SU+RE HOUSE

Stevens Institute of Technology Construction Documentation

Project Manual

08-17-15

Sustainable Resilient

SU+RE HOUSE

a new direction for coastal housing

Stevens Institute of Technology

U.S Department Of Energy Solar Decathlon 2015

Construction Documentation Submission
August 17 2015

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01 SUMMARY of CHANGES

SUMMARY OF CHANGES

08.17.15 Revision

Significant Design Change Overview

SURE HOUSE's structure has changed significantly since the Construction Drawing Submission. The main structural components of SURE HOUSE are now comprised of standard wood framing. Floors are framed with 9 ½" TJI in modules 1 and 2, and 9 ½" LVL in module 3. Walls are comprised of a 2x6 stud wall assembly, with both interior and exterior cavities for additional insulation. The roof is framed with 9 ½" TJI which are held down with Simpson Strong Tie Hurricane clips. Flood proofing is achieved with a plastic 1/8" sheathing that wraps the house below a design flood elevation (DFE) of five feet. Decks of the house are designed with a combination of PSL (+), pressure treated 2x8s, and 2x10s. Decks are split into panels that can ship flat-packed for ease of reconstruction. A steel frame wraps the deck to provide uplift resistance for the shutters, stability for louvers, and privacy.

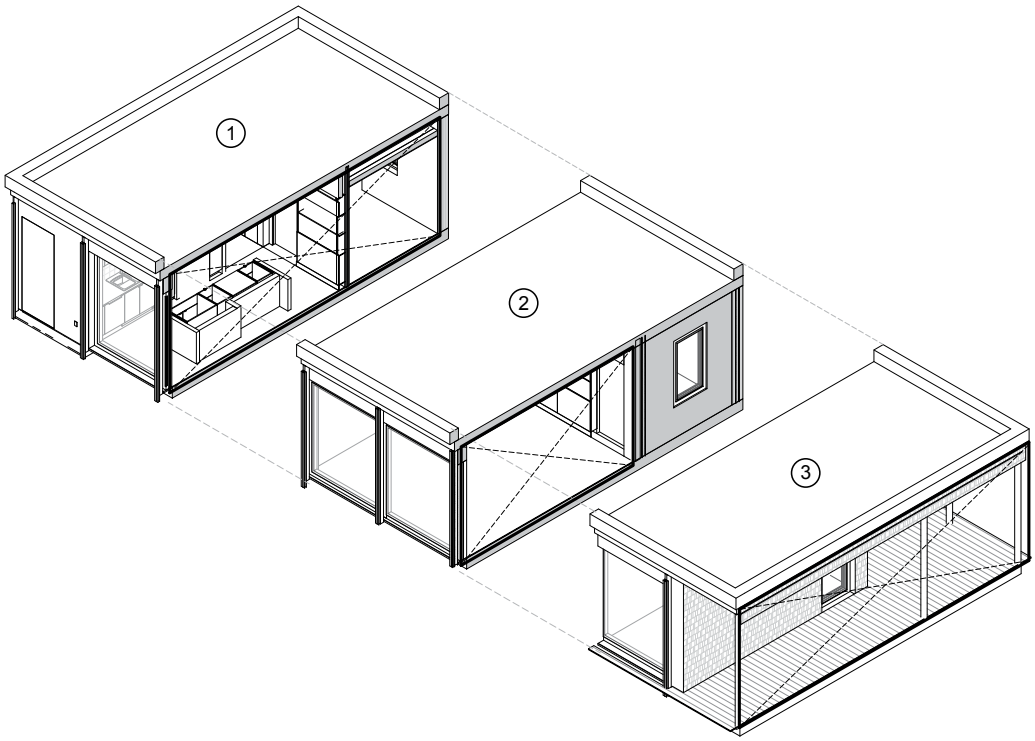

Fig 1.1 MODULE CONNECTIONS

SUMMARY OF CHANGES

08.17.15 Construction Drawing Documentation Summary

Significant changes to the Construction Drawing Set that have occurred between submissions have been outlined below. The Construction Drawings should be reviewed for revisions.

General Sheets

- **SIGNIFICANT CHANGES HAVE BEEN MADE TO S SHEETS REGARD ALL AS UPDATED**

Hazard Sheets

- **H-101** - Changed to Reflect New Design

Landscape Sheets

- **L-101** - Landscape Locations Updated - Vegetation Schedules Added

Structure Sheets

- **SIGNIFICANT CHANGES HAVE BEEN MADE TO S SHEETS REGARD ALL AS UPDATED**

Operations Sheets

- **SIGNIFICANT CHANGES HAVE BEEN MADE TO S SHEETS REGARD ALL AS UPDATED**

SUMMARY OF CHANGES

08.17.15 Construction Drawing Documentation Summary

Architecture Sheets

- **A-113** - First Floor Plan Updated To Reflect New Design Scheme
- **A-121** - RCP Updated To Reflect New Design Scheme
- **A-201,02** - Exterior Elevations Updated
- **A-311,12,13,14,15,16,17,21,23,24** - Updated To Reflect New Construction Assembly
- **A-405** - Shutter Plan Section Cut View Added
- **A-411** - Enlarged South Facade Plan + Elevation Updated
- **A-501** - Updated To Reflect New Construction Assembly
- **A-525,26,27,28** - Bathroom Details Updated
- **A-512,13,14,15,16,17,18,19** - Updated To Reflect New Construction Assembly
- **A-541,42,43** - Ramp and Handrail Details Added
- **A-552,53,54,55,56** - Updated To Reflect New Construction Assembly
- **A-591** - Ramp Details Added
- **A-601** - Updated To Reflect New Construction Assembly
- **A-605** - Wall Types Conductivity Added

Interior Sheets

- **I-201,02** - Interior Elevations Updated
- **I-401,501,503,504,505** - Lighting and Drop Ceiling Assembly Details Added

Fire Detection and Suppression Sheets

- **F-101** - Updated To Reflect New Construction Assembly
- **F-102** - Sprinkler Riser Details Added
- **F-103** - Updated To Reflect New Construction Assembly

Plumbing Sheets

- **P-101** - Updated To Reflect New Construction Assembly
- **P-102** - Updated To Reflect New Construction Assembly
- **P-601,02** - Updated To Reflect New Construction Assembly

Mechanical Sheets

- **SIGNIFICANT CHANGES HAVE BEEN MADE TO M SHEETS REGARD ALL AS UPDATED**

Electrical Sheets

- **E-101** - Changed To Reflect New Design
- **E-102** - Updated to New Roof + Shutter Scheme
- **E-103** - Changed To Reflect New Design
- **E-601** - Detailed One Line + Updated Panel Schedule + Updated Load Calculations
- **E-602,03** - Updated To Reflect New PV Scheme

SUMMARY OF CHANGES

08.17.15 Project Manual Revision

Significant changes to the Project Manual that have occurred between submissions have been outlined below.

Revised Summary of Changes SEE PAGE 07

Updates/Changes Made to Updated As Built Drawing Set
Updates/Changes Made to Project Manual

Rules Compliance Checklist Updated in Relation to As Built Drawing Set SEE PAGE 21

All Sheets Updated To Correlate With Updates Made To As Built Drawing Set

All Structural (Overview, Calculations, Diagrams) Updated to Current As Built Drawing Set SEE PAGE 26

All Structural Design Updated
Foundation and Load Transfer Design Updated
Ramp Footing Design Added
Wood Framing Design Updated
Steel Beam Design Updated
Detailing Calculations Added

Structural Calculations Stamped By Liscensed Engineer SEE PAGE 27

Detailed Water Budget Updated to Current As Built Design Scheme SEE PAGE 119

Summary Of Unlisted Electrical Components Updated to Current As Built Design Scheme SEE PAGE 121

Summary Of Reconfigurable Features Updated to Current As Built Design Scheme SEE PAGE 123

Lift and Slide Doors Updated
Bi-Folding Stormshutter Systems Updated
Removable Storm Panel Updated
Operable Shade System Updated

Interconnection Application Form Updated SEE PAGE 138
Quantity Take Off - Competition Prototype SEE PAGE 142
Construction Specifications Updated SEE PAGE 160
Product Cut Sheets Updated SEE PAGE 562

SUMMARY OF CHANGES

08.17.15 Project Manual Revision

Energy Code Compliance

Section Updated to Project Manual

Construction Specifications Updated to Current As Built Design Scheme

All CSI Division Specifications Applicable Updated To Project Manual

In-Depth Quantity Takeoff to Current As Built Design Scheme

Quantity Takeoff Updated to Reflect Current Design Scheme

Product Cut Sheets Updated to Current As Built Design Scheme

All CSI Division Specifications Applicable Updated To Project Manual

SUMMARY OF CHANGES (PRIOR SUBMISSIONS)

02.12.15 Revision

Significant Design Change Overview

In the design development stage, the structural envelope of the SURE HOUSE was comprised of custom composite-skinned SIP panels making up the floor, walls, and roof of the house. This design has been altered and now consists of a more conventional framed structure with an open web truss floor system, typical wood SIPs wall panels, and wood SIP roof panels supported by wood beams. The SIPs will be manufactured by Murus to all appli cable codes. The flood proofing function of the composite SIPs will be provided by a layer of composite sheathing applied to the exterior of the core structural frame described above.

SUMMARY OF CHANGES (PRIOR SUBMISSIONS)

02.12.15 Construction Drawing Documentation Summary

Significant changes to the Construction Drawing Set that have occurred between submissions have been outlined below. The Construction Drawings should be reviewed for revisions.

General Sheets

- **G-003** - Symbols Updated
- **G-012** - Ramp And Handrail Notes Added
- **G-013** - Design Intent And Target Market Description Updated
- **G-101** - Finished Square Footage Updated To Current Design Scheme
- **G-103** - ADA Tour Compliance Plan Updated

Hazard Sheets

- **H-101** - Changed to Reflect New Design

Civil Sheets

- **C-101** - Pier Layout Changed/Updated - Added New Pier Types

Landscape Sheets

- **L-101** - Landscape Locations Updated - Vegetation Schedules Added

Structure Sheets

- **S-101** - Pier Layout Changed/Updated - Added New Pier Types
- **S-102** - New Structure Design - Updated From Steel To Timber
- **S-103** - Structural Layout Changed
- **S-301** - Additional Components/Detail Added
- **S-400** - Ramp and Railing Details Added
- **S-501** - Structural Details Changed
- **S-503** - Ramp Details Added
- **S-504** - Header And Footer Details Added
- **S-505** - Module Connections Added
- **S-511** - Seismic Piers Added - Change To Connections
- **S-613** - Tributary Areas Added To Updated Design
- **S-614** - Tributary Areas Added To Updated Design

Operations Sheets

- **O-101,02** - Updated To Fit New Crane Plan
- **O-201,02** - Updated Truck Locations
- **O-401** - Added To Reflect New Construction Assembly
- **O-402** - Module Sheet Added
- **O-801,02** - Module Sheet Added

SUMMARY OF CHANGES (PRIOR SUBMISSIONS)

02.12.15 Construction Drawing Documentation Summary

Architecture Sheets

- **A-112** - Roof Slope And Drainage Plan Added
- **A-113** - First Floor Plan Updated To Reflect New Design Scheme
- **A-121** - RCP Updated To Reflect New Design Scheme
- **A-311,12,13,14,15,16,17,21,23,24** - Updated To Reflect New Construction Assembly
- **A-405** - Shutter Plan Section Cut View Added
- **A-411** - Enlarged South Facade Plan + Elevation Added
- **A-421,22** - Enlarged Casework Plan + Elevations Added
- **A-501** - Updated To Reflect New Construction Assembly
- **A-502** - Bathroom Details Added
- **A-512,13,14,15,16,17,18,19** - Updated To Reflect New Construction Assembly
- **A-552,54,55,56,57** - Updated To Reflect New Construction Assembly
- **A-591** - Ramp Details Added
- **A-601** - Updated To Reflect New Construction Assembly
- **A-605** - Wall Types Conductivity Added

Fire Detection and Suppression Sheets

- **F-101** - Updated To Reflect New Construction Assembly
- **F-102** - Sprinkler Riser Details Added
- **F-103** - Updated To Reflect New Construction Assembly

Plumbing Sheets

- **P-101** - Updated To Reflect New Construction Assembly
- **P-102** - Updated To Reflect New Construction Assembly
- **P-602** - Updated To Reflect New Construction Assembly

Mechanical Sheets

- **M-101** - Changed To Reflect New Design - New ERV -AHU + Zoning Kit Added
- **M-201** - Desiccant System Removed- Changed to Reflect New Design
- **P-602** - Changed To Reflect New Design - New ERV -AHU + Zoning Kit Added

Electrical Sheets

- **E-101** - Changed To Reflect New Design
- **E-102** - Updated to New Roof + Shutter Scheme
- **E-103** - Changed To Reflect New Design
- **E-601** - Detailed One Line + Updated Panel Schedule + Updated Load Calculations
- **E-602,03** - Updated To Reflect New PV Scheme

SUMMARY OF CHANGES (PRIOR SUBMISSIONS)

02.12.15 Project Manual Revision

Significant changes to the Project Manual that have occurred between submissions have been outlined below.

Updated Project Summary

Updates to Overall Concept
Revisions To Sequence Diagrams
Updates to Post Solar Decathlon Location

Revised Summary of Changes

Updates/Changes Made to Construction Drawing Set
Updates/Changes Made to Project Manual

Rules Compliance Checklist Updated in Relation to CD Drawing Set

All Sheets Updated To Correlate With Updates Made To CD Drawing Set

All Structural (Overview, Calculations, Diagrams) Updated to Current CD Design Scheme

All Structural Design Updated
Foundation and Load Transfer Design Added
Ramp Footing Design Added
Wood Framing Design Updated
Steel Beam Design Updated
Detailing Calculations Added

Structural Calculations Stamped By Liscensed Engineer

Detailed Water Budget Updated to Current CD Design Scheme

Summary Of Unlisted Electrical Components Updated to Current CD Design Scheme

Summary Of Reconfigurable Features Updated to Current CD Design Scheme

Lift and Slide Doors Updated
Bi-Folding Stormshutter Systems Updated
Removable Storm Panel Added
Mecho Shade System Added
Movable Exterior Electric Grill Dock Added

SUMMARY OF CHANGES (PRIOR SUBMISSIONS)

02.12.15 Project Manual Revision

In-Depth Energy Analysis Updated to Current CD Design Scheme

Trnsys Analysis Added
DIVA Shading Analysis Added
PHPP Calculations Added
THERM Analysis Added
Solar Array Updated

Construction Specifications Added to Current CD Design Scheme

All CSI Division Specifications Applicable Added To Project Manual

In-Depth Quantity Takeoff to Current CD Design Scheme

Quantity Takeoff Updated to Reflect Current Design Scheme

Product Cut Sheets Updated to Current CD Design Scheme

All CSI Division Specifications Applicable Added To Project Manual

SUMMARY OF CHANGES (PRIOR SUBMISSIONS)

Prior Revisions - 11.18.14 Design Development Drawing Set Revision

Significant changes to the Design Development Drawing Set that have occurred between submissions have been outlined below.

Sheet G-001 - Title Block Updated to Year to 2015
- Lot Number Updated to 110
- Refer to sheet A-101 for Location Plan & Sheet A-102 for Site Plan

Sheet G-002 - Aligned Schedule + Abbreviations As Per NCS
Sheet G-010 - Left As Is, Complying With 2012 IRC
- Updated Applicable Codes

Sheet G-011 - Text Changed To All Caps
- Added View Titles To All Images

Sheet G-102 - Called Out As Ramp, Added Railings (Slope Would Be Greater Than 1:20)
Sheet G-103 - Thresholds; Refer to sheet A-502 DTL. (A4)
Sheet G-201 - Added Planters To Vegetation Touching Ground
Sheet G-602 - Added View Titles To All Images
Sheet C-101 - Piers + Structure For Ramp Added
- All Piers Labeled Accordingly

Sheet L-101 - Updated Detail Number In Accordance With The NCS Grid System
- All Piers Labeled Accordingly

Sheet S-104 - Grade and Species Added
Sheet S-901 - Piers Labeled And Adjustability Sheet Added
Sheet A-111 - Refer To Sheet A-602: Egress Shown On Window And Door Schedule
Sheet A-121 - Wood Board Finish To Be Below 5/8" GYP and 12" Drop Ceiling (reference A-301)
Sheet A-211 - Removed Dimensioned Lines From Elevation Views
Sheet A-602 - Clear Opening Show On Window And Door Schedule
Sheet A-901 - Comment From October 8Th Noted, Will Make Changes For CD Submission
Sheet A-902 - Comment From October 8Th Noted, Will Make Changes For CD Submission
Sheet F-101 - Smoke Alarms Reduced, and Remaining Moved
Sheet E-101 - General Notes Updated
Sheet E-601 - Main Service Disconnect Updated
Sheet E-602 - Resolved In Previous Version - Now Included
- Wiring Details Added - Type And Sizing And Conduit
- Output Currents Verified - Breaker Amperage Calculations In Progress
- Wiring Details Added - Type And Sizing And Conduit
- System Spec Weather Data - Switched F to C - Issue Resolved

Sheet O-101 - Construction Area + Solar Envelope Is Shown And Called Out
- Called Out, Temporary Truck In Loading/Unloading Zone

Sheet O-103 - Added General Notes To Sheet: Crane Specs To Be Located On O-601 When Completed
- Added General Notes To Sheet: Temporary Truck In The Loading/Unloading Zone

Sheet O-104 - Labeled (1) Supply Tank and (2) Wastewater Tank
Sheet O-602 - Added Sheet O-603, Showing Map Of Route, Total Miles, Estimated Travel Time And List Of States Passing Through

SUMMARY OF CHANGES (PRIOR SUBMISSIONS)

Prior Revisions - 11.18.14 Project Manual Revision

Significant changes to the Project Manual that have occurred between submissions have been outlined below.

Text Updated in Compliance with Communication Standards

Jury/Architecture/Engineering Narratives : Comment From October 8Th Noted, Will Make Changes For Final Submission

Text Updated in Compliance To Solar Decathlon Lot Sizing

Site Locations : : Comment From October 8Th Noted, Specific Location To Be Added, Will Make Changes For Final Submission

In Depth Discussion On Composite SIP Panel Usage/Manufacturing/Structural Description Added

In Depth Explanation Of Steel Moment Frame Added

Additional Details Added On Solar Hot Water System

Location/Description of LUMOS LSX200 Series Added - See Stormshutter System

Product Cut Sheets Updated + Division 26 - Electrical Added

SUMMARY OF CHANGES (PRIOR SUBMISSIONS)

Prior Revisions - 10.08.14 Design Development Drawing Set

The changes to the SURE HOUSE project have been so significant since the Schematic Design Summary submission that a bulleted change list would be unruly and would describe a huge portion of the project. Therefore, the Design Development drawings and Project Manual should be reviewed in toto essentially as the summary of changes.

02 RULES COMPLIANCE **CHECKLIST**

RULES COMPLIANCE CHECKLIST

RULE	RULE DESCRIPTION	LOCATION DESCRIPTION	LOCATION
Rule 4-2	Construction Equipment	Drawing(s) showing the assembly and disassembly sequences and the movement of heavy machinery on the competition site	O-901
Rule 4-2	Construction Equipment	Specifications for heavy machinery	O-101
Rule 4-3	Ground Penetration	Drawing(s) showing the locations and depths of all ground penetrations on the competition site	S-101 S-522
Rule 4-4	Impact on the Competition Site	Drawing(s) showing the locations of all low impact footings that shall be used to support all house and site components	C-101
Rule 4-5	Generators	Specifications for generators (including sound rating)	N/A
Rule 4-6	Spill Containment	Drawings for all equipment, containers, and pipes that will contain liquids at any point during the event	H-101
Rule 4-7	Lot Conditions	Calculations showing that the structural design remains compliant even if 18 in. (45.7 cm) of vertical elevation change exists	S-101
Rule 4-8	Electric Vehicles	Drawings showing electric vehicles are compliant with solar envelope lot limits	A-102
Rule 5-1	Lot Sizes	Drawings showing lot dimensions within the solar envelope	G-101,201,202
Rule 5-2	Solar Envelope Dimensions	Drawing(s) showing the location of all house and site components relative to the solar envelope	G-201,202
Rule 5-2	Solar Envelope Dimensions	List of solar envelope exemption requests accompanied by justifications and drawing references	N/A

RULES COMPLIANCE CHECKLIST

RULE	RULE DESCRIPTION	LOCATION DESCRIPTION	LOCATION
Rule 6-1	Structural Design Approval	List of, or marking on all drawing and project manual sheets that will be stamped by the qualified, licensed design professional in the stamped structural submission; the stamped submission shall consist entirely of sheets that also appear in the drawings and project manual	S-101,02,03,04,05,07,08 S-201,02,301 S-411,12 S-501,11,12,13,14,15,16, 17,18,19,20,21,22,23,24 S-901
Rule 6-2	Finished Square Footage	Drawing(s) showing all information needed by the rules officials to measure the finished square footage electronically	G-101
Rule 6-2	Finished Square Footage	Drawing(s) showing all movable components that may increase the finished square footage if operated during contest week	N/A
Rule 6-3	Entrance and Exit Routes	Drawing(s) showing the accessible public tour route	G-103 G-104
Rule 6-4	Competition Prototype Alternate	Drawing(s) showing the competition prototype house and the associated competition prototype site components on a featureless lot equal in size and orientation to the solar envelope.	N/A
Rule 7-1	Placement	Drawing(s) showing the location of all vegetation, and if applicable, the movement of vegetation designed as part of an integrated mobile system	L-101
Rule 7-2	Watering Restrictions	Drawing(s) showing the layout and operation of greywater irrigation systems	N/A
Rule 8-1	PV Technology Limitations	Specifications for photovoltaic components	E-602,03
Rule 8-2	Energy Sources	Drawing(s) showing the only sources of energy that may be consumed in the operation of the house without the requirement of subsequent energy offsets	G-121 E-102

RULES COMPLIANCE CHECKLIST

RULE	RULE DESCRIPTION	LOCATION DESCRIPTION	LOCATION
Rule 8-3	Batteries	Drawing(s) showing the location(s) and quantity of all primary and secondary batteries and stand-alone, PV-powered devices	N/A
Rule 8-3	Batteries	Specifications for all primary and secondary batteries and stand-alone, PV-powered devices	N/A
Rule 8-4	Desiccant Systems	Drawing(s) describing the operation 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	**SEE PROJECT MANUAL** "**07** Interconnection App. Form"
Rule 8-5	Village Grid	Drawing(s) showing the locations of the photovoltaics, inverter(s), terminal box, meter housing, service equipment, and grounding means	E-101,02 E-401 E-602,03 M-401
Rule 8-5	Village Grid	Specifications for the photovoltaics, inverter(s), terminal box, meter housing, service equipment, and grounding means	**SEE PROJECT MANUAL** "**10** Product Cutsheets-Division **26** and Division **48**"
Rule 8-5	Village Grid	One-line electrical diagram	E-601
Rule 8-5	Village Grid	Calculation of service/feeder net computer load per NEC 220	E-601
Rule 8-5	Village Grid	Site plan showing the house,decks,ramps,tour paths, and terminal box	G-103
Rule 8-5	Village Grid	Elevations(s) showing the meter housing, main utility disconnect, and other service equipment	E-401 M-401
Rule 9-1	Container Locations	Drawing(s) showing the location of all liquid containers relative to the finished square footage	H-101

RULES COMPLIANCE CHECKLIST

RULE	RULE DESCRIPTION	LOCATION DESCRIPTION	LOCATION
Rule 9-1	Container Locations	Drawing(s) demonstrating that the primary supply water tank(s) is fully shaded from direct solar radiation between 9 a.m. and 5 p.m. PDT between 8 a.m. and 4 p.m. solar time on October 1	0-101,02 L-501
Rule 9-2	Team Provided Liquids	Quantity, specifications, and delivery date(s) of all team-provided liquids for irrigation, thermal mass, hydronic system pressure testing, and thermodynamic system operation	N/A
Rule 9-3	Greywater Reuse	Drawing(s) showing the layout and operation of greywater reuse systems	N/A
Rule 9-4	Rainwater Collection	Drawing(s) showing the layout and operation of rainwater collection systems	N/A
Rule 9-5	Evaporation	Water may be used for evaporation purposes	N/A
Rule 9-6	Thermal Mass	Drawing(s) 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(s) showing the layout and operation of greywater heat recovery systems	N/A
Rule 9-8	Water Delivery	Drawing(s) showing the complete sequence of water delivery and distribution events	O-201
Rule 9-8	Water Delivery	Specifications for the containers to which water will be delivered	P-601
Rule 9-9	Water Removal	Drawing(s) showing the complete sequence of water consolidation and removal events	O-202
Rule 9-9	Water Removal	Specifications for the containers to which water will be removed	P-601
Rule 11-4	Public Exhibit	Interior and exterior plans showing entire accessible tour route	G-103

03 STRUCTURAL CALCULATIONS

STRUCTURAL CALCULATIONS

SU+RE HOUSE
a new direction for coastal housing

Stamped Structural Calculations

Stevens Institute of Technology

U.S. Department of Energy Solar Decathlon 2015

Final Submission: August 17, 2015

Student Team Leaders

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Architectural Project Manager:	Michael Signorile
Construction Manager:	Chris Hamm
Project Engineer:	Christine Hecker
Electrical Engineer:	AJ Elliott
Health and Safety Officer:	Allison Outwater
Measured Contest Captain:	Juan Alicante
Instrumentation Contact:	Grace Gallagher
Public Relations Contact:	AJ Elliott
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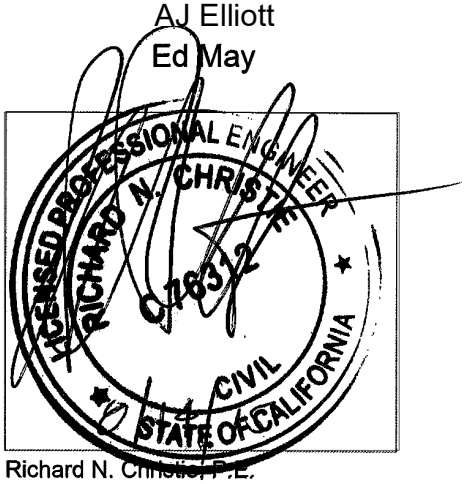

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STRUCTURAL CALCULATIONS

This project manual provides an evaluation of construction methods and structural calculations as stipulated by ASCE 7-10 and the Department of Energy for the 2015 Solar Decathlon. The objective of the Stevens Structural Team is to create a safe and sensible structural system that maximizes efficiency and minimizes the use of materials that require high energy during production while taking structural integrity into consideration in a coastal environment. Additionally, a core design goal was creating a flood proof building which could seal from the outside.

The group designed a typical wood construction house to handle all standard load conditions with an additional fiberglass cladding to take on the flood loads only. Storm shutters cover all doors and windows to complete the seal in any openings not covered by the cladding. A steel exoskeleton that wraps around the house and deck transfers all shading and louver uplift loads to foundation. The steel columns on the south side of the house (Grid B) support the living room roof load and columns on the east side support the roof load from the overhang. Other than these specific locations, the steel does not support the house in any way. The wood framing takes all remaining house loads. The deck is its own standing structure structurally independent from the house and is supported on its own seismic piers. All of the loads for the house, deck, and exoskeleton are transferred to temporary pier foundations designed to meet applicable California and Solar Decathlon structural codes.

The dimensions of the house were constrained by practical transportation concerns and additional structural analysis was performed for the connection between the modules and the flood proofing shutter system on the southern facade. The majority of the calculations were done in Microsoft Excel to provide the designers with flexibility throughout the process to make alterations easy to implement and check.

STRUCTURAL CALCULATIONS

The structural design must accommodate multiple phases of loading including construction, transportation, and reassembly. Because of the nature of the competition and transportation logistics, the house was designed in three modular components, each 14' 10" wide. The building must be transportable on US highways from Hoboken, New Jersey to Irvine, California. The loading conditions for the structurally stamped house are for DOE requirements and Southern California requirements. Any additional structural design considerations such as for flood loading were undertaken in addition to state and government requirements and will not violate the validity of the stamped structural design for California, but are included in the stamped calculation set and were taken into consideration for design. In some cases, the team used larger load conditions in design (such as snow and wind) corresponding to the house's permanent site on the New Jersey shore to ensure the house's structure would also meet NJ code upon completion. In all cases, these loads were calculated in addition to CA and Solar Decathlon requirements to ensure design was conservative enough to be valid in both locations.

FOUNDATION

The foundation represented in this report was designed as a temporary structure solely for use during the competition. A new structural analysis will be completed after the competition to consider loading and soil bearing conditions at the permanent site. With this information, a permanent foundation will be designed to withstand all buoyant forces associated with a hurricane.

DESIGN METHOD

All steel and wood design was completed using Load Resistance Factor Design, or LRFD, unless otherwise stated.

APPLICABLE CODES

- AISC Steel Construction Manual 14th edition
- Solar Decathlon Building Code 2015
- 2012 International Residential Code (IRC)
- ASCE 7: Minimum Design Loads for Buildings and Other Structures
- Wood Design Package
    - National Design Specification (NDS) for Wood Construction
    - Special Design Provisions for Wind and Seismic
    - Manual for Engineered Wood Construction

STRUCTURAL INFORMATION

Type of Steel:

- A500 Grade B with Fy = 46 ksi and Fu = 58 ksi for HSS Sections
- A992 with Fy = 50 ksi and Fu = 65 ksi for W Sections
- A36 with Fy = 36 ksi and Fu = 58 ksi for C Sections

DESIGN LOADS:

Building Loads

1. Structural design of the building is in accordance with the 2012 international building code and solar decathlon 2015 building code.
    a. Live Load
        i. Floor = 50 psf
        ii. Roof = 20 psf
        iii. Deck = 100 psf
    b. Dead Load
        i. Floor = 15 psf
        ii. Roof = 17 psf
        iii. Deck = 16 psf
    c. Wind Load
        i. Basic wind speed = 130 mph
        ii. Exposure c
    d. Snow Load
        i. 25 psf where applicable, 5 psf on ramps
    e. Seismic Load
        i. D_o zone
2. For temporary pad footings at temporary location in Irvine, CA notify engineer of any change of site location.

	DEAD LOAD	LIVE LOAD	SNOW LOAD	WIND LOAD	SEISMIC LOAD	TOTAL FACTORED LOAD
ROOF	17 PSF	20 PSF	25 PSF	-	-	64.9 PSF
FLOOR	15 PSF	50 PSF	-	-	-	98 PSF
DECK	16 PSF	100 PSF	25 PSF WHERE APPLICABLE	-	-	179.2 PSF (NO SNOW)
GENERAL	-	-	25 PSF	39 PSF	7.8K OVER HOUSE	-

Table 3.1 LIVE + DEAD LOADS

All dead loads were determined through assumptions from a professional engineer. All live loads are based upon the required loads in the solar decathlon 2015 building code.

WOOD:

1. All framing lumber and details of wood construction shall conform to the "National Design Specification for Stress Grade Lumber and Its Fastenings" (including supplements) or related documents.
2. All engineered wood products are to be provided by Nordic and West Fraser and are to meet all specifications of "Westfraser LVL user's guide" and "Nordic Engineered Wood Residential Design Construction Guide" or approved equal.
3. Refer to "WestFraser LVLUser's Guide" and "Nordic Engineered Wood Residential Design Construction Design" for all information including, but not limited to:
    a. Penetration allowances in wood members
    b. Bearing requirements of joists
    c. Connection/blocking details
4. Typical lumber shall be the following minimum grade and shall be grade stamped by a recognized grading agency, shall be surface dry, and shall be used at a maximum of 19% moisture content. If a different grade is specified in the structural drawings, that grade must be used.
    a. Species
        i. Douglas fir-larch
    b. Grade
        i. No. 2
5. Plywood sheathing shall be APA grade stamped for the specified span, and shall be made with exterior glue, and shall be of the following grade:
    a. Floors/roofs: APA rated sheathing exposure 1
    b. Non-shear walls: APA rated sheathing exposure 1
    c. Shear walls: APA rated structural sheathing grade 1
6. All plywood sheathing shall be glue and nailed to floor joists using APA approved elastomeric construction adhesive and code required nailing.
7. Details of wood framing such as nailing, blocking, bridging, etc. Shall conform to the 2012 international building code or the "WestFraser LVL User's Guide" and "Nordic Engineered Wood Residential Design Construction Guide" or approved equal unless greater requirements are shown in drawing details.
8. Where beams are flush framed to header, use approved type beam hanger.

