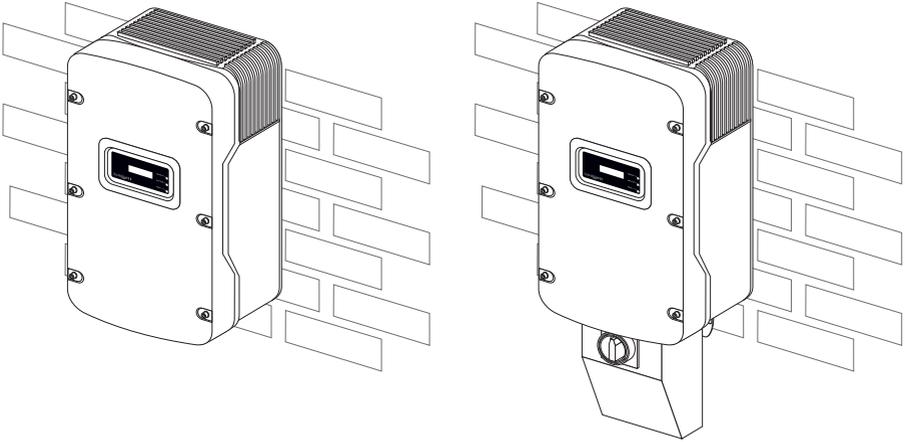
2. Inspect the inverter from both sides to ensure that it sits centered on the wall bracket.
3. Attach the inverter to the mounting bracket with the two M6 screws and washers provided through holes next to the fan outputs on both sides of the inverter (see # 2 in figure above). The teeth of the washers should face towards the wall in order to ensure proper grounding. Tighten the screws to a torque of 44 in-lbs. (5 Nm).
4. Close the fan outputs with the handle covers (see # 3 in figure above) provided in the accessories kit. They are required to adequately prevent insects entering the unit.



Should the handle covers break, new handle covers can be ordered from SunPower.

5. Carefully verify that the inverter is firmly mounted in place.

6. The figure below shows a correctly mounted inverter.



5 Wiring the inverter

This section provides step-by-step procedures and additional information required for wiring the inverter to the PV array and to the utility grid. For a safe and efficient installation complete the steps in the order of appearance.



DANGER

Inappropriate performing of the instructions described in this manual.

Death or serious injuries.

- All work on the inverter must only be carried out by qualified personnel.
- Work on the inverter must only be carried out as described in this manual.
- Observe all safety instructions listed on the inverter, in this manual and those of the PV plant.
- Always turn off all breakers and switches in the PV system before connecting any wires to or disconnecting any wires from the inverter.

NOTICE

Ingress of water when mounting and installing the Sunny Boy.

Damage to the Sunny Boy.

- Do not open the inverter when it is raining or when high humidity is present (> 95 %).

NOTICE

Touching the components can result in electrostatic discharges.

Damage to components.

- Ground yourself before touching a component.



Electrical installations

All electrical installations must be done in accordance with all local electrical codes and the National Electrical Code (NEC), ANSI/NFPA 70. For installation in Canada the installations must be done in accordance with applicable Canadian standards.

For inverters provided with a fixed AC output:

The AC input and AC output circuits are isolated from the enclosure and system grounding, if required by section 250 of the National Electric Code, ANSI/NFPA 70, is the responsibility of the installer.

The Photovoltaic System Grounding must be installed according to the requirements of sections 690.41 through 690.47 of the National Electric Code, ANSI/NFPA 70, and is the responsibility of the installer.

AC grounding

The inverter must be connected to the AC ground from the utility via the Ground Terminal (PE). See 3.2 "Locating internal components" (page 21).

PV grounding

The PV array (frame) ground should be connected to the PV Grounding and DC Grounding Electrode Conductor. see 3.2 "Locating internal components" (page 21). The size for the conductor is usually based on the size of the largest conductor in the DC system.

DC grounding electrode conductor

A DC grounding electrode conductor may be required by the Authority Having Jurisdiction (AHJ) Use the PV Grounding and DC Grounding Electrode Conductor. See 3.2 "Locating internal components" (page 21).

5.1 Sequence of connecting

5.1.1 Wiring without DC-disconnect

Connect the wires to the inverter only in the following order:

1. De-energize all energy sources by opening all AC and DC disconnects and/or breakers.
2. Wiring from AC breaker to the AC disconnect switch.
3. Wiring from the AC disconnect switch to the inverter, follow the procedure on page 49 et seq..
4. Wiring from the PV wires to the DC disconnect.
5. Wiring from the DC disconnect to the inverter, follow the procedure on page 59 et seq..
6. Turn the DC switches and/or breakers to ON.
7. Turn the AC switches and/or breakers to ON.



WARNING

Always wait a minimum of 5 minutes for stored potentials in the inverter to discharge completely before opening the enclosure.



WARNING

All electrical installations must be done in accordance with all local electrical codes and the National Electrical Code (NEC), ANSI/NFPA 70.



WARNING

Before connecting the inverter to the electrical utility grid, contact the local utility company. This connection must be made only by qualified personnel.

To disconnect the inverter, disconnect the wiring in the reverse order from above.



The AC system must always be disconnected before the DC system.

5.1.2 Wiring with DC-disconnect

Connect the wires to the inverter only in the following order:

1. De-energize all energy sources by opening all AC and DC disconnects and/or breakers.
2. Wiring from the AC breaker to the DC-Disconnect, follow the procedure on page 52 et seq.
3. AC wiring from the DC-Disconnect to the inverter, follow the procedure on page 52 et seq.
4. Wiring from the PV array to the DC-Disconnect, follow the procedure on page 61 et seq.
5. DC wiring from the DC-Disconnect to the inverter, follow the procedure on page 61 et seq.
6. Switch the DC-Disconnect to the "1" position.
7. Turn the AC breaker to ON.



WARNING

Always wait a minimum of 5 minutes for stored potentials in the inverter to discharge completely before opening the enclosure.



WARNING

All electrical installations must be done in accordance with all local electrical codes and the National Electrical Code (NEC), ANSI/NFPA 70.



WARNING

Before connecting the inverter to the electrical utility grid, contact the local utility company. This connection must be made only by qualified personnel.

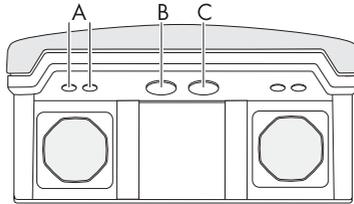
To disconnect the inverter, disconnect the wiring in the reverse order from above.



The AC system must always be disconnected before the DC system.

5.2 Bottom view and dimensions

The DC input from the PV array (via the DC disconnect enclosure) and the output to the AC utility grid connect to the inverter inside the inverter's case. The internal AC and DC wiring terminals accept a maximum wire size of 6 AWG (16 mm²). Knockouts are provided on the bottom of the inverter near each of the terminals for the wires to enter the case, see figure below.

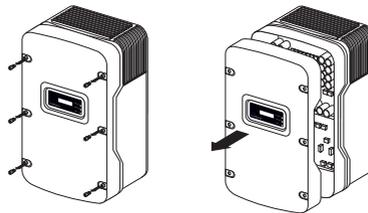


Position	Description
A	1/2 in. (13 mm) Communication Cable Glands
B	3/4 in. (19 mm) DC Knockout
C	AC Knockout



The AC and DC knockouts are sized for 3/4 in. (19 mm) rigid conduit (EMT). DO NOT enlarge any of these holes, as this is a violation of UL requirements and will void the SunPower warranty.

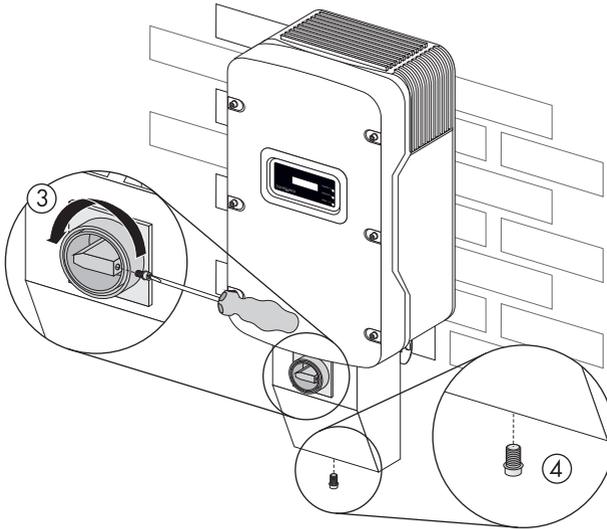
5.3 Opening the inverter



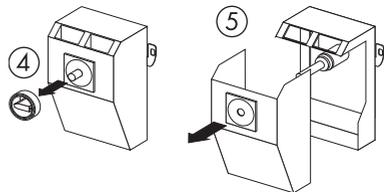
1. Remove the six screws from the enclosure lid and pull the lid forward smoothly.
2. Put the lid, the screws and the washers to one side so that they do not get lost.

5.4 Opening the DC-disconnect (if applicable)

1. Turn the DC-Disconnect off by turning the switch to "0".



2. Loosen screw in the right area of the DC-Disconnect with a small phillips screwdriver (used screw: UNC no 5 x 3/4 in. (19 mm), cross recess Phillips pan head machine screw). Check if you can remove the knob of the DC-Disconnect. If not, unscrew the screw further until you can remove the knob. The screw is attached with a rubber washer in order to make the assembly easier.
3. Remove the metric M6 x 10 screw and the washer from the bottom side of the DC-disconnect, which fastens the lid.
4. Pull off the switch handle.
5. Remove the lid of the DC-disconnect by pulling it down and moving it at the same time carefully forward at its lower edge.



5.5 Wiring the AC output

This subsection provides complete, step-by-step procedures for wiring the AC output from the inverter to the utility grid.

5.5.1 AC connection requirements

**WARNING**

All electrical installations must be done in accordance with all local electrical codes and with the National Electrical Code (NEC), ANSI/NFPA 70. Use 6 AWG (16 mm²) (maximum), +194 °F (+90 °C), copper wire for all AC wiring connections to the inverter. Voltage drop and other considerations may dictate that larger size wires be used. Use only solid or stranded wire but not fine stranded wire.

**WARNING**

The National Electrical Code (NEC) states that the inverter must be connected to a dedicated circuit, and that no other outlets or devices can be connected to the same circuit. See NEC Section 690-64(b)(1). The NEC also imposes limitations on the size of the inverter and the manner in which it is connected to the utility grid. See NEC Section 690-64(b)(2).

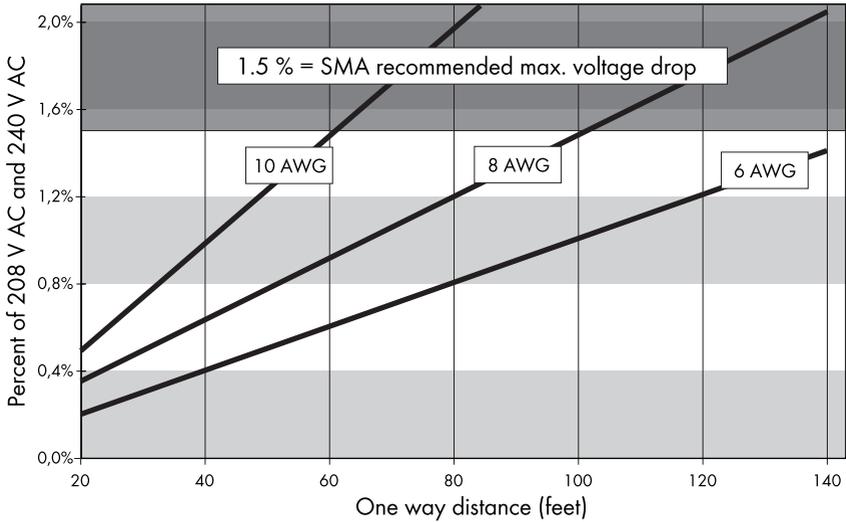
**WARNING**

To reduce the risk of fire, connect only to a circuit provided with the required branch circuit overcurrent device sized in accordance with the National Electric Code, ANSI/NFPA 70. The maximum size overcurrent device must not be more than 50 A.

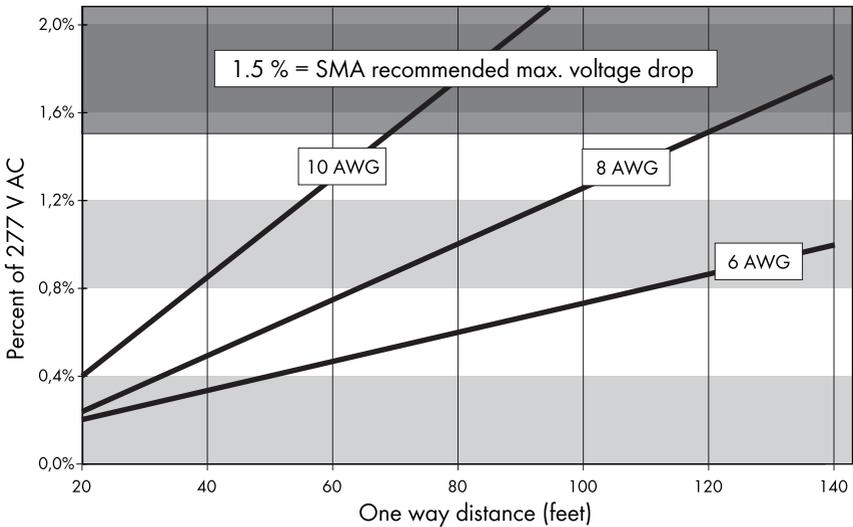
The following diagrams show the potential losses in AC wires with respect to the cross-sectional area of the cable and the length of the cable. Use the following diagrams to determine the best wire size to use for your particular installation.

SunPower SPR-5000m PV inverter

Percent voltage drop for 208 V AC and 240 V AC service

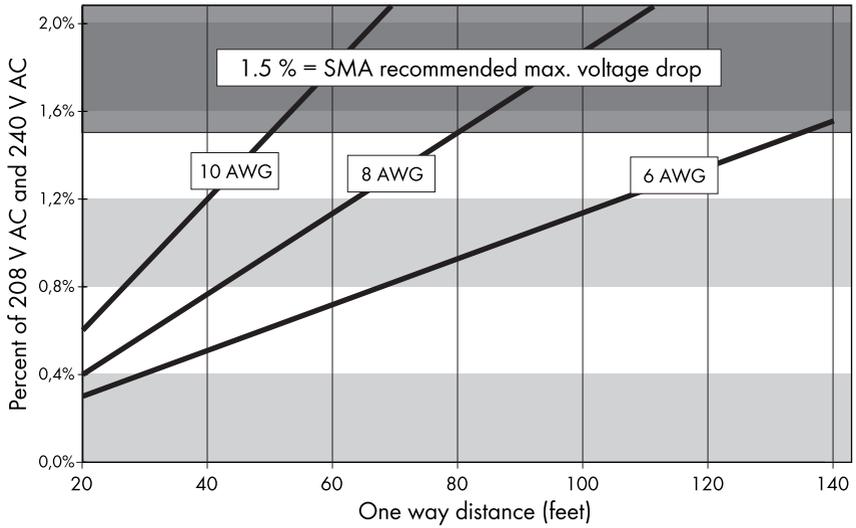


Percent voltage drop for 277 V AC service

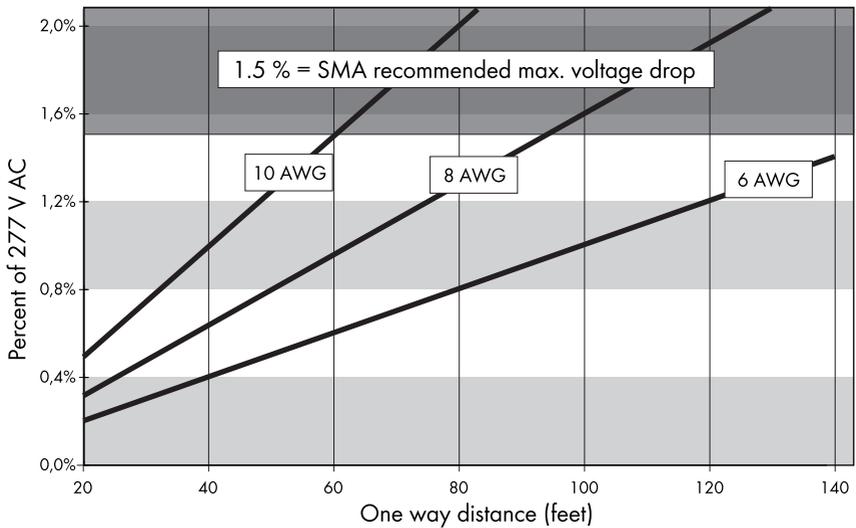


SunPower SPR-6000m PV inverter

Percent voltage drop for 208 V AC and 240 V AC service

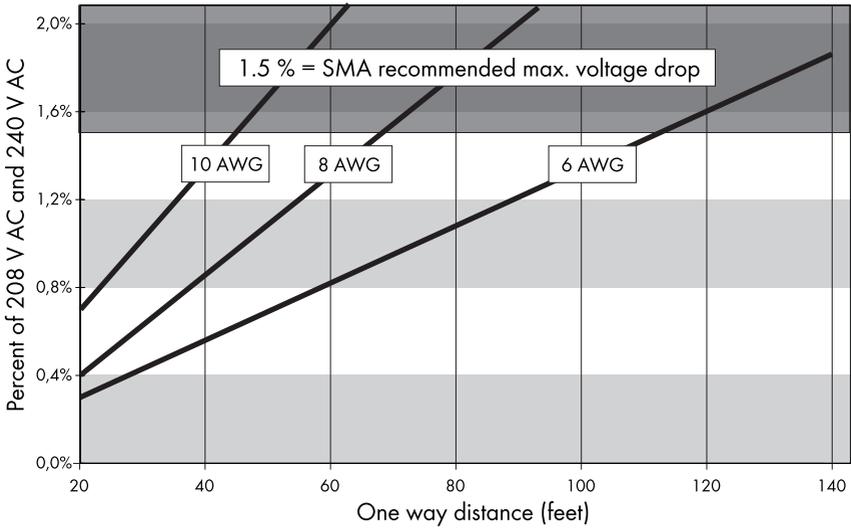


Percent voltage drop for 277 V AC service

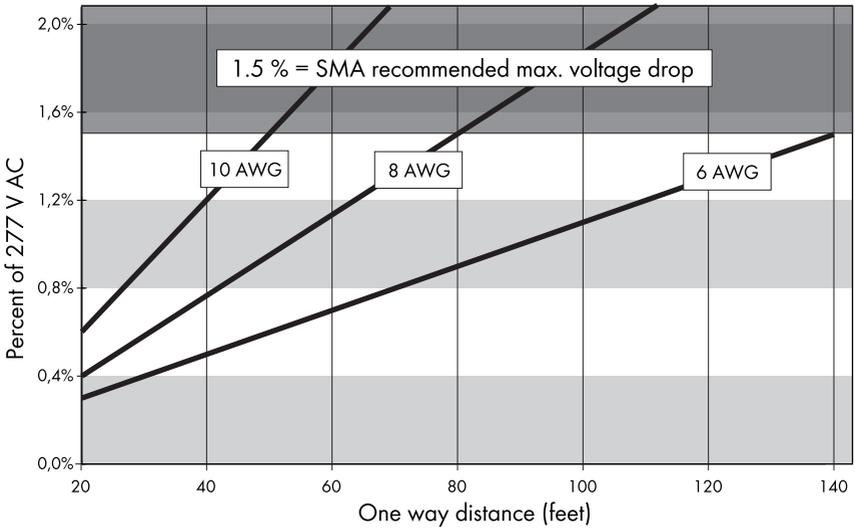


SunPower SPR-7000m PV inverter

Percent voltage drop for 208 V AC and 240 V AC service

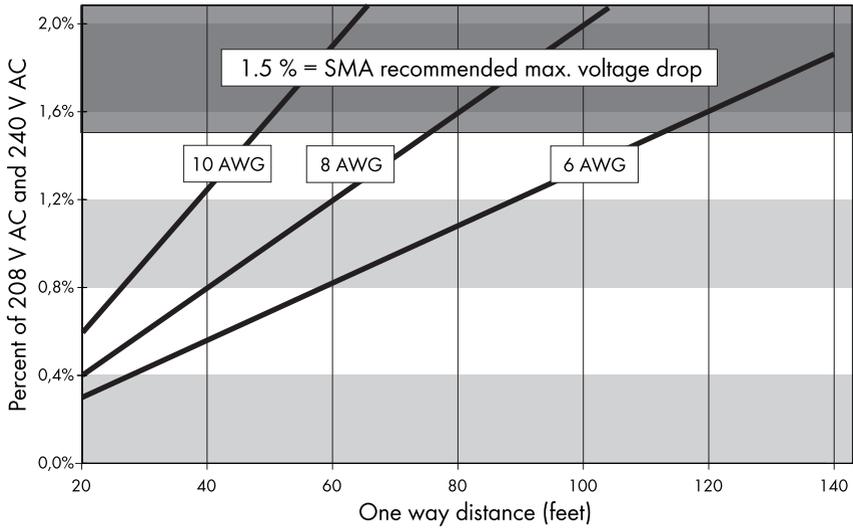


Percent voltage drop for 277 V AC service

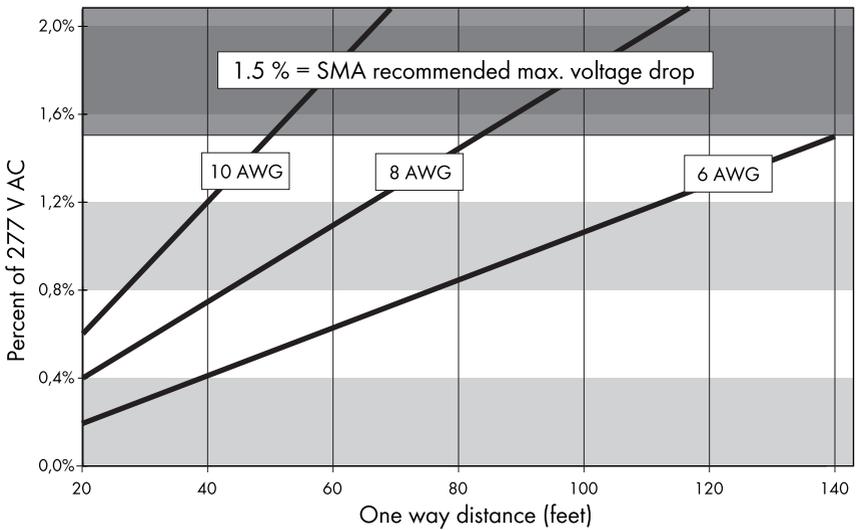


SunPower SPR-8000m PV inverter

Percent voltage drop for 208 V AC and 240 V AC service



Percent voltage drop for 277 V AC service



5.5.2 AC wiring without DC-disconnect



WARNING

You must connect the wires that carry the AC voltage from the inverter to the utility grid in the order described in this procedure. Deviating from this procedure could expose you to lethal voltages that can cause serious injury and/or death.

1. Turn OFF the main breaker in the main utility breaker box.
2. Remove interior breaker panel lid.
3. If you are replacing an existing inverter, disconnect the wires for the AC line you are working with in the breaker box.
4. Install a 3/4 in. (19 mm) conduit fitting in the inverters's AC wiring knockout (the knockout on the right side of the inverter, as shown in chapter 5.2 "Bottom view and dimensions" (page 42)). Fasten the conduit fitting on the inside of the inverter with the appropriate locknut.
5. Install a 3/4 in. (19 mm) conduit between the main breaker box and the inverter's AC wiring knockout.
6. Pull the AC wires through the conduit from the interior of the breaker box to the interior of the inverter.



CAUTION

Avoid using wire nuts to join any wires together or to make any connections anywhere in the PV system. Wire nuts are a frequent cause of unreliable, resistive connections, and ground faults.

7. Connect the AC equipment-ground wire to the PE terminal labeled in the inverter.



The SPR-8000m may not be connected to a 208 V grid.

8. For 208 V/240 V/277 V connect the L1 (AC line 1 or UNGROUNDED) wire to the terminal labeled L1. Refer to following figures.
9. For 208 V/240 V connect the L2 (AC line 2) to the terminal labeled L2 and N (AC line N) wire to the terminal labeled N. Refer to following figures.
10. For 277 V connect the N (AC line N) wire to the terminal labeled N. The L2 terminal is not used.



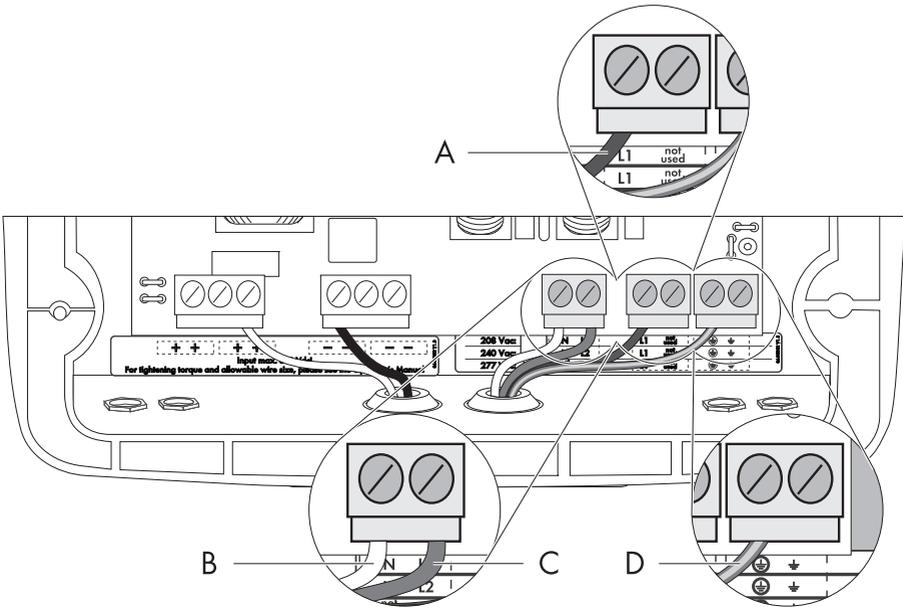
The terminal must be opened completely before you insert the cable.

- Connect the wires to the terminal blocks in the inverter and tighten them. Torques for AC connection terminal blocks:

Grey Terminal Blocks (Weidmüller)	10 ... 6 AWG (6 mm ² ... 16 mm ²): 18 in.-lbs. (2 Nm)
Green Terminal Blocks (Phoenix)	8 ... 6 AWG (10 mm ² ... 16 mm ²): 40 in.-lbs. (4.5 Nm)
	10 AWG (8 mm ²): 22 in.-lbs. (2.5 Nm)

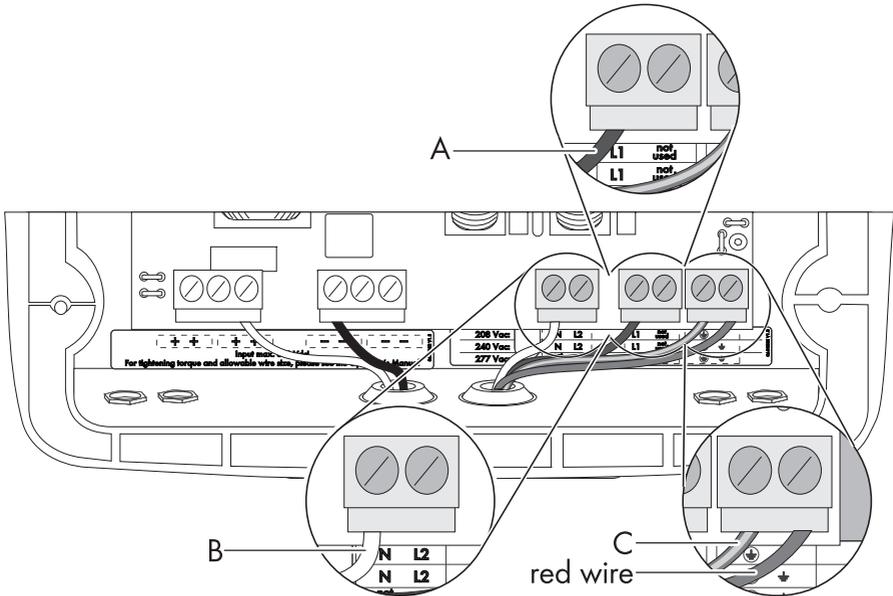
- Verify that all connections are correctly wired and properly torqued. Pull on the cable in order to make sure that it is sufficiently fixed in the terminal.

AC connection terminals for 208 V (not for SPR-8000m) and 240 V



Position	Description
A	L1 wire connected to L1 terminal
B	N wire connected to N terminal
C	L2 wire connected to L2 terminal
D	Equipment ground wire connected to PE terminal

AC connection terminals for 277 V



Position	Description
A	L1 wire connected to L1 terminal
B	N wire connected to N terminal
C	Equipment ground wire connected to PE terminal

5.5.3 AC wiring with DC-disconnect



WARNING

You must connect the wires that carry the AC voltage from the inverter to the utility grid in the order described in this procedure. Deviating from this procedure could expose you to lethal voltages that can cause serious injury and/or death.

1. Turn OFF the main breaker in the main utility breaker box.
2. Remove interior breaker panel cover.
3. If you are replacing an existing inverter, disconnect the wires for the AC line you are working with in the breaker box.
4. Install a 3/4 in. (19 mm) conduit fitting in the DC-Disconnect AC wiring knockout (the knockout on the right side of the DC-Disconnect). Fasten the conduit fitting on the inside of the DC-Disconnect with the appropriate locknut.
5. Install 3/4 in. (19 mm) conduit between the main breaker box and the DC-Disconnect's AC wiring knockout.
6. Pull the AC wires through the conduit from the interior of the breaker box to the interior of the DC-Disconnect.



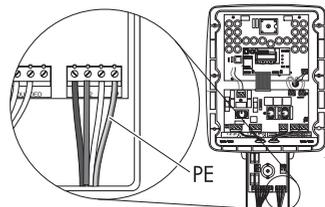
CAUTION

Avoid using wire nuts to join any wires together or to make any connections anywhere in the PV system. Wire nuts are a frequent cause of unreliable, resistive connections, and ground faults.



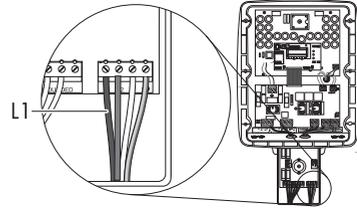
The terminal must be opened completely before you insert the cable.

7. Connect the AC equipment-ground wire to the PE terminal labeled  in the DC-Disconnect.



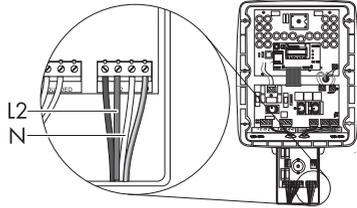
8. For 208 V/240 V/277 V connect the L1 (AC line 1 or UNGROUNDED) wire to the terminal labeled L1 in the DC-Disconnect.

The SPR-8000m may not be connected to a 208 V grid.



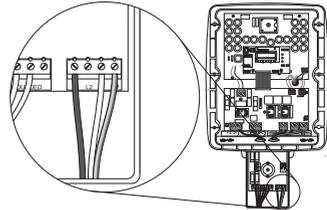
9. For 208 V/240 V connect the L2 (AC line 2) and N (AC line N) wire to the terminal labeled L2 and N in the DC-Disconnect.

The SPR-8000m may not be connected to a 208 V grid.

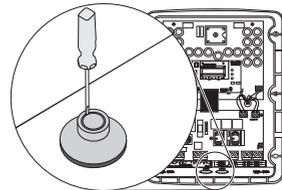


For 277 V connect the N (AC line N) wire to the terminal labeled N in the DC-Disconnect.

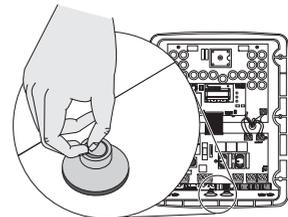
Note: For 277 V the L2 terminal is not used.



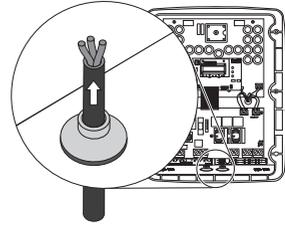
10. Connect the wires to the terminal blocks in the DC-Disconnect and tighten to a torque of 15 in-lbs. (1.7 Nm).
11. Use a screwdriver in order to poke a hole in the groove of the grommet inside the inverter.



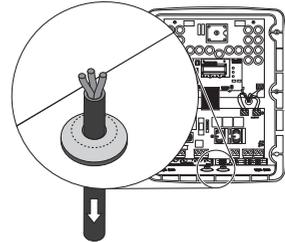
12. Remove the membrane.



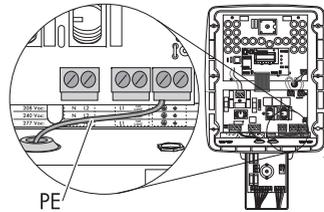
- Pull the cable into the inverter.



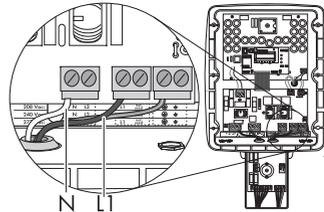
- Pull the cable slightly back in order to seal the grommet.



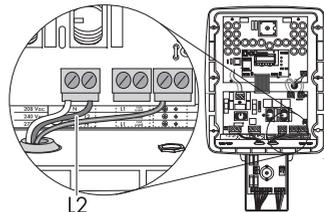
- Connect the green/yellow cable of the inverter to the terminal labeled: 



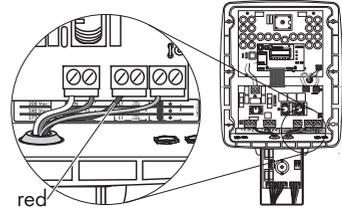
- Connect the white wire of the DC-Disconnect to the terminal labeled N and the black wire to the terminal labeled L1 of the inverter.



- For 208 V/240 V connect the red wire to the terminal labeled L2 in the inverter.
The SPR-8000m may not be connected to a 208 V grid.



For 277 V connect the red wire to the terminal labeled \perp in the inverter (not used).



- Connect the wires to the terminal blocks in the inverter and tighten them. Torques for AC connection terminal blocks:

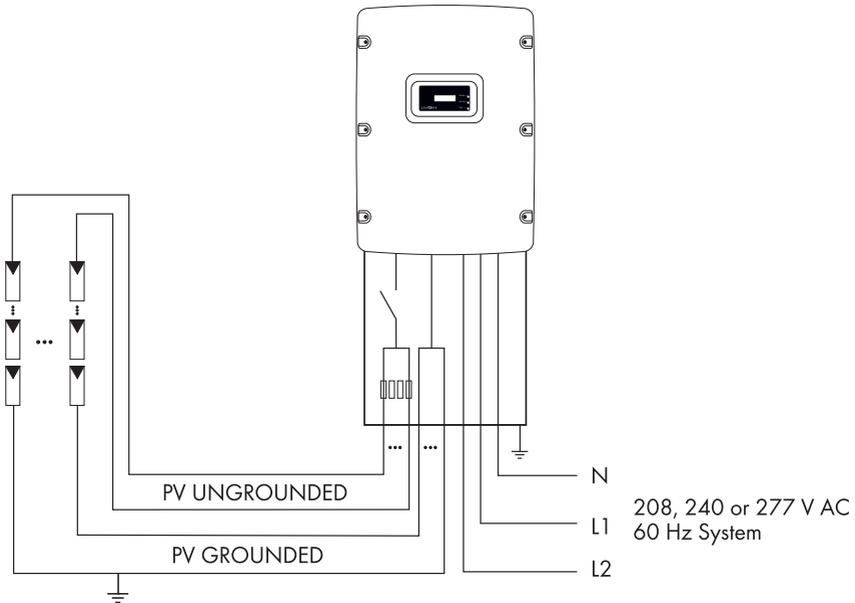
Grey Terminal Blocks (Weidmüller)	10 ... 6 AWG (6 mm ² ... 16 mm ²): 18 in.-lbs. (2 Nm)
Green Terminal Blocks (Phoenix)	8 ... 6 AWG (10 mm ² ... 16 mm ²): 40 in.-lbs. (4.5 Nm)
	10 AWG (8 mm ²): 22 in.-lbs. (2.5 Nm)

- Verify that all connections are correctly wired and properly torqued. Pull on the cable in order to make sure that it is sufficiently fixed in the terminal.

5.6 Wiring the DC input

This subsection provides procedures for wiring the DC input from the PV array to the inverter.

Simplified electrical wiring diagram of a PV system



5.6.1 DC connection requirements



WARNING

All electrical installations must be done in accordance with all local electrical codes and with the National Electrical Code (NEC), ANSI/NFPA 70. For installation in Canada the installations must be done in accordance with applicable Canadian standards.



WARNING

Use 10 AWG ... 6 AWG (6 mm² ... 16 mm²), +194 °F (+90 °C), copper wire for all DC wiring connections to the inverter. Voltage drop and other considerations may dictate that larger size wires be used. Use only solid or stranded wire but not fine stranded wire.



WARNING

The DC disconnect for the inverter must have a minimum rating of 600 V DC and 36 A continuous. The DC Disconnect is shipped with 4 x 15 A, 600 V DC fuses (one for each string). The maximum fuse rating for the four DC disconnect fuses is 20 A, 600 V DC (one for each string). See "Exchanging the PV String Fuses within the DC Disconnect" on page 104 for details.

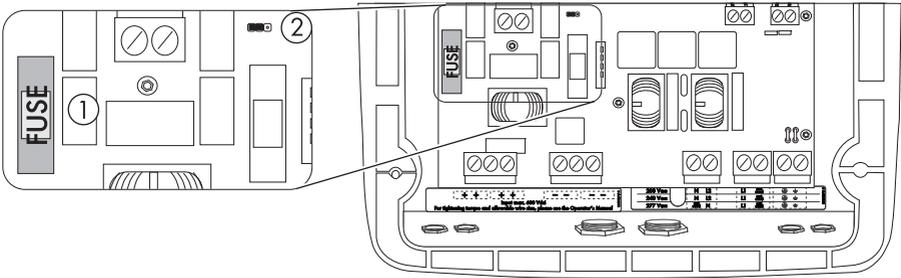


Series fusing may be required depending on the type of PV module used in the system. See NEC 690.9.

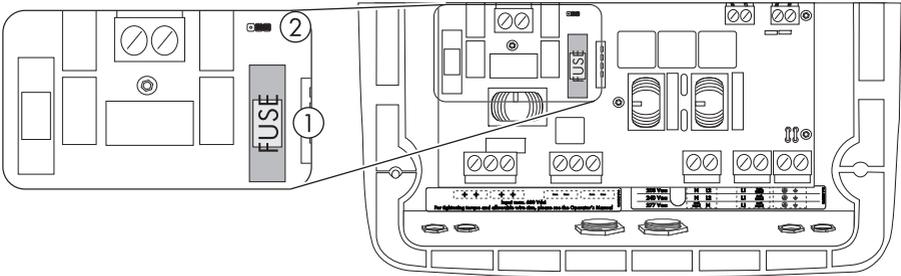
5.7 DC input grounding

The SunPower inverter is factory-set for positive ground systems. Certain types of PV modules may require that the negative terminal is grounded instead of the positive terminal. To configure the SunPower inverter for negative ground, move the fuse (1) and change the jumper position (2) as shown in the following illustrations.

GFDI fuse and jumper settings for positive ground



GFDI fuse and jumper settings for negative ground



5.8 Connecting the DC wires



WARNING

You must connect the wires that carry the DC voltage from the PV array to the inverter in the order described in the following procedure. Deviating from this procedure could expose you to lethal voltages that can cause serious injury and/or death.



WARNING

PV arrays are energized when exposed to light. Use safe working practices when working on PV arrays.



WARNING

Always turn OFF all AC and DC breakers and switches in the PV system and wait a minimum of 5 minutes for the inverter to completely discharge before connecting any wires to the inverter or disconnecting any wires from the inverter. Failure to do so could expose you to lethal voltages that can cause serious injury and/or death.



CAUTION

Verify the polarity and the open-circuit voltage from the PV strings before you connect the DC wires to the inverter. Applying an open-circuit DC-input voltage that exceeds the maximum DC-input-voltage range will cause irreversible damage to the inverter and void the warranty! Always configure the DC-input-voltage range correctly before connecting the DC-input wires from the PV array to the inverter.

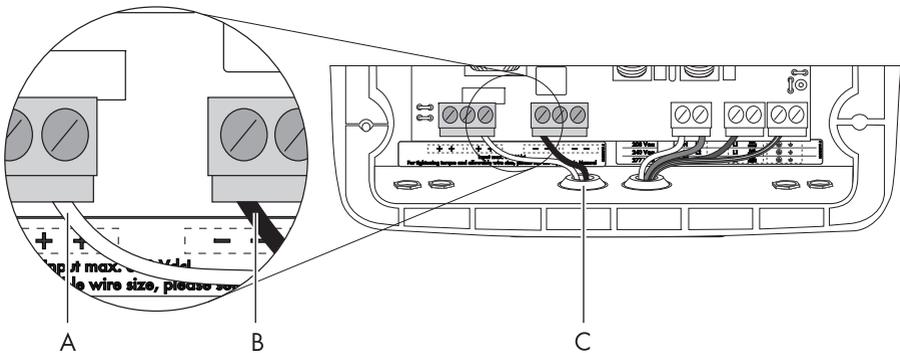


WARNING

Verify that the DC current of your installation does not exceed the maximum values specified in the type rating label.

5.8.1 DC wiring without DC-disconnect

1. Verify that the AC breaker is set to OFF.
2. Verify that the DC disconnect is open in the external DC disconnect enclosure.
3. Install a 3/4 in. (19 mm) conduit fitting in the inverter’s DC wiring knockout. Use the left one of the two large openings on the bottom of the inverter. See chapter 5.2 “Bottom view and dimensions” (page 42) and the figure below. Fasten the conduit fitting on the inside of the inverter with the appropriate locknut.
4. Install 3/4 in. (19 mm) conduit between the DC disconnect enclosure and the inverter’s DC wiring knockout.
5. Refer to the figure below for steps 6 through 8.



Positon	Description
A	Positive DC wire connected to DC+
B	Negative DC wire connected to DC -
C	DC Knockout

6. Pull the DC wires from the DC disconnect through the conduit into the interior of the inverter.

i The following steps describe DC connection for positive grounding. For negative grounding the colors of the conductors will change places on the connection terminals.

7. Connect the positive DC wire to the terminal labeled DC+ in the inverter.
8. Connect the negative DC wire to the terminal labeled DC - in the inverter.

i The inverter has provisions for up to three PV strings. The positive and negative terminal blocks each have three positions, so three pairs of DC input wires can be connected in parallel.



CAUTION

Do not use wire nuts to join any wires together or to make any connections anywhere in the PV system. Wire nuts are a frequent cause of unreliable, resistive connections, and ground faults.



The terminal must be opened completely before you insert the cable.

9. Connect the positive and negative DC wires to the appropriate terminals in the DC disconnect enclosure.
10. Connect the DC equipment ground wire to the PE terminal labeled  in the inverter.
11. Torque all wires in the AC and DC terminal blocks inside the inverter to:

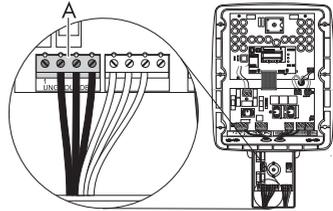
Grey Terminal Blocks (Weidmüller)	10 ... 6 AWG (6 mm ² ... 16 mm ²): 18 in-lbs. (2 Nm)
Green Terminal Blocks (Phoenix)	8 ... 6 AWG (10 mm ² ... 16 mm ²): 40 in-lbs. (4.5 Nm)
	10 AWG (8 mm ²): 22 in-lbs. (2.5 Nm)

12. Verify that all connections are correctly wired and properly torqued. Pull on the cable in order to make sure that it is sufficiently fixed in the terminal.

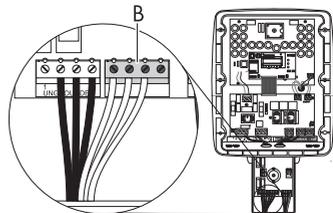
5.8.2 DC wiring with DC-disconnect

Positive Grounding

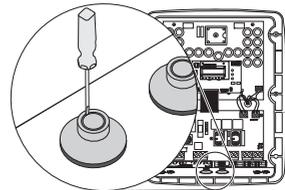
1. Connect the negative DC wires (A) to the terminal labeled PV UNGROUNDED in the DC-Disconnect.



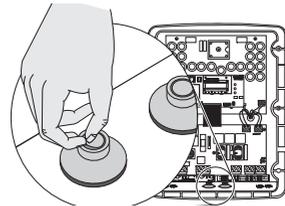
2. Connect the positive DC wires (B) to the terminal labeled PV GROUNDED in the DC-Disconnect.



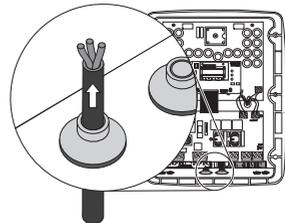
3. Torque all wires in the terminal blocks inside the DC-Disconnect to 15 in-lbs. (1.7 Nm).
4. Use a screwdriver in order to poke a hole in the groove of the grommet.



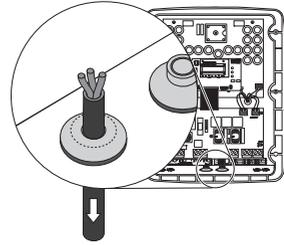
5. Remove the membrane.



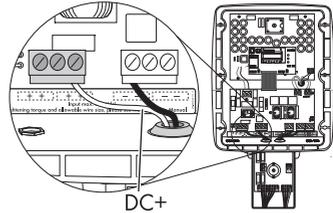
6. Pull the DC wires from the DC disconnect through the conduit into the interior of the inverter.



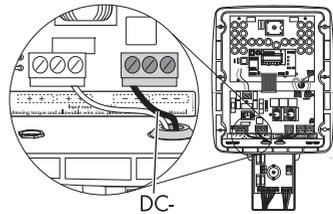
- Pull the wires slightly back in order to seal the grommet.



- Connect the white wire (PV GROUNDED) to the terminal labeled DC+ in the inverter.



- Connect the black wire (PV UNGROUNDED) to the terminal labeled DC - in the inverter.



- Torque all wires in the terminal blocks inside the inverter to:

Grey Terminal Blocks (Weidmüller)	10 ... 6 AWG (6 mm ² ... 16 mm ²): 18 in-lbs. (2 Nm)
Green Terminal Blocks (Phoenix)	8 ... 6 AWG (10 mm ² ... 16 mm ²): 40 in-lbs. (4.5 Nm)
	10 AWG (8 mm ²): 22 in-lbs. (2.5 Nm)

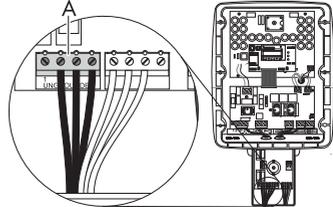
- Verify that all connections are correctly wired and properly torqued. Pull on the cable in order to make sure that it is sufficiently fixed in the terminal.

Negative grounding

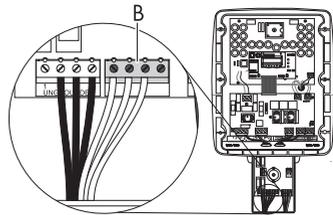


To verify that your inverter is grounded as intended please refer to section 5.7 "DC input grounding" (page 57).

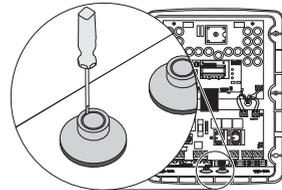
1. Connect the positive DC wires (A) to the terminal labeled PV UNGROUNDED in the DC-Disconnect.



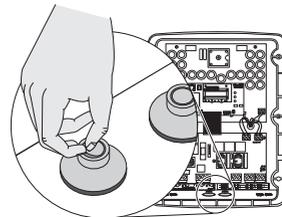
2. Connect the negative DC wires (B) to the terminal labeled PV GROUNDED in the DC-Disconnect.



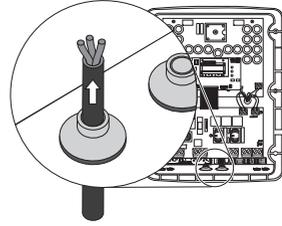
3. Torque all wires in the terminal blocks inside the DC-Disconnect to 15 in-lb (1.7 Nm).
4. Use a screwdriver in order to poke a hole in the groove of the grommet.



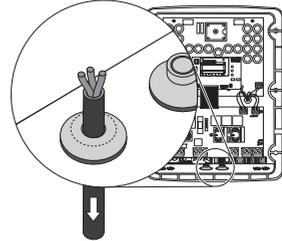
5. Remove the membrane.



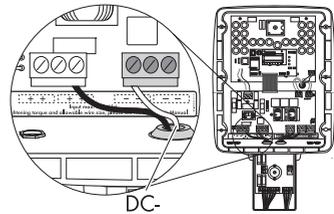
- Pull the DC wires from the DC disconnect through the conduit into the interior of the SunPower inverter.



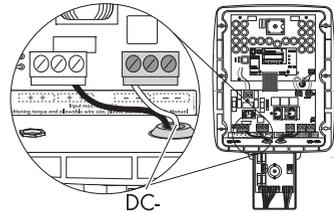
- Pull the wires slightly back in order to seal the grommet.



- Connect the black wire (PV UNGROUNDED) to the terminal labeled DC+ in the SunPower inverter.



- Connect the white wire (PV GROUNDED) to the terminal labeled DC- in the SunPower inverter.



- Torque all wires in the terminal blocks inside the SunPower inverter to:

Grey Terminal Blocks (Weidmüller)	10 ... 6 AWG (6 mm ² ... 16 mm ²): 18 in.-lbs. (2 Nm)
Green Terminal Blocks (Phoenix)	8 ... 6 AWG (10 mm ² ... 16 mm ²): 40 in.-lbs. (4.5 Nm)
	10 AWG (8 mm ²): 22 in.-lbs. (2.5 Nm)

- Verify that all connections are correctly wired and properly torqued.
- Check for voltage.

**CAUTION**

Do not use wire nuts to join any wires together or to make any connections anywhere in the PV system. Wire nuts are a frequent cause of unreliable, resistive connections, and ground faults.



The terminal has to be fully opened before you insert the cable.

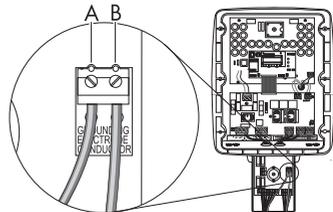
Use the following procedure to connect the DC wires to the inverter with DC-Disconnect:

1. Verify that the AC breaker is OFF.
2. Install a 3/4 in. (19 mm) conduit fitting in the DC-Disconnect's DC wiring knockout (the knockout on the left side of the DC-Disconnect). Fasten the conduit fitting on the inside of the DC-Disconnect with the appropriate locknut.
3. Install 3/4 in. (19 mm) conduit between the DC-Disconnect and the PV array.
4. Pull the DC wires from the PV array through the conduit into the interior of the DC-Disconnect.



The DC-Disconnect has provisions for up to four PV strings. The PV UNGROUNDED and PV GROUNDED terminal block each has four positions, so four pairs of DC-input wires can be connected in parallel.

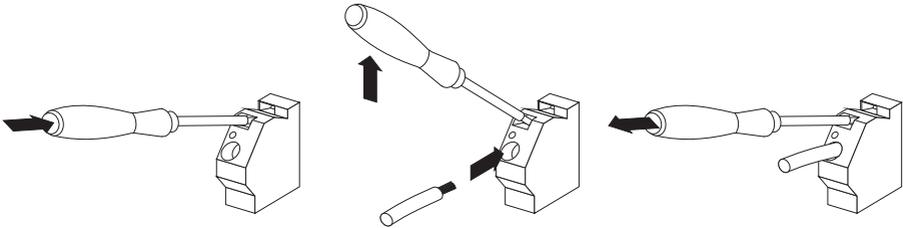
5. Connect the grounding electrode to the grounding electrode conductor terminal (B).
6. Connect the PV generator grounding to the grounding electrode conductor terminal (A).



5.8.3 DC connection with additional DC distribution

If combining more than 1 string prior to the integrated DC-Disconnect use the combined terminal on the ungrounded side.

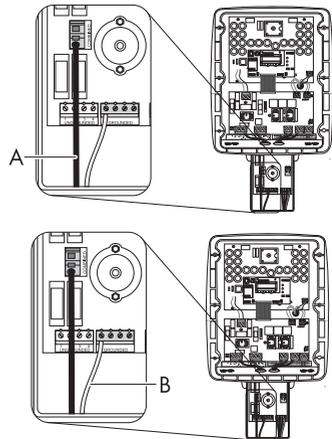
Using spring terminal labeled Combined



1. Insert a insulated screwdriver into the provided slot of the spring terminal.
2. Push the screwdriver up, the spring terminal is opened.
3. Insert the stripped cable into the spring terminal.
4. Return the screwdriver to its original position.
5. Remove the screwdriver. The spring terminal is closed and the cable is fastened.

DC connection with additional DC distribution for positive grounding

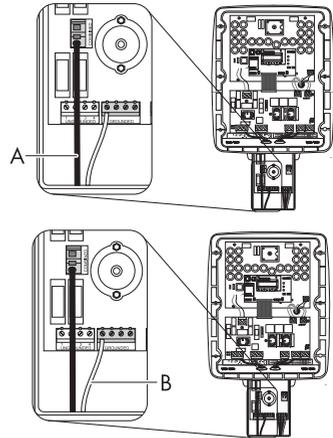
1. Connect the negative DC wire (A) to the terminal labeled COMBINED in the DC disconnect.
2. Connect the positive DC wire (B) to the terminal labeled PV GROUNDED in the DC disconnect.



3. Torque all wires in the terminal blocks inside the DC disconnect to 15 in-lbs. (1.7 Nm).

DC connection with additional DC distribution for negative grounding

1. Connect the positive DC wire (A) to the terminal labeled COMBINED in the DC disconnect.
2. Connect the negative DC wire (B) to the terminal labeled PV GROUNDED in the DC disconnect.



3. Torque all wires in the terminal blocks inside the DC disconnect to 15 in-lbs. (1.7 Nm).

5.9 Communication wiring

Various data-communication options are available for the inverter. These options are provided in the form of accessory Piggy-Back modules that can be installed and connected either at the time the inverter is installed or at any time thereafter. Please contact SunPower for information.

The following subsections provide instructions for connecting the various communication cables between an inverter with a communication module and a personal computer (PC). The connection of an inverter to a SunPower Communication Device is shown in those respective manuals.

5.9.1 RS232 communication

RS232 is a communication standard for bidirectional transmission of data between a inverter and a PC. Only one inverter can be connected with a RS232 serial cable to a PC.

Requirements for RS232 communication:

- The inverter must be equipped with an RS232 Piggy-Back communication module.
- The cable must be no longer than 50 ft. (15 m).
- Conduit may be required for communication wiring, per local electrical code requirements.