9. No beams, except as shown in details, shall be cut or notched without approval from the structural engineer.
10. All structural wood exposed to external environments shall be pressure treated.

STEEL:

1. Fabrication and erection of structural steel shall be in accordance with the "code of standard practice for steel buildings and bridges".
2. Materials:
    a. W Shapes
        i. ASTM A992
    b. HSS Shapes
        i. ASTM A500 GRADE B
3. Bolts: unless otherwise noted on drawings
    a. High strength bolts:
        i. ASTM A325-N
    b. Machine Bolts:
        i. ASTM A307
4. Bolt holes in steel shall be 1/16 inch larger diameter than nominal size of bolt used, unless otherwise noted or approved by structural engineer.
5. For bolted connections, provide 1 ½ inch edge and end distance, unless otherwise noted.
6. All welds shall be prequalified in conformance with the "structural welding code - steel" (AWS d1.1) of the American Welding Society. Minimum tensile strength of weld metal shall be 70 ksi typical unless otherwise noted. Welding electrodes shall be as recommended by their manufacturer for the position and other conditions of actual use.

STRUCTURAL CALCULATIONS

WIND LOADS

LATERAL WIND

DESCRIPTION:
These calculations provide the extreme case of lateral wind loading on the leeward and windward sides of the house.

REFERENCE:
Minimum design loads for buildings and other structures, ASCE/SEI 7-10. Reston, VA: American Society Of Civil Engineers/Structural Engineering Institute, 2006. Print.

ASSUMPTIONS:
1. Flat roof
2. Enclosed, partially enclosed building (internal pressure coefficients for buildings, table 6-7)
3. Hurricane prone region, category ii (importance factor, table 6-1)
4. Exposure c (open terrain with scattered obstructions…)
5. Basic wind speed: 130 mph (increased from 120 for conservation, Figure 6-1)
6. Wind load parameters (table 6-6)
    a. $K_2 = 0.85$
    b. $K_{2T} = 1$
    c. $I = 1.00$
    d. $K_D = 0.85$
    e. GCPI = 0.18
    f. GCPF (MAX) = -1.07
7. Case B with wind direction from east side of house. Maximum positive and maximum negative wind cases assumed for all sides of house. (Figure 6-4)

EQUATION:
28.4.1 Design Wind Pressure for Low-Rise Buildings – EQ. (28.4-1)
$P = Q_H[(GC_{PF}) – (GC_{PI})]$ (LB/FT^2)

28.3.2 Velocity Pressure – EQ. (28.3-1)
$Q_Z = 0.00256K_ZK_{ZT}K_DV^2I$ (LB/FT^2)

VARIABLES:
K_D = Wind Directionality Factor
K_Z = Velocity Pressure Exposure Coefficient
K_{ZT} = Topographic Factor
V = Basic Wind Speed
Q_H = Velocity Pressure Q_z Calculated At Mean Roof Height H

(GC_{PF-}) = External Pressure Coefficient
(GC_{PI}) = Internal Pressure Coefficient
I = Importance Factor

WIND LOADS:		
Risk Category	2	
Basic Wind Speed (mph)	130	*mph*
K_z	0.85	*Exposure C*
K_{zt}	1	
K_d	0.85	
Importance Factor (I)	1	
Load Case	B	
Degree of Roof Angle	0.083	
Gcpi ($\pm$)	0.18	
	-0.18	
$q_z = 0.00256 K_z K_{zt} K_d V^2 I$		
q_z =	31.25824	

Table 3.2 WIND LOADS

MWFRS Design Pressures		$P = q_z (GC_{pf} - (\pm GC_{pi}))$		
	Velocity Pressure	External Pressure Coeff	Design Pressures (P) psf	
Building Zone	q_z	GC_{pf}	(+) GC_{pi}	(-) GC_{pi}
1	31.25824	-0.45	-19.6926912	-8.4397248
2	31.25824	-0.69	-27.1946688	-15.9417024
3	31.25824	-0.37	-17.192032	-5.9390656
4	31.25824	-0.45	-19.6926912	-8.4397248
5	31.25824	0.4	6.8768128	18.1297792
6	31.25824	-0.29	-14.6913728	-3.4384064
1E	31.25824	-0.48	-20.6304384	-9.377472
2E	31.25824	-1.07	-39.0728	-27.8198336
3E	31.25824	-0.53	-22.1933504	-10.940384
4E	31.25824	-0.48	-20.6304384	-9.377472
5E	31.25824	0.61	13.4410432	24.6940096
6E	31.25824	-0.43	-19.0675264	-7.81456
		MAX	-39.0728	-27.8198336

Table 3.3 DESIGN PRESSURES

SHUTTER WIND LOADS

DESCRIPTION:
These calculations provide the extreme case of lateral wind loading on the leeward and windward sides of the house.

REFERENCE:
Minimum design loads for buildings and other structures, ASCE/SEI 7-10. Reston, VA: American Society of Civil Engineers/Structural Engineering Institute, 2006. PRINT.
Assumptions:

1. Overhang
2. Uplift is formed when shutter is in the up position.

EQUATION:
28.4.1 Design Wind Pressure for Low-Rise Buildings – EQ. (28.4-1)
$P = Q_H[(GC_{PF}) - (GC_{PI})]$ (LB/FT^2)

28.3.2 Velocity Pressure – EQ. (28.3-1)
$Q_Z = 0.00256K_ZK_{ZT}K_DV^2I$ (LB/FT^2)

VARIABLES:
K_D = Wind Directionality Factor
K_Z = Velocity Pressure Exposure Coefficient
K_{ZT} = Topographic Factor
V = Basic Wind Speed
Q_H = Velocity Pressure Q_z Calculated At Mean Roof Height H
(GC_{PF-}) = External Pressure Coefficient
(GC_{PI}) = Internal Pressure Coefficient
I = Importance Factor

Calculations:
First, Q_Z was calculated using the following equation:

$$Q_Z = 0.00256K_ZK_{ZT}K_DV^2I \text{ (LB/FT}^2\text{)}$$

Inputting the variables given:

$$Q_Z = 0.00256(0.85)(1)(.85)(130)^2(1)\ LB/FT^2$$
$$= 31.25824\ LB/FT^2$$

The maximum design uplift pressure was then found using the following equation:

$$P = Q_H[(GC_{PF}) - (GC_{PI})]\ (LB/FT^2)$$

$P = 31.25824[(-2.0-0)]\ LB/FT^2$

$= -62.51648\ LB/FT^2$

At a shutter size of 38.31 square feet, there is a total load of -2395.6 lbs per shutter applied to the columns.

SHUTTTER UPLIFT UP POSITION			
Velocity Pressure	External Pressure Coeff	Design Pressures (P) psf	
q_z	GC_{pf}	(+) GC_{pi}	(-) GC_{pi}
31.25824	-2.0	-62.51648	-62.51648

SHUTTER UPLIFT LOAD		
At shutter size of	38.31944	sq ft
Total load:	-2395.6	lbs/shutter

Table 3.4 SHUTTER UPLIFT

SOLAR PANEL UPLIFT

SOLAR PANELS UPLIFT: Open Building	
Velocity Pressure	GC
q_h	GC_r
31.25824	1

Width:	38	in
Length:	66	in
Angle:	10	degrees
Angle Height	6.60	in
Projected Area Af	3.02	ft2
Number of Solar Panels	36	
Total Af	108.8774074	ft2

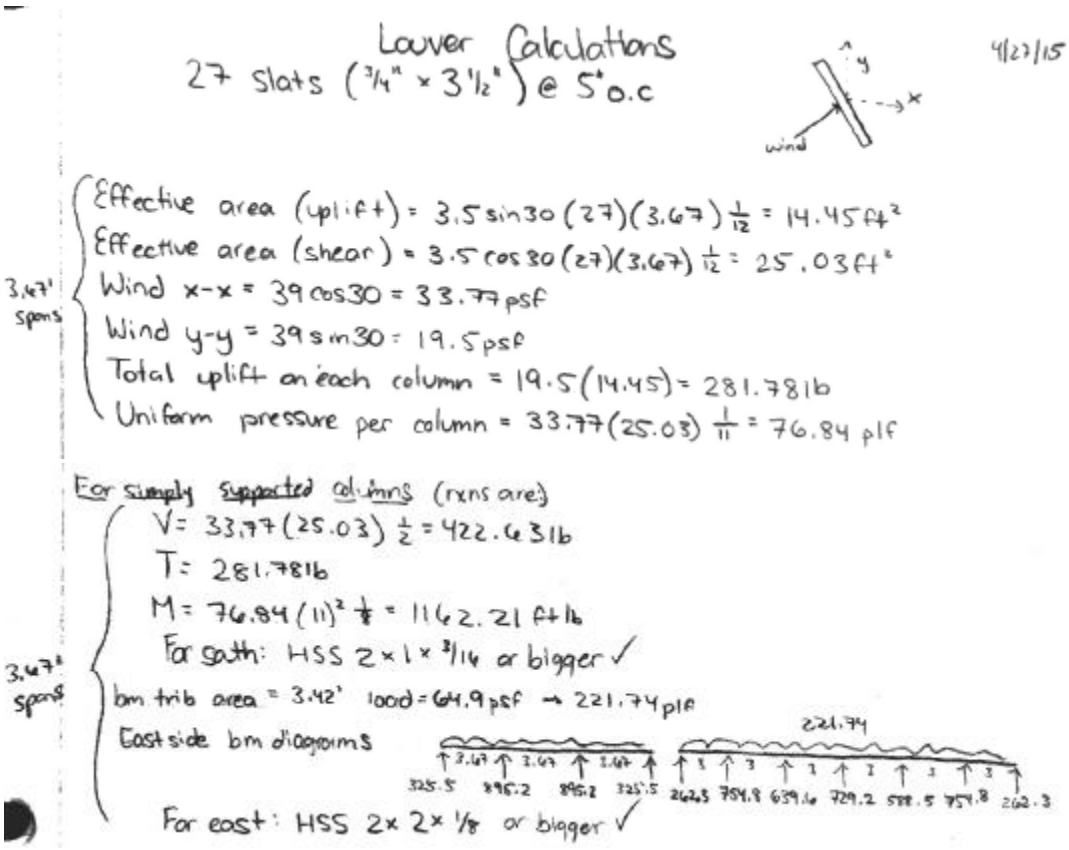
Af	Fv Uplift (lbs)
108.8774074	3403.316131

Table 3.5 PV UPLIFT

LOUVER UPLIFT AND OVERTURNING

DESCRIPTION:

These calculations provide the extreme case of uplift on the louvers.



Louver Cabalations

4/27/15

27 slats (¾" × 3½") @ 5" o.c.

7.42' spans
- Effective area (uplift) = $(3.5)(\sin 30)(27)(7.42)\frac{1}{12} = 29.22\ ft^2$
- Effective area (shear) = $(3.5)(\cos 30)(27)(7.42)\frac{1}{12} = 50.60\ ft^2$
- Wind x-x = $39 \cos 30 = 33.77$ psf
- Wind y-y = $39 \sin 30 = 19.5$ psf
- Total uplift on each column = $19.5(29.22) = 569.79$ lb
- Uniform pressure per column = $33.77(50.6)\frac{1}{11} = 155.34$ plf

for simply ~~supported~~ columns (rxns are:)

7.42' spans
- $V = 33.77(50.6)\frac{1}{2} = 854.38$ lb
- $T = 569.79$ lb
- $M = 155.34(11)^2\frac{1}{8} = 2349.52$ ft lb
- Self Weight = $9.4(11) = 103.4$ lb
- Check column in excel : HSS 4×4×3/16 ✓

STRUCTURAL CALCULATIONS

SEISMIC LOADS

HOUSE SEISMIC LOADS

DESCRIPTION:
Determining the loading applied on the main house modules (including the east deck) by seismic activity by calculating the base shear value.

ASSUMPTIONS:

- Modules act as one-story building in seismic situations due to CP seismic foundation
- Seismic weight (w) of the home is 40.38 kips

REFERENCE:

- IRC Section R301.2.2.
- ASCE 07-10

CLASSIFICATIONS:

- IRC Seismic Design Category D_2 = 1.17G
- Response Modification Factor (ASCE 07 10)=6
- Importance Factor (ASCE 07-10) II Risk Category = 1

VARIABLES:

- I_E=Importance Factor
- W = Assumed Seismic Weight Of Home
- S_{DS} = Seismic Design Category
- R = Response Modification Factor
- C_S= Seismic Response Coefficient
- V=Base Shear

EQUATIONS:
Seismic Response Coefficient (ASCE 07 10 SECTION 12):

$C_S=S_{DS}/(R_W/I_E)$
$C_S=1.17G/(6/1)$
$C_S=.195$

Base Shear (ASCE 07 10 SECTION 12):
$V=C_S*W$
V=.195*40.38KIPS
V= 7.87 KIPS

SOUTH DECK SEISMIC LOADS

DESCRIPTION:
Determining the loading applied on the south deck by seismic activity by calculating the base shear value.

ASSUMPTIONS:
- South deck acts as 1 story building in seismic situations due to CP seismic foundation
- Seismic weight (W) of the south deck is 8.45 kips

REFERENCE:
- IRC Section R301.2.2.
- ASCE 07-10

CLASSIFICATIONS:
- IRC Seismic Design Category D_2 = 1.17G
- Response Modification Factor (ASCE 07 10)= 6
- Importance Factor (ASCE 07 10) II RISK CATEGORY = 1

VARIABLES:
- I_E=Importance Factor
- W = Assumed Seismic Weight Of Home

- S_{DS} = Seismic Design Category
- R = Response Modification Factor
- C_S= Seismic Response Coefficient
- V=Base Shear

EQUATIONS:

Seismic Response Coefficient (ASCE 07 10 SECTION 12):

$C_S=S_{DS}/(R_W/I_E)$

$C_S=1.17G/(6/1)$

$C_S=.195$

Base Shear (ASCE 07 10 SECTION 12):

$V=C_S*W$

V=.195*8.45 KIPS

V= 1.65 KIPS

NORTH DECK SEISMIC LOADS

DESCRIPTION:

Determining the loading applied on the north deck by seismic activity by calculating the base shear value.

ASSUMPTIONS:

- North deck acts as 1-story building in seismic situations due to CP seismic foundation
- Seismic weight (W) of the north deck is 3.80 kips

REFERENCE:

- IRC Section R301.2.2.
- ASCE 07-10

CLASSIFICATIONS:

- IRC Seismic Design Category D_2 = 1.17G
- Response Modification Factor (ASCE 07 10) = 6
- Importance Factor (ASCE 07-10) II RISK CATEGORY = 1

VARIABLES:

- I_E=Importance Factor
- W = Assumed Seismic Weight Of Home
- S_{DS} = Seismic Design Category
- R = Response Modification Factor
- C_S= Seismic Response Coefficient
- V=Base Shear

EQUATIONS:

Seismic Response Coefficient (ASCE 07 10 Section 12):

$C_S=S_{DS}/(R_W/I_E)$

$C_S=1.17G/(6/1)$

$C_S=.195$

Base Shear (ASCE 07 10 Section 12):

$V=C_S*W$

V=.195*3.80KIPS

V= .74 KIPS

RAMP SEISMIC LOADS

DESCRIPTION:

Determining the loading applied on the ramp by seismic activity by calculating the base shear value.

ASSUMPTIONS:

- Ramp acts as 1-story building in seismic situations due to CP seismic foundation
- Seismic weight (W) of the ramp is 3.91 kips

REFERENCE:

- IRC Section R301.2.2.
- ASCE 07-10

CLASSIFICATIONS:

- IRC Seismic Design Category D_2 = 1.17G
- Response Modification Factor (ASCE 07 10) = 6
- Importance Factor (ASCE 07 10) II RISK CATEGORY = 1

VARIABLES:

- I_E=Importance Factor
- W = Assumed Seismic Weight Of Home
- S_{DS} = Seismic Design Category
- R = Response Modification Factor
- C_S= Seismic Response Coefficient
- V=Base Shear

EQUATIONS:

Seismic Response Coefficient (ASCE 07 10 Section 12):

$C_S=S_{DS}/(R_W/I_E)$

$C_S=1.17G/(6/1)$

$C_S=.195$

Base Shear (ASCE 07 10 Section 12):

$V=C_S*W$

V=.195*3.91KIPS

V= .76 KIPS

STRUCTURAL CALCULATIONS

SHEAR WALL DESIGN

SHEAR WALL DESIGN

Shear wall design must be compliant with the 2012 International Residential Code Section R602.10.

For our application choose the wall braced panel (WBP) method.

Design Length (R602.10.1.2)

1. Wind (<110 MPH)
    a. N/S Lines: Use 20' Braced Wall Line Spacing
        I. 5' Length Required Without Factors
        Ii. Exposure Factor = 1.2
        Iii. Roof Eave/Ridge Factor = .7
        Iv. Method Factor = 1.4
        V. Need 5.88'
    b. E/W Lines: Use 20' Braced Wall Line Spacing
        I. Need 5.88' (Same factors as above)
2. Seismic (D_2 FOR CA)
    a. N/S Lines: Use 30' Line Length
        I. 7.5' Length Required Unfactored
        Ii. Story Height Factored = 1.2
        Iii. Roof Dead Load Factor = 1.2
        Iv. Need 10.8'
    b. E/W Lines: Use 40' Line Length
        I. 10' Length Required Unfactored
        Ii. Same Factors As Above
        Iii. Need 14.4'

In summary, we need 10.8' for n/s lines and 14.4' for e/w lines.

To meet WBP specifications the following requirements must be met:

1. Use 7/16" thick interior sheathing that conforms to and is marked as doc PS1 or DOC PS2 compliant on one side of the shear wall. The other side of the panel must be clad in at least ½" gypsum. Material specifications must be compliant with R604.
2. Connection details for the wall braced panel must conform to R602.3 (3).
3. Sheathing cannot be attached with adhesive in any D seismic zone.

Our shear walls are located as is seen in the following image:

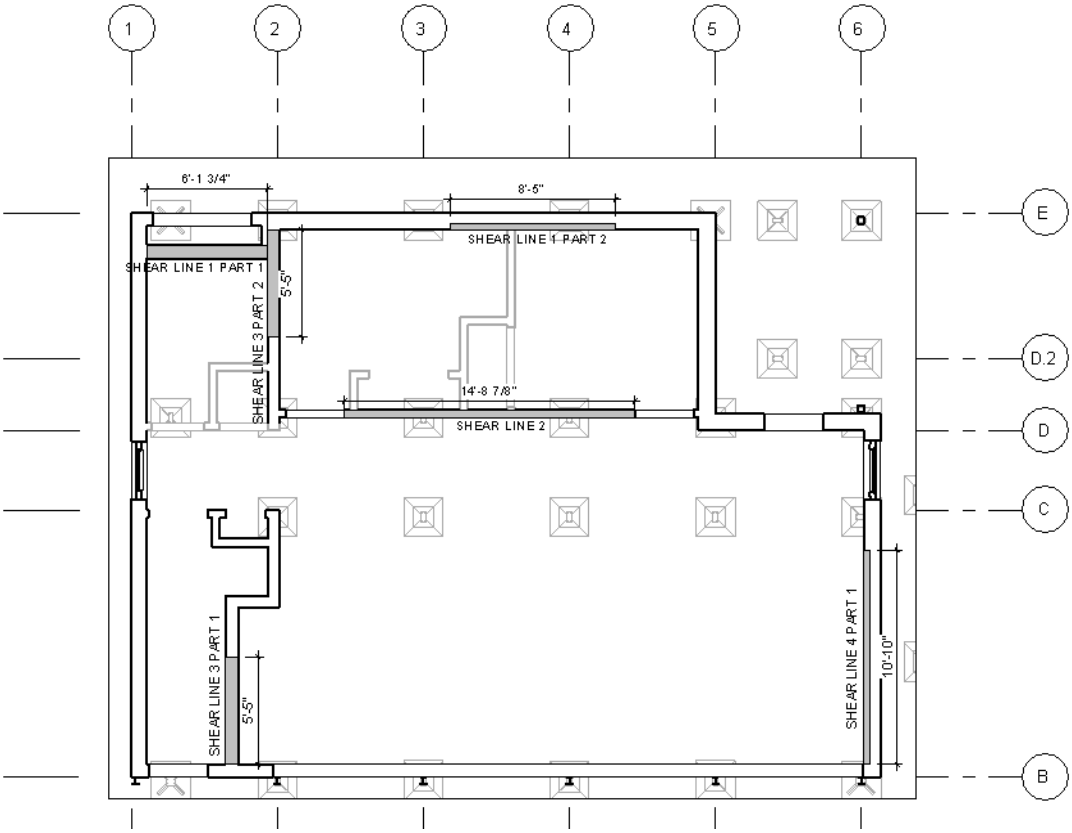


Figure 3.1 SHEAR WALLS

Wall types must be built in accordance with the construction drawings or equivalent with connections as per the shear wall diagrams or R604 equivalent.

STRUCTURAL CALCULATIONS

UPLIFT CHECK

HOUSE MODULES UPLIFT CHECK

DESCRIPTION:
These calculations provide the extreme case of overall uplift on the house modules (including the east porch).

REFERENCE:
Minimum Design Loads for Buildings and Other Structures, ASCE/SEI 7-10. Reston, VA: American Society of Civil Engineers/Structural Engineering Institute, 2006. Print.

EQUATIONS:
28.4.1 DESIGN WIND PRESSURE FOR LOW-RISE BUILDINGS – EQ. (28.4-1)
$P = Q_z[(GC_{PF}) - (GC_{PI})]$ (LB/FT^2)

VARIABLES:
K_D = Wind Directionality Factor
K_Z = Velocity Pressure Exposure Coefficient
K_{ZT} = Topographic Factor
V = Basic Wind Speed
Q_H = Velocity Pressure Q_z Calculated At Mean Roof Height *H*
(GC_{PF-}) = External Pressure Coefficient
(GC_{PI}) = Internal Pressure Coefficient
I = Importance Factor

CALCULATIONS:
First, Q_Z was calculated using the following equation:
$Q_Z = 0.00256K_ZK_{ZT}K_DV^2I$ (LB/FT^2)

Inputting the variables given:

$Q_Z = 0.00256(0.85)(1)(.85)(130)^2(1)$ LB/FT^2
$= 31.25824$ LB/FT^2

The maximum design pressure was then found using the following equation:
$P = Q_H[(GC_{PF}) - (GC_{PI})]$ (LB/FT^2)

For roof wind loading (house zone 3):

$P = 31.25824[(-0.69) - (0.18)]\ LB/FT^2$

$= -27.194\ LB/FT^2$

Vertical uplift force was then found using:

$F_v = P_h * (GC) * A_R\ (LB/FT^2)$

Given,

GC = 1.0

Area of Roof = 254 SQ FT

Therefore,

$F_v = (27.194\ PSF)(1)(254\ SQ\ FT)$

$= 6858\ LBS$

With a house weight = 40282 lbs the house dead load > uplift force and uplift will not occur with more than a safety factor of 2.

Wind Force Equation:
$pz = qz[GCpf - GCpi]$

pz=	27	psf	from Wind Calculations document

Vertical Uplift Force:
$F = pz * (GC) * Area$

House Uplift Check		
GC	1	
Area of Roof:	254	sqft
Total House Dead Load:	40282	lbs
F	6858	lbs
House Dead Load	>	Uplift Force
Uplift Will NOT Occur		

Table 3.6 UPLIFT FORCES

Note: this check does not account for louver uplift. Louver uplift is taken into account below:

Louvers provide 76.79lb uplift per linear foot. At 28.42', this gives us 2182.37lb of uplift to account for in our 3 house modules. More in depth analysis of louver effect on individual foundation points was completed and can be seen in the load derivation. Design is satisfactory with more than a safety factor of 2.

SOUTH DECK UPLIFT CHECK

The south deck experiences louver uplift with a quantity of 76.79 plf. Since we have 32.34 lf of louvers in this area, the south deck will experience 2483.39 lb of uplift. Since the weight of the south deck is estimated at 8448 lb, we meet the required factor of safety for uplift loading.

Note: combined effects of uplift and sliding are accounted for in the sliding check section of this report.

STRUCTURAL CALCULATIONS

SLIDING CHECK

SLIDING CHECK

DESCRIPTION:
These calculations provide the extreme case of sliding forces on the house.

REFERENCE:
Honjo, Yusuke. Geotechnical Risk and Safety Proceedings of the 2nd International Symposium on Geotechnical Safety & Risk, Gifu, Japan, 11-12 June 2009. Boca Raton: Crc, 2009. Print.

ASSUMPTIONS:
1. SMA13-Fine Gradation
2. Gravel Of 30 Degrees

EQUATION:
Mohr-Coulomb Failure Criterion
$T_F = C + \Sigma TAN(\Phi) > \Sigma$ Lateral Forces

VARIABLES:
T_F = Frictional Resistance Of Soil
C = Cohesion
Φ = Internal Angle Of Friction

HOUSE MODULES SLIDING CHECK

NORTH DIRECTION - CRITICAL CASE		
Length of Wall (ft)	44.750	
Height of Wall (including parapet) (ft)	12.670	
Area of North Wall (ft^2)	566.983	
Windward Pressure on Wall (psf)	39.000	*(determined in wind loads)*
Wind Load in North Direction (lbs)	22112.318	
Seismic Base Shear (lbs)	7870.000	*(from seismic load calculations)*
Worst Case Lateral Force in North Direction (lbs)	22112.318	
Raw Dead Load of SURE House (lbs)	40382.000	
Uplift from Roof (lb)	6858.000	*(determined in wind loads)*
Uplift from Louvers (lb)	2182.370	*(determined in louver calcs)*
Modified Dead Load of SURE House Modules (lbs)	31341.630	*(determined in seismic calcs)*
Internal Angle of Friction for Asphalt, ϕ (degrees)	30.000	
Internal Angle of Friction for Asphalt, ϕ (radians)	0.524	
Frictional Resistance of Soil (lbs) = tan(ϕ)*[Dead Load]	18095.095	
Since, frictonal resistance of the soil is	<	**than 2x the total lateral force, the house WILL slide - REDESIGN.**
Amount to account for in anchorage design (lb)		**26129.540**
Number of anchors needed		**18.000**

Table 3.7 SLIDING FORCES

SOUTH DECK SLIDING CHECK

WEST DIRECTION: GOVERNING CASE		
Length of West Wall (ft)	12.670	
Windward Pressure on Wall (plf)	209.350	*(from louver load calculations)*
Wind Load in West Direction (lbs)	2652.465	
Seismic Base Shear (lbs)	1650.000	*(from seismic load calculations)*
Worst Case Lateral Force in West Direction	2652.465	
Raw Dead Load of North Deck (lbs)	8448.000	
Uplift from Louvers	2483.390	
Modiified Dead Load of North Deck (lbs)	5964.610	*(determined in seismic calcs)*
Internal Angle of Friction for Asphalt, ϕ (degrees)	30.000	
Internal Angle of Friction for Asphalt, ϕ (radians)	0.524	
Frictional Resistance of Soil (lbs) = tan(ϕ)*[Dead Load]	3443.669	
Since, frictonal resistance of the soil is	**<**	**than 2x the total lateral force, the house WILL slide - REDESIGN.**
Amount to account for in anchorage design (lb)		**1861.260**
Number of anchors needed		**2.000**

Table 3.8 S. DECK SLIDING FORCES

NORTH DECK SLIDING CHECK

Any Direction (Symmetrical)		
Area of North Wall (ft^2)	0.000	
Windward Pressure on Wall (psf)	39.000	*(from wind load calculations)*
Wind Load in North Direction (lbs)	0.000	
Seismic Base Shear (lbs)	740.000	*(from seismic load calculations)*
Total Lateral Force in North Direction (lbs)	740.000	
Dead Load of North Deck (lbs)	2806.880	*(determined in seismic calcs)*
Internal Angle of Friction for Asphalt, ϕ (degrees)	30.000	
Internal Angle of Friction for Asphalt, ϕ (radians)	0.524	
Frictional Resistance of Soil (lbs) = tan(ϕ)*[Dead Load]	1620.553	
Since, frictonal resistance of the soil is	>	**than 2x the total lateral force, the house WILL NOT slide - OK.**
Amount to account for in anchorage design (lb)		**Nothing, design satisfactory**

Table 3.9 N. DECK SLIDING FORCES

RAMP SLIDING CHECK

Any Direction (Symmetrical)		
Area of North Wall (ft^2)	0.000	
Windward Pressure on Wall (psf)	39.000	*(from wind load calculations)*
Wind Load in North Direction (lbs)	0.000	
Seismic Base Shear (lbs)	760.000	*(from seismic load calculations)*
Total Lateral Force in North Direction (lbs)	760.000	
Dead Load of Ramp (lbs)	3910.080	*(determined in seismic calcs)*
Internal Angle of Friction for Asphalt, ϕ (degrees)	30.000	
Internal Angle of Friction for Asphalt, ϕ (radians)	0.524	
Frictional Resistance of Soil (lbs) = tan(ϕ)*[Dead Load]	2257.485	
Since, frictonal resistance of the soil is	>	**than 2x the total lateral force, the house WILL NOT slide - OK.**
Amount to account for in anchorage design (lb)		**Nothing, design satisfactory**

Table 3.10 RAMP SLIDING CHECK

Note: in order to be compliant in resistance to sliding and uplift as per SD building code 2015, the given number of anchors in each section of sliding analysis must be utilized to anchor the house and surrounding decks/ramps. Rods should be 1" diameter A36 mild solid steel or better. Each anchor should be driven at least 36" into the ground.

STRUCTURAL CALCULATIONS

OVERTURNING CHECK

OVERTURNING FORCE:

DESCRIPTION: These calculations provide the extreme case of overturning of the house.

Dead Loads:

Floor: 15 PSF
Deck: 16 PSF
Roof: 17 PSF

Areas:

Floor Area: 964.85 ft^2
Deck Area: 857.5 ft^2
Roof Area: 1234.65 ft^2

Weight:

Floor Weight: 14472.75 lb

Deck Weight: 13720 lb

Roof Weight: 20989 lb

Total Weight: 49181.8 lb

Floor Plan:

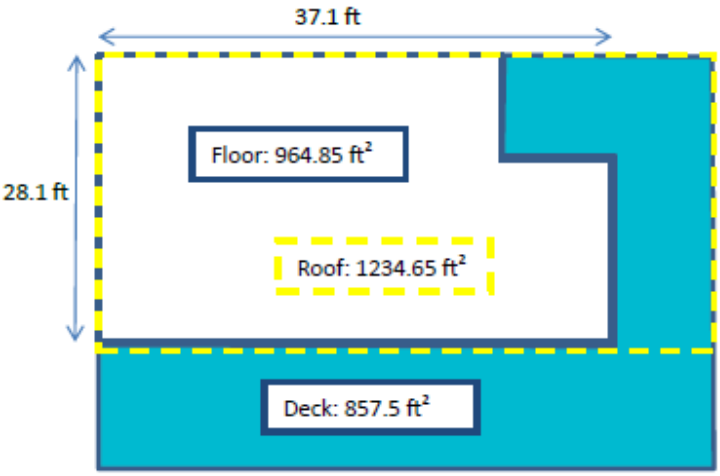


Fig. 3.2 OVERTURNING FORCE

Wind Load

39 PSF

Wall Height

12.6 ft

North-South Wall Wind Force

Area: 37.1 ft * 12.6 ft = 467.46 ft^2

Force: 467.46 ft^2 * 39 PSF = 18230.94 lb

East-West Wall Wind Force

Area: 28.11 ft * 12.6 ft = 354.2 ft^2

Force: 354.2 ft^2 * 39 PSF = 13813.3 lb

Overturning Equation

(1) (2)

(½ Wall Height)*(Wind Force) < (Weight)*(½ Wall Length)

North-South Wall

(1) (6.3 ft) * (18230.94 lb) = 114854.9 lb*ft

(2) (18.55 ft) * (49181.8 lb) = 912322.4 lb*ft

(1) < (2) ⟵ Acceptable

East-West Wall

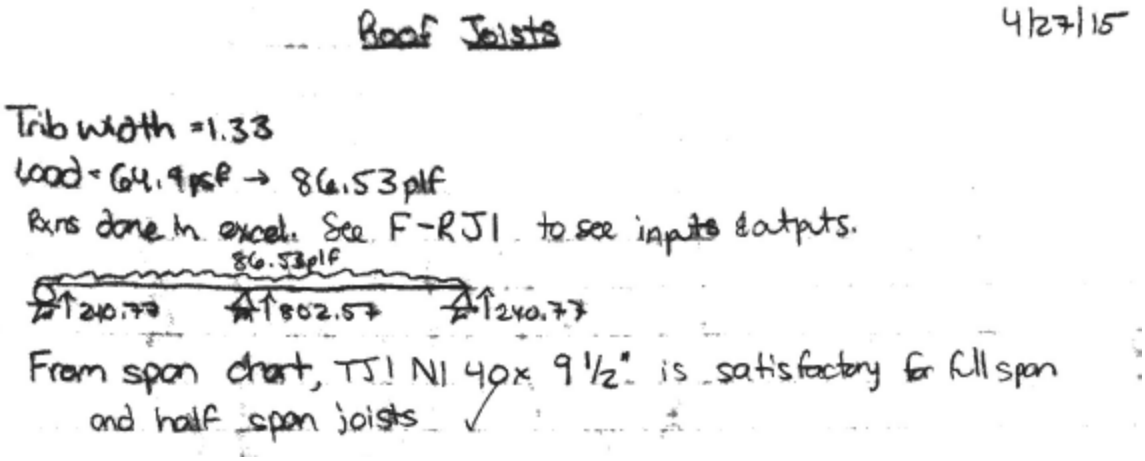
(1) (6.3 ft) * (13813.3 lb) = 87023.8 lb*ft

(2) (14.1 ft) * (49181.8 lb) = 691250.2 lb*ft

(1) < (2) ⟵ Acceptable

STRUCTURAL CALCULATIONS

WOOD HOUSE
ROOF DESIGN



FRJ-1

1/Length Span 1 (ft)	0.135
1/Length Span 2 (ft)	0.135
Applied Load Span 1 (plf)	86.530
Applied Load Span 2 (plf)	86.530
Length Span 1 (ft)	7.42
Length Span 2 (ft)	7.42
Span 1 Left	240.770
Span 1 Right	401.283
Span 2 Left	401.283
Span 2 Right	240.770
Support 1 Rxn (lb)	240.770
Support 2 Rxn (lb)	802.566
Support 3 Rxn (lb)	240.770
Total Applied Load (lb)	1284.105
Total Rxn Load (lb)	1284.105

1	0.500	0.500	1
-397.003	397.003	-397.003	397.003
397.003	0.000	0.000	-397.003
0.000	198.501	-198.501	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.00	595.50	-595.50	0.00

Table. 3.11 ROOF JOISTS

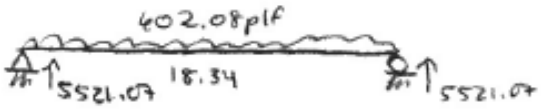
Roof Beams

4/27/15

Beams @ midspan of joist (governing condition)
Load = 802.57 lb/joist → 602.08 plf

Southern beams

Length = 18.34 ft



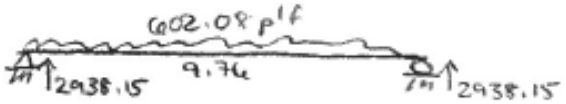
V = 5521.07 lb

$M = \frac{WL^2}{8} = \frac{602.08(18.34)^2}{8} = 25814.12$ ft-lb

Use (2) 2.0E LVL $3\frac{1}{2}" \times 11\frac{7}{8}"$ ✓

Northern beams

Length = 9.76 ft



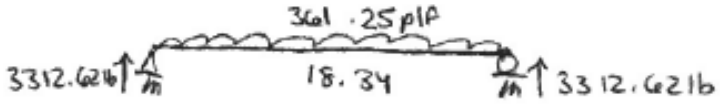
V = 2938.15 lb

$M = \frac{WL^2}{8} = \frac{602.08(9.76)^2}{8} = 7169.09$ ft-lb

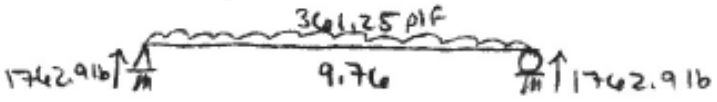
Use (2) 1.8E LVL $1\frac{3}{4}" \times 7\frac{1}{4}"$ ✓

Non-governing condition for other calculations (from the reactions)

Southern beams



Northern beams



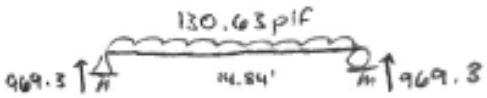
STRUCTURAL CALCULATIONS

WOOD HOUSE
FLOOR DESIGN

Floor Joists 5/4/15

Module 2

Load = 98(1.333) = 130.63 plf

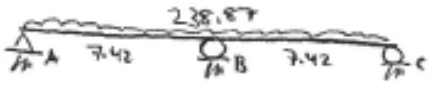


From Manual:

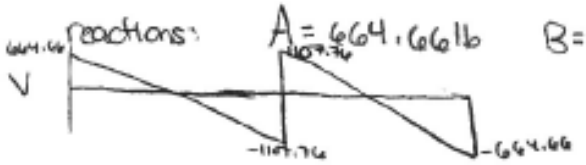
TJI NI-60 9½" are satisfactory for Module 2

Module 3 (worst case)

Load = 179.2(1.33) = 238.87 plf



*See F-FJ1 for excel calcs of this beam



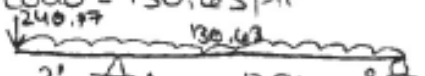
Max V = 1107.76 lb

Max M = 1643.92 ft lb

Use West Fraser 2750 Fb 1.7E LVL 1¾" x 9½" 16" O.C

Module 1

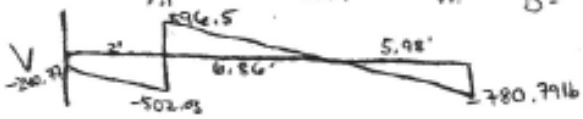
Load = 130.63 plf



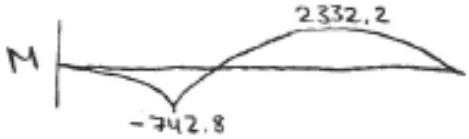
A = 1398.5316

B = 780.7916

*See F-FJ2 for excel calcs on this beam



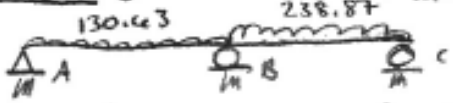
Max V = 896.51b



Max M = 2332.2 ft lb

Use TJI NI-60 9½" for Module 1

Module 3 (not worst case) for later calculations



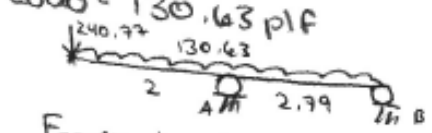
*See F-FJ3 for excel calcs on this beam

A = 313.28 lb B = 1713.5616 C = 714.85 lb

Floor Joist Analysis for Shower 5/4/15

E/W Joists (Short)

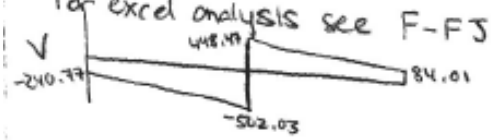
Load = 130.63 plf



A = 950.51b
B = -84.01 lb

*Please see F-FJ4 for excel calculations

For excel analysis see F-FJ3

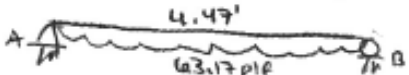


Max V = 502.03 lb

Max M = 742.8 ft-lb

Choose West Fraser 2750 Fb 1.7E LVL 1 3/4" x 7 1/4"

N/S Joist (Most Western)



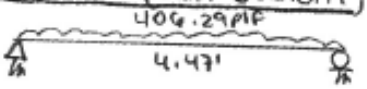
Load = $-84.01\left(\frac{1}{1.33}\right) = 63.17$ plf

A = -141.18 lb = B

Max V = 141.18 lb Max M = $\frac{WL^2}{8}$ = 157.77 lb-ft

Choose West Fraser 2750 Fb 1.7E LVL 1 3/4" x 7 1/4"

N/S Joist (Most Eastern)



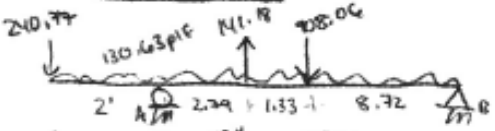
Load = 98 (8.29') $\frac{1}{2}$ = 406.29 plf

Rxn = 908.06 lb

Max V = 908.06 lb Max M = $\frac{WL^2}{8}$ = 1014.75 ft-lb

Choose West Fraser 2750 Fb 1.7E LVL 1 3/4" x 7 1/4"

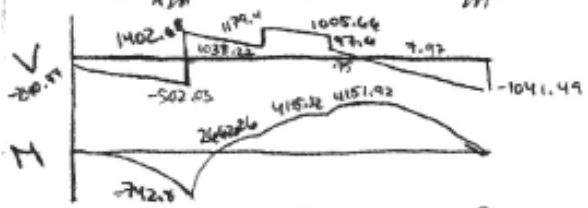
E/W Joists (Long)



$\Sigma M_A = 0$

$130.63(12.84)^2\frac{1}{2} + 908.06(4.12) - 130.63(2)^2\frac{1}{2} - 141.18(2.79) - 240.77(2) = 12.87_B$

B = 1041.49 lb A = 1904.71



Max V = 1402.68 lb

Max M = 4151.92 ft-lb

Choose West Fraser 2750 Fb 1.7E LVL 1 3/4" x 9 1/2"

F-FJ1

1/Length Span 1 (ft)	0.135
1/Length Span 2 (ft)	0.135
Applied Load Span 1 (plf)	238.870
Applied Load Span 2 (plf)	238.870
Length Span 1 (ft)	7.42
Length Span 2 (ft)	7.42
Span 1 Left	664.656
Span 1 Right	1107.760
Span 2 Left	1107.760
Span 2 Right	664.656
Support 1 Rxn (lb)	664.656
Support 2 Rxn (lb)	2215.519
Support 3 Rxn (lb)	664.656
Total Applied Load (lb)	3544.831
Total Rxn Load (lb)	3544.831

Table. 3.12 FLOOR JOISTS LOAD

1	0.500	0.500	1
-1095.944	1095.944	-1095.944	1095.944
1095.944	0.000	0.000	-1095.944
0.000	547.972	-547.972	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.00	1643.92	-1643.92	0.00

F-FJ2

Load	130.630
Length Span 1	2.000
Length Span 2	12.840
Point Load at End	240.77
Rxn 1	1398.525
Rxn 2	780.7941327
Applied Force	2179.319
Rxn Sum	2179.319

Table. 3.13 FLOOR JOISTS LOAD NET

Note: all excel calculations that follow this template are calculations utilizing the moment distribution method.

F-FJ3

1/Length Span 1 (ft)	0.135
1/Length Span 2 (ft)	0.135
Applied Load Span 1 (plf)	130.630
Applied Load Span 2 (plf)	238.870
Length Span 1 (ft)	7.42
Length Span 2 (ft)	7.42

Span 1 Left	313.282
Span 1 Right	655.992
Span 2 Left	1057.563
Span 2 Right	714.852

Support 1 Rxn (lb)	313.282
Support 2 Rxn (lb)	1713.556
Support 3 Rxn (lb)	714.852

Total Applied Load (lb)	2741.690
Total Rxn Load (lb)	2741.690

1	0.500	0.500	1
-599.335	599.335	-1095.944	1095.944
599.335	248.304	248.304	-1095.944
124.152	299.667	-547.972	124.152
-124.152	124.152	124.152	-124.152
62.076	-62.076	-62.076	62.076
-62.076	62.076	62.076	-62.076
31.038	-31.038	-31.038	31.038
-31.038	31.038	31.038	-31.038
15.519	-15.519	-15.519	15.519
-15.519	15.519	15.519	-15.519
7.760	-7.760	-7.760	7.760
-7.760	7.760	7.760	-7.760
3.880	-3.880	-3.880	3.880
-3.880	3.880	3.880	-3.880
1.940	-1.940	-1.940	1.940
-1.940	1.940	1.940	-1.940
0.970	-0.970	-0.970	0.970
-0.970	0.970	0.970	-0.970
0.008	-0.008	-0.008	0.008
-0.008	0.008	0.008	-0.008
0.004	-0.004	-0.004	0.004
0.00	1271.45	-1271.46	0.00

F-FJ4

Load	130.630
Length Span 1	2.000
Length Span 2	2.790
Point Load at End	240.77

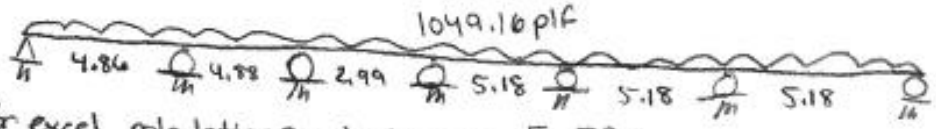
Rxn 1	950.495
Rxn 2	-84.0077091

Applied Force	866.488
Rxn Sum	866.488

Tables. 3.13 - .16 FLOOR JOISTS LOAD NET

Floor Beam 5/4/15

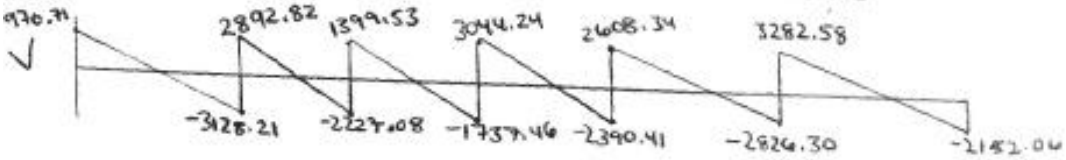
Off from Grid 1 Load = 1398.53 $(\frac{1}{1.33})$ = 1049.16 plf



For excel calculations please see F-FB1

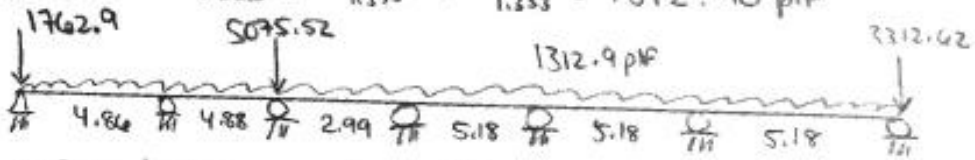
Rxns ↑1970.71 ↑6621.03 ↑3626.61 ↑4781.30 ↑4998.75 ↑6608.88 ↑2152.06

Max M = 2928.05 ft lb Max V = 3282.58 lb



Choose (2) 1 3/4" x 7 1/4" LVL (West Fraser) dropped below joists

Grid 3 Load = $\frac{780.79}{1.333}$ + $\frac{969.3}{1.333}$ = 1312.90 plf

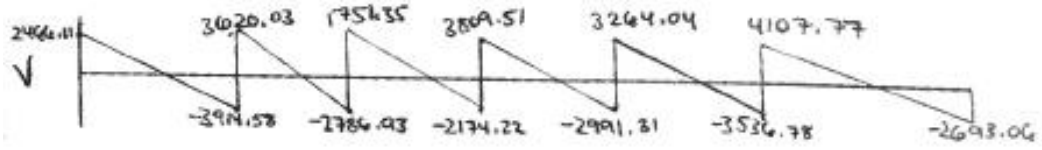


Ignore Point loads in excel calculations

For excel calculations please see F-FB2

Rxns ↑2466.11 ↑7534.61 ↑4538.28 +5075.52 ↑5983.73 ↑6255.35 ↑7644.55 ↑2693.06

Max M = 3664.10 ft lb Max V = 4107.77 lb



Choose (2) 3000 F_b 1.9E LVL 1 3/4" x 9 1/2" (West Fraser) in joist plane
* transfer point loads directly to foundation

F-FB1

1/Length Span 1 (1/ft)	0.2058
1/Length Span 2 (1/ft)	0.2049
1/Length Span 3 (1/ft)	0.3344
1/Length Span 4 (1/ft)	0.1931
1/Length Span 5 (1/ft)	0.1931
1/Length Span 6 (1/ft)	0.1931
Applied Load Span 1 (plf)	1049.16
Applied Load Span 2 (plf)	1049.16
Applied Load Span 3 (plf)	1049.16
Applied Load Span 4 (plf)	1049.16
Applied Load Span 5 (plf)	1049.16
Applied Load Span 6 (plf)	1049.16
Length Span 1 (ft)	4.86
Length Span 2 (ft)	4.88
Length Span 3 (ft)	2.99
Length Span 4 (ft)	5.18
Length Span 5 (ft)	5.18
Length Span 6 (ft)	5.18

Span 1 Left	1970.711666
Span 1 Right	3128.205934
Span 2 Left	2892.824678
Span 2 Right	2227.076122
Span 3 Left	1399.537557
Span 3 Right	1737.450843
Span 4 Left	3044.24815
Span 4 Right	2390.40065
Span 5 Left	2608.349829
Span 5 Right	2826.298971
Span 6 Left	3282.584199
Span 6 Right	2152.064601

Support 1 Rxn (lb)	1970.711666
Support 2 Rxn (lb)	6021.030612
Support 3 Rxn (lb)	3626.613679
Support 4 Rxn (lb)	4781.698994
Suport 5 Rxn (lb)	4998.750479
Support 6 Rxn (lb)	6108.88317
Support 7 Rxn (lb)	2152.064601

Total Applied Load (lb)	29659.753
Total Rxn Load (lb)	29659.753

Max Moment	2928.046

1	0.501	0.499	0.380	0.620	0.634	0.366	0.500	0.500	0.500	0.500	1
-2065.062	2065.062	-2082.093	2082.093	-781.633	781.633	-2345.957	2345.957	-2345.957	2345.957	-2345.957	2345.957
2065.062	8.533	8.498	-494.076	-806.384	991.823	572.500	0.000	0.000	0.000	0.000	-2345.957
4.267	1032.531	-247.038	4.249	495.912	-403.192	0.000	286.250	0.000	0.000	-1172.978	0.000
-4.267	-393.553	-391.940	-190.023	-310.138	255.635	147.557	-143.125	-143.125	586.489	586.489	0.000
-196.776	-2.133	-95.011	-195.970	127.817	-155.069	-71.563	73.779	293.245	-71.563	0.000	293.245
196.776	48.672	48.473	25.893	42.260	143.690	82.941	-183.512	-183.512	35.781	35.781	-293.245
24.336	98.388	12.946	24.236	71.845	21.130	-91.756	41.471	17.891	-91.756	-146.622	17.891
-24.336	-55.782	-55.553	-36.504	-59.578	44.779	25.847	-29.681	-29.681	119.189	119.189	-17.891
-27.891	-12.168	-18.252	-27.777	22.389	-29.789	-14.840	12.924	59.595	-14.840	-8.945	59.595
27.891	15.241	15.179	2.047	3.340	28.296	16.333	-36.259	-36.259	11.893	11.893	-59.595
7.621	13.945	1.023	7.589	14.148	1.670	-18.130	8.167	5.946	-18.130	-29.797	5.946
-7.621	-7.500	-7.469	-8.259	-13.479	10.436	6.024	-7.056	-7.056	23.963	23.963	-5.946
-3.750	-3.810	-4.129	-3.735	5.218	-6.739	-3.528	3.012	11.982	-3.528	-2.973	11.982
3.750	3.978	3.962	-0.564	-0.920	6.510	3.758	-7.497	-7.497	3.251	3.251	-11.982
1.989	1.875	-0.282	1.981	3.255	-0.460	-3.748	1.879	1.625	-3.748	-5.991	1.625
-1.989	-0.798	-0.795	-1.989	-3.247	2.668	1.540	-1.752	-1.752	4.870	4.870	-1.625
-0.399	-0.994	-0.995	-0.397	1.334	-1.623	-0.876	0.770	2.435	-0.876	-0.813	2.435
0.399	0.997	0.993	-0.356	-0.581	1.585	0.915	-1.602	-1.602	0.844	0.844	-2.435
0.498	0.200	-0.178	0.496	0.792	-0.290	-0.801	0.457	0.422	-0.801	-1.217	0.422
-0.498	-0.011	-0.011	-0.490	-0.799	0.692	0.399	-0.440	-0.440	1.009	1.009	-0.422
-0.005	-0.249	-0.245	-0.005	0.346	-0.400	-0.220	0.200	0.505	-0.220	-0.211	0.505
0.005	0.247	0.246	-0.129	-0.211	0.393	0.227	-0.352	-0.352	0.215	0.215	-0.505
0.124	0.003	-0.065	0.123	0.196	-0.106	-0.176	0.113	0.108	-0.176	-0.252	0.108
-0.124	0.031	0.031	-0.121	-0.198	0.179	0.103	-0.111	-0.111	0.214	0.214	-0.108
0.016	-0.062	-0.061	0.015	0.089	-0.099	-0.055	0.052	0.107	-0.055	-0.054	0.107
-0.016	0.061	0.061	-0.040	-0.065	0.098	0.056	-0.079	-0.079	0.055	0.055	-0.107
0.031	-0.008	-0.020	0.031	0.049	-0.032	-0.040	0.028	0.027	-0.040	-0.054	0.027
-0.031	0.014	0.014	-0.030	-0.049	0.046	0.026	-0.028	-0.028	0.047	0.047	-0.027
0.007	-0.015	-0.015	0.007	0.023	-0.025	-0.014	0.013	0.023	-0.014	-0.014	0.023
-0.007	0.015	0.015	-0.011	-0.018	0.024	0.014	-0.018	-0.018	0.014	0.014	-0.023
0.008	-0.003	-0.006	0.008	0.012	-0.009	-0.009	0.007	0.007	-0.009	-0.012	0.007
-0.008	0.005	0.005	-0.008	-0.012	0.012	0.007	-0.007	-0.007	0.010	0.010	-0.007
0.002	-0.004	-0.004	0.002	0.006	-0.006	-0.003	0.003	0.005	-0.003	-0.003	0.005
-0.002	0.004	0.004	-0.003	-0.005	0.006	0.004	-0.004	-0.004	0.003	0.003	-0.005
0.00190	-0.00114	-0.00154	0.00189	0.00305	-0.00251	-0.00214	0.00176	0.00173	-0.00214	-0.00260	0.00173
-0.00190	0.00134	0.00134	-0.00188	-0.00306	0.00295	0.00170	-0.00175	-0.00175	0.00237	0.00237	-0.00173
0.0007	-0.0009	-0.0009	0.0007	0.0015	-0.0015	-0.0009	0.0009	0.0012	-0.0009	-0.0009	0.0012
-0.0007	0.0009	0.0009	-0.0008	-0.0013	0.0015	0.0009	-0.0010	-0.0010	0.0009	0.0009	-0.0012
0.0005	-0.0003	-0.0004	0.0005	0.0008	-0.0007	-0.0005	0.0004	0.0004	-0.0005	-0.0006	0.0004
-0.0005	0.0004	0.0004	-0.0005	-0.0008	0.0007	0.0004	-0.0004	-0.0004	0.0006	0.0006	-0.0004
0.0002	-0.0002	-0.0002	0.0002	0.0004	-0.0004	-0.0002	0.0002	0.0003	-0.0002	-0.0002	0.0003
-0.0002	0.0002	0.0002	-0.0002	-0.0003	0.0004	0.0002	-0.0002	-0.0002	0.0002	0.0002	-0.0003
0.0001	-0.0001	-0.0001	0.0001	0.0002	-0.0002	-0.0001	0.0001	0.0001	-0.0001	-0.0001	0.0001
0.000	2812.711	-2812.711	1188.285	-1188.284	1693.465	-1693.465	2363.558	-2363.557	2928.046	-2928.046	0.000

Tables 3.16 FLOOR JOISTS SPAN LOADS

F-FB2

1/Length Span 1 (1/ft)	0.2058
1/Length Span 2 (1/ft)	0.2049
1/Length Span 3 (1/ft)	0.3344
1/Length Span 4 (1/ft)	0.1931
1/Length Span 5 (1/ft)	0.1931
1/Length Span 6 (1/ft)	0.1931
Applied Load Span 1 (plf)	1312.9
Applied Load Span 2 (plf)	1312.9
Applied Load Span 3 (plf)	1312.9
Applied Load Span 4 (plf)	1312.9
Applied Load Span 5 (plf)	1312.9
Applied Load Span 6 (plf)	1312.9
Length Span 1 (ft)	4.86
Length Span 2 (ft)	4.88
Length Span 3 (ft)	2.99
Length Span 4 (ft)	5.18
Length Span 5 (ft)	5.18
Length Span 6 (ft)	5.18

Span 1 Left	2466.113221
Span 1 Right	3914.580779
Span 2 Left	3620.028899
Span 2 Right	2786.923101
Span 3 Left	1751.356188
Span 3 Right	2174.214812
Span 4 Left	3809.517515
Span 4 Right	2991.304485
Span 5 Left	3264.042177
Span 5 Right	3536.779823
Span 6 Left	4107.766971
Span 6 Right	2693.055029

Support 1 Rxn (lb)	2466.113221
Support 2 Rxn (lb)	7534.609679
Support 3 Rxn (lb)	4538.279289
Support 4 Rxn (lb)	5983.732327
Suport 5 Rxn (lb)	6255.346662
Support 6 Rxn (lb)	7644.546794
Support 7 Rxn (lb)	2693.055029

Total Applied Load (lb)	37115.683
Total Rxn Load (lb)	37115.683

Max Moment	3664.104

1	0.501	0.499	0.380	0.620	0.634	0.366	0.500	0.500	0.500	0.500	1
-2584.181	2584.181	-2605.494	2605.494	-978.121	978.121	-2935.688	2935.688	-2935.688	2935.688	-2935.688	2935.688
2584.181	10.678	10.634	-618.277	-1009.095	1241.150	716.417	0.000	0.000	0.000	0.000	-2935.688
5.339	1292.091	-309.139	5.317	620.575	-504.547	0.000	358.208	0.000	0.000	-1467.844	0.000
-5.339	-492.485	-490.467	-237.791	-388.101	319.897	184.651	-179.104	-179.104	733.922	733.922	0.000
-246.243	-2.670	-118.896	-245.233	159.948	-194.050	-89.552	92.325	366.961	-89.552	0.000	366.961
246.243	60.907	60.658	32.402	52.883	179.812	103.791	-229.643	-229.643	44.776	44.776	-366.961
30.454	123.121	16.201	30.329	89.906	26.442	-114.822	51.895	22.388	-114.822	-183.481	22.388
-30.454	-69.804	-69.518	-45.680	-74.555	56.035	32.345	-37.142	-37.142	149.151	149.151	-22.388
-34.902	-15.227	-22.840	-34.759	28.018	-37.277	-18.571	16.172	74.576	-18.571	-11.194	74.576
34.902	19.073	18.994	2.561	4.180	35.409	20.439	-45.374	-45.374	14.882	14.882	-74.576
9.536	17.451	1.281	9.497	17.705	2.090	-22.687	10.219	7.441	-22.687	-37.288	7.441
-9.536	-9.385	-9.347	-10.335	-16.867	13.059	7.538	-8.830	-8.830	29.987	29.987	-7.441
-4.693	-4.768	-5.167	-4.673	6.529	-8.434	-4.415	3.769	14.994	-4.415	-3.721	14.994
4.693	4.978	4.958	-0.705	-1.151	8.146	4.702	-9.381	-9.381	4.068	4.068	-14.994
2.489	2.346	-0.353	2.479	4.073	-0.575	-4.691	2.351	2.034	-4.691	-7.497	2.034
-2.489	-0.999	-0.995	-2.489	-4.063	3.339	1.927	-2.193	-2.193	6.094	6.094	-2.034
-0.499	-1.244	-1.245	-0.497	1.669	-2.031	-1.096	0.964	3.047	-1.096	-1.017	3.047
0.499	1.247	1.242	-0.445	-0.727	1.983	1.145	-2.005	-2.005	1.057	1.057	-3.047
0.624	0.250	-0.223	0.621	0.992	-0.363	-1.003	0.572	0.528	-1.003	-1.523	0.528
-0.624	-0.014	-0.014	-0.613	-1.000	0.866	0.500	-0.550	-0.550	1.263	1.263	-0.528
-0.007	-0.312	-0.306	-0.007	0.433	-0.500	-0.275	0.250	0.632	-0.275	-0.264	0.632
0.007	0.310	0.308	-0.162	-0.264	0.491	0.284	-0.441	-0.441	0.270	0.270	-0.632
0.155	0.003	-0.081	0.154	0.246	-0.132	-0.220	0.142	0.135	-0.220	-0.316	0.135
-0.155	0.039	0.039	-0.152	-0.248	0.224	0.129	-0.138	-0.138	0.268	0.268	-0.135
0.019	-0.077	-0.076	0.019	0.112	-0.124	-0.069	0.065	0.134	-0.069	-0.067	0.134
-0.019	0.077	0.077	-0.050	-0.081	0.122	0.071	-0.099	-0.099	0.068	0.068	-0.134
0.038	-0.010	-0.025	0.038	0.061	-0.041	-0.050	0.035	0.034	-0.050	-0.067	0.034
-0.038	0.017	0.017	-0.038	-0.062	0.057	0.033	-0.035	-0.035	0.058	0.058	-0.034
0.009	-0.019	-0.019	0.009	0.029	-0.031	-0.017	0.017	0.029	-0.017	-0.017	0.029
-0.009	0.019	0.019	-0.014	-0.023	0.031	0.018	-0.023	-0.023	0.017	0.017	-0.029
0.010	-0.004	-0.007	0.010	0.015	-0.012	-0.011	0.009	0.009	-0.011	-0.015	0.009
-0.010	0.006	0.006	-0.009	-0.015	0.015	0.008	-0.009	-0.009	0.013	0.013	-0.009
0.003	-0.005	-0.005	0.003	0.007	-0.008	-0.004	0.004	0.007	-0.004	-0.004	0.007
-0.003	0.005	0.005	-0.004	-0.006	0.008	0.004	-0.005	-0.005	0.004	0.004	-0.007
0.00238	-0.00143	-0.00192	0.00237	0.00382	-0.00314	-0.00268	0.00220	0.00217	-0.00268	-0.00325	0.00217
-0.00238	0.00168	0.00167	-0.00235	-0.00384	0.00369	0.00213	-0.00219	-0.00219	0.00296	0.00296	-0.00217
0.0008	-0.0012	-0.0012	0.0008	0.0018	-0.0019	-0.0011	0.0011	0.0015	-0.0011	-0.0011	0.0015
-0.0008	0.0012	0.0012	-0.0010	-0.0017	0.0019	0.0011	-0.0013	-0.0013	0.0011	0.0011	-0.0015
0.0006	-0.0004	-0.0005	0.0006	0.0010	-0.0008	-0.0006	0.0006	0.0005	-0.0006	-0.0007	0.0005
-0.0006	0.0005	0.0005	-0.0006	-0.0010	0.0009	0.0005	-0.0005	-0.0005	0.0007	0.0007	-0.0005
0.0002	-0.0003	-0.0003	0.0002	0.0005	-0.0005	-0.0003	0.0003	0.0003	-0.0003	-0.0003	0.0003
-0.0002	0.0003	0.0003	-0.0003	-0.0004	0.0005	0.0003	-0.0003	-0.0003	0.0003	0.0003	-0.0003
0.0001	-0.0001	-0.0001	0.0001	0.0002	-0.0002	-0.0002	0.0001	0.0001	-0.0002	-0.0002	0.0001
0.000	3519.776	-3519.776	1486.998	-1486.998	2119.171	-2119.172	2957.714	-2957.713	3664.104	-3664.104	0.000

Tables 3.17 FLOOR JOISTS SPAN LOADS

F-FB3

1/Length Span 1 (1/ft)	0.2058
1/Length Span 2 (1/ft)	0.2049
1/Length Span 3 (1/ft)	0.3344
1/Length Span 4 (1/ft)	0.1931
1/Length Span 5 (1/ft)	0.1931
1/Length Span 6 (1/ft)	0.1931
Applied Load Span 1 (plf)	1407.18
Applied Load Span 2 (plf)	1407.18
Applied Load Span 3 (plf)	1226.15
Applied Load Span 4 (plf)	1226.15
Applied Load Span 5 (plf)	1226.15
Applied Load Span 6 (plf)	1226.15
Length Span 1 (ft)	4.86
Length Span 2 (ft)	4.88
Length Span 3 (ft)	2.99
Length Span 4 (ft)	5.18
Length Span 5 (ft)	5.18
Length Span 6 (ft)	5.18