Connecting an RS232 cable

Use the following procedure to install a RS232 data-communication network:

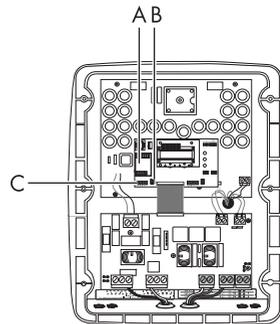
1. Route the communication cable from the location of the PC to the inverter.
2. Verify that the PC has a serial port and that it is activated in the BIOS and the operating system.
3. Attach the appropriate DB-9 connector to the end of the cable near the PC. See table and figure below for the pin assignments for the serial connector.
4. Note down the wire color used for each of the pins.
5. Route the other end of the cable into the solar inverter through the communication-knockout at the bottom of the inverter. See section 5.2 "Bottom view and dimensions" (page 42).
6. Refer to table and figure below as well as your note of the wire colors. Connect the appropriate wires to the communication terminal block.
7. Connect the cable shield to the inverter's case.
8. Do NOT connect the cable shield to the PC's DB-9 connector. The shield must remain floating at the PC.



CAUTION

All AC and DC power must be off when connecting the communication wiring to the inverter.

Position	Description
A	RS232 Piggy-Back communication module
B	Signal symmetry and termination jumpers
C	Terminal block for RS232 connection



Pin assignment RS232 cable

Communication Terminal Block	Signal Name	9-Pin Serial-Port Connector (PC)	25-pin Serial-Port Connector (PC)
Case	Shield	Case	Case
2	RxD (Output from inverter)	2	3
3	TxD (Input to inverter)	3	2
5	GND	5	7

5.9.2 RS485 communication

RS485 is a communication standard for bidirectional transmission of data between one or more solar inverters and a PC.



All PV inverters are capable of RS485 communication. You can mix different inverter models on the RS485 communication bus.

Requirements for RS485 communication:

- The PV inverter must be equipped with an RS485 Piggy-Back communication module.
- The cable must be no longer than 4,000 ft (1,200 m) with a common shield, and a wire size no smaller than 24 AWG (0.25 mm²).
- Conduit may be required for communication wiring, per local electrical code requirements.

Connecting an RS485 cable

The following steps describe how to connect one or more PV inverters to an RS485 bus.

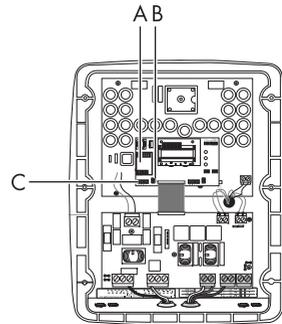
1. Connect the three wires of the RS485 cable to terminals 2, 5, and 7 of the communication terminal block as shown in following figure. Note the wire color used for each of the terminals. Torque the wires to 18 in-lbs. (2 Nm).
2. Connect the shield of the cable to the flat connection for grounding in the inverter. For position see 3.2 "Locating internal components" (page 21). Do NOT connect the cable shield to the PC's DB-9 connector. The shield must remain floating at the PC.
3. Install a jumper in position A, the bottom set of pins on the communication jumper block, to set it for termination.



The termination of the other end of the RS485 cable will depend on what type of device you're connecting to.

Jumper configuration for RS485 communication:

Position	Description
A	RS485 Piggy-Back communication module
B	Signal symmetry and termination jumpers
C	Terminal block for RS485 connection



Jumpers B & C Installed: Installing these jumpers puts 680 Ohm symmetry resistors between pin 2 (Data+) and +5V and between pin 7 (Data -) and Ground.

Jumper A installed: Installing this jumper puts a 120 Ohm termination resistor across pin 2 (Data+) and pin 7 (Data -).

i Install jumpers B & C after the inverter is on the RS485 bus and only if symmetry of the signal is required. Install jumper A only, if the inverter is on one of the ends of the RS485 bus.

RS485 pinouts

2 - A (+)	(Data+)
7 - B (-)	(Data -)
5 - SR (Signal Ref.)	-

5.10 Closing the inverter

When you have finished connecting the AC-output wires, the DC-input wires, and the communication cables, re-check all connections to ensure that everything is in the right place and that all connections and knockout fittings are secure and properly torqued. Check all of the knockout fittings on the bottom of the inverter to ensure that they provide a weather-tight seal.



WARNING

Never install the inverter during rain or very damp conditions. Because the inverter is completely sealed, you must be sure no moisture is trapped inside the enclosure when securing the lid.

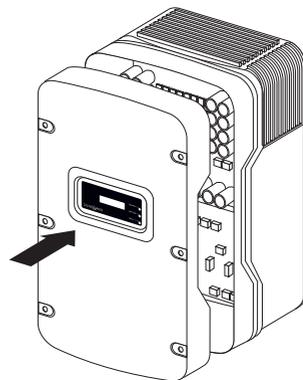


CAUTION

Be careful not to misplace the screws or the lock washers that attach the lid to the case, as all 6 screws and lock washers are required to ensure that the lid is grounded properly and is fully sealed to the case. Handle the lid carefully, as even minor damage to the lid could result in an inadequate seal between the lid and the case, thus allowing moisture to enter the case and damage the sensitive electronic components.

Use the following procedure to install the lid on the inverter:

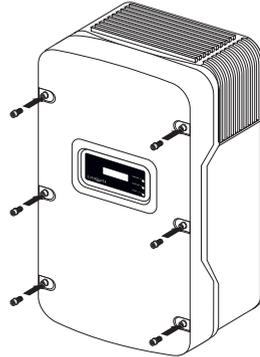
1. Check wire routing to ensure that no wires can interfere with proper sealing of the lid and that no pressure will be exerted on the connections when the lid is replaced.
2. Locate the 6 screws and lock washers you removed to take the lid off the inverter. Make sure you have all 6 screws and lock washers, as all of this hardware is necessary to ensure proper grounding and a weather-tight seal.
3. Check the seal on the inside of the lid to ensure it is undamaged and in the correct position.
4. Carefully position the lid on the front of the inverter so that the 6 holes in the lid are aligned correctly with the 6 threaded holes in the case.





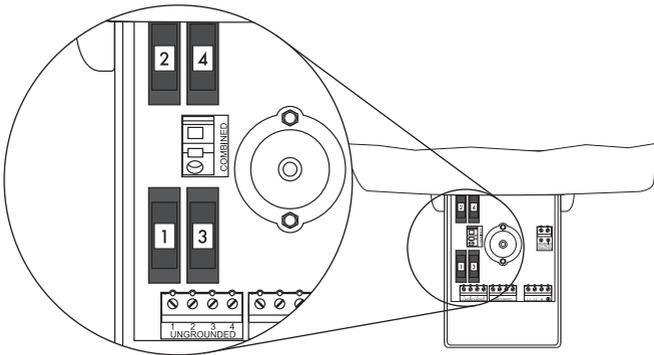
Be sure when reinstalling the six screws that the lock washers are installed correctly. The teeth of the washers should face towards the lid.

5. While holding the lid in place, carefully insert the six screws with lock washers through the holes in the lid into the threaded holes in the case and turn them until they are finger-tight. Be careful not to cross-thread any of the screws. Do not use power tools to start the screws.
6. Verify that the lid is in the correct position and that the seal is in place between the case and the lid.
7. Tighten the lid screws to a torque of 53 in-lbs. (6 Nm).

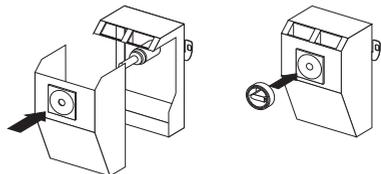


5.11 Closing the DC-disconnect (if applicable)

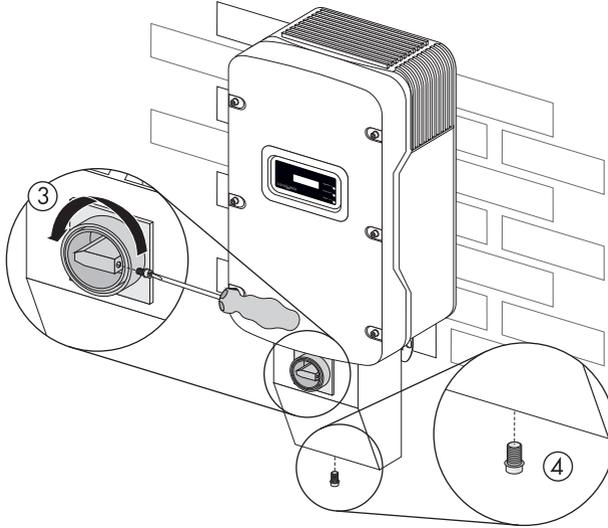
1. Make sure the string fuses are securely mounted.



2. Position the lid onto the DC-Disconnect and insert the switch handle into the lid.



3. Turn the switch to the "0" position and tighten the screw on the right side of the switch with a small phillips screwdriver (used screw: UNC no 5 x 3/4 in. (19 mm), cross recess Phillips pan head machine screw)
4. Install the screw and washer on the bottom side of the DC-Disconnect, to fasten the lid. The teeth of the washer must face toward the lid in order to ensure proper grounding.
5. Tighten the screw to a torque of 44 in-lbs. (5 Nm).



6 Commissioning



DANGER

Deviating from the procedure described in this chapter could expose you to lethal voltages. Death or serious injury.

- Commission the Sunny Boy in the order described in the following procedure.



CAUTION

Accidental touching of components if lid is removed. Latent voltage may still be present. Risk of electric shock.

Never insert the GFDI fuse into the inverter without the fuse handle.

All inverters have a sophisticated system for detecting and responding to PV array ground faults as required by NEC Section 690.5. The PV array normally operates in a grounded configuration. The array's positive conductor is connected to the grounding system inside the inverter as a part of the UL1741 listed ground-fault detection system. The GFDI protection is active whenever there is sufficient DC voltage to turn on the LCD in the inverter.

1. Make sure any covering placed over the PV array is removed.
2. Connect the grid voltage to the inverter by switching on the main AC circuit breaker in the main utility panel.
3. Switch the external DC disconnect to the „on“ or the DC-Disconnect to the „1“ position. If there is sufficient sunlight available, the inverter will enter the “Wait” mode at this time and the green LED will begin to blink.
 - If no AC faults are detected, the “Wait” mode will end after 10 seconds and the green LED will stop blinking, remain on and the inverter will begin to operate normally.
 - If an AC fault was registered, the inverter will wait 5 minutes prior to starting.



If there is a ground fault in the array, the “EarthCurrentMax” error message will be displayed and the GFDI fuse can clear. If this error message is encountered, switch off the DC and AC disconnects to the inverter and troubleshoot the array.



If the inverter is not operating as expected after the commissioning procedure has been completed, refer to chapter 7 “Displays and messages” (page 76) and to chapter 8 “Troubleshooting” (page 90).



If there is adequate solar irradiation and the resulting PV input voltage is greater than 300 V DC (365 V DC for SPR-8000m), the inverter will automatically begin feeding power to the utility grid.



The inverter operates from the power produced by the PV array and is designed for minimal internal DC-power consumption. The maximum power that the inverter will consume in normal operation is 7 W.

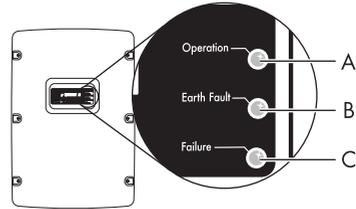


Anytime the AC power is disconnected from the inverter, either manually or as a result of an AC disturbance, the inverter will wait 5 minutes after the AC power has been restored to reconnect. When servicing the inverter, always disconnect the DC first, then the AC.

7 Displays and messages

The LED status indicator

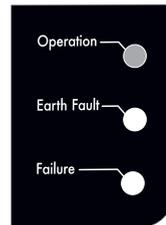
Position	Description
A	Operation
B	Earth Fault
C	Failure



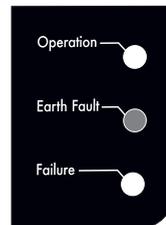
Each inverter comes equipped with three LED status indicators, shown in the figure above.

The basic definitions of the indicator lights are as follows:

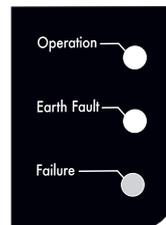
The green LED indicates normal operation of the inverter.



The red LED indicates the status of the GFDI fuse, located inside the inverter. If this LED is lit, the GFDI fuse has cleared or is not present.



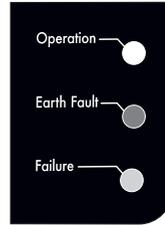
The yellow LED indicates that there is a fault of some kind, either inside the inverter or somewhere in the PV system. The inverter will not operate until the fault has been corrected. The different error codes and possible causes are addressed later in this section and in chapter 8 "Troubleshooting" (page 90).



The red and yellow LEDs combined indicate that the inverter has detected a ground fault. The ground fault must be located and cleared. The inverter must then be reset manually. It will not restart automatically after detecting a ground fault. The ground fault may also clear the GFDI fuse.



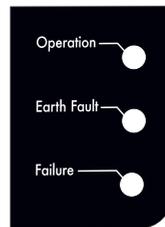
All GFDI fuses are disabled in turbine mode.



7.1 LED operation indicators

7.1.1 All LEDs are off

The inverter is in standby mode because the input voltage is too low for operation.



7.1.2 All LEDs are on

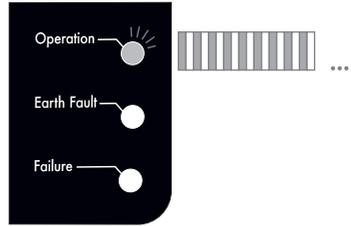
The inverter is initializing. The power from the array is sufficient to initialize control power, but not yet powerful enough to begin normal operation. Data transmission is not possible during initialization.

Occasionally, during inclement weather or low irradiation, the LEDs may all turn on at once and then go off again. This indicates that the inverter is trying to initialize but the power available from the array is not sufficient for normal operation. This is not a malfunction.



7.1.3 Green LED blinks three times per second

The inverter has sufficient DC voltage to calibrate its internal systems, but not enough to begin normal operation. Typically, the calibration lasts less than 10 seconds and then the inverter resumes normal operation. PV voltage must remain greater than the PV Start Voltage setting for the period of the P-Start parameter setting. See chapter 8 "Troubleshooting" (page 90). The inverter will also show this status if it has been manually set to STOP mode.



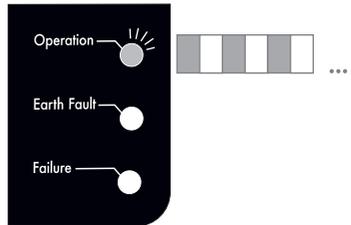
7.1.4 Green LED blinks once per second

The inverter has determined that there is enough voltage from the array to operate and is checking the condition of the grid prior to connecting to it.



If the inverter fails to connect to the utility grid 3 times in a row, it will wait 10 minutes before the next attempt.

In case of a grid failure, the inverter waits 5 minutes before it tries to reconnect to the grid.



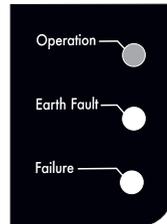
7.1.5 Green LED is on

The inverter is feeding the utility grid in either "MPP", Constant Voltage" or "Turbine" mode.

"MPP" mode: The inverter adjusts the voltage and current from the PV array to obtain the greatest PV output power.

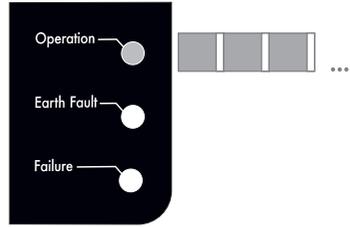
"Constant Voltage" mode: The voltage from the PV array has been set to a fixed value. The parameter name is "V-Const". This mode is typically used for fuel cell or microhydro applications.

"Turbine" mode: This mode is used for DC rectified motor sources with a dynamic power curve (typically wind turbines). The user can set the magnitude and slope of the curve to match a particular alternator.



7.1.6 Green LED is shortly off once per second

The inverter is designed to operate at full rated power up to +113 °F (+45 °C) ambient. The inverter will continue to operate beyond +113 °F (+45 °C) and will derate as required to maintain a safe internal component temperature. Unnecessary derating can be caused by blocked fan intakes. For this reason the fan intakes should be inspected as described in section 9.1 "Cleaning the fans" (page 93).

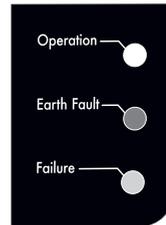


7.2 LED fault indicators

7.2.1 Red and yellow LEDs are on

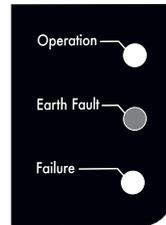
The inverter has detected a ground fault in the PV system and has disconnected from the grid. The ground fault must be located and fixed before the inverter will resume normal operation. Refer to chapter 8 "Troubleshooting" (page 90) for information on solving PV array ground faults. The inverter will not restart automatically.

All GFDI fuses are disabled in turbine mode.



7.2.2 Red LED is on

The GFDI fuse located in the fuse holder on the circuit board of the inverter has been cleared or is not present. This fuse is used to protect the PV system in the event of an array ground fault. Troubleshoot the PV array for ground faults prior to replacing this fuse.



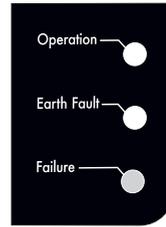
CAUTION

For continued protection against the risk of fire, replace the GFDI fuse with fuses of the same type and rating only. The inverter is shipped with a Littelfuse KLKD 1 Amp, 600 V AC/DC type fuse.

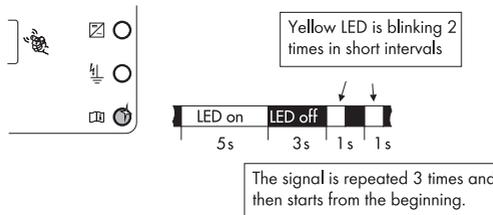
7.2.3 Yellow LED is on

The yellow LED remains lit.

The inverter has detected a fault within the internal monitoring systems. When the inverter detects a fault of this kind it will no longer connect to the utility grid. To correct this, the inverter must be serviced by a qualified service technician. Contact SunPower for assistance.



7.2.4 Yellow LED is blinking 2 times



The yellow LED is on for 5 seconds, out for 3 seconds and then blinks twice. The code is repeated 3 times. This code sequence will repeat as long as there is a grid fault condition.

This code can be caused by any of the following conditions:

- Low Grid Voltage (<Vac Min)
- High Grid Voltage (>Vac Max)
- Low Grid Frequency (< fac Min)
- High Grid Frequency (>fac Max)
- Rapid change in grid frequency or voltage

Check the condition of the grid at the AC terminal blocks within the inverter. Also inspect the AC disconnect between the inverter and the grid.



CAUTION

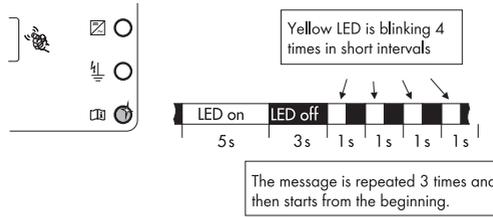
Have the grid connection to the inverter checked only by qualified personnel.



WARNING

If opening the inverter is required, do so only after disconnecting all sources of power and waiting at least 5 minutes.

7.2.5 Yellow LED is blinking 4 times



The yellow LED is on for 5 seconds, remains off for 3 seconds and then blinks 4 times. The code is repeated 3 times. This code sequence will repeat as long as there is a grid fault condition.

The inverter has detected a DC input voltage that is too high for safe operation.

WARNING



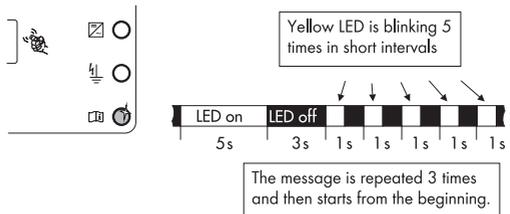
Disconnect the PV array from the inverter immediately. High DC input voltage can damage the inverter permanently. A qualified technician must check the input source.

WARNING



Always test the DC voltage at the DC disconnect switch before energizing the inverter.

7.2.6 Yellow LED is blinking 5 times



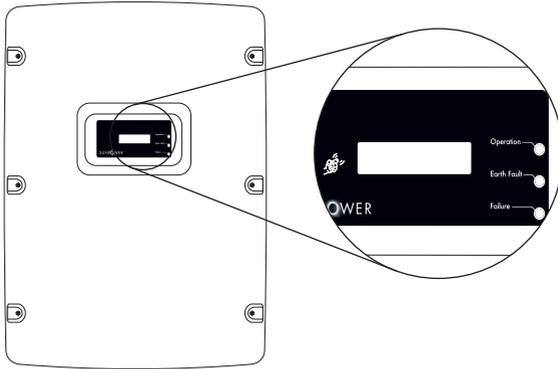
The yellow LED is on for 5 seconds, remains off for 3 seconds and then blinks 5 times. The code is repeated 3 times. This code sequence will repeat as long as there is a grid fault condition.

The inverter has encountered an internal fault that prohibits normal operation and will most likely require servicing.

Contact SunPower for assistance.

7.3 Status messages on the LCD Display

The inverter comes standard with an LCD in the lid.



The screens can be scrolled through manually by repeatedly knocking on the lid of the inverter. Each knock advances the screen to the next message.

Activation of the backlight

The backlight is activated by knocking twice on the lid. Additional knocks will scroll through the display messages.

The backlight shuts off automatically after 2 minutes.

Operation messages

The LCD continuously scrolls through all relevant operating data. Each message (MSG) is displayed for 5 seconds, after all messages have been displayed the LCD repeats from the beginning.

MSG #1 "E-Today" (total energy produced on this day) and current operating mode:

```
E-today 8.86kWh
Mode MPP
```

See section 7.4.2 "Operating mode" (page 86).

MSG #2 Nominal grid voltage configuration and actual line-to-neutral voltage measurements:

```
Gridtype - 208V
L1 120V L2 120V
```

MSG #3 Actual AC power output and DC input voltage:

```
Pac 500W
Vpv 380V
```

MSG #4 Accumulated energy yield of the device since installation and the total operating hours:

```
E-Total 724.4kWh
h-total 512h
```

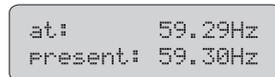
Fault messages

In case of a fault condition the LCD switches to "Fault" mode and the backlight is activated.

The upper display line indicates one of the three following failure types:

- Disturbance

For example, this Disturbance message would be displayed if the inverter detected a problem with the frequency of the utility grid. The message would clear automatically once the condition was corrected. Disturbances are typically caused by a measured value exceeding a predetermined limit. The display will show the value of the error (at-first line in display) as well as the present value for the particular parameter (present-second line in display).



- Warning

For example, this Warning message would be displayed if the GFDI fuse was open or cleared. Typically, Warning messages indicate a system condition that should be investigated. Warning conditions will not preclude inverter operation.



- Error

For example, this Error message would be displayed if the inverter detected a problem with the internal ROM. An Error condition will prevent the inverter from restarting until the condition is cleared. See section 8.2 "Error messages" (page 91).



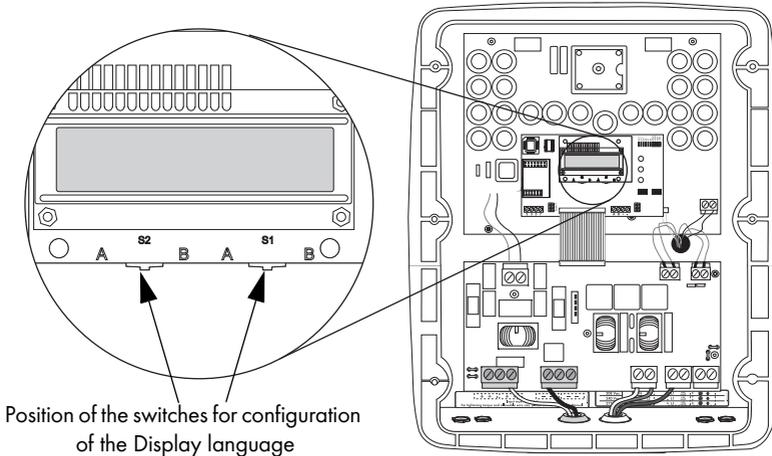
Each fault message is displayed for 5 seconds. After 5 seconds, the LCD will once again scroll through its normal operating screens. The fault condition will be included in the series of screens until the condition is cleared.

7.3.1 LCD display language selection

The LCD Display can display information in one of four different languages. Setting the language is performed by using a pair of slide switches located along the bottom edge of the display PC board. The language choices are:

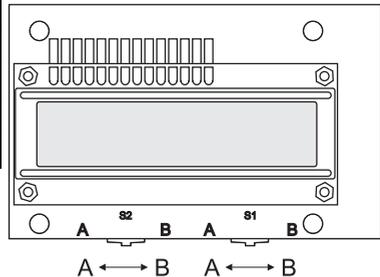
- German
- English
- French
- Spanish

Use the diagram and chart below for setting the display.



Language selection switches for the LCD display

Language	Switch S2	Switch S1
German	B	B
English	B	A
French	A	B
Spanish	A	A



7.4 Measuring channels and parameters

The communication options support a number of measuring channels and messages from the inverters.

The following abbreviations are used:

Abbreviation	Description
BFR	Betriebsführungsrechner (Sequential Control System)
SRR	Stromregelungsrechner (Current Control System)

The BFR and SRR are redundant processor control systems for the utility protection functions.

7.4.1 Measuring channels

Channel	Description
Vpv:	PV input voltage
Vpv Setpoint:	MPPT DC voltage target
Iac	Grid current
Vac:	Grid voltage L1 - L2
Vac L1:	Grid voltage L1 - N
Vac L2:	Grid voltage L2 - N
Fac:	Grid frequency
Pac:	Power fed to grid
Vpv-PE:	PV-voltage to earth (For troubleshooting PV ground faults)
Temperature:	Temperature measured at IGBT module
Ipv:	PV current
Max Temperature:	Max temperature measured at IGBT
Max Vpv:	Max PV input voltage
I-dif:	Error current
Vfan:	Fan voltage
E-Total:	Total energy yield
h-Total:	Total operation hours
h-on:	Indicates how long sufficient DC voltage has been applied to the inverter, how long it has been active. Time included when it was not able to feed to the utility due to low DC voltage or operation in stop mode.
Power On:	Total system start-up counter
Event-Cnt:	Event counter
Serial Number:	Serial number of the inverter
CO2 saved:	Amount CO2 saved in operation time
Mode:	Current operating mode
Grid Type:	Type of grid the inverter is connected to

Channel	Description
Error:	Description of fault

7.4.2 Operating mode

Name	Description
Stop:	Manual system stop
Offset:	Offset calibration of the electronics (at start-up)
Waiting:	PV voltage is not high enough to start
Grid monitoring:	Synchronizing to grid (at start-up)
MPP-Search:	MPPT range test (at start-up)
MPP:	The inverter is in MPP mode (normal operation)
V-Const:	The inverter is in constant voltage MPP mode
Derating:	Reduction of the grid feeding power due to abnormal heatsink temperatures
Disturbance:	Grid related fault condition, self clearing
Error:	Inverter fault, user interaction required
Warning:	System warning advising further investigation

7.4.3 Inverter operating parameters



CAUTION

The changing of operating parameters should only be performed by qualified personnel. Changes to factory preset parameters may adversely effect inverter operation and performances.

Operating Parameters for SunPower inverters of the following types:

- SPR-5000m
- SPR-6000m
- SPR-7000m
- SPR-8000m

Name	Description	Range/Value	Explanation	Default
Antiland-Amp*	Amplification of the Anti Island process	0 deg ... 10 deg		0 deg
Antiland-Freq*	Repetition rate of the Anti Island process	0 mHz ... 2000 mHz		500 mHz

Name	Description	Range/Value	Explanation	Default
CO2-Fact	The approximate CO2 emission avoided by your inverter	0 lbs/kWh ... 2 lbs/kWh	The amount of CO2 avoided is computed according to the kWh produced (E-total) multiplied by the factor defined in the parameter "CO2".	1.7 lbs/kWh
Default	Value for adjusting the parameters country specific settings	USA/UL1741/2005 OFF_Grid NON IEEE1547	After changing one of the parameters marked with "**", the parameter "default" changes to "adjusted" automatically.	USA/ UL1741/ 2005
dFac-MAX*	Maximum "rate of frequency change" before anti-islanding protection engages	0.005 Hz/s ... 4 Hz/s	Default value is for country setting USA/UL1741/2005.	0.5 Hz/s
E_Total	Total energy yield of the inverter	0 kWh ... 200000 kWh	Changing the value can be necessary when a inverter is exchanged and you wish to match the previously acquired data.	0 kWh
Fac-delta - *	Maximum allowable operating frequency below 60 Hz	0.2 Hz ... 3 Hz	Default value is optimal for installations < 30 kW at country setting USA/UL1741/2005.	0.69 Hz
Fac-delta+*	Maximum allowable operating frequency above 60 Hz	0 Hz ... 4.5 Hz	Default value is optimal for installations < 30 kW at country setting USA/UL1741/2005.	0.49 Hz
Fac-MinTripTime*	Utility interconnection frequency trip time	0.16 s ... 300 s	Default value is optimal for installations < 30 kW.	0.16 s
Fan-Test	Function test of the fans This test turns the fans at maximum speed by setting this parameter to "1".	0 1		0
h_Total	Total operating hours of the inverter Shows the total operating hours since the commissioning of the inverter.	0 h ... 200000 h	Changing the value can be necessary when a inverter is exchanged and you wish to match the previously acquired data.	0 h
Memory Function	Modes of the memory function	no function Default param. Reset Op.Data Reset errors	 Sets all parameters to default. Sets all parameters that are visible in user level to default values. Resets all permanent device disable errors.	no function

Name	Description	Range/Value	Explanation	Default
Operating Mode	Operating modes of the inverter	MPP	Sets the inverter in Maximum Power Point Tracking Mode.	MPP
		Turbine	Operating mode for wind power plants.	
		V-const	Constant Voltage Mode. Setpoint defined in "Vconst-Setval".	
		Stop	Disconnection from utility, no operation.	
T-Max-Fan	Temperature for maximum fan rotation speed	0 °C ... 100 °C		90 °C
T-Start	Interval before grid connection The time the inverter waits to connect to the grid after Vpv-Start is exceeded.	5 s ... 1600 s	This value defaults to 5 minutes after a utility fault.	10 s
T-Start-Fan	Fan turn-on temperature at minimum rotating speed	0 °C ... 100 °C		70 °C
T-Stop	Interval before disconnecting from grid The time that the SunPower inverter waits to disconnect from the grid when Pac falls below minimum necessary Vpv.	1 s ... 1800 s		2 s
T-Stop-Fan	Fan turn-off temperature	0 °C ... 100 °C		55 °C
V-Const Setval	PV Setpoint voltage for constant voltage operation	SPR-5000m - SPR-7000m: 250 V ... 600 V	These parameters only are important in case the parameter "Operating Mode" is set to "V-const".	600 V
		SPR-8000m: 300 V ... 600 V		
Vac-Min*	Lowest limit of allowable AC voltage	0 % ... 50 %	Default value is optimal for installations < 30 kW. The default value results in a trip value of 88 % as listed under trip limits.	12 %
Vac-Max*	Highest limit of allowable AC voltage	0 % ... 20 %	Default value is optimal for installations < 30 kW. The default value results in a trip value of 110 % as listed under trip limits.	10 %
Vac-Min-Fast*	Lowest limit of allowable AC voltage for fast disconnection	0 % ... 50 %	Default value is optimal for installations < 30 kW. The default value results in a trip value of 50 % as listed under trip limits.	50 %
Vac-Max-Fast*	Highest limit of allowable AC voltage for fast disconnection	0 % ... 20 %	Default value is optimal for installations < 30 kW. The default value results in a trip value of 120 % as listed under trip limits.	20 %
Vac-Min-Reconnect	Lowest limit to reconnect to the grid after a grid failure	0 % ... 50 %		11.7 %
Vac-Max-Reconnect	Highest limit to reconnect to the grid after a grid failure	0 % ... 20 %		5.83 %

Name	Description	Range/Value	Explanation	Default
Vpv-Start	Minimum DC voltage for the inverter to connect to the grid	SPR-5000m - SPR-7000m: 250 V ... 600 V		300 V
		SPR-8000m: 300 V ... 600 V		365 V

*Modifications of parameters marked with may result in changes to conformity with IEEE 1547 and should be approved by the local utility and/or authority.

Fixed Operating Parameters for the SunPower inverters of the following types:

- SPR-5000m
- SPR-6000m
- SPR-7000m
- SPR-8000m

The following parameters appear in parameter list but cannot be modified:

Name	Description	Default
Plimit	Upper limit of AC output power in W	SPR-5000m: 5100 W
		SPR-6000m: 6100 W
		SPR-7000m: 7100 W
		SPR-8000m: 8100 W
SMA-SN	Serial Number of the SunPower inverter	
Software-BFR	Firmware version of the operation control unit	
Software-SRR	Firmware version of the current control unit	

8 Troubleshooting

8.1 General

Our quality control program assures that each inverter is manufactured to exact specifications and is thoroughly tested before leaving the factory. If you encounter difficulty with the operation of your inverter, please follow the steps below in an effort to correct the problem.

- Check the blinking code on the lid of the inverter and compare the code with the blinking codes in chapter 6 "Commissioning" (page 74).
- Check and record the exact "Mode" and/or "Error" messages on the LCD display or other communication system available. Take appropriate action to correct the issue.
- If necessary, check the DC and AC voltages at terminals inside the inverter. Be sure to observe all of the safety precautions listed throughout this manual when doing so, or hire a qualified professional.
- If the system problem persists, contact SunPower technical support at:

Tel (408) 240.5500

In order to better assist you when contacting SunPower, please provide the following information. This information is required for service assistance.

Information regarding the inverter:

- Serial number
- Model Number
- Short description of the problem
- Blinking Code or display message
- What error code is indicated? (Provided a communication option is installed)
- AC line voltage
- DC line voltage
- Check GFDI Fuse
- Can you reproduce the failure? If yes, how?
- Has this problem occurred in the past?
- What were the ambient conditions when the problem occurred?

Information regarding the PV modules:

- Manufacturer name and model number of the PV module
- Output power of the module
- Open circuit voltage (Voc) of the module
- Number of modules in each string

If it becomes necessary to send the inverter back to the manufacturer for service, please ship it in the original box to avoid damage during shipping.

8.2 Error messages

If a fault occurs, the inverter generates an error code according to the operating mode and the detected fault.

Error Type	Error Code	Description
Disturbance	Bfr-Srr	Communication between micro-controllers is failing
Warning	Derating	The inverter reduces the output power due to high internal temperature.
Error	EarthCurMax-B	BFR-earth current between PV+ and GND is out of tolerable range
Error	EarthCurMax-S	SRR-earth current between PV+ and GND is out of tolerable range
Disturbance	EEPROM	Transition failure during reading or writing of data EEPROM. The data is not essential for safe operation - this failure does not effect performance.
Error	EEPROM p	Data EEPROM defective, device is set to permanent disable due to the fact that the data loss affects important functions of the inverter. Contact SunPower.
Disturbance	EeRestore	Internal failure
Disturbance	Fac-Bfr, Fac-Srr	The AC grid frequency is exceeding the allowable range. "Bfr" or "Srr" is an internal message and is not important to the user. The inverter assumes that the public grid is down and disconnects from the grid in order to avoid islanding. If the grid frequency is within the tolerable range and you still observe the failure message "Fac-Bfr" or "Fac-Srr" contact SunPower.
Warning	GFDI Fuse Open	The GFDI-Fuse is open or cleared. Check PV array for ground faults before replacing the fuse.
Disturbance	Grid-Timeout, Grid-Fault-S	The type of grid could not be detected (208/240/277 V). In case you are connecting to a 277 V grid, check up if the cables for L1 and N are in the correct position.
Disturbance	Imax	Overcurrent on the AC side. This failure code is indicated in case the current to the AC grid exceeds the specification. This may happen in case of harmful interference on the grid. If you observe "Imax" often, check your grid. For assistance contact SunPower.
Disturbance	K1-Close	Relay test failed. Contact SunPower for assistance.
Error	K1-Open, K2-Open	

Error Type	Error Code	Description
Disturbance	MSD-FAC, MSD-Idif	Internal measurement comparison error: The inverter measured values of BFR and SRR are too different from each other. Contact SunPower for assistance.
Error	MSD-VAC	
Disturbance	OFFSET	Grid monitoring self-test failed.
Error	ROM	The internal test of the inverter control system firmware failed. Contact SunPower in case you observe this failure often.
Disturbance	Shut-Down	Internal overcurrent continuous
Disturbance	Vac-Bfr, Vac-Srr	The AC grid voltage is exceeding the allowable range. "Bfr" or "Srr" is an internal message and is not important for the user. Vac can also result from a disconnected grid or a disconnected AC cable. The inverter assumes that the public grid is down and disconnects from the grid in order to avoid islanding. If the grid voltage is within the tolerable range and you still observe the failure message "Vac-Bfr" or "Vac-Srr" contact SunPower.
Disturbance	VacL1-Bfr, VacL2-Bfr, VacL1-Srr, VacL2-Srr	Voltage is too high or too low on the indicated leg.
Disturbance	VpvMax !PV Overvoltage! !Disconnect DC!	DC input voltage above the tolerable maximum value. Disconnect DC immediately!
Disturbance	Watchdog	Watchdog for operation control triggered
Disturbance	XFMR	Transformer is connected to the wrong grid. Check the connection of the transformer. In Delta corner grounded grids make sure that the Ground of the grid is connected to terminal L2 In unbalanced 208 V and 240 V grids interchanging L1 and L2 may clear this error.
Disturbance	XFMR_TEMP_F	High transformer temperature, the inverter stops working and the fans work with maximum speed.
Warning	XFMR_TEMP_W	High transformer temperature is gone. The inverter starts working and shows the failure "XFMR_TEMP_W". Check the function of the fans.

9 Maintenance

The SunPower SPR-5000m/SPR-6000m/SPR-7000m/SPR-8000m is designed to provide many years of trouble-free service. Performing regular maintenance will help ensure the long life and high efficiency of your system.

9.1 Cleaning the fans

The fan intakes and handle covers should be cleaned periodically with a vacuum cleaner. For deeper cleanings, the fans can be removed completely.

Do not blow air through the fans or the fan screens while the fan plate is assembled to the inverter.

The inverter is fitted with two fans at the bottom.

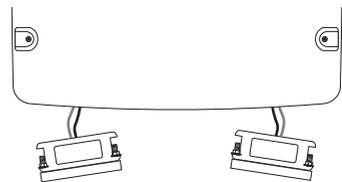
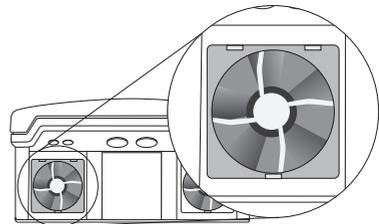
In order to clean the fans, proceed as follows:

1. Turn off all DC and AC disconnects



Always wait a minimum of 5 minutes for stored potentials in the inverter to discharge completely before opening the enclosure.

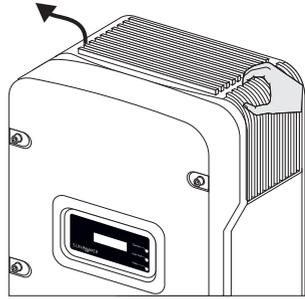
2. Disconnect the inverter from both the DC and AC connections, paying attention to the safety instructions in chapter 5 "Wiring the inverter" (page 38).
3. Wait for the fans to stop rotating.
4. Push the 2 latches at the top of the black plastic cover to one side and remove it carefully with the fan grates mounted behind.
5. The fans themselves are fastened with 3 plastic latches. Unhook the latches and remove the fans by pulling them downwards slowly and carefully. Move the fans far enough out to disconnect the internal plug to the inverter. Unlock the corresponding plugs and remove them. You can now take out the fans and clean them.
6. To clean the fans use a soft brush or cloth. Do not use air pressure for cleaning the fans. This will damage the fans.
7. When the fans are clean, reinstall them using the above steps in reverse order.



9.2 Cleaning the handle covers

There are handle covers on either side of the inverter. The inverter sucks air in from underneath via the fans and blows it out on the upper sides. For optimum heat dissipation within the device, you have to clean both handle covers. Proceed as follows when cleaning the handle covers:

- Place your fingers in the space between the top of the enclosure and the handle covers and gently pull the handle covers out of their bracket.



- Insert the handle covers back into the inverter. The handle covers can only be inserted on the right or left side of the inverter respectively. "links/left" or "rechts/right" is printed on the inside of the handle covers to help you identify the sides.



The handle covers must not be removed permanently, because otherwise the device is not protected against the entrance of insects! If the handle covers should break, new handle covers can be ordered from SunPower.

9.3 Testing the fans

You can verify the operation of the fans in two ways:

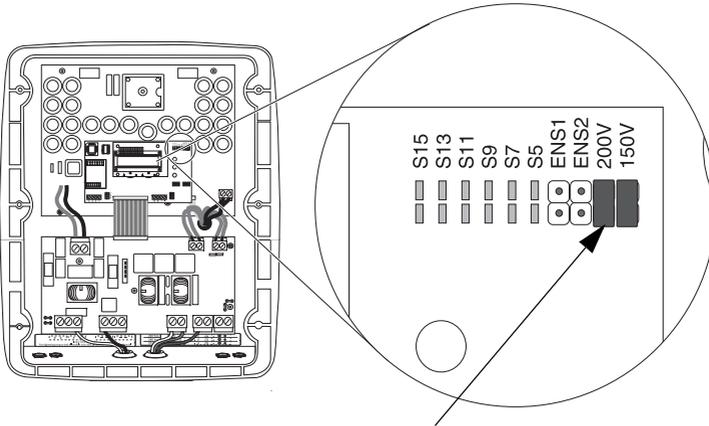
1. Turn off the inverter by turning off all DC and AC disconnects.



Always wait a minimum of 5 minutes for stored potentials in the inverter to discharge completely before opening the enclosure.

2. Once the LED's are off, remove the lid and set the jumpers as shown in the figure below.
3. Turn on the AC disconnect and then the DC disconnect.
4. Switch the DC-Disconnect to the "1" position.

Jumper position for fan test



Jumper position for verifying the operation of the fans

9.4 Exchanging the fuses

9.4.1 Exchanging the GFDI fuse within the inverter



WARNING

For continued protection against risk of fire, replace the fuse only with the same type and ratings of fuse (600 V DC, 1 A)!

1. Turn off the inverter by turning off all DC and AC disconnects.



Always wait a minimum of 5 minutes for stored potentials in the inverter to discharge completely before opening the enclosure.

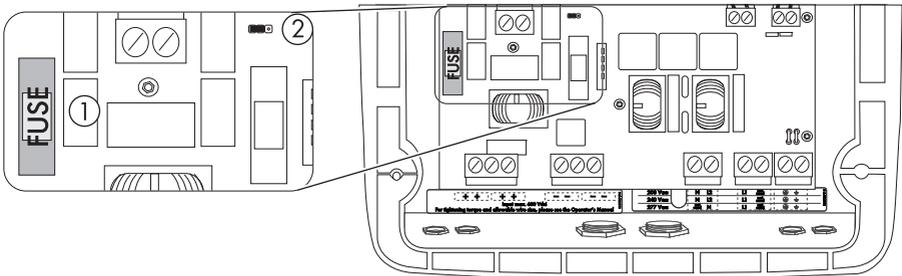
2. Open the inverter as described in chapter 3.1 "Opening the inverter" (page 20).
3. Exchange the fuse.

Refer to the figures below for correct fuse location.



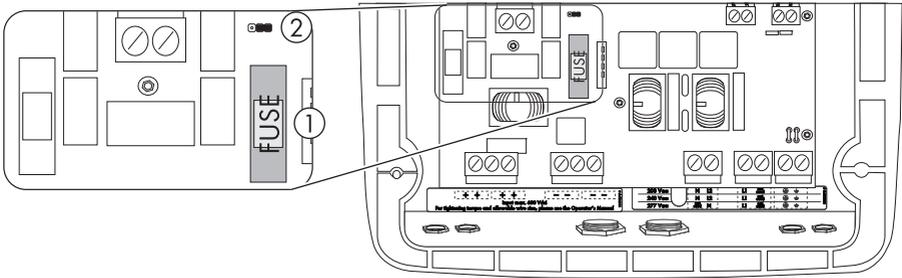
Ensure that the fuse is completely inserted in the clamp.

GFDI fuse and jumper settings for positive grounding



Position	Description
1	Position of fuse for positive grounding
2	Position of jumper for positive grounding

GFDI fuse and jumper settings for negative grounding

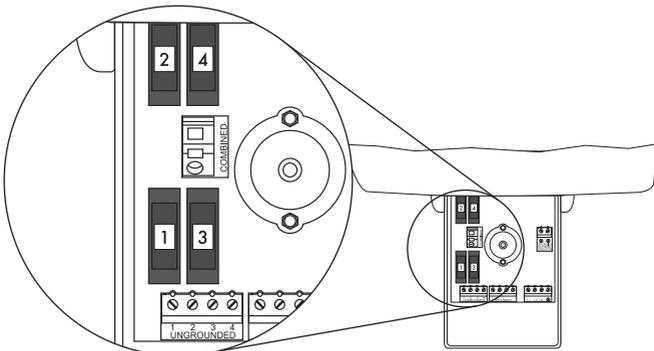


Position	Description
1	Position of fuse for negative grounding
2	Position of jumper for negative grounding

4. Close the inverter.
5. Turn ON all AC and DC switches and/or breakers.

9.4.2 Exchanging the PV string fuses within the DC-disconnect

1. Turn OFF all AC and DC switches and/or breakers.
2. Wait for at least 5 minutes.
3. Open the DC-Disconnect as described in chapter 5.4 "Opening the DC-disconnect (if applicable)" (page 43).
4. Exchange the fuses having regard to the information on the next page.



5. Close the DC-Disconnect.
6. Turn ON all AC and DC switches and/or breakers.

PV string fuse sizing

In any electrical system, fuses are used to protect wiring and equipment from excessive currents that can cause damage, heating or in extreme cases even fire. If the fuse rating is too small it could open during normal operation. If the fuse rating is too large, it cannot provide the needed protection. In PV systems, the minimum and maximum size of the series fuse is determined by the electrical ratings of the PV module as well as by UL and National Electrical Code (NEC) requirements. Be sure to consult your PV module manufacturer for appropriate PV string fuse ratings.

The minimum size of fuses and wiring are calculated using the Short Circuit Current Rating (Isc) of the PV module. The NEC requires that all fuses and wiring be sized for a minimum of 1.56 times the Isc of the PV module used in the system. The proper size PV string fuse is determined by calculating $1.56 \times \text{Isc}$ of the PV module. Round up to the next standard fuse size.



Example

If the Isc of the PV module equals 6.9 A DC, then the PV string fuse size is determined by $1.56 \times 6.9 = 10.76$. The next standard fuse size would be a 12 A, 600 V DC fuse.



CAUTION

The string fuse size must not be greater than the maximum fuse size rating of the PV module as provided on the PV module manufacturers data sheet. If no maximum fuse size is indicated, please contact the PV module manufacturer!

DC disconnect requirements

NEC 690.15-18 allows the use of fuse holders as a suitable means of disconnecting PV arrays for servicing. Additional DC disconnects external to the inverter may be required by the local authority having jurisdiction (AHJ).



WARNING

Never remove a fuse while it is under load. Electrical arcing and damage to the fuse holder will occur if a fuse is removed under load.

PV string fuses

The DC-Disconnect is shipped with 15 A, 600 V DC fuses in the fuse holders. The maximum string fuse rating for the DC-Disconnect is 20 A. The figure in chapter 9.4.2 "Exchanging the PV string fuses within the DC-disconnect" (page 97) shows the string fuse holders and their corresponding terminals.

10 Technical specifications

10.1 FCC compliance information

SunPower Utility Interactive Inverter, Model SPR-5000m/SPR-6000m/SPR-7000m/SPR-8000m

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class A & B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.
- The user is cautioned that changes or modifications not expressly approved by SunPower Corp. could void the user's authority to operate this equipment.

Contact SunPower for more information.

SunPower Corporation

3939N. First Street

San Jose, California 95134, USA

Tel 1-877-SUN-0123

Fax 408.877.1808

customercare@sunpowercorp.com

10.2 Wiring diagrams

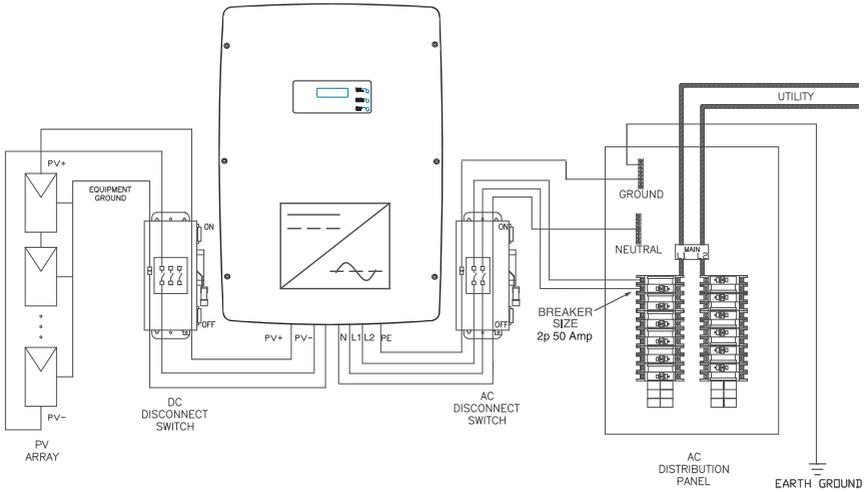


Following figures show DC wiring configurations with positive grounding. The configuration for negative grounding will vary.

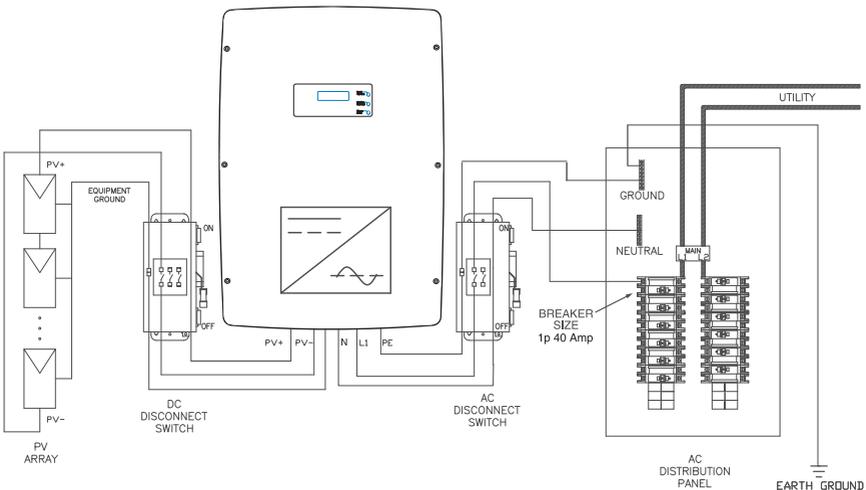
The PV grounding must not be disconnectable by a breaker.