Span 1 Left	2642.415262
Span 1 Right	4196.479538
Span 2 Left	3883.916169
Span 2 Right	2983.122231
Span 3 Left	1711.759371
Span 3 Right	1954.429129
Span 4 Left	3550.483392
Span 4 Right	2800.973608
Span 5 Left	3050.810217
Span 5 Right	3300.646783
Span 6 Left	3835.857862
Span 6 Right	2515.599138

Support 1 Rxn (lb)	2642.415262
Support 2 Rxn (lb)	8080.395707
Support 3 Rxn (lb)	4694.881602
Support 4 Rxn (lb)	5504.912521
Suport 5 Rxn (lb)	5851.783825
Support 6 Rxn (lb)	7136.504645
Support 7 Rxn (lb)	2515.599138

Total Applied Load (lb)	36426.493
Total Rxn Load (lb)	36426.493

Max Moment	3776.376

1	0.501	0.499	0.380	0.620	0.634	0.366	0.500	0.500	0.500	0.500	1
-2769.752	2769.752	-2792.596	2792.596	-913.492	913.492	-2741.712	2741.712	-2741.712	2741.712	-2741.712	2741.712
2769.752	11.445	11.398	-713.916	-1165.188	1159.141	669.079	0.000	0.000	0.000	0.000	-2741.712
5.723	1384.876	-356.958	5.699	579.570	-582.594	0.000	334.540	0.000	0.000	-1370.856	0.000
-5.723	-515.014	-512.904	-222.358	-362.912	369.380	213.214	-167.270	-167.270	685.428	685.428	0.000
-257.507	-2.861	-111.179	-256.452	184.690	-181.456	-83.635	106.607	342.714	-83.635	0.000	342.714
257.507	57.137	56.903	27.264	44.498	168.075	97.016	-224.660	-224.660	41.817	41.817	-342.714
28.569	128.754	13.632	28.451	84.037	22.249	-112.330	48.508	20.909	-112.330	-171.357	20.909
-28.569	-71.339	-71.047	-42.737	-69.752	57.114	32.967	-34.708	-34.708	141.844	141.844	-20.909
-35.669	-14.284	-21.369	-35.523	28.557	-34.876	-17.354	16.484	70.922	-17.354	-10.454	70.922
35.669	17.863	17.790	2.647	4.320	33.115	19.115	-43.703	-43.703	13.904	13.904	-70.922
8.932	17.835	1.323	8.895	16.558	2.160	-21.851	9.557	6.952	-21.851	-35.461	6.952
-8.932	-9.599	-9.559	-9.670	-15.783	12.485	7.207	-8.255	-8.255	28.656	28.656	-6.952
-4.799	-4.466	-4.835	-4.780	6.242	-7.891	-4.127	3.603	14.328	-4.127	-3.476	14.328
4.799	4.660	4.641	-0.556	-0.907	7.620	4.398	-8.966	-8.966	3.802	3.802	-14.328
2.330	2.400	-0.278	2.320	3.810	-0.454	-4.483	2.199	1.901	-4.483	-7.164	1.901
-2.330	-1.063	-1.059	-2.329	-3.801	3.130	1.807	-2.050	-2.050	5.823	5.823	-1.901
-0.532	-1.165	-1.165	-0.529	1.565	-1.901	-1.025	0.903	2.912	-1.025	-0.950	2.912
0.532	1.167	1.162	-0.393	-0.642	1.855	1.071	-1.908	-1.908	0.988	0.988	-2.912
0.584	0.266	-0.197	0.581	0.927	-0.321	-0.954	0.535	0.494	-0.954	-1.456	0.494
-0.584	-0.035	-0.034	-0.573	-0.935	0.808	0.467	-0.515	-0.515	1.205	1.205	-0.494
-0.017	-0.292	-0.287	-0.017	0.404	-0.468	-0.257	0.233	0.602	-0.257	-0.247	0.602
0.017	0.290	0.289	-0.147	-0.240	0.460	0.265	-0.418	-0.418	0.252	0.252	-0.602
0.145	0.009	-0.073	0.144	0.230	-0.120	-0.209	0.133	0.126	-0.209	-0.301	0.126
-0.145	0.032	0.032	-0.142	-0.232	0.209	0.120	-0.129	-0.129	0.255	0.255	-0.126
0.016	-0.072	-0.071	0.016	0.104	-0.116	-0.065	0.060	0.128	-0.065	-0.063	0.128
-0.016	0.072	0.072	-0.046	-0.075	0.115	0.066	-0.094	-0.094	0.064	0.064	-0.128
0.036	-0.008	-0.023	0.036	0.057	-0.037	-0.047	0.033	0.032	-0.047	-0.064	0.032
-0.036	0.016	0.015	-0.035	-0.058	0.053	0.031	-0.032	-0.032	0.055	0.055	-0.032
0.008	-0.018	-0.018	0.008	0.027	-0.029	-0.016	0.015	0.028	-0.016	-0.016	0.028
-0.008	0.018	0.018	-0.013	-0.021	0.029	0.017	-0.022	-0.022	0.016	0.016	-0.028
0.009	-0.004	-0.007	0.009	0.014	-0.011	-0.011	0.008	0.008	-0.011	-0.014	0.008
-0.009	0.005	0.005	-0.009	-0.014	0.014	0.008	-0.008	-0.008	0.012	0.012	-0.008
0.003	-0.004	-0.004	0.003	0.007	-0.007	-0.004	0.004	0.006	-0.004	-0.004	0.006
-0.003	0.004	0.004	-0.004	-0.006	0.007	0.004	-0.005	-0.005	0.004	0.004	-0.006
0.00222	-0.00131	-0.00179	0.00221	0.00357	-0.00292	-0.00252	0.00206	0.00203	-0.00252	-0.00308	0.00203
-0.00222	0.00155	0.00154	-0.00220	-0.00359	0.00345	0.00199	-0.00204	-0.00204	0.00280	0.00280	-0.00203
0.0008	-0.0011	-0.0011	0.0008	0.0017	-0.0018	-0.0010	0.0010	0.0014	-0.0010	-0.0010	0.0014
-0.0008	0.0011	0.0011	-0.0009	-0.0015	0.0018	0.0010	-0.0012	-0.0012	0.0010	0.0010	-0.0014
0.0006	-0.0004	-0.0005	0.0006	0.0009	-0.0008	-0.0006	0.0005	0.0005	-0.0006	-0.0007	0.0005
-0.0006	0.0004	0.0004	-0.0005	-0.0009	0.0009	0.0005	-0.0005	-0.0005	0.0006	0.0006	-0.0005
0.0002	-0.0003	-0.0003	0.0002	0.0004	-0.0004	-0.0003	0.0003	0.0003	-0.0003	-0.0003	0.0003
-0.0002	0.0003	0.0003	-0.0002	-0.0004	0.0004	0.0003	-0.0003	-0.0003	0.0003	0.0003	-0.0003
0.0001	-0.0001	-0.0001	0.0001	0.0002	-0.0002	-0.0001	0.0001	0.0001	-0.0001	-0.0002	0.0001
0.000	3776.376	-3776.376	1578.439	-1578.439	1941.230	-1941.230	2772.393	-2772.393	3419.470	-3419.470	0.000

Tables 3.18 FLOOR JOISTS SPAN LOADS

F-FB4

1/Length Span 1 (1/ft)	0.2058
1/Length Span 2 (1/ft)	0.2049
1/Length Span 3 (1/ft)	0.3344
1/Length Span 4 (1/ft)	0.1931
1/Length Span 5 (1/ft)	0.1931
1/Length Span 6 (1/ft)	0.1931
Applied Load Span 1 (plf)	1662.06
Applied Load Span 2 (plf)	1662.06
Applied Load Span 3 (plf)	1285.49
Applied Load Span 4 (plf)	1285.49
Applied Load Span 5 (plf)	1285.49
Applied Load Span 6 (plf)	1285.49
Length Span 1 (ft)	4.86
Length Span 2 (ft)	4.88
Length Span 3 (ft)	2.99
Length Span 4 (ft)	5.18
Length Span 5 (ft)	5.18
Length Span 6 (ft)	5.18

Span 1 Left	3120.320297
Span 1 Right	4957.291303
Span 2 Left	4590.937212
Span 2 Right	3519.915588
Span 3 Left	1873.142327
Span 3 Right	1970.472773
Span 4 Left	3714.758073
Span 4 Right	2944.080127
Span 5 Left	3200.972791
Span 5 Right	3457.865409
Span 6 Left	4020.992188
Span 6 Right	2637.846012

Support 1 Rxn (lb)	3120.320297
Support 2 Rxn (lb)	9548.228516
Support 3 Rxn (lb)	5393.057914
Support 4 Rxn (lb)	5685.230847
Suport 5 Rxn (lb)	6145.052918
Support 6 Rxn (lb)	7478.857597
Support 7 Rxn (lb)	2637.846012

Total Applied Load (lb)	40008.594
Total Rxn Load (lb)	40008.594

Max Moment	4463.839

1	0.501	0.499	0.380	0.620	0.634	0.366	0.500	0.500	0.500	0.500	1
-3271.433	3271.433	-3298.413	3298.413	-957.701	957.701	-2874.398	2874.398	-2874.398	2874.398	-2874.398	2874.398
3271.433	13.518	13.463	-889.292	-1451.420	1215.238	701.460	0.000	0.000	0.000	0.000	-2874.398
6.759	1635.716	-444.646	6.731	607.619	-725.710	0.000	350.730	0.000	0.000	-1437.199	0.000
-6.759	-596.758	-594.312	-233.406	-380.944	460.120	265.590	-175.365	-175.365	718.600	718.600	0.000
-298.379	-3.380	-116.703	-297.156	230.060	-190.472	-87.682	132.795	359.300	-87.682	0.000	359.300
298.379	60.165	59.918	25.491	41.605	176.357	101.797	-246.048	-246.048	43.841	43.841	-359.300
30.082	149.189	12.746	29.959	88.179	20.802	-123.024	50.899	21.921	-123.024	-179.650	21.921
-30.082	-81.134	-80.801	-44.883	-73.254	64.811	37.410	-36.410	-36.410	151.337	151.337	-21.921
-40.567	-15.041	-22.442	-40.401	32.406	-36.627	-18.205	18.705	75.668	-18.205	-10.960	75.668
40.567	18.780	18.703	3.038	4.958	34.765	20.067	-47.187	-47.187	14.583	14.583	-75.668
9.390	20.283	1.519	9.351	17.382	2.479	-23.593	10.034	7.291	-23.593	-37.834	7.291
-9.390	-10.924	-10.879	-10.157	-16.577	13.387	7.727	-8.662	-8.662	30.714	30.714	-7.291
-5.462	-4.695	-5.078	-5.439	6.694	-8.289	-4.331	3.864	15.357	-4.331	-3.646	15.357
5.462	4.897	4.877	-0.477	-0.778	8.001	4.618	-9.610	-9.610	3.988	3.988	-15.357
2.448	2.731	-0.238	2.438	4.001	-0.389	-4.805	2.309	1.994	-4.805	-7.678	1.994
-2.448	-1.249	-1.244	-2.446	-3.993	3.293	1.901	-2.152	-2.152	6.242	6.242	-1.994
-0.624	-1.224	-1.223	-0.622	1.647	-1.996	-1.076	0.950	3.121	-1.076	-0.997	3.121
0.624	1.226	1.221	-0.389	-0.635	1.948	1.124	-2.036	-2.036	1.036	1.036	-3.121
0.613	0.312	-0.195	0.611	0.974	-0.318	-1.018	0.562	0.518	-1.018	-1.560	0.518
-0.613	-0.059	-0.059	-0.602	-0.983	0.847	0.489	-0.540	-0.540	1.289	1.289	-0.518
-0.029	-0.307	-0.301	-0.029	0.423	-0.491	-0.270	0.244	0.645	-0.270	-0.259	0.645
0.029	0.304	0.303	-0.150	-0.244	0.483	0.279	-0.444	-0.444	0.265	0.265	-0.645
0.152	0.015	-0.075	0.152	0.241	-0.122	-0.222	0.139	0.132	-0.222	-0.322	0.132
-0.152	0.030	0.030	-0.149	-0.244	0.218	0.126	-0.136	-0.136	0.272	0.272	-0.132
0.015	-0.076	-0.075	0.015	0.109	-0.122	-0.068	0.063	0.136	-0.068	-0.066	0.136
-0.015	0.076	0.075	-0.047	-0.077	0.120	0.069	-0.100	-0.100	0.067	0.067	-0.136
0.038	-0.008	-0.024	0.038	0.060	-0.039	-0.050	0.035	0.034	-0.050	-0.068	0.034
-0.038	0.016	0.016	-0.037	-0.061	0.056	0.032	-0.034	-0.034	0.059	0.059	-0.034
0.008	-0.019	-0.019	0.008	0.028	-0.030	-0.017	0.016	0.029	-0.017	-0.017	0.029
-0.008	0.019	0.019	-0.014	-0.022	0.030	0.017	-0.023	-0.023	0.017	0.017	-0.029
0.009	-0.004	-0.007	0.009	0.015	-0.011	-0.011	0.009	0.008	-0.011	-0.015	0.008
-0.009	0.005	0.005	-0.009	-0.015	0.014	0.008	-0.009	-0.009	0.013	0.013	-0.008
0.003	-0.005	-0.005	0.003	0.007	-0.008	-0.004	0.004	0.007	-0.004	-0.004	0.007
-0.003	0.005	0.005	-0.004	-0.006	0.008	0.004	-0.005	-0.005	0.004	0.004	-0.007
0.00233	-0.00134	-0.00186	0.00232	0.00375	-0.00304	-0.00266	0.00217	0.00213	-0.00266	-0.00327	0.00213
-0.00233	0.00160	0.00160	-0.00231	-0.00377	0.00361	0.00209	-0.00215	-0.00215	0.00296	0.00296	-0.00213
0.0008	-0.0012	-0.0012	0.0008	0.0018	-0.0019	-0.0011	0.0010	0.0015	-0.0011	-0.0011	0.0015
-0.0008	0.0012	0.0012	-0.0010	-0.0016	0.0019	0.0011	-0.0013	-0.0013	0.0011	0.0011	-0.0015
0.0006	-0.0004	-0.0005	0.0006	0.0009	-0.0008	-0.0006	0.0005	0.0005	-0.0006	-0.0007	0.0005
-0.0006	0.0004	0.0004	-0.0006	-0.0009	0.0009	0.0005	-0.0005	-0.0005	0.0007	0.0007	-0.0005
0.0002	-0.0003	-0.0003	0.0002	0.0005	-0.0005	-0.0003	0.0003	0.0003	-0.0003	-0.0003	0.0003
-0.0002	0.0003	0.0003	-0.0003	-0.0004	0.0005	0.0003	-0.0003	-0.0003	0.0003	0.0003	-0.0003
0.0001	-0.0001	-0.0001	0.0001	0.0002	-0.0002	-0.0002	0.0001	0.0001	-0.0002	-0.0002	0.0001
0.000	4463.839	-4463.840	1850.547	-1850.547	1996.056	-1996.056	2916.997	-2916.997	3582.348	-3582.349	0.000

Tables 3.19 FLOOR JOISTS SPAN LOADS

STRUCTURAL CALCULATIONS

WOOD COLUMN DESIGN

Wood Column Design inside House

5/4/15

Grid Line D+E

$l_e = k_e l = 1(10.5) = 10.5'$ * Treat column as pinned-pinned $k_e = 1$ from NDS ap. G

$C = .8$

$E_{min} = 440\,000$ psi for stud SPF from NDS supplement

$F_{cE} = \frac{.822 E_{min}}{(l_e/d)^2} = 279.074$ psi

$F_c^* = F_c C_D C_F = 761.25$ psi

$C_D = 1$ for normal "ten years" (conservative) Table 2.3.2

$C_F = 1.05$ from NDS Supplement Table 4A commentary

$F_c = 725$ psi from NDS Table 4A

$$C_p = \frac{1+(F_{cE}/F_c^*)}{2c} - \sqrt{\left(\frac{1+(F_{cE}/F_c^*)}{2c}\right)^2 - \frac{F_{cE}/F_c^*}{c}}$$

$$C_p = \frac{1+279.074/761.21}{2(.8)} - \sqrt{\left(\frac{1+.367}{2(.8)}\right)^2 - \frac{.367}{.8}} = .34$$

$F'_c = F_c C_D C_F C_p = 761.25(1)(1.05)(.34) = 271.77$ psi

Grid E

$A = 1.5(5.5) = 8.25 in^2$

$F_{allow} = 2242.1$ lb

$F_{actual} = 2938.15$ lb

Use (2) 2x6 as column

Grid D

$A = 1.5(3.5) = 5.25 in^2$

$F_{allow} = 1426.79$ lb

$F_{actual} = 8459.22$ lb

Use (6) 2x4 as column

STRUCTURAL CALCULATIONS

WOOD DECK DESIGN

Deck Calculations

5/2/15

Southern Panels (All but most western)

Joist span = 7.42'

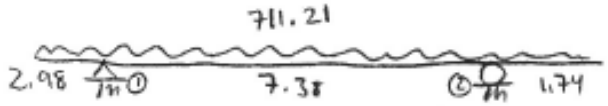
Load = 191.7 · 1.33 = 255.54 plf

$M = \frac{wL^2}{8} = \frac{255.54(7.42)^2}{8} = 1758.61$ ft-lb → 21103.35 lb-in

$V = \frac{wL}{2} = 948.05$ lb

→ Use Douglas Fir-Larch Select Structural 2x8

Beam Load = 3.71'(191.7) = 711.207 plf

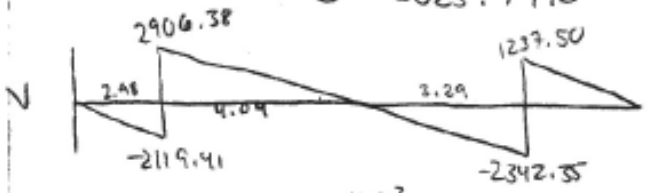


$\Sigma M_{①} = 0$

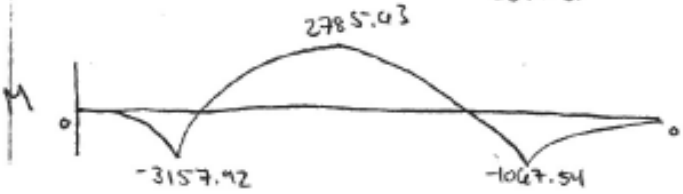
$711.21(9.12)^2\frac{1}{2} - 711.21(2.98)^2\frac{1}{2} = 7.38$ ②

② = 3579.85 lb

① = 5025.79 lb



Max V = 2906.38 lb



Max M = 3157.92 ft-lb

→ Choose StructurePro Treated Glulam 24F-V5M1 Southern Pine $3\frac{1}{2}" \times 9\frac{1}{2}"$

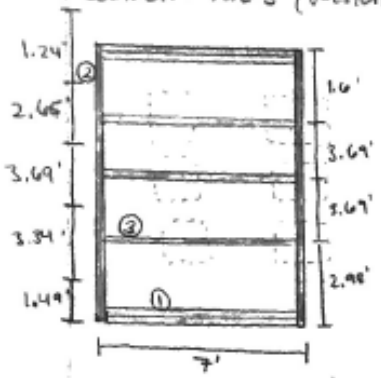
*Add 2x4 blocking for deck plank span as needed (can be on the flat)

*Use (2) 2x10 for top & bottom of panel for stability

Deck Calculations

5/3/15

Southern Reds (Western Red)



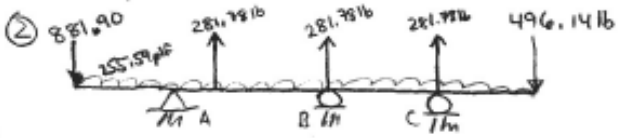
① Load = 285.63

V = 1059.70 lb

M = 1965.72 ft lb → 23588.64 lb in

Use (2) 2×8 Douglas fir-Larch

load = 1059.7 − 2(281.78) = 496.14 lb

② 

* for simplicity assume that the left 281.78 lb acts @ support

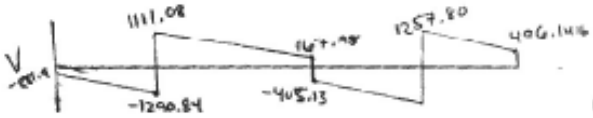
A = 2401.923 − 281.78 = 2120.14 lb

B = −573.08 − 281.78 = −854.86 lb

C = 2606.05 − 281.78 = 2324.27 lb

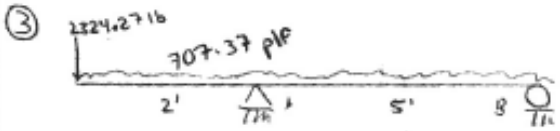
Max M = 2613.37 ft lb

*See D-1 excel printout for moment distribution method

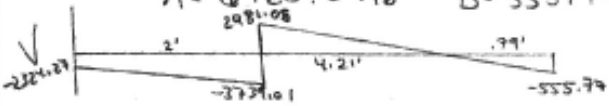


Max V = 1290.84 lb

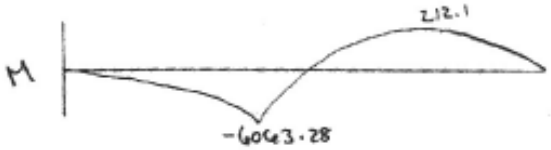
Choose

③ 

A = 6720.09 lb B = 555.77 lb



Max V = 3739.01 lb



Max M = 6063.28 ft lb

72759.36 lb in

Choose (2) 2×10 Douglas Fir-Larch

& use for all 3 lines

D-1

1/Length Span 1 (ft)	0.625
1/Length Span 2 (ft)	0.271
1/Length Span 3 (ft)	0.271
1/ Length Span 4 (ft)	0.336
Applied Load Span 1 (plf)	256
Applied Load Span 2 (plf)	255.59
Applied Load Span 3 (plf)	255.59
Applied Load Span 4 (plf)	255.59
Length Span 1 (ft)	1.6
Length Span 2 (ft)	3.69
Length Span 3 (ft)	3.69
Length Span 4 (ft)	2.98
Point Load @ 1 (lb)	881.9
Point Load @ 4 (lb)	496.14

Span 1 Left	0
Span 1 Right	1290.844
Span 2 Left	1111.079
Span 2 Right	-167.952
Span 3 Left	-405.126
Span 3 Right	1348.253
Span 4 Left	1257.798
Span 4 Right	0

Support 1 Rxn (lb)	2401.923
Support 2 Rxn (lb)	-573.078
Support 3 Rxn (lb)	2606.0515

Total Applied Load (lb)	4434.896
Total Rxn Load (lb)	4434.896

Max M (ftlb)	2613.368

0	0	1.00	0.50	0.50	1.000	0	0
0	1738.195	-290.012	290.012	-290	290.012	-2613	0.000
0	0	-1448.184	0.000	0	2323.356	0	0
0	0	0.000	-724.092	1161.678	0	0	0
0	0	0.000	-218.793	-218.793	0	0	0
0	0	-109.397	0.000	0.000	0	0	0
0	0	109.397	0.000	0.000	0	0	0
0	0	0.000	54.698	0.000	0	0	0
0	0	0.000	-27.349	-27.349	0	0	0
0	0	-13.675	0.000	0.000	0	0	0
0	0	13.675	0.000	0.000	0	0	0
0	0	0.000	6.837	0.000	0	0	0
0	0	0.000	-3.419	-3.419	0	0	0
0	0	-1.709	0.000	0.000	0	0	0
0	0	1.709	0.000	0.000	0	0	0
0	0	0.000	0.855	0.000	0	0	0
0	0	0.000	-0.427	-0.427	0	0	0
0	0	-0.214	0.000	0.000	0	0	0
0	0	0.214	0.000	0.000	0	0	0
0	0	0.000	0.107	0.000	0	0	0
0	0	0.000	-0.053	-0.053	0	0	0
0	0	-0.027	0.000	0.000	0	0	0
0	0	0.027	0.000	0.000	0	0	0
0	0	0.000	0.013	0.000	0	0	0
0	0	0.000	-0.007	-0.007	0	0	0
0	0	-0.003	0.000	0.000	0	0	0
0	0	0.003	0.000	0.000	0	0	0
0	0	0.000	0.002	0.000	0	0	0
0	0	0.000	-0.001	-0.001	0	0	0
0	0	0.000	0.000	0.000	0	0	0
0	0	0.000	0.000	0.000	0	0	0
0	0	0.000	0.000	0.000	0	0	0
0	0	0.000	0.000	0.000	0	0	0
0	1738.195	-1738.195	-621.617	621.617	2613	-2613	0.000

Tables 3.20 DECK LOADS

Deck Calculations 5/6/15

Northern Panels (worst case scenerio)

Joist Span = 5.56'

Choose Douglas Fir-Larch Select Structural 2x8

(we know this is ok b/c it is less than the southern span)

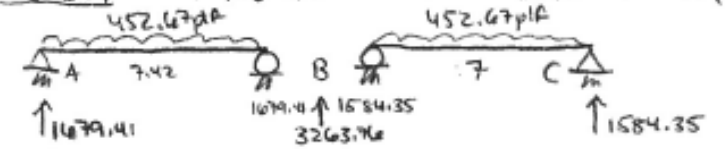
Beam Span = 7.42'

Choose StructurePro Treated Glulam 24F-V5M1 Sutton Ale $3\frac{1}{2}$" x $9\frac{1}{2}$"

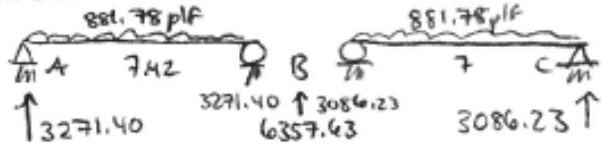
(we know this is ok b/c loading condition is less than that on south)

Derive reaction forces for fondation analysis (not considering panels, only load transfer)

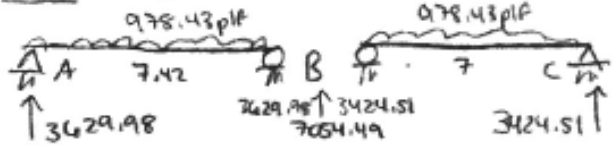
Grid E.1 Trib area = 2.53' Load = 179.2 (2.53) = 452.67



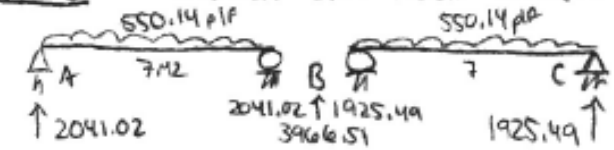
Grid E.2 Trib area = 2.53 + 2.39 = 4.92 Load = 179.2(4.92) = 881.78 plf



Grid F Trib area = 2.39 + 3.07 = 5.46 Load = 179.2(5.46) = 978.43 plf



Grid 6 Trib area = 3.07 Load = 179.2(3.07) = 550.14 plf



STRUCTURAL CALCULATIONS

RAMP DESIGN

Ramp Framing Design 7/12/15

Joists-Upper

Span = 7.42'

Spacing = 1.625' o.c.

Load = 181.7psf

* This includes CA snow requirements instead of NJ b/c the ramp will not be used in final NJ location.

Load = 295.26 plf

$M = \frac{wL^2}{8} = \frac{295.26(7.42)^2}{8} = 2031.99$ lbft

$V = \frac{wL}{2} = 1095.41$ lb

Choose Southern Yellow Pine Pressure Treated No. 2 2x8

Joists-Lowest

Span = 6.11'

Spacing = .75' o.c.

Load = 181.7 psf → 136.275 plf

$M = \frac{wL^2}{8} = 635.93$ lbft

$V = \frac{wL}{2} = 415.64$ lb

Choose Southern Yellow Pine Pressure Treated No. 2 2x4

Joists-Middle

Span = 3.97'

spacing = 1.625' O.C

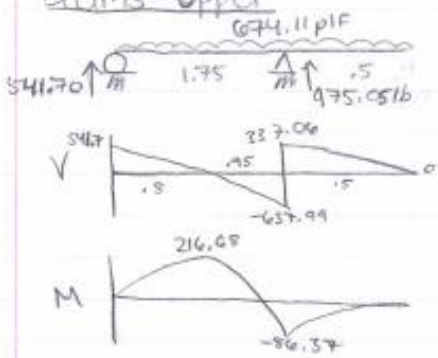
Load = 181.7 psf → 295.26 plf

$M = \frac{wL^2}{8} = 581.70$ lbft

$V = \frac{wL}{2} = 586.09$ lb

Choose Southern Yellow Pine Pressure Treated No. 2 2x4

Beams-Upper



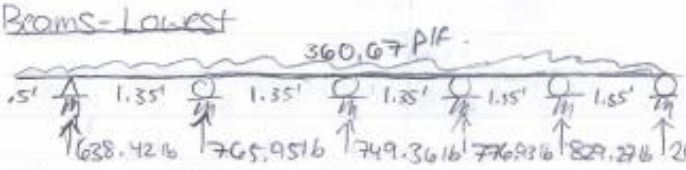
* For reaction derivation please see R-RB1

Max V = 541.7 lb

Max M = 216.68 lbft

Choose Sathern Yellow Pine No 2. 2x8 or better.

Beams-Lowest



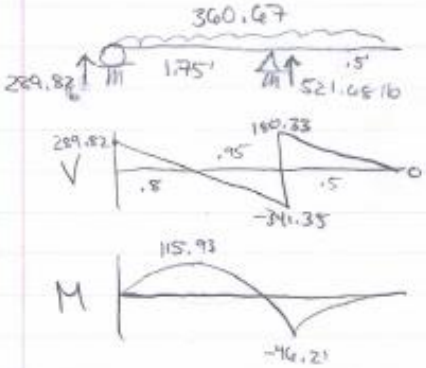
Max M = 88.04 lbft

Max V = 829.27 lb

Choose Southern Yellow Pine No. 2. 2x4

* For reaction, moment, and shear derivation please see R-RB-2

Beams-Middle



* For reaction derivation please see R-RB3

Max V = 341.35 lb

Max M = 115.93 lbft

R-RB1

Load	674.110	
Length Span 1	0.500	overhanged part
Length Span 2	1.750	backspan
Point Load at End	0	
Rxn 1	975.052	closer to overhang
Rxn 2	541.6955357	behind backspan
Applied Force	1516.748	
Rxn Sum	1516.748	

Tables 3.21 DECK SPAN

R-RB2

1/Length Span 1 (ft)	2.000
1/Length Span 2 (ft)	0.741
1/Length Span 3 (ft)	0.741
1/Length Span 4 (ft)	0.741
1/Length Span 5 (ft)	0.741
1/Length Span 6 (ft)	0.741
Applied Load Span 1 (plf)	360.67
Applied Load Span 2 (plf)	360.67
Applied Load Span 3 (plf)	360.67
Applied Load Span 4 (plf)	360.67
Applied Load Span 5 (plf)	360.67
Applied Load Span 6 (plf)	360.67
Length Span 1 (ft)	0.5
Length Span 2 (ft)	1.35
Length Span 3 (ft)	1.35
Length Span 4 (ft)	1.35
Length Span 5 (ft)	1.35
Length Span 6 (ft)	1.35
Point Load @ 1 (lb)	0
Span 1 Left	0
Span 1 Right	180.335
Span 2 Left	234.477
Span 2 Right	252.428
Span 3 Left	245.249
Span 3 Right	241.655
Span 4 Left	245.240
Span 4 Right	241.665
Span 5 Left	263.143
Span 5 Right	223.762
Span 6 Left	315.056
Span 6 Right	171.848741
Support 1 Rxn (lb)	414.812
Support 2 Rxn (lb)	497.677
Support 3 Rxn (lb)	486.895
Support 4 Rxn (lb)	504.807
Support 5 Rxn (lb)	538.818
Support 6 Rxn (lb)	171.849
Total Applied Load (lb)	2614.858
Total Rxn Load (lb)	2614.858
Max M (ftlb)	57.201
Max V (lb)	538.818

0	0	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.00
0	45.084	-54.777	54.777	-54.777	54.777	-54.777	54.777	-54.777	54.777	-54.777	54.777
0	0	9.693	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-54.777
0	0	0.000	4.847	0.000	0.000	0.000	0.000	0.000	0.000	-27.388	0
0	0	0.000	-2.423	-2.423	0.000	0.000	0.000	0.000	-13.694	-13.694	0
0	0	-1.212	0.000	0.000	-1.212	0.000	0.000	-6.847	0.000	0.000	0
0	0	1.212	0.000	0.000	0.606	0.606	-3.424	-3.424	0.000	0.000	0
0	0	0.000	0.606	0.303	0.000	-1.712	0.303	0.000	-1.712	0.000	0
0	0	0.000	-0.454	-0.454	0.856	0.856	0.151	0.151	-0.856	-0.856	0
0	0	-0.227	0.000	0.428	-0.227	0.076	0.428	-0.428	0.076	0.000	0
0	0	0.227	-0.214	-0.214	0.076	0.076	0.000	0.000	0.038	0.038	0
0	0	-0.107	0.114	0.038	-0.107	0.000	0.038	0.019	0.000	0.000	0
0	0	0.107	-0.076	-0.076	0.053	0.053	0.028	0.028	0.000	0.000	0
0	0	-0.038	0.053	0.027	-0.038	0.014	0.027	0.000	0.014	0.000	0
0	0	0.038	-0.040	-0.040	0.012	0.012	0.013	0.013	0.007	0.007	0
0	0	-0.020	0.019	0.006	-0.020	0.007	0.006	0.004	0.007	0.000	0
0	0	0.020	-0.012	-0.012	0.007	0.007	0.005	0.005	0.003	0.003	0
0	0	-0.006	0.010	0.003	-0.006	0.002	0.003	0.002	0.002	0.000	0
0	0	0.006	-0.007	-0.007	0.002	0.002	0.003	0.003	0.001	0.001	0
0	0	-0.003	0.003	0.001	-0.003	0.001	0.001	0.001	0.001	0.000	0
0	0	0.003	-0.002	-0.002	0.001	0.001	0.001	0.001	0.001	0.001	0
0	0	-0.001	0.002	0.001	-0.001	0.000	0.001	0.000	0.000	0.000	0
0	0	0.001	-0.001	-0.001	0.000	0.000	0.000	0.000	0.000	0.000	0
0	0	-0.001	0.001	0.000	-0.001	0.000	0.000	0.000	0.000	0.000	0
0	0	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0
0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0
0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0
0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0
0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0
0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0
0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0
0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0
0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0
0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0
0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0
0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0
0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0
0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0
0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0
0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0
0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0
0	45.084	-45.084	57.201	-57.201	54.775	-54.775	52.362	-65.248	38.666	-96.665	0.000

Tables 3.22 DECK SPAN

R-RB3

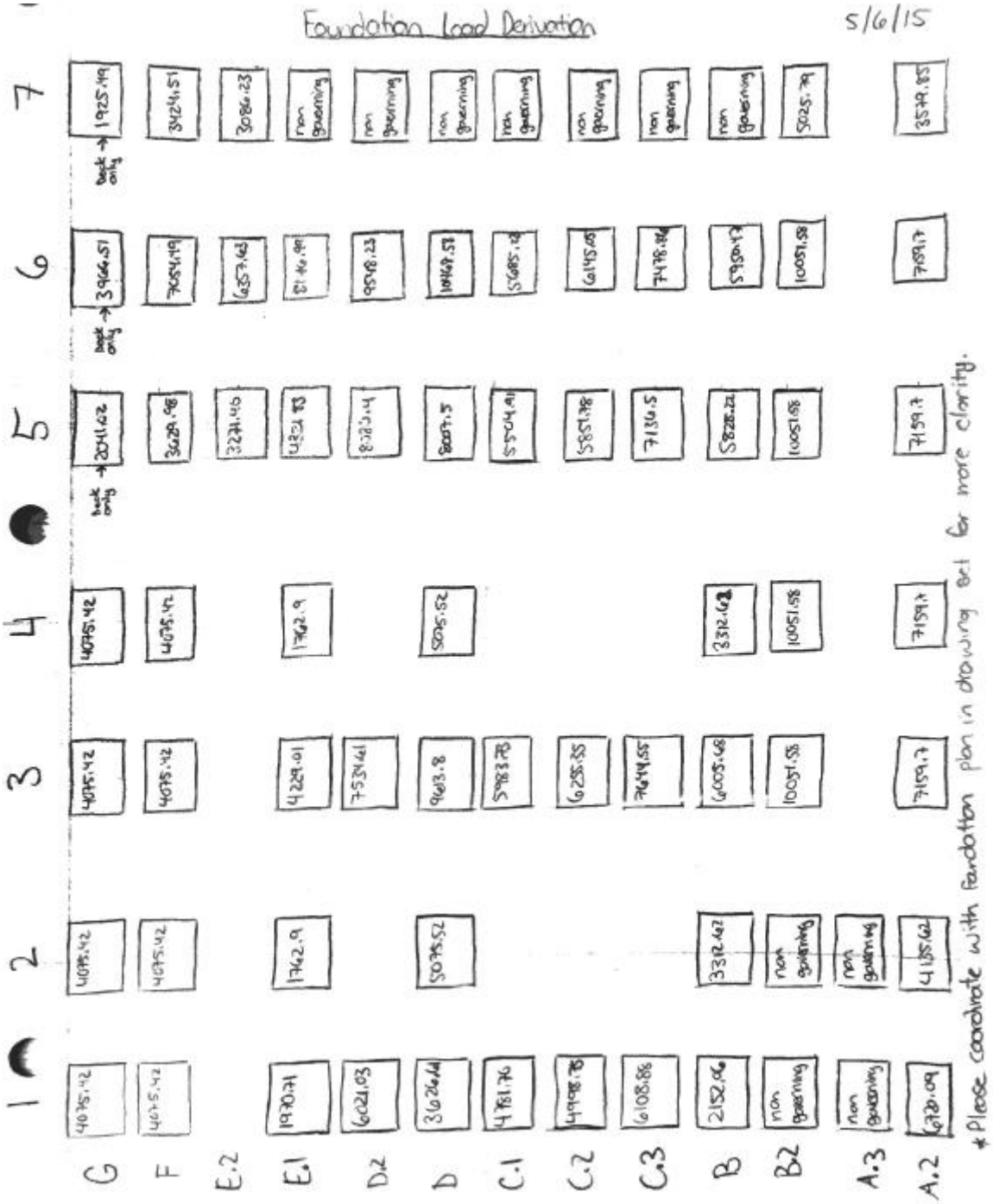
Load	360.670	
Length Span 1	0.500	overhanged part
Length Span 2	1.750	backspan
Point Load at End	0	
Rxn 1	521.683	closer to overhang
Rxn 2	289.8241071	behind backspan
Applied Force	811.508	
Rxn Sum	811.508	

Tables 3.23 DECK SPAN

STRUCTURAL CALCULATIONS

FOUNDATION DESIGN

LOAD DERIVATION

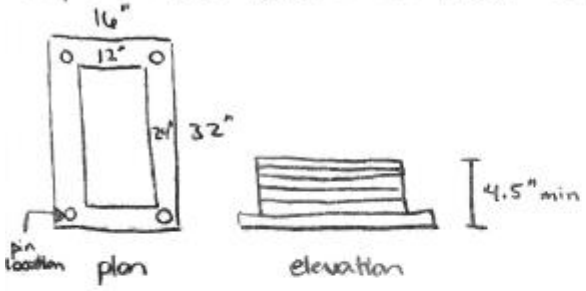


For grid lines f and g only deck loads are shown. See louver calculations for more detailed foundation and load derivation for these locations.

HOUSE & DECK

Fandation Design → House 5/6/15

Highest load fandation in hase = 10468.58 lb → plywood pier



Using 45° rule this gives us 3.5+4.5 ⇒ 8"+1.5" → 9.5" & 24+1.5 = 25.5"

$9.5(25.5) = 242.25\,in^2 \rightarrow 1.68\,ft^2$

Use unfactored load for fandation design (LRFD factors not required)

$\frac{10468.58}{1.4} = 7477.56\,lb$

Bearing Pressure = $\frac{7477.56}{1.68} = 4444.86\,psf$ < 6000psf as per DOE ✓

* This pier is satisfactory for all fandation points in the hase and deck except for north planter locations, however will only be used for the hase fandation & a few locations in the deck that require a fandation with a larger surface area.
* Layers of plywood may be fastened above this base pier for leveling purposes. They may be as small as 3.5" x 15", however larger pieces are preferred for ease of construction and more tolerance on load transfer.

Fandation Design → Deck 5/6/15

Highest Load fandation in deck (excluding planter & ramp) = 10051.58 lb

Use CP Seismic Pier Fandation System (11")
- max allowable load = 106606.67 lb ✓
- use 4 anchor piers in each north & sath partions of the deck for sliding, overturning, & wind resistance

* Hase fandations acceptable if necessary for larger connection surface

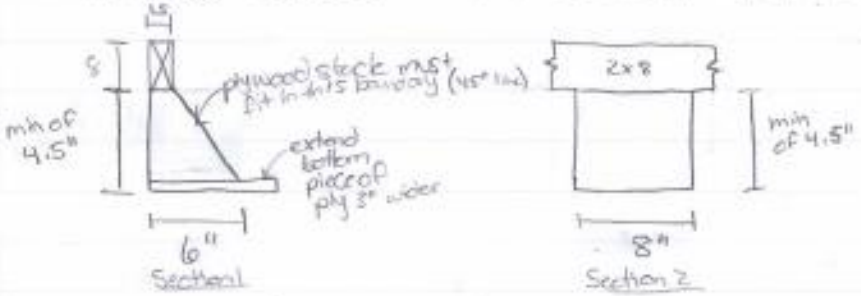
RAMP

2x8 portions of ramp

Max Load = 1896.55lb

Max Allowable bearing pressure = 6000psf

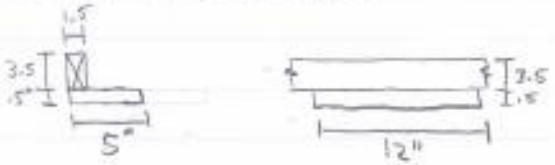
1896.55 = 6000x x → 45.52 in² required area



2x4 portions of ramp - edge condition

Max Load = 970.43lb

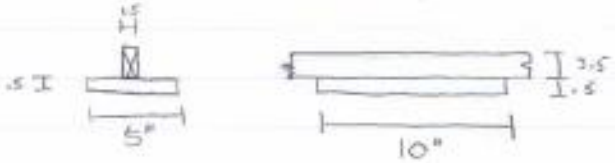
23.29 in² required area



2x4 portions of ramp - middle condition

Max Load = 1157.95lb

27.79 in² required area



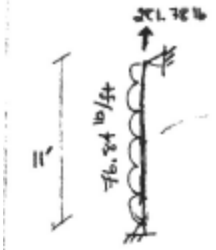
STRUCTURAL CALCULATIONS

HSS STEEL LEGEND

STEEL LOAD CASES

- Southern Louver Column - Type A & Type B

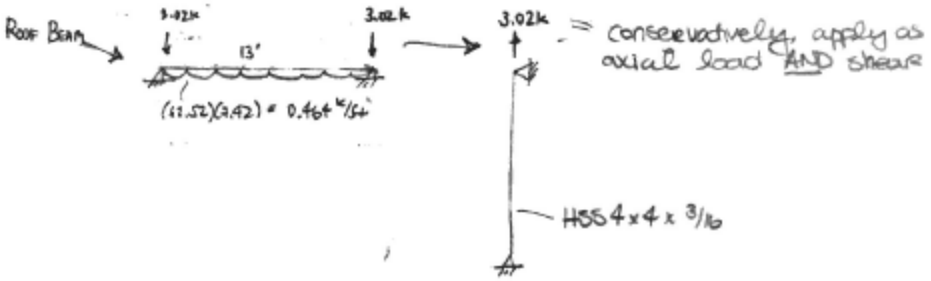
HSS4x4 HSS4x2



$V = \left(\frac{wL}{2}\right) = \left(\frac{(0.07684)(11)}{2}\right) = 0.423\ k$

$M = \left(\frac{wL^2}{8}\right) = \left(\frac{(0.07684)(11)^2}{8}\right) = 1.162\ k\text{-}ft$

- Southern Column

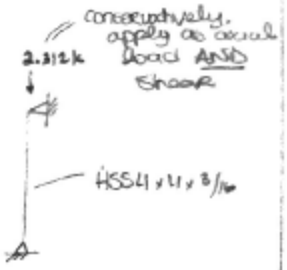


$(11.52)(3.42) = 0.464\ k/ft$

- East Column - Type A

Weight from Roof Beam:

$\frac{(64.2\ lb/ft^2)\left(\frac{7.52}{2}ft + \frac{6.32}{2}ft\right)(10ft)}{2 \cdot 1000\ lb/k} = 2.312\ k$

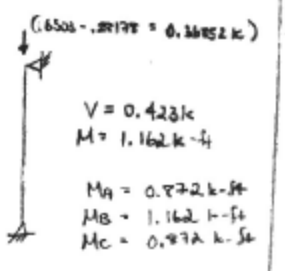


East Column - Type B HSS4x4

Max Dead Weight = 650.3 lbs
(from Christine's calculations)

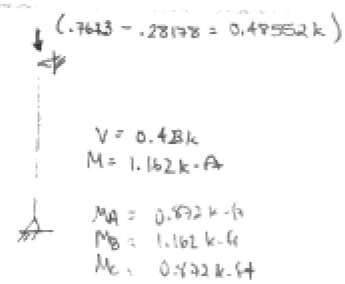
+

Same Wind (Louver) detail as southern louver columns



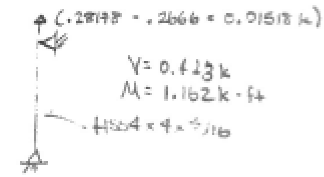
- East Column - Type C
  - HSS4x2

  Max Dead Weight = 767.3 lbs
  (From Christina's calculation)
  +
  Same Wind (Louver) detail as southern louver columns

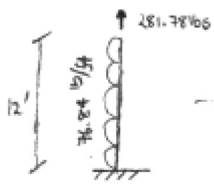


- East Column - Type D
  - Southeast Column of House (HSS4x4x5/16)
  - * Bending about Y-axis! *

  Max Dead Weight = 266.6 lbs
  (From Christine's Calculator)
  +
  Same Wind (Louver) detail as southern louver columns



- Cantilever Column - Type A & Type B
  - HSS4x4 | HSS4x2



$V = (76.84\ lb/ft)(12ft)\left(\frac{1k}{1000lb}\right) = 0.922\ k$

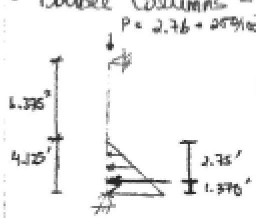
$M = \left(\frac{(76.84\ lb/ft)(12ft)^2}{2(1000\ lb/k)}\right) = 5.53\ k\text{-}ft$

- Double Columns - Worst Case

  P = 2.76 + 251/1000 + 0.5k = 3.51 k = Pu = Pr   (0.5k = Snow, 0.25k = Structure Weight)

  $L_x = L_y = 10\frac{1}{2}'$

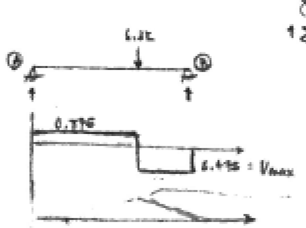
  For pinned - pinned column; $K_x = K_y = 1.0$ (braced).



$P = 1.6\left[62.4(4.125)(7.42)\right]\left(\frac{1}{2}\right)(4.125)\left(\frac{1}{1000}\right) = 6.3k$

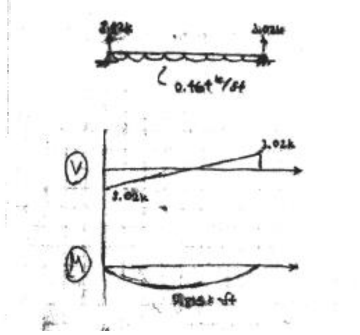
$\circlearrowleft + M_A = 6.3(9.125) - R_B(10.5) \rightarrow R_B = 5.475\ k$

$\uparrow \Sigma F_y = R_A - 6.3 + 5.475 \rightarrow R_A = 0.875$



$M_A = 2.17\ k\text{-}ft$
$M_B = 4.33\ k\text{-}ft$
$M_C = 6.5\ k\text{-}ft$

- Roof Beam



STRUCTURAL CALCULATIONS

HSS COLUMN DESIGN

COLUMN DESIGN OF HSS MEMBERS

COLUMNS ALONG GRID 2 ARE THE GOVERNING CASE

APPLIED AXIAL LOAD PER ½ OF BEAM = 2.21 K (SEE BEAM ANALYSIS)
APPLIED MOMENT (STRONG AXIS) = .368 KFT (DUE TO CONNECTION)
LENGTH OF COLUMN = 10.5 FT

CHECK HSS 2 ½" X 2" X ⅛"

- **DESIGN OF MEMBERS FOR COMPRESSION (AISC CHAPTER E)**
  - EFFECTIVE LENGTH CHECK *(SECTION E2)*
    - $\frac{KL}{r_y} = 160.51 < 200$
  - SLENDERNESS *(TABLE B4.1A – CASE 6)*
    - If $\frac{b}{t} \leq 1.40\sqrt{\frac{E}{F_y}}$, THE SECTION IS NONSLENDER.
      - OUR SECTION IS NONSLENDER
  - FLEXURAL BUCKLING *(SECTION E3)*
    - $F_e = \frac{\pi^2 E}{\left(\frac{KL}{r}\right)^2} = 11.11$
    - If $\frac{KL}{r} \geq 4.71\sqrt{\frac{E}{F_y}} \rightarrow F_{cr} = 0.877F_e = 9.74$
  - NOMINAL STRENGTH *(EQUATION E3-1)*
    - $\varphi P_n = 0.9 * A_g * F_{cr} = 8.38$

- **Design of Members for Flexure (AISC Chapter F)**
  - YIELDING *(SECTION F7.1)*
    - $M_n = M_p = F_y Z = 3.10$ KFT
  - FLANGE LOCAL BUCKLING *(TABLE B4.1B – CASE 17; SECTION F7.2)*
    - If $\frac{b}{t} < 1.12\sqrt{\frac{E}{F_y}}$, the section is compact.
    - FOR COMPACT SECTIONS, THE LIMIT STATE OF FLANGE LOCAL BUCKLING DOES NOT APPLY. OUR SECTION IS COMPACT
  - Web Local Buckling *(Table B4.1b – Case 20; Section F7.3)*
    - If $\frac{h}{t} < 2.42\sqrt{\frac{E}{F_y}}$, the section is compact.
    - FOR COMPACT SECTIONS, THE LIMIT STATE OF FLANGE LOCAL BUCKLING DOES NOT APPLY. OUR SECTION S COMPACT.
  - NOMINAL MOMENT
    - $\varphi M_n = 0.9 * \min(\text{Yielding } M_n; \text{FLB } M_n; \text{WLB } M_n) = 2.79$

- **Design of Members for Shear (AISC Chapter G)**
  - ACCORDING TO SECTION G5, FOR HSS SECTIONS, $K_v = 5$.
  - ACCORDING TO SECTION G2.1B
    - If $\frac{h}{t_w} \leq 1.10\sqrt{\frac{k_v E}{F_y}} \rightarrow C_v = 1.0$

COLUMN DESIGN OF HSS MEMBERS

COLUMNS ATTACHED TO LOUVER

THERE'S AN UPLIFT FORCE ALONG THE SIDES OF THE COLUMN. TO BE CONSERVATIVE WE APPLIED THESE LOADS AS A TENSILE FORCE AND A SHEAR FORCE.

APPLIED AXIAL LOAD = 1.16 K

APPLIED SHEAR = 1.16 K

LENGTH OF COLUMN = 12.5 FT

CHECK HSS 2" X $1^1/_2$" X $^1/_8$"

- **DESIGN OF MEMBERS FOR TENSION (AISC CHAPTER D)**
  - SLENDERNESS LIMITATIONS *(SECTION D1)*
    - $\frac{L}{r_y} = 258.18 < 300$
    - SECTION IS ADEQUATE
  - TENSILE YIELDING *(SECTION D2.1A)*
    - $\varphi P_n = \varphi F_y A_g = 0.9 * 46 * .724 = 29.97K$
  - TENSILE RUPTURE *(SECTION D2.1B)*
    - COLUMN WILL BE WELDED TO A BASE PLATE. THUS, USE TABLE D3.1 – CASE 3.
      - U=1
      - A_N = AREA OF DIRECTLY CONNECTED ELEMENTS = A_G
    - $\varphi P_n = \varphi F_u A_e = \varphi F_u U A_n = \varphi F_u U A_g = 0.75 * 58 * 1 * .724 = 31.49K$
  - NOMINAL STRENGTH
    - $\varphi P_n = \min(\text{yielding strength, rupture strength}) = 29.97K$
- **Design of Members for Flexure (AISC Chapter F)**
  - YIELDING *(SECTION F7.1)*
    - $M_n = M_p = F_y Z = 1.82$ KFT
  - FLANGE LOCAL BUCKLING *(TABLE B4.1B – CASE 17; SECTION F7.2)*
    - If $\frac{b}{t} < 1.12\sqrt{\frac{E}{F_y}}$, the section is compact.
    - FOR COMPACT SECTIONS, THE LIMIT STATE OF FLANGE LOCAL BUCKLING DOES NOT APPLY. OUR SECTION IS COMPACT
  - WEB LOCAL BUCKLING *(TABLE B4.1B – CASE 20; SECTION F7.3)*
    - If $\frac{h}{t} < 2.42\sqrt{\frac{E}{F_y}}$, the section is compact.
    - FOR COMPACT SECTIONS, THE LIMIT STATE OF FLANGE LOCAL BUCKLING DOES NOT APPLY. OUR SECTION S COMPACT.
  - NOMINAL MOMENT
    - $\varphi M_n = 0.9 * \min(\text{Yielding } M_n; \text{FLB } M_n; \text{WLB } M_n) = 1.64$KFT
- **Design of Members for Shear (AISC Chapter G)**
  - ACCORDING TO SECTION G5, FOR HSS SECTIONS, $K_v = 5$.
  - ACCORDING TO SECTION G2.1B
    - If $\frac{h}{t_w} \leq 1.10\sqrt{\frac{k_v E}{F_y}} \rightarrow C_v = 1.0$

- If $1.10\sqrt{\frac{k_v E}{F_y}} < \frac{h}{t_w} \leq 1.37\sqrt{\frac{k_v E}{F_y}} \rightarrow C_v = \frac{1.1\sqrt{\frac{k_v E}{F_y}}}{\frac{h}{t_w}}$
- If $\frac{h}{t_w} > 1.37\sqrt{\frac{k_v E}{F_y}} \rightarrow C_v = \frac{1.57 k_v E}{\left(\frac{h}{t_w}\right)^2 F_y}$
- IN OUR CASE Cv = 1

- $h_{shear} = h - 2 * (t_{nom} + 3 * t_{nom}) = 1.5$
- $A_w = 2 * h_{shear} * t_{des} = 0.35$
- SHEAR
  - $\varphi V_n = 0.9 * 0.6 * F_y * A_w * C_v = 8.64$ K

- **Design of Members for Combined Forces and Torsion (AISC Chapter H)**
  - FOR AN HSS SECTION, EQUATION H3-6 FROM SECTION H3.2 APPLIES.
  - TORSION EFFECTS ARE NEGLIGIBLE.
    - $\left(\frac{P_r}{P_c} + \frac{M_r}{M_c}\right) + \left(\frac{V_r}{V_c} + \frac{T_r}{T_c}\right)^2 = \left(\frac{2.21}{8.38} + \frac{0.368}{2.79}\right) + \left(\frac{0}{8.64} + 0\right) = 0.4 \leq 1$
    - SECTION IS ADEQUATE FOR COMBINED FORCES.

Example from above analysis is purely for example purposes-it is not for any beam in the house. Process is the same for sure house design.

COLUMN UPLIFT

Input Values						Steel Member	General Steel Properties			
Column Name	Max Axial Load (kips)	Max Shear (kips)	Mz (k-ft)	My (k-ft)	L (ft)	AISC Section	E (ksi)	Fy (ksi)	Fu (ksi)	G (ksi)
Southern Louver Column - Type A	0.28178	0.423	0	1.162	11.00	HSS4X2X1/8	29000	46	58	11200
Southern Louver Column - Type B	0.28178	0.423	0	1.162	11.00	HSS4X4X3/16	29000	46	58	11200
Southern Column	3.02	3.02	0	0	11.27	HSS4X4X3/16	29000	46	58	11200
East Column - Type D	0.01518	0.423	0	1.162	11.00	HSS4X2X5/16	29000	46	58	11200
Cantilever Column - Type A	0.28178	0.922	0	5.53	12.00	HSS4X4X3/16	29000	46	58	11200
Cantilever Column - Type B	0.28178	0.922	0	5.53	12.00	HSS4X2X3/16	29000	46	58	11200

Member Properties																
Column Name	K	b/t	Cw	J	Ix	Iy	Ag (in2)	Zx (in3)	Zy (in3)	Sx (in3)	Sy (in3)	h/t	des (in)	tnom (in)	h (in)	ry (in)
Southern Louver Column - Type A	1	14.2	1.69	2.2	2.65	0.898	1.3	1.66	1.02	1.32	0.898	31.5	0.116	0.125	4	0.83
Southern Louver Column - Type B	1	20	5.07	10	6.21	6.21	2.58	3.67	3.67	3.1	3.1	20	0.174	0.1875	4	1.55
Southern Column	1	20	5.07	10	6.21	6.21	2.58	3.67	3.67	3.1	3.1	20	0.174	0.1875	4	1.55
East Column - Type D	1	3.87	3.59	4.4	5.13	1.67	2.94	3.43	2.08	2.56	1.67	10.7	0.291	0.3125	4	0.754
Cantilever Column - Type A	2.1	20	5.07	10	6.21	6.21	2.58	3.67	3.67	3.1	3.1	20	0.174	0.1875	4	1.55
Cantilever Column - Type B	2.1	8.49	2.41	3.08	3.66	1.22	1.89	2.34	1.43	1.83	1.22	20	0.174	0.1875	4	0.804

DESIGN OF MEMBERS FOR TENSION (AISC Chapter D)								
Column Name	L/r	AISC E2 Check	Nominal Yielding Tensile Strength	U	An	Ae	Nominal Rupture Tensile Strength	Tensile Strength (kips)
Southern Louver Column - Type A	159.04	OK	53.82	1	1.30	1.30	56.55	53.82
Southern Louver Column - Type B	85.16	OK	106.81	1	2.58	2.58	112.23	106.81
Southern Column	87.25	OK	106.81	1	2.58	2.58	112.23	106.81
East Column - Type D	175.07	OK	121.72	1	2.94	2.94	127.89	121.72
Cantilever Column - Type A	92.90	OK	106.81	1	2.58	2.58	112.23	106.81
Cantilever Column - Type B	179.10	OK	78.25	1	1.89	1.89	82.22	78.25

DESIGN OF MEMBERS FOR FLEXURE (AISC Chapter F)										
Column Name	Yielding Mn (k-ft)	Flange λp	Flange λr	Flange Property	Flange Local Buckling Mn (kft)	Web λp	Web λr	Web Property	Web Local Buckling Mn (kft)	ϕMn
Southern Louver Column - Type A	6.36	28.12	35.15	Compact	N/A	60.76	143.12	Compact	N/A	5.73
Southern Louver Column - Type B	14.07	28.12	35.15	Compact	N/A	60.76	143.12	Compact	N/A	12.66
Southern Column	14.07	28.12	35.15	Compact	N/A	60.76	143.12	Compact	N/A	12.66
East Column - Type D	7.97	28.12	35.15	Compact	N/A	60.76	143.12	Compact	N/A	7.18
Cantilever Column - Type A	14.07	28.12	35.15	Compact	N/A	60.76	143.12	Compact	N/A	12.66
Cantilever Column - Type B	8.97	28.12	35.15	Compact	N/A	60.76	143.12	Compact	N/A	8.07

Table 3.24 COLUMN UPLIFT

COLUMN COMPRESSION

Input Values						Steel Member	General Steel Properties			
Column Name	Max Axial Load (kips)	Max Shear (kips)	Mz (k-ft)	My (k-ft)	L (ft)	AISC Section	E (ksi)	Fy (ksi)	Fu (ksi)	G (ksi)
East Column - Type A	2.312	2.312	0	0	11.00	HSS4X4X3/16	29000	46	58	11200
East Column - Type B	0.36852	0.423	0	1.162	11.00	HSS4X4X3/16	29000	46	58	11200
East Column - Type C	0.48552	0.423	0	1.162	11.00	HSS4X2X1/8	29000	46	58	11200
Double Column - Worst Case	3.51	5.475	0	7.53	10.50	HSS4X2X5/16	29000	46	58	11200

Member Properties														
Column Name	K	b/t	Cw	J	Ix	Iy	Ag	Zx	Sx	h/t	tdes	tnom	h	ry
East Column - Type A	1	20	5.07	10	6.21	6.21	2.58	3.67	3.1	20	0.174	0.1875	4	1.55
East Column - Type B	1	20	5.07	10	6.21	6.21	2.58	3.67	3.1	20	0.174	0.1875	4	1.55
East Column - Type C	1	14.2	1.69	2.2	2.65	0.898	1.3	1.66	1.32	31.5	0.116	0.125	4	0.83
Double Column - Worst Case	1	3.87	3.59	4.4	5.13	1.67	2.94	3.43	2.56	10.7	0.291	0.3125	4	0.754

DESIGN OF MEMBERS FOR COMPRESSION (AISC Chapter E)							
Column Name	KL/r	AISC E2 Check	λr	Slenderness	FB Fe	FB, Fcr	ϕPn
East Column - Type A	85.16	OK	35.15	Nonslender	39.47	28.24	65.58
East Column - Type B	85.16	OK	35.15	Nonslender	39.47	28.24	65.58
East Column - Type C	159.04	OK	35.15	Nonslender	11.32	9.92	11.61
Double Column - Worst Case	167.11	OK	35.15	Nonslender	10.25	8.99	23.78

DESIGN OF MEMBERS FOR FLEXURE (AISC Chapter F)										
Column Name	Yielding Mn (k-ft)	Flange λp	Flange λr	Flange Property	Flange Local Buckling Mn (kft)	Web λp	Web λr	Web Property	Web Local Buckling Mn (kft)	ϕMn
East Column - Type A	14.07	28.12	35.15	Compact	N/A	60.76	143.12	Compact	N/A	12.66
East Column - Type B	14.07	28.12	35.15	Compact	N/A	60.76	143.12	Compact	N/A	12.66
East Column - Type C	6.36	28.12	35.15	Compact	N/A	60.76	143.12	Compact	N/A	5.73
Double Column - Worst Case	13.15	28.12	35.15	Compact	N/A	60.76	143.12	Compact	N/A	11.83

DESIGN OF MEMBERS FOR SHEAR (AISC Chapter G)					
Column Name	Cv	t (in)	shear h (in)	Aw (in2)	ϕVn (kips)
East Column - Type A	1.00	0.17	2.50	0.87	21.61
East Column - Type B	1.00	0.17	2.50	0.87	21.61
East Column - Type C	1.00	0.12	3.00	0.70	17.29
Double Column - Worst Case	1.00	0.29	1.50	0.87	21.69

INTERACTION CHECK -- AISC H3.2		
Column Name	Interaction Equation	Combined Forces < 1?
East Column - Type A	0.05	OK

East Column Type B Interaction Check -- AISC H1.3			
Pr	0.36852	kips	= from hand calc
Pcy	65.58	kips	= from Cell I20
Mrx = Mmax	1.162	k-ft	= from hand calc
Mcx	12.66	k-ft	= from Cell L27
Ma	0.872	k-ft	= from hand calc
Mb	1.162	k-ft	= from hand calc
Mc	0.872	k-ft	= from hand calc
Cb	1.136		= AISC Eq C-F1-2
Interaction Eq	0.015		= AISC Eq H1-2
Combined Forces <1?	OK		

Table 3.25 COLUMN COMPRESSION

East Column Type C Interaction Check -- AISC H1.3			
Pr	0.48552	kips	= from hand calc
Pcy	11.61	kips	= from Cell I21
Mrx = Mmax	1.162	k-ft	= from hand calc
Mcx	5.73	k-ft	= from Cell L28
Ma	0.872	k-ft	= from hand calc
Mb	1.162	k-ft	= from hand calc
Mc	0.872	k-ft	= from hand calc
Cb	1.136		= AISC Eq C-F1-2
Interaction Eq	0.094		= AISC Eq H1-2
Combined Forces <1?	OK		

East Column Type C Interaction Check -- AISC H1.3			
Pr	3.51	kips	= from hand calc
Pcy	23.78	kips	= from Cell I22
Mrx = Mmax	7.53	k-ft	= from hand calc
Mcx	11.83	k-ft	= from Cell L29
Ma	2.17	k-ft	= from hand calc
Mb	4.33	k-ft	= from hand calc
Mc	6.5	k-ft	= from hand calc
Cb	1.514		= AISC Eq C-F1-2
Interaction Eq	0.387		= AISC Eq H1-2
Combined Forces <1?	OK		

COLUMN DESIGN CHECKS							
Column Name	AISC Section	Axial	Axial Utilization (%)	Shear	Shear Utilization (%)	Moment	Flexural Moment Utilization (%)
East Column - Type A	HSS4X4X3/16	OK	3.53%	OK	10.70%	OK	0.00%
East Column - Type B	HSS4X4X3/16	OK	0.56%	OK	1.96%	OK	9.18%
East Column - Type C	HSS4X2X1/8	OK	4.18%	OK	2.45%	OK	20.29%
Double Column - Worst Case	HSS4X2X5/16	OK	14.76%	OK	25.25%	OK	63.63%

Table 3.25 COLUMN CHECK

STRUCTURAL CALCULATIONS

HSS BEAM DESIGN

BEAM DESIGN OF HSS MEMBERS

BEAM ALONG 4 BEWTEEN F AND G ARE GOVERNING.