10.2.1 Without DC-disconnect

Inverter connections for 208 V and 240 V AC grid

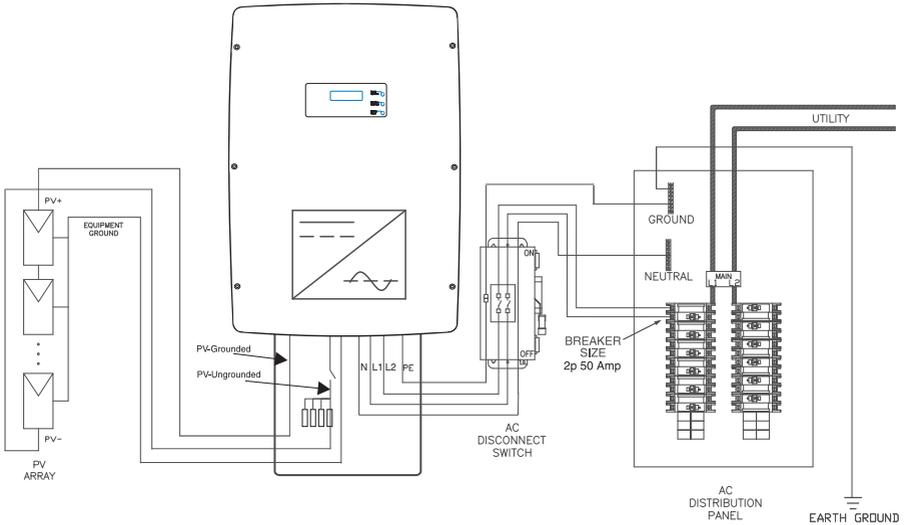


Inverter connections for 277 V AC grid

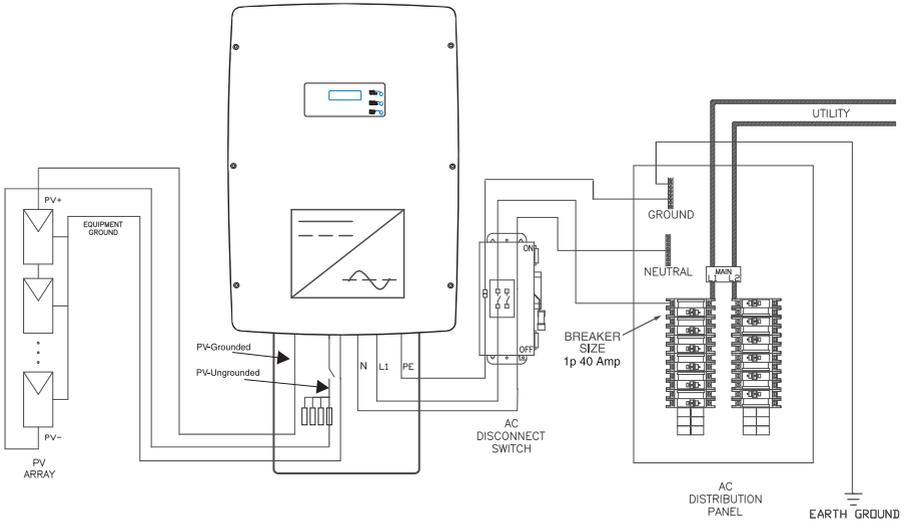


10.2.2 With DC-disconnect

Inverter connections for 208 V and 240 V AC grid



Inverter connections for 277 V AC grid



10.3 Specifications

10.4 SPR-5000m

PV generator connection

Peak Power Tracking Voltage	250 V ... 480 V
Range of Input Operating Voltage	250 V ... 600 V
Maximum Array Input Power	6,250 W
Maximum DC Power	5,300 W
PV Start Voltage	300 V
Maximum DC Input Current	21 A
Maximum Input Short Circuit Current	36 A
Maximum Utility Backfeed Current to PV array	50 A AC
DC Voltage Ripple	< 10 %

Grid connection

AC Operating Voltage Range at 208 V nominal	183 V ... 229 V
AC Operating Voltage Range at 240 V nominal	211 V ... 264 V
AC Operating Voltage Range at 277 V nominal	244 V ... 305 V
AC Operating Frequency Range	59.3 Hz ... 60.5 Hz
AC Frequency Nominal	60 Hz
AC Maximum Continuous Output Power	5,000 W
Current THD	< 4 %
AC Maximum Continuous Output Current at 208 V	24 A
AC Maximum Continuous Output Current at 240 V	20.8 A
AC Maximum Continuous Output Current at 277 V	18 A
Maximum Output Fault Current	57.6 A
Maximum Output Overcurrent Protection	50 A
Synchronization In-Rush Current	9.23 A
Trip Limit Accuracy	±2 %
Trip Time Accuracy	±0.1 %
Power Consumption at Night	0.1 W
Power Consumption in Operation	< 7 W

Efficiency

Output Power Factor Range	0.95 ... 1.0
Output Power Factor Nominal	0.99
Peak Inverter Efficiency	96.8 %
CEC Weighted Efficiency	95.5 %

Ambient conditions

Ambient Temperature Range	- 13 °F ... +113 °F (- 25 °C ... +45 °C)
---------------------------	--

Mechanical data

Width x Height x Depth	18.42 in x 24.14 in x 9.53 in (468 mm x 613 mm x 242 mm)
Weight	147 lbs (67 kg)
Noise Emission	44 dB(A)

Features

Inverter Technology	True sine, low frequency transformer
Cooling Concept	OptiCool, forced active cooling

10.5 SPR-6000m

PV generator connection

Peak Power Tracking Voltage	250 V ... 480 V
Range of Input Operating Voltage	250 V ... 600 V
Maximum Array Input Power	7,500 W
Maximum DC Power	6,400 W
PV Start Voltage	300 V
Maximum DC Input Current	25 A
Maximum Input Short Circuit Current	36 A
Maximum Utility Backfeed Current to PV array	50 A AC
DC Voltage Ripple	< 10 %

Grid connection

AC Operating Voltage Range at 208 V nominal	183 V ... 229 V
AC Operating Voltage Range at 240 V nominal	211 V ... 264 V
AC Operating Voltage Range at 277 V nominal	244 V ... 305 V
AC Operating Frequency Range	59.3 Hz ... 60.5 Hz
AC Frequency Nominal	60 Hz
AC Maximum Continuous Output Power	6,000 W
Current THD	< 4 %
AC Maximum Continuous Output Current at 208 V	29 A
AC Maximum Continuous Output Current at 240 V	25 A
AC Maximum Continuous Output Current at 277 V	21.6 A
Maximum Output Fault Current	57.6 A
Maximum Output Overcurrent Protection	50 A
Synchronization In-Rush Current	9.23 A
Trip Limit Accuracy	±2 %
Trip Time Accuracy	±0.1 %
Power Consumption at Night	0.1 W
Power Consumption in Operation	< 7 W

Efficiency

Output Power Factor Range	0.95 ... 1.0
Output Power Factor Nominal	0.99
Peak Inverter Efficiency	97.0 %
CEC Weighted Efficiency at 208 V AC	95.5 %
CEC Weighted Efficiency at 240 V AC	95.5 %
CEC Weighted Efficiency at 277 V AC	96.0 %

Ambient conditions

Ambient Temperature Range	- 13 °F ... +113 °F (- 25 °C ... +45 °C)
---------------------------	--

Mechanical data

Width x Height x Depth	18.42 in x 24.14 in x 9.53 in (468 mm x 613 mm x 242 mm)
Weight	147 lbs (67 kg)
Noise Emission	44 dB(A)

Features

Inverter Technology	True sine, low frequency transformer
Cooling Concept	OptiCool, forced active cooling

10.6 SPR-7000m

PV generator connection

Peak Power Tracking Voltage	250 V ... 480 V
Range of Input Operating Voltage	250 V ... 600 V
Maximum Array Input Power	8,750 W
Maximum DC Power	7,500 W
PV Start Voltage	300 V
Maximum DC Input Current	30 A
Maximum Input Short Circuit Current	36 A
Maximum Utility Backfeed Current to PV array	50 A AC
DC Voltage Ripple	< 10 %

Grid connection

AC Operating Voltage Range at 208 V nominal	183 V ... 229 V
AC Operating Voltage Range at 240 V nominal	211 V ... 264 V
AC Operating Voltage Range at 277 V nominal	244 V ... 305 V
AC Operating Frequency Range	59.3 Hz ... 60.5 Hz
AC Frequency Nominal	60 Hz
AC Maximum Continuous Output Power	7,000 W
Current THD	< 4 %
AC Maximum Continuous Output Current at 208 V	34 A
AC Maximum Continuous Output Current at 240 V	29 A
AC Maximum Continuous Output Current at 277 V	25.3 A
Maximum Output Fault Current	57.6 A
Maximum Output Overcurrent Protection	50 A
Synchronization In-Rush Current	9.23 A
Trip Limit Accuracy	±2 %
Trip Time Accuracy	±0.1 %
Power Consumption at Night	0.1 W
Power Consumption in Operation	< 7 W

Efficiency

Output Power Factor Range	0.95 ... 1.0
Output Power Factor Nominal	0.99
Peak Inverter Efficiency	97.1 %
CEC Weighted Efficiency at 208 V AC	95.5 %
CEC Weighted Efficiency at 240 V AC	96.0 %
CEC Weighted Efficiency at 277 V AC	96.0 %

Ambient conditions

Ambient Temperature Range	- 13 °F ... +113 °F (- 25 °C ... +45 °C)
---------------------------	--

Mechanical data

Width x Height x Depth	18.42 in x 24.14 in x 9.53 in (468 mm x 613 mm x 242 mm)
Weight	141 lbs (64 kg)
Noise Emission	46 dB(A)

Features

Inverter Technology	True sine, low frequency transformer
Cooling Concept	OptiCool, forced active cooling

10.7 SPR-8000m

PV generator connection

Peak Power Tracking Voltage	300 V ... 480 V
Range of Input Operating Voltage	300 V ... 600 V
Maximum Array Input Power	10,000 W
Maximum DC Power	8,600 W
PV Start Voltage	365 V
Maximum DC Input Current	30 A
Maximum Input Short Circuit Current	36 A
Maximum Utility Backfeed Current to PV array	50 A AC
DC Voltage Ripple	< 10 %

Grid connection

AC Operating Voltage Range at 240 V nominal	211 V ... 264 V
AC Operating Voltage Range at 277 V nominal	244 V ... 305 V
AC Operating Frequency Range	59.3 Hz ... 60.5 Hz
AC Frequency Nominal	60 Hz
AC Maximum Continuous Output Power at 240 V	7,680 W
AC Maximum Continuous Output Power at 277 V	8,000 W
Current THD	< 4 %
AC Maximum Output Continuous Current at 240 V	32 A
AC Maximum Output Continuous Current at 277 V	29 A
Maximum Output Fault Current	61.7 A
Maximum Output Overcurrent Protection	50 A
Synchronization In-Rush Current	14.32 A
Trip Limit Accuracy	±2 %
Trip Time Accuracy	±0.1 %
Power Consumption at Night	0.1 W
Power Consumption in Operation	< 7 W

Efficiency

Output Power Factor Range	0.95 ... 1.0
Output Power Factor Nominal	0.99
Peak Inverter Efficiency	96.5 %
CEC Weighted Efficiency at 240 V AC	96.0 %
CEC Weighted Efficiency at 277 V AC	96.0 %

Ambient conditions

Ambient Temperature Range	- 13 °F ... +113 °F (- 25 °C ... +45 °C)
---------------------------	--

Mechanical data

Width x Height x Depth	18.42 in x 24.14 in x 9.53 in (468 mm x 613 mm x 242 mm)
Weight	147 lbs (67 kg)
Noise Emission	49 dB(A)

Features

Inverter Technology	True sine, low frequency transformer
Cooling Concept	OptiCool, forced active cooling

Specifications subject to change without notice.

Values at nominal conditions.

10.7.1 DC-disconnect

Maximum DC Input Current	36 A DC
Maximum System Voltage	600 V DC
Maximum String Fuse Rating	20 A DC
Maximum AC Operating Current	40 A AC
Enclosure	3R rated

Specifications subject to change without notice.

10.8 Trip limits/trip times

Nominal Frequency	Trip Limit	Trip Frequencies	Trip Times
60 HZ	> 60.5 Hz	60.45 Hz ... 60.55 Hz	max. 0.1602 s
	< 57.0 Hz ... 59.8 Hz (default 59.3 Hz)	56.95 Hz ... 59.85 Hz (default 59.25 Hz ... 59.35 Hz)	adjustable 0.16 s ... 300 s (default max. 0.1602 s)
	< 57.0 Hz	56.95 Hz ... 57.05 Hz	max. 0.1602 s

Nominal Voltage	Trip Limit	Trip Voltages Line-to-Neutral*	Trip Voltages Line-to-Line*	Trip Times
208 V	50 %	57.6 V ... 62.4 V	99.8 V ... 108.2 V	max. 0.1602 s
	88 %	103.2 V ... 108.0 V	178.9 ... 187.2 V	max. 2.002 s
	110 %	129.6 V ... 134.4 V	224.6 V ... 233.0 V	max. 1.001 s
	120 %	141.6 V ... 146.4 V	245.4 V ... 253.8 V	max. 0.1602 s
240 V	50 %	57.6 V ... 62.4 V	115.2 V ... 124.8 V	max. 0.1602 s
	88 %	103.2 V ... 108.0 V	206.4 V ... 216.0 V	max. 2.002 s
	110 %	129.6 V ... 134.4 V	259.2 V ... 268.8 V	max. 1.001 s
	120 %	141.6 V ... 146.4 V	283.2 V ... 292.8 V	max. 0.1602 s
277 V	50 %	133.0 V ... 144.0 V	N/A	max. 0.1602 s
	88 %	238.2 V ... 249.3 V	N/A	max. 2.002 s
	110 %	299.2 V ... 310.2 V	N/A	max. 1.001 s
	120 %	326.9 V ... 337.9 V	N/A	max. 0.1602 s

* The intervals result from the measuring accuracies listed below.

Manufacturer's Accuracies:

Trip Limit Accuracy: $\pm 2\%$ of nominal grid voltage

Trip Time Accuracy: $\pm 0.1\%$ of nominal trip time

Trip Frequency Accuracy: $\pm 0.1\%$ of nominal frequency

10.9 Torque values and wire sizes

Terminal	Torque	Wire Size
Grey AC & DC Terminal Blocks (Weidmüller) Inverter	18 in-lbs. (2 Nm)	10 ... 6 AWG (6 mm ² ... 16 mm ²)
Green AC & DC Terminal Blocks (Phoenix) Inverter	40 in-lbs. (4.5 Nm)	8 ... 6 AWG (10 mm ² ... 16 mm ²)
	22 in-lbs. (2.5 Nm)	10 AWG (6 mm ²)
Grey AC Configuration Terminal Blocks for Unused Wires (Weidmüller)	11 in-lbs. (1.2 Nm)	–
Green AC Configuration Terminal Blocks for Unused Wires (Phoenix)	15 in-lbs. (1.7 Nm)	–
AC & DC Terminal Blocks DC-Disconnect	15 in-lbs. (1.7 Nm)	10 ... 6 AWG (6 mm ² ... 16 mm ²)
Combined Terminal Block DC-Disconnect	Spring Terminal	10 ... 6 AWG (6 mm ² ... 16 mm ²)
Grounding Electrode Conductor Terminal Block DC-Disconnect	15 in-lbs. (1.7 Nm)	10 ... 6 AWG (6 mm ² ... 16 mm ²)
Screws for fastening the SunPower inverter and the DC-Disconnect to the wall mounting bracket and closing the DC-Disconnect cover	44 in-lbs. (5 Nm)	–
Cover Screws	53 in-lbs. (6 Nm)	–

SUNPOWER™

SunPower Corporation
3939N. First Street
San Jose, California 95134, USA
Tel 1-877-SUN-0123
Fax 408.877.1808
customer@sunpowercorp.com
For the product warranty, visit www.sunpowercorp.com
DMS# 001-65188 Rev. **



User Manual

eMonitor Dashboard User Manual - Release 1.96

Last Update 1-15-11

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1. Introduction

The eMonitor™ by Powerhouse Dynamics is an exciting way to monitor and control the electricity usage in your home and determine ways you can reduce energy use, save money and reduce your carbon footprint. By showing you exactly where your electricity is going, you can more easily pinpoint wasteful usage – including such things as leaking or “Phantom Power” - and control it. You may also be able to identify appliances that are not operating correctly or efficiently. The eMonitor will also help keep your family safer by alerting you when significant events occur to electrical devices in your house – such as a circuit overload - and help you save money by providing tips and suggestions for more efficient operation of appliances and devices, as well as opportunities for making cost effective appliance upgrades. If you are generating your own power – through a Solar PV system, wind turbines, or other device – the eMonitor will keep you up-to-date on the amount of electricity you are producing, the savings you are realizing in dollars and carbon output, and any problems or issues with the system.

The eMonitor consists of the eMonitor base unit, which is installed near your electrical circuit panel(s), and the eMonitor Dashboard, available at www.emonitor.us. Check with your Authorized Dealer for the availability of optional Smart Outlets and Smart Thermostats.

Key features:

- Real-time web display and iPhone® interface
- Whole house and circuit level monitoring of energy use, costs and carbon footprint
- Easy to read graphs—down to the minute—making it easy to see what causes spikes in energy use and when and where energy is being used
- Personalized energy saving recommendations and tips
- Remote control of individual Smart Outlets and Smart Thermostats coming in Q4 2010
- Monitoring of energy-producing systems such as Solar PV
- Ongoing alerts about appliance problems, unusual usage, overloaded circuits, electric bills to date, appliances left on and more. Alerts can be sent to your phone or email.
- Ongoing energy “Report Card” —showing your progress in curtailing energy costs—available on-line and via a monthly e-mail

2. Using the eMonitor Safely

Caring for your product

As with any electrical device, care should be taken when positioning the eMonitor, and it should be protected from moisture and the elements to the extent possible. Generally, wherever the home’s indoor circuit panel is located is an appropriate place. The standard eMonitor can be located outside if the environmental conditions fall within the guidelines below. The eMonitor must be sheltered from direct rain, unless you have a weatherized model of the eMonitor designed specifically for outdoor use with a wider environmental range.

Operating Temperature: –10°C to +60°C

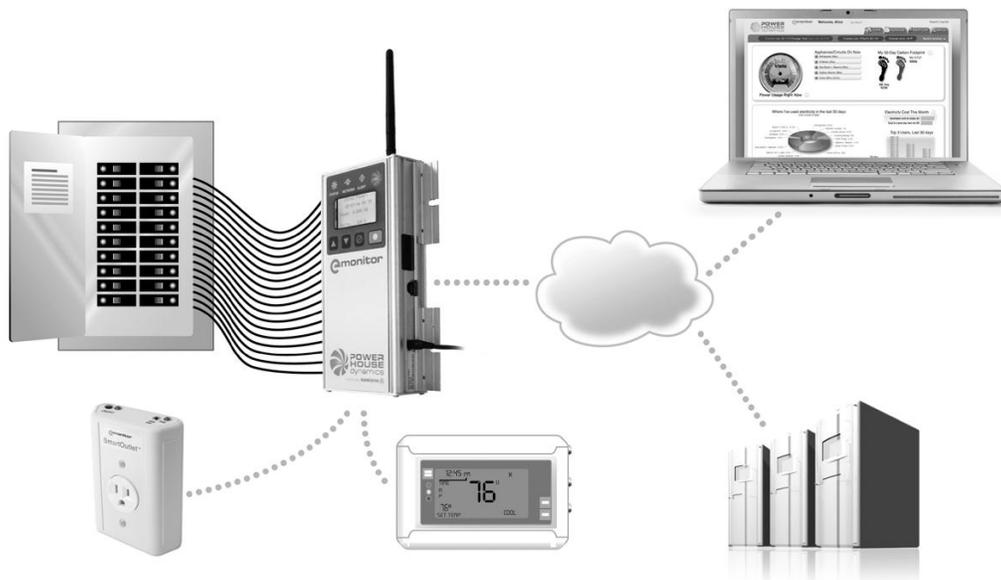
Humidity: 5% to 95%, non-condensing

Important Safety Information

The eMonitor is connected directly into the high voltage circuit breaker panel in your home and, while it is safe to operate, unless you are trained and comfortable doing so you should not attempt to install the unit yourself, modify the installation or move the eMonitor unit. See the “eMonitor Installation Guide” for full safety warnings.

3. How the eMonitor Works

The eMonitor uses sensors to detect the amount of electricity moving through each circuit in your electrical panel. The eMonitor then connects to the broadband router in your home and sends this data to the eMonitor servers, where it is analyzed and displayed on a web-based “Dashboard”. The eMonitor has also been integrated with some popular Home Control systems, and some of the information can be displayed on the in-home display units for that system. Please consult your Authorized Dealer about the eMonitor and home control systems.



This manual is not the place for a tutorial on energy terms, but there are a few terms that may help you to make the most of your eMonitor experience. The eMonitor reports both the *Power* that is being used in your home and on each circuit, measured in *Watts*, and the *Energy* consumed, measured in *Watt Hours* (1 Watt used for an hour) or *Kilowatt Hours* (kWh, which is the basis upon which your utility bills you). *Watts* are computed as *Voltage* (V – a unit of electrical force) x *Current* (measured as Amps, or A, and a measure of flow). Luckily, eMonitor computes it all for you! Now let’s get started.

The Dashboard

The Dashboard will display current and historical energy usage and allow you to track which parts of your home are using the most power. This usage data will allow you to understand how you use electricity and, if desired, make changes to your usage habits and see the results of those changes in real time.

In your home, *voltage* is generally a constant. In North America, we use 120 Volts for most household items, with 240 Volts for larger items, such as central air conditioners. (Some appliances, such as electric ranges, actually have components that use 120 Volts and others that use 240 Volts, described further In the Installation Guide). To measure things properly, the eMonitor needs to know circuit voltages, and this is one of the pieces of information your installer is asked to record. The circuit breakers in your home will also have varying *current* ratings. Some circuits are rated at 15 Amps while others are 20 Amps or 30 Amp or higher depending on what is attached to them. 240-Volt circuits should have larger breakers, generally 40 Amps or higher. Circuit breakers are designed to trip when current exceeds the amp ratings, so that the circuits are not overloaded, which could be a safety hazard. One of the nice features of the eMonitor is that it can actually alert you in advance of a circuit nearing capacity so that you can act before the circuit breaker trips.

4. Logging In to your eMonitor Dashboard

Now that you've completed the setup process, you can log in securely to your eMonitor Dashboard using the eMonitor username and password you created in the installation process. After you finish registration, you are automatically taken to:

<https://www.emonitor.us>

Bookmark this address so it will be easy to come back at any time.



Once you have logged in, if you have registered eMonitors at more than one location, you will see links to log in to your different locations. You can also switch between locations once you have logged in. If you registered more than one eMonitor at one location, all the eMonitors at that location will be treated as one. You won't see a link for each eMonitor—you'll be taken straight to the Dashboard.

Note: For security reasons, the system will automatically log you off if you take no action for an extended period of time. If you are still using the system, you will see an advance notice so that you can avoid the Log Out. If you are logged out, you will be returned to the Log In screen where you can log right back in.

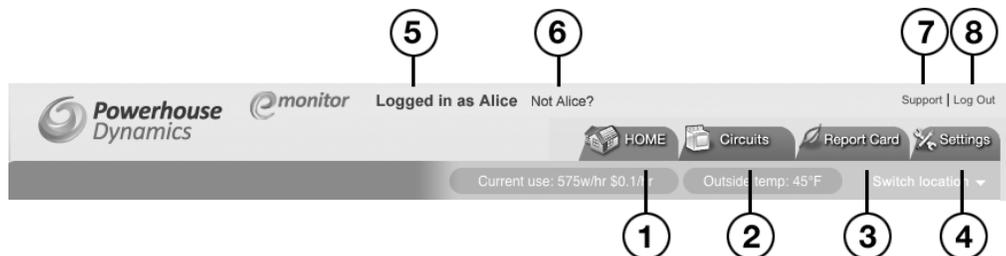
5. Navigating the eMonitor Dashboard

The eMonitor Dashboard is an easy-to-use Web portal that allows you to learn about your electricity usage and find ways to manage it more effectively.

The following pages will guide you through the elements of the dashboard and how to use them to save on your electric bill.

Navigation

The Dashboard uses a simple “tab” structure for navigation. There currently are four Navigation tabs Home (1), Circuits (2), Report Card (3), and Settings (4). The welcome (5) and confirmation (6) assure you're logged in to your account. Also at the very top are the link to Support (7) and a log-out link (8).



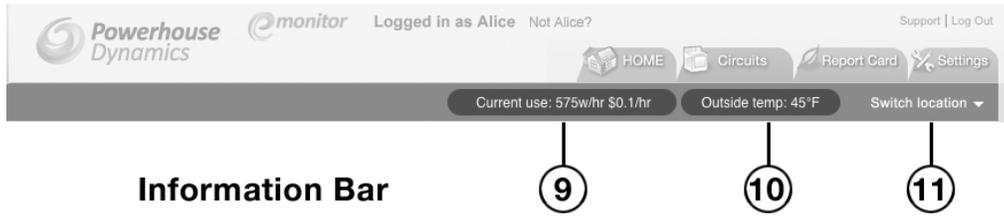
The Tabs:

- 1. Home** – Provides a summary of key elements of your energy usage.
- 2. Circuits** - Provides more details on each of your circuits, including minute-by-minute usage, costs, tips, and recommendations.

3. **Report Card** – Provides you a summary of your trends; is your usage going up or down?

4. **Settings** - Lets you see and change any of the settings established during the Registration process.

Immediately below the Tabs you will find an **Information Bar**.



This will provide you with a quick snapshot of such things as current usage levels and how that translates into cost per hour given your current electric rate (9), and current outside temperature for your zip code (10). You will find new data added to the Information Bar over time. In addition, if you have eMonitors installed in more than one location, you will see a **Switch Location** link (11) that will let you switch to any of your other locations.

HOME Tab

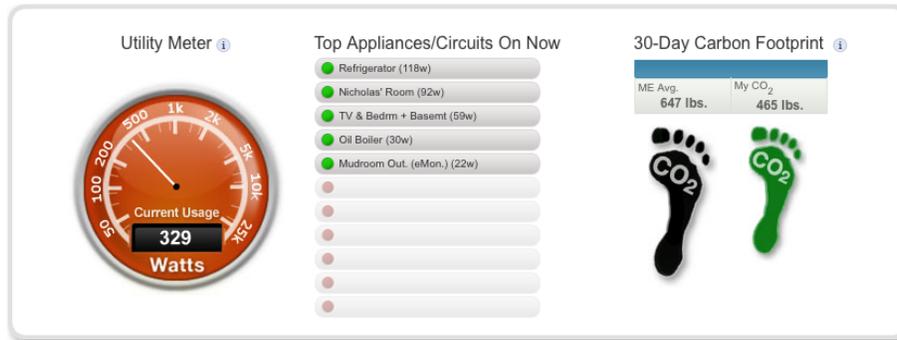
The **Home tab** is the heart of Dashboard, where you will be able to see instantly what is happening in your home. This page is divided in to three sections.



The eMonitor Dashboard

Top Section

The top panel shows current power consumption with a live analog-style gauge showing watts being used. To the right is a list of the top 10 circuits that are currently active and how much they are using. These two areas are updated every minute.



Clicking on any of the active **Appliances/Circuits** will take you directly to that Circuit's details page (which can also be accessed from the Circuits tab, which is described on page 32.)

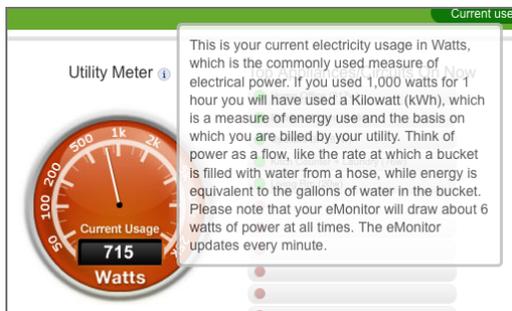
If you are monitoring solar or wind power, the eMonitor will automatically show you how much power you are pulling from the utility grid (shown as your Utility Meter) and how much your renewable energy system is producing (the blue gauge to the right). The sum of those two represent how much power you are using, shown in the gray box below the gauges. A small icon to the right or left of the Production gauge indicates what type of renewable energy system you have. Clicking on that icon will take you to the detail for that circuit. (If you have more than one inverter, you will first be taken to a summary of each inverter). The gauge below shows power production of 2809 watts from solar.



When you are drawing energy from the grid, the Utility Meter will be orange and show as a positive number. If you are producing more energy than you are using, the Utility Meter will turn green and "spin backwards", representing "Net Metering". In the illustration below, the blue gauge shows power production of 3,086 watts, but with power use at only 1,254 watts, 1,832 watts can be sent back to the grid, (-1,832 watts on the utility meter). Please note that Net Metering rules with respect to utility payments vary from state to state.



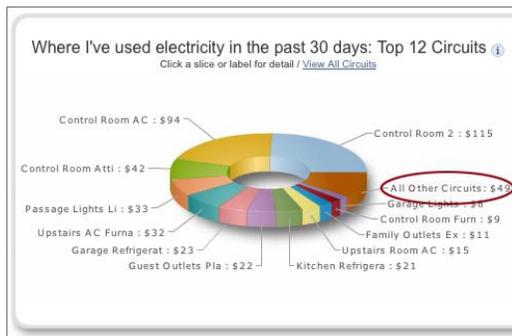
At the right of the top section is a graphical representation of your “Carbon Footprint” – how much carbon dioxide your electricity usage releases into the atmosphere, and how your Footprint compares to the average household in your state. This is a great way to get a sense of how well you are doing in controlling CO₂ emissions. If your usage is lower than or comparable to the average, your Footprint will be green; if your usage is above the average, it will show as grey.



Throughout the eMonitor web portal you will see “i” (information) icons.

Hover your cursor over these icons to see a pop-up window with more information about that area of the screen.

Middle Section

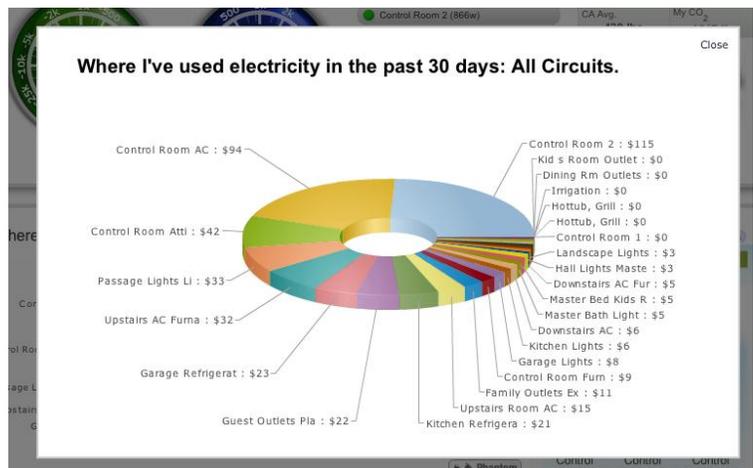


The second panel of the page provides monthly cost information. The pie graph on the left side (which we affectionately call the *Donut*) illustrates your last 30 day usage for the 12 circuits that used the most energy, along with 30-day estimated cost for each circuit, which allows you to easily identify which circuits are using the most power and may be targets for action to reduce energy use. If you hover your cursor over any slice of the pie, or its label, it will show you that circuit’s percent of your 30 day usage.

Clicking on view all circuits will bring up a larger Donut that shows all circuits (right).

Clicking a slice on either Donut takes you directly to that Circuit’s details page.

Please note that all percentages are of the entire house, not just a single circuit panel.



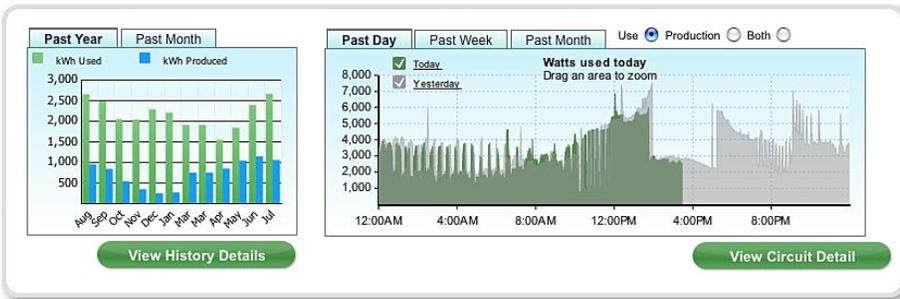


The top right of the middle section shows **Electricity Cost This Month**, a month-to-date comparison of your costs this month vs. last month. As noted in the information box, this will NOT compare exactly with your utility bill which is not based on a calendar basis.

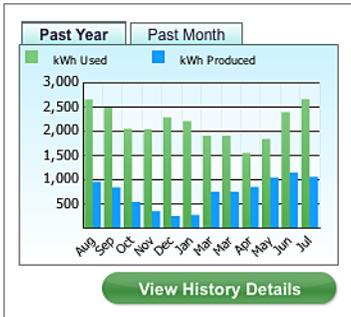
Beneath this, the **Top 3 Users, Last 30 days** quickly shows you your biggest electricity hogs – ideal targets for potential reduction.

Note the **Phantom Power** link at to the left of the Top 3 Users. For more information on Phantom Power see Page 15, immediately after the description of the Home Page.

Bottom Section



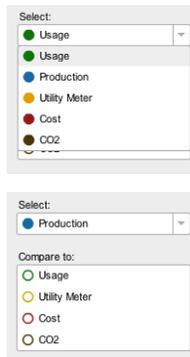
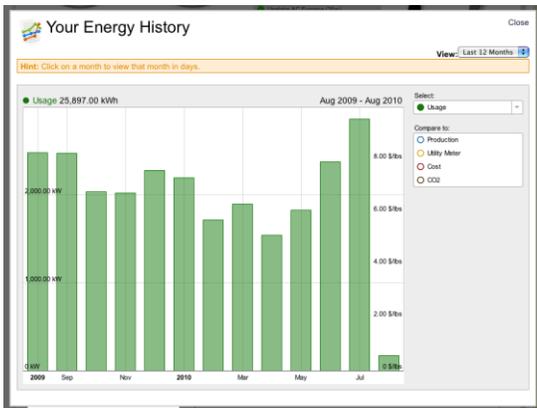
The graphs in the third section help you analyze your power usage over different periods of time. They display usage in increments from one minute to one month.



The **bar graph** on the left shows your usage, in kilowatt-hours, by month for the past year, and by day for the past month. The graph also shows electricity production if you have renewable energy.

Usage is shown with green bars. If you have renewable energy production, it is shown with blue bars. Click on any bar for more information.

Clicking on the **View History Details** button will bring up a detailed history view that lets you look at any time period.

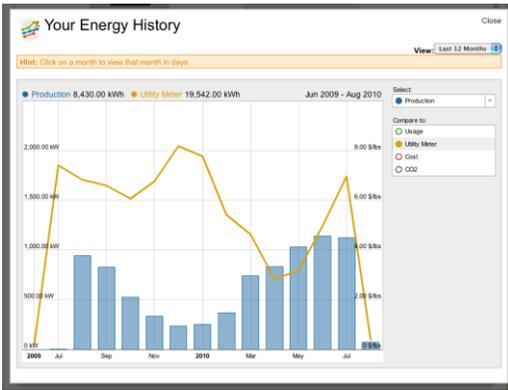


The default “base” graph is **Usage**. You can choose a different base graph by clicking the **Select** dropdown menu and choosing a different parameter.

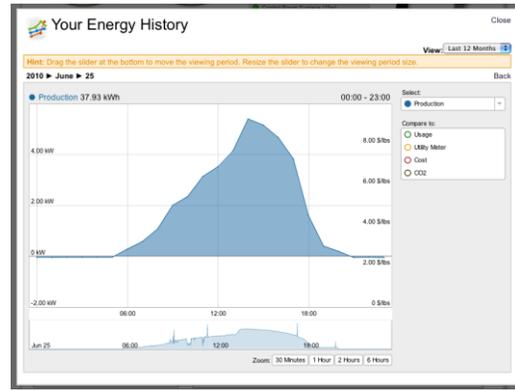
Then, by clicking the colored circles in the box below the dropdown, you can compare production, cost, or CO₂, and overlay any of these variables on the base graph. When you click a circle, it changes to a filled circle. Clicking a choice with a filled circle will unselect it, and that parameter will no longer be displayed on the graph. When you change your base parameter, the “Compare to” choices change.

Renewable Energy Production

If you have renewable energy production, you can also look at a production view, showing you your production by month, day or hour.



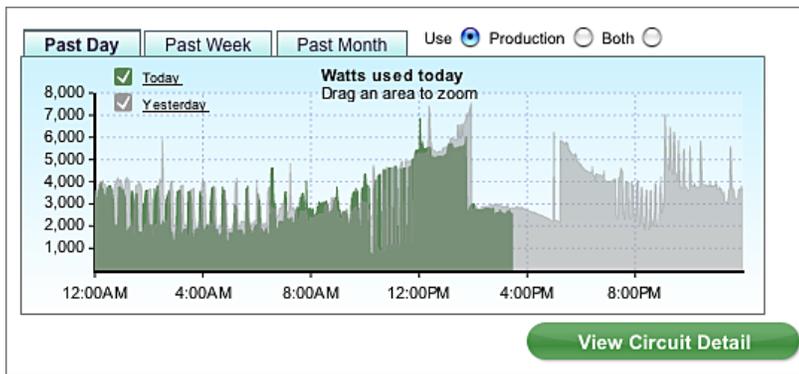
You can compare production to other parameters, such as “Utility Meter” to compare production with energy being taken from the utility grid. The graph above shows that during April and May, solar production was greater than the amount used from the grid.



The graphs will default to a monthly view. You can drill down to a daily view for that month by clicking on the bar for that month. You can then drill down to an hourly view by clicking on a day. You can adjust the granularity of the hourly view by clicking the tabs at the bottom of the graph, as in this hourly view.

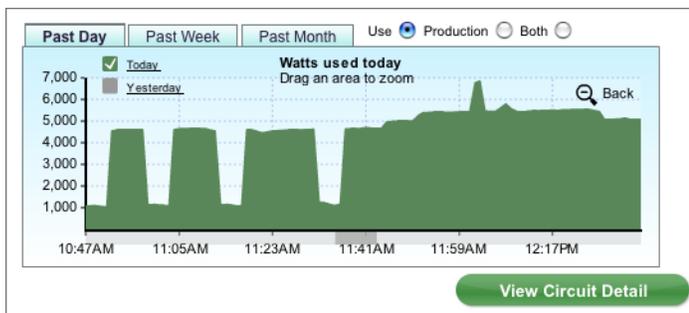
Return to a monthly or yearly view by clicking **Back** (above right of the Select dropdown menu). Close the history detail window by clicking on the **Close** link at the upper right of the window. We’re now back at the home page.

The graph on the *right* side of the bottom panel shows your usage for the past day, week or month, selected using the tabs at the top. Along the bottom of the graph a time period will be displayed (hours, for instance, when you’ve selected “Past Day” as the time period) and the vertical axis will show power usage.



In the daily view, two areas are shown. Green indicates the current day and gray represents the previous day. In the daily view, you are looking at minute-by-minute usage measured in watts. In all other views you are looking at watt-hours.

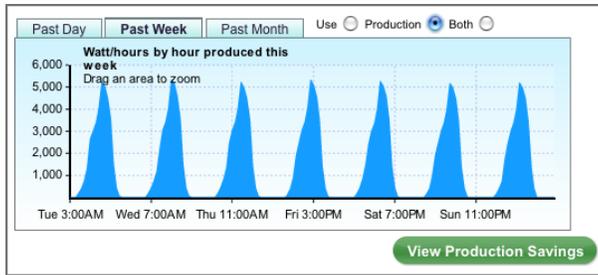
Zooming In



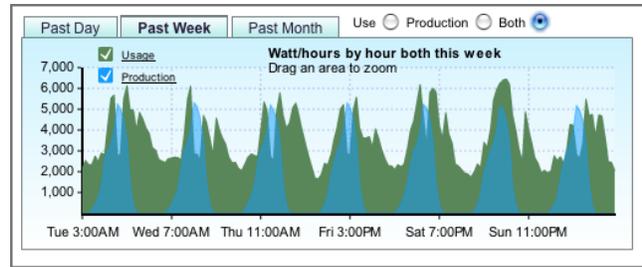
For an even closer analysis you can drag over a section of the graph with your mouse to “zoom in” on that area. This is a feature of all line graphs in the Dashboard. You may notice when you zoom in that the vertical axis values change. They automatically adjust to cover the range of values that are displayed.

Note that you will automatically get back to the “un-zoomed” graph every minute when the information is

updated, or you can click the **Back** button on the right hand side. Also note that the above graph also has Production and Both tabs. These tabs will only show if you have renewable energy production.



This graph shows renewable energy production for the past week.



Selecting the button for **Both** shows usage and production together

“View” Buttons

- View Circuit Detail
- View Production Savings

If you only monitor power usage, you will see a button labelled “View Circuit Detail.” If you are also monitoring solar or wind production, different “View” buttons will display just below the graph depending on whether you have selected **Use**, **Production**, or **Both**. If you select “Use”, you will see a button labelled **View Circuit Detail**. If you select “Production”, you will see **View Production Savings**. If you select “Both”, no View button is shown.

Production Savings Close

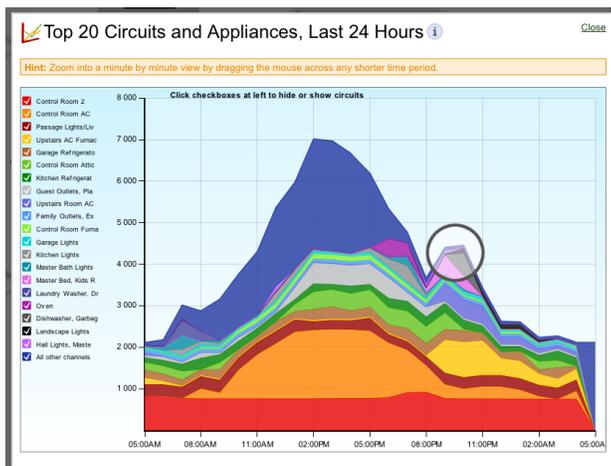
Past 7 days

kWh Produced	250
Dollars Saved	\$42
lbs CO2 Saved	182
kWh Exported To Grid	0
Dollars Exported To Grid	\$0

Clicking **View Production Savings** shows your savings for the selected period (in this case, Past Week). Savings are shown in kilowatt hours produced, dollars and CO₂ saved, and power exported to the grid, along with the dollar value of the exported power. Please note that dollar value is estimated from your electric rate, and may not match your actual savings.

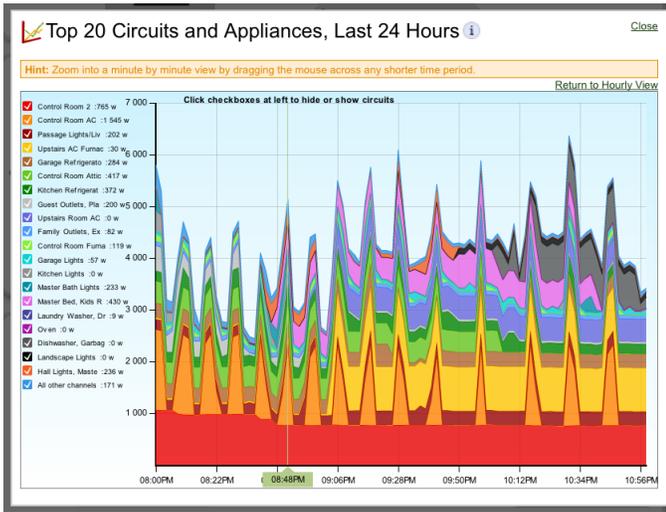
- View Circuit Detail

The “View Circuit Detail” button will pop-up a graph showing the hourly power usage by circuit for the last 24 hours. This is one of the most powerful views of your power usage but requires some explanation. **Note:** If you have more than 20 circuits being monitored, this view will show the top 20 circuits over the 24-hour period for clarity.



This colorful chart shows total usage (the height of the graph at a particular time) of the top 20 circuits, with a different color for each circuit. Using this graph you can see which circuits are driving your usage during any period of time, and what is causing spikes in electricity use. In this example, the small spike at 10PM (circled) appears to be caused by the Dishwasher and Garbage Disposal. It will be useful to zoom in by dragging the mouse across the graph to see an even shorter time period (below). In the zoomed view, you will see details of power usage averaged over every two minutes, for a very granular view.

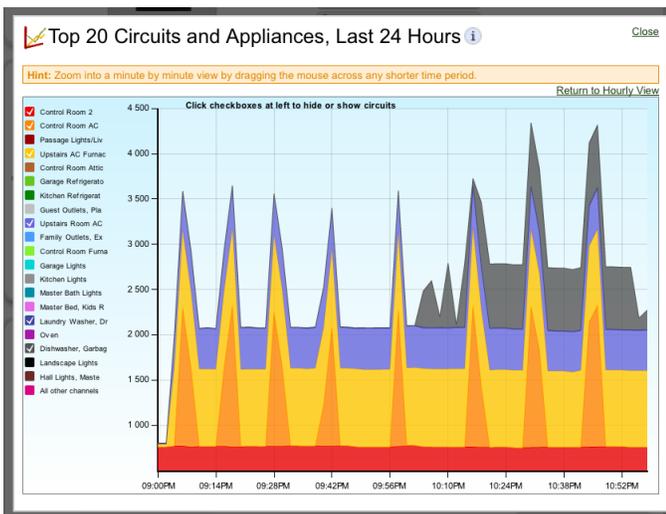
The width of the stripe indicates the amount of power used. Thinner stripes show less usage, thicker stripes show more.



The left menu of the graph lists your top 20 circuits by amount used. You can toggle each on or off by checking the box to the left of the name.

In the zoomed view, we can see there is not one large spike for an hour, but continuous usage of several circuits, pushed into spikes by one circuit (orange). Note that the information in this graph is stacked, and a noticeable pattern, like a refrigerator cycle might, might shape the overall graph.

The gray area of the graph, our original point of interest, indicates Dishwasher use. It's hard to see what's happening because of the spiky appearance of the graph.



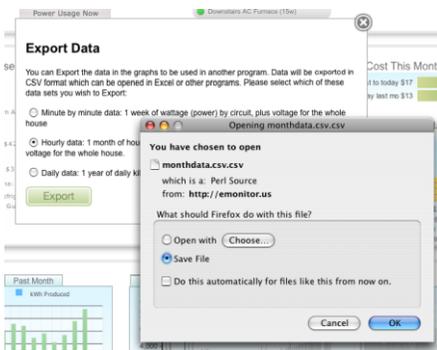
In this view, we're doing a little detective work. We can simplify the graph by turning off the minor users (narrow stripes) and leaving just a few circuits showing. We can now see that the Dishwasher ran from about 10PM to 11PM. Upstairs Room AC and Upstairs AC Furn were on continuously, along with the Control Room. Now we can see that spikes were caused by the Control Room AC (air conditioning) cycling on and off. Because the overall view only shows hour by hour, we didn't see detail like this until we zoom in.

At a zoomed view you can see details such as a refrigerator turning on and off. You can also isolate circuits which are always drawing power, as shown by continuous horizontal stripes.

Other ways to view your data



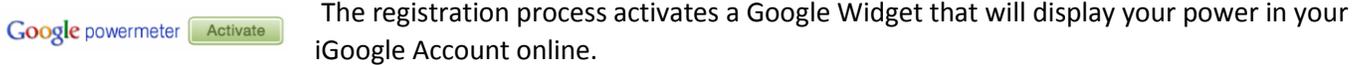
Now return to the Home page by clicking the **Close link**. At the bottom left of this page is an **"Export Data"** feature that allows you to export the accumulated eMonitor data as a standard CSV (comma separated values) file, which can be opened and analyzed in a third party program such as Microsoft Excel. Why would you want to do this? There are many people who already keep track of their energy usage in spreadsheets so they can do any kind of analysis or graphing that they like. This feature was requested by a number of eMonitor beta users, so we made it available for whatever purpose you might be able to come up with.



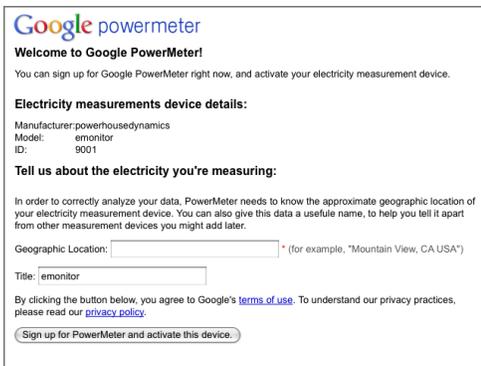
Click Export Data. Choose your data sets (1 week of minute-by-minute data, 1 month of hourly data or 1 year of daily data) and click "Export." Save the file to your computer.

Google PowerMeter

Below the last graph in the dashboard, you will see the Google PowerMeter logo and a button labelled **Activate**. Google PowerMeter lets you look at your energy use on your iGoogle page.



Click **Activate** to register your eMonitor with Google PowerMeter. In the window that displays, click **Activate Google PowerMeter** (shown circled in red). Other links will give you further information about Google PowerMeter as well as eMonitor’s terms of use.



The next window will show that the eMonitor has sent basic information about your eMonitor to let the Google PowerMeter software know what to display. You enter your geographic location and give your eMonitor a title such as “Alice’s eMonitor”, or leave the default title (eMonitor).

Finally, click the **Sign Up** button. You will briefly see a screen acknowledging your registration, and will automatically be returned to the eMonitor dashboard.

At this point, your Google PowerMeter button at the bottom of the dashboard will be re-labelled **Update**, so you can make changes to your PowerMeter account going forward.



It’s not necessary to click this button to use Google PowerMeter; your data will automatically be sent. Clicking it displays the window at left. It includes a link to Google.com, a support link, and links to other information.

Log into iGoogle.com to view your data in Google PowerMeter.

Phantom Power

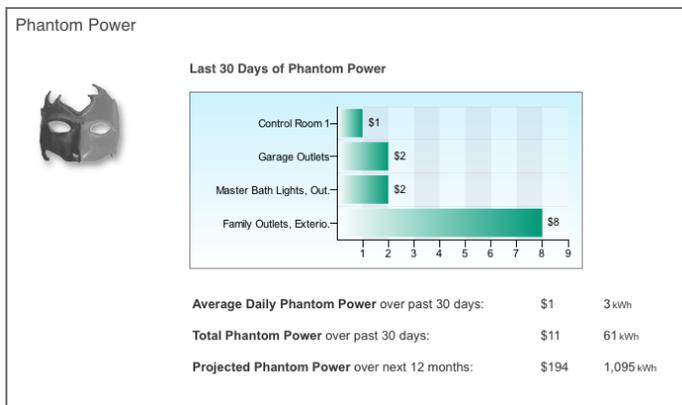
30-day
Phantom Power
Cost: \$28



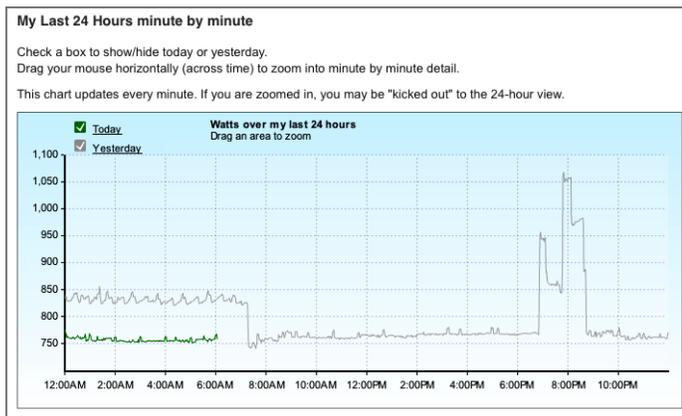
One of the benefits of the eMonitor is that it identifies where you are “leaking” electricity in your home. This effect is generally known as phantom (also called vampire) power. Reducing these power loads could be one of the most important steps to overall electricity savings in your home!

So what is Phantom Power?

Phantom Power is the electricity you are using when you don't know about it. Technically, Phantom Power is the power you are using when everything is turned off. Electronics often draw power on standby. The clock on the electric range and the cordless telephone base are examples of Phantom Power. Bigger Phantom Power users are TVs and all related electronics which continue to draw power after they are turned off, so that they can start up more quickly when turned on. Add to this voluntary but unconscious power use: the computer you leave on in sleep mode, or the cell phone charger you leave plugged in.



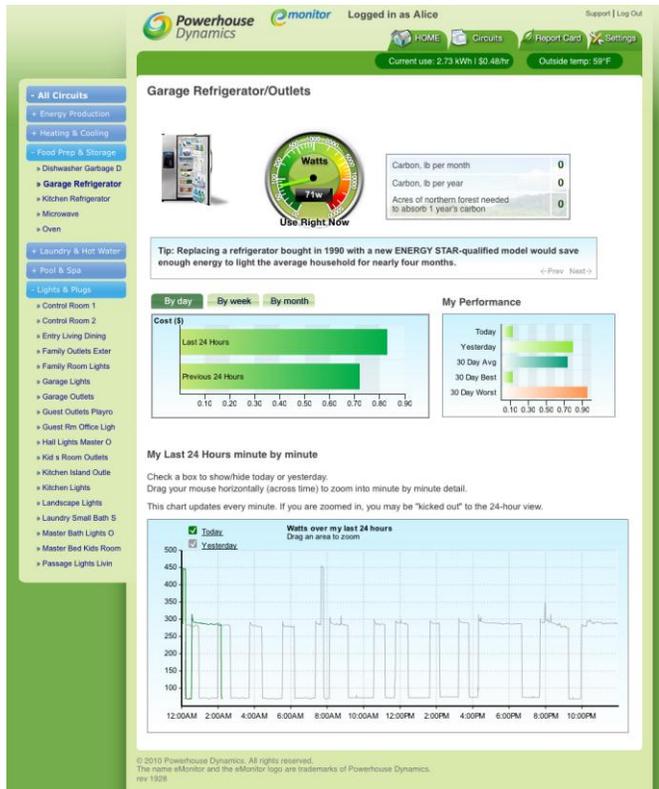
On the **Phantom Power** page you will see an overview of the likely locations of phantom power in your home. Take note of how much you potentially can save by reducing this consumption, looking at the projected cost. The page will also make suggestions for further isolating and addressing phantom power, including devices you can use to schedule circuits to turn off. To see immediate details on one of the circuits, click one of the Phantom Power graph bars to go to that **Circuit's Detail** page.



At left is a circuit showing a constant low power use that never falls to zero. Identifying these constant users can give you options to turn appliances off using power strips instead of the power button on the appliance, or finding other ways to reduce power use.

Circuits Tab

The **Circuits Tab** displays detailed information about each circuit, with a menu on the left to navigate to any circuit.



The Circuits tab displays either the first circuit in the circuit list, or the last circuit visited in this session.

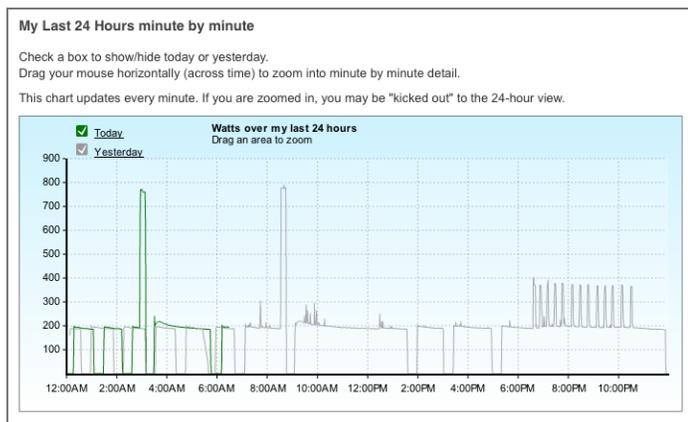
The left menu is grouped in logical categories (blue bars). Clicking a category “opens” it and lists the circuits under that category. You may have more than one category open at a time. Click an open category to close it. Categories are not editable.

The circuits page shows the familiar usage gauge and carbon information at the top, but in this case for the specific appliance or circuit.

Just below the gauge is an appliance-specific **Tips** section that provides useful information about how to reduce electrical usage for that appliance. These tips are triggered by the appliance you selected from the Appliance dropdown on the Channel Configuration Page during Registration (see Appendix A). You may change the appliance in that dropdown on the **Settings page**, under Channel Configuration sub-tab.

In the middle of the page are cost comparison bar graphs and at the bottom is a minute-by-minute line graph for that circuit or appliance.

Note that when you change the tab for the horizontal cost comparison bar graph in the middle (by Day, by Week, by Month, and by Year) the line graph below automatically changes to the same time period.



The minute by minute graph will compare today’s usage to the previous day (or this week’s to the previous week’s – etc.) and can be used to spot trends and perhaps problems. In the above example, you see a typical refrigerator cycle, where the refrigerator motor cycles on and off on a fairly regular basis, with heavier use around mealtimes. Occasionally you will see a huge spike, which is the defrost cycle kicking in. For a refrigerator, this is normal. For another appliance, such as a central air conditioner, this might be the sign of a problem.

Report Card Tab

My Energy Report Card

	This Month	This Year Through Last Month	This Month Last Year
Average Daily Cost	\$1.07	\$3.1	\$3.5
Average Daily kWh	6.62 kWh	18.9 kWh	21.3 kWh
Average Daily CO2	6.18 lbs	17.6 lbs	20 lbs

The "Report Card" is designed to show you, at a glance, how you are doing in your energy conservation efforts. (Please note that this Tab will not provide all of the functionality described below until your eMonitor has been operational for at least 60 days).

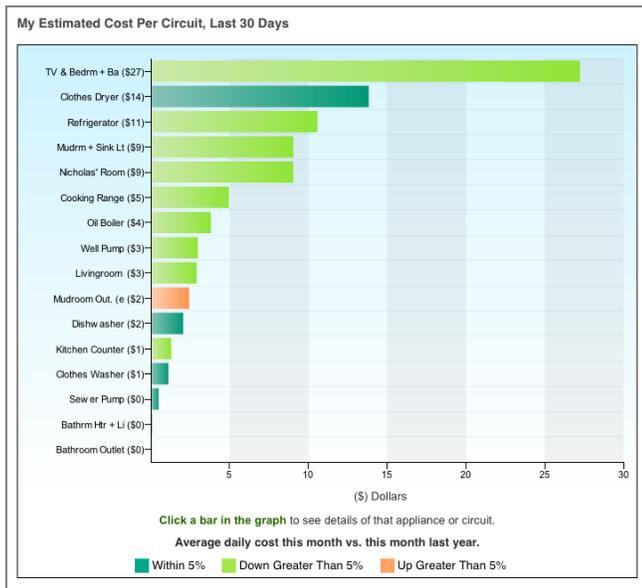
My Energy Report Card 

	This Month	This Year Through Last Month	This Month Last Year
Average Daily Cost	\$6.63	\$3.1	\$3.5
Average Daily kWh	37.51 kWh	18.9 kWh	21.3 kWh
Average Daily CO2	27.28 lbs	17.6 lbs	20 lbs

You have been awarded with 2.5 green leaves. Green Leaves are awarded as follows: 1 if your average daily usage for the last 30 days is no higher than your average for the last year; 2 if it is at least 5% lower; 3 if it is at least 10% lower; 4 if it is at least 15% lower; and 5 if it is at least 20% lower.

Near the top of the page is a one to five "Green Leaf" score, showing how your past month's daily usage compares to your daily average for the previous year.

The more you lower your energy use the more green leaves you get! At left is the explanation that displays when you move your mouse over the leaves.



The Report Card bar graph presents your circuits in order of cost over the past 30 days. Click a bar to go to that circuit's detail page. Each bar is color coded based on that circuit's trend, up or down. Hovering the cursor over a bar pops up details about that circuit's costs and trends.

At the bottom of the Report Card tab you will find the level of increase or decrease of all circuits that have changed, in kWh and %.

- Oil Boiler is down by 607%. Usage [View Details](#)
- Livingroom is down by 114%. Usage [View Details](#)
- Mudroom Out. (eMon.) is up by 100%. Usage [View Details](#)
- Mudrm + Sink Lt is down by 200%. Usage [View Details](#)

NOTE: circuits with less than a 5% change are not displayed. The "View Details" button takes you the individual circuit details page.

NOTE: Unless you opt out on the Alerts page, you will be sent an e-mail of this report card on a monthly basis.

Settings Tab

The **Settings** tab lets you change any of the settings you established during the Configuration and Registration process.

Your Information | Channel Configuration | Alerts

Add and edit information about you and your installation.

* Denotes a required field.

Your Contact Information:

Username *

First Name *

Last name *

Address Line 1 *

Address Line 2

City *

State/Province *

Zip/Postal Code *

Country *

Email *

Phone *

Device Location:

Location Description

Address Line 1 *

Address Line 2

This section is divided into 3 areas via sub-tabs that conform to the Steps in the registration process with almost identical screens, other than Steps 1 and 2 being combined here into the *Your Information* sub-tab.

Your Information Sub-Tab

Use this tab (shown at left) to change your account and contact information, as well as your utility information.

Utility Information:

My Utility Company Utility companies in 05555

Show all utilities in my state.

Average Electric Rate/kWh *

Bill Total kWh Used

Use calculated rate: \$ 0 / 0

(Optional. For use when suggested rate above is incorrect.) Calculated Rate: 0.000000

The eMonitor gets your electricity rate from a utility database. If you would rather calculate your rate from your electric bill, enter the total bill and the kilowatt hours used, and the eMonitor will use that rate instead.

Channel Configuration Sub-Tab

Configure Your eMonitor Channels

How to use this page

eMonitor Serial Number
EM1R1 001499 9999

Panel Being Monitored
Main panel

Ch #	In Use	Power Source	Breaker Size (A)	Your Label	Appliance	Circuit Size			CT Sensor Type			
						120v	240v	240v	White (20A)	Black (30A)	Large (150A)	
1				Main Power								
2				Main Power								
3	<input checked="" type="checkbox"/>		30	Well Pump	Well Pump	<input type="checkbox"/>						
4	<input checked="" type="checkbox"/>		30	Cooking Range	Oven/Range - Electric	<input type="checkbox"/>						
5	<input checked="" type="checkbox"/>		30	Clothes Dryer	Dryer - Electric	<input type="checkbox"/>						
6	<input type="checkbox"/>		20	-	Choose	<input type="checkbox"/>						
7	<input checked="" type="checkbox"/>		20	Kitchen Counter	Outlets	<input type="checkbox"/>						
8	<input checked="" type="checkbox"/>		20	Refrigerator	Refrigerator	<input type="checkbox"/>						
9	<input checked="" type="checkbox"/>		20	Mudrm + Slnk Lt	Outlets/Lighting	<input type="checkbox"/>						
10	<input checked="" type="checkbox"/>		20	Livingroom	Outlets/Lighting	<input type="checkbox"/>						
11	<input checked="" type="checkbox"/>		20	Oil Boiler	Furnace - Oil	<input type="checkbox"/>						
12	<input checked="" type="checkbox"/>		20	Dishwasher	Dishwasher	<input type="checkbox"/>						
13	<input checked="" type="checkbox"/>		15	TV & Bedrm + Basemt	TV/DVD/Other Entertainment	<input type="checkbox"/>						

Use this sub-tab to change any of your circuit/channel configuration information. This section looks exactly as it does in the Registration process, except for providing a drop down menu to switch between multiple eMonitors if you have registered more than one.

When you scroll down the page, the column headings remain visible for reference.

If you find a circuit label (under Your Label) is getting cut off when it's displayed in a graph, you may edit it at any time. Data will still be collected and stored for that circuit under the new label. Your energy use history will not be affected.

You may also change the Appliance you have selected as representative of a circuit. This may change the tips and alerts you receive, but energy use history will not be affected.

Alerts Sub-Tab

Please select which of the following Alerts you would like to receive, related to energy cost, usage, or safety

Cost Alerts

Notification when your electric bill for the month has passed \$

Note: utility billing periods vary from month to month, so this monthly threshold will not correspond directly to your billing period nor, hence, your actual bill.

Safety/Usage Alerts

Notify me when any circuit is getting close to (95%) its rated capacity
This warning could potentially help you avoid a short circuit or damage to electronics.

Notify me when a particular circuit or appliance seems to have been on for an extended period
For example if your stove has been left on or that something is causing a sump pump to keep running.

Please pick the circuits you would like to monitor (up to 3), and the amount of time you would like to go by before you are notified.

- Well Pump
Notify if on for over minutes.
- Cooking Range
Notify if on for over minutes.
- Clothes Dryer
Notify if on for over minutes.
- Kitchen Counter

Notify me when a particular circuit is not drawing power for an extended period of time
For example if you have medical equipment or computers you would like to keep on at all times, or if your furnace does not come on while you are away.

Please pick the circuits you would like to monitor (up to 3), and the amount of time you would like to go by before you are notified.

- Well Pump
- Cooking Range
- Clothes Dryer
- Kitchen Counter
- Refrigerator
Notify if off for over minutes.
- Mudrm + Slnk Lt

Performance Alerts

Notify me when my eMonitor is not uploading data
Usually the result of lost Internet connectivity, but could indicate a power outage or problem with the eMonitor. If you regularly lose Internet service, you may not want to sign up for this alert.

Let me know if the defrost cycle on my refrigerator does not appear to be operating properly.
Note: do not select this alerts if your refrigerator is not frost-free or if there are many other devices on the refrigerator circuit.

This area is virtually identical to the Alerts portion of the Registration process and can be used to add or modify Alerts at any time.

If you would like to receive text message alerts on your cell phone, check the box and enter your cell number and carrier. Here you may also opt out of receiving a monthly e-mail summary report.

Please let us know your preferences for receiving alerts:

Email

Use email address from contact info.

Use alternative email address.

Text Messages

Cell Phone Number:

Cell Carrier:

The eMonitor will e-mail you a monthly "Report Card" providing you with a summary of how your energy use has been changing and suggestions for saving energy and money.

Please do not send me a monthly e-mail report.

NOTE: unless you check **Please do not send me a monthly e-mail report, you will receive a monthly report card.**

6. Support

NOTE: For support on your installation of the eMonitor, please contact the dealer from whom you purchased your eMonitor.

eMonitor Dashboard Support Page

eMonitor Support

Send us your comments, questions and problems

Any comments and feedback are most welcome. We apologize if you are here to report a problem. If so, please send as much detail as possible, and our technical support staff will work to resolve the issue as soon as possible.

Support Email: support@powerhousedynamics.com
Support Phone: 1-617-340-6582 x200

Request Type

Comment/Feedback Question
 Login Problem Technical Problem

Subject:

First name:
Last name:
Email:

Manuals and Documents

- [User Manual \(5MB\)](#)
- [Installation Guide \(4.7MB\)](#)
- [Base Unit Operations Manual \(700K\)](#)
- [eMonitor-12/12r Channel Setup Worksheet \(350k\)](#)
- [eMonitor-12s Channel Setup Worksheet \(350k\)](#)
- [eMonitor-22s Channel Setup Worksheet \(350k\)](#)
- [eMonitor-24/24r Channel Setup Worksheet \(350k\)](#)

Join the eMonitor Community

[Visit the eMonitor support site](#)

Join and post comments and questions on the forum, find answers to FAQs.

The support screen provides a way to send an email to eMonitor Support staff on specific issues and to download manuals and Channel Setup Worksheets for your eMonitor model. On the lower right of the screen is a link to visit the eMonitor Support Website, where you'll find information, FAQs, and a user community.

eMonitor Support Web Site

Support Home Public Discussion Knowledge Base / FAQ Logged in as [alice@myemail.net](#) from eMonitor. (1) [Log out](#)

[Support Home](#) [Public Discussion](#) [Knowledge Base / FAQ](#) [Go to eMonitor](#)

We want to hear from you

Welcome to the eMonitor Support Site.

You can search our knowledge base articles, browse public discussions, or create a new discussion if you're having trouble.

Since you've already got an account, you can post **private** discussions as well. You and our support team are the only people who can see private discussions.

+ ≡ [FAQ / Knowledge Base](#) ?

RECENT DISCUSSIONS

- 05 AUG 13:42 Net metering
- 29 JUL 02:41 Detail Display order
- 28 JUL 14:37 Graph Display mode option
- 28 JUL 14:36 Button Functions on the eMonitor Base Unit

RECENT ARTICLES

- What happened to the detail on the all circuits chart?
- Can I measure a 240V circuit with 1 CT?
- Why don't I see any Phantom Power?
- Can I run multiple wires through a CT?
- What happens if I don't configure my CT-Sensors correctly?

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Clicking Visit the eMonitor support site brings you to the eMonitor Support website home page. FAQ and discussions are available, among other resources.

Appendix A

Setting up your eMonitor

The first step of the setup procedure is the hardware installation and circuit identification. If that has not been completed, you will need to do so before proceeding. For help with hardware installation, see the Installation Guide included with your eMonitor. **Unless you have experience working with an open electrical circuit panel, we strongly recommend you use an electrician for the installation.**

Next we begin the registration process.

Registering and Configuring Your eMonitor

The next step in the process is Registration and Configuration, which is performed online. This can be completed by the homeowner or by the installer, if different, and is also described in the eMonitor Dashboard User Manual. Please note that until Registration and Configuration is complete, you cannot access the data other than on the display and no data will be stored.

To begin the Registration and Configuration process, go to: <http://emonitor.us/register>

The screenshot shows the registration page with two main sections: "New Customers" and "Returning Customers".

- New Customers:** A box with the text "This is my first eMonitor" and a house icon. Below it is a green "Register" button.
- Returning Customers:** Two boxes with radio buttons below them.
 - Box 1: "Add this eMonitor to a location already being monitored" with a house icon and a green plus sign. Example: "Subpanel".
 - Box 2: "Add an eMonitor to a new location" with a house icon and a green plus sign. Example: "Vacation Home".Below these boxes are input fields for "Username" and "Password", and a green "Log In" button.

If you are registering the first eMonitor to this location, click **Register**. If you are adding an eMonitor to a location that already has an eMonitor, click the radio button under **Add this eMonitor to a location already being monitored** and log in. If you already have an eMonitor registered at one location, and you are adding a new eMonitor at *another* location, such as a vacation home, click the radio button under **Add an eMonitor to a new location** and log in.

Registration begins with some basic questions about what you are installing. Since you can have multiple eMonitor units in a single home, you first need to indicate how many eMonitors you are configuring in this session. If you choose more than one, there will be fields for each eMonitor. Enter the six-digit Device ID for each eMonitor (found within the Serial Number), along with the last four digits of Serial Number (which corresponds to the last 4 digits of the MAC Address) as shown in the screen shot below.

You should also add a description of the panel the eMonitor is measuring (for instance "Main Panel" or "Workshop Sub-panel"). This information should have been filled out on the Channel Setup Worksheet. Once you have added this information, click **Continue**.

NOTE: If you are installing more than one eMonitor, the first one needs to be the unit that is connected to the Main Panel so that you are sure to be measuring the total power consumption of your home. While you can install up to 5 eMonitors in a single registration session, because of the time it takes to do each one we recommend that you do one at a time, and come back to the Registration page after each unit is configured.

NOTE: If you see a “Not Valid” notice after you press Continue or on entering the Device ID or Serial #/MAC address, it means you have entered a non-valid Device ID. Please re-check the Device ID (found within the Serial Number) first on the installation form and, if that is same, check the one on the eMonitor Base Unit itself. In the unlikely event the number is still not valid, and you’re sure you have entered it correctly, please contact your Authorized Dealer.

You are now ready to enter information about your home and your home’s circuits. All this information helps the eMonitor make accurate calculations and recommendations. The process has four steps. You will be guided through each one. If you can’t complete all four steps you may save your entries for later by clicking the **Finish Later** button, which will appear beginning with Step 2. When you click **Finish Later**, you will be able to log-in to registration and pick up where you left off.

Step 1: Contact and Location Information

NOTE: If you are adding an eMonitor to an existing location, the online registration screen will skip this Step as well as Step 2, and will take you directly to Step 3.

The screenshot shows a registration form titled "Step 1 of 4: Contact and Location Information". It contains several input fields: First name*, Last name*, Address*, Address2, City*, State/Province* (with a dropdown menu), Zip/Postal Code*, Country, Location Description* (with a note: "(Home, vacation home, etc.)"), and Phone*. There are also fields for Email* and Confirm Email*. A password field is present with a note: "Password must contain at least 6 characters. Passwords are case-sensitive." Below the password field is a checkbox for "I have read and agree to the license agreement. View License Agreement". At the bottom are "Back" and "Continue" buttons.

Enter your contact and related information. Required fields are marked by an asterisk. If you are an existing user registering an eMonitor at a new location, your name and other basic information will already be filled out. For **Location Description**, choose a name that for instance “Home” or “Vacation Condo”.

describes the location of this installation,

If you click **Continue** with incomplete fields you left out or entered in an read & agree to the license agreement”

information you will be notified in red text of the invalid format. Remember to check the “I have checkbox on the bottom of the page.

Step 2: Utility and Rate Information

Step 2 of 4: Utility Name and Electric Rate per Kilowatt Hour

The screenshot shows a form titled "Step 2 of 4: Utility Name and Electric Rate per Kilowatt Hour". It includes a note: "Only one electric utility for your zip/postal code was found. It is shown in the list below. If this is not your electricity supplier, check 'Show all utilities in my state' to see a list of all utilities in your state." There is a checkbox for "Show all utilities in my state". Below that is a dropdown menu for "Select Utility Co. in 17129" with "PPL Electric Utilities Corp" selected. An "Electric Rate:" field contains the value "0.09520004577637". A note explains: "This is the average residential rate per Kilowatt Hour for your utility that we will use for calculations. If you believe that this does not accurately reflect your average rate, please feel free to change it. The calculator provided below will update it if used. Your average rate could vary monthly based on your total usage and seasonal variations, but using an estimated average should be sufficient for the eMonitor to provide you with a sense of costs for different energy usages." At the bottom, there is a checkbox for "Use calculated rate: (Optional. For use when suggested rate above is incorrect.)" and a calculator with fields for "Bill Total" and "KWh Used", a "Calculate" button, and a "Calculated Rate:" field showing "0.000000".

Next, confirm your electric utility company and your electric rate (measured in cents per kilowatt hour, or kWh). The eMonitor has a database that identifies your utility based on your zip code, but homes in some zip codes may be served by more than one utility, so you may need to choose one from the list. If the eMonitor cannot locate your utility, check the **Show all utilities in my state** checkbox for a full state list.

A Note on Utility Rates: The eMonitor database reports average residential rates for each utility. This works extremely well in getting a sense of the costs of different appliances in your home. However, the cost estimates generated by the eMonitor cannot take into account all the complex formulas or special rate programs your utility uses unless there is an arrangement with the utility. Neither will the eMonitor’s measuring period necessarily be the same time period reflected on your utility bill, so trying to compare them is not recommended. You may be able to enter a better estimate of your average rate by dividing your total bill by the number of kilowatt hours reported on your bill in the provided calculator.

In addition to the Utility Rate data, this page will also list what is available from Public Records data on the size and year built of your house. This information is important for analyzing your energy use, so please correct the information if you do not believe it to be accurate, or fill in anything missing.

Step 3: Channel Configuration

The next set-up screen enables you to configure your online eMonitor settings so that the system knows what is being monitored on each eMonitor **Channel**. This is where the eMonitor gets most of its information about your home's circuits. The time you take here will give you almost immediate payback in accurate, up-to-the-minute information on your usage, and useful tips and suggestions for saving power. Enter information from your completed Channel Setup Worksheet, as illustrated below:

eMonitor™ Channel Setup Worksheet: eMonitor-24

Serial #: EM1 A1 1234563CE3 Installation Address: 123 SPRING ST
 Monitored Panel: MAIN PANEL (e.g.: Main Panel, Subpanel, 3rd floor panel) SPRINGDALE, IL 54103

Monitored Breakers				eMonitor Sensors and Ports				
Breaker Number(s)	Double Breaker?	Breaker Size (A)	Circuit Label	CT/Sensor Type Check 1 of 3 boxes			Channel #	
				White (20A)	Black (50A)	Large (150A)	2 CTs?	
Computed Mains? <input type="checkbox"/>	<input checked="" type="checkbox"/>		Main Power	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1
	<input checked="" type="checkbox"/>		Main Power	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2
5A,B	<input checked="" type="checkbox"/>	50	PV SYSTEM	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3
3A,B	<input checked="" type="checkbox"/>	40	CENTRAL A/C	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4
7A	<input checked="" type="checkbox"/>	30	DRYER	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5
7B	<input checked="" type="checkbox"/>	30	DRYER	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	6
9A,B	<input checked="" type="checkbox"/>	40	HOT WATER HEATER	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7
11A	<input type="checkbox"/>	20	REFRIGERATOR	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8
13A	<input type="checkbox"/>	15	KITCHEN LIGHTS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9
13B	<input type="checkbox"/>	15	DISPOSAL	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10
15A	<input type="checkbox"/>	15	DISHWASHER	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	11
15B	<input type="checkbox"/>	15	LIVING RM.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	12
17A	<input type="checkbox"/>	15	MASTER BATH LIGHTS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	13
2A	<input type="checkbox"/>	15	GARAGE, OUTSIDE LIGHTS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	14
4A	<input type="checkbox"/>	15	MASTER BR LIGHTS, PLUGS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	15
4B	<input type="checkbox"/>	20	KIDS BEDROOM 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	16
6A	<input type="checkbox"/>	15	GUEST BR, BATH	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	17
8A	<input type="checkbox"/>	15	KIDS BEDROOM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	18
10A	<input type="checkbox"/>	20	WASHING MACHINE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	19
12A	<input type="checkbox"/>	20	ATTIC LIGHT, FAN	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	20
12B	<input type="checkbox"/>	15	DINING ROOM LIGHTS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	21
14A	<input type="checkbox"/>	15	DOWNSTAIRS BATH, HALL	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	22
16A	<input type="checkbox"/>	15	SUMP PUMP	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	23
18A	<input type="checkbox"/>	20	HOME OFFICE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	24

The eMonitor will use the Channel numbers (rightmost column) on the Worksheet to report what is being served by

5A,B	<input checked="" type="checkbox"/>	50	PV SYSTEM	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	3
3A,B	<input checked="" type="checkbox"/>	40	CENTRAL A/C	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	4
7A	<input checked="" type="checkbox"/>	30	DRYER	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	5
7B	<input checked="" type="checkbox"/>	30	DRYER	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	6

each of your circuits. This example shows that Channel 4 is monitoring one wire of a Double Breaker, 3a &

b, Central Air Conditioning, and Channels 5 and 6 are monitoring both wires of Double Breaker 7a & 7b, an Electric Dryer.

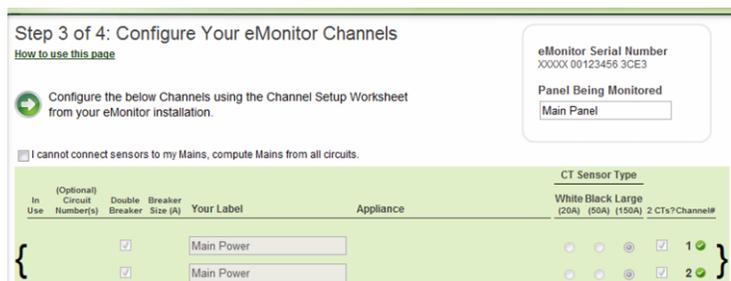
You will be asked to enter some additional information about each circuit that is **not** on the form. Most importantly, you will be asked to enter the major appliance or most appropriate choice on each circuit. In the above examples, the answer is very straightforward. In other cases, for example where the label says "kitchen appliances", you might need to make a judgement call. For circuits that serve outlets and lights, there is a choice for that. Based on the appliance you select, the system will automatically determine the circuit size and make an assumption about the CT/Sensor configuration. **Change this if it does not match the Worksheet.** This is described further below.

If you are configuring Channels for more than one eMonitor, when you complete this page for the first eMonitor and hit Continue you will get a new empty form to complete for the next eMonitor. Remember you can **Save and Finish Later** at any point.

The bottom of the Channel Configuration page provides an explanation of each field. The explanations are reprinted in Appendix C at the back of this manual.

Filling Out the Channel Configuration Page

First, review the general information at the top of the page. **eMonitor Serial Number** is taken from what you entered earlier and cannot be edited. You can edit the **Panel Description**.



Channels 1 and 2, **Main Power**, are pre-filled out and have no settings to be entered on a Main Panel. (Brackets will automatically appear for double breakers with 2 CTs). You will be able to use these Channels on sub-panels. **NOTE: on a small subset of electric panels the Main Power wires are not accessible**, and you will not be able to attach CTs. If you have this situation, click the **Computed Mains** checkbox and the system will use the sum of the individual circuits to calculate total

power. For this to be reasonably accurate, you will need to ensure that you are monitoring all or virtually all of your circuits.

Now you're ready to fill out information for each Channel. We'll show the worksheet and the Channel Configuration Screen together for reference.

5A,B	<input checked="" type="checkbox"/>	50	PV SYSTEM	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	3
------	-------------------------------------	----	-----------	--------------------------	-------------------------------------	--------------------------	---

Channel 3 has information, which means it's in use, so check the **In Use** box. This will enable you to enter data in this row. You can enter the **Circuit Numbers** so you have a good on-line mapping of what is on your circuits, but this is an *optional* field. It's a Solar PV system on a Double Circuit, so check the **Double Circuit** box. The worksheet shows 50 Amps for the breaker, so choose **50** in the **Breaker Size** dropdown menu. The Circuit Label is "PV System." Enter your version of that label in **Your Label**. Keep the name descriptive yet short, so it will be visible and understandable on the Dashboard graphs.

In Use	(Optional) Circuit Number(s)	Double Breaker	Breaker Size (A)	Your Label	Appliance	CT Sensor Type			2 CTs? Channel#	
						White (20A)	Black (50A)	Large (150A)		
<input checked="" type="checkbox"/>	5A, B	<input checked="" type="checkbox"/>	50	PV System	Solar Panels	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	3 ✓
<input checked="" type="checkbox"/>	3A, B	<input checked="" type="checkbox"/>	40	Central A/C	Air Conditioning - Central	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	4 ✓

Choose the most appropriate appliance type from the **Appliance** dropdown. In this case, you will find Solar Panels under the Energy Production category. (NOTE: to be able to add Solar or Wind sources, you will need to have purchase an eMonitor-24r, 12r, or 44r unit). Optionally click the **Details** link and enter information about the system; this could include manufacturer, model number, size of system, year installed, or whatever other information you think might be helpful. (Again, this is optional, but can help the eMonitor analyze your appliance or system. In the case of PV systems, you can select manufacturer and model numbers from a list when setting up Alerts).

If you selected Solar Panels as the Appliance in the above example, the system should automatically mark the **CT Sensor Type** as **Black-50A** and will not check the **2 CTs** box. **This automatic check will happen whenever you select an appliance. However, these defaults will not be correct in all cases. Please note what your installer put on the form; if it is different, please enter whatever your installer checked.**

Press **Save** (or check In Use on the next row) and your data will be saved and you are ready to move on to the next circuit.

<input checked="" type="checkbox"/>	5A, B	<input checked="" type="checkbox"/>	50	PV SYSTEM	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3
<input checked="" type="checkbox"/>	3A, B	<input checked="" type="checkbox"/>	40	CENTRAL A/C	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4

Setting up Channel 4 in our example is very similar to Channel 3. In this case the Appliance Type - Air Conditioning-Central – will be found in the Heating & Cooling Category.

<input checked="" type="checkbox"/>	5A, B	<input checked="" type="checkbox"/>	50	PV System	Solar Panels	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	3 ✓
<input checked="" type="checkbox"/>	3A, B	<input checked="" type="checkbox"/>	40	Central A/C	Air Conditioning - Central	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	4 ✓

Continue through all the Channels on your Worksheet. Detailed explanations of each field are given at the bottom of the Channel Configuration screen and in Appendix C of this Guide. You can go back and change any field at any time; as soon as you leave that field it will be saved.

Once you have filled out the configuration for each eMonitor that has been installed, you are ready to move on to the final step.

Step 4: Alerts

Knowing when action needs to be taken is an important part of energy management, and eMonitor Alerts can inform you at about power usage, costs, on/off conditions of appliances, and other important events. In Step 4, you may select which Alerts you wish to receive. **This step is optional during registration.** You may set up or change Alerts at any time later by navigating to the Settings tab in the eMonitor Dashboard and choosing the Alerts sub-tab.

Cost Alerts

Notification when your electric bill for the month has passed \$

Note: utility billing periods vary from month to month, so this monthly threshold will not correspond directly to your billing period nor, hence, your actual bill.

Safety/Usage Alerts

Notify me when any circuit is getting close to (80%) its rated capacity
This warning could potentially help you avoid a short circuit or damage to electronics.

Notify me when a particular circuit or appliance seems to have been on for an extended period
For example if your stove has been left on or that something is causing a sump pump to keep running.

Notify me when a particular circuit is not drawing power for an extended period of time
For example if you have medical equipment or computers you would like to keep on at all times, or if your furnace does not come on while you are away.

Performance Alerts

Notify me when my eMonitor is not uploading data
Usually the result of lost Internet connectivity, but could indicate a power outage or problem with the eMonitor. If you regularly lose Internet service, you may not want to sign up for this alert.

Let me know if the defrost cycle on my refrigerator does not appear to be operating properly.
Note: do not select this alerts if your refrigerator is not frost-free or if there are many other devices on the refrigerator circuit.

The eMonitor will have additional alerts available in the future, and you will be able to select them from the Dashboard Settings screen when they are available. In fact, since we are regularly adding alerts, this document is unlikely to show all of the alerts you will find on-line. If you want to skip the Alerts step, you can go straight to **Finish** at the bottom of the page. But please come back to do this later; Alerts are one of the most important parts of the eMonitor and deliver significant value.

Alerts can be set and then cancelled, or changed at any time. Currently you can select from several Alerts, and will see additional options if you have a Solar PV System installed. When you check a checkbox, you may see a

request for additional information.

Detailed explanations of these alerts are given in Appendix D.

You can decide whether to receive alerts by e-mail or text message, or both.

Please let us know your preferences for receiving alerts:

Email

Use email address from contact info.

Use alternative email address.

Text Messages

Please send a copy to my eMonitor dealer.

The eMonitor will e-mail you a monthly "Report Card" providing you with a summary of how your energy use has been changing and suggestions for saving energy and money.

Please do not send me a monthly e-mail report.

If you check the box to receive text messages on your cell phone, new options will appear. Just enter your cell phone number, and select your carrier from the drop-down list.

Please send a copy of my alerts to my dealer (your Authorized Dealer's name will appear) will be checked, although you can un-check/. Your dealer can track your alerts and see if there are patterns that indicate the need for follow-up.

Finally, unless you check **Please do not send me a monthly e-mail report**, you will receive a monthly eMonitor Report Card e-mail which will inform you about your last 30 days of energy usage and suggestions on how to reduce your energy cost, usage, and carbon footprint.

An e-mail alert from the eMonitor might look like this:

Alert courtesy of Powerhouse Dynamics eMonitor

Hi Martin,

Your eMonitor service has detected that your Refrigerator circuit is not drawing any power or the expected level of power. If you have any appliances or devices that should be on, please check them.

'Refrigerator' Circuit Summary

 Cost for last 30 days: \$3
Carbon for last 30 days: 18 lbs

Click [here](#) to log in to the eMonitor Dashboard to view this circuit, see all of your electricity usage and costs, or update your alert settings.

Regards, eMonitor Support
Powerhouse Dynamics

Click *Finish*, and you're ready to start saving energy! Unless.....

If you have an eMonitor r-unit and have indicated that you have a Power Source, such as PV or Wind, you will be prompted to do one last step, which involves verifying the direction of all power inputs, including the Mains. (If your production is actually greater than your usage, you can actually be shipping power back into the utility grid - net metering).

The Power Direction Calibration process is a 2-step Wizard. You will be asked to first turn off the breaker your Power Source is coming into (typically an inverter). In that way, the eMonitor can be confident that Main power is incoming. Press Calibrate and the eMonitor will self-adjust as necessary. (Note: if for any reason you unplug and plug the eMonitor back in the with plug in the reverse direction, you will need to recalibrate the Mains).

Power Direction Calibration

Before you can begin to use your system, we have one quick final step to make sure that your eMonitor is correctly reflecting the direction power is flowing, shown on the left below.

If you are not sure, or if at any point you must change these settings, you can come back and do so in the Channel Configuration tab found in Settings, by clicking on 'Power Direction Calibration'.

1 Calibrate your Mains. Please ensure that the circuit breakers for any Inputs, other than the Mains, are turned off and press Calibrate.

Mains (More Info)

1045w into home	→		Main Power	<input type="button" value="Calibrate"/>
--------------------	---	---	------------	--

After pressing Next, you will be prompted to turn your Power Source breaker back on. If the power from that source is shown to be flowing in the direction you would expect, press Done. If not, press Flip to re-calibrate the eMonitor's sense of direction. Now you're really done!

Power Direction Calibration

Before you can begin to use your system, we have one quick final step to make sure that your eMonitor is correctly reflecting the direction power is flowing, shown on the left below.

If you are not sure, or if at any point you must change these settings, you can come back and do so in the Channel Configuration tab found in Settings, by clicking on 'Power Direction Calibration'.

2 Calibrate your Inputs. You can now turn on the circuit breakers for any Input circuits that were turned off. If any of the directions below look incorrect press Flip to reverse them.

Inputs (More Info)

126w producing	→		Solar1	<input type="button" value="Flip"/>
128w producing	→		Solar2	<input type="button" value="Flip"/>
128w producing	→		Solar3	<input type="button" value="Flip"/>

Appendix B

Frequently Asked Questions

How do I view my home's and each circuit's current electricity use?

Real-time electric power use for the whole house is displayed on the HOME tab on the “utility meter” or “speedometer” gauge. It is also always displayed with the actual cost of that power on the top green bar just below the HOME tab.

Up to the minute electric power consumption information for individual circuits in the house is available in the Circuits On section of the Home Page and by selecting the Circuits tab and then selecting the circuit of interest.

How do I view my home's historical electricity use?

You can view this in a few different ways on the eMonitor Dashboard. This simplest way is to look on the bottom third of the HOME tab. On the bottom left, you can view your consumption by day or by month and then drill down (View History Details) for much more information. On the bottom right, you can see your minute by minute power for the last day, week, or month.

For more detail on your last day's usage, click on the “View Circuit Details” button on the very bottom right of the HOME tab page. The page this brings you to shows you the electricity use on each circuit minute by minute. This is a “stacked line” plot, which means the width of each band indicates how much a given color code circuit is using - notice the color code legend on the left of the plot. You can turn off the display of individual circuits by clicking on their checkbox in the legend. You can also zoom in on the plot by clicking on the plot and dragging left or right to define which time span to look at more closely.

How do I analyze how much money my devices cost me?

You can see the top 3 users of electricity in your house on the HOME tab page in the middle right of the page on the plot which shows a stack of gold coins for how much each device cost for the last 30 days. To see more information, look to the left at the “donut” plot which breaks down your last 30 days of cost by circuit.

You can also see all your circuits compared by cost by clicking on the “Report Card” tab. The bars are color coded, so that if you have used less electricity in the last 30 days than have on average over the year it will be green. If you have used more, it will be red.

To see greater detail for each circuit, go to the Circuits tab, and click on the circuit of interest. You will see more information on the “My Performance” plot on the middle right, which shows the cost for the last 2 days and for the last 30 days. You can also see details on the circuit's consumption over the last 2 days, weeks, months or years to the left of the “My Performance” plot.

How to I create and adjust alerts?

Go to the Settings tab, and then from within that page choose the Alerts sub-tab. From this page you can turn on various simple alerts by just checking on their checkbox or setting some more complex ones by inputting the requested information requested after checking. Be sure to look further down the page to confirm that your e-mail address and/or phone number are correct and turned on to receive the alerts as desired. For more information, see the Alerts section in Chapter 5 and Appendix C.

What if the eMonitor Dashboard is Showing 0 Power?

Ensure that the eMonitor is plugged into wall power and to an Ethernet connection. Also, try cycling the power on the eMonitor by unplugging it from wall power for 30 seconds and then plugging it back in.

What if I'm not receiving the alerts I think I should?

Check your e-mail address and phone number in the Alerts sub-tab of the Settings tab. Also confirm that the alerts are enabled and that the condition which sets them off is occurring.

What if my eMonitor is not transmitting data?

There are many possible reasons for this. We'll go through them one by one.

Check your internet connection.

Check if the eMonitor displays the correct day and time on the total power display (default when powering up).

Check the eMonitor display. Is it displaying total power/channel wattage measurement?

If yes:

Check the eMonitor status lights. Is the "Network" light constantly on? Is the "Alert" light on?

Check if the eMonitor is communicating with the router by pressing the down arrow repeatedly (slowly) until the network settings are displayed. You should see a "MAC" address that looks something like:

01:23:45:67:89:ab

Under the MAC address number, an IP address like 192.168.1.101 should be displayed. If you don't see an IP address, the eMonitor is not communicating with your Ethernet router.

Check the Ethernet Cable between the eMonitor and the router. Are the cable connectors fully inserted (most connectors make a click sound when inserted)?

If an Ethernet Bridge is used, check the status lights on both ends: are they all lit according to the manual?

If you have a laptop computer, the Ethernet connection can be tested by plugging in the Ethernet cable from the eMonitor to the laptop computer (make sure the wireless option is turned off on the computer).

Now try to connect to the Internet.

An Appliance/Circuit is always displaying 0 Watts

Check the sensor connector for that channel to make sure that it is fully inserted into the eMonitor.

Often an electrical panel has incorrect or outdated labels. If tightening the sensor connector has no effect, it is possible that the circuit breaker is actually inactive. Try turning the breaker off and see if any appliances, lights or receptacles are affected.

One of my appliances is using a lot less power than I would have expected.

The first thing to check is whether the sensor that is attached to the circuit that has that appliance is tightly connected to the eMonitor.

If that is not the problem, it is possible that your circuit panel had the wrong label, and the eMonitor is not monitoring the appliance you think it is. The way to check that is to turn off the breaker which has the associated label, and see if the appliance turns off. If not, you will need to perform a little trial and error to find the correct circuit and channel.

NOTE: before turning the breaker off, be sure to turn off any computers on that circuit to avoid damage to them.

Why is my region's average carbon foot print so different from the average carbon footprint displayed on a friend's unit in another region?

Electric generators in different regions of the country are fueled by different sources. For instance, areas that rely heavily coal burning power plants will show much higher carbon outputs than areas that use a lot of gas or nuclear power.

Why does my eMonitor's estimate of monthly electricity consumption not match my utility bill?

The eMonitor is trying to provide an estimate of your costs for different appliances, and not trying to replicate your bill; no matter what differences you see there is no suggestion that something is wrong with your meter.

Electric utilities schedule the start and end of their monthly billing cycle on different days each month for different customers. The eMonitor's estimate is based on electricity use from the first of the month to the end of the month.

Differences are also possible because the eMonitor uses annual average residential rates for each utility. Your rate could differ from the average. Where there are large fixed rates as well as tiered rates, the effective average rate will vary by the amount you use. Averages are fine for comparing relative costs of different appliances, but may not accurately reflect your total costs.

For all of these reasons, you should expect the eMonitor estimate to be different from your actual bill.

Can I connect a smart thermostat to my eMonitor and control it from the eMonitor portal?

This feature is planned for release in Q4 of 2010.

Is my personal data safe and private?

Yes. Data security and privacy are of utmost concern. Your data is housed on secure servers run by leaders in the data management world using encrypted transmissions generally used for banking and other secure transmissions. Your personal power consumption data will never be released without your explicit consent.

Do you support solar photovoltaic panels or solar thermal water heaters?

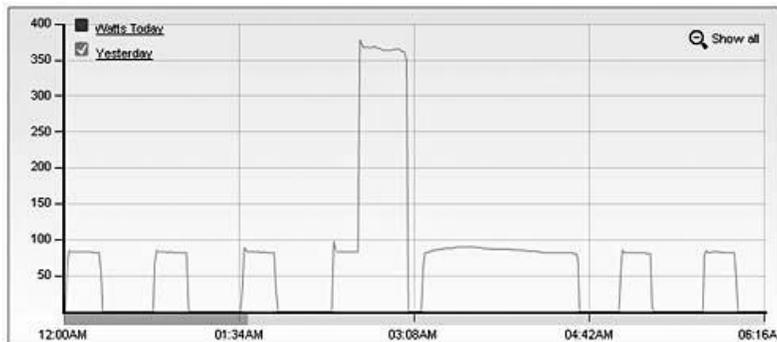
Yes, we support these in various ways. We offer monitoring of solar photovoltaic (PV) systems as part of the electricity monitored in your residence. We also offer a PV estimator which allows you to learn about the benefits and costs of installing PV at your residence. We will be adding similar support for solar thermal hot water systems in the first quarter of 2011.

I have an idea for a new way I'd like to view my data or be alerted by my eMonitor about my electrical consumption. How can I discuss my ideas?

We would be thrilled to hear about ideas you have to make the eMonitor™ better. Please use the Support section or speak to your Authorized Dealer.

Why does my refrigerator use so much power in the middle of the night?

First of all, refrigerator motors cycle on and off all day to keep the refrigerator cool. In addition, most modern household refrigerators have an automatic defrost cycle, which removes ice build-up from the cooling coils using an electric resistance heater to heat up the coils. This occasional process uses a great deal of energy, visible in the plot below with the half hour 370W power draw and then the 90W power draw (from a little after 3:08AM to a bit before 4:42AM) when the compressor is run to cool the system down again.



Why does the power on my circuit change so often and so quickly when I didn't use anything on that circuit?

When an appliance is not being used, there may still be power use on the circuit. Let's say you see 10W of power, which could be the phantom power draw for a few pieces of electronics that continue to draw power when they are off, such as a TV, stereo, cell phone charger, etc. The reason the plot jumps so much is that the scale on it will be very small (say 4W from top to bottom of the plot), so a very small change in the signal creates a large move. The changes may be due to random electrical noise or the resolution limits of the eMonitor. This does not indicate significant changes in power consumption on that circuit.

Why does my clothes dryer use power so erratically when it is running?

When you begin to run most dryers, they will use a lot of power consistently for a while, with a couple of jumps in power for changes in cycles, and then turn off.

However, for some newer dryers, the power consumption can be much more erratic. For instance, some recent models reverse tumble rotation direction every few minutes. There will be a momentary reduction in power consumption every time it reverses direction.

Appendix C

Explanation of Fields on Channel Configuration Page

Computed Mains? (Required)	On a small subset of electric panels the Main Power wires are not accessible, and you will not be able to attach CTs. If you have this situation, click the Computed Mains checkbox and the system will use the sum of the individual circuits to calculate total power. For this to be reasonably accurate, you will need to ensure that you are monitoring all or virtually all of your circuits.
In Use (Required)	This indicates that the eMonitor channel is attached to a circuit. Please check the In Use box to enter information into each Channel that is shown as connected on the Set-up Worksheet.
Breaker # (s) (Optional)	This is an optional field so you can see the mapping of circuits to channels and have an on-line record of what each of your circuits controls. Fill in the breaker number shown on the Set-up Worksheet. When there is a double breaker that has only one CT/Sensor attached, there may be 2 circuit numbers in the field.
Double Breaker?	Double breakers are 2 breakers locked together; these are used for 240-Volt circuits and checking this box tells the eMonitor that this is a 240-Volt circuit, which is necessary for the calculations to be correct.
Breaker Size (Required)	Your installer will also list the circuit breaker size, in amps. Please select the correct amps rating from the drop down list. Setting this for each Channel allows the eMonitor to know what kind of electrical load can be handled by the circuit.
Your Label (Required)	This label is for you, so you understand what circuit is being monitored. It will show as a label in some graphs, so it should be brief but descriptive. For instance, if Channel 12 is connected to the circuit for your bathroom lights, you could enter Bathroom Lights. You can use the labels your installer copied from the circuit panel, or create your own. You can always come back and edit these labels at any time.
Appliance (Required)	Next, choose from the Appliance list, which will help the eMonitor know the key energy user on this circuit and perform appropriate analyses. This is a cascading list organized by grouping; for example, there is a grouping for Power Generation, Heating & Cooling, etc. <i>This information will not appear on the Channel Setup Worksheet.</i> Many circuits do not connect to just one appliance, but serve a whole room or part of a room, such as a living room or a kitchen counter. In this case, select "Outlets" or "Outlets/Lighting" under appliances (which may be obvious from the circuit label), or choose the most important appliance on that circuit.
Details (Optional)	The "Details" button under the Appliance field, which is also not on the Setup Worksheet, will pop up a window in which you can enter details about your major appliances, such as washers, dryers, and refrigerators. This information, which could include make, model size, and year installed, can help eMonitor analyze the power use for each appliance and match it with expected performance, or provide you with a better explanation of what is on the circuit. This information is not required, and you can come back and enter them at any time.
CT Sensor Type (Required)	The system will automatically assign 20 amp CTs to 120-Volt circuits and 50 amp CTs to 240-Volt circuits, but please double-check against whatever the installer entered and change the radio button selected to match the installer's check mark, if necessary.

Defaults but can
override)

2 CTs?

(May default to
checked but can
be overridden)

As explained in the Installation Guide, some types of 240-Volt appliances, such as Central Air Conditioning, need only have 1 CT attached, while others, such as Electric Ovens, will always require 2. The system will default based on the Appliance you selected, but please double-check against whatever the installer entered and change the selection to match if necessary.

Appendix D

Explanations of Alerts

1. **Notify Me When My Electric Bill has Passed X.** This Alert will let you know when you have passed a certain dollar threshold in electricity cost for the month. This would be important if you want to keep to a strict budget. For example, if you want to keep your costs below \$150 for the month, you might want to be notified when you hit \$100, so that you can begin to take actions to stay within budget. PLEASE NOTE that the eMonitor is measuring your energy use on a calendar month basis, so these costs will NOT match with your utility bill. To receive this alert you need to check the box and select the threshold; you can change it at any time.
2. **Notify Me When any Circuit is Getting Close to Capacity.** This Alert will notify you when *any* circuit is nearing its capacity, which is the Amps level you entered during registration. In this way, you will be in a position to turn something off before the circuit breaker trips – or worse.
3. **Notify Me When an Appliance or Circuit has Been on for an Extended Period.** This Alert can notify you when something has been left on longer than it should be. A classic candidate for this Alert is an electric oven or range; this could be a very important Alert when you are away from home. The circuit on which you do your ironing may be another example. Or, it could be that Attic light that you keep forgetting to turn off, or the outside lights left on all night. You get to pick the circuits you want monitored and the amount of time that the system should wait before contacting you. For example, if you routinely leave the oven on for 2 hours, you might want to set the alert time to 4 hours.
4. **Notify me When a Particular Circuit is not Drawing Power for an Extended Period.** This is, in effect, the reverse of the previous Alert; in this case you are notified if you lose power on a particular circuit. There could be a number of things you want to make sure are working at all times; this would certainly include any medical equipment, but might also include your heating system during the winter, your refrigerator, your hot water system (even when you are away it cycles on and off to keep the water in the tank warm), a well pump, and perhaps a server. As with the previous Alert, you need to select each circuit you want to monitor and the time it needs to be off before you are notified.
5. **Notify me When my eMonitor is Not Uploading Data.** This Alert is triggered if no data is received from your eMonitor for an extended period of time. This may mean that your power has gone out, that your Internet access has been interrupted, or that something is wrong with the eMonitor. (If you get this Alert and your power is on and your Internet service is working, check to see that the eMonitor is still plugged in and that there is power at that outlet, and if it is still connected to your Internet network). This could be a particularly useful Alert to get if you are away from home. PLEASE NOTE that the eMonitor can store data for up to 24 hours in the event of an Internet outage. Once the outage is over the eMonitor will automatically upload the missing data.
6. **Notify me When my Solar PV System is Producing x% Less than it Should be.** This Alert will only be available if you indicate that you have a Solar PV system. This is a very important alert that will notify you if the system is either not working or working less effectively than should be expected, given the size of the system and expected performance under different conditions. The system uses current temperature and solar irradiation level or, lacking that data from a home weather monitoring system, an approximation of irradiation levels based on cloud cover from third party sources. The latter will not be as accurate, so we have set the alert to occur only if performance seems dramatically different than expected, but you can adjust the level.

7. **Let me Know if the Defrost Cycle on my Refrigerator is not Operating Properly.** The eMonitor uses a pattern recognition algorithm to compare the results for a particular type of appliance against what would be expected. Problems with the defrost cycle are easy to spot this way – before a freezer freezes up or the refrigerator stops working. There is no need to select this Alert for a non frost-free model, but the eMonitor will recognize those in any event.

This manual is prepared to assist eMonitor owners in getting the most out of their eMonitor in analyzing energy use and targeting ways to reduce it. We strive to make it accurate and current. However, because software changes rapidly, some images or descriptions may not be completely up to date. If you find inaccuracies or features that are not covered, we invite you to bring them to our attention.



SUNPOWER LIMITED WARRANTY FOR PV MODULES

Applies to the following models:

SPR-yyyEz-xxx-x – where yyy is a module power rating between 90 and 430 Watts

SPR-yyyz-xxx-x, where yyy is a module power rating between 80 and 420 Watts.

T5-SPR-yyy, where yyy is a module power rating between 290 and 325 Watts.

Serengeti branded pv modules: SER-yyyz, where yyy is a module power rating between 200 and 290 Watts

("xxx-x" "z" defines product variants)

1. Limited Product Warranty – Ten (10) Year Repair, Replacement or Refund Remedy

SunPower Corporation with offices at 3939 North First Street, San Jose, CA 95134 ("SunPower") warrants that for ten (10) years from the date of delivery, its Photovoltaic modules ("PV modules") shall be free from defects in materials and workmanship under normal application, installation, use and service conditions. If the PV modules fail to conform to this warranty, then for a period ending ten (10) years from date of delivery to the original end-customer ("the Customer"), SunPower will, at its option, either repair or replace the product, or refund the purchase price as paid by the Customer ("Purchase Price"). The repair, replacement or refund remedy shall be the sole and exclusive remedy provided under the Limited Product Warranty and shall not extend beyond the ten (10) year period set forth herein. This Limited Product Warranty does not warrant a specific power output, which shall be exclusively covered under clause 2 hereinafter (Limited Power Warranty).

2. Limited Power Warranty

- a) SunPower additionally warrants: If, within twelve (12) years from date of delivery to the Customer any PV module(s) exhibits a power output less than 90% of the Minimum Peak Power¹ as specified at the date of delivery in SunPower's Product datasheet, provided that such loss in power is determined by SunPower (at its sole and absolute discretion) to be due to defects in material or workmanship SunPower will replace such loss in power by either providing to the Customer additional PV modules to make up such loss in power or by providing monetary compensation equivalent to the cost of additional PV modules required to make up such loss in power or by repairing or replacing the defective PV modules, at the option of SunPower
- b) SunPower additionally warrants: If, within twenty five (25) years from date of delivery to the Customer any PV module(s) exhibits a power output less than 80% of the Minimum Peak Power¹ as specified at the date of delivery in SunPower's Product datasheet, provided that such loss in power is determined by SunPower (at its sole and absolute discretion) to be due to defects in material or workmanship SunPower will replace such loss in power by either providing to the Customer additional PV modules to make up such loss in power or by providing monetary compensation equivalent to the cost of additional PV modules required to make up such loss in power or by repairing or replacing the defective PV modules, at the option of SunPower.

3. Exclusions and limitations

- a) Warranty claims must in any event be filed within the applicable Warranty period.
- b) Warranty claims may only be made by, or on the behalf of, the original end customer or a person to whom title has been transferred for the PV Modules.

¹"Minimum Peak Power" = Peak power *minus* the Peak power tolerance (as specified in SunPower's Product datasheet). "Peak power" is the power in peak watts that a PV module generates at STC (Standard Test conditions: Irradiance of 1000 W/m², light spectrum AM 1.5g and a cell temperature of 25 degrees C)

SunPower Corporation

1-800-SUNPOWER (1-800-786-7693) • Email : customercare@sunpowercorp.com • www.sunpowercorp.com

- c) The Limited Warranties do not apply to any of the following:
 - 1. PV modules which in SunPower's absolute judgment have been subjected to: misuse, abuse, neglect or accident; alteration, improper installation, application or removal (including but not limited to installation, application or removal by any party other than a SunPower authorized dealer; non-observance of the applicable SunPower installation, users and/or maintenance instructions; repair or modifications by someone other than an approved service technician of SunPower; power failure surges, lightning, flood, fire, accidental breakage or other events outside SunPower's control.
 - 2. Cosmetic defects stemming from normal wear and tear of PV module materials.
 - 3. PV modules installed in locations, which in SunPower's absolute judgment may be subject to direct contact with salt water.
- d) The Limited Warranties do not cover any transportation costs for return of the PV modules, or for reshipment of any repaired or replaced PV modules, or cost associated with installation, removal or reinstallation of the PV modules.
- e) When used on a mobile platform of any type, the Limited Power Warranty, applying to any of the PV modules shall be limited to twelve (12) years as per the provisions of clause 2(a) hereof.
- f) Warranty claims will not apply if the type or serial number of the PV modules is altered, removed or made illegible.

4. Limitation of Warranty Scope

SUBJECT TO THE LIMITATIONS UNDER APPLICABLE LAW, THE LIMITED WARRANTIES SET FORTH HEREIN ARE EXPRESSLY IN LIEU OF AND EXCLUDE ALL OTHER EXPRESS OR IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY AND OF FITNESS FOR PARTICULAR PURPOSE, USE, OR APPLICATION, AND ALL OTHER OBLIGATIONS OR LIABILITIES ON THE PART OF SUNPOWER, UNLESS SUCH OTHER WARRANTIES, OBLIGATIONS OR LIABILITIES ARE EXPRESSLY AGREED TO IN WRITING SIGNED AND APPROVED BY SUNPOWER. SUNPOWER SHALL HAVE NO RESPONSIBILITY OR LIABILITY WHATSOEVER FOR DAMAGE OR INJURY TO PERSONS OR PROPERTY OR FOR OTHER LOSS OR INJURY RESULTING FROM ANY CAUSE WHATSOEVER ARISING OUT OF OR RELATED TO THE PRODUCT, INCLUDING, WITHOUT LIMITATION, ANY DEFECTS IN THE MODULE, OR FROM USE OR INSTALLATION. UNDER NO CIRCUMSTANCES SHALL SUNPOWER BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES, HOWSOEVER CAUSED. LOSS OF USE, LOSS OF PROFITS, LOSS OF PRODUCTION, LOSS OF REVENUES ARE THEREFORE SPECIFICALLY BUT WITHOUT LIMITATION EXCLUDED.

SUNPOWER'S AGGREGATE LIABILITY, IF ANY, IN DAMAGES OR OTHERWISE, SHALL NOT EXCEED THE PURCHASE PRICE PAID TO SUNPOWER BY THE CUSTOMER, FOR THE UNIT OF PRODUCT OR SERVICE FURNISHED OR TO BE FURNISHED, AS THE CASE MAY BE, WHICH GAVE RISE TO THE WARRANTY CLAIM.

SOME STATES DO NOT ALLOW LIMITATIONS ON IMPLIED WARRANTIES OR THE EXCLUSION OF DAMAGES SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU.

5. Obtaining Warranty Performance

If you feel you have a justified claim covered by this Limited Warranty, immediately notify the (a) Installer, who sold the PV-modules, or (b) any authorized SunPower distributor, of the claim in writing, or (c) send such notification to SunPower Corporation, 3939 North First Street, San Jose, CA 95134, directly. In addition, please enclose evidence of the date of delivery of the PV module. If applicable, your installer or distributor will give advice on handling the claim. If further assistance is required, please write to SunPower for instructions. The return of any PV-modules will not be accepted unless prior written authorization has been given by SunPower.

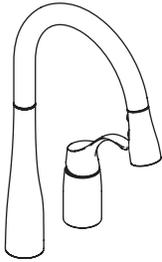
SunPower Corporation

1-800-SUNPOWER (1-800-786-7693) • Email : customercare@sunpowercorp.com • www.sunpowercorp.com

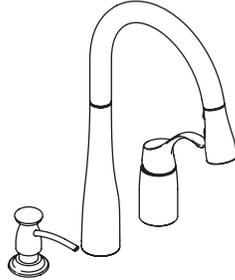
Homeowners Guide

Single-Control Kitchen Sink Faucet

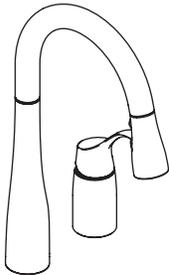
K-647



K-R648



K-649



M product numbers are for Mexico (i.e. K-12345**M**)

Los números de productos seguidos de

M corresponden a México (Ej.

K-12345**M**)

Français, page "Français-1"

Español, página "Español-1"

THE BOLD LOOK
OF **KOHLER**®

1048033-5-D

Thank You For Choosing Kohler Company

Thank you for choosing the Bold Look of Kohler. Kohler craftsmanship offers you a rare combination of proven performance and graceful sophistication that will satisfy you for years to come. The dependability and beauty of your Kohler product will surpass your highest expectations. We're very proud of our products here at Kohler and we know you will be too.

Please take a few minutes to study this Homeowners Guide. Pay special attention to the care and cleaning instructions.

All information in this manual is based upon the latest product information available at the time of publication. At Kohler, we constantly strive to improve the quality of our products. We reserve the right to make changes in product characteristics, packaging or availability at any time without notice.

Your New Kohler Kitchen Faucet

Your new Kohler kitchen faucet blends classic styling with the ease of operation for a unique expression in your kitchen. All metal construction and one-piece ceramic valving provide trouble-free operation even under the hardest water conditions.

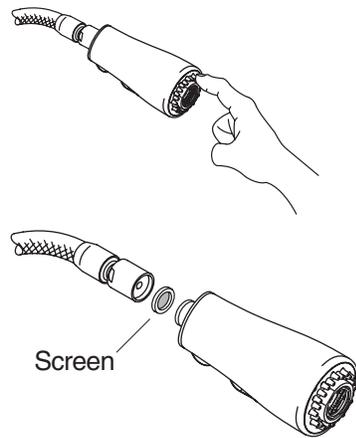
Care and Cleaning

For best results, keep the following in mind when caring for your KOHLER product:

- Use a mild detergent such as liquid dishwashing soap and warm water for cleaning. Do not use abrasive cleaners that may scratch or dull the surface.
- Carefully read the cleaner product label to ensure the cleaner is safe for use on the material.
- Always test your cleaning solution on an inconspicuous area before applying to the entire surface.
- Do not allow cleaners to sit or soak on the surface.
- Wipe surfaces clean and rinse completely with water immediately after cleaner application. Rinse and dry any overspray that lands on nearby surfaces.
- Use a soft, dampened sponge or cloth. Never use an abrasive material such as a brush or scouring pad to clean surfaces.

Care and Cleaning (cont.)