MOMENT APPLIED = 6.4 KFT

SHEAR APPLIED = .71 K

UNSUPPORTED LENGTH = 6FT

CHOOSE HSS 5 X 5 X $^1/_2$"

- **DESIGN OF MEMBERS FOR FLEXURE (AISC CHAPTER F)**
  - YIELDING *(SECTION F7.1)*
    - $M_n = M_p = F_yZ = 50.217$ k-ft
  - FLANGE LOCAL BUCKLING *(TABLE B4.1B – CASE 17; SECTION F7.2)*
    - If $\frac{b}{t} < 1.12\sqrt{\frac{E}{F_y}}$, the section is compact.
    - FOR COMPACT SECTIONS, THE LIMIT STATE OF FLANGE LOCAL BUCKLING DOES NOT APPLY. OUR SECTION IS COMPACT.
  - WEB LOCAL BUCKLING *(TABLE B4.1B – CASE 20; SECTION F7.3)*
    - If $\frac{h}{t} < 2.42\sqrt{\frac{E}{F_y}}$, the section is compact.
    - FOR COMPACT SECTIONS, THE LIMIT STATE OF FLANGE LOCAL BUCKLING DOES NOT APPLY. OUR SECTION IS COMPACT.
  - NOMINAL MOMENT
    - $\varphi M_n = 0.9 * \min(\text{Yielding } M_n; \text{FLB } M_n; \text{WLB } M_n) = 45.195$ k-ft
- **DESIGN OF MEMBERS FOR SHEAR (AISC CHAPTER G)**
  - ACCORDING TO SECTION G5, FOR HSS SECTIONS, $K_V = 5$.
  - ACCORDING TO SECTION G2.1B
    - If $\frac{h}{t_w} \leq 1.10\sqrt{\frac{k_vE}{F_y}} \rightarrow C_v = 1.0$
    - If $1.10\sqrt{\frac{k_vE}{F_y}} < \frac{h}{t_w} \leq 1.37\sqrt{\frac{k_vE}{F_y}} \rightarrow C_v = \frac{1.1\sqrt{\frac{k_vE}{F_y}}}{\frac{h}{t_w}}$
    - If $\frac{h}{t_w} > 1.37\sqrt{\frac{k_vE}{F_y}} \rightarrow C_v = \frac{1.57k_vE}{\left(\frac{h}{t_w}\right)^2 F_y}$
    - IN OUR CASE, $C_V = 1$
  - $h_{shear} = h - 2 * (t_{nom} + 3 * t_{nom}) = 1$
  - $A_w = 2 * h_{shear} * t_{des} = 0.93$
  - SHEAR
    - $\varphi V_n = 0.9 * 0.6 * F_y * A_w * C_v = 23.101$ kips
- **DEFLECTION CHECK**
  - $\Delta = \frac{5wL^4}{384EI} = 0.344 \leq \Delta_{max} = {}^L/_{120} = 0.6$
  - SECTION IS ADEQUATE FOR DEFLECTION

Example from above analysis is purely for example purposes-it is not for any beam in the house. Process is the same for sure house design.

	Input Values			Steel Member
Beam	Unsupported Length (ft)	Shear (k)	Moment (kft)	Section Choice
Roof Beam	13.000	3.020	9.815	HSS3X3X3/8

	General Steel Properties			Member Properties									
Beam	E (ksi)	Fy (ksi)	Fu (ksi)	b (in)	t_{des} (in)	Ix (in4)	Sx (in3)	Zx (in3)	kv	h/t	b/t	h	tnom
Roof Beam	29000	46	58	3	0.349	3.78	2.52	3.25	5	5.6	5.6	3	0.375

Structural Calcs													
Beam	Mp (k-ft)	λ_{flange}	$\lambda_{p,\ flange}$	$\lambda_{r,\ flange}$	λ_{web}	$\lambda_{p,\ web}$	$\lambda_{r,\ web}$	φMn Yielding (kft)	φMn FLB (kft)	φMn WLB (kft)	φMn Controlling (kft)	Cv	φV (k)
Roof Beam	12.458	5.600	28.121	35.152	5.600	60.762	143.118	11.213	N/A	N/A	11.213	1.000	13.004

Results						
Beam	Strength Check ($\varnothing Mv > Mv?$)	Flange State	Web State	Shear Check	Moment Utiliation (%)	Shear Utilization (%)
Roof Beam	Ok	Compact	Compact	Ok	88%	23%

Table 3.26 HSS BEAM CHECK

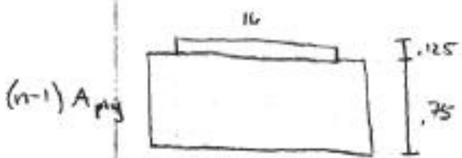
STRUCTURAL CALCULATIONS

FLOOD PROOF CHECK

Plywood 1.01×10^6 psi $n = \frac{E_{ply}}{E_{pls}} = 14$

Plastic 72150 psi (100% virgin PET 320 in-lb)

Try 3/4" ply 1/8" (.125) plastic → uncracked section



$(n-1)A_{ply} = 13(16)(.75) = 156$

$\bar{y} = \frac{16(.125)(.75+\frac{.125}{2}) + 156(\frac{.75}{2})}{156 + 16(.125)} = .38$ from the bottom

$C = h - \bar{y} = .825 - .38 = .444$

$I_{ut} = 156(.056)^2 + \frac{16(.125)^3}{12} + 16(.125)(.382)^2$

$I_{ut} = .784 \text{ in}^4$

3/4" t&g OSB

$M = \frac{f_{cmax}}{c}\left(b\int_{c-h}^{c} y^2\,dy + (n-1)A_{ply}(d-c)^2\right)$

$M = \frac{f_{cmax}}{c}\left(b\int_{-.381}^{.444} y^2\,dy + (n-1)A_{ply}(d-c)^2\right)$

$M = \frac{f_{cmax}}{.444}\left(16\left(\frac{1}{3}y^3\Big|_{-.381}^{.444}\right) + (13)(16(.75))(.5-.444)^2\right)$

$M = \frac{f_{cmax}}{.444}(.762 + .489)$

$M = 2.82 f_{cmax}$

$M = 520.25$ ft lb allowable

$f_{cmax} = \frac{E_{plas}\,\varepsilon_{plas}(A_{plas}) + f_{allow\,ply}(A_{ply})}{A_{plas} + A_{ply}}$

$f_{cmax} = \frac{72150(.05)(16)(.125) + 30392.66(16)(.75)}{16(.125) + 16(.75)}$

$f_{cmax} = 26566.21$ psi → 184.49 psf

We have...

250 psf 250 plf /ft $\frac{250(1.33)^2}{8} = 55.28$ lb ft /ft

∴ this sheathing is acceptable for floodproofing & hydrostatic load requirements

STRUCTURAL CALCULATIONS

STRUCTURAL ASSEMBLY

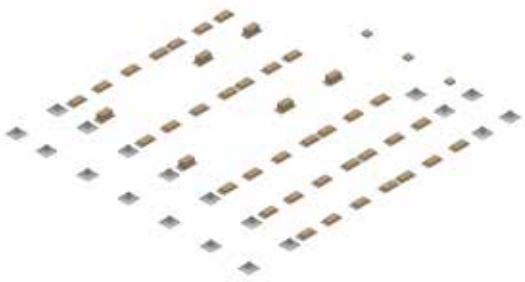


Fig. 3.3 FOUNDATION PIERS

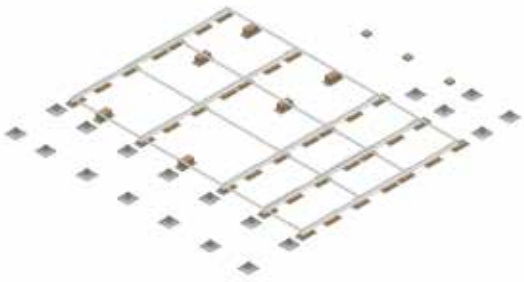


Fig. 3.4 FOUNDATION SECONDARY SUPPORTS

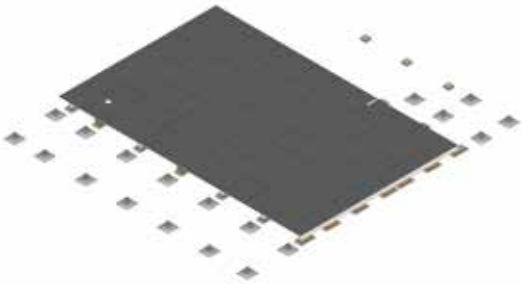


Fig. 3.5 ABS PLASTIC SHEATHING

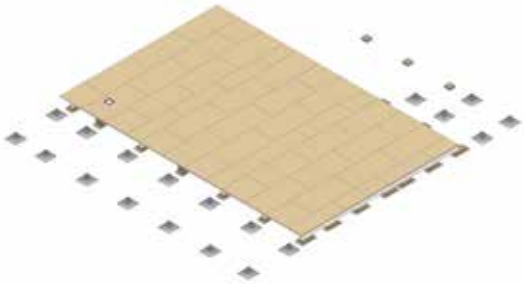


Fig. 3.6 EXT. FLOOR SHEATHING

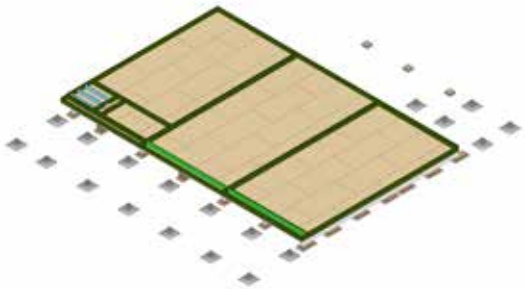


Fig. 3.7 LVL FLOOR BEAMS

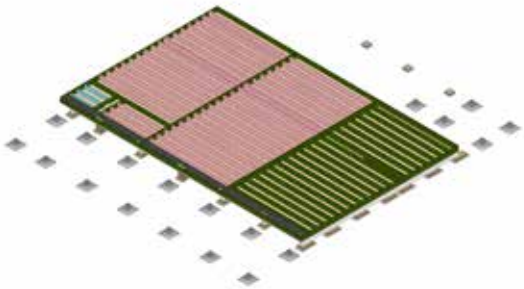


Fig. 3.8 TJI FLOOR BEAM

STRUCTURAL CALCULATIONS

STRUCTURAL ASSEMBLY

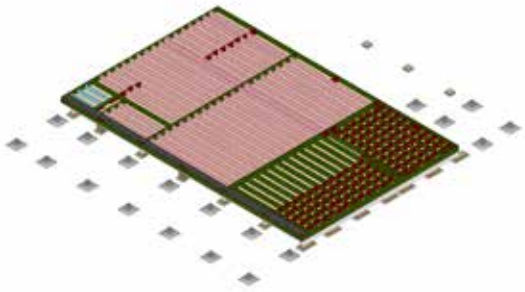


Fig. 3.9 ADDITIONAL BLOCKING

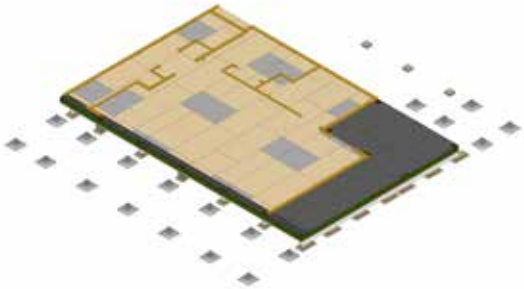


Fig. 3.10 SUBFLOOR SHEATHING

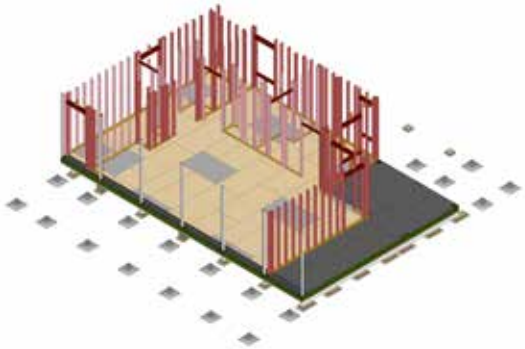


Fig. 3.11 WOOD WALL STUDS

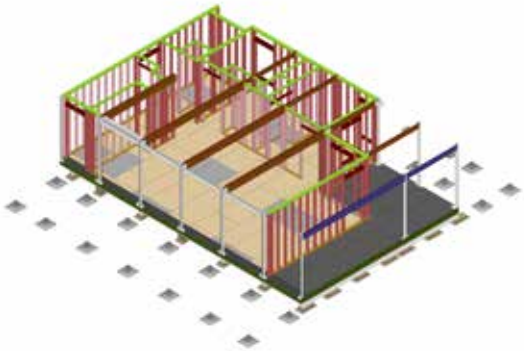


Fig. 3.12 WOOD TOP PLATES + LVL ROOF BEAMS

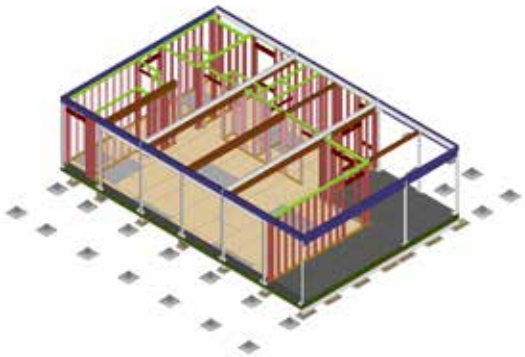


Fig. 3.13 ADDITIONAL PERIMETER BEAMS

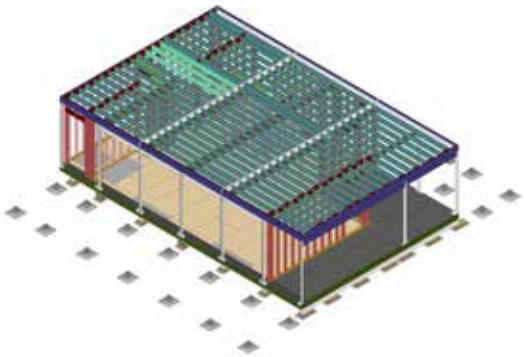


Fig. 3.14 ROOF TJI BEAMS

STRUCTURAL CALCULATIONS

STRUCTURAL ASSEMBLY

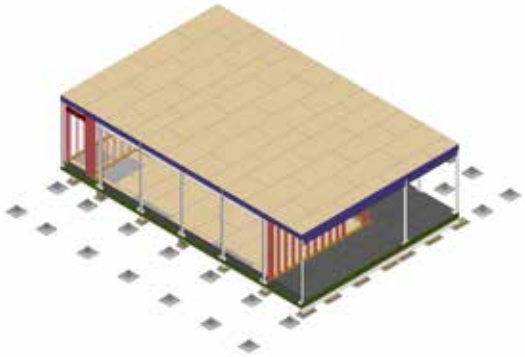


Fig. 3.15 ROOF SHEATHING

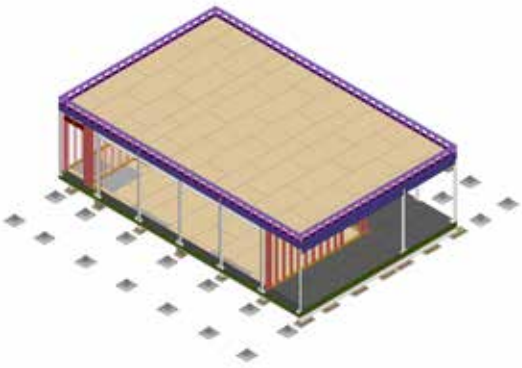


Fig. 3.16 PARAPET FRAMING

STRUCTURAL CALCULATIONS

COMPOSITE PANEL MANUFACTURING

Composite panels developed as the flood shutters, window plugs and north facade of the SURE HOUSE have been manufactured by the team under engineering supervision of Gurit and professional composite builders from the International Yacht Restoration School (IYRS).

The SURE HOUSE produced panels using a low energy process known as vacuum infusion. A current Stevens graduate student and team member is an alum of IYRS, certified in Vacuum Infusion processes through the American Composites Manufacturing Association (ACMA), and has been in the fiber composite construction industry for 2 years.

The procedure of vacuum infusion has been developed by the marine industry to maximize control of production, including fiber layup and orientation, resin content within each part as well as reducing emissions.

STRUCTURAL CALCULATIONS

COMPOSITE MANUFACTURING

MOULD PRODUCTION AND PART LAYUP:

Flat panel composite construction is a relatively straightforward process. A large, flat vacuum tight surface acts as the mould for the production of our panels. This can be as simple as a heated concrete floor or more complex such as CNC cut patterns to produce exterior finishes. Built off this surface will be a series of removable detail jigs to account for edge conditions specific to each panel where required. The jigs can be constructed from stock lumber sections, 2x4, 2x10, etc. **See Fig 3.17.**

After the mould is assembled, a finishing paint will be applied, known as gel coat, and outer layers of fiberglass reinforcement is placed on the surface followed by high strength engineered PVC foam core and finally by the inner fiberglass skin. **See Division 6 of the Construction Specifications and Cut Sheets** for further detail on material choices. The structural skins is laid in place, taking special care to align fibers into the correct orientation. Our composite structural engineering partner, Gurit, has assisted in specifying the correct core density, fiber orientation and material weight to maximize stiffness and strength while reducing waste and unnecessary components. **See Fig 3.18.**

STRUCTURAL CALCULATIONS

COMPOSITE MANUFACTURING

MOULD AND LAMINATE ASSEMBLY

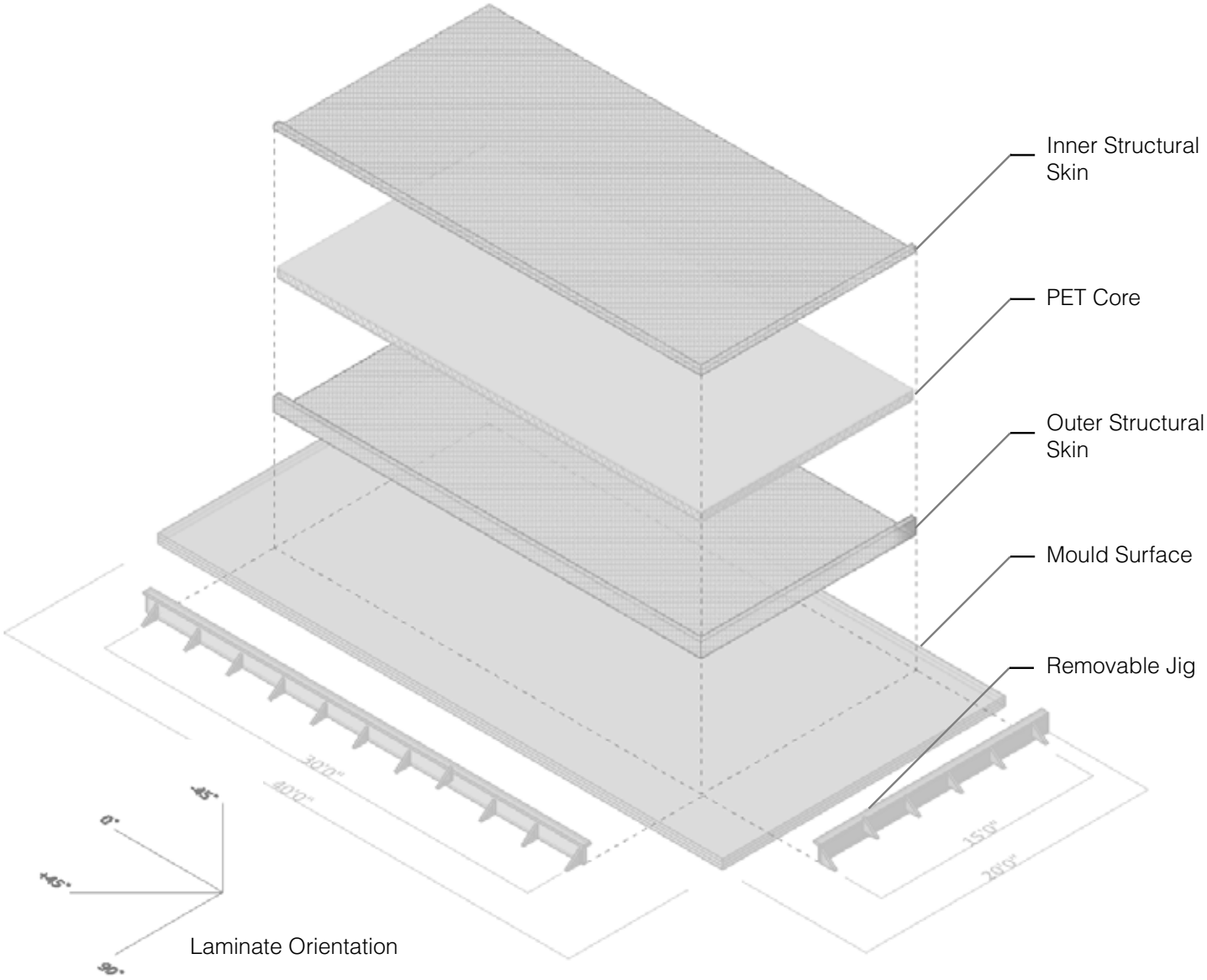
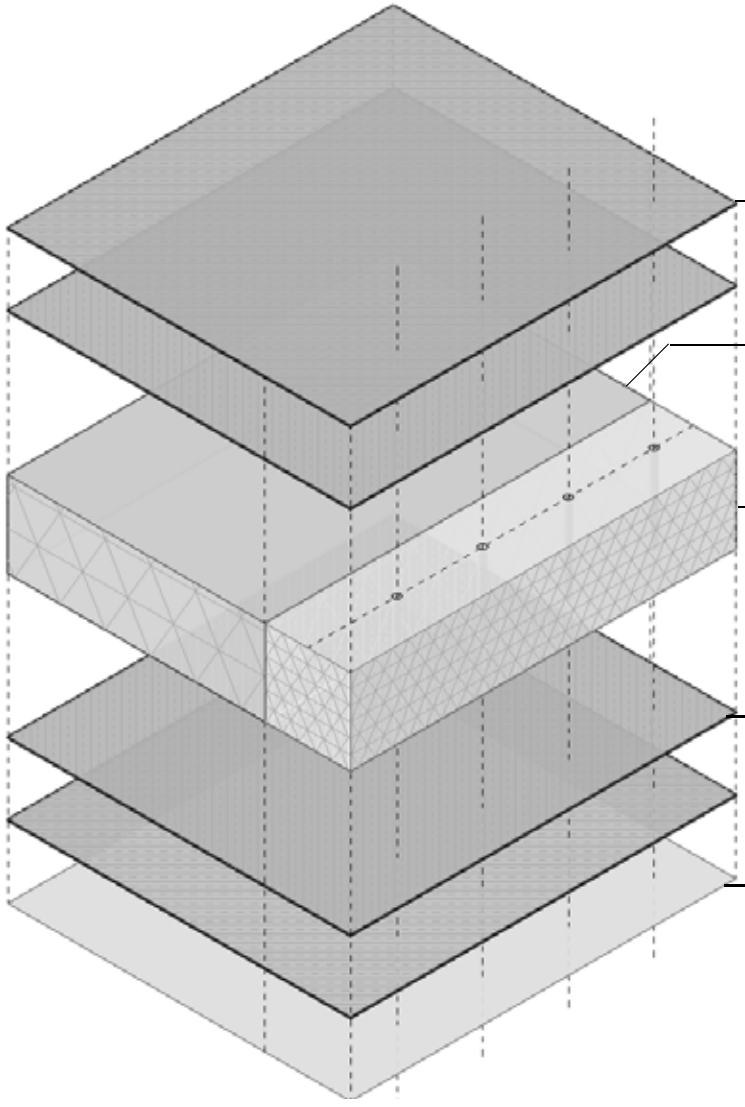


Fig 3.17

STRUCTURAL CALCULATIONS

COMPOSITE MANUFACTURING

Structural Core and FR Systems



Structural Fiberglass Skin:
Infused with fire retardant resin as per ASTM standards where rquired.

High R Value (low density) Core:
Standard in all systems. Vairies in thickness as required.

High Density (low R value) Core:
Spliced in before infusion to create a continuos core and skin for drilling and bolting. Eliminates the requirement for post process secondary bonding on panels.

Structural Fiberglass Skin:
Infused with fire retardant resin as per ASTM standards where rquired.

Intumescent Film:
Applied to the interior of panels to increse fire rating on wall system behind gypsum board.

Fig 3.18

STRUCTURAL CALCULATIONS

COMPOSITE MANUFACTURING

VACUUM INFUSION

A clean, temperature controlled shop was required for this process, the SURE HOUSE team had access to such a facility with the coorcination of IYRS, who had space available for prototype construction and testing in Bristol, RI.

The above noted structural materials have been placed into the mould dry, or without a resin system. This greatly diminished outgassing caused by the curing resin matrix and made for a safe working environment. Various processing materials were then be applied to the panel layup. These possibly included: peel ply, flow media, resin and vacuum lines, resin and vacuum ports, vacuum bags, sealing gaskets, etc. **See Fig 3.19**

Before resin infusion took place, a series of industry testing procedures have been performed on each part. These include vacuum strength and leak down tests measured by calibrated gauge. The aim was to eliminate all vacuum leaks before the resin matrix is introduced. Air intrusion into the laminate during and after the infusion process have the potential to fail the part structurally. A decision was made post production with thorough industry inspection techniques, including combination of visual, auditory and thermal imaging tests. Resin matrix selection was crucial for proper mechanical properties of the panel. Design considerations such as fire retardancy, compression strength and elasticity are among the physical properties used to determine the most efficient system.

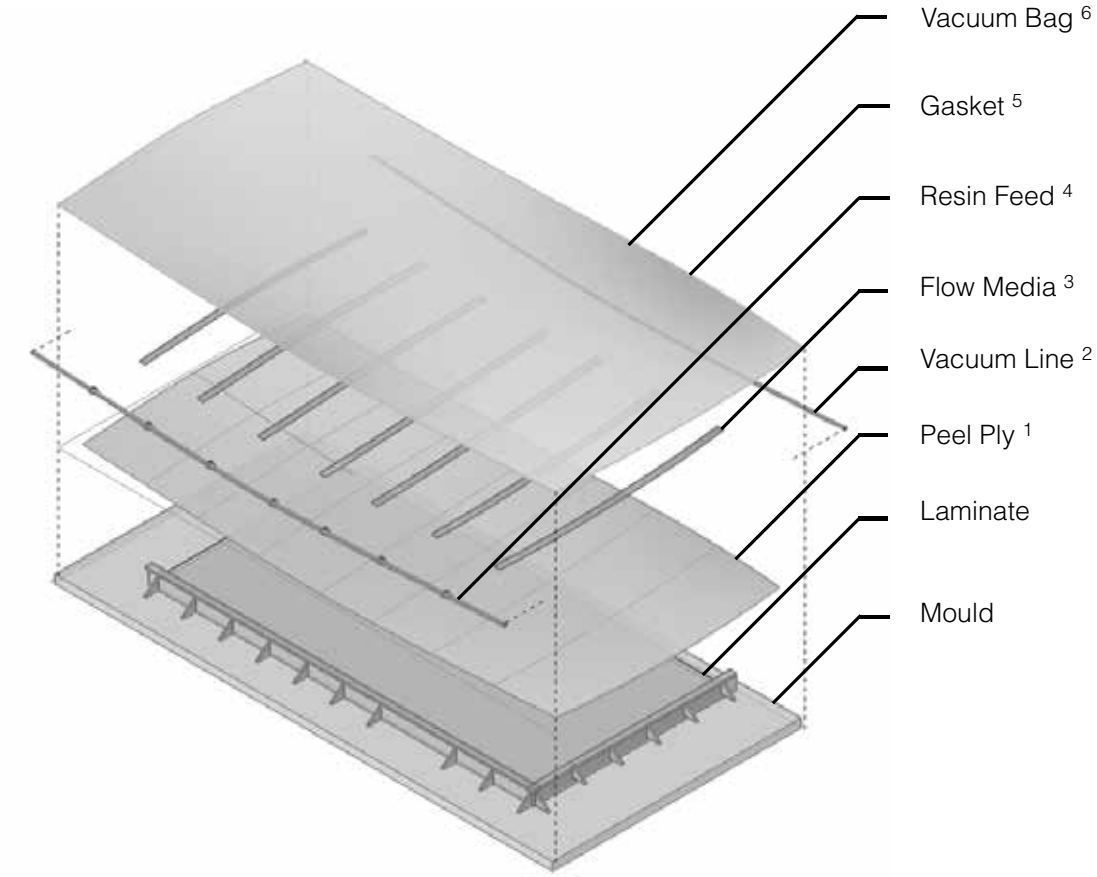
This choice was made by Gurit, and followed by the manufacture team.

STRUCTURAL CALCULATIONS

COMPOSITE MANUFACTURING

VACUUM INFUSION

Process Stack



1. Peel Ply is a thin release fabric that is placed directly against the laminate surface. This prevents any additional process material from becoming bonded to the laminate.
2. Vacuum Line is connected to a low volume, high pressure vacuum pump to evacuate all air from the bag before infusion.
3. Flow Media is connected ot the resin feed line and assists whith the rate at which the resin front flows.
4. Resin Feed lines attach to external sources of resin to pull the matrix through the laminate during infusion at a designed interval.
5. Gasket material surrounds the edge of the vacuum bag for an air tight seal.
6. Vacuum Bag material is lastly applied to the entire structural and process stack.

Fig 3.19

STRUCTURAL CALCULATIONS

COMPOSITE MANUFACTURING

VACUUM INFUSION PROCESS

Fig 3.20 Mould Prepared and Waxed

Fig 3.21 Gelcoat Paint Finish

Fig 3.22 Outer Structural Laminate and Core

Fig 3.23 Vacuum Infusion Process Materials

Fig 3.24 Resin Infusion

Fig 3.25 Top and Bottom Complete

STRUCTURAL CALCULATIONS

COMPOSITE MANUFACTURING

Gasketing

Gaskets are designed to seal many types of media, including water, air, dust, and oil. Water was used in Rogers' evaluations because it is the most common test media recognized by NEMA, UL, and IEC.

Not all liquids will penetrate a gasket with the same effectiveness; however, most of the general variables affecting sealing, including gasket width, gasket compression, and pressure of the liquid, are the same regardless of the liquid. Correlations can be drawn between water and other substances, but application testing is always recommended.

Finishing and Installation

Serious design consideration has been implemented to minimize hand finishing work required for assembly of our panels. High density potting and fastening core will be spliced into the typical PVC core for drilling and attachment points during part layup. This reduces secondary bonding requirements and creates a single uniform component minimizing field work required for construction and allows for precise location of structural and core components. Fig 3.6

Secondary bonding operations such as hardware and PV installation require cleanliness and a minimum temperature 60˚F for the adhesive to cure properly. Edge conditions will be be moulded to each corresponding panel to maximize efficiency. This bond between panels, where required, is structural and waterproof. Fasteners will also be used to satisfy sheathing code requirements where appropriate. The SURE HOUSE Structural and Composite manufacture teams are collaborating on a weekly basis with Guirt engineers and professionals at IYRS to ensure that our connection and hardware details, both bonded and bolted, are specified properly to exceed our intended design loads.