For detailed cleaning information and products to consider, visit www.kohler.com/clean. To order Care & Cleaning information, call 1-800-456-4537 and press 1 for Kohler Products and then 3 for Literature.



Service Procedures

Reduced Spray Flow



CAUTION: Risk of fresh water contamination. This faucet contains important back-siphonage protection. Do not tamper with or remove any components.

- With water flowing through the spray holes, firmly rub your finger back and forth across the nozzles to dislodge debris and mineral deposits.
- Unthread the hose from the spray to access and clean the screen. Hold the end of the hose so it does not retract into the spout.

Lifetime Limited Warranty

For USA and Canada

Kohler Co. warrants its faucets manufactured after January 1, 1997, to be leak and drip free during normal residential use for as long as the original consumer purchaser owns his/her home. *If the faucet should leak or drip during normal use, Kohler will, free of charge, mail to the purchaser the cartridge necessary to put the faucet in good working condition.

Kohler also warrants all other aspects of the faucet, except gold finish, to be free of defects in material and workmanship during normal residential use for as long as the original consumer purchaser owns his/her own home. If a defect is found in normal residential use,

Lifetime Limited Warranty (cont.)

Kohler Co. will, at its election, repair, provide a replacement part or product, or make appropriate adjustment. Damage to a product caused by accident, misuse, or abuse is not covered by this warranty. Proof of purchase (original sales receipt) must be provided to Kohler with all warranty claims. Kohler Co. is not responsible for labor charges, installation, or other consequential costs. In no event shall the liability of Kohler exceed the purchase price of the faucet.

If the faucet is used commercially, Kohler warrants the faucet to be free from defects in material and workmanship for one (1) year from the date the product is installed, with all other terms of this warranty applying except duration.

If you believe that you have a warranty claim, contact Kohler Co., either through your Dealer, Plumbing Contractor, Home Center or E-tailer, or by writing: Kohler Co., Attn.: Customer Service Department, 444 Highland Drive, Kohler, WI 53044, USA. Please be sure to provide all pertinent information regarding your claim, including a complete description of the problem, the product, model number, color, finish, the date the product was purchased and from whom the product was purchased. Also include your original invoice. For other information, or to obtain the name and address of the service and repair facility nearest you, call 1-800-4-KOHLER from within the USA, 1-800-964-5590 from within Canada and 001-877-680-1310 from within Mexico.

The foregoing warranties are in lieu of all other warranties, express or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose.

Seller disclaims any liability for special, incidental or consequential damages. Some states/provinces do not allow limitations of how long an implied warranty lasts or the exclusion or limitation of such damages, so these limitations and exclusions may not apply to you. This warranty gives the consumer specific legal rights. You may also have other rights that vary from state/province to state/province. This warranty is to the original consumer purchaser only, and excludes product damage due to installation error, product abuse, or product misuse, whether performed by a contractor, service company, or the consumer.

This is our exclusive written warranty.

*Trend® faucets, MasterShower™ Tower, polished gold finish, all items within the "Fixture Related" section of the KOHLER Faucets Price Book, drains, Duostrainer® sink strainers, soap/lotion dispensers and faucets used in commercial settings are covered by Kohler's one-year limited warranty.

One-Year Warranty

For Mexico Only

KOHLER CO.

It is recommended that at the time of purchase, you verify that all accessories and components are complete in this package.

This Kohler product is warranted to be free of defects in material and workmanship for one (1) year from the date of purchase as shown on the invoice or receipt.

1. Kohler Co. will only service its commercialized products through its authorized distributors.
2. To obtain warranty service, please present the invoice and corresponding warranty.
3. Through its authorized distributors, Kohler Co. promises to repair the defective product or provide a new replacement or an equivalent model (in those cases that the model has been discontinued) when the product is beyond repair, without any charge to the consumer.
4. The time of repair will not exceed six (6) weeks commencing on the date the product is received.
5. It is recommended that the consumer save the invoice or receipt as additional protection, as it may substitute the warranty in the case that there is a discrepancy in the validity of the warranty.

EXCEPTIONS AND RESTRICTIONS

The Warranty will not be valid in the following cases:

1. When the product is not operated in accordance with the instructions concerning use and operation set forth in the owner's manual or installation instructions, and when the recommendations and warnings included are not observed.
2. When the product has been modified or dismantled partially or totally; or has been used in a negligent fashion and as a consequence has suffered damages attributable to the consumer, individual, or hardware not authorized by Kohler Co.
3. This warranty does not cover the damages as a result of disaster such as fire or acts of God, including flooding, earthquake, or electric storms, etc. To obtain a list of distributors in your area where you can exercise your rights under this warranty, please call 001-877-680-1310.

KOHLER CO., KOHLER, WI 53044 U.S.A.

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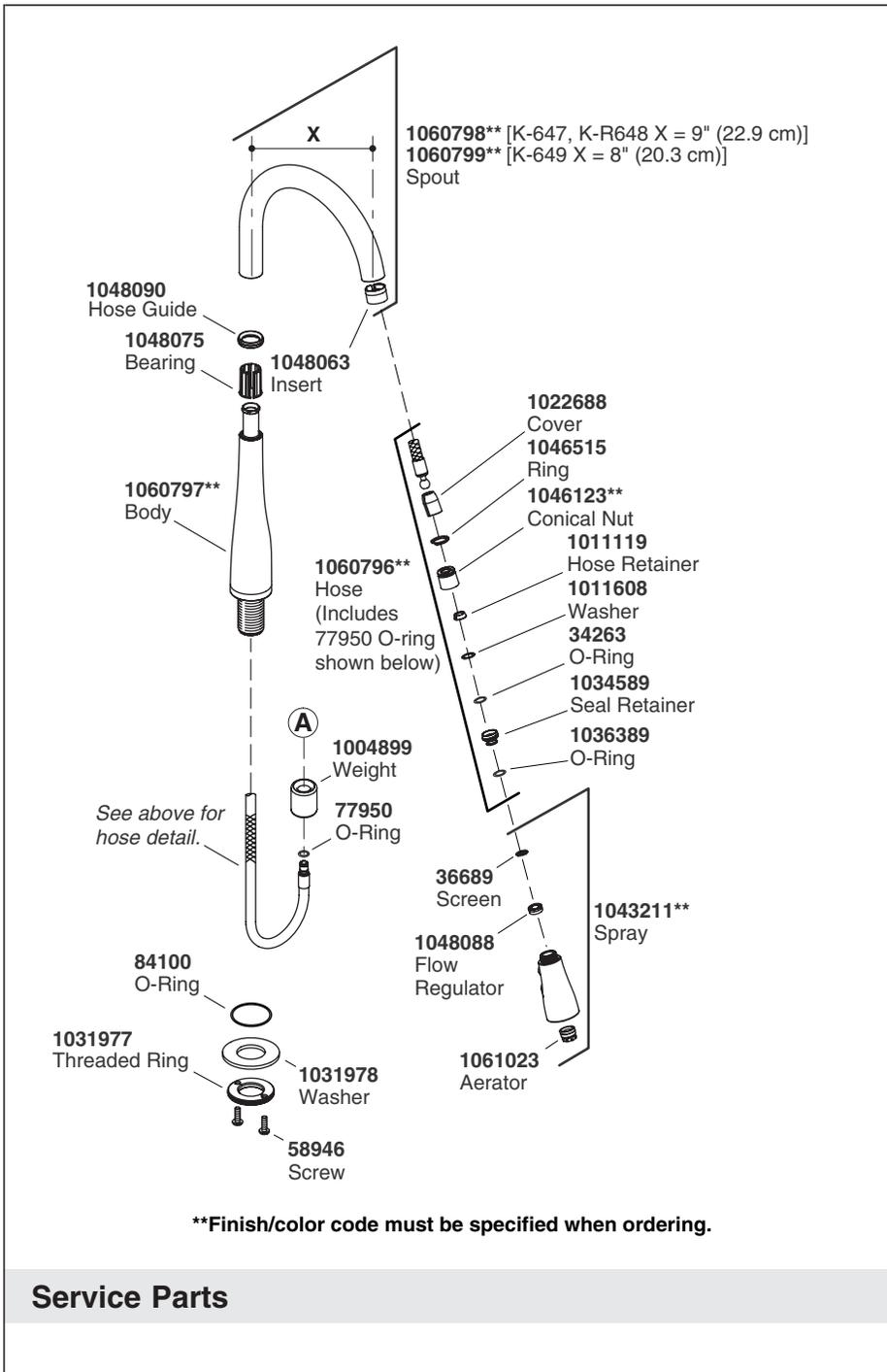
INTERNACIONAL DE CERÁMICA, S.A.B. DE C.V.

One-Year Warranty (cont.)

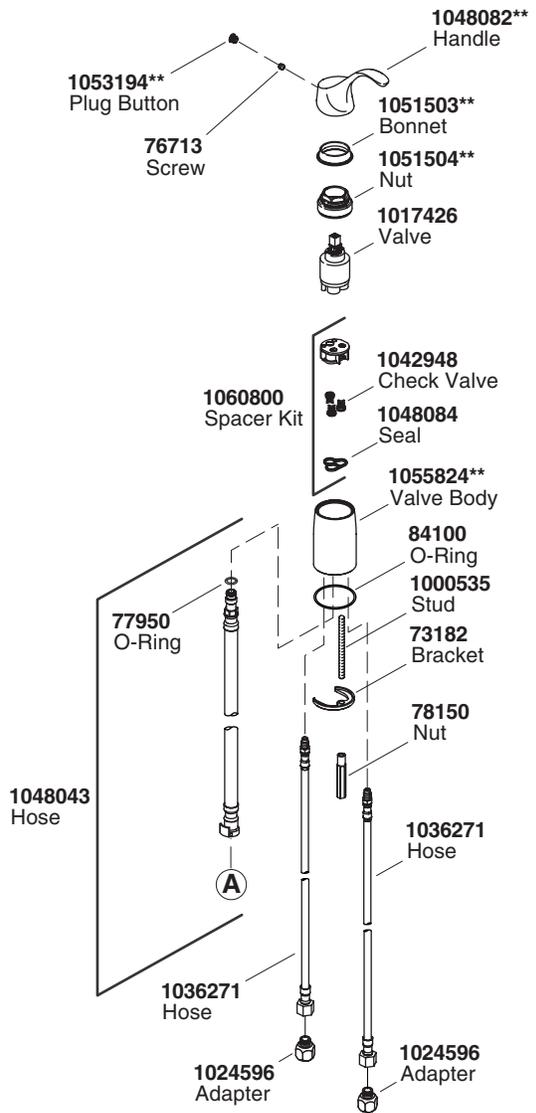
AV. CARLOS PACHECO NO. 7200

CHIHUAHUA, CHIH., MEXICO C.P. 31060

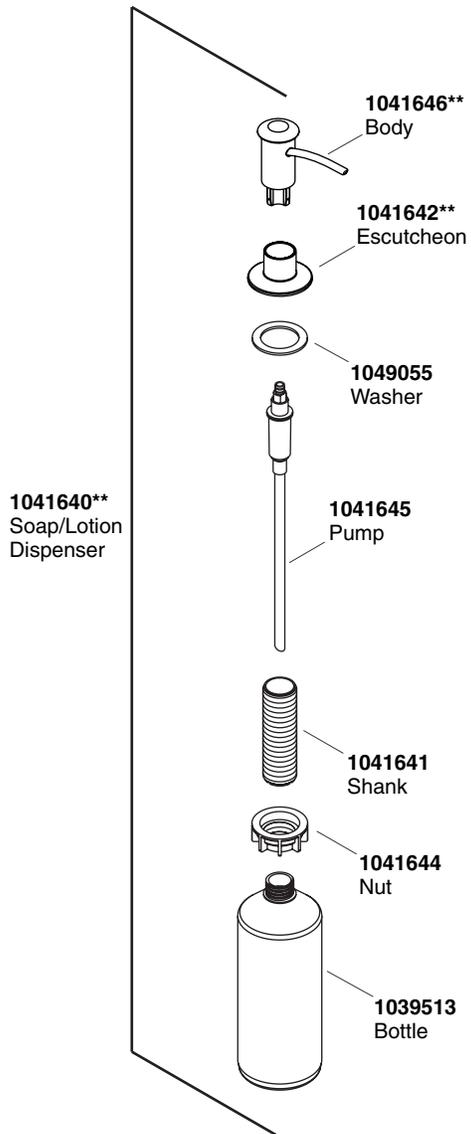
TEL: 52 (14) 29-11-11



Service Parts



****Finish/color code must be specified when ordering.**



****Finish/color code must be specified when ordering.**

Guide du propriétaire

Robinet d'évier de cuisine mono-contrôle

Merci d'avoir choisi la compagnie Kohler

Merci d'avoir choisi la ligne the Bold Look of Kohler. Le travail soigné des artisans de Kohler vous fera apprécier une rare combinaison de performances prouvées et une sophistication gracieuse, qui vous satisferont pour les années à venir. La fiabilité et la beauté de votre produit Kohler surpasseront vos plus grandes espérances. Chez Kohler, nous sommes fiers du rendement de nos produits et nous savons que vous le serez aussi.

Veillez prendre s'il vous plaît quelques minutes pour consulter ce guide du propriétaire. Prêter une attention toute particulière aux instructions d'entretien et de nettoyage.

Toute l'information dans ce manuel est basée sur la dernière disponible au moment de la publication. Chez Kohler, nous veillons constamment à améliorer la qualité de nos produits. Nous nous réservons le droit d'apporter des modifications aux caractéristiques, emballages et disponibilités des produits à tout moment, et ce sans préavis.

Votre nouveau robinet de cuisine Kohler

Votre nouveau robinet de cuisine Kohler combine un stylisme classique et une facilité d'utilisation pour une expression unique dans votre cuisine. Toute construction métallique et valve en céramique d'une pièce fonctionnent sans problèmes, même dans des régions où les conditions d'eau sont les plus rudes.

Entretien et nettoyage

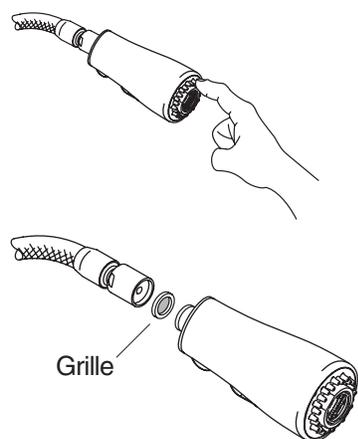
Pour de meilleurs résultats, prendre ce qui suit en considération lors de l'entretien de votre produit KOHLER:

- Utiliser un détergent doux tel que liquide pour vaisselle et de l'eau chaude pour nettoyer. Ne pas utiliser de nettoyeurs abrasifs car ils pourraient rayer ou abîmer la surface.
- Lire attentivement l'étiquette du produit de nettoyage pour vérifier qu'il soit adéquat à utiliser sur le matériau.
- Toujours tester la solution de nettoyage sur une surface la moins évidente avant de l'appliquer sur la totalité de la surface.

Entretien et nettoyage (cont.)

- Ne pas permettre aux nettoyants de reposer sur la surface.
- Essuyer les surfaces et rincer complètement avec de l'eau immédiatement après l'application du nettoyant. Rincer et sécher tout éclaboussement sur les surfaces avoisinantes.
- Utiliser une éponge ou un chiffon doux et humide. Ne jamais utiliser de matériau abrasif tel que brosse ou éponges à récurer pour nettoyer les surfaces.

Pour l'information détaillée de nettoyage et des produits à considérer, visiter www.kohler.com/clean. Pour commander des informations d'entretien et de nettoyage, composer le 1-800-456-4537 puis presser 1 pour les produits Kohler et 3 pour littérature.



Procédures d'entretien

Débit réduit du vaporisateur



ATTENTION : Risque de contamination d'eau fraîche. Ce robinet contient une protection importante de siphon anti-retour. Ne pas enlever les raccords meulés de la valve d'admission.

- Avec l'eau s'écoulant par les orifices du vaporisateur, frotter les doigts fermement en va et vient sur les orifices pour déloger les débris et les dépôts minéraux.
- Dévisser le flexible du vaporisateur pour accéder et nettoyer la grille. Tenir l'extrémité du flexible pour empêcher qu'il ne rentre dans le bec.

Garantie limitée à vie

Pour les É.U. et le Canada

Kohler Co. garantit que ses robinets fabriqués après le 1 Janvier 1997 ne gouteront pas, et seront sans fuites pendant leur utilisation normale à domicile, aussi longtemps que l'acquéreur initial en soit le propriétaire. *Si le robinet gouttait ou présentait des fuites en cours d'utilisation normale, Kohler vous enverra par courrier, sans frais, la cartouche nécessaire pour réparer le robinet.

Kohler garantit aussi que toutes les autres caractéristiques du robinet, à l'exception de la finition dorée, sont exemptes de défauts de matériau

Garantie limitée à vie (cont.)

et de fabrication durant l'utilisation résidentielle normale, aussi longtemps que l'acquéreur initial soit propriétaire de son domicile. Si un défaut est décelé en cours d'usage normal domestique, Kohler Co. décidera à sa discrétion, de réparer, de remplacer ou d'effectuer les réglages appropriés. Cette garantie n'offre pas de protection contre les dommages causés par accident, mauvais usage ou mauvais traitement. Une preuve d'achat (ticket de caisse original) doit être présentée à Kohler avec tous les recours en garantie. Kohler Co. n'est pas responsable des coûts de main-d'oeuvre, d'installation ou d'autres frais qui en découlent. La responsabilité de Kohler n'excédera en aucun cas le prix d'achat du robinet.

Si le produit est utilisé dans un commerce, Kohler garantit le produit contre tout défaut de matériel et de fabrication pour un (1) an à partir de la date d'installation du produit, en plus de tous les autres termes de cette garantie appliquée excepté la durée.

Pour vous prévaloir d'une indemnisation en vertu de cette garantie, veuillez contacter Kohler Co. par l'intermédiaire de votre vendeur, plombier, centre de rénovation ou revendeur par internet, ou bien par écrit à l'adresse suivante: Kohler Co., A l'attention de: Customer Service Department, 444 Highland Drive, Kohler, WI 53044, USA. Veuillez vous assurer de fournir tous les renseignements pertinents à votre demande d'indemnité, y compris une description complète du problème, produit, modèle, couleur, finition, date et lieu de l'achat. Joindre également l'original de la facture. Pour plus de renseignements ou pour demander les coordonnées du centre de réparation le plus proche, composer le 1-800-4-KOHLER à partir des E.U., le 1-800-964-5590 à partir du Canada ou le 001-877-680-1310 à partir du Mexique.

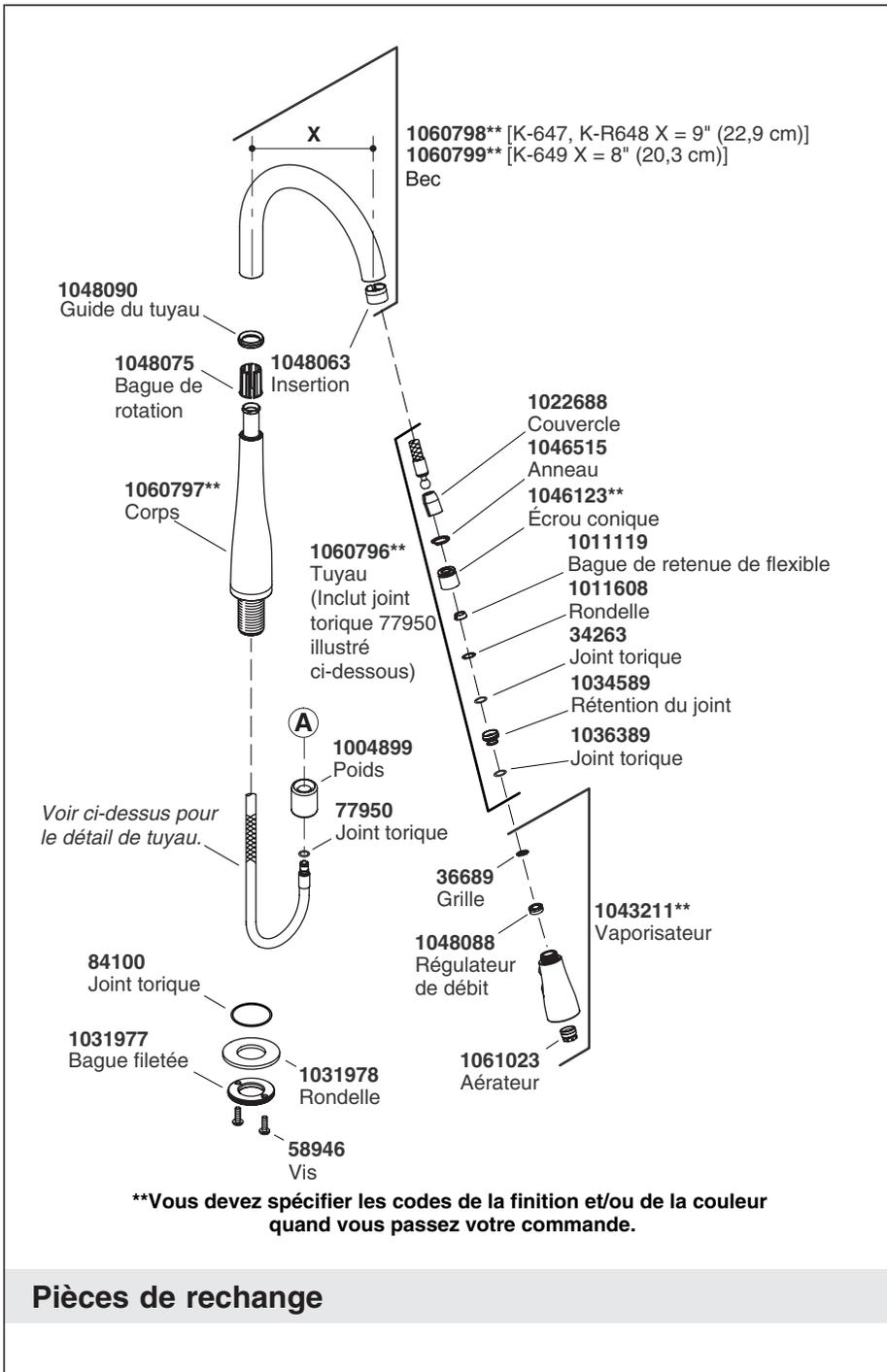
Les garanties données ci-dessus remplacent toutes les autres garanties, expresse ou tacites, y compris, mais sans s'y limiter, à celles marchandes et d'aptitude à un emploi particulier.

Le vendeur décline toute responsabilité contre les dommages particuliers, directs ou indirects. Certains états/provinces ne permettent pas de limitations de durée ou l'exclusion ou limitation de tels dommages qui pourraient ne pas s'appliquer dans votre cas. La présente garantie accorde au consommateur des droits légaux spécifiques. Vous pouvez également avoir d'autres droits qui varient d'un état/province à l'autre. Cette garantie est accordée uniquement à l'acquéreur initial et exclut tous dommages dus à une installation erronée, un usage abusif ou une mauvaise utilisation du produit, qu'ils soient effectués par un entrepreneur, une société de services ou le consommateur.

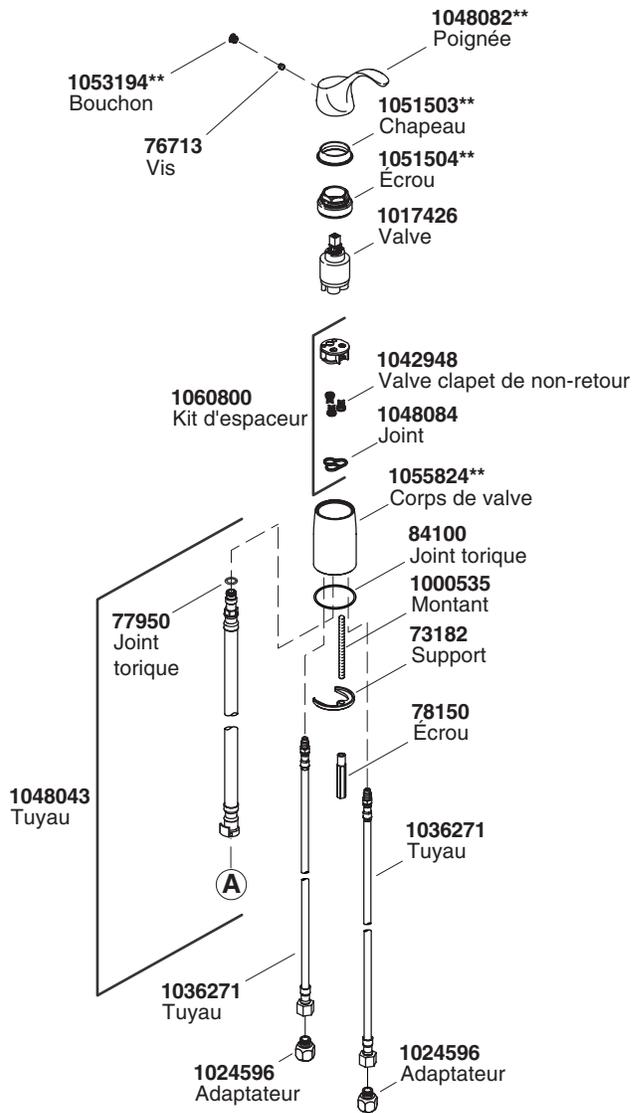
Garantie limitée à vie (cont.)

Ceci constitue notre garantie écrite exclusive.

*Les robinets Trend®, la Tour MasterShower™, les finitions en or poli, tous les articles contenus dans la section "Relatif à l'appareil" du catalogue des prix des robinets Kohler, drains, Duostrainer®, distributeurs de savon/lotion et les robinets utilisés dans des environnements commerciaux sont couverts par la garantie limitée d'un an de Kohler.

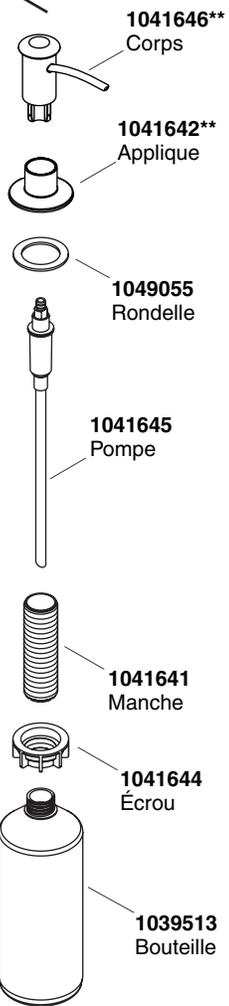


Pièces de rechange



****Vous devez spécifier les codes de la finition et/ou de la couleur quand vous passez votre commande.**

1041640**
Distributeur de
savon/lotion



****Vous devez spécifier les codes de la finition et/ou de la couleur
quand vous passez votre commande.**

Guía del usuario

Grifería monomando de fregadero de cocina

Gracias por elegir los productos de Kohler

Gracias por elegir la línea de productos de The Bold Look of Kohler. La artesanía de Kohler le ofrece una rara combinación de rendimiento comprobado y agraciada elegancia capaces de satisfacer sus exigencias durante muchos años. La fiabilidad y belleza de su producto Kohler sobrepasarán sus mayores expectativas. En Kohler, nos sentimos orgullosos de nuestros productos y sabemos que usted también lo estará.

Dedique unos minutos para leer esta Guía del usuario. Preste especial atención a las instrucciones de cuidado y limpieza.

Toda la información contenida en este manual está basada en la información más reciente disponible al momento de su publicación. En Kohler, nos esforzamos constantemente por mejorar la calidad de nuestros productos. Por lo tanto, Kohler se reserva el derecho de efectuar cambios en las características del producto, embalaje o disponibilidad en cualquier momento, sin previo aviso.

Su nueva grifería de cocina Kohler

Su nueva grifería de cocina Kohler combina el estilo clásico con la facilidad de uso, creando una expresión única en su cocina. La estructura de metal y la válvula de cerámica de una pieza ofrecen un funcionamiento sin problemas, incluso en zonas de agua dura.

Cuidado y limpieza

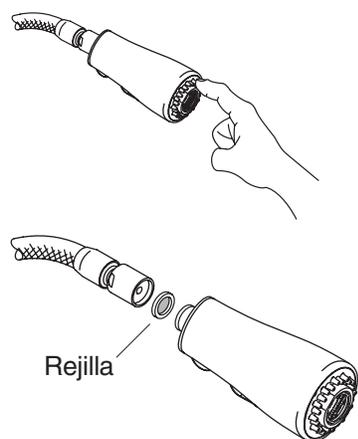
Para obtener los mejores resultados, tenga presente lo siguiente al limpiar su producto KOHLER:

- Para la limpieza, utilice solamente un detergente suave como el jabón líquido para lavar platos y agua tibia. No utilice limpiadores abrasivos que puedan rayar u opacar la superficie.
- Lea atentamente la etiqueta del producto de limpieza para asegurar que no presente riesgos al usarse en el material.
- Siempre pruebe la solución de limpieza en un área oculta antes de aplicarla a toda la superficie.

Cuidado y limpieza (cont.)

- No deje por tiempo prolongado los limpiadores en la superficie.
- Limpie con un trapo y enjuague completa e inmediatamente con agua después de aplicar limpiadores. Enjuague y seque las superficies cercanas que se hayan rociado.
- Utilice una esponja o trapo suave y húmedo. Nunca utilice materiales abrasivos como cepillos o estropajos de tallar para limpiar las superficies.

Para obtener información detallada de limpieza y los limpiadores a considerar, visite www.kohler.com/clean. Para solicitar información sobre el cuidado y la limpieza, llame al 1-800-456-4537 y presione 1 para productos Kohler y luego 3 para documentos.



Procedimientos de mantenimiento

Flujo reducido del rociador



PRECAUCIÓN: Riesgo de contaminación del agua limpia.

Esta grifería tiene protección importante de contrasifonaje. No manipule ni desmonte ninguno de los componentes.

- Con el agua fluyendo a través de los orificios del rociador, frote con el dedo las boquillas para desalojar los sedimentos y depósitos minerales.
- Desenrosque la manguera del rociador para poder limpiar la rejilla. Sostenga el extremo de la manguera para que no se retraiga en el surtidor.

Garantía limitada de por vida

Para Estados Unidos y Canadá

Kohler Co. garantiza que la grifería fabricada después del 1 de enero de 1997 está libre de problemas de fugas y goteo durante el uso residencial normal, mientras el comprador consumidor original sea el propietario de la casa. *En caso de que la grifería presente fugas o goteo durante el uso normal, Kohler enviará por correo y sin ningún cargo al comprador original, el cartucho necesario para que la grifería funcione correctamente.

Kohler también garantiza que todas las demás características de la grifería, excepto el acabado en oro, están libres de defectos de material y mano de obra, durante el uso residencial normal, mientras el

Garantía limitada de por vida (cont.)

comprador consumidor original sea el propietario de la casa. Si el producto presenta defectos durante el uso residencial normal, Kohler Co., a su criterio, reparará, proveerá el repuesto o el producto, o realizará los ajustes pertinentes. Esta garantía no cubre daños causados por accidentes, abuso o uso indebido del producto. Al presentar las reclamaciones de garantía a Kohler, es necesario incluir la prueba de compra (recibo original). Kohler Co. no se hace responsable de los gastos de mano de obra, instalación u otros gastos indirectos. En ningún caso la responsabilidad de Kohler excederá el precio de la grifería.

Si la grifería es para uso comercial, Kohler garantiza que la grifería está libre de defectos de material y mano de obra por un (1) año, a partir de la fecha de instalación, estando en efecto todas las demás condiciones de la presente garantía, excepto la duración.

Si usted considera que tiene una reclamación en virtud de la garantía, comuníquese con Kohler Co., ya sea a través de su distribuidor, contratista de plomería o distribuidor a través de Internet, o escriba a la siguiente dirección: Kohler Co., Attn.: Customer Service Department, 444 Highland Drive, Kohler, WI 53044, USA. Por favor, asegúrese de proporcionar toda la información pertinente a su reclamación, incluyendo una descripción completa del problema, producto, número de modelo, color, acabado, fecha y lugar de compra del producto. También incluya el recibo de compra original. Para información adicional, o para obtener el nombre y dirección del lugar de reparación y servicio más cercano a usted, llame al 1-800-4-KOHLER desde los Estados Unidos, al 1-800-964-5590 desde Canadá y al 001-877-680-1310 desde México.

Las garantías anteriormente mencionadas sustituyen todas las demás garantías, expresas o implícitas, incluyendo, entre otras, las garantías implícitas de comercialización e idoneidad para un propósito en particular.

El vendedor no se hace responsable por concepto de daños particulares, incidentales o indirectos. Algunos estados/provincias no permiten limitaciones en cuanto a la duración de una garantía implícita o a la exclusión o limitación de tales daños, por lo que estas limitaciones y exclusiones pueden no aplicar a su caso. La presente garantía otorga al consumidor ciertos derechos legales específicos. Además, usted puede tener otros derechos que varían de estado a estado y provincia a provincia. Esta garantía está destinada únicamente para el comprador consumidor original y excluye todo daño al producto como resultado de errores de instalación, abuso del producto o uso indebido del mismo, bien sea por parte de un contratista, compañía de servicios o el consumidor mismo.

Garantía limitada de por vida (cont.)

Ésta es nuestra garantía exclusiva por escrito.

*La grifería Trend®, la torre MasterShower™, los productos con acabado en oro, todos los artículos contenidos en la sección "Fixture Related" del KOHLER Faucets Price Book, los desagües, las coladeras de fregadero Duostrainer®, los dispensadores de jabón y loción, y la grifería de uso comercial están cubiertos por la garantía limitada de un año de Kohler.

Garantía de un año

Sólo para México

KOHLER CO.

Al adquirir el producto, se recomienda verificar que todos los accesorios y componentes estén completos en la caja.

Kohler Co. garantiza que el material y la mano de obra de este producto están libres de defectos, por un (1) año, a partir de la fecha de compra que aparece en la factura o recibo.

1. Kohler Co. prestará servicio únicamente a los productos comercializados a través de sus distribuidores autorizados.
2. A fin de obtener el servicio de garantía, favor de presentar la factura de compra y la garantía correspondiente.
3. Kohler Co., a través de sus distribuidores autorizados, se compromete a reparar el producto defectuoso o a reemplazarlo por uno nuevo o equivalente (en caso de que el producto esté descontinuado) cuando no sea posible la reparación, sin ningún cargo al consumidor.
4. El tiempo de reparación no excederá de seis (6) semanas, a partir de la fecha de recepción del producto.
5. Se recomienda al consumidor que conserve el recibo o factura de compra como protección adicional, pues el mismo puede sustituir a la garantía, en caso de que exista discrepancia en cuanto a la validez de la misma.

EXCEPCIONES Y RESTRICCIONES

La garantía no tendrá validez en los siguientes casos:

1. Cuando el producto no se haya utilizado conforme a las instrucciones de uso y funcionamiento incluidas en el manual del usuario o en las instrucciones de instalación y cuando no se hayan observado las recomendaciones y advertencias allí contenidas.

Garantía de un año (cont.)

2. Cuando el producto se haya modificado o desmantelado parcial o totalmente; o manipulado de manera negligente y, como consecuencia, haya sufrido daños atribuibles al consumidor, persona o herrajes no autorizados por Kohler Co.

3. Esta garantía no cubre los daños que resulten de desastres naturales, tales como incendios o casos de fuerza mayor, incluyendo inundaciones, terremotos, tormentas eléctricas, etc. Para obtener una lista de distribuidores cerca de usted y así hacer valer sus derechos bajo esta garantía, llame al 001-877-680-1310.

KOHLER CO., KOHLER, WI 53044 U.S.A.

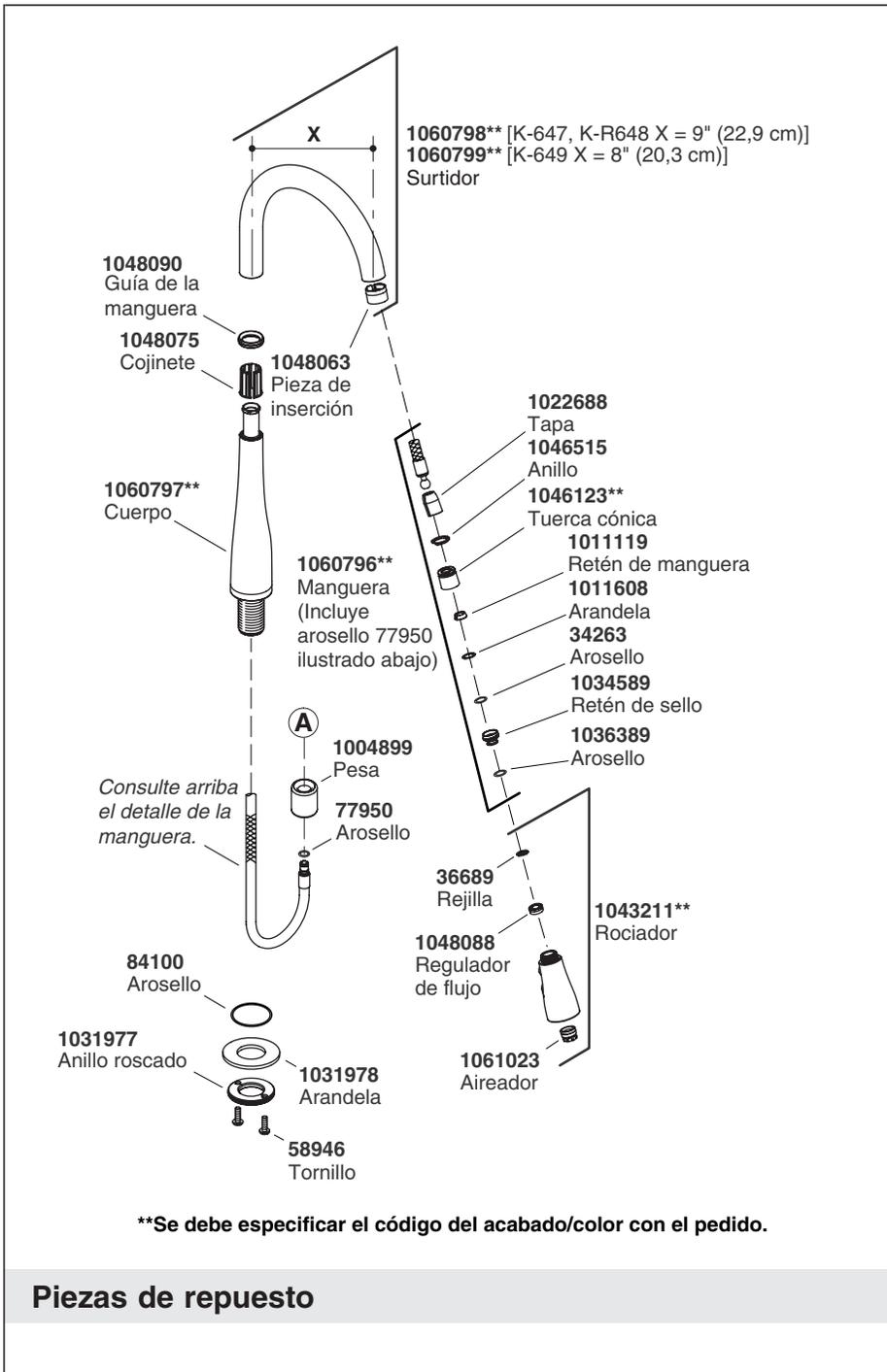
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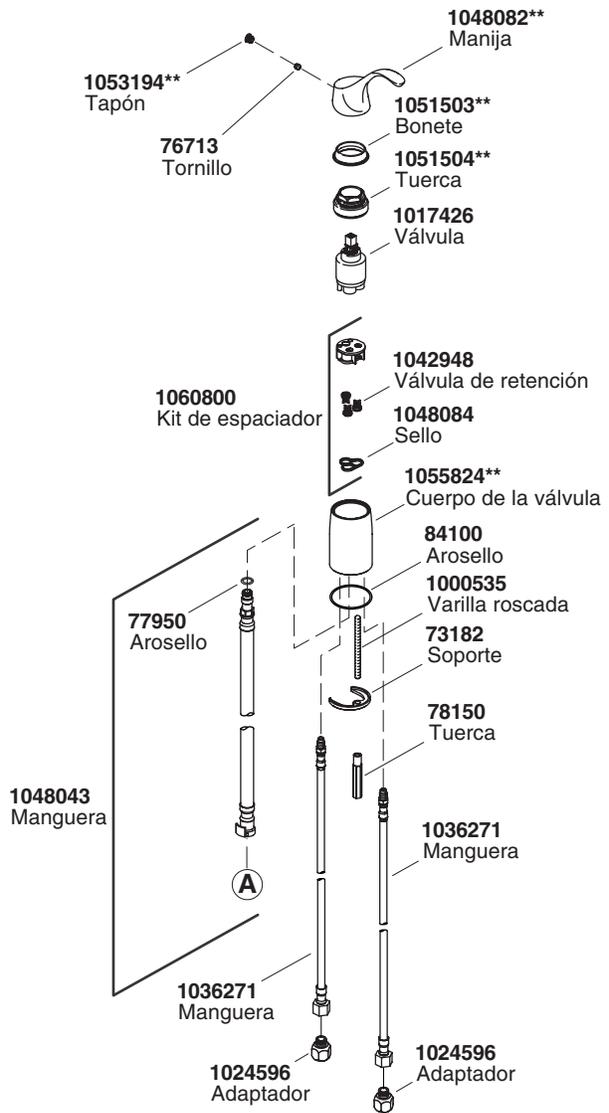
INTERNACIONAL DE CERÁMICA, S.A.B. DE C.V.

AV. CARLOS PACHECO NO. 7200

CHIHUAHUA, CHIH., MÉXICO C.P. 31060

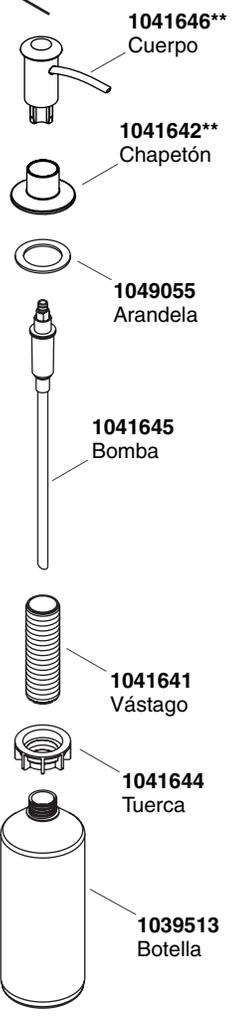
TEL: 52 (14) 29-11-11





****Se debe especificar el código del acabado/color con el pedido.**

1041640**
Dispensador
de jabón/loción



****Se debe especificar el código del acabado/color con el pedido.**

USA: 1-800-4-KOHLER
Canada: 1-800-964-5590
México: 001-877-680-1310

kohler.com

THE BOLD LOOK
OF **KOHLER**®

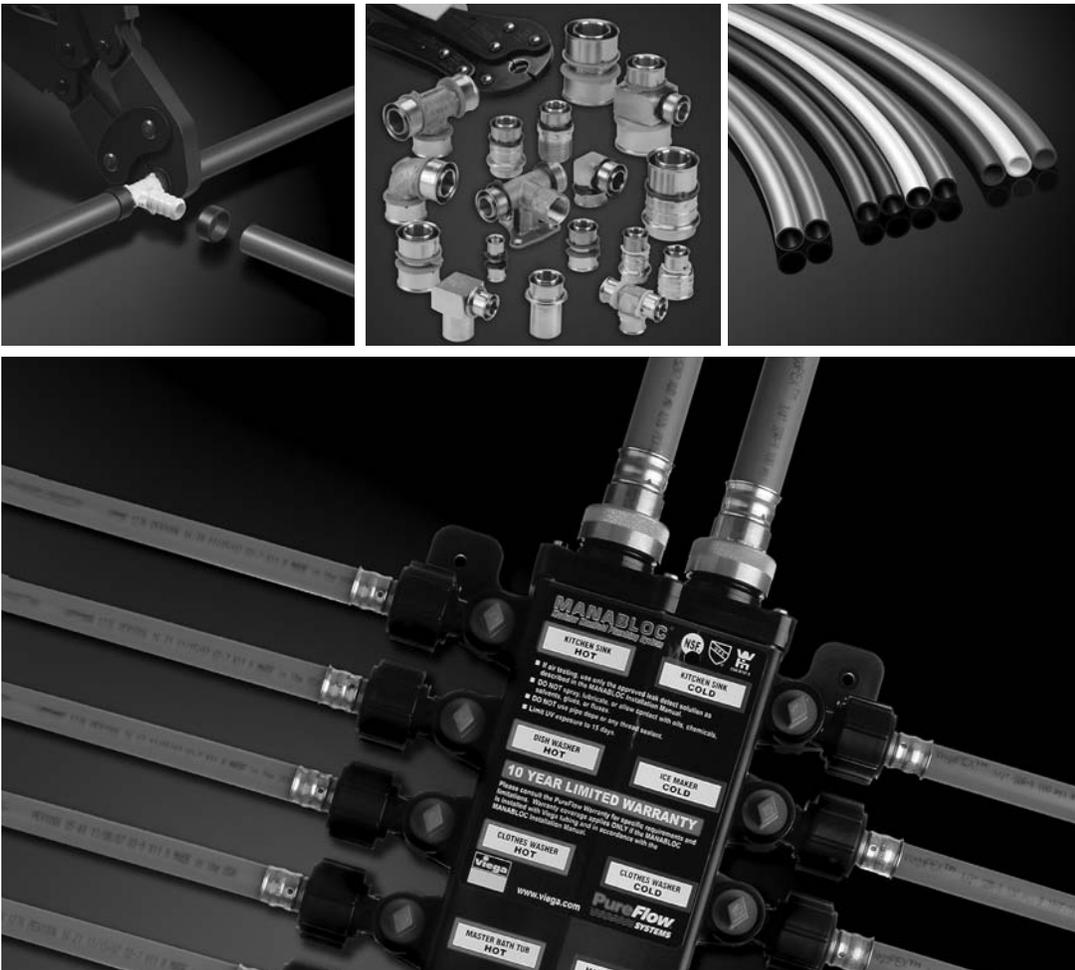
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1048033-5-D

PureFlow[®] Water Systems



Installation Manual



June 2009



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 MANABLOC is a registered trademark of Viega LLC
 ViegaPEX is a trademark of Viega LLC
 FostaPEX is a registered trademark of Viega GmbH & Co. KG
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Working with Viega is the perfect solution.

Viega researches, develops and produces complete system solutions for contractors. The components are produced at our plants or are supplied exclusively by the finest quality manufacturers. Each of our systems is developed in-house and tested under stringent quality control conditions to guarantee safety and efficient operation.

An international company with a national commitment.

Viega PureFlow plumbing combines technology from both sides of the Atlantic into the very best PEX plumbing systems for our customers.

Viega's reach extends throughout North America with distribution across the U.S., Canada and Mexico.

Our network of sales experts and wholesale distributors can meet your needs whether you are in Boston or Berkeley. The products we deliver are the finest quality offered at a highly competitive price. Our goal is to remain on the forefront of the plumbing industry well into the new century, and with our advanced products and a determination to remain the quality leader, we are convinced this accomplishment is well within our reach.

Call 800-976-9819 for your local representative and wholesale location.

Why you can depend on Viega PureFlow.

- A safe system
- Competitively priced
- Leakproof fitting connection
- Highly flexible and kink resistant
- Lightweight and easy to handle
- Fast and solder-free installation
- No open flame during installation
- Reduced number of fittings used in wall
- Long life expectancy
- Non-corroding
- Reduced flow noises
- In coils or straight lengths
- FostaPEX form stable tubing ideal for exposed runs
- Listed by NSF to meet the requirements of ANSI 14 and 61 and NSF Protocol P171 (CL-R/CL-TD)
- Listed to ASTM F876/F2023 and F877

IMPORTANT NOTICE

This installation guide is intended for traditional (branch and main) plumbing systems and hybrid plumbing systems using termination manifolds, MANABLOC® and MINIBLOC parallel / manifold plumbing system.

NOTE: References to ViegaPEX™ tubing made throughout this publication include the entire line of Viega cross-linked polyethylene products.

IN THE EVENT OF CONFLICT OR INCONSISTENCY BETWEEN THESE INSTALLATION GUIDELINES AND LOCAL BUILDING OR PLUMBING CODES, LOCAL CODES SHOULD TAKE PRECEDENCE.

NOTE: Failure to follow the installation instructions will void the Viega Plumbing Warranty. Nothing in this publication is intended to create any warranty beyond Viega's applicable warranty. For additional information, contact Viega at 800-976-9819.

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Terms Used in This Guide:

PEX	ViegaPEX cross-linked polyethylene tubing
AHJ	Authority Having Jurisdiction
PPM	Parts Per Million
NSF	NSF International, Inc. (formerly National Sanitation Foundation)
CAN/CSA	Canadian Standards Association
“shall”	Required; a mandatory procedure
“may” or “should”	A suggested optional procedure

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Terms Used in This Guide:

PEX	ViegaPEX cross-linked polyethylene tubing
AHJ	Authority Having Jurisdiction
PPM	Parts Per Million
NSF	NSF International, Inc. (formerly National Sanitation Foundation)
CAN/CSA	Canadian Standards Association
"shall"	Required; a mandatory procedure
"may" or "should"	A suggested optional procedure

1. INTRODUCTION

1.1 Viega

For over 100 years, Viega has been a trusted name in the plumbing business globally.

Through innovative techniques, sophisticated technologies and acquisition of the top PEX plumbing products in the U.S. Viega has become the industry leader for PEX plumbing.

Viega produces a comprehensive range of plumbing and heating equipment. Anywhere that water flows in a building Viega manufactures a system to fit. The company's experience with press fitting technology in bronze, stainless steel and copper led to the development of the PureFlow water distribution system. Viega is positioned as the number-one supplier of PEX plumbing systems in North America.

Today Viega engineers and manufactures more than 12,000 system components at five state-of-the-art factories including our PEX tubing facility located in the heart of the U.S. Viega quality has proven itself in millions of systems installed each year around the world.

Viega has a history in North America of technological innovation and customer service that is second to none. The Viega product line now is composed of multiple brands including ProPress® flameless copper and ProPress® stainless steel joining technology, PureFlow® flexible PEX tubing plumbing technology, ProRadiant® comfortable efficient heating technology and S-no-Ice® snow and ice melting technology, to name a few. Each line is selected so that components work together to create a complete system concept. PureFlow plumbing provides complete PEX systems for potable

water distribution, including manifolds, PEX and multilayer tubing, fittings and valves. The ProRadiant program includes a wide range of hydronic radiant systems and controls as well as thermostats and setpoint controls.

In addition, the Viega S-no-Ice line includes snow and ice detection controls, heat exchangers and snow melting systems.

As the pioneer in combining technology and engineering expertise from both sides of the Atlantic into the very best systems for our customers in North America, we are proud to present you the world's finest potable water distribution systems: PureFlow.

The name says it all.

We look forward to sharing our history in the making with you.



1.2 PureFlow System Concepts

ViegaPEX PureFlow is a high-quality flexible PEX system for hot and cold potable water distribution.

The PureFlow plumbing system offers maximum security thanks to cold press and full circle crimp fitting techniques. These fittings guarantee the plumber quick installation, suitability for use in all types of applications at the construction site and vast reductions in the required number of fittings and necessary installation time.

Top quality materials such as brass, bronze, stainless steel and durable, environmentally compatible plastics provide the basis for the very highest standards of quality at Viega.

PEX tubing offers outstanding versatility. More than 655 million feet of Viega PEX Tubing has been manufactured since 2006. This is conclusive evidence of this product's considerable importance in plumbing installation, in both quality and quantity.

This is clearly the result of excellent workmanship, fast and simple installation and the reliability and safety which are characteristic of the Viega system concept.

The efficiency of the integrated system concept for Viega branded products is confirmed by:

- Perfectly coordinated components
- Quick delivery at short notice
- Time-saving installation
- Complete installation of an entire system from one supplier

Viega's comprehensive services include technical support and warranty coverage, subject to the exclusive use of PureFlow system components.

PureFlow is a high-quality plumbing system. It is able to withstand high levels of thermal and mechanical stress (200°F at 80 psi, 180°F at 100 psi, 73.4°F at 160 psi).

The systems incorporate:

- ViegaPEX tubing: red, white and blue cross-linked polyethylene tubing designed with superior chlorine resistance
- ViegaPEX Ultra tubing: red, white, blue, and black cross-linked polyethylene tubing with added resistance to UV
- Viega FostaPEX tubing: cross-linked polyethylene with additional aluminum and polyethylene layers to provide rigidity and form stability, available in red or silver to differentiate hot water lines
- A range of bronze, brass or plastic fittings for PEX Press and PEX Crimp fitting systems
- PureFlow MANABLOC distribution system for use with Viega PEX tubing
- A range of inline, manifold and stop valves for ViegaPEX fitting systems
- Viega PureFlow press tools and jaws for the PEX Press fitting systems
- Viega PureFlow crimp tools for the PEX Crimp fitting systems



2. GREEN BUILDING

2.1 General

Green Building incorporates environmental considerations into every phase of the home building process. Multiple factors are considered during construction as well as its operation and its impact on the environment. LEED® (Leadership in Energy and Environmental Design) was established by the U.S. Green Building Council (USGBC) as a system to define and measure “green building.” This voluntary market-driven rating system is based on existing, proven technology, and awards credits for different aspects of environmental design. There are four levels of performance that can be achieved per these resource categories: Certified, Silver, Gold and Platinum.

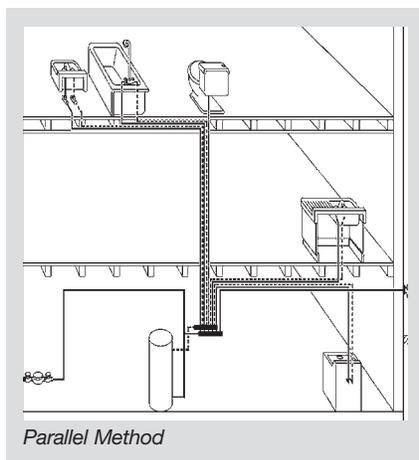
Viega’s PureFlow plumbing systems can be incorporated to improve both water and energy efficiency, earning your home credits toward a LEED certification level (when following LEED installation criteria). To obtain more information concerning LEED certification for your home, contact the USGBC.

2.2 Structured Plumbing

Structured plumbing is the practice of installing and/or designing a plumbing system in a manner that enhances the system’s performance by reducing water waste and hot water delivery times. This plumbing strategy is becoming important for home builders in markets where water conservation is prevalent. Viega, being the leader in innovation and technology for the plumbing and heating systems, has embraced this philosophy with its plumbing products.

2.2.1 Parallel Systems

Using home run manifolds (see illustration below), the installer can potentially plumb a house without fittings hidden inside walls. By installing a manifold system near the hot water source, tubing can be run directly to each fixture without using additional fittings. This system provides the lowest pressure losses, as well as eliminates interference between fixtures. Often each fixture can be fed with smaller diameter tubing, which is easier and faster to install.



The MANABLOC Manifold is a unique plumbing system that not only provides a superior plumbing system for homeowners but can also be incorporated to provide water and energy savings. It’s a simple concept that provides extraordinary performance: each fixture is fed by its own flexible water distribution line, which runs from a central manifold. By providing each fixture with its own distribution line, the line can be sized appropriately so hot water can be delivered rapidly. Since the line is dedicated to a single hot or cold fixture, less water is required to purge the line. This saves time, energy and can reduce water waste by up to 40%.

Clean System and Clean Installation

The MANABLOC is preferred by many installers thanks to its fast and safe installation. There are no fumes from solvents to contend with and no torches required on site for installation. Installation time is significantly less than that of a rigid plumbing system due to the flexibility of ViegaPEX tubing and the simplicity of the PureFlow fitting systems. Viega tubing is color coded to make installation easier and the connection of fixtures to the proper distribution line faster and more foolproof. Homeowners can be assured of the purity of the system due to the third party NSF 61 certification carried by both the MANABLOC and ViegaPEX tubing. Homeowners also benefit from the corrosion resistance of ViegaPEX, which helps prevent contamination of drinking water.

Fewer Fittings Behind the Wall

The MANABLOC requires fewer fittings than branch and main plumbing systems. This means very few are needed behind the wall. The MANABLOC is installed using flexible ViegaPEX tubing that can be bent around obstacles without the need for fittings. In most cases, each dedicated line has a fitting at the MANABLOC and one at the fixture connection with no fittings located behind the walls.

Rich in Homeowner Benefits

Home builders enjoy the many features the MANABLOC system offers their customers over branch and main plumbing systems including:

- **Faster Hot Water Delivery** – properly sized lines deliver hot water up to four times faster
- **Better Control of the Plumbing System** – individual shutoff valves provide a simple way of servicing a fixture or adding on to the system

- Quiet Operation – Flexible ViegaPEX tubing reduces water hammer noise and provides quiet operation
- Balanced Water Delivery – multiple fixtures can be used simultaneously without noticeable pressure or temperature changes.



Water Heater Placement

The MANABLOC should be as close as possible to the water heater to minimize extra water from being stored in the larger hot water supply lines between the MANABLOC and water heater.

The longer the hot water supply line is, the greater the volume of water requiring purging through the faucet before hot water is available. This creates water waste and longer hot water delivery times.

Proper Water Distribution Line Sizing to Each Fixture

This is crucial for overall system performance. If you oversize a distribution line to a fixture (1/2" PEX line supplying a sink instead of a 3/8" PEX line) you are essentially doubling the volume of water being stored in that line. It can take roughly twice as long to purge an oversized line compared to a properly sized line.

The fixture is what dictates water flow (federally mandated, governed by code). The tubing applies a friction loss dictated by its size and length. Therefore, as long as you do not undersize a distribution line or run it excessive distances (60 feet or greater), the system will perform properly, maintaining sufficient pressure and flow.

The Length of a Distribution Line Run to Each Fixture

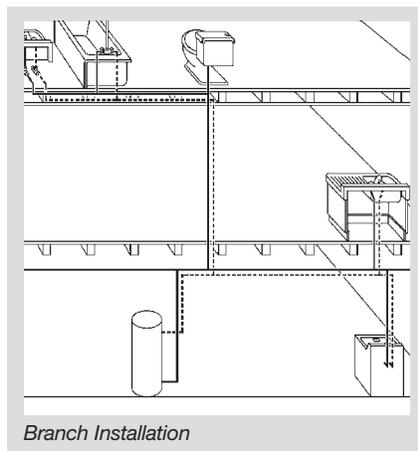
This is just as important as properly sizing each distribution line. Length of a distribution line run can drastically affect the performance of a MANABLOC system. The longer the line is, the more water being stored within it. Therefore, it will take longer to purge it out before hot water can reach the fixture. The MANABLOC should be located somewhat central to your fixture groups, keeping within 60 feet or less of each fixture for maximum performance.

If this cannot be accomplished with one MANABLOC, multiple MANABLOCs may be required. Place one at each end of the home to split the distribution line distance between them (see section 14.6 for use of multiple MANABLOCs).

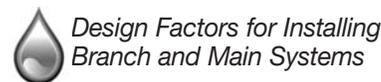
2.2.2 Branch and Main Systems

This method of plumbing is commonly referred to as a conventional plumbing system or branch and tee systems.

This system uses a large diameter "main" supply line (minimum 3/4") for both hot and cold water supplies that runs throughout a structure to or near each fixture group with smaller "branch" lines teeing off the main to supply each fixture.



While this system can reduce the amount of tubing used, it requires more fittings, which can increase installation time and cost.



Design the layout as condensed as possible

Keep the main hot supply line close to the fixture groups with the branch lines shorter than 6 feet. This will help provide hot water in a reasonable amount of time with less wasted water.

The limiting factor for installers to accomplish an optimal design is how spread out the fixture groups are within the structure.

If the fixture groups are not condensed, a branch and main system will have slow hot water delivery times and substantial water waste.

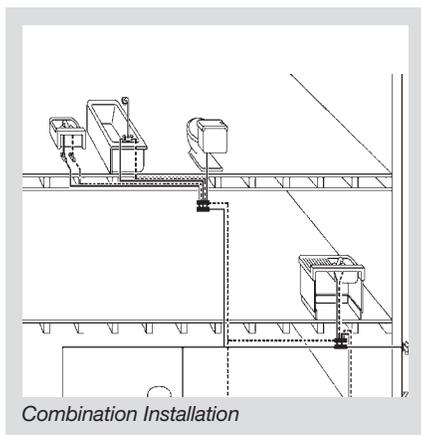
If there is a floor plan that incorporates stacked or back-to-back fixture groups, then a branch and main system can be an effective alternative to a parallel system.

One disadvantage to these systems is they store excess amounts of water in the large main lines. Therefore the farther away the fixture is, the longer the main supply line must be to reach it, and the longer it takes to purge all stored water out before hot water reaches the fixture.

Another problem these systems suffer from is noticeable pressure drop during multiple fixture use. When multiple fixtures are used it increases the water flow (load) within the main line, causing higher friction loss equal to pressure loss at the point of use. This causes a drop in pressure (and potentially a temperature change) in your shower when a toilet is flushed.

2.2.3 Combination Systems

A combination system uses multiple manifolds combined with a branch and main type supply system. These systems use small manifolds located throughout a structure placed near each main fixture group and are supplied by the main hot and cold supply lines similar to the branch and main system. The manifolds branch multiple lines from a common location in lieu of multiple tee fittings spread throughout. This takes advantage of benefits from both types of systems and helps keep hidden fittings to a minimum.



Just like the branch and main system, condensed floor plan layouts are preferable to minimize the length and the amount of water stored in the main supply line, minimizing the amount of water purged before hot water reaches the fixtures. These systems can also suffer from fluctuating pressure during multiple fixture use.

2.2.4 Domestic Hot Water Circulating Systems

A hot water circulation system can be incorporated into most plumbing systems and works by constantly (or periodically throughout the day on a timer) circulating hot water through the main hot supply line of your plumbing system.

This is done by using a return line at the end of the main hot supply line, and a low-flow pump (usually near the hot water tank). The circulating system keeps hot water readily available throughout the entire main hot water supply line, eliminating the need to purge the entire line before hot water is present at the fixture.

There are a number of hot water circulation systems available in the marketplace that offer a variety of options. These systems are ideal for branch and main, or combination systems with spread-out fixture groups/floor plans, as well as for larger homes using multiple MANABLOCs in a parallel type system.



Design Factors for Hot Water Circulation Systems

Installing a hot water circulation system

A tanked water heater shall be used for this type of system. A tankless or instantaneous type water heater will drastically increase the operating cost of the system.

There are many types of these systems available on the market today. Research which type is best for the particular application. Ensure all the components being used within the circulation system are rated and/or approved for a hot water circulation system. The chosen system may require maintenance and/or repairs over time, which could include complete pump replacement.

Note: Utility costs are associated with running these systems due to the electricity required to operate the pump. Costs will vary depending on the frequency of operation and size of the pump.

3. VIEGAPEX TUBING

3.1 General

ViegaPEX PureFlow tubing is a high-density cross-linked polyethylene tubing (PEX). Cross-linking produces a strong, durable tubing ideal for both hot and cold potable water systems.

3.2 PEX - the superior tubing

Cross-linked polyethylene is the ideal tubing choice for potable water systems. Compared to ordinary polyethylene tubing (PE), cross-linked tubing has higher temperature resistance and higher burst pressure.

ViegaPEX tubing is manufactured to ASTM F876/F877 standards and listed to ANSI/NSF Standards 14 and 61. It is chlorine resistance rated for both traditional (CL-TD) and continuous recirculation (CL-R) or (CL5) applications. ViegaPEX tubing is rated at 100 psi at 180°F and 160 psi at 73°F.

In addition, the smooth walls of ViegaPEX tubing are resistant to corrosion and scaling.

3.3 Colors

ViegaPEX is available in red, white and blue for easy identification of hot and cold lines.

3.4 ViegaPEX Properties and Performance

Linear Expansion Coefficient:

- 1.1 inch per 100 feet per 10°F

Temperature and Pressure Ratings:

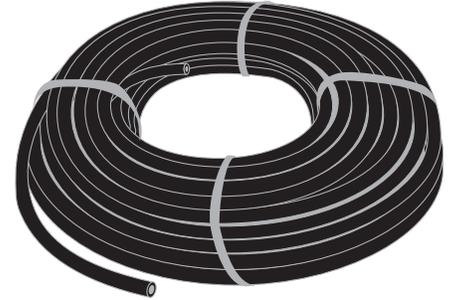
- 200°F at 80 psi
- 180°F at 100 psi
- 73.4°F at 160 psi

UV Resistance:

- maximum exposure 60 days

Flexibility:

- ViegaPEX can be easily bent by hand, or with the use of Viega approved bend supports to a radius as small as 5 times tubing outer diameter.



3.5 Tubing Markings

ViegaPEX tubing is marked every 2 feet with the following representative information:

Length Marker*	000 Feet
Company	Viega
Product Name	ViegaPEX™
Nominal Tubing Size	1/2"
Standard Dimension Ratio	SDR 9
Temperature & Pressure Rating	100 psi @ 180°F / 160 psi @ 73°F
NSF Potable Water Certification	NSF-pw
Chlorine Listing	P171 CL-R/CL-TD or CL5
ASTM Tubing Standards Certification	ASTM F876/F877
Fitting System Compatibility	PureFlow — ASTM F877/F1807/F2159
IAPMO Listing	UPC®
Canadian Standard Assoc.	Warnock Hersey (CSA B137.5)
Plenum Rating	FS/SD 25/50 ASTM E84
ICC — Listing	ES - PMG™ — 1038
HUD Listing	MR 1276
Material Designation Code	PEX 5006
Manufacturer's Date Code	1/1/07
Manufacturing Code	B2X14.2
Country of Manufacture	Made in the USA

* 300 ft and larger coils

3.6 ViegaPEX Tubing Dimensions

Nominal Size	Inner Diameter	Outer Diameter	Wall Thickness
3/8"	.350	.500	.075
1/2"	.475	.625	.075
3/4"	.671	.875	.102
1"	.863	1.125	.131

3.7 ViegaPEX Sizes

Nominal Size	Available Coil Lengths	Available Straight Lengths
3/8"	100, 500, 1000 feet	20-foot lengths in bundles of 50
1/2"	100, 300, 500, 1000 feet	20-foot lengths in bundles of 50
3/4"	100, 300, 500, 1000 feet	20-foot lengths in bundles of 25
1"	100, 500 feet	20-foot lengths in bundles of 5

4. VIEGAPEX ULTRA TUBING

4.1 General

ViegaPEX Ultra tubing is a high-density cross-linked polyethylene tubing (PEX). Cross-linking produces a strong, durable tubing ideal for both hot and cold potable water systems.

4.2 PEX - the superior tubing

Cross-linked polyethylene is the ideal tubing choice for potable water systems. Compared to ordinary polyethylene tubing (PE), cross linked tubing has higher temperature resistance and higher burst pressure.

ViegaPEX Ultra tubing is manufactured to ASTM F876/F877 standards and listed to ANSI/NSF Standards 14 and 61. It is chlorine resistance rated for both traditional (CL-TD) and continuous recirculation (CL-R) or (CL5) applications. ViegaPEX Ultra tubing is rated at 100 psi at 180°F and 160 psi at 73°F.

In addition, the smooth walls of ViegaPEX Ultra tubing are resistant to corrosion and scaling.

4.3 Colors

ViegaPEX Ultra, available in red, white, blue and black, is multilayered (2 layers) with a black core that increases the UV resistance of the tubing, enabling exposure of up to 6 months. It also blocks transmission of visible light, preventing most types of algae growth from occurring.

4.4 ViegaPEX Ultra Properties and Performance

Linear Expansion Coefficient:

- 1.1 inch per 100 feet per 10°F

Temperature and Pressure Ratings:

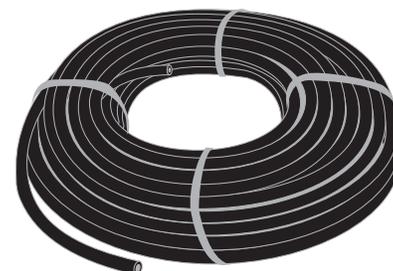
- 200°F at 80 psi
- 180°F at 100 psi
- 73.4°F at 160 psi

UV Resistance:

- maximum exposure 6 months

Flexibility:

- ViegaPEX Ultra can be easily bent by hand, or with use of Viega approved bend supports to a radius as small as 5 times tubing outer diameter.



4.5 Tubing Markings

ViegaPEX Ultra tubing is marked every 2 to 5 feet with the following representative information:

Length Marker*	000 Feet
Company	Viega
Product Name	ViegaPEX™ Ultra
Nominal Tubing Size	1/2"
Standard Dimension Ratio	SDR 9
Temperature & Pressure Rating	100 psi @ 180°F / 160 psi @ 73°F
NSF Potable Water Certification	cNSF®us-pw
NSF Uniform Plumbing Code Listing	NSF U.P. Code
Chlorine Listing	P171 CL-R/CL-TD or CL5
ASTM Tubing Standards Certification	ASTM F876/F877
Canadian Standard Assoc.	cNSF®us (CSA B137.5)
Fitting System Compatibility	PureFlow — ASTM F877/F1807/F2159
Plenum Rating	FS/SD 25/50 ASTM E84
ICC — Listing	ES - PMG™ — 1038
HUD Listing	MR 1276
Material Designation Code	PEX 5006
Manufacturer's Date Code	1/1/07
Manufacturing Code	B2X14.2
Country of Manufacture	Made in the USA

* 300 ft and larger coils

4.6 ViegaPEX Ultra Tubing Dimensions

Nominal Size	Inner Diameter	Outer Diameter	Wall Thickness
3/8"	.350	.500	.075
1/2"	.475	.625	.075
3/4"	.671	.875	.102
1"	.863	1.125	.131
1-1/4"	1.053	1.375	.160
1-1/2"	1.243	1.625	.190

4.7 ViegaPEX Ultra Sizes

Nominal Size	Available Coil Lengths	Available Straight Lengths
3/8"	100, 500, 1000 feet	20-foot lengths in bundles of 50
1/2"	100, 300, 500, 1000 feet	20-foot lengths in bundles of 50
3/4"	100, 500 feet	20-foot lengths in bundles of 25
1"	100, 500 feet	20-foot lengths in bundles of 5
1-1/4"	100, 300 feet	20-foot lengths in bundles of 5
1-1/2"	100 feet	20-foot lengths in bundles of 5

5. FOSTAPEX TUBING

5.1 General

FostaPEX tubing is the perfect companion for the PureFlow plumbing system. This tubing can be easily bent by hand like the ViegaPEX tubing, but holds its shape after bending (combining the benefits of both rigid and flexible tubing). The result is fewer fittings and bend supports, and less labor. FostaPEX can be purchased in straight lengths or coils. A unique feature of FostaPEX is that the inner layer is fully dimensioned ViegaPEX tubing. The aluminum and outer PE layers surround the inner PEX tubing. This construction allows the inner layer alone to meet all temperature and pressure requirements of the system. Using the prep tool to remove the outer layers allows the use of the standard PureFlow PEX Press fitting system, which reduces tooling costs for the contractor and simplifies connections.

5.2 Advantages of FostaPEX

FostaPEX retains many of the features of ViegaPEX tubing while increasing strength and ease of installation. FostaPEX shares the same PEX Press fitting system as the ViegaPEX tubing, reducing inventory and tooling costs. In addition, the aluminum layer within FostaPEX tubing minimizes expansion during temperature changes. The expansion rate of FostaPEX is similar to that of copper tubing, reducing the necessity for expansion loops and offsets. FostaPEX is ideal for exposed tubing runs, where it can be straightened to present a clean and traditional appearance. A bending tool is also available to assist in making smooth, tight bends in FostaPEX.

5.3 Colors

FostaPEX, available in red and silver, is constructed of a black PEX core, with aluminum and PE outer layers. It also blocks transmission of visible

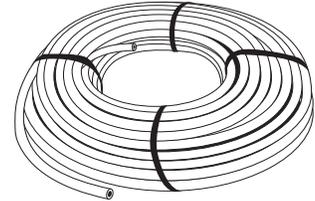
light, preventing most types of algae growth from occurring. In addition, the smooth walls of FostaPEX tubing are resistant to corrosion and scaling.

5.4 FostaPEX Properties and Performance

Linear Expansion Coefficient:
 • 0.16 inch per 100 feet per 10°F

Temperature and Pressure Ratings:
 • 200°F at 80 psi
 • 180°F at 100 psi
 • 73.4°F at 160 psi

UV Resistance:
 • Extended (fully dimensioned PEX core is protected by outer AL/PE layers)



Not for use with PEX crimp fittings.

Flexibility:

- FostaPEX tubing can be bent to a radius of 3.5 x tubing O.D. with the use of a Viega tubing bender.

5.5 Tubing Markings

FostaPEX tubing is marked every 3 feet with the following representative information:

Length Marker	000 Feet
Company	Viega
Product Name	FostaPEX™
Nominal Tubing Size	1/2"
Standard Dimension Ratio	SDR 9
Material Designation Code	PEX 1006
ASTM Tubing Standards Certification	ASTM F876/F2023/F877
Temperature & Pressure Rating	180°F 100 psi / 200°F 80 psi
NSF Radiant Floor Heating Certification	NSF®-rfh
NSF Potable Water Certification	NSF®-pw
IAPMO Listing	UPC®
Plenum Rating	FS/SD 25/50 ASTM E84
ICC – Listing	ES - PMG™ 1015, 1038
Oxygen Barrier Presence	With oxygen diffusion barrier
Country of Manufacture	Made in Germany
Manufacturing Code	HO
Material (Cross-Linked Polyethylene)	PEX
Manufacturer's Date Code	12345
Manufacturer's Identifier	WA 999999

5.6 FostaPEX Tubing Dimensions

Nominal Size	Inner Diameter	Outer Diameter*	Wall Thickness*
1/2"	.475	.625	.075
3/4"	.671	.875	.102
1"	.863	1.125	.103

*Dimensions do not reflect outer aluminum and PE layers

5.7 FostaPEX Sizes

Nominal Size	Available Coil Lengths	Available Straight Lengths
1/2"	150, 400 feet	20-foot lengths in bundles of 25
3/4"	150 feet	20-foot lengths in bundles of 25
1"	150 feet	20-foot lengths in bundles of 10

6. PUREFLOW PEX PRESS FITTINGS

6.1 Bronze PEX Press with Attached Sleeve

PureFlow Bronze PEX Press fittings are cast and machined from a solid bronze alloy and incorporate an attached stainless steel press sleeve with three view holes and a tool locator ring. This gives the fittings high corrosion and stress cracking resistance while simplifying the connection for installation. The bronze alloy has been specially developed to resist dezincification, a process that can weaken ordinary brass fittings over time. The following design criteria make PureFlow PEX Press fittings perfect for use in potable water applications.

- attached sleeve
- high corrosion resistance
- excellent strength properties
- resistant to stress corrosion
- superior wear properties
- compatible with all materials
- color coded tool locator ring matches PEX Press hand tool color

All PureFlow tubing, fittings and manifolds are NSF certified for use in potable water systems.

NOTE: Some fittings/adaptors are still available with the separate press sleeve.

6.1.1 Bronze PEX Press Fittings, Manifolds and Sleeves

PureFlow Bronze PEX Press fittings are produced for all connections necessary in a potable water system. PEX to PEX fittings are available as straight couplings, elbows and tees (both single size and reducing). Adaptors mate PureFlow tubing to NPT threads, copper tubing and copper fittings.

A full manifold offering is available. PEX Press copper manifolds are available from 2 to 12 outlets and may be installed in concealed locations. The MANABLOC homerun manifold system is also available with bronze PEX Press connections.

The stainless steel press sleeves used in the PureFlow PEX Press system ensure the integrity of each connection. The strength of this material guarantees a leak-free connection every time, while the view holes allow both the installer and inspector to easily verify full insertion of the tubing. The tool locator ring ensures a consistent press every time. The stainless steel will not corrode, maintaining a clean appearance for the lifetime of the system.

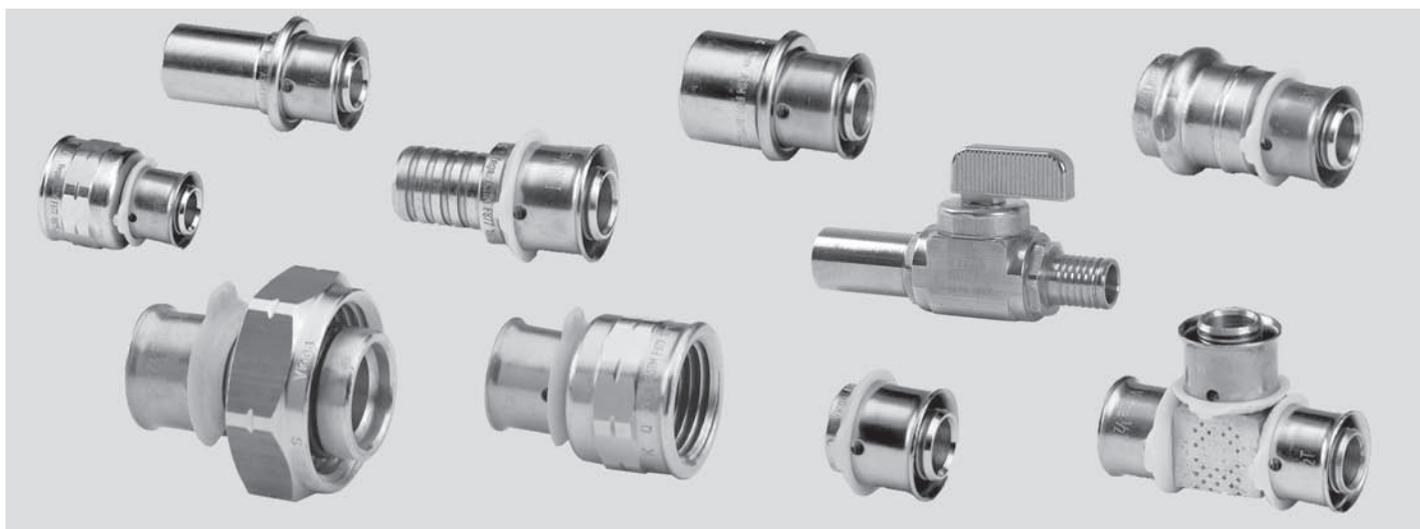
6.1.2 Bronze Press Fitting Markings

Each PureFlow Bronze PEX Press fitting is marked where space permits with the following information:

Manufacturer	VIEGA
ASTM standard	ASTM F877
Temperature Rating	180°F
Certifications	cNSF _{US} -pw, UPC® cULus®



Use only Viega Stainless Steel Press Sleeves and Press tools with PureFlow PEX Press fittings



6.2 PEX Press Connection with Attached Sleeve

The PureFlow PEX Press connection with attached sleeve provides a simple and safe connection between the ViegaPEX or FostaPEX tubing and PureFlow system components. The ratchet system in the press tool, simple connection process, three view holes in the press sleeve and color-coded locator rings all ensure a consistent, worry-free press connection. The difference between a finished and unfinished press fitting is also easily visible, making inspection simple.

6.2.1 The PureFlow PEX Press Hand Tool

The PureFlow PEX Press connection must always be carried out with the aid of a PureFlow PEX Press tool. The hand tool incorporates a forced compression mechanism to ensure a complete and secure connection each time. A ratchet inside the tool prevents the tool from being opened until the proper force has been applied to the press sleeve. (A safety release screw allows the tool to be opened at any time, but any connection made without full tool compression must be redone.)

The high mechanical advantage provided by the PureFlow PEX Press tool permits one-handed operation, making the PureFlow PEX Press system perfect for tight spaces and awkward locations.

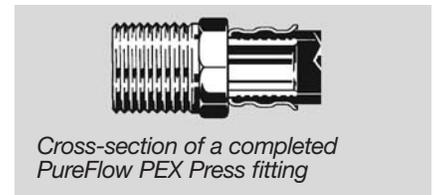
The PureFlow PEX Press hand tool is available for 3/8", 1/2", 3/4" and 1" PureFlow PEX Press connections. Each tool has a color-coded handle that matches the PEX Press fitting locator ring for easy identification on the job site and they are available individually or in convenient sets. See the Viega product catalog for details.

6.2.2 The PureFlow PEX Press Power Tool

The PureFlow PEX Press connection may also be carried out with one of the PureFlow power tools. These tools are designed to make the same consistent press as the PureFlow PEX Press hand tools. In addition, these tools have an integrated diagnostic system that monitors tool performance and battery life. The tools have interchangeable jaw sets for 3/8", 1/2", 3/4", 1", 1-1/4" and 1-1/2" PureFlow PEX Press connections and are also compatible with the ProPress copper press system jaw sets. See the Viega product catalog for details.

6.2.3 The PureFlow PEX Press Fitting

The PureFlow PEX Press tool compresses the stainless steel sleeve around the tubing and fitting in two places, permanently securing them together — no O-rings. This connection exceeds the requirements of the ASTM F877 standard. The compression of the tool also allows press connections to be made in temperatures as low as -4°F (23°F for power tools).



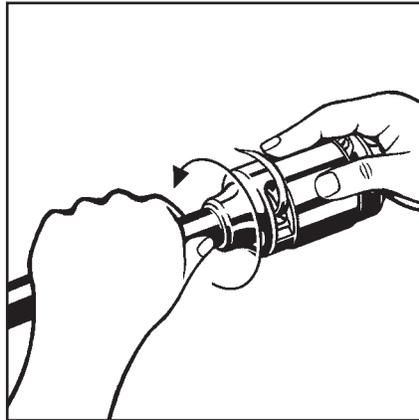
Three view holes in the sleeve allow installers to check for proper tubing insertion.



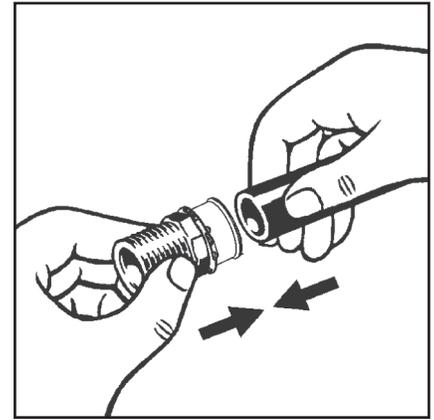
6.2.4 Making a PureFlow PEX Press Hand Tool Connection (Attached Sleeves)



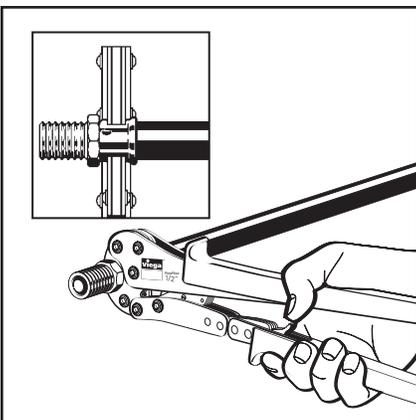
1. Square off tubing to proper length. Uneven, jagged or irregular cuts will produce unsatisfactory connections.



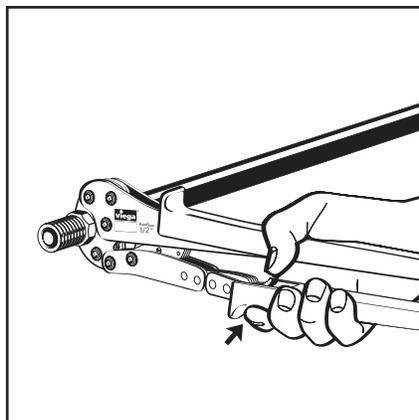
2. If using FostaPEX tubing, insert into prep tool, push and turn until no resistance is felt. If using ViegaPEX, continue to step 3.



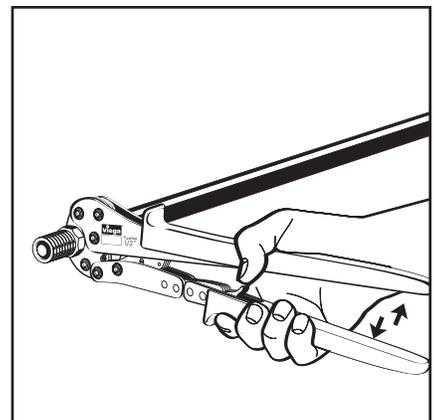
3. Insert PEX Press fitting with attached sleeve into tubing and engage fully. Tubing should be visible through view holes.



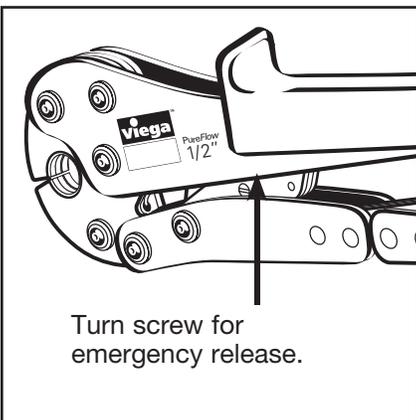
4. Position press tool perpendicular over press sleeve and close tool jaws to engage ratchet.



5. Close handles, using trigger to reduce grip span if desired.



6. Extend handle and continue ratcheting until automatic tool release occurs at proper compression force.



Turn screw for emergency release.

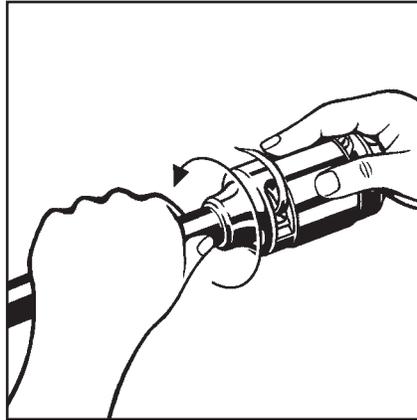
NOTE: For PEX Press fittings utilizing loose press sleeves, place sleeve on tubing before fully inserting PEX Press fittings into tubing.

7. **Warning:** The connection is not leakproof when the tool has been opened by emergency release.

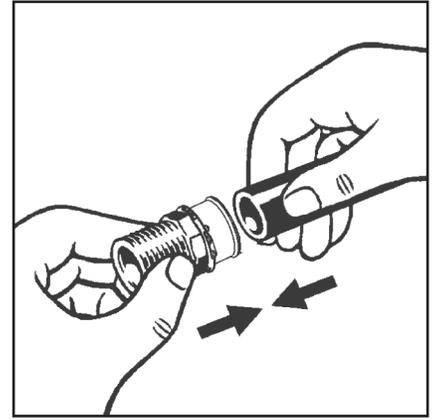
6.2.5 Making a PureFlow PEX Press Power Tool Connection (Attached Sleeves)



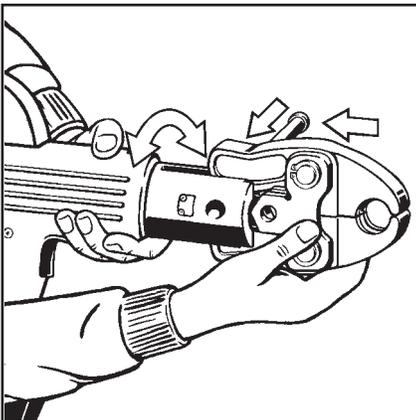
1. Square off tubing to proper length. Uneven, jagged or irregular cuts will produce unsatisfactory connections.



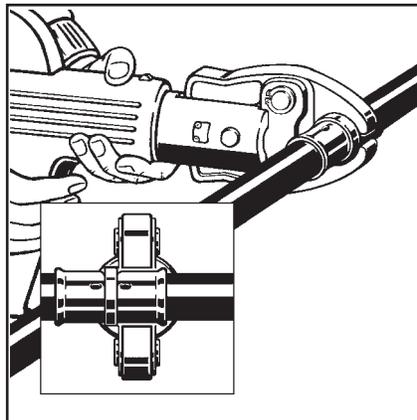
2. If using FostaPEX tubing, insert into prep tool, push and turn until no resistance is felt. If using ViegaPEX, continue to step 3.



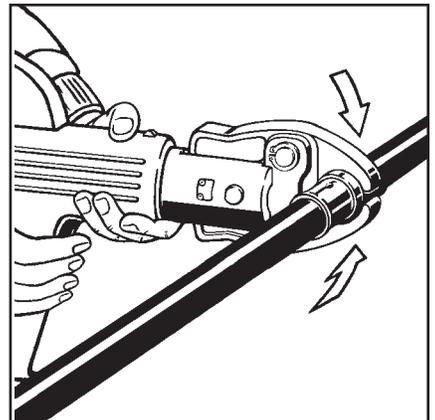
3. Insert PEX Press fitting with attached sleeve into tubing and engage fully. Tubing should be visible through view holes.



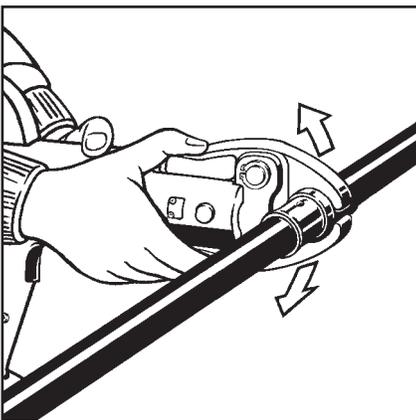
4. Insert the appropriate PureFlow Press Jaw into the press tool and push in the holding pin until it locks.



5. Open jaw and position perpendicular over press sleeve. Close jaw.



6. Start pressing process; hold the trigger until the jaw has automatically released.



7. When press connection is complete, open and remove jaw.

NOTE: For PEX Press fittings utilizing loose press sleeves, place sleeve on tubing before fully inserting PEX Press fittings into tubing.

7. PUREFLOW PEX CRIMP FITTINGS

7.1 Brass PEX Crimp

PureFlow Brass PEX Crimp fittings are machined from a brass alloy. The following design criteria make PureFlow PEX Crimp fittings perfect for use in potable water applications.

- Cost Effective
- Excellent Strength Properties
- Fast Installation

All PureFlow tubing, fittings and manifolds are NSF certified for use in potable water systems.

7.1.1 Brass PEX Crimp Fittings, Manifolds and Crimp Rings

PureFlow Brass PEX Crimp fittings are produced for all connections necessary in a potable water system.

PEX to PEX fittings are available as straight couplings, elbows and tees (both single size and reducing). Adapters mate PureFlow tubing to NPT threads, copper tubing and copper fittings.

PEX Crimp copper manifolds are available from 4 to 10 outlets and may be installed in concealed locations. The MANABLOC homerun manifold system is also available with brass PEX Crimp connections.

PEX Crimp Fittings are widely accepted with over 50% of the industry offering this system.

7.1.2 Brass PEX Crimp Fitting Markings

Each PureFlow Brass PEX Crimp fitting is marked where space permits with the following information:

Manufacturer	VIEGA
ASTM standard	ASTM, F1807
Certifications	UPC®, or U.P. Code, NSF-pw, CSA B137.5, cNSFus

Note: All fittings may not be listed with every organization shown.



Use only F1807 copper crimp rings and full circle crimp tools with PureFlow PEX Crimp fittings.



NOT for use with FostaPEX tubing



7.2 PolyAlloy™ PEX Crimp

PureFlow PolyAlloy PEX Crimp fittings are molded from Acudel®. The following design criteria make PureFlow PolyAlloy PEX Crimp fittings perfect for use in potable water applications.

- Cost Effective
- Superior Wear Properties
- Fast Installation
- High Corrosion Resistance

All PureFlow tubing, fittings and manifolds are NSF certified for use in potable water systems.

! PureFlow PolyAlloy PEX Crimp fittings must be protected from UV exposure and petroleum products, which can damage them. In the event of incidental UV exposure during storage, installation and handling, combined exposure of PolyAlloy PEX fittings shall not exceed 15 days.

7.2.1 PolyAlloy PEX Crimp Fittings and Crimp Rings

PureFlow PolyAlloy PEX Crimp fittings are produced for many connections necessary in a potable water system.

PEX to PEX fittings are available as straight couplings, elbows and tees (both single size and reducing). Adapters mate PureFlow tubing to fixture connections. The MANABLOC homerun manifold system is available with PolyAlloy PEX Crimp connections.

The material choice and fitting design used in the PureFlow PolyAlloy PEX Crimp system ensure the integrity of each connection.

7.2.2 PolyAlloy PEX Crimp Fitting Markings

Each PureFlow PolyAlloy PEX Crimp fitting is marked where space permits with the following information:

Manufacturer	VIEGA
ASTM standard	ASTM, F2159
Certifications	NSF U.P. Code, NSF-pw, CSA B137.5 



Use only F1807 copper crimp rings and full circle crimp tools with PureFlow PEX Crimp fittings.



NOT for use with FostaPEX tubing



7.3 PEX Crimp Connections

The PureFlow PEX Crimp connection provides a simple and safe connection between ViegaPEX and PureFlow PEX Crimp system components.

The full circle crimp tool and simple connection process ensure a consistent, worry-free crimp connection every time.

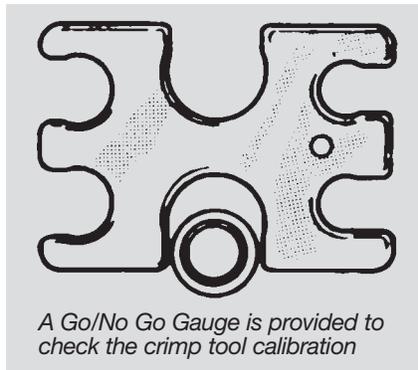
7.3.1 The PureFlow PEX Crimp Hand Tool

The PureFlow PEX Crimp connection must always be carried out with the aid of a PureFlow PEX Crimp tool. There are multiple configurations of PureFlow PEX Crimp tools perfect for tight spaces and awkward locations.

The PureFlow PEX Crimp hand tool is available for 3/8", 1/2", 3/4" and 1" PureFlow PEX Crimp connections. Some tools are available with color-coded handles for easy identification on the job site. See the Viega product catalog for details.

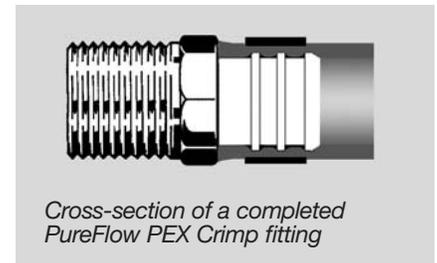
A GO/NO GO gauge is provided to check the calibration of the crimp tool. A crimp is good if the GO gauge fits over the ring, and the NO GO gauge does not.

At least one connection should be checked at the beginning and end of each day to ensure proper crimps have been made. Most crimp tools can be recalibrated. Please refer to tool instructions.



7.3.2 The PureFlow PEX Crimp Fitting

The PureFlow PEX Crimp tool compresses the crimp ring around the tubing and fitting in a full circle, permanently securing them together — no O-rings required. This connection meets the requirements of the ASTM F1807 or F2159 standard. The compression of the tool also allows crimp connections to be made in temperatures as low as -30°F.

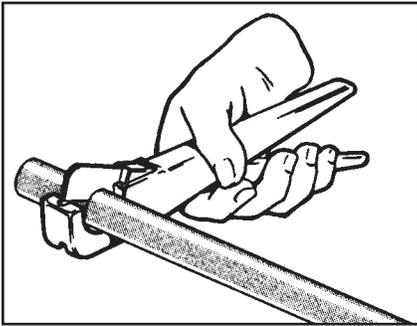


1. Position the crimp ring and insert the fitting into the tubing.

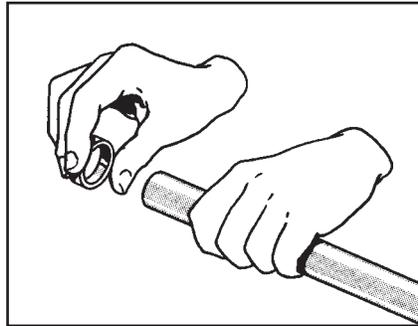


2. Crimp the ring full circle.

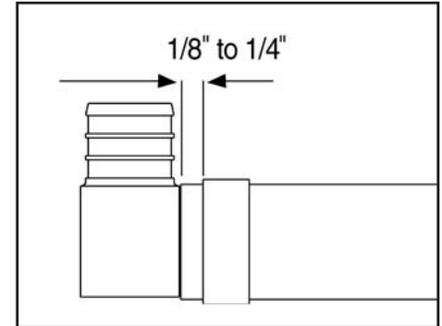
7.3.3 Making a PureFlow PEX Crimp Connection



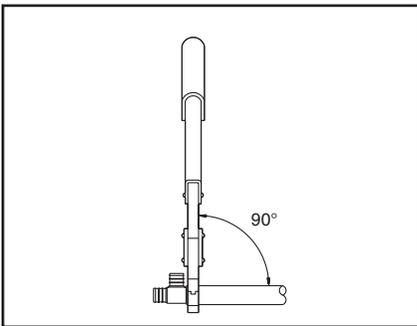
1. Square off tubing to proper length. Uneven, jagged or irregular cuts will produce unsatisfactory connections.



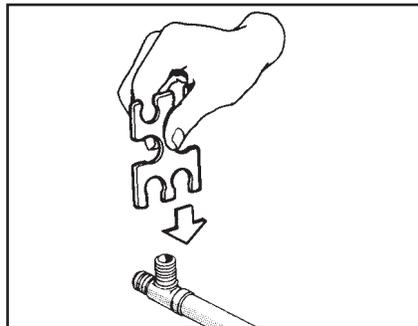
2. Slide the correct size crimp ring over end of the tubing.



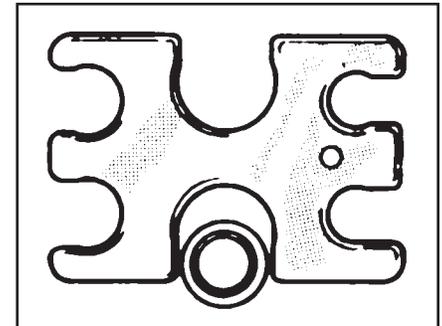
3. Insert the fitting into the pipe to the shoulder or tube stop. Position the ring 1/8" to 1/4" from the end of the tubing.



4. Center the crimping tool jaws exactly over the ring. Keep the tool at 90° and close the handles completely. **DO NOT CRIMP TWICE.**



5. When checking crimps with a GO/NO GO gauge, push the gauge **STRAIGHT DOWN** over the crimped ring. **NEVER** slide the gauge in from the side. Do not attempt to gauge the crimp at the jaw overlap area. The overlap area is indicated by a slight removal of the blackening treatment.



6. A crimp connection is considered good if the GO gauge fits the ring and the NO GO does not. A crimp connection is considered bad if the GO gauge does not fit the ring or the NO GO gauge does fit. Bad crimps must be cut out of the tubing and replaced.

8. THE MANABLOC

8.1 The MANABLOC

The MANABLOC control unit is molded from PLS (Polysulfone) plastic and tested to the requirements of ASTM F877 and certified by NSF International. The following design criteria make the MANABLOC distribution system perfect for potable water applications:

- Fast Installation
- Fewer Fittings
- Excellent Resistance to Chlorine
- Fast Hot Water Delivery

The MANABLOC supply inlet connections use a special 1" MANABLOC swivel adapter that is not included in the MANABLOC package and must be purchased separately. Transition fittings available include bronze insert (PEX Press), brass insert (PEX Crimp), PolyAlloy insert (PEX Crimp), Male NPT male thread and compression. These transition adapters are available in sizes ranging from 3/4" to 1-1/4" depending on the connection type (see product catalog for a list of sizes). The MANABLOC incorporates color-coded valves for hot and cold water supplies.

8.1.1 MANABLOC PEX Connections

Connections for the individual PEX distribution lines are a mechanical-type fitting and will not work with standard pipe fittings. Use only fittings supplied with the MANABLOC or other fittings designed for special port transitions available from Viega, listed in the Product catalog. Refer to Section 16, Installing MANABLOC Distribution Lines, for detailed information. Warranty coverage applies **ONLY** when the MANABLOC is installed with ViegaPEX tubing and in accordance with the Installation Instructions, local code and good plumbing practices.

MANABLOC port connections are available in Bronze Press, Brass Crimp, Poly Crimp and Compression available in all 3/8", 1/2" or a combination of both for all connection types. A model for hard and soft water systems is also available.

8.1.2 MANABLOC Markings

Each PureFlow MANABLOC is marked where space permits with the following information:

Manufacturer	VIEGA
ASTM standard	ASTM, F877
Certifications	UPC® NSF-pw, CSA B137.5



Use only Viega approved fittings to connect ViegaPEX tubing to the MANABLOC



9. SYSTEM SIZING AND CALCULATIONS

9.1 System Sizing and Calculations

PureFlow systems should be designed following standard plumbing engineering practice. Follow local codes to determine minimum tubing size and required fixture pressures.

Pressure drop through fittings can be estimated from the chart at right. Values are expressed in equivalent length of PEX, so add the values for the relevant fittings to the length of tubing in the run, and then determine the total pressure drop from the charts on the following page.

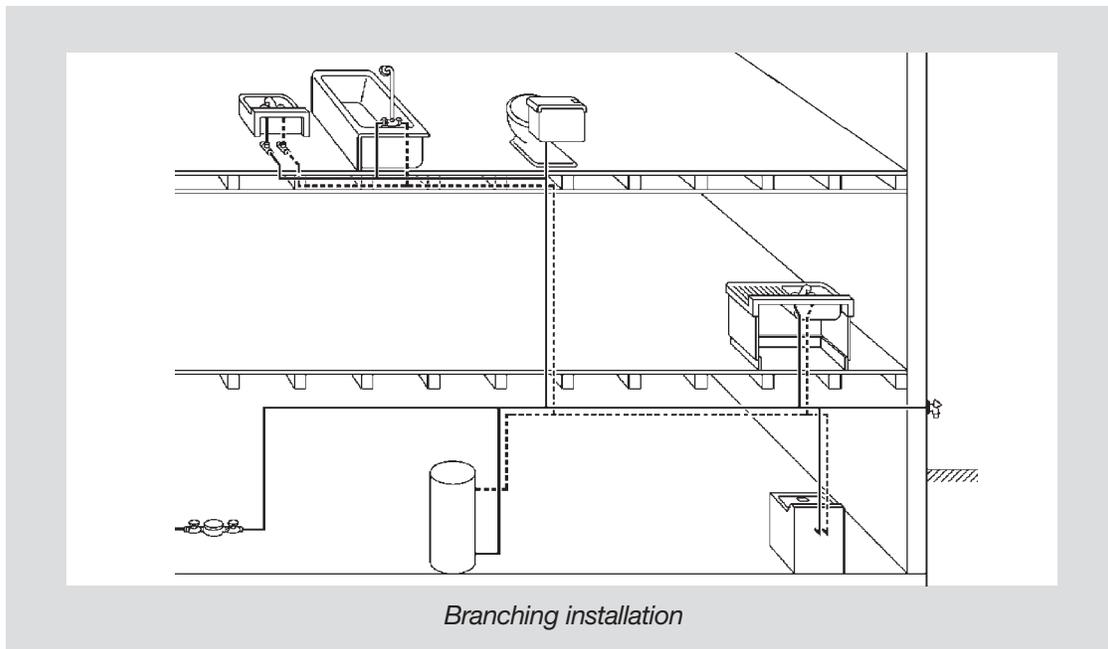
To determine the pressure drop through runs of ViegaPEX and FostaPEX tubing, refer to the pressure drop chart on the following page. For a known flow rate, tubing size and tubing length, the pressure drop through the run can be easily determined.

**PureFlow PEX Press and Pex Crimp Fittings
Friction Loss - Equivalent Feet of SDR9 PEX Tubing**

Size	Coupling	Elbow	Tee Run	Tee Branch
3/8"	2.9	9.2	2.9	9.4
1/2"	2.0	9.4	2.2	10.4
3/4"	0.6	9.4	1.9	8.9
1"	1.3	10.0	2.3	11.0
1-1/4"	5.5	11.0	4.8	13.0
1-1/2"	6.1	13.0	5.0	16.0

**PureFlow PolyAlloy PEX Crimp Fittings
Friction Loss - Equivalent Feet of SDR9 PEX Tubing**

Size	Coupling	Elbow	Tee Run	Tee Branch
1/2"	7.1	16.5	7.2	17.9
3/4"	4.8	17.4	6.6	17.7
1"	4.5	18.0	6.0	17.0



Pressure Drop (psi per foot of PEX tubing)						
gpm	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"
1	0.070	0.016				
1.5	0.149	0.034				
2.2	0.303	0.069				
2.5	0.385	0.087				
3	0.539	0.122	0.023			
3.5	0.717	0.162	0.030			
4		0.208	0.039			
5		0.314	0.059			
6		0.440	0.082	0.024		
7		0.586	0.109	0.032		
8			0.140	0.041		
9			0.174	0.051		
10			0.211	0.062	0.024	
11			0.252	0.074	0.028	
12			0.296	0.087	0.033	
13			0.343	0.101	0.038	
14				0.116	0.044	
16				0.148	0.056	0.025
18				0.184	0.070	0.031
20				0.224	0.085	0.038
22				0.267	0.102	0.045
24					0.119	0.053
26					0.138	0.062
28					0.159	0.071
30					0.180	0.080
32					0.203	0.091
34						0.101
36						0.113
38						0.125
40						0.137

■ = 8 fps per size tubing

NOTE: Maximum flow for each size based on 12 FPS velocity. PSI x 2.307 = head loss.

10. INSTALLING THE PUREFLOW PEX TUBING SYSTEM

10.1 Handling PureFlow Tubing

The properties of PureFlow tubing make it very easy to work with and install in most types of construction. Some care must be taken to prevent damage to the tubing before and during installation:

- Use care to protect both ViegaPEX and FostaPEX tubing from physical damage during storage and installation. Keep the tubing away from sharp objects, open flames, etc., and do not place heavy objects on the tubing.
- Damaged sections of tubing should be cut out and discarded.
- Do not expose ViegaPEX tubing to sunlight or any UV source for extended periods of time (less than 60 days for standard ViegaPEX or less than 6 months for ViegaPEX Ultra).
- FostaPEX, with its aluminum layer, is resistant to UV light, but long-term exposure should still be avoided.
- Do not store ViegaPEX or FostaPEX tubing outdoors where it may be exposed to UV light.



10.2 Uncoiling PureFlow Tubing

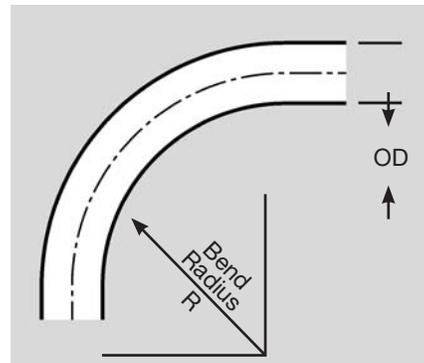
An uncoiler should be used to prevent twisting when removing tubing from 3/8" to 1" coils. Roll coils out and use care to avoid twisting 1-1/4" and 1-1/2" coils or when a uncoiler is unavailable.

10.3 Bending PureFlow Tubing

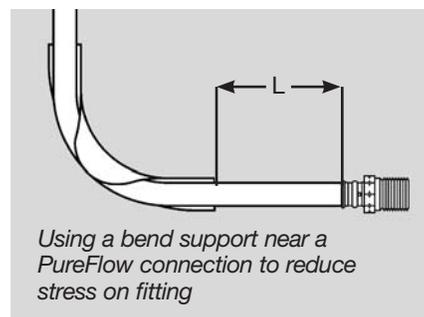
ViegaPEX tubing can be free bent (unsupported bend) to a minimum radius of 8 times the tubing O.D. and 5 times the tubing O.D. with the use of a Viega approved bend support. FostaPEX tubing can be free bent to a minimum radius of 8 times the tubing O.D. and 3.5 times the tubing O.D. with the use of a Viega tubing bender. For situations requiring tighter bends, use elbow fittings. If bending against a PEX coil bend direction, the bending radius is 24 times the tubing O.D.

To reduce damaging stress on PureFlow fittings, bend supports or tubing fasteners must be used to anchor all bends made close to fittings. Support must be provided for tubing bends located closer to fittings than distance "L" in table below. See the diagrams to the right for typical installation examples. Since FostaPEX will maintain its shape once bent, these requirements do not apply.

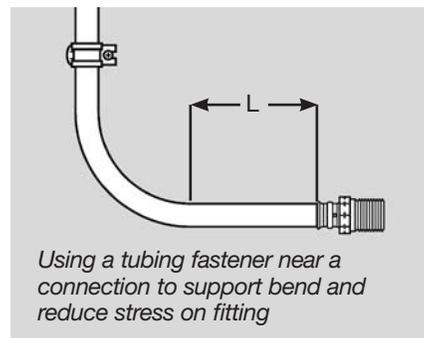
Tubing size	Distance from fitting to bend
3/8" PEX	L = 6 inches
1/2" PEX	L = 8 inches
3/4" PEX	L = 10 inches
1" PEX	L = 12 inches
1-1/4" PEX	L = 14 inches
1-1/2" PEX	L = 16 inches



Minimum bending radius for PureFlow tubing



Using a bend support near a PureFlow connection to reduce stress on fitting



Using a tubing fastener near a connection to support bend and reduce stress on fitting

A FostaPEX Tubing bender is available to assist with making accurate, tight bends in all sizes of FostaPEX tubing.



10.4 Installation Temperature Range

The flexibility of PureFlow tubing and the strength of the PureFlow PEX connections combine to provide a system that can be installed during any weather. The positive compression provided by the PureFlow PEX Press hand tools allow installation in temperatures down to -4°F (23°F for power tools), and -30°F for PEX Crimp hand tools.

10.5 Removing PureFlow PEX Connections

Should a mistake be made, simply cut out the PEX fitting and replace with a new one. Do not reuse PureFlow PEX fittings.