04 DETAILED WATER BUDGET

DETAILED WATER BUDGET

FUNCTION	WATER USE (Gallons)	CALCULATIONS Gallons	x	Events	NOTES
Clothes Washing	192.64	13.76		14	Running clothes washer
Cooking	3	0.6		5	Boiling 5 pounds of water
Dinner	6	3		2	Dinner for 8 guests (bottled water)
Dish Washing	11.6	2.9		4	Running dish washer
Fire Protection	260	260		1	Use if necessary
Hot Water Draws	240	15		16	15 gallon hot water draw
Hot Water Heater	80	80		1	Initial system fill
H.W.H Expansion Tank	5	5		1	Initial system fill
Movie	2	2		1	Water for guests (bottled water)
Vaporization	5	1		5	Losses
Vegetation	110	55		2	Vegetation
Calculated Use	906.64				
Safety Factor (10%)	90.664				
Water Required	**997.304**				

Table 4.1 Detailed Water Budget

05 SUMMARY of UNLISTED **ELECTRICAL COMPONENTS**

SUMMARY OF UNLISTED ELECTRICAL COMPONENTS

All electrical components carry an approved testing agency's listing per Section 6-7 of the SD 2015 Building Code. However, we would like to point out that our Advanced Energy AV PV heater is not readily available in the US. It is CE listed and well documented. A cut sheet for this product is located in Division 23 of the Product Cut Sheets section of this manual. See "23 56 00 SOLAR HEATING COLLECTORS".

Additional information and certificates are located below :

CE **Conformity Declaration**

REFUsol GmbH,
Uracher Straße 91, 72555 Metzingen / Germany

KoE-NE-13028

The following electronic devices comply with the EC-directives and guidelines:

- Directive 2006/95/EC Electrical equipment designed for use within certain voltage limits
- Directive 2004/108/EC Relating to electromagnetic compatibility

Type	**REFUsol 401R1K5 PV Heater DCLV Set**
Safety	
EN 60335-1:2012-10	Household and similar electrical appliances - Safety - Part 1: General requirements
EN 60335-2-21:2009-06	Household and similar electrical appliances - Safety - Part 2-21: Particular requirements for storage water heaters
EN 60730-1:2012-10	Automatic electrical controls for household and similar use - Part 1: General requirements
EMC-Compatibility - Immunity	
EN 61000-6-1:2007	Electromagnetic Compatibility (EMC) Part 6-1: Generic Standards - Immunity for residential, trade and light-industrial environments
EN 61000-6-2:2005	Electromagnetic Compatibility (EMC) Part 6-2: Generic Standards - Immunity for industrial environments
EMC-Compatibility - Emission	
EN 61000-6-3:2007 + A1:2011	Electromagnetic Compatibility (EMC) - Part 6-3: Generic Standards - Emission standard for residential, commercial and light industrial environments

Metzingen	Valid from 2013-11-27		i.V.
location	date	Dr. Michael Seehuber Managing Director	Ronald Kiebler Head of Testing Department

We reserve the right to make changes in the conformity declaration. Presently applicable edition can be obtained upon request.

06 SUMMARY of RECONFIGURABLE FEATURES

SUMMARY OF RECONFIGURABLE FEATURES

The design incorporates four reconfigurable components.

A. REMOVABLE STORM PANELS

1. The casement stormshutter systems incorporate a protective layer to the casement windows located in the bedrooms. Operable for jurors only.

See drawing(s) A-515, A-516,

B. BI-FOLDING STORMSHUTTER SYSTEMS

1. The bi-folding stormshutter systems incorporate a protective layer to the perimeter of the living room. The stormshutter system acknowledges various scenarios/modes the user or natural environment may have. Operable for jurors only.

See drawing(s) A-552-53,54,55,56.

C. SCHUCO LIFT AND SLIDE DOORS

1. The Schuco Lift and Slide Doors have various qualities that enhance the experience, space, and aesthetics of SURE HOUSE. This feature allows for the blending of interior and exterior space.Operable for jurors only.

See drawing(s) A-512-513.

D. MANUAL SHADE SYSTEM

1. This feature allows for the shading of interior space on the south facade. Operable for jurors only.

See drawing(s) A-513.

SUMMARY OF RECONFIGURABLE FEATURES

A. REMOVABLE STORM PANELS

Introduction

SURE HOUSE features a set of removable glass fiber composite storm panels that can be installed over fixed windows during a high wind or flood event. The panels remain tucked away in storage until needed and can be fitted over the windows to protect glass from debris as well as providing a defense against water infiltration. EPDM gaskets create the waterproof seal.

SUMMARY OF RECONFIGURABLE FEATURES

A. REMOVABLE STORM PANELS

Demonstration of Reconfigurable Feature

The application of the storm panels will be demonstrated through exhibit materials. Under everyday conditions, the panels will remain in storage. They are intended to be utilized only in emergency events. Therefore it is not practical to demonstrate their installation and removal for every tour. However, graphics will be displayed on the tour route to illustrate their purpose and operation to the public.

See Construction Drawing Set A-511, A-514,A-515.

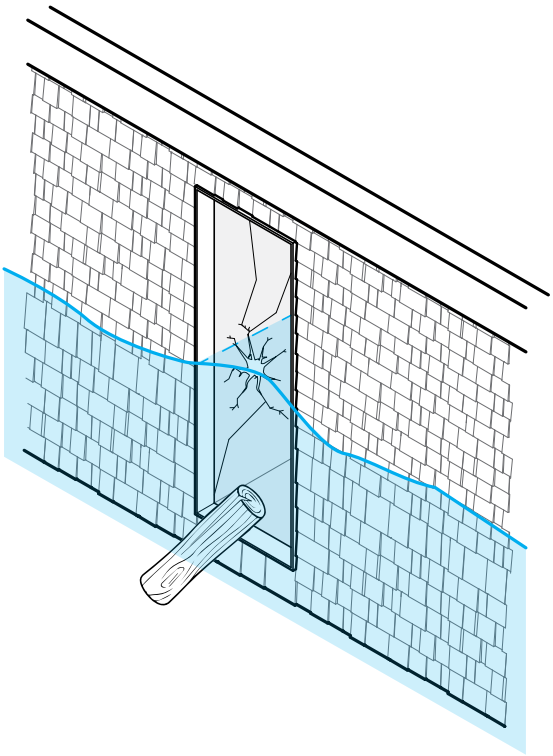


Fig 6.1 TYPICAL DEBRIS CONDITION

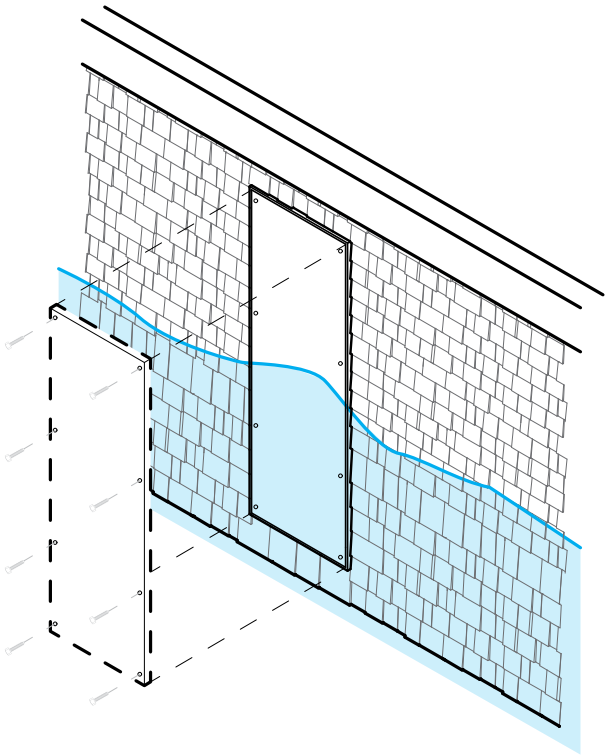


Fig 6.2 INTEGRATED STORMPLUG

SUMMARY OF RECONFIGURABLE FEATURES

B. BI-FOLDING STORMSHUTTER SYSTEMS

Introduction

SURE HOUSE has been designed with a durable resiliency program. To protect during high wind and flood events, the home will incorporate a storm shutter system. The bi folding shutter doors are a multi-purposed system, acting as a protection against storms, passive shading over the South glazing, and as solar collection for the DC hot water system.

Fig 6.3 Stormshutters in a Shade + Flood Scenario

SUMMARY OF RECONFIGURABLE FEATURES

B. BI-FOLDING STORMSHUTTER SYSTEMS

Details

The bi-folding shutters are designed to shade the glazing of a residential structure in daily weather conditions and to act as the primary defensive barrier, protecting the South facade from debris and water during storm events. The storm shutters as manufactured of a lightweight composite glass fiber and structural foam core, allowing to withstand designed loads and be light enough for manual operation.

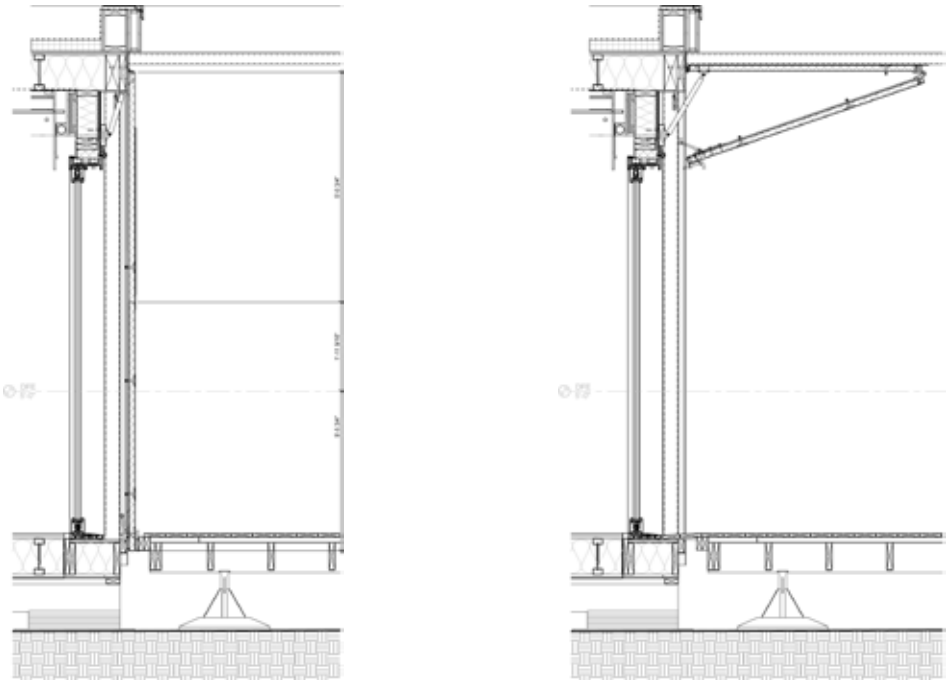


Figure 6.4 Section View of Shutters in Closed “Resiliency” Mode and Open “Shade” Mode

In daily operation, the shutters are static in their full up position and shade the South facing lift and slide doors of the SURE HOUSE. The shutters will be locked into the house’s framing with a series of ½” spring loaded locking pins, This is a redundant safety system to the manual 6:1 block and tackle used to lift and hold the shutter in position. This system is supplemented by a pair of gas springs to assist with lifting and lowering. Just as a typical garage door system, the bi-fold shutters will run along steel tracks with a nylon door roller.

SUMMARY OF RECONFIGURABLE FEATURES

B. BI-FOLDING STORMSHUTTER SYSTEMS

Details

Before a storm hits the shutters will be lowered as part of an evacuation procedure and locked into place using a series of latches attached to the shutters. Final storm sealing of the SURE HOUSE cannot be done from within. The shutters rest against weather-resistant EPDM rubber seals. This creates a continuous gasketed membrane up to the Designed Flood Elevation (DFE) or five feet above grade.

Figure 6.5 Shutter Axle

Figure 6.6 Shutter Rigging

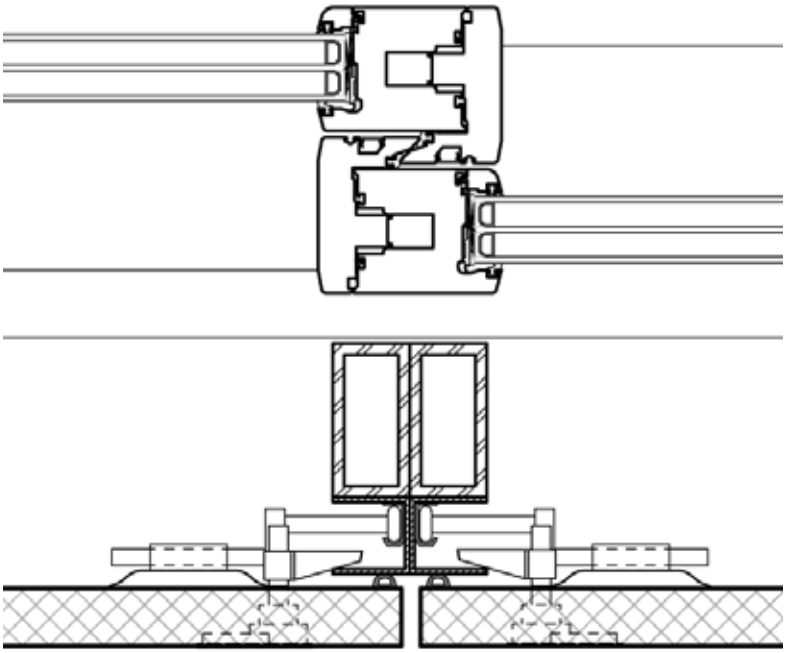


Figure 6.7 Plan View of Shutters in Closed “Resiliency” Mode

Adhered to the upper shutter panel are two sixty cell photovoltaic modules that supplement the heat pump hot water system with a DC electric heating coil inserted into the tank. Hot water is being created so long as the panels are operational. If the tank is up to temperature, the system switches to open circuit mode so it does not overheat.

SUMMARY OF RECONFIGURABLE FEATURES

B. BI-FOLDING STORMSHUTTER SYSTEMS

Figure 6.8 Shutter Open “Summer Mode”

Figure 6.9 Shutter Panel Operation Diagram

Figure 6.10 Shutter Panel Closed “Resilient Mode”

SUMMARY OF RECONFIGURABLE FEATURES

B. BI-FOLDING STORMSHUTTER SYSTEMS

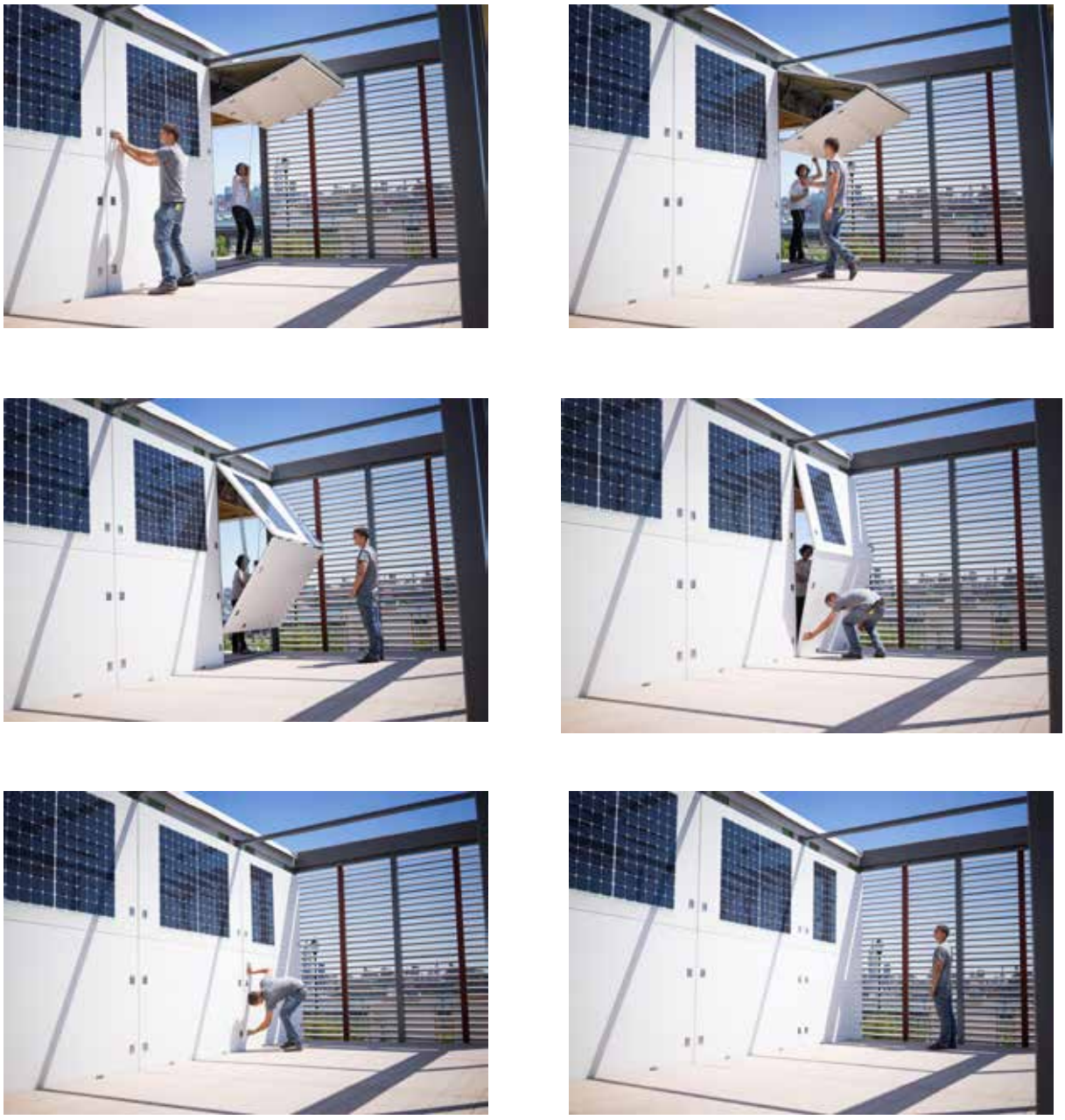


Figure 6.11 Shutter Panel Operation Series

SUMMARY OF RECONFIGURABLE FEATURES

B. BI-FOLDING STORMSHUTTER SYSTEMS

Demonstration Of Reconfigurable Feature

During public tours, the shutters will remain in their open and locked position to simulate daily operation. It is not reasonable to demonstrate the reconfiguration of these features for every tour throughout the competition. However, this capability will be clearly presented in video, photo, and rendering submissions and in the literature distributed at the competition.

Operation of at least one shutter will be shown to the jury during the engineering walkthroughs. This will include lowering the shutter into its storm and flood position, latching, and raising back to daily operation position.

See drawing(s) A-552-53,54,55,56.

SUMMARY OF RECONFIGURABLE FEATURES

B. BI-FOLDING STORMSHUTTER SYSTEMS

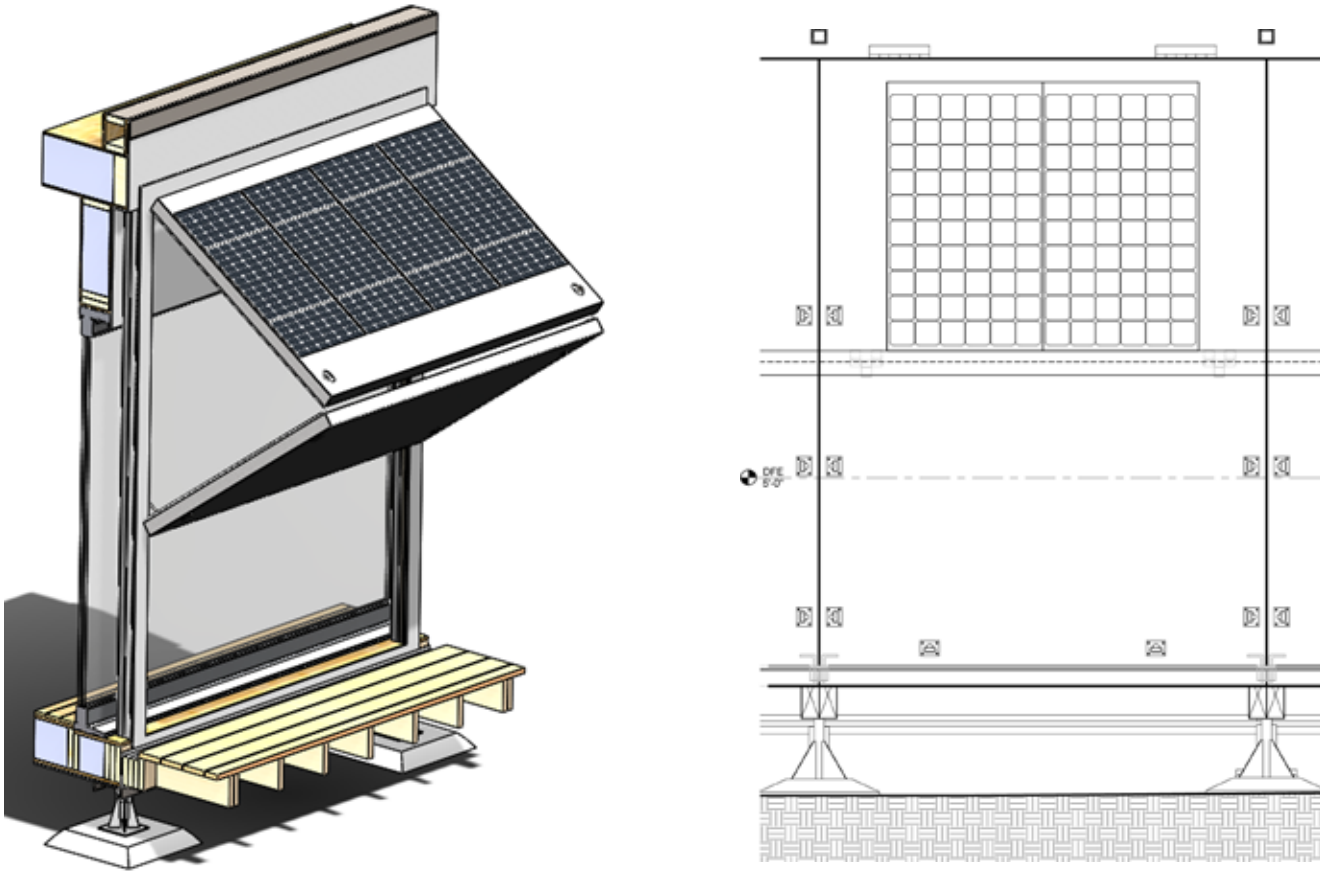


Fig 6.12 Solidworks Shutter Analysis w/ Components

SUMMARY OF RECONFIGURABLE FEATURES

C. SCHUCO LIFT AND SLIDE DOORS

Introduction

Lift-Slide doors are a quintessential tool for contemporary living. No other type of patio door can offer equivalent expanses of glass without dividers which limit views. Schuco Sliding Doors are super-insulated to ensure comfort and "**Passive House**" energy efficiency with only glass in between occupant and view. In the SURE HOUSE these doors allow for maximum flexibility to the kitchen and living space, allowing these spaces to spill outside and thereby blurring the line between interior and exterior.

Fig 6.13 Casement Stormshutter Windows Perspectives

SUMMARY OF RECONFIGURABLE FEATURES

C. SCHUCO LIFT AND SLIDE DOORS

Demonstrations of Reconfigurable Features for the Jury

During the competition, the lift and slide doors will primarily be closed in the mornings and open in the afternoons to demonstrate the continuity of the space in both configurations. During the jury walk-through, lift and slides will be operated to demonstrate their ease of use.

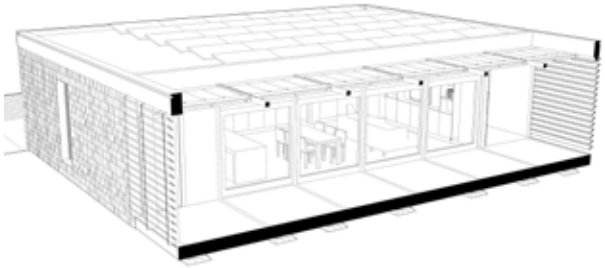


Fig 6.14 Closed Bi-Fold Door Mode - Enclosed Space

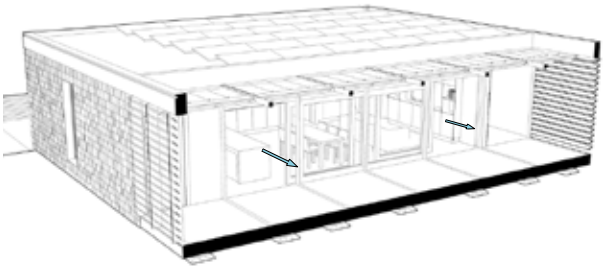


Fig 6.15 Open Bi-Fold Door Mode - Continuous Space

Fig 6.16 Deck Perspective

SUMMARY OF RECONFIGURABLE FEATURES

D. MANUAL SHADING SYSTEM

Introduction

Chain-driven roller screens are manual solar protection and room-darkening shading systems. They feature visually-transparent sunscreens and room-darkening shades. Shading, Interior Comfort, and Energy Balance are extremely important in the SURE HOUSE, therefore, a unique manual system allows the user to vary the space to their desire.

SUMMARY OF RECONFIGURABLE FEATURES

D. MANUAL SHADING SYSTEM

Demonstrations of Reconfigurable Features for the Jury

During the competition, the shades, located on the south lift and slide doors will primarily be concealed. Depending on weather or changes in interior comfort, the shades will be deployed. This feature will be presented in the video, photo, and rendering submissions and in the literature distributed at the competition.

See drawing(s) A-513.

07 INTERCONNECTION APPLICATION FORM

INTERCONNECTION APPLICATION FORM

SURE HOUSE - Lot #101

PV SYSTEMS

MODULE MANUFACTURER	SHORT DESCRIPTION OF ARRAY	DC RATING OF ARRAY (W)
LG MONO - X 280 W	**Inverter "I1"**: One (I) string of twelve (12) modules	3,360
LG MONO - X 280 W	**Inverter "I2"**: Two (2) strings of ten (10) modules	5,600
	Total DC Power Of All Arrays is 8.96 kW	

INVERTERS

INVERTER MANUFACTURER	MODEL NUMBER	VOLT-AGE	RATING (KVA OR KW)	QUANTITY
SMA America	SB 3000TL-US	240 V	3 kVA	1
SMA America	SB 5000TL-US	240 V	5 kVA	1

REQUIRED INFORMATION

	LOCATION
One - Line Electrical Schematic	E - 601
Calculations Of Service / Feeder Net Computed Load And Neutral Load (Nec 220)	E - 601
Plan View Of The Lot Showing The House, Decks, Ramps, Tour Paths, The Service Point, And The Distribution Panel Or Load Center	G - 121 G - 103

SURE HOUSE Team Electrical Engineer - Armando Elliott
aelliott@stevens.edu

08 ENERGY CODE COMPLIANCE

ENERGY CODE COMPLIANCE

BACKGROUND

Using an array of software platforms including PHPP, designPH, THERM, TRNSYS, and various Grasshopper plugins, the SURE HOUSE has been extensively energy modeled as part of an iterative design process. Based on this methodology and analysis, our project exceeds the New Jersey Energy Code which is based on the 2009 International Energy Conservation Code, as shown in Table 8.1.

	CLIMATE ZONE	FENESTRATION U - FACTOR (BTU/H FT^2 F)	GLAZE FENESTRATION SHGC (-)	CEILING R-VALUE (H FT^2 F/BTU)	WOOD FRAME WALL (H FT^2 F/BTU)	FLOOR R-VALUE (H FT^2 F/BTU)
2009 IECC NJ CODE	4 Except Marine	0.35	NR	38	13	19
SURE HOUSE	4 Except Marine	**0.125**	**>0.5**	**50**	**37**	**31**

Table 8.1 SURE HOUSE Comparison With 2009 IECC Insulation And Fenestration Requirements

SPACE HEATING	**SURE HOUSE** Heating Demand	**14.5** kWh/(m^{2}a)
	PASSIVE HOUSE Heating Demand	**15** kWh/(m^{2}a)
SPACE COOLING	**SURE HOUSE** Cooling Demand	**16** kWh/(m^{2}a)
	PASSIVE HOUSE Cooling Demand	**16.5** kWh/(m^{2}a)

Table 8.2 SURE HOUSE Passive House Certification Criteria

09 QUANTITY TAKE OFF

COMPETITION PROTOTYPE

QUANTITY TAKEOFF OF COMPETITION PROTOTYPE

COLLECTIVE TOTALS

CSI #	BRIEF DESCRIPTION	DETAILED DESCRIPTION	QTY.	UNIT
01 - GENERAL REQUIREMENTS				
01 54 16	lull/forklift	setting steel and decks	**2**	days
01 54 19	90 ton hydraulic truck crane	setting modules	**1**	day
05 - METALS				
05 05 23	1 1/2"x3" 12-gauge L-angle	beam to floor framing connectors	**100**	ea
05 05 23	6" x 3" 12-gauge L-angle	pier to beam connectors	**25**	ea.
05 12 13	HSS 4x2x5/16	southern steel columns	**0.63**	tons
05 12 13	HSS 4x4x3/16	north and east porch columns	**0.34**	tons
05 12 13	HSS 4x4, 3/16	shade structure steel columns	**0.47**	tons
05 12 13	HSS 4x2, 3/16	shade structure steel columns	**0.08**	tons
05 12 13	HSS 3x3, 3/8	shade structure steel beams	**0.54**	tons
05 12 13	WT4X7.5	lover steel columns	**45**	lf
05 13 00	stainless steel cable	southern diagonal supports	**25**	lf
05 14 00	Roof Anchors	PV racking roof array	**32**	ea
05 14 00	Strut Channel and Hardware	PV racking roof array	**120**	lf
05 52 13	HSS 1X1, 1/4	ramp railing	**100**	lf

DIVISION 5 CONT.

QUANTITY TAKEOFF OF COMPETITION PROTOTYPE

COLLECTIVE TOTALS

CSI #	BRIEF DESCRIPTION	DETAILED DESCRIPTION	QTY.	UNIT
05 14 00	Roof Anchors	PV racking roof array	**32**	ea
05 14 00	Strut Channel and Hardware	PV racking roof array	**120**	lf
05 52 13	HSS 1X1, 1/4	ramp railing	**100**	lf
05 53 00	1/4 plate steel	ramp to ground transition	**45**	sf
06 - WOODS, PLASTICS, COMPOSITES				
06 11 16	2x4 SPF	interior partition framing	**715**	lf
06 11 16	2x6 SPF	interior partition framing	**180**	lf
06 11 16	2x6 SPF	bedroom drop ceiling	**106**	sf
06 11 16	2x4 SPF	kitchen island	**55**	lf
06 11 16	2x4 SPF	foundation beam top plates to create space for crane straps	**315**	lf
06 11 16	2x8 SPF	foundation beams attached to piers, supporting floor	**171**	lf
06 11 16	2x10 SPF	south dropdown floor framing + blocking	**90**	lf
06 11 16	2x10 SPF	roof framing blocking	**250**	lf
06 11 16	2x4 SPF	ledgers for roof joist support at module seams	**90**	lf
06 11 16	2x4 SPF	south shadestructure "sweatband" framing	**70**	lf
06 11 16	2x6 SPF	exterior wall and parapet framing	**1880**	lf
06 11 16	1x3 SPF	exterior rainscreen battens	**3345**	lf

DIVISION 6 CONT.