10.6 Removing PureFlow PEX Press Connections with Loose Sleeves

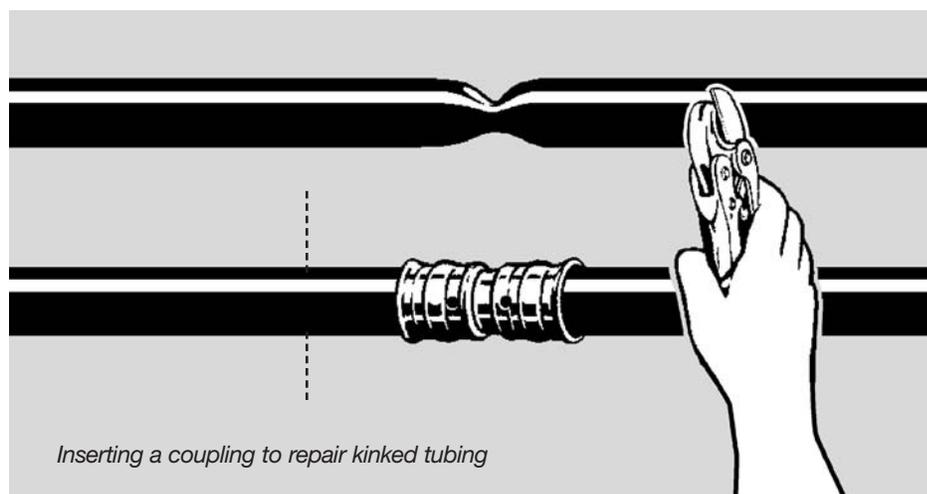
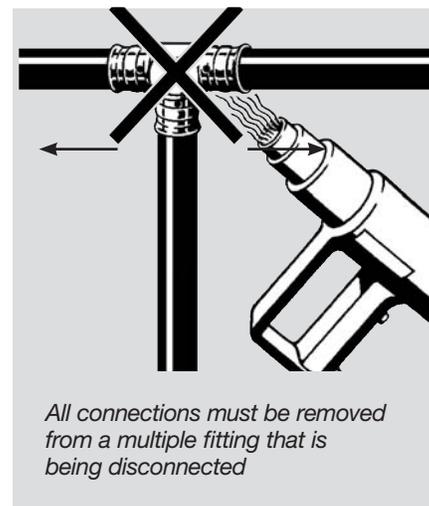
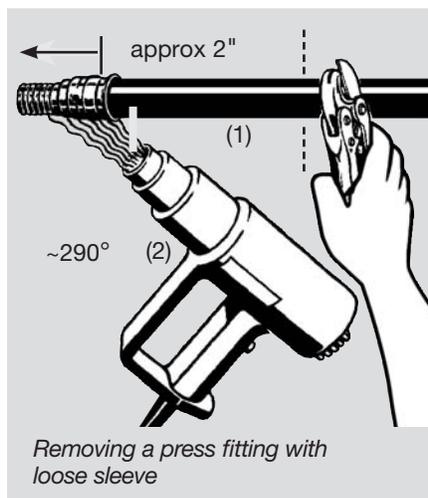
A PureFlow connection is permanent once full tool compression has been reached.

Should a mistake be made, square off tubing as shown. The complete PEX Press connection with loose press sleeve can then be heated with a hot-air blower and the tubing can be pulled from the fitting together with the press sleeve. Do not use an open flame to heat the tubing.

The fitting can be reused, following inspection to verify that it is clean and in perfect condition (no defects or scoring). The press sleeve cannot be reused.

10.7 Repairs

Sections of kinked tubing should be repaired by cutting out the damaged section and installing a repair coupling.



10.8 Tubing Expansion

When installing PureFlow tubing, expansion and contraction of the material must be considered. ViegaPEX tubing should not be pulled tight when installed, as cold water will cause tubing to shrink slightly as the system is filled. A slight amount of slack should be left in each run to allow for this contraction without stressing the fittings.

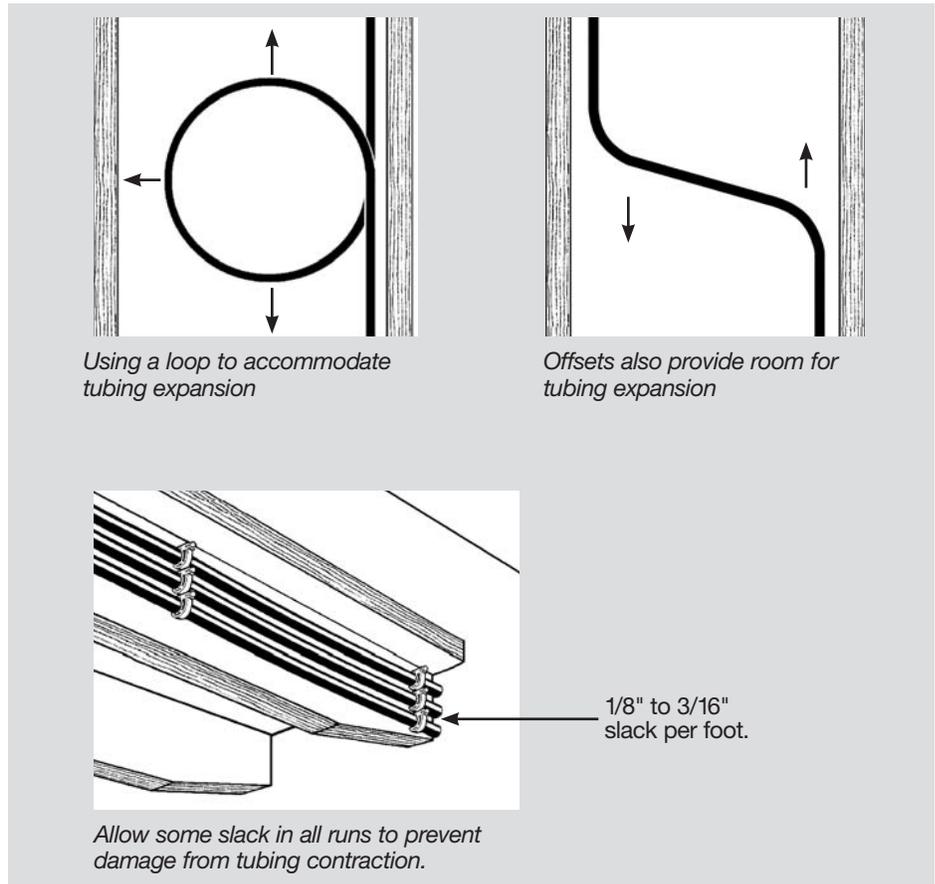
Expansion of the tubing in hot water lines should be accommodated by using expansion loops or offsets. Fasteners should not grip tubing tightly so that it can move slightly as expansion takes place. Expansion loops or offsets will give tubing a place to grow without stressing fittings. Using suspension clip fasteners at all penetrations will allow tubing to move without creating noise.

ViegaPEX expands or contracts 1.1 inches in length per 100 feet of tubing for every 10°F change in temperature. Tubing expansion is less critical with FostaPEX, though still present. The aluminum layer in this tubing limits expansion to 0.16 inches per 100 feet of tubing for every 10°F rise in temperature, similar to copper. This makes FostaPEX ideal for use where expansion is a concern.

10.9 Freezing

The flexibility of PureFlow tubing makes it resistant to damage from freezing, but precautions to prevent freezing should be taken when low temperatures might be encountered.

Insulating each PEX tube individually or as a group is not generally necessary if the PEX tubing is installed within the insulation envelope of the structure, i.e. the heated area. For example, the tubing may be installed under the insulation in the attic or within an interior wall of a heated space.



PEX tubing systems should not be intentionally subjected to freezing.

Do not use open torch or excessive heat to thaw PEX tubing. Tubing failure or damage can result.

Heat (DO NOT USE A TORCH) must be applied directly to the frozen tubing section. Temperature on tubing shall not exceed 180°F.

Several suitable methods exist to thaw PEX tubing.

They include:

- Hot water
- Wet hot towels
- Handheld hair dryer
- Low wattage electrical heating tape (self limiting)
- A commercial system that pumps heated water through a tube to the ice blockage, and returns the cooled water for reheating.

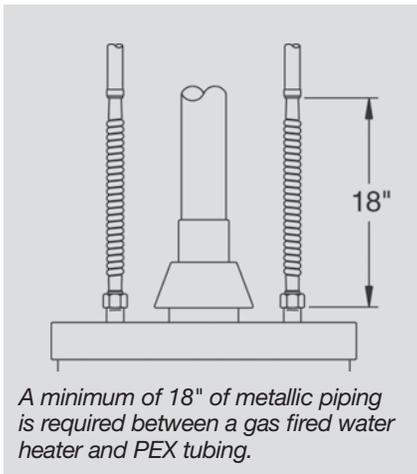


10.10 Water Heaters

PureFlow tubing should not be connected directly to gas-fired water heaters. The high temperatures of these appliances can damage the tubing.

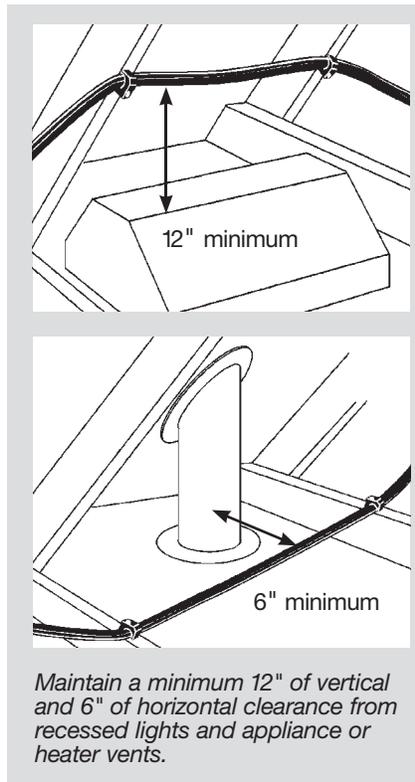
When connecting a PureFlow system to a gas-fired water heater, install a minimum of 18" of metallic piping between the water heater and tubing, keeping tubing more than 6" away from the vent pipe. Where local code allows, PureFlow tubing may be connected directly to electric water heaters and used for hot water recirculation lines which do not come within 6" of the gas heater vent.

ViegaPEX may be used to connect to instantaneous / tankless water heaters or other hot water producing devices. However, consult manufacturer's recommendations for use with plastic tubing and ensure temperature and pressure do not exceed the maximum ratings of the tubing.



10.11 Heaters, Flues, Vents and Recessed Lights

Keep PureFlow PEX tubing a **MINIMUM of 12" vertically and 6" horizontally** from sources of high heat such as gas flue vents, heating appliances or electric motors. Concerning recessed lighting (including low voltage types) and proper installation clearance, Viega recognizes the following types of lighting fixtures: "Type IC" or



"Inherently Protected," which allow direct contact with thermal insulation and other combustible materials, and "Type Non-IC," which require a minimum clearance of 3" to thermal insulation. If room does not allow for the minimum clearance spacing specified by Viega, then the PEX tubing must be insulated with a suitable pipe insulation capable of withstanding the specific maximum temperatures generated by the fixture. Minimum clearance between any pipe insulation and fixture shall be per the requirements of the fixture type and local building codes.

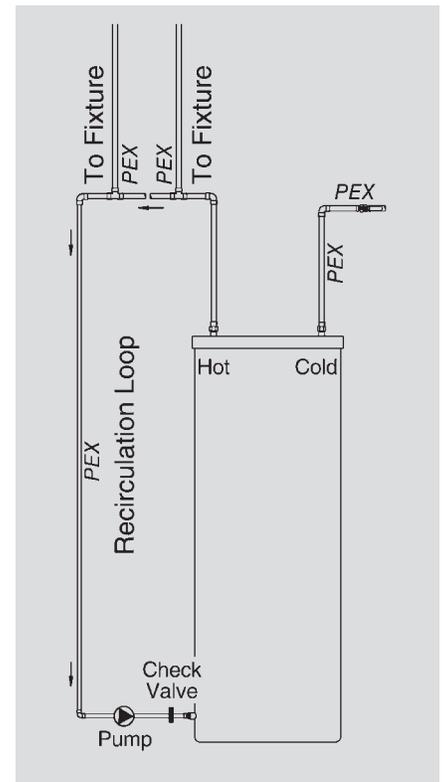
Forced air heating ducts and PVC power vent flues are not generally considered sources of high heat. These areas of installation should be rechecked after further construction and other mechanical systems have been installed.

In cases where light leakage (direct beam) from a UV generating light source (special lighting or heating type lamps) is possible, tubing must be adequately protected with light blocking insulation.

10.12 Continuously Recirculating Hot Water Plumbing Loops

ViegaPEX can be used in continuously recirculating domestic hot water plumbing loops, provided:

1. The plumbing loops shall operate with water temperatures of 140°F or lower, as required by most model plumbing codes.
2. The recirculating loop is for supplying hot water more quickly to the fixture.
3. The tubing is marked as rated for "continuous recirculation" as evidenced by the NSF Protocol P171 third-party certification marking (CL-R) or (CL5).



10.13 Noise and Water Hammer in PEX Systems

As with all plumbing materials under some operating conditions, water hammer can occur in PEX plumbing systems. The inherent flexibility of ViegaPEX drastically reduces the magnitude of pressure surges compared with metallic plumbing materials. Damage to plumbing components in a PEX system due to these pressure surges is highly unlikely, although noise can sometimes result. Fortunately, there are solutions to minimize or eliminate water hammer noise.

- Install fixtures that are not water hammer prone. As a general rule, two-handle fixtures are less likely to cause hammer than single-handle fixtures. Single-handle shower valves, which rotate to close and therefore are difficult to close quickly, might be good choices.
- Clamping or strapping more frequently may help prevent tubing noise. It is very important that the tubing not be in contact with wallboard, forced air ducts or other high resonance articles. Insufficiently or improperly clamped or strapped tubing may move during fixture operation and hit against these surfaces.
- Install a water hammer arrester at fixtures where noise is a problem. A water hammer arrester (AA sized) installed as close as possible to the fixture on the cold water side only will eliminate the source of the noise (the pressure wave). It should be noted that even with an arrester, tubing that is clamped or strapped insufficiently may still hit against something as it moves slightly when the water flow is stopped.
- Avoid operating fixtures in such a way that causes near instantaneous shutoff. Simply closing fixtures in a less abrupt manner can eliminate hammer noise.

10.14 Shower Valves

PEX lines should only be run to the inlet connections of tub / shower valves unless specifically approved by the valve manufacturer for other connections.

10.15 Electrical Grounding

Neither ViegaPEX nor FostaPEX tubing may be used as an electrical ground. Consult the NEC for recommended grounding method when plastic pipe is used.

10.16 Pressure Testing

All PureFlow systems must be pressure tested in accordance with local code after installation, or to at least the system working pressure. Connections may be pressure tested immediately after completion. Refer to section 17.1: Pressure Testing PureFlow Systems for specific testing requirements.

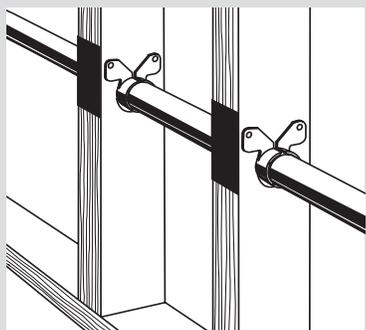
11. FASTENING THE PUREFLOW SYSTEM

11.1 Wood Frame Construction

ViegaPEX and FostaPEX tubing are ideal for use in wood frame construction. The ability to bend the tubing around corners and obstacles greatly simplifies installation. This system eliminates the expensive and time-consuming use of fittings where tubing turns within a wall, and eliminates the potential fire hazard of soldering close to exposed framing members.

A few rules should be followed when running PureFlow tubing in wood frame construction:

- Use nailing plates to protect the tubing from nails and screws where it passes through studs
- Suspension clips are optional but can reduce the potential for noise
- When turning tubing sharply to exit from a wall, a bend support must be provided. Either use a drop ear bend support, drop ear elbow or a stub out. Neglecting to use a support will place excessive stress on the fitting, and the tubing will not exit perpendicular to the wall (except FostaPEX).



Nailing plates protect tubing passing through studs and joists from nails

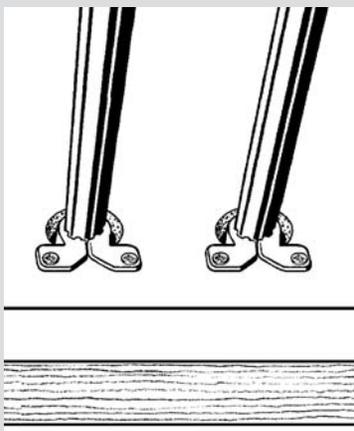
11.2 Supporting PureFlow Tubing

Use only plastic tubing supports. Metal supports may damage tubing.

When running tubing, leave a small amount of slack between fasteners to account for tubing contraction.

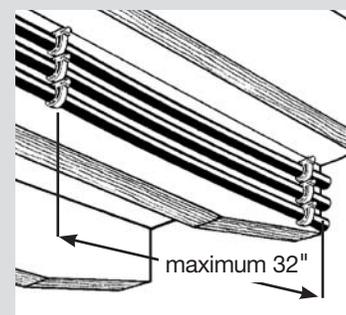
Note that ViegaPEX tubing will expand or contract 1.1 inches per 100 feet for every 10°F of temperature change. In long straight runs allow adequate clearance for this (see section 10.8). The aluminum layer in FostaPEX reduces expansion and contraction, so that it expands only 0.16 inches per 100 feet for every 10°F of temperature change. This makes it ideal for locations where expansion must be minimized.

Tubing should be allowed freedom to move slightly as it expands. Do not clip it tightly into place or locate it where it will be tightly constrained. Use suspension clips or an approved plastic insulator where tubing passes through studs or joists to prevent abrasion and possible noise as tubing moves (see below).

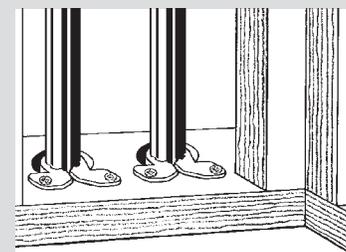


Suspension clips support tubing in joist penetrations or anywhere abrasion is a concern

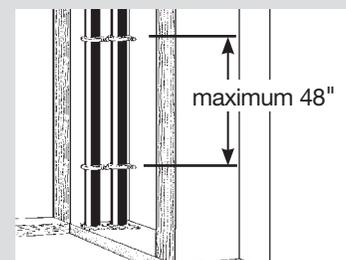
ViegaPEX tubing must be fastened at 32" intervals in horizontal runs (see below), and 32-48" for FostaPEX. In risers or vertical runs, ViegaPEX and FostaPEX tubing should be attached with suspension clips or an approved plastic insulator at each floor or ceiling penetration, and every 4 feet in between (see below).



Tubing supported with U-clip or lock clip fasteners on horizontal runs



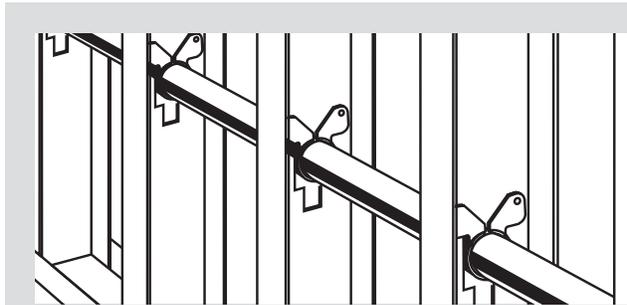
Suspension clip fasteners used at floor plate



J-clip or lock clip fasteners used to support tubing in vertical runs between floors

11.3 Steel Construction

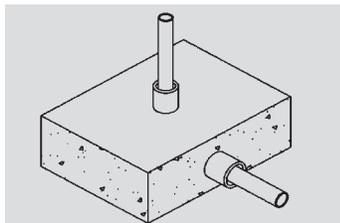
The PureFlow system works as well in steel frame construction as it does in wood. Where tubing runs through metal studs, suspension clip fasteners must be used to protect tubing from sharp stud edges (see illustration to the right). Follow the same guidelines for fastening and supporting the tubing as for wood frame construction.



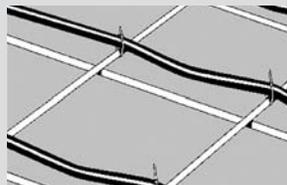
Suspension clip fasteners used to protect tubing from abrasion when passing through steel studs

11.4 Concrete

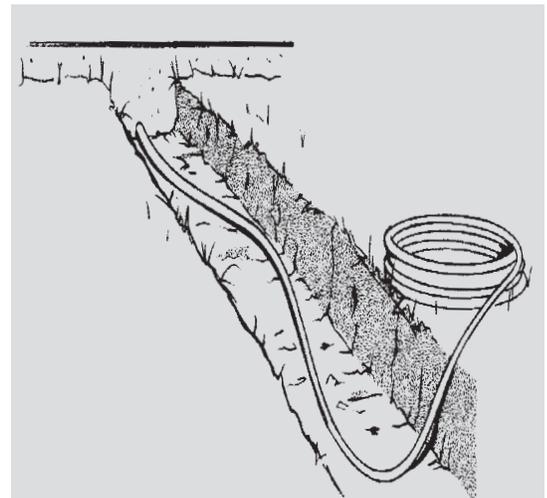
ViegaPEX and FostaPEX tubing may be run within concrete slabs. All penetration points must be sleeved to prevent tubing damage (entry/exit points, expansion joints, etc.). Penetrations in walls, etc. may be sealed with silicone caulk. Do not use oil-based caulk. Every effort should be made to use only continuous lengths of tubing within a slab. If the use of fittings buried in concrete is necessary for repairs, all such fittings must be wrapped with insulation, noncorrosive tape (no adhesives) or sleeved to prevent corrosion. When running tubing within a concrete slab, the tubing must be fastened to the reinforcing mesh or rebar every 2 to 3 feet to prevent it from floating up while concrete is curing.



Elbow sleeves protect tubing at concrete slab penetrations



Tubing must be fastened to the reinforcing mesh on rebar



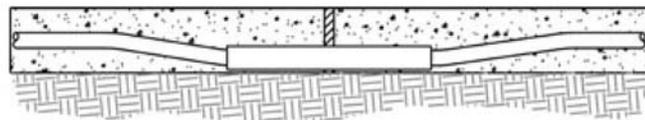
Allow sufficient slack when tubing is laid in trench

See section 11.8 for additional information regarding use of PEX tubing in direct burial applications.

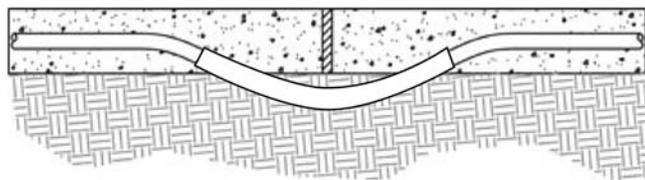
11.5 Installing Under the Slab

When installing ViegaPEX or FostaPEX tubing in the ground under the slab, the tubing should be snaked from side to side in the prepared trench. The trench bottom should be smooth and free of rocks and debris. Lay the tubing directly on the trench bottom. Tubing must be continuously supported by the trench bottom. Use only continuous lengths of tubing in or under-slab. Any connections shall be outside the slab or in an access box.

PEX tubing must be sleeved at all expansion joints and every point where it enters, exits or penetrates the slab. For expansion joints that are to be cut, the tubing must be dipped below the slab to prevent damage.



SLEEVE PEX TUBING AT ALL EXPANSION JOINTS



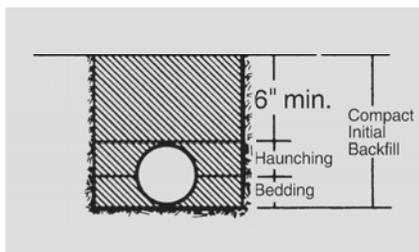
FOR CUT EXPANSION JOINTS, DIP THE TUBING BELOW THE SLAB TO A SAFE DISTANCE AT THE CUT LINES

11.6 Below Grade and Service Lines

ViegaPEX and FostaPEX tubing may both be used underground and for water service piping. When running lines underground, it is important to provide a stable, continuous trench base to support the tubing.

Do not use blocking to support tubing. PEX tubing can be damaged by contact with sharp objects. Ensure that trench bottom and fill do not contain sharp rocks or other items. In good soil conditions tubing may be placed directly on trench bottom. In poor soil conditions (rocky, loose, etc.) the trench should be excavated at least 6 inches below the tubing level and backfilled with appropriate material to provide a stable base (coarse sand, pea gravel or similar).

Always allow sufficient slack when tubing is laid in trenches. Snake the tubing slightly side-to-side to provide for contraction due to temperature change. ViegaPEX tubing changes length by 1.1 inches per 100 feet for every 10°F temperature change. FostaPEX tubing changes length by 0.16 inches per 100 feet for every 10°F temperature change.



Backfill material must be free of large rocks, glass or other sharp objects. Provide sufficient coverage over tubing so that expected traffic loads will not deform tubing (consult local codes). Compact this material to at least 6" above the tube.

Do not install PureFlow tubing where soil is or may become contaminated with solvents, fuels or similar



Trench in good soil



Trench in poor soil

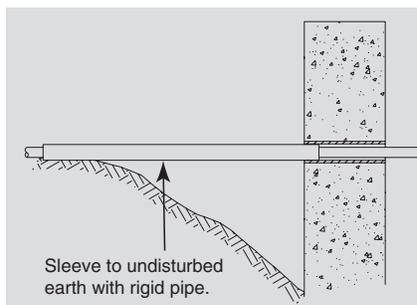
chemicals. Also do not install tubing above or below septic tanks, leach fields, pits or cesspools.

Always follow local codes when installing PureFlow tubing. Consult standards such as ASTM D2774: Standard Recommended Practice for Underground Installation of Thermoplastic Pressure Piping for further information.

11.7 Foundation Penetration

Where service lines penetrate foundation or basement walls, to prevent shearing or pinching off of the tube when backfill below the tubing settles, plastic tubing must be properly sleeved.

If there is an area of over-excavation through which the tubing must pass, it shall be sleeved with a larger rigid



pipe (Schedule 40 PVC or equivalent) to undisturbed earth. The foundation end of the rigid pipe must also be supported by the foundation wall.

Slight over-excavations (12" or less) do not require rigid sleeving when the area below the tubing is back-filled and well compacted to the level of penetration. Always sleeve plastic tubing where it passes through concrete. Do not use oil-based caulks or sealants in contact with PureFlow tubing.

11.8 Direct Burial of PureFlow Fittings

When direct burying PureFlow fittings, PEX Press fittings do not need to be wrapped; however, Brass PEX Crimp fittings do. When Brass PEX Crimp fittings are put in contact with ground soil by direct burial, it is the position of Viega, that these brass fittings and copper crimp rings be securely wrapped using self-fusing, fully cured silicone rubberlike tape with a minimum 0.020" thickness.

Contact a Viega representative for additional information on approved wrapping materials.

11.9 Protecting PEX Tubing



Protect tubing and fittings from UV exposure.

Due to the nature of slab-on-grade installation, tubing and fittings may be exposed to UV light for unspecified periods of time.

To prevent damage from UV exposure, all tubing and PolyAlloy fittings shall be protected with an opaque covering (black plastic polyethylene bag or sheeting) immediately after they have been installed.

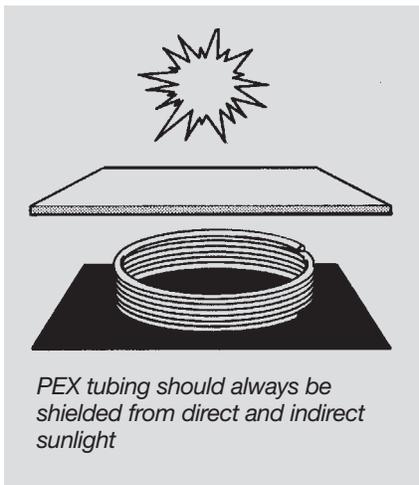
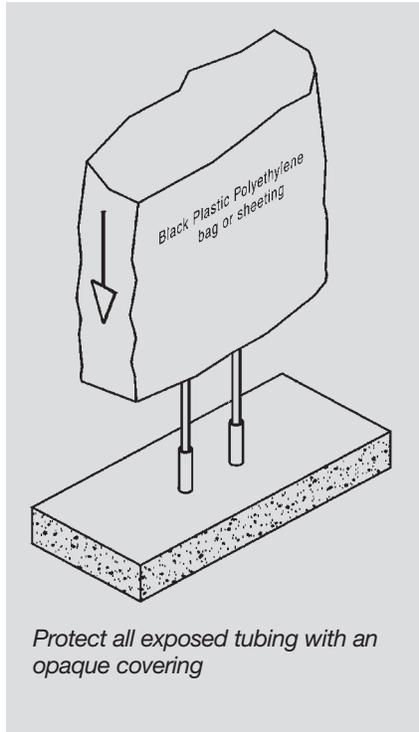
PEX tubing shall be stored under cover, shielded from direct and indirect sunlight when the material is stored for any length of time. Short exposure times of ViegaPEX, FostaPEX and PolyAlloy fittings not exceeding the total accumulated recommended exposure time are permissible. See sections 3.4, 4.3, 5.4 and 7.2 for more information.



Inform the other trades working on the same structure of the plumbing lines. Common damage

to PEX during construction is from staples, nails, screws or other sharp fasteners.

Informing the other trades of the presence of the lines may help prevent damage.



12. INSTALLING MANIFOLDS AND FITTINGS

12.1 General

The use of manifolds can simplify installation of the plumbing system, as well as eliminate hidden fittings in walls and ceilings. Viega offers several different manifolds to meet a variety of applications, whether it is a homerun or a combination installation.

12.2 PureFlow PEX Press Brazed Copper Manifolds

PureFlow PEX Press Brazed Copper Manifolds are available for use where permanent connections must be used (concealed locations). These are offered in 3, 4, 5, 6, 8, 10 or 12 outlets. Manifolds are 1" copper with male or female solder inlets and 1/2" PEX Press outlets. The end of each manifold is closed, but can be cut off for through runs or joining to make larger manifolds. The manifolds can be fastened using any standard fasteners for 1" tubing such as Viega Lock Clips.

Copper Manifold Dimensions

Number of Outlets	Manifold Length (L)
3	8"
4	10"
5	12"
6	14"
8	18"
10	22"
12	26"

12.3 PEX Press ProPress Manifolds

PEX Press ProPress manifolds are modular in design to allow for easy assembly and flexibility on the job site. They may be used where permanent connections are necessary (concealed locations).

These manifolds have a 3/4" or 1" ProPress inlet with 1/2" or 3/4" PEX outlets. The open ends, one straight and one with a ProPress connection, enable the manifolds to be connected together on the job site to create as many outlets as needed. In addition, these manifolds are available with 1" ProPress inlet and 1/2" ProPress outlets that may be assembled with 1/2" ProPress Manifold Valves or the Press Copper Fitting Adapter, to create as many valved outlets as needed. The ProPress Tool is required for connections.

PEX Press ProPress Manifold Dimensions

Number of Outlets	Manifold Length (L)
1	3-3/8"
3	7-5/16"

ProPress Manifold Dimensions

Number of Outlets	Manifold Length (L)
1	3-11/16"
3	7-5/16"



12.4 PureFlow PEX Crimp Brazed Copper Manifolds

PureFlow PEX Crimp Brazed Copper Manifolds are available for use where permanent connections must be used (concealed locations.) These are offered in 4, 6, 8 or 10 outlets. Manifolds are 1" copper with 1" or 3/4" crimp inlets and 1/2" PEX crimp outlets

PEX Crimp Manifold Dimensions

Number of Outlets	Manifold Length (L)
4	10-11/16"
6	14-11/16"
8	18-11/16"
10	20-11/16"

12.5 PureFlow MANABLOC® Homerun Manifold Plumbing System

Viega offers the industry's leading homerun manifold solution: MANABLOC. MANABLOC has been in use for more than 20 years with exceptional performance and added value to end users. It provides faster hot water delivery times, balanced water delivery and less pressure drop during multiple fixture use. MANABLOC is compatible with all PureFlow fitting systems. Please refer to section 14.



MANABLOC Homerun Manifold Plumbing System

12.6 Stub Out Options

The PureFlow system includes fittings to accommodate most plumbing needs. Stub outs are available for a variety of fixture situations, as well as fittings and valves to connect to other plumbing materials and fixtures.



Standard stub outs with 90-degree bends and a closed end to facilitate pressure testing are available in either 3/8" or 1/2" PEX x 1/2" Copper.

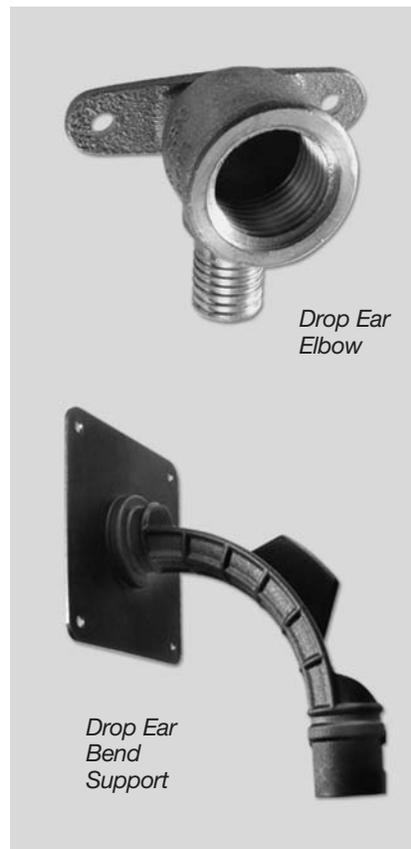
Also, PEX Press Copper tube elbows and PEX Crimp shower valve adapters are available for easy connections to tub and shower valves.



Drop ear elbows provide a 1/2" or 3/4" F NPT threaded connection at a wall or floor penetration, as well as a flange for securing the fitting. Drop ear bend supports allow ViegaPEX tubing to be directly

stubbed out of a wall. These supports allow the tubing to make the tight bend necessary to exit the wall at a 90-degree angle, as well as providing a flange for securing the support.

The exposed tubing can then be connected to a valve, using an optional chrome sleeve to cover the tubing if desired.



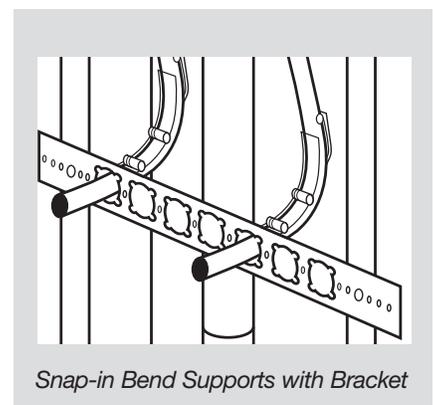
1/2" snap-in bend supports are also available with a metal mounting bracket (sold separately) for quick and easy stub outs with 1/2" ViegaPEX tubing.

Seven stub out locations and numerous nail holes make this a versatile option for stubbing out any number of lines, or supporting tubing near manifolds.

12.7 Copper Connections

Fittings are available to adapt PureFlow tubing to both copper tubing and copper fittings. Copper tubing adapters slip over copper tubing to provide a sweat or ProPress connection. Always make the sweat connection to the fitting before connecting PEX to avoid heat damage to the tubing.

Copper fitting adapters fit into copper fittings to mate PEX to standard sweat or ProPress fittings. As with copper tubing adapters, always make sweat connections prior to PEX connection to avoid tubing damage.



12.8 Threaded Connections

The PureFlow system also provides a number of fittings to adapt ViegaPEX and FostaPEX tubing to NPT threads.

In addition to the NPT drop ear elbows already mentioned, male and female adapters and male NPT elbows provide threaded connections.

The threaded connection should always be made before the PEX connection to avoid twisting the PEX connection.



12.9 Valves

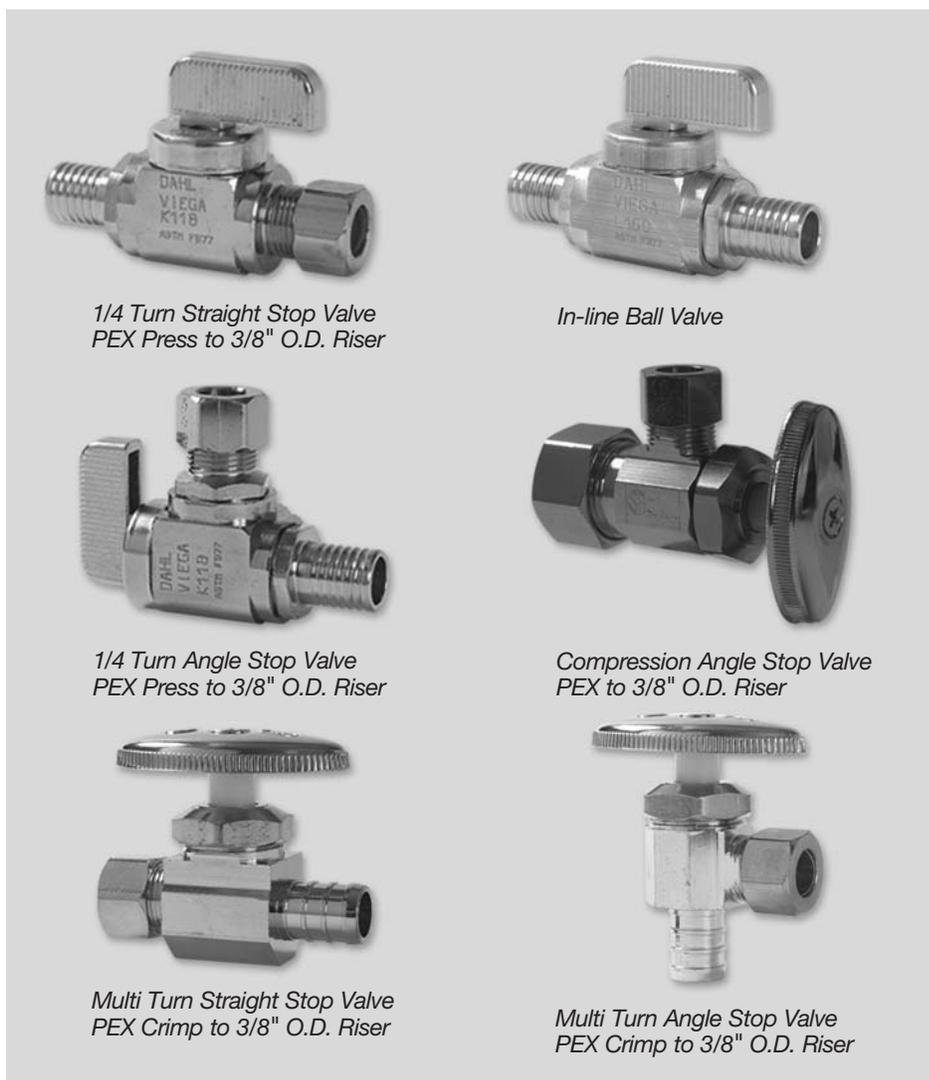
In-line ball valves are available for use with PureFlow tubing. These brass finish valves may be used anywhere an in-line valve is needed.

Stop valves have 3/8" or 1/2" PEX inlets and 1/4" CTS (3/8" O.D.) riser outlets.

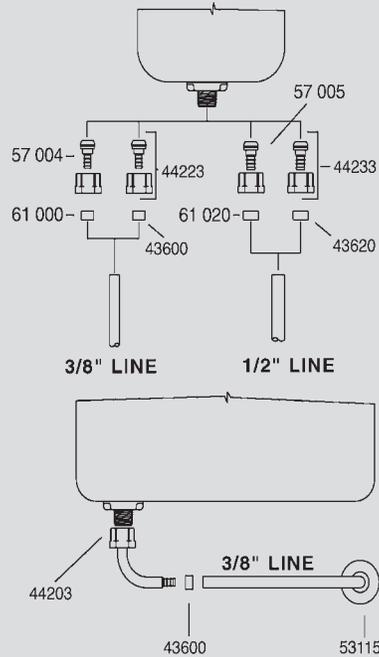
Both straight and angled versions are available depending on installation requirements.

Compression stop valves provide a compression fit over ViegaPEX tubing and a connection to a 3/8" O.D. riser. Use of included insert stiffener and plastic ferrule are required when connecting ViegaPEX tubing to the supply side of a compression stop valve.

After installation, retighten all compression fittings after 30 minutes to ensure a watertight seal. (Compression valves are not designed to work with FostaPEX.)



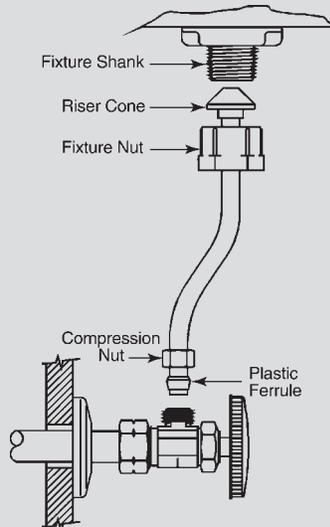
WATER CLOSET CONNECTIONS



Tighten fixture nut hand tight plus an additional 1/4 turn. Check all connections for leaks.

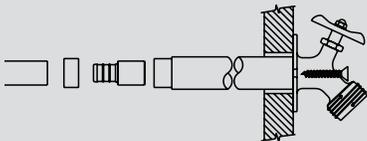
DO NOT OVERTIGHTEN.

RISER CONNECTIONS



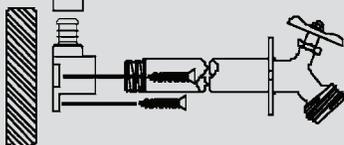
Thread fixture nut onto fixture shank. Tighten fixture nut hand tight plus an additional 1/2 turn. Slide compression nut and supplied plastic ferrule over tube as shown. The long taper of the ferrule goes toward valve. Tighten compression nut according to valve manufacturer's recommendations.

HOSE BIBB CONNECTIONS

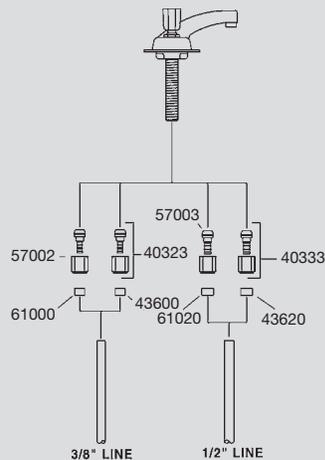


Hose bibbs supported by the structure can be connected directly.

Freestanding hose bibbs shall not be supported by ViegaPEX. Well-anchored drop-ear fittings or metal pipe shall be used to install hose bibbs.



FAUCET CONNECTIONS LAV or KITCHEN



Tighten fixture nut hand tight plus an additional 1/4 turn. Check all connections for leaks.

DO NOT OVERTIGHTEN.

13. PUREFLOW MANABLOC SYSTEM DESIGN AND SIZING

13.1 General

The general sizing information shown may be appropriate for many MANABLOC installations. These recommendations are based on flow rates of typical fixtures that require 8 psi residual pressure.

For more complete and definitive sizing information for distribution line length limitations, request the MANABLOC Tube Size Guide from your local supplier or from Viega.

13.2 Supply and Distribution Line Sizing

Typical supply line size:

- 3/4" up to 2-1/2 baths
- 1" up to 4-1/2 baths

Typical distribution line size:

3/8" up to 2-1/2 GPM

ixture flow requirement (lavs, toilets, bidets, bar sinks, kitchen sinks, dishwashers, some showers (no tub fill)* and some washing machines)**

1/2" up to 4 GPM

ixture flow requirement (hose bibbs, tubs, showers, washing machines, whirlpool baths, soaking tubs, etc.)

* Due to the many types of shower valves, it is recommended that you consult the valve manufacturer's literature to determine the actual flow rate and required residual pressure demands of the fixture. Use the MANABLOC Tube Size Guide to determine distribution line size and length limitations.

**Some washing machines use a timer instead of a water-level sensor to determine when the machine has been filled with the proper amount of water. There are cases in which low supply pressure or excessive distribution line length may cause some machines to fill to a level less than designed. Consult the washing machine manufacturer's literature to determine the actual fill rate and residual pressure requirements for distribution line size.

Hose Bibb Note: If a hose bibb is primarily for irrigation purposes, it should be supplied from the main service line prior to the MANABLOC.

The service line needs to be sized appropriately for the additional water demand. A typical residential plumbing system cannot be plumbed with all 3/8" distribution lines. It is the decision of the user to choose a combination of both 3/8" and 1/2" lines or to upsize the entire system to 1/2".

However, supplying fixtures with 1/2" lines when it is unnecessary for the fixture demand, will increase the wait time for hot water delivery to those fixtures. The best water and energy savings of a MANABLOC system are realized when distribution lines are sized according to the fixture demand and the length of the individual line (see the MANABLOC Tube Size Guide for details on sizing a typical system).

A PEX Press and PEX Crimp MANABLOC comes with 1/2" ports that are designed to fit both 3/8" and 1/2" PEX port adapters.

The adapters are available to purchase separately (bags of 6) and adapt to these different PEX tube sizes.

Note: Each port converted to a larger or smaller size requires one adapter and one PEX Crimp ring or PEX Press sleeve (sold separately).

13.3 Plumbing Code Compliance (Parallel Systems)

The MANABLOC parallel water distribution system meets the ASTM F877, standard specification for cross-linked polyethylene (PEX) plastic hot and cold water distribution system utilizing ViegaPEX tubing meeting the requirements of the ASTM F876, standard specification for cross-linked polyethylene tubing.

The 2006 International Plumbing Code® (IPC) and the 2006 Uniform Plumbing Code™ (UPC) recognize and list these ASTM standards within their respective mandatory standards and/or approved material sections.

The MANABLOC is IAPMO listed to the UPC utilizing both 3/8" and 1/2" PEX tubing sizes for distribution.

Sizing of Parallel Water Distribution Systems (MANABLOC) are addressed in both the IPC and UPC 2006 plumbing codes.

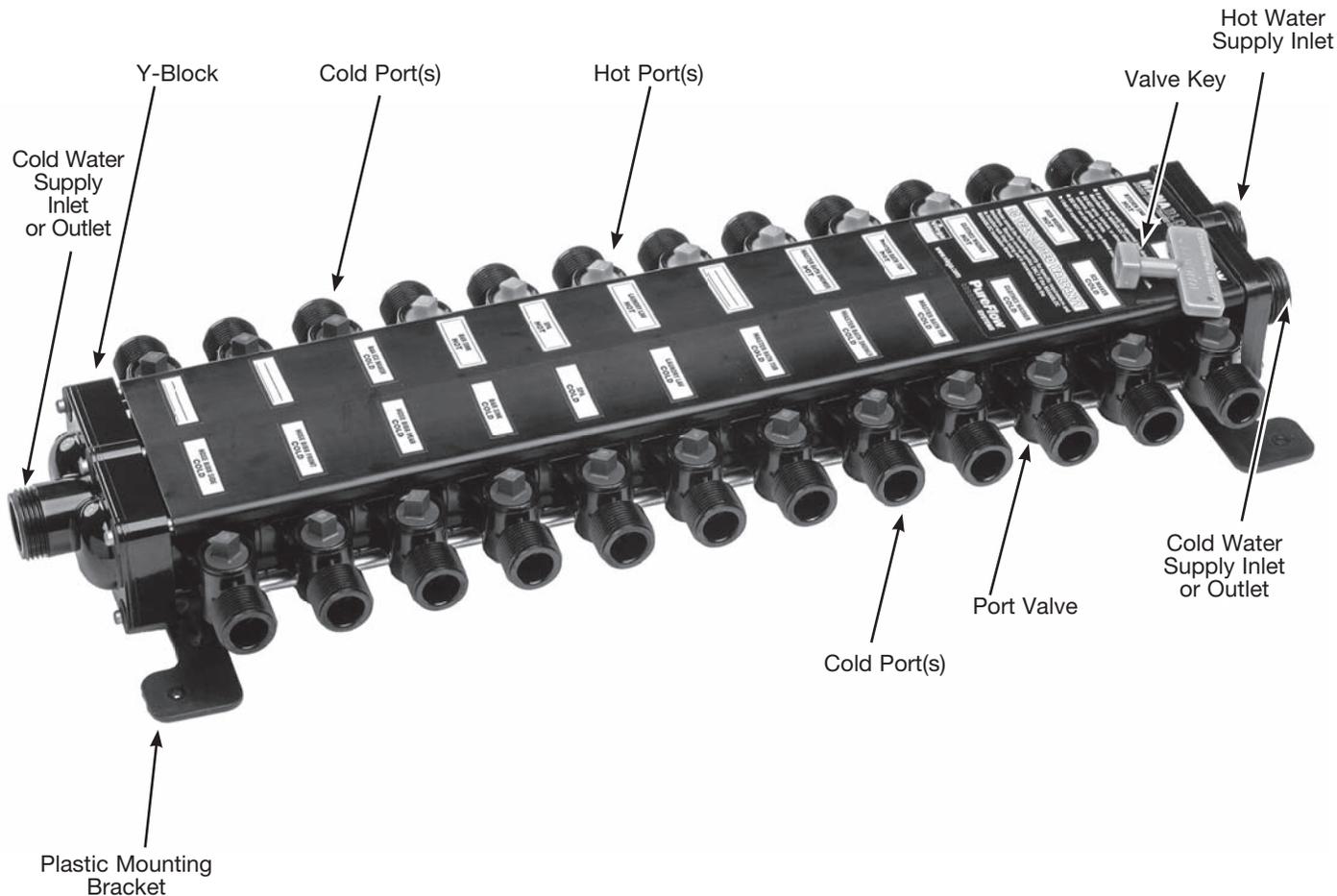
In the IPC, section 604.5 Size of fixture supply states, "The minimum size of individual distribution line utilized in gridded or parallel water distribution systems shall be as shown in Table 604.5." This table includes 3/8", 1/2" and 3/4" size tubing. In the UPC, section 610.4 it states, "Listed parallel water distribution systems shall be installed in accordance with their listing, but at no time shall any portion of the system exceed the maximum velocities allowed by the code." The MANABLOC's IAPMO UPC listing says to install per the manufacturer's current installation instructions. Therefore, these instructions shall be used to size and install these types of systems.

13.4 Valve Requirements for Parallel Systems

The IPC and UPC codes address valves in sections 604.10.3 Valves, and 605.5 respectively, which allow the use of manifold valves in parallel systems in lieu of valves at the fixture, as long as they are installed at the manifold and are identified with the fixture being supplied.



14. INSTALLING THE MANABLOC



14.1 General

Use the same precautions outlined in section 10 of this guide for proper handling of the PureFlow tubing when installing the MANABLOC.

Components utilized in the MANABLOC plumbing system consist of ViegaPEX, ViegaPEX Ultra, and FostaPEX cross-linked polyethylene tubing, fixture transition fittings, water service swivel connections, compression port connections and the MANABLOC control unit. The MANABLOC and ViegaPEX tubing are manufactured to national and international standards and are listed by recognized third-party agencies.

14.2 Overview and Carton Contents

Additional package contents include:

- Valve T-Handle
- Instruction Packet — to be left at installation site
- Port Labels

14.3 Location

Before installing the MANABLOC, review the following instructions.

NOTE: The MANABLOC is much like an electrical breaker box. When a fixture needs repair, the line to that fixture may be shut off at the MANABLOC, eliminating the need to shut down the water supply for the entire house.

This feature requires that the MANABLOC be accessible after installation.

1. Under no circumstances shall the MANABLOC be located in a permanently covered area (behind sheetrock, plywood, paneling), or where freezing temperatures may occur. Do not install in direct sunlight. **THE MANABLOC MUST BE ACCESSIBLE** and there shall be sufficient clear area in front of the MANABLOC to provide access.
2. When local code allows, mount the MANABLOC unit in a fire rated wall, provided an access door meeting the same rating requirements as the wall is installed over the access opening.

3. When installing the MANABLOC in a location other than between studs, provisions must be made to support the tubing runs as they exit the MANABLOC. (See section 15.3).
4. Any installed cover panel shall allow access to the MANABLOC and its mounting screws, the port valves, distribution line connections and supply line connections.
5. To maximize potential water and energy savings, the MANABLOC should be mounted as close as is practical to the hot water source, taking the following into consideration:
 - a. When the MANABLOC is mounted above the water heater, there shall be a minimum of 36" of connecting tubing between the water heater and the MANABLOC to reduce the chance of heat stacking.
 - b. When the MANABLOC is mounted beside the water heater and is connected with tubing incorporating a horizontal flow, there shall be at least 18" of

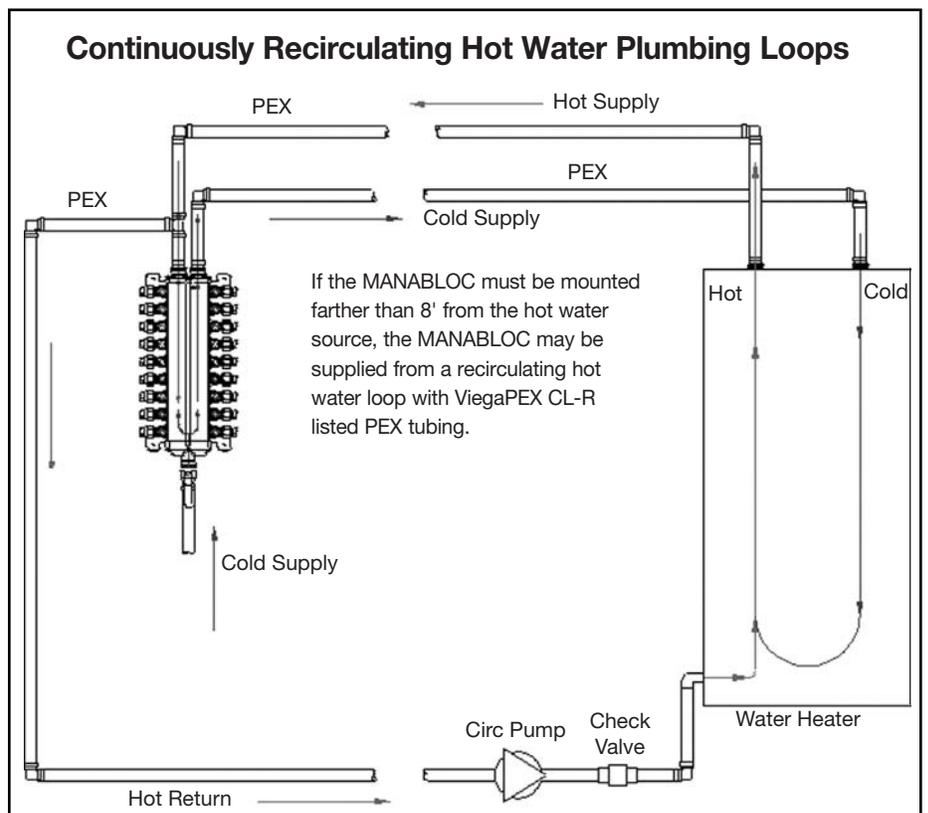
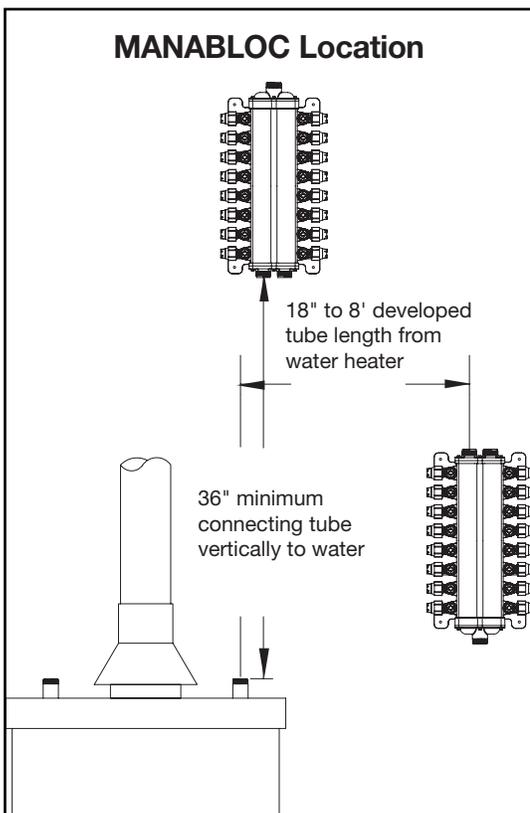
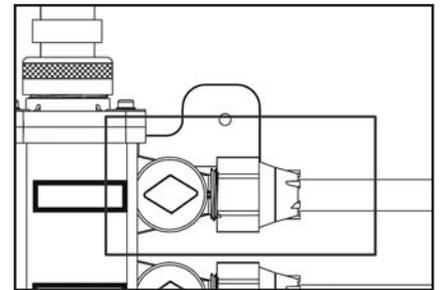
developed tube length. Mounting the MANABLOC within 8 feet of developed tube length of the water heater will minimize delivery time of hot water to individual fixtures. The MANABLOC may be mounted closer than 12" to the hot water source (tank) if it does not exceed the minimum allowable vertical and horizontal spacing outlined in this section.

- c. Install the unit in an area that is centrally located to the most dense concentration of served fixtures. Some applications will require that the MANABLOC be mounted farther than eight (8) feet from the hot water source. See design factors for installing a parallel system on page 8 for suggestions on reducing hot water delivery times in these instances.
6. DO NOT install the MANABLOC within a continuously recirculating hot water plumbing loop. The MANABLOC, however, may be supplied from a recirculating hot water loop. (See figure below.)

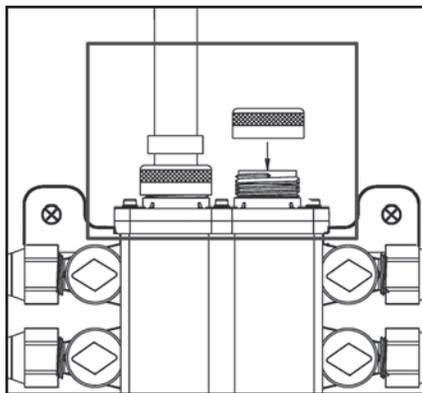
7. Position the MANABLOC so that it can be securely fastened through the holes provided in the mounting brackets. The mounting surface should be as flat as possible so as not to induce any twisting or bending forces on the unit. The 45716 Mounting Straps simplify mounting between studs on 16" centers.

14.4 Valve Operation

A MANABLOC system, which has valves on all of the outlet ports, does not require stop valves at the fixtures. However, the Authority Having Jurisdiction (AHJ) may require stop valves at some fixtures.

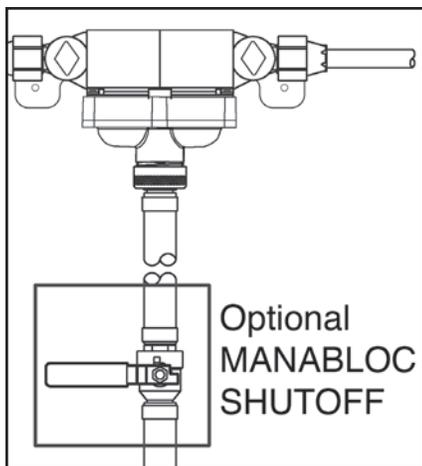


Note: these valves are field-repairable. Contact Viega Customer Service for more information on this procedure.



If a main inlet/outlet will not be used, it must be capped (use Stock Code 53601).

The main service line to the MANABLOC may include a main shutoff valve, as required by local code. Although a shutoff valve for the main service line at the MANABLOC itself is not required, it can be a beneficial option for a homeowner and is recommended.



Local code may also require the installation of a check valve, PRV (pressure reducing valve), back flow preventer, etc. To prevent debris and other particles from entering the system, a strainer may be installed in the service line.

14.5 Domestic Hot Water Circulation Systems

ViegaPEX and the MANABLOC can be used in continuously recirculating domestic hot water plumbing loops, provided:

- The plumbing loops operate with water temperatures of 140°F or lower, as required by most model plumbing codes
- The recirculating loop is for supplying hot water more quickly to the MANABLOC, not to circulate through the MANABLOC or the distribution lines

DO NOT include the MANABLOC within a continuously recirculating loop.

14.6 Multiple MANABLOC Installations

If a home requires multiple MANABLOCs to service the number of fixtures in the home, these guidelines should be followed if the MANABLOCs are closely located to each other.

- Consider dividing high demand fixtures between the units
- Consider a reasonable division, i.e. upstairs/downstairs, east/west or front/back

Locating a Remote MANABLOC

A remote MANABLOC is sometimes recommended to achieve maximum efficiency from your MANABLOC system. Advantageous when the line lengths are excessive from one centralized MANABLOC unit. When the home requires more than one unit due to the number of fixtures or size of the home, consider locating a remote unit near an outlying group of fixtures.

14.7 ViegaPEX General Design/Installation Practices

The following are general guidelines to consider when installing ViegaPEX tubing with a MANABLOC system. Please refer to section 10 of this installation guide for more detail on PEX tubing installations:

1. Insulating each PEX tube individually or as a group is not necessary if the PEX tubing is installed within the insulation envelope of the structure, i.e. the heated area. For example, the tubing may be installed under the insulation in the attic or within an interior wall of a heated space.
2. Install a minimum 18" of metallic or other piping between the water heater and PEX. For electric water heaters, it is permissible to connect directly to the inlets and outlets with a brass swivel elbow or straight brass swivel fitting.
3. Protect the PEX tubing with non-metallic sleeving material where it enters and/or exits a slab or at mass penetrations. PEX need not be sleeved its entire length within the slab. However, full-length sleeving is allowed. Penetrations through concrete walls may be sleeved with a larger size metal or plastic tube. Protect the tubing from any sharp edges where it enters and exits larger sleeving material.



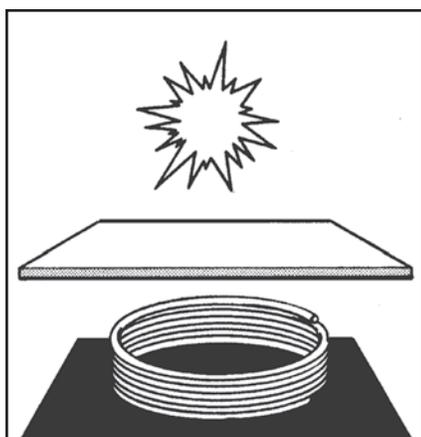
COLD WEATHER CAUTION!

The thermoplastic components of the MANABLOC, like all thermoplastics, have decreased resistance to impact under freezing conditions and can be damaged. Care must be exercised when installation occurs in freezing conditions.

BEFORE INSTALLING THE MANABLOC, MAKE SURE THE LOCATION REQUIREMENTS HAVE BEEN MET.

Take extra caution when handling the MANABLOC in temperatures that are below freezing. Tubing penetrations may require sleeving or the installation of an insulator.

When the tubing penetrates at an angle in relation to the hole, it may be subject to a sharp edge that can damage the pipe. Acceptable sleeving materials include flexible plastic tubing, foam pipe insulation or an approved plastic insulator.



PEX tubing should always be shielded from direct or indirect sunlight.

PEX tubing shall be stored under cover, shielded from direct and indirect sunlight when the material is stored for any length of time. Short exposure times, of ViegaPEX, FostaPEX and PolyAlloy fittings, not exceeding the total accumulated recommended exposure time are permissible. See the PureFlow Water Systems Installation Manual for more information.

It is not necessary to sleeve PEX when penetrating wooden framing members or non-metallic finished or unfinished walls. However, if there is a doubt, sleeve the pipe or install an insulator.



Sleeve all penetrations of metal, metal studs and masonry or concrete.

When penetrations must be sealed for air infiltration purposes, there are several options available. A good grade of silicone, acrylic or siliconized acrylic caulking (DO NOT use oil-based caulks), most canned expanding foams and open- or closed-cell pipe insulation are good sealing materials and may be used in direct contact with PEX tubing. Other materials may be used provided they do not cause short- or long-term damage to the PEX tubing.

If there is no information available on the compatibility of the proposed sealing material, wrap the tubing with several layers of aluminum foil in the area of contact and extending a few inches on both sides before applying the sealing material.

Most building codes require the use of a fire-stopping compound when tubing penetrates a fire-rated wall. There are a number of fire-stopping compounds available that have been listed for use with PEX tubing. These compounds come in standard caulking tubes and are identified as water based, acrylic or latex. Consult the compound manufacturers' instructions for proper application.



DO NOT APPLY CHEMICALS TO THIS MANABLOC



PureFlow MANABLOC must be protected from UV exposure and petroleum products which can damage them. In the event of incidental UV exposure during storage, installation and handling, combined exposure shall not exceed 15 days.

15. MOUNTING THE MANABLOC

15.1 Mounting the MANABLOC Between Studs

NOTICE! Please leave this installation guide for the homeowner's reference. Local code may also require additional labeling directly adjacent to the MANABLOC or on the inside of any cover panel.

Dimensions in these instructions are for 16" stud centers, and must be adjusted for other stud spacing.

Once the general location of the MANABLOC has been determined (see section 14.3 for guidelines), the MANABLOC may be mounted to a suitable surface between a pair of adjacent studs. For 16" stud spacing, the 45716 Mounting Straps can simplify installation.

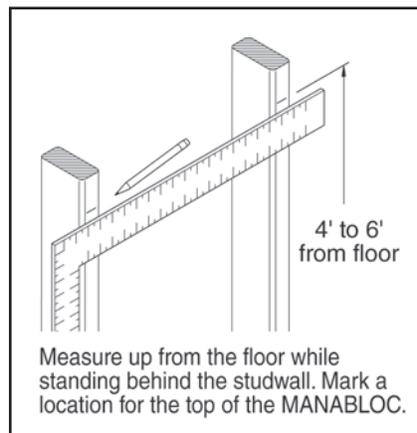
Tools Required

- Electric Drill
- Pencil or Pen
- Framing Square
- Tape Measure
- 3/4" and 1-1/4" Wood Drill Bits
- #2 Phillips Head Screwdriver
- Permanent Marking Pen*
- Tubing Cutter - Stock Code 21304 or 21307
- PEX Press/Crimp Tool(s)*
- MANABLOC Wrench* - Stock Code 50631(Compression Blocs only)

Additional Materials

- Wood or Drywall Screws - 1/2" or longer
 - 1/2" or 3/4" Plywood - only required when not mounting between studs
 - Nylon Ties - Stock Code 43714
 - PEX Distribution Line Tubing
 - Supply Line Tubing
 - MANABLOC 1" Swivel Supply Fittings
 - Fixture Transition Fittings
 - Tubing Clamps and Hangers
 - MANAPANEL Access Panel*
 - Tubing Uncoiler*
 - Tube Turnouts (recommended)
- * Optional or may not be required for some installations

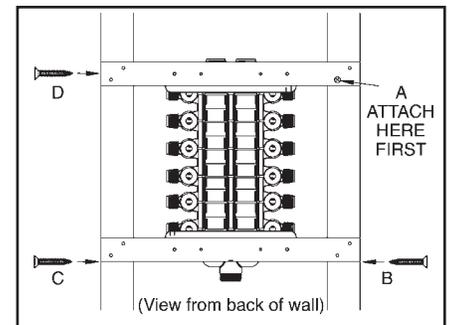
1. Lay the MANABLOC, plastic brackets down, on a suitable flat surface that is large enough to accommodate the full length of the MANABLOC. Place a 45716 Mounting Strap under each plastic mounting bracket (located at the top and bottom ends of the MANABLOC). Attach the plastic mounting bracket at one end of the MANABLOC to the two outer center holes of a Mounting Strap using the provided self-tapping pan-head screws. The screw heads must be on the accessible side of the mounting strap. Repeat at the other end of the MANABLOC. Tighten screws securely.
2. Standing behind the studwall, measure up from the floor and make a mark on the back of one of the studs to represent the top of the MANABLOC. (See illustration.)



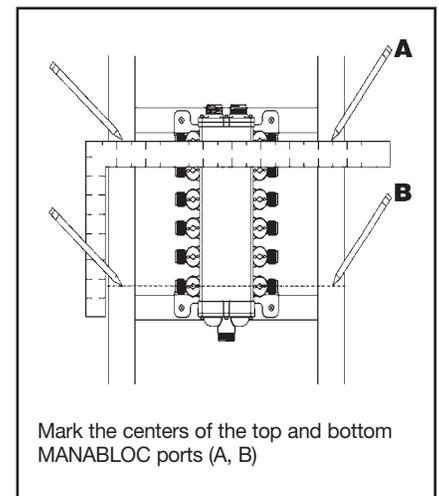
This mark should be between 4 feet and 6 feet from the floor but may be at any height, provided the height will allow all valves on the MANABLOC to be accessible. With a framing square or level, transfer and mark the noted height on the other stud.

NOTE: A residence intended for disabled persons may require that the MANABLOC be mounted lower in the wall to provide access.

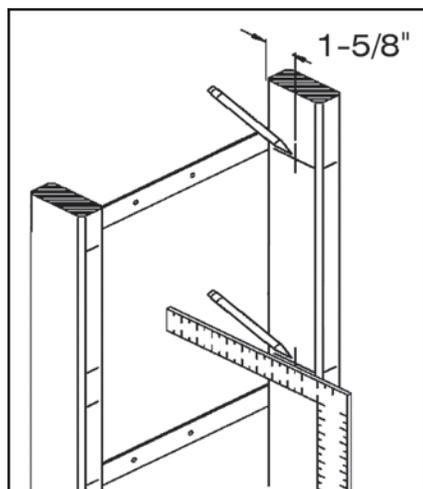
3. Standing behind the stud wall, hold the MANABLOC facing away from you and align the top of the UPPER 45716 Mounting Strap to the line on the stud that you made in Step 2. Loosely attach this Mounting Strap flush to the back outer edge of one stud using a 3/4" or longer drywall or other suitable wood screw (A). See illustration.



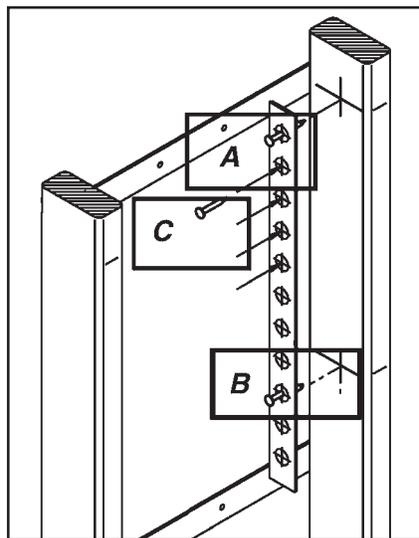
4. Line up the LOWER Mounting Strap with the back outer edge of the stud and attach it in the same manner (B). Attach the remaining strap ends (C & D) to the other stud, and tighten all screws.
5. Standing in front of the wall, using a framing square or straight edge, mark the center line position of the top and bottom ports onto both studs (see illustration).



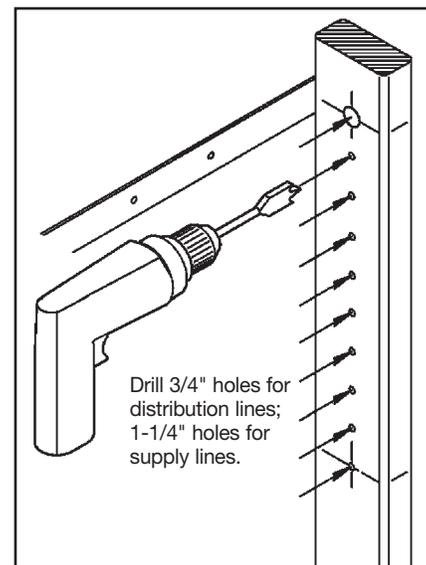
6. Detach the MANABLOC from its Mounting Straps (or 1 x 4s) and remove it from the installation area to prevent wood chips or other debris from falling into the unit.
7. Transfer the port location marks made in step 5 to the insides of the stud cavity using a square and pencil.
8. Measure 1-5/8" from the mounting surface. Draw a vertical line on the studs that passes through each of the horizontal port center lines marked in step 7 (see illustration below). Be sure to mark the inside of both studs.



9. Push a small nail through the printed center line at one end of the Drill Guide (A). Push the nail into the cross formed where the top port mark intersects with the 1-5/8" mark. Tap the nail into the stud to hold the Drill Guide in place.
10. Push a small nail through the printed center line on the lower end of Drill Guide with the center line of the port. (B). Tap the nail into the stud to hold the Drill Guide in place.



11. Using an awl, nail or other pointed tool (C), mark the stud by tapping through the Drill Guide at each printed center line between the two nails.
12. Carefully remove the Drill Guide and repeat the marking procedure on the adjacent stud.
13. Drill 3/4" holes through both studs at each marked location. Be sure to hold the drill level perpendicular to the stud to prevent drilling holes at an angle. Remove any splinters or burrs made during drilling.
14. Mark and drill any holes for main water supply and hot water supply/return lines at this time. A 1-1/4" bit will provide adequate clearance for 3/4" or 1" tubing. The tubing shall enter and/or exit the MANABLOC in a straight line so as not to induce bending stress on the MANABLOC. Necessary elbows, couplings and tees are allowed in the main water supply lines.



15. Reattach the MANABLOC to the mounting straps.



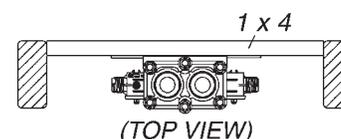
When the MANABLOC is installed prior to wall finishing operations, the unit **MUST** be protected from paint, texture compounds and drywall dust.

NOTE: The wall in which the MANABLOC is mounted must be accessible from both sides during installation to use the 45716 Mounting Straps.

15.2 Mounting the MANABLOC Between Studs Without Use of 45716 Straps

If not using the 45716 Mounting Straps, this procedure applies:

1. Cut two pieces of lumber (1 x 4 - or 3/4" plywood — about 3-1/2" wide) to a length that provides a snug fit BETWEEN two studs.

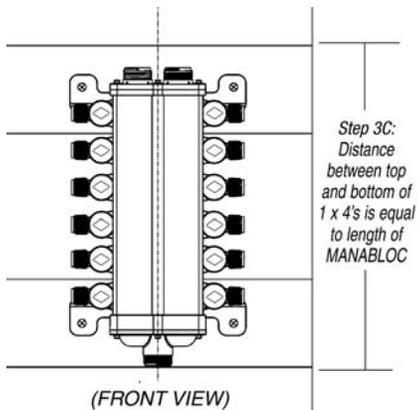


1 x 4s attach at the back, inside the studs, and the MANABLOC is centered between the studs.

2. The top of the MANABLOC should be between 4' and 6' from the floor (but may be at any height provided that it maintains accessibility to all of the ports on the MANABLOC). Make a mark near the back of the inside of one stud that would represent the top of the MANABLOC. With a framing square or level, mirror the mark on the inside back of the other stud.

3. ATTACHING THE MANABLOC BETWEEN THE STUDS:

- a. Measure the total length of the MANABLOC.
- b. Attach the first (UPPER) 1 x 4 inside and flush to the back of the studs (see TOP VIEW on previous page) at a height where the center of its width is centered on the marks from step 2.
- c. Attach the remaining (LOWER) 1 x 4 inside and flush to the back of the studs at a distance below the upper 1 x 4 that is equal to the length of the MANABLOC (step 3a) when measured from the top of the upper 1 x 4 to the bottom of the lower 1 x 4. See FRONT VIEW illustration.

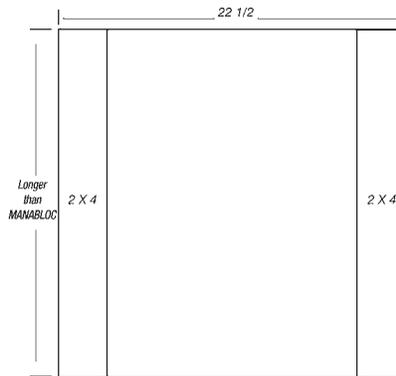


4. CENTER THE MANABLOC IN THE STUD CAVITY: Attach the MANABLOC to the 1 x 4s with four 1/2" - 3/4" drywall screws (DO NOT OVERTIGHTEN).

5. Continue to section 15.1 step 5 to finish installation.

15.3 Mounting the MANABLOC Without Studs, Surface Mount

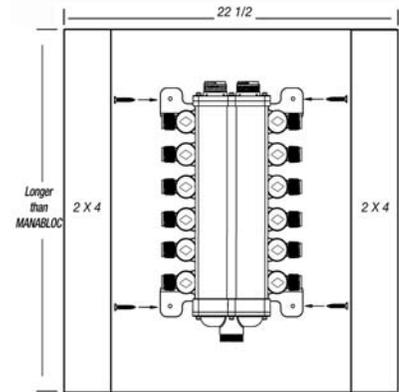
- 1. A suitable base for the MANABLOC can be constructed from a section of 1/2" or thicker plywood that is a minimum 22-1/2" wide and slightly longer than the overall length of the MANABLOC.
- 2. Securely attach a length of 2 x 4, or other suitable framing material with a thickness of 1-1/2" and about 3-1/2" wide on the left and right sides of the mounting base running the full-length of the MANABLOC (see illustration below). The 2 x 4s will be used to secure the distribution lines at the correct height as they exit the MANABLOC. (Support clamps not to exceed 6" spacing from end of ports.)



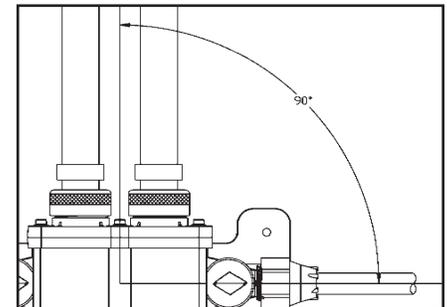
3. Attach the mounting base to the structure in a suitable location (see Section 14.3). The base should be mounted so the top of the MANABLOC is between 4 feet and 6 feet from the floor but may be at any height provided that the height maintains accessibility to all the ports on the MANABLOC.

4. The mounting base must be firmly attached to a structure solid enough to support, at a minimum, the weight of the MANABLOC filled with water. The base should be square and level.

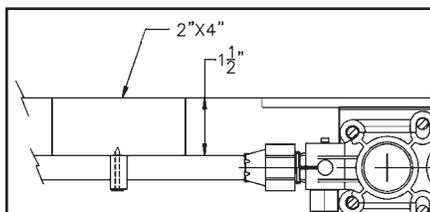
5. Center the MANABLOC on the base both vertically and horizontally as shown here. Attach the MANABLOC to the mounting base with four 1/2" or longer drywall or wood screws through the holes in the plastic brackets on the MANABLOC. (DO NOT OVERTIGHTEN)



6. As the distribution lines are connected to the MANABLOC (see section 16.2), ensure that the tubing exits the unit at a 90-degree angle to the center line of the MANABLOC so as not to induce bending stress on the MANABLOC.



7. When attaching the distribution line tubing to the 2 x 4 supports, be sure to use appropriately sized Viega tubing clamps (For example, use stock code 52 000 for 3/8" tubing and stock code 52 020 for 1/2" tubing).



Use one clamp per tube to ensure that the tubing is held securely. Position clamps **NO FARTHER** than six (6) inches from the end of the port. **DO NOT** pull tubing tight. Leave at least 7" of slack per 50' of tubing run. This is to accommodate for any expansion and/or contraction of the tubing caused by ambient air or water temperature changes.

16. INSTALLING MANABLOC DISTRIBUTION LINES

16.1 Installing MANABLOC Distribution Lines

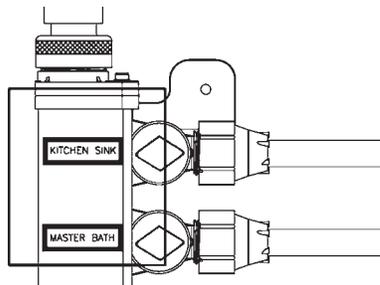
Run distribution lines continuously in the most direct route from the MANABLOC to the fixtures.

A distribution line may contain a coupling or other fitting for purposes such as repairing a damaged section of tubing, handling a change of direction that cannot be made within the minimum bend radius guidelines, accommodating a fixture location change that requires a longer line, or to supply a low-demand accessory (i.e., ice maker). However, several pieces of shorter tubing should not be connected with fittings for the purpose of using up leftover lengths of tubing.

NOTE: It is the responsibility of the installer to ensure that further construction, finishing and other mechanical system installations do not compromise the MANABLOC plumbing system as installed according to these instructions.

1. Tubing coils are usually placed at the MANABLOC location and tubing is pulled to the fixture through stud cavities, holes drilled overhead in floor joists, etc. Several tubes may be pulled at one time. Viega's color-coded ViegaPEX tubing helps prevent cross-connections.
2. Do not pull tubing tightly. Some slack (7" per 50') is necessary to accommodate expansion and contraction. Leave enough excess tubing at the beginning and end of runs to make connections without putting strain on the tubing.
3. Exercise care when pulling PEX tubing to prevent cutting or abrading. Take care to prevent kinking of the coiled tubing. If kinking or cutting occurs, cut out the damaged section and install a coupling.

4. For the best results, connect the distribution lines to fixtures and the MANABLOC immediately upon installation. Label the end-use fixture on the MANABLOC cover plate next to the port.



Self-adhesive labels are supplied with the MANABLOC. Mark tubes pulled as a bundle or those not connected immediately at both ends with a permanent marker to designate the fixture supplied.

5. Since plumbing fixtures are generally located in groups, and there may be several ViegaPEX distribution lines running to approximately the same location, it is easiest to run these distribution lines bundled together.

Hot and cold lines may be run in the same bundle. For a neat appearance, tie bundles with nylon ties (Stock Code 43714 or 43701 or plastic strapping at regular intervals.

NOTE: Bundles shall be sufficiently tied for tubing support but shall NOT restrict tubing expansion and contraction caused by temperature variations.



CAUTION: DO NOT USE DUCT TAPE FOR BUNDLING.

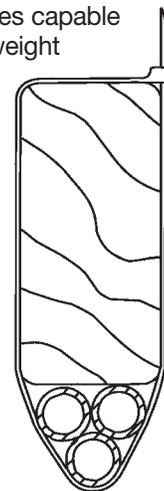
Duct tape will not permit tubing movement.

6. Bundles can be supported with hangers designed for larger tubing sizes.

7. The 43714 or 43701 can be used to support PEX lines directly from wooden framing members.

Any plastic cable ties capable of supporting the weight of the tube or bundle when filled with water can be used.

8. Holes drilled through studs, joists, plates, headers, etc. must be large enough to accommodate tubing bundles without binding to allow free movement. Several smaller holes (accommodating a few lines each) may be preferable to drilling a bundle-size hole. In no case should the hole size exceed building code guidelines, as this could weaken the structural support members.



For more detailed instructions, refer to section 10 of this guide.

16.2 Connecting Distribution Lines to the MANABLOC

PEX Press, PEX Crimp and Compression connection models are available and included with each MANABLOC model. Supply connections are not included and must be ordered separately.



UNDER NO CIRCUMSTANCES

shall any form of thread sealant (Teflon[®] paste, pipe dope) be used on distribution line connections. The carriers present in these compounds can crack the plastic port connections, resulting in leaks and water damage.

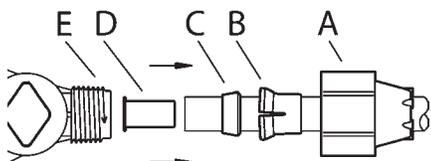
16.2.1 Compression Connections (3/8" & 1/2" ports)

THE WATER SUPPLY TO THE MANABLOC AND THE PORT VALVES SHALL BE TURNED OFF BEFORE ATTEMPTING INSTALLATION OF PEX COMPRESSION CONNECTIONS.

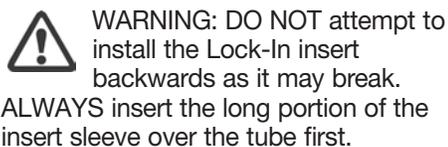


NOTE: The red MANABLOC valves designate hot ports, the blue valves designate cold ports. Make sure the distribution lines are connected to the correct ports (hot or cold). The use of color-coded ViegaPEX tubing reduces the possibility of cross connections.

1. For each distribution line, slide the Lock-In compression nut (A), Lock-In insert (B) and the plastic ferrule (C) onto the tubing in that order. See illustration below.

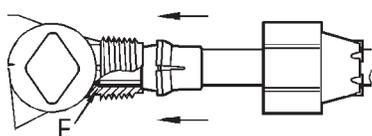


The long taper of a 3/8" ferrule (C) must be TOWARD THE END OF THE TUBE; a 1/2" ferrule is symmetrical and may be installed facing either direction. Insert the stainless steel stiffener (D) COMPLETELY into the end of the tubing.



DO NOT attempt to use or reuse inserts that are defective, cracked, broken or otherwise damaged, as connection failure will result.

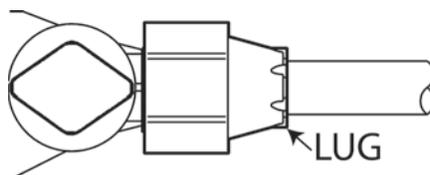
2. Push the tubing into the port socket (E) until it bottoms out.



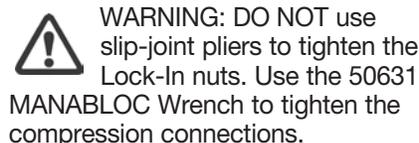
Holding the tube so that it does not back out of the port socket, slide the white Lock-In insert and ferrule snugly against the chamfer inside the port socket.

While holding the tube against the bottom of the socket, thread the Lock-In compression nut onto the port and tighten hand-tight.

3. While holding the tube securely to prevent turning, finish tightening the nut with the MANABLOC Wrench (Stock Code 50631) until the white Lock-In insert appears between the lugs and becomes flush with the ends of the lugs, plus 1/4 to 1/2 turn.



Complete the connection as soon as each distribution line is connected to the MANABLOC.



Each valve should be turned to the open position after completing each connection, as shown above.

4. After all connections are complete, recheck that all of the Lock-In inserts are visible between the lugs and are flush or protruding slightly beyond the lugs.

5. As the distribution lines are connected to the MANABLOC, they should immediately be labeled on the cover plate as to which fixture that line supplies.

Fixture labels are included with each MANABLOC. Affix the appropriate label to the cover plate next to the port.



This plumbing system relies upon the proper tightening of distribution line compression connections.

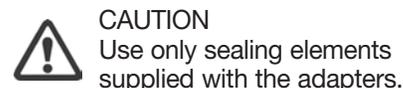
Failure to properly complete ALL connections may result in system failure. Incomplete or improper connections can hold pressure during a system test but may fail at a later date, resulting in water damage.



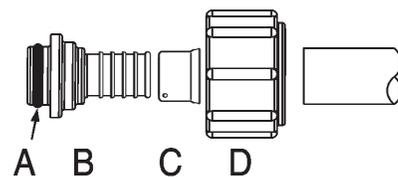
Overtightening of the Lock-In compression nuts may cause damage to the tubing, nut, valve or fitting body. DO NOT tighten Lock-In nuts beyond the recommendation of these instructions (Step 3).

16.2.2 PEX Press Connections (1/2" ports)

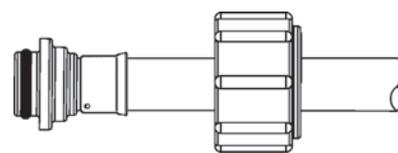
THE WATER SUPPLY TO THE MANABLOC AND THE PORT VALVES SHALL BE TURNED OFF BEFORE ATTEMPTING INSTALLATION OF PEX PRESS ADAPTERS.



1. Slide the supplied swivel nut (D) and a press sleeve (C) 61000 for 3/8" tubing; 61020 for 1/2" onto the tubing (threads of the nut toward the end of the tubing).

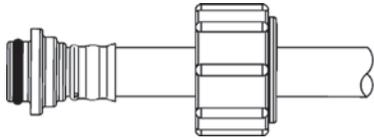


Insert the barbed end of the fitting (B) fully into the end of the tubing as shown.

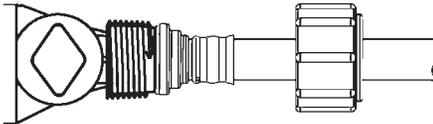


2. Check view hole of sleeve, if tubing is fully inserted, then press the sleeve with an appropriately sized press tool. See section 6 from this guide for pressing instructions.

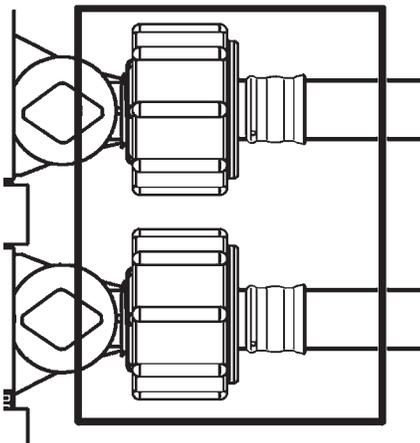
DO NOT PRESS TWICE.



3. Ensure sealing element (A) is in place, then insert the fitting into the desired port until the fitting flange sets flush with the end of the port.



4. Slide the swivel nut (D) over the press sleeve (C) and thread the nut onto the MANABLOC port. Hand tighten only!



5. Open the port valve(s) before turning on the main water supply.

16.2.3 PEX Crimp Connection (1/2" ports)

THE WATER SUPPLY TO THE MANABLOC AND THE PORT VALVES SHALL BE TURNED OFF BEFORE ATTEMPTING INSTALLATION OF PEX CRIMP ADAPTERS.

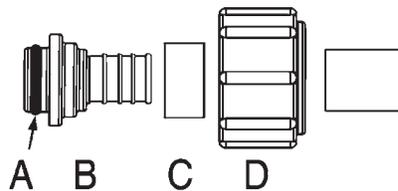


CAUTION: Use only sealing elements supplied with the adapters.

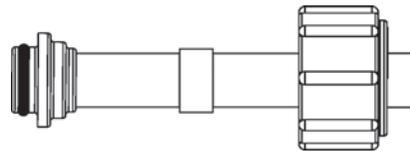


NOT FOR USE WITH FOSTAPEX

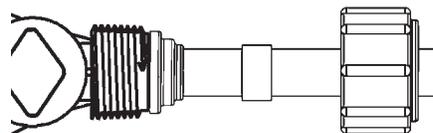
1. Slide the supplied swivel nut (D) and a crimp ring (C) 43600 for 3/8" tubing 43620 for 1/2" onto the tubing (threads of the nut toward the end of the tubing).



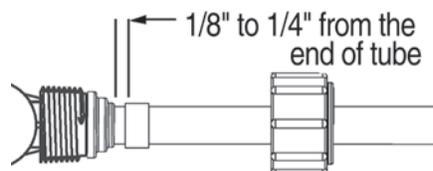
Insert the barbed end of the fitting (B) fully into the end of the tubing as shown.



2. Ensure sealing element (A) is in place, then insert the fitting into the desired port until the fitting flange sets flush with the end of the port.



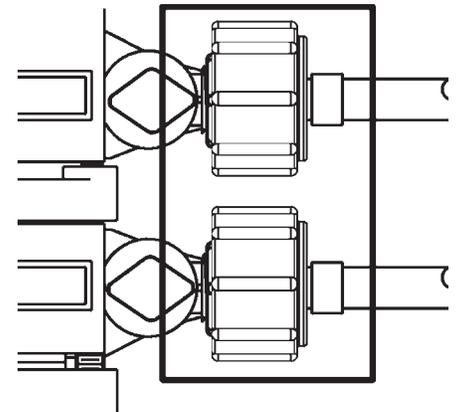
3. Slide the crimp ring (C) within 1/8" to 1/4" from the end of tube. Crimp the ring with an appropriately sized full-circle crimp tool.



See section 7 of this guide for crimping instructions.

DO NOT CRIMP TWICE.

4. Slide the swivel nut (D) over the crimped ring (C) and thread the nut onto the MANABLOC port. Hand tighten only!



5. Open the port valve(s) before turning on the main water supply.

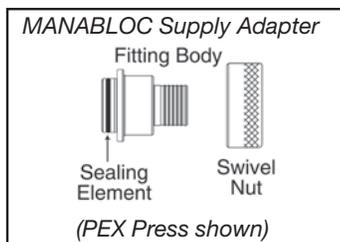
16.3 Connecting Distribution Lines to Fixtures

There are a variety of male and female adapters, sweat adapters, turn out supports and stub out adapters to assist in terminating at the fixture. Refer to section 12.6 though 12.9 of this guide or the Viega product catalog.

16.4 Water Supply Connections

The main water supply shall be turned off before making water supply connections.

The MANABLOC water supply connection uses a special 1" swivel MANABLOC transition fitting that seals with a sealing element.



This connection is used on the cold water supply and the hot water supply/return lines. This connection to the MANABLOC does not require any form of thread sealant and none shall be used.



DO NOT USE ANY FORM OF THREAD SEALANT TO MAKE THIS CONNECTION.

NOTE: Water Service connections to adapt to most types of plumbing supply materials are available. Consult the Viega Product Catalog for a complete listing of available connections.

1. Connect water service adapters to water supply piping before attaching the swivel fitting to the MANABLOC (instructions included with adapters.) Excessive force from threaded fittings, or solvents from solvent welding (PVC or CPVC) will cause damage to the MANABLOC.

Drill all holes in wood members for water supply/return tubing BEFORE mounting the MANABLOC.

2. When using male or female pipe thread transition fittings, to connect to supply tubing, use only Teflon® TAPE to seal pipe threads. DO NOT use pipe dopes, thread sealers, Teflon® pastes, etc.
3. If copper sweat fittings are used anywhere in the MANABLOC water supply line or water heater supply/return lines, these fittings must be soldered, cooled and flushed of any flux residue before these lines are connected to the MANABLOC.

Soldering creates a tremendous amount of heat, which could melt the MANABLOC, and solder flux contains strong acids and may also contain petroleum products.

These compounds can attack the plastic materials from which the MANABLOC is made and cause crazing, cracking and failure of the MANABLOC, resulting in leaks and water damage.

4. Ensure that the hot/cold supply lines are connected to the correct supply inlet/outlet on the MANABLOC. Red valves designate hot ports; blue valves designate cold ports.
5. Supply lines shall enter and/or exit the MANABLOC in a straight line. If bending of the supply lines is required, the tubing must be anchored to a framing member to isolate the bend stress from the MANABLOC or use a directional fitting.
6. After the supply tubing has been connected to the transition fitting, remove the plastic protective cap from the MANABLOC inlet/outlet part and thread the swivel nut onto the threaded male adapter hand tight only.

DO NOT CROSS-THREAD.

Viega Part No.50346 is available to connect 3/4" PEX, copper and CPVC lines to the MANABLOC.

IMPORTANT WARNING:
FLUX, PVC AND CPVC SOLVENTS WILL CRACK THE MANABLOC
Instructions included with fitting.

TO MANABLOC

50346

COPPER PEX CPVC

Swivel fittings must be ALIGNED CORRECTLY before being attached to the MANABLOC. The piping material must not be allowed to put stress on the MANABLOC, as leaking and damage may result.

HAND TIGHTEN ONLY

Damage May Result if Overtightened

HAND TIGHTEN ONLY



DO NOT ELECTRICALLY GROUND TO THIS SYSTEM.

16.5 Filling and Testing the MANABLOC

All PureFlow systems must be pressure tested in accordance with local code or the system working pressure after installation. Connections may be pressure tested immediately after completion. Refer to section 17.1: Pressure Testing PureFlow Systems for specific testing requirements.

16.6 Draining the MANABLOC System

If the MANABLOC system has been filled with water and there exists the possibility that the ambient temperature will drop close to or below 32° F (0° C), then the MANABLOC unit **MUST** be drained to prevent irreparable damage. The process of draining involves loosening and removal of 1 or more supply line connections and 2 distribution lines from the MANABLOC.

NOTE: Depending on the installation, some supply connections may be capped. If that is the case, remove the cap(s) as instructed below.

1. Turn off all water supply(s) feeding the MANABLOC. Open both sides of all fixtures served by the manifold and leave the fixtures open during draining. For each port of the MANABLOC where there is a distribution line connected, make sure the port valve is in the open position.
2. Loosen and remove the bottom supply connection(s) (or cap(s)) and the lowest pair of hot and cold distribution lines.
3. As the connections are removed, most of the water contained in the MANABLOC main bores and some of the water in the distribution lines should purge from the system.
4. Allow to drain until no water purges.

5. Reattach the supply line(s) or cap(s) and the distribution lines. Tighten the supply connections according to the instructions in section 16.4. When reconnecting the distribution lines, **DO NOT** overtighten the connections. These only need to be hand-tight!

NOTE: The procedure described above will leave a small amount of water in the MANABLOC unit and, depending on the installation, may leave some or most of the water in the distribution lines. This remaining water should not cause damage to the manifold unit or to the PEX distribution lines in the event of a freeze. However, for complete assurance that freeze damage will not occur, perform the following additional steps.

16.7 To completely drain the system:

1. Loosen and remove all of the supply line connections (or caps) and all of the distribution lines from the MANABLOC.
2. Remove the 4 attachment screws and withdraw the MANABLOC unit from its mounting. Note: Grasp the unit firmly before removing the last attachment screw to prevent the unit from falling and being damaged.
3. Completely drain the MANABLOC unit by inverting the unit several times until there is no water coming from any of the supply connections or ports.
4. To purge the PEX distribution lines, first make sure that both sides of all of the fixtures are in the open position. Using low pressure air from a tank or compressor, force the water from the lines by connecting the air pressure source to each line one at a time and blow air through the lines until no water flows from the fixtures.

5. Reattach the MANABLOC and reconnect the supply and distribution line connections.

NOTE: When reconnecting the distribution lines, **DO NOT** overtighten the connections. Compression connections should require only about 1/8 turn past hand tight when reinstalling connections that were previously tightened to the specifications outlined in this installation guide. PEX Press and PEX Crimp connections only require to be hand tightened.

17. PRESSURE TESTING PUREFLOW SYSTEMS

17.1 General

Upon completion of the installation the system shall be filled and pressure tested. When hydrostatic testing, use only POTABLE water.

NOTE: During the initial pressure test period, the system pressure indicated on the gauge may decrease due to the initial deformation of the pipe, followed by a slow expansion. The pressure drop is dependent on ambient temperature, system capacity and pressure but shall not be more than 8 psi in an hour.

When pressure testing the MANABLOC, open all connected port valves before filling the system with water or air and pressurizing. If the MANABLOC is filled and pressurized before the port valves have been opened, read valve notice below.

Testing PEX Systems (Branch and Main / MANABLOC)				
Test Method	Min/Max Duration (Min)	Max Pressure (psi)	Min Pressure (psi)	Allowable Variance (psi)
Water	15 min/1 hr	100	40	N/A
Air	15 min/1 hr	100	40	8*



NOTICE - VALVE INFORMATION!

Opening a port valve to an empty or unpressurized distribution line may cause valve damage.

To prevent potential valve damage or failure, open the port valves before filling and pressurizing the lines. The force of water rushing to fill an empty line can cause the valve's seal to "clip off," resulting in incomplete sealing or complete valve failure.

CARE must be exercised when opening a port valve to an empty or unpressurized line. The fixture to which the line is connected should be in the OFF position and the valve must be opened slowly until water starts to flow into the line.

DO NOT CONTINUE to open the valve until the line is full and pressurized. Open the valve fully only after the line is up to system pressure. The fixture can then be opened to purge the line of air.

Valve stems are replaceable. Order Stock Code 50602.

* If the pressure in the system declines more than eight psi during the 15-minute to one-hour period, repressurize the system to the original test pressure and retest. If the system pressure declines more than 8 psi again during the test period, test the distribution line test caps or any other fittings in the system with the approved leak detect solution.

NOTE: Some plumbing fixtures may not withstand test pressures greater than 80 psi. Consult fixture manufacturer's instructions for pressure limitations or plug all distribution lines at the fixture end. The system shall, at a minimum, withstand the test pressure, without leaking, for a period of 15 minutes.

WATER TESTING SHALL BE AVOIDED DURING FREEZING CONDITIONS. UNDER NO CIRCUMSTANCES SHALL THE SYSTEM BE TESTED AT TEMPERATURES LOWER THAN 10°F (-12°C).

THE WATER HEATER SHALL BE ISOLATED AND NOT INCLUDED IN THE SYSTEM AIR TEST.



WARNING! PRESSURES USED IN TESTING CAN BLOW UNMADE OR INCOMPLETE CONNECTIONS APART WITH TREMENDOUS FORCE!

This force is many times greater when air is used as a test medium. To reduce the risk of personal injury, ensure that all connections are completed before testing. Use only the pressure and time required to determine that the system is leak free.

17.2 Leak Detection

Leak detection: Use only a mixture of Original Palmolive Green™ dishwashing soap (#46100-46200) or Palmolive Ultra™ (#356140 or 46128) mixed with potable water at a ratio of 2 ounces of soap to one gallon of water (mix Ultra at a ratio of 1.5 ounces per gallon)

NOTE: If such a solution is used, the antifreeze solution must be sufficiently concentrated to withstand the lowest temperature encountered while the testing fluid is in the system. Antifreeze solutions should be purged and the system flushed with potable water prior to consumer use.

NOTE: If the solution does not show a leak on any of the caps or fittings, isolate the MANABLOC by turning the valves to the “OFF” position, repressurize if needed, and apply the same solution to the MANABLOC manifold components.

When testing a MANABLOC and no leaks are found on any of the caps or fittings, isolate the MANABLOC by turning the valves to the “OFF” position, repressurized if needed, and apply the same solution to the MANABLOC manifold components.

Any connections found to be in question must be replaced or remade and the pressure test repeated.

18. SYSTEM DISINFECTION

18.1 General

Local codes may require system disinfection. When no other method is available, follow the time limitations and exposure levels show below.

1. Use a chlorine solution and one of the exposure durations listed below:

Concentration	Period	Authority
200 PPM	3 hours	IPC/UPC®
50 PPM	24 hours	IPC/UPC®

2. Mix the disinfection solution thoroughly before adding it to the system.
3. The chlorine solution must reach all parts of the system. Open all fixtures (both sides) and flow water until a chlorine smell is present. As an alternative, chlorine test tablets can be used to detect chlorine at each fixture.
4. The chlorine source for the solution can be, but is not limited to, the following:

Chlorine Source	% Active Chlorine	Form	Amount Per 100 Gallon Water for a 200 PPM solution
Laundry bleach	5.25	Liquid	3 pints (48 oz.)

5. After the solution has been in the system for the time required by the Authority Having Jurisdiction or the exposure durations listed in step 1 above, the system shall be flushed completely with potable water.
6. The system must be purged or drained of all water or protected from freezing.

FAILURE TO FLUSH THE SYSTEM NOTICE!

To prevent reduced service life of system components, disinfection solutions shall not be allowed to stand in the system longer than 24 hours. Thoroughly flush the system with potable water after disinfection.

19. CODES, STANDARDS AND APPROVALS

19.1 Codes

PureFlow is accepted by the following model codes for use in potable hot and cold water distribution systems.

UPC - Uniform Plumbing Code

IPC - International Plumbing Code

IRC - International Residential Code

NSPC - National Standard Plumbing Code

Most state written codes

Check with your local Viega representative for code compliance in your area.

19.2 Standards

ASTM - American Society for Testing and Materials

ASTM F876/F2023: Standard Specification for Cross-linked Polyethylene (PEX) Tubing -

This standard contains finite dimensional requirements for SDR9 PEX tubing in addition to burst, sustained pressure, chlorine resistance and other relevant performance tests at different water temperatures.

ASTM F877: Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems -

This standard contains performance requirements for SDR9 PEX tubing and fitting systems. The standard contains finite dimensional requirements for tubing, in addition to burst, sustained pressure and other relevant performance tests at different water temperatures.

F1807 - This standard contains finite dimensional requirements for metallic insert fittings for SDR9 PEX tubing and other relevant performance tests at different water temperature.

F2159 - This standard contains finite dimensional requirements for plastic insert fittings for SDR9 PEX tubing and other relevant performance tests at different water temperatures.

NSF International

ANSI/NSF 14: Plastics Piping System Components and Related Materials-

This standard establishes minimum physical and performance requirements for plastic piping components and related materials. These criteria were established for the protection of public health and the environment.

ANSI/NSF 61: Drinking Water System Components - Health Effects -

This standard establishes minimum health effects requirements for the chemical contaminants and impurities that are indirectly imparted to drinking water from products, components and materials used in drinking water systems. This standard does not establish performance or taste and odor requirements for drinking water system products components or materials.

ISO - International Standards Organization

ISO 9001 - This standard is intended to establish, document and maintain a system for ensuring production output quality. ISO 9001 certification is a tangible expression of a firm's commitment to quality that is internationally understood and accepted. All PureFlow PEX press fittings are manufactured in ISO 9001 certified facilities.

Check with your local Viega representative for further information or copies of above mentioned listings and certifications.

19.3 Listings and Certifications

PPI - Plastic Pipe Institute

TR 4 Listed Materials

Listing of Hydrostatic Design Bases (HDB) Strength Design Bases (SDB), Pressure Design Bases (PDB) and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe.

Pressure/Temperature Ratings:

- 160 psi at 73.4°F
- 100 psi at 180°F
- 80 psi at 200°F

NSF International

NSF-pw certification mark - Product meets all applicable performance standards for pressure-rated potable water applications required in ANSI/NSF Standard 14 and complies with ANSI/NSF Standard 61 for health effects.

cNSFus-pw - Product meets requirements of Canadian CSA B137.5 listing.

NSF U.P. Code - Product meets requirements of the Uniform Plumbing Code

PEX 5006 - Tested and listed to the NSF-pw (CL5) chlorine resistance rating for an end use condition of 100% @ 140°F per ASTM F876, which is the highest chlorine resistance rating available through ASTM. When the product is marked with the PEX 5006 (CL5) designation it affirms the product is approved for use in continuous domestic hot water circulation systems with up to 140°F water temperatures.

IAPMO R&T - International Association of Plumbing and Mechanical Officials Research and Testing

Certificate of Listing - Product meets the requirements of the Uniform Plumbing Code™.

ICC - ES - International Code Council - Evaluation Services

ICC ES-PMG™ - Product complies with International Plumbing Code.

PureFlow[®] Warranty

viiega

VEIEGA LIMITED WARRANTY PUREFLOW[®] POTABLE WATER PLUMBING SYSTEMS

Subject to the conditions and limitations in this Limited Warranty, VIEGA LLC (Viega) warrants to owners of real property in the United States that the components in its PureFlow Plumbing Systems (as described below) when properly installed by licensed plumbers in potable water systems, under normal conditions of use, shall be free from failure caused by manufacturing defects for a period of ten (10) years from date of installation. This warranty also applies to those supplying products covered by this warranty and installed on the property.

PureFlow Plumbing Systems and components covered by this ten-year warranty are:

ViegaPEX[™] and ViegaPEX[™] ULTRA cross-linked polyethylene (PEX) tubing, FostaPEX[®], MANABLOC[®], Minibloc[™] or manifolds sold by Viega and using approved connections sold by Viega installed together in manifold plumbing systems.

ViegaPEX and ViegaPEX ULTRA cross-linked polyethylene (PEX) tubing or FostaPEX installed with PEX press fittings and PEX press sleeves sold by Viega.

ViegaPEX and ViegaPEX ULTRA cross-linked polyethylene (PEX) tubing and crimp insert fittings installed with copper crimp rings and meeting the specifications of ASTM F1807 and certified/listed for conformance with ANSI/NSF Standards No. 14/61 and Viega PolyAlloy[™] fittings.

Power tools and jaws used with PEX Press fittings are warranted by the manufacturer and Viega extends no separate warranty on those tools or jaws. Viega warrants that PEX Press hand tools sold by Viega, under normal conditions of use, shall be free from failure caused by manufacturing defects for a period of two (2) years from date of sale. Viega warrants that PEX Crimp hand tools sold by Viega, under normal conditions of use, shall be free from failure caused by manufacturing defects for a period of twelve (12) months from date of sale.

Viega warrants that properly installed stop valves, PEX lav and closet risers and riser accessories manufactured and/or sold by Viega shall be free from failure caused by manufacturing defects for a period of two (2) years from date of installation.

Under this limited warranty, you only have a right to reimbursement if the failure or leak resulted from a manufacturing defect in the products covered by this warranty and the failure or leak occurred during the warranty period. You do not have a remedy or right of reimbursement under this warranty and the warranty does not apply if the failure or resulting damage is caused by (1) components in the plumbing system other than those manufactured or sold by Viega; (2) not designing, installing, inspecting or testing the system in accordance with Viega's installation instructions at the time of the installation, applicable code requirements and good plumbing practices; (3) improper handling and protection of the product prior to and during installation, inadequate freeze protection, exposure to water pressures or temperatures in excess of the limitations on the tubing or application of unauthorized solvents or chemicals; (4) acts of nature such as earthquakes, fire, flood or lightning. In addition, the warranty does not apply if distribution lines and their connections to the MANABLOC system are not ViegAPEX or FostaPEX tubing or connections sold by Viega.

In the event of a leak or other failure in the system, it is the responsibility of the property owner to obtain and pay for repairs. Only if the warranty applies will Viega be responsible for reimbursement under this warranty. The part or parts which you claim failed should be kept and Viega contacted at the address below* or by telephoning 800-976-9819 within thirty (30) days after the leak or other failure and identifying yourself as having a warranty claim. You should be prepared to ship, at your expense, the product which you claim failed due to a manufacturing defect, document the date of installation, and the amount of any claimed bills for which you claim reimbursement. Within a reasonable time after receiving the product, Viega will investigate the reasons for the failure, which includes the right to inspect the product at Viega and reasonable access to the site of damage in order to determine whether the warranty applies. Viega will notify you in writing of the results of this review.

In the event that Viega determines that the failure or leak and any resulting damages were the result of a manufacturing defect in the products and occurred during the time periods covered by this warranty, Viega will reimburse the property owner for reasonable repair or replacement charges to include drywall, flooring and painting costs as well as damages to personal property resulting from the failure or leak. VIEGA SHALL NOT BE LIABLE FOR CONSEQUENTIAL ECONOMIC LOSS DAMAGES UNDER ANY LEGAL THEORY AND WHETHER ASSERTED BY DIRECT ACTION, FOR CONTRIBUTION OR INDEMNITY OR OTHERWISE.

THE ABOVE LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IF FOUND APPLICABLE, ANY IMPLIED WARRANTIES ARE LIMITED TO THE DURATION OF THE TIME LIMITS SET OUT IN THIS WRITTEN WARRANTY. Other than this limited warranty, Viega does not authorize any person or firm to create for it any other obligation or liability in connection with its products. This written warranty applies for the full term of the applicable warranty regardless of any change of ownership in the property.

Some states do not allow the exclusion or limitation of incidental or consequential damages or limitations on the duration of implied warranties in certain types of transactions, so the above exclusion or limitations may not apply to you. This limited warranty gives you specific legal rights and you also may have other rights which vary from state to state. This warranty shall be interpreted and applied under the law of the state in which the product is installed.

* 301 N Main, 9th Floor, Wichita, KS 67202

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Flameless
copper joining
technology.



ProPressG™ System

Flameless
copper fuel
gas joining
technology.



PureFlow® Systems

Flexible
PEX tubing
plumbing
technology.



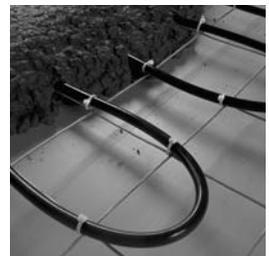
ProRadiant™ Systems

Comfortable,
efficient heating
technology.



S-no-Ice® System

Snow and
ice melting
technology.



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301 N. Main, 9th Floor, Wichita, KS 67202
Phone: 1-800-976-9819 Fax: 1-800-976-9817
www.viega.com service@viega.com