QUANTITY TAKEOFF OF COMPETITION PROTOTYPE

COLLECTIVE TOTALS

CSI #	BRIEF DESCRIPTION	DETAILED DESCRIPTION	QTY.	UNIT
06 11 16	1x3 SPF	exterior rainscreen battens	**3345**	lf
06 11 16	2x3 SPF	interior service cavity battens	**600**	lf
06 11 16	2x10 PT	south deck framing	**270**	lf
06 11 16	2x8 PT	south deck framing	**40**	lf
06 11 16	2x4 PT	south deck framing	**325**	lf
06 11 16	2x10 PT	north deck framing	**50**	lf
06 11 16	2x8 PT	north deck framing	**204**	lf
06 11 16	2x8 PT	ramp framing	**30**	lf
06 11 16	2x4 PT	ramp framing	**30**	lf
06 11 16	2x4 PT	ramp platform framing	**100**	sf
06 11 16	2x4 PT	electrical platform framing	**40**	lf
06 11 13	1 3/4 x 7 1/4 LVL	beams attached to piers, supporting floor	**115**	lf
06 11 13	1 3/4 x 9 1/2 LVL	module three floor joists	**320**	lf
06 11 13	1 3/4 x 7 1/4 LVL	shower pan framing	**10**	lf
06 11 13	1 3/4 x 9 1/2 LSL	plumber waste header	**10**	lf
06 11 13	1 3/4 x 9 1/2 LVL	floor beam at module perimeters	**171**	lf
06 11 13	1 1/2 x 9 1/2	rim joist	**102**	lf

DIVISION 6 CONT.

QUANTITY TAKEOFF OF COMPETITION PROTOTYPE

COLLECTIVE TOTALS

CSI #	BRIEF DESCRIPTION	DETAILED DESCRIPTION	QTY.	UNIT
06 11 13	1 3/4 x 9 1/2 LVL	floor beam at module perimeters	**171**	lf
06 11 13	1 1/2 x 9 1/2	rim joist	**102**	lf
06 11 13	3 1/2 x 11 7/8 LVL	living room and east porch beams	**11**	lf
06 11 13	3 1/2 x 11 7/8 LVL	kitchen beams	**24**	lf
06 11 13	1 3/4 x 7 1/4 LVL	bedroom beams	**37**	lf
06 11 13	3 1/2 x 9 1/2 LVL	north porch beams	**27**	lf
06 11 13	3 1/2 x 9 1/2 LSL	east porch beam	**19**	lf
06 11 13	1 1/8 x 9 1/2 rimboard	rim joists, doubled at module seams	**218**	lf
06 11 13	1 3/4 x 9 1/2 PSL	southern perimeter beam for shutter lateral loads	**44**	lf
06 11 13	3 1/2 x 9 1/2 LVL	southern perimeter beam for shutter lateral loads	**44**	lf
06 11 16	1 3/4 x 9 1/2 LVL	column between southern lift and slide doors	**10**	lf
06 11 16	3 1/2 x 9 PSL	south deck framing	**130**	lf
06 11 16	3 1/2 x 9 PSL	north deck framing	**87**	lf
06 16 23	3/4 OSB	sheathing uder floorjoists allow for floodproofing	**1000**	sf
06 16 23	3/4 T & G OSB	subfloor	**1000**	sf
06 16 26	3/4 T&G OSB	roof sheathing	**1240**	sf

DIVISION 6 CONT.

QUANTITY TAKEOFF OF COMPETITION PROTOTYPE

COLLECTIVE TOTALS

CSI #	BRIEF DESCRIPTION	DETAILED DESCRIPTION	QTY.	UNIT
06 16 36	3/4 CDX ply	Material component for 12" x 24" and 6" x 10" foundation piers consisting of glued and screwed plywood, combination of 3/4", 5/8", 1/2", and 1/4" as required by site contour	**36**	ea
06 16 36	5/8 CDX ply	Material component for 12" x 24" and 6" x 10" foundation piers consisting of glued and screwed plywood, combination of 3/4", 5/8", 1/2", and 1/4" as required by site contour	**3**	ea
06 16 36	1/2 CDX ply	Material component for 12" x 24" and 6" x 10" foundation piers consisting of glued and screwed plywood, combination of 3/4", 5/8", 1/2", and 1/4" as required by site contour	**3**	ea
06 16 36	1/4 CDX ply	Material component for 12" x 24" and 6" x 10" foundation piers consisting of glued and screwed plywood, combination of 3/4", 5/8", 1/2", and 1/4" as required by site contour	**3**	ea
06 16 36	7/16 zip sheathing system	exterior sheathing	**1365**	sf
06 16 36	1/4 ply	fascia over southern shutters	**45**	sf
06 16 36	1/2 CDX ply	interior shear wall sheathing	**270**	sf
06 16 36	1/2 CDX ply	north planter box framing	**190**	sf
06 16 36	1/2 CDX ply	electrical platform framing	**28**	sf
06 16 36	1/2 CDX ply	south shadestructure "sweatband" framing	**70**	lf
06 16 53	1/8" ABS sheet plastic	glued and screwed to 3/4" sheathing under floor joists	**1000**	sf
06 16 53	1/8" ABS sheet plastic	wraps first 4' feet of exterior wall	**400**	sf
06 17 33	2 1/2 x 9 1/2 I-Joist	modules 1 and 2 floor joists, 16" OC	**610**	lf
06 17 33	2 1/16 x 9 1/2 I-Joist	roof joists	**928**	lf

DIVISION 6 CONT.

QUANTITY TAKEOFF OF COMPETITION PROTOTYPE

COLLECTIVE TOTALS

CSI #	BRIEF DESCRIPTION	DETAILED DESCRIPTION	QTY.	UNIT
06 17 33	2 1/16 x 9 1/2 I-Joist	roof joists	**928**	lf
06 20 13	1x8 #3 cedar	north planter box trim	**60**	lf
06 20 13	1x6 T&G cedar	porch ceiling	**250**	sf
06 25 00	MDF face panels	fridge, dishwasher, pantry	**50**	sf
06 20 13	1/2 birch ply	south shadestructure "sweatband" finish	**70**	sf
06 40 23	3/4 AB ply	mechanical room sheathing	**190**	sf
06 40 23	3/4 birch ply	hallway walls	**64**	sf
06 40 23	1/2 birch ply	drop ceiling living room	**506**	sf
06 40 23	1/2 birch ply	drop ceiling hall	**25**	sf
06 40 23	3/4 AB ply	mechanical room	**42**	sf
06 40 23	1/2 birch ply	living room beam wrap	**100**	sf
06 40 23	3/4 birch ply	living room and entertainment center built-in shelving	**220**	sf
06 46 13	1x4 finger-jointed paint grade pine	door and window trim for bedrooms	**75**	lf
06 46 19	1x4 finger-jointed paint grade pine	bedroom baseboard	**78**	lf
06 65 00	1x6 PVC trim	porch ceiling edges	**45**	lf
06 73 00	1x6 TruGrain composite lumber	door and window trim	**150**	lf
06 73 00	3/4" TruGraincomposite lumber	shower	**22**	sf

DIVISION 6 CONT.

QUANTITY TAKEOFF OF COMPETITION PROTOTYPE

COLLECTIVE TOTALS

CSI #	BRIEF DESCRIPTION	DETAILED DESCRIPTION	QTY.	UNIT
06 73 00	1x6 TruGrain composite lumber	door and window trim	**150**	lf
06 73 00	3/4" TruGraincomposite lumber	shower	**22**	sf
06 73 00	5/4x6 TruGrain composite decking	decking	**1120**	sf
06 73 00	1x6 TruGrain composite lumber	ramp and deck trim	**170**	lf
06 73 00	5/4x6 TruGrain composite decking	ramp decking	**190**	sf
06 73 00	5/4x6 TruGrain composite decking	electrical platform decking	**15**	sf
06 73 00	1x6 TruGrain composite lumber	electrical platform finish	**28**	sf
06 73 00	1x6 TruGrain composite lumber	louver verticals	**88**	lf
06 73 00	1x4 TruGrain composite lumber	louvers	**1160**	lf
07 - THERMAL AND MOISTURE PROTECTION				
07 13 26	Grace Ice and Water Sheild	exterior floor to wall joint	**120**	lf
07 21 16	8" mineral wool batts	floor cavity insulation	**1000**	sf
07 21 16	12" mineral wool batts	roof cavity insulation	**1000**	sf
07 21 16	5.5" mineral wool batts	wall cavity insulation	**980**	sf
07 21 16	2.5" mineral wool batts	service cavity insulation	**980**	sf
07 21 16	1 1/4" mineral wool board insulation	insulation over sheathing	**920**	sf
07 21 16	3.5" mineral wool batts	interior acoustic insualtion	**290**	sf

DIVISION 07 CONT.

QUANTITY TAKEOFF OF COMPETITION PROTOTYPE

COLLECTIVE TOTALS

CSI #	BRIEF DESCRIPTION	DETAILED DESCRIPTION	QTY.	UNIT
07 21 16	2.5" mineral wool batts	service cavity insulation	**980**	sf
07 21 16	1 1/4" mineral wool board insulation	insulation over sheathing	**920**	sf
07 21 16	3.5" mineral wool batts	interior acoustic insualtion	**290**	sf
07 22 22	tapered polyisocyanurate rigid insulation	roof deck insulation; 6" at west tapered to 1" at east	**1240**	sf
07 27 00	ProClima Intello	interior primary air barrier	**3260**	sf
07 46 23	cedar shakes	east, north, west finish	**983**	sf
07 46 23	primed cedar shakes	north planter box finish	**165**	sf
07 46 46	3/16" fibercement board	south bathroom facade	**70**	sf
07 46 46	3/16" fibercement board	south shadestructure "sweatband" finish	**70**	sf
07 54 00	SikaSarnafil G410 PVC, 60 mil	roofing membrane	**1240**	sf
07 62 00	coping cap	membrane seal at parapet edge	**160**	sf
07 70 00	vent strip	cap top and bottom of rainscreen cavity	**160**	lf
07 71 00	retrodrain scuppers	scupper drains	**2**	ea
07 92 13	10oz marine sealant	floodproofing joint sealant	**20**	ea.
07 92 13	4" x 75' self-healing joint tape (Grace Vycor)	floodproofing joint flashing tape	**5**	ea.
08 - OPENINGS				
08 14 16	3'-0" x 7'-0"	Interior doors	**3**	ea

DIVISION 08 CONT.

QUANTITY TAKEOFF OF COMPETITION PROTOTYPE

COLLECTIVE TOTALS

CSI #	BRIEF DESCRIPTION	DETAILED DESCRIPTION	QTY.	UNIT
08 14 16	2'-8" x 7--0"	Interior doors	1	ea
08 14 16	2'-8" x 7'-0"	Interior doors bifold	1	ea
08 15 00	Schuco SL82, 7'-0" x 3'-2"	swinging entry doors	2	ea.
08 32 16	Schuco thermoslide, triple pane, low-E,safety glazing, 8'-5" x 14'-10"	sliding patio doors	2	ea.
08 53 00	Schuco tilt and turn, triple pane, low-E, safety glazing, 3 'x 5'-1 1/2"	tilt/turnwindow (bedroom)	30	sf
08 53 00	Schuco tilt and turn, triple pane, low-E, safety glazing, 2' x 5'-3"	tilt/turn window (bedroom)	10.5	sf
08 53 00	Schuco fixed triple pane, low-E, safety glazing, 3' x 7'-11"	fixed windows (east + west)	48	sf
09 - FINISHES				
09 22 16	2x4 metal stud framing	bathroom drop ceiling	42	sf
09 29 00	5/8" type X gypsum	bedroom walls	670	sf
09 29 00	5/8" type X gypsum	bedroom drop ceiling	106	sf
09 29 00	5/8" type X gypsum	bathroom drop ceiling	42	sf
09 30 13	ceramic wood pattern tile	bathroom walls	200	sf
09 30 13	ceramic white tile	bathroom walls	32	sf
09 62 19	aquastep laminate flooring	mechanical room	42	sf
09 65 13	prefinished 3/4" maple plank	living and bedroom floor	710	sf
09 91 13	paint: gypsum board	bedrooms	670	sf

DIVISION 09 CONT.

QUANTITY TAKEOFF OF COMPETITION PROTOTYPE

COLLECTIVE TOTALS

CSI #	BRIEF DESCRIPTION	DETAILED DESCRIPTION	QTY.	UNIT
09 91 13	paint: gypsum board	bedrooms	**670**	sf
09 91 13	paint: wood trim	bedrooms	**25**	sf
09 91 13	paint: birch plywood	hallway	**64**	sf
09 91 13	paint: wood trim	bedroom baseboard	**78**	lf
09 91 13	paint: plywood	hallway and living room beam wrap	**25**	lf
09 91 13	paint: gyp	bedrooms and bathroom	**148**	lf
09 93 23	polyurethane: interior plywood surfaces	living room built-ins	**515**	sf
09 93 23	polyurethane: plywood	living room	**506**	sf
10 - SPECIALTIES				
10 28 16	3' x 5' mirror	vanity mirror	**1**	ea
10 28 16	Ikea: Grundtal	towel hanger	**1**	ea
10 28 16	Ikea: Grundtal	toilet paper roll	**1**	ea
10 28 16	Ikea: Grundtal	small hanger	**1**	ea
10 71 16	11'-0 x 7'-6" fiberglass composite panels with hardware and rigging	manually operable shutters	**6**	ea
10 71 16	1.5" fiberglass composite panels	storm plugs for windows and doors	**115**	sf
11 - EQUIPMENT				
11 30 13	Thermador UCVM36FS	recirculating range hood	**1**	ea

DIVISION 11 CONT.

QUANTITY TAKEOFF OF COMPETITION PROTOTYPE

COLLECTIVE TOTALS

CSI #	BRIEF DESCRIPTION	DETAILED DESCRIPTION	QTY.	UNIT
11 31 13	GE JP656DDBB	cooktop	1	ea
11 31 13	GE JT5000DF	wall oven	1	ea
11 31 13	Liebherr HC1030	refrigerator	1	ea
11 31 13	Bloomberg DW 551100	dishwasher	1	ea
11 31 23	LG WM4070H_A	washer	1	ea
11 31 23	LG DLHX4072	dryer	1	ea
12 - FURNISHINGS				
12 24 13	rolling shades	manual solar protection	290	sf
12 32 13	Ikea casework: lower cabinets	lower cabinets	5.5	lf
12 32 13	Ikea casework: upper cabinets	upper cabinets	7.5	lf
12 36 61	Hi-Macs composite	bathroom vanity; 2 shelves and sink enclosure	1	ea
12 36 61	HI-Macs composite	kitchen counter	9	lf
12 36 61	HI-Macs composite	backsplash	18	sf
21 - FIRE SUPRESSION				
21 13 13	fire sprinkler head		6	ea
21 13 13	1" Fire Protection Pipe		90	lf
21 13 13	fitting elbow		10	ea

DIVISION 21 CONT.

QUANTITY TAKEOFF OF COMPETITION PROTOTYPE

COLLECTIVE TOTALS

CSI #	BRIEF DESCRIPTION	DETAILED DESCRIPTION	QTY.	UNIT
21 13 13	fitting tee		2	wa
21 13 13	valve assembly		1	ea
21 13 13	pressure release valve		1	ea
21 30 00	fire pump		1	ea
22 - PLUMBING				
22 11 13	plumbing manifold	mech room	1	ea
22 11 16	1/2" PEX pipe	domestic supply	70	lf
22 11 16	misc. valves and fittings	domestic supply	1	ls
22 11 23	pump	domestic supply; under planter		
22 12 23	pressure tank	domestic supply; under planter	1	ea
22 12 19	1000 gallon water tank	domestic supply; under planter	1	ea
22 13 16	4" PVC	gutter downspout, along west exterior wall behind finish	40	lf
22 13 16	4" corrugated drain pipe	to direct downspout water from under house to daylight	20	lf
22 13 16	waste and vent piping: PVC		80	lf
22 13 53	400 gallon water tank	waste; planter	1	ea
22 14 29	sump pump	to waste tank; outside house under electrical platform	1	ea
22 30 30	80 gallon heat pump water heater w/ 2nd electrical element circuited to shutter PV	domestic hot water; mech room	1	ea

DIVISION 22 CONT.

QUANTITY TAKEOFF OF COMPETITION PROTOTYPE

COLLECTIVE TOTALS

CSI #	BRIEF DESCRIPTION	DETAILED DESCRIPTION	QTY.	UNIT
22 41 00	expansion tank	mech room	1	ea
22 41 13	residential water closet	bathroom	1	ea
22 41 13	shower pan	bathroom	1	ea
22 41 16	shower drain/faucet	bathroom	1	ea
22 41 16	double bowl sink	kitchen	1	ea
22 41 39	faucet	bathroom	1	ea
22 41 39	clothes washer connection	laundry	1	ea
22 41 39	faucet	kitchen	1	ea
22 41 39	dishwasher connection	kitchen	1	ea
23 - HVAC				
23 09 13	Daikin DZK030E5	zoning kit	1	ea
23 09 13	Daikin DZK-MTS-1	Main Thermostat	1	ls
23 09 13	Daikin DZK-ZTS-1	Wireless Thermostat	4	ls
23 09 13	Daikin BRC1E73	AHU Thermostat	1	ls
23 23 00	Copper Piping	refrigerant piping	15	lf
23 31 16	Zehnder comfopipe insulated rigid ductwork	heating and cooling (heat pump)	130	lf
23 31 16	Zehnder comfotube flexible ductwork	ventilation (ERV)	50	lf

DIVISION 23 CONT.

QUANTITY TAKEOFF OF COMPETITION PROTOTYPE

COLLECTIVE TOTALS

CSI #	BRIEF DESCRIPTION	DETAILED DESCRIPTION	QTY.	UNIT
23 31 16	Zehnder comfotube flexible ductwork	ventilation (ERV)	**50**	lf
23 33 13	Tuttle and Bailey MA, 4000, DXFR, and T75D	grilles, registers, diffusers	**12**	ea
23 34 00	Daikin FBQ24PVJU	air handler	**1**	ea
23 72 00	Zehnder Comfowell 220	ventilation manifold	**2**	ea
23 72 00	Zehnder NOVUS 300	ERV	**10**	lf
23 82 19	Daikin RDZQ24PVJU9	condensing unit	**1**	ea
25 - INTEGRATED AUTOMATION				
25 37 00	data opening		**2**	ea
25 37 00	tv opening		**2**	ea
25 38 00	smoke detector		**3**	ea
25 50 00	exterior south deck uplighting: LED		**6**	ea
25 50 00	exterior east porch downlighting: LED		**6**	ea
26 - ELECTRICAL				
26 05 19	200A panel including AFCI breakers		**1**	ea
26 05 19	electrical meter		**1**	ea
26 05 19	service entrance conductors; (3) 2/0 THHN (1) #4 ground		**15**	lf
26 05 19	#8 AWG THWN-2		**0**	lf

DIVISION 26 CONT.

QUANTITY TAKEOFF OF COMPETITION PROTOTYPE

COLLECTIVE TOTALS

CSI #	BRIEF DESCRIPTION	DETAILED DESCRIPTION	QTY.	UNIT
26 05 19	#8 AWG THWN-2		0	lf
26 05 19	#10 AWG THWN-2		50	lf
26 05 19	#12 AWG THWN-2		100	lf
26 05 19	#12/2 NM-B		500	lf
26 05 19	#10/3 NM-B		100	lf
26 05 19	#8/3 NM-B		100	lf
26 05 19	#10 AWG PV Wire		400	lf
26 05 19	#8 AWG PV Wire		100	lf
26 05 19	#10 AWG THWN-2		250	lf
26 05 19	#8 AWG THWN-2		100	lf
26 21 00	200A SE cable		80	lf
26 27 26	20A 125V duplex receptacle		10	ea
26 27 26	20A 125V duplex receptacle - GFCI		15	ea
26 27 26	20A 125V duplex receptacle - WP		5	ea
26 27 26	duplex receptacle cover In-Use		3	ea
26 27 26	50A 240V single receptacle		4	ea
26 27 26	15A 125V duplex receptacle - Floor		2	ea

DIVISION 26 CONT.

QUANTITY TAKEOFF OF COMPETITION PROTOTYPE

COLLECTIVE TOTALS

CSI #	BRIEF DESCRIPTION	DETAILED DESCRIPTION	QTY.	UNIT
26 27 26	20A 120/277V Switch		8	ea
26 27 26	20A 120/277V 3-Way Switch		4	ea
26 27 26	domestic water pump station connection		1	ea
26 27 26	dishwasher connection		1	ea
26 27 26	heat pump water heater connection		1	ea
26 27 26	sump pump connection		1	ea
26 27 26	air handler connection		1	ea
26 27 26	heat pump; 2-ton outdoor unit connection		1	ea
26 27 26	energy recovery ventilator connection		1	ea
26 27 26	combiner Box		3	ea
26 27 26	transition/junction box		2	ea
26 28 16	disconnect wwitch		2	ea
26 31 00	module 60-cell mSi 280W Framed	PV Roof Array	32	ea
26 31 00	module 60-cell mSi 180W Flexible	PV Flood Shutters	10	ea
26 31 00	Renusol CS60 ballasted racking trays	PV Racking Roof Array	32	ea
26 50 00	drivers/pwr supply and acc'ys (Exterior)		2	ea
26 51 13	interior linear LED fixtures		36	ft

DIVISION 26 CONT.

QUANTITY TAKEOFF OF COMPETITION PROTOTYPE

COLLECTIVE TOTALS

CSI #	BRIEF DESCRIPTION	DETAILED DESCRIPTION	QTY.	UNIT
26 50 00	drivers/pwr supply and acc'ys (Exterior)		2	ea
26 51 13	interior linear LED fixtures		36	ft
26 51 13	interior track LED fixtures		21	ea
26 51 13	interior recessed LED downlight fixtures		2	ea
26 51 13	drivers/pwr supply and acc'ys (Interior)		6	ea
31 - EARTHWORK				
31 66 00	concrete and steel pier	11" seismic piers for deck	16	ea
31 66 00	concrete and steel pier	7" seismic piers for deck	4	ea
32 93 00	ornamental grasses and fall perrenials: Muhlenbergia, Capillaris, Muhlenbergia Capillaris Festuca Rubra, Kniphofia uvaria, Solidage Californica	ornamental plants	220	sf
32 94 00	standard 1 Ga. Containers from Nursery	planter boxes	40	ea.
32 94 00	lightweight infill gravel	soil	130	cu. ft
48 - ELECTRICAL POWER GENERATION				
48 19 16	inverter grid-tied 5000W 240Vac		1	ea
48 19 16	inverter grid-tied 3000W 240Vac		1	ea
48 19 16	network interface inverter		2	ea

END OF COLLECTIVE TOTALS

10 CONSTRUCTION SPECIFICATIONS

CONSTRUCTION SPECIFICATIONS

DIVISION 01 GENERAL REQUIREMENTS

01 01 01	PROJECT TITLE PAGE
01 01 15	LIST OF CD DRAWING SHEETS
01 12 00	SUMMARY
01 30 00	ADMINISTRATIVE REQUIREMENTS
01 40 00	QUALITY REQUIREMENTS
01 42 00	REFERENCES
01 52 00	CONSTRUCTION FACILITIES
01 60 00	PRODUCT REQUIREMENTS

DIVISION 02 EXISTING CONDITIONS

NOT USED

DIVISION 03 CONCRETE

NOT USED

DIVISION 04 MASONRY

NOT USED

DIVISION 05 METALS

05 01 10	MAINTENANCE OF STRUCTURAL METAL FRAMING
05 12 00	STRUCTURAL STEEL FRAMING
05 13 00	STAINLESS STEEL ROD ASSEMBLIES
05 40 00	COLD-FORMED METAL FRAMING
05 50 00	METAL FABRICATIONS
05 52 00	METAL RAILINGS

CONSTRUCTION SPECIFICATIONS

DIVISION 06 WOOD, PLASTICS, AND COMPOSITES

06 00 00	CONSTRUCTION ADHESIVES
06 10 00	ROUGH CARPENTRY
06 05 23	WOOD FASTENERS
06 11 00	WOOD FRAMING
06 11 13	ENGINEERED WOOD PRODUCTS
06 16 23	SUBFLOORING
06 16 33	SHEATHING
06 16 53	MOISTURE RESISTANT SHEATHING BOARD
06 17 13	LAMINATED VENEER LUMBER
06 17 33	WOOD I-JOISTS
06 20 13	EXTERIOR FINISH CARPENTRY
06 20 23	INTERIOR FINISH CARPENTRY
06 40 23	INTERIOR ARCHITECTURAL WOODWORK
06 51 00	STRUCTURAL PLASTIC SHAPES AND PLATES
06 60 00	PLASTIC FABRICATIONS
06 73 00	FIBER-REINFORCED HYBRID DECKING
06 83 00	COMPOSITE PANELING

DIVISION 07 THERMAL AND MOISTURE PROTECTION

07 13 26	SELF-ADHERING SHEET WATERPROOFING
07 21 00	THERMAL INSULATION
07 22 22	POLYISOCYANURATE ROOF INSULATION
07 25 00	WEATHER BARRIER
07 31 29.16	WOOD SHAKES
07 42 33	EXTERIOR WALL CLADDING SYSTEM
07 46 46	FIBER CEMENT WALL PANELS
07 54 23	THERMOPLASTIC-POLYOLEFIN ROOFING
07 62 00	SHEET METAL FLASHING AND TRIM
07 70 00	RIDGE,SOFFIT AND SIDING VENTS
07 71 00	ROOF SPECIALTIES
07 72 00	ROOF ACCESSORIES
07 92 00	JOINT SEALING

CONSTRUCTION SPECIFICATIONS

DIVISION 08 OPENINGS

08 06 71	DOOR HARDWARE SCHEDULE
08 14 16	FLUSH WOOD DOORS
08 15 00	PLASTIC DOORS (EXTERIOR)
08 32 00	SLIDING GLASS DOORS
08 53 00	PLASTIC WINDOWS
08 71 00	DOOR HARDWARE
08 80 00	GLAZING
08 90 00	LOUVERS AND VENTS

DIVISION 09 FINISHES

09 30 00	TILING
09 51 00	WOOD CEILING PANELS
09 64 29	WOOD STRIP AND PLANK FLOORING
09 65 19	RESILIENT TILE FLOORING
09 74 13	WALL COVERINGS
09 91 23	INTERIOR PAINTING
09 93 00	STAINING AND TRANSPARENT FINISHING
09 93 13	EXTERIOR STAINING AND FINISHING
09 97 13	STEEL COATINGS

DIVISION 10 SPECIALTIES

10 28 16	RESIDENTIAL BATH ACCESSORIES
10 56 16	FABRICATED WOOD STORAGE SHELVING
10 71 00	EXTERIOR PROTECTION
10 71 16.13	DEMOUNTABLE STORM PANELS

DIVISION 11 EQUIPMENT

11 31 00	RESIDENTIAL APPLIANCES

CONSTRUCTION SPECIFICATIONS

DIVISION 12 FURNISHINGS

12 21 23	ROLL DOWN BLINDS
12 35 00	SPECIALTY CASEWORK
12 36 61	SIMULATED STONE COUNTERTOPS

DIVISIONS 13 - 20

NOT USED

DIVISION 21 FIRE SUPPRESSION

21 13 13	WET PIPE SPRINKLER SYSTEM

DIVISION 22 PLUMBING

22 11 16	DOMESTIC WATER PIPING
22 11 19	DOMESTIC WATER PIPING SPECIALTIES
22 11 23	DOMESTIC WATER PUMP
22 12 19	FACILITY POTABLE-WATER STORAGE TANKS
22 13 16	SANITARY WASTE AND VENT PIPING
22 14 29	SUMP PUMP
22 33 01	DOMESTIC WATER HEATER ELECTRIC RESIDENTIAL
22 41 00	RESIDENTIAL PLUMBING FIXTURES
22 41 23	RESIDENTIAL SHOWERS

DIVISION 23 HEATING, VENTILATING AND AIR CONDITIONING

23 07 00	HVAC INSULATION
23 20 00	HVAC PIPING AND PUMPS
23 23 00	REFRIGERANT PIPING
23 23 23	REFRIGERANTS
23 31 00	HVAC DUCTS AND CASINGS
23 33 00	DIFFUSERS, REGISTERS AND GRILLES
23 56 00	SOLAR ENERGY HEATING EQUIPMENT
23 72 00	AIR-TO-AIR ENERGY RECOVERY EQUIPMENT
23 74 00	AIR COOLED CONDENSING UNIT

CONSTRUCTION SPECIFICATIONS

DIVISION 25 INTEGRATED AUTOMATON

25 10 00 INTEGRATED AUTOMATION NETWORK EQUIPMENT

DIVISION 26 ELECTRICAL

26 05 19 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS
26 05 26 GROUNDING FOR ELECTRICAL SYSTEMS
26 05 33 RACEWAYS FOR ELECTRICAL SYSTEMS
26 05 00 COMMON WORK RESULTS FOR ELECTRICAL
26 08 13 STARTING OF EQUIPMENT AND SYSTEMS
26 08 19 TESTING, ADJUSTING AND BALANCING OF ELECTRICAL EQUIPMENT AND SYSTEMS
26 08 23 STARTING,TESTING BY QUALIFIED TEAM MEMBER
26 24 16 PANELBOARDS
26 27 26 WIRING DEVICES
26 31 00 PHOTOVOLTAIC COLLECTORS
28 31 46 SMOKE DETECTOR SENSORS
28 40 00 ELECTRONIC MONITORING AND CONTROL

DIVISION 26 COMMUNICATIONS

NOT USED

DIVISION 28 ELECTRONIC SAFETY AND SECURITY

28 31 46 SMOKE DETECTOR SENSORS

DIVISIONS 29 - 48

NOT USED ; **SEE PRODUCT CUT SHEETS**

CONSTRUCTION SPECIFICATIONS

SECTION 01 01 01 - PROJECT TITLE PAGE

TITLE : TEAM SIT SOLAR DECATHLON 2015 : **The SU+RE HOUSE**

Stevens Institute of Technology

Projected Completion Date :
October 2015

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CONSTRUCTION SPECIFICATIONS

SECTION 01 01 15 - LIST OF CD DRAWING SHEETS

1.01 SECTION INCLUDES

List of graphic documents bound separately from the project manual.

GENERAL

August 2015

G-001 COVER SHEET & PROJECT TITLE
G-002 TABLE OF CONTENTS & ABBREVIATIONS
G-003 SYMBOLS
G-010 SITE AND BUILDING REGULATORY SUMMARY
G-011 BUILDING CODE
G-012 RAMP & HANDRAIL NOTES
G-013 DESIGN INTENT AND TARGET MARKET DESCRIPTION
G-101 FINISHED SQUARE FOOTAGE COMPLIANCE PLAN
G-102 EGRESS PLAN
G-103 ADA TOUR ROUTE COMPLIANCE PLAN
G-121 INTERCONNECTION PLAN
G-201 SOLAR ENVELOPE COMPLIANCE ELEVATIONS
G-202 SOLAR ENVELOPE COMPLIANCE ELEVATIONS
G-601 SHADING DIAGRAMS
G-901 GENERAL PROJECT RENDERINGS
G-902 GENERAL PROJECT RENDERINGS

H-101 LIQUID LOCATION AND SPILL CONTAINMENT PLAN
C-101 GROUND CONTACT PLAN
L-101 LANDSCAPE LOCATIONS

CONSTRUCTION SPECIFICATIONS

SECTION 01 01 15 - LIST OF CD DRAWING SHEETS

1.01 SECTION INCLUDES

List of graphic documents bound separately from the project manual.

GENERAL

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S-001 STRUCTURAL NOTES AND SYMBOLS
S-101 FOUNDATION PLAN
S-102 FLOOR STRUCTURAL PLAN
S-103 ROOF STRUCTURAL PLAN
S-201 STRUCTURAL SECTIONS
S-301 FRAMING SECTIONS
S-400 RAMP & RAILINGS DETAILS
S-501 TYP. & STRUCTURAL DETAILS
S-502 ROOF BEAM CONNECTION DETAILS
S-503 RAMP DETAILS
S-504 HEADER DETAILS
S-505 MODULE CONNECTIONS
S-511 SEISMIC PIER DETAILS
S-512 FOUNDATION TYPES AND ADJUSTMENTS
S-601 STRUCTURAL SCHEDULES
S-611 LOAD DIAGRAMS
S-612 PANEL LOAD DIAGRAM
S-613 FLOOR TRIBUTARY AREA DIAGRAM
S-614 ROOF TRIBUTARY AREA DIAGRAM
S-901 FRAMING ISOMETRICS
S-902 STRUCTURAL WALL ISOMETRICS

CONSTRUCTION SPECIFICATIONS

SECTION 01 01 15 - LIST OF CD DRAWING SHEETS

1.01 SECTION INCLUDES

List of graphic documents bound separately from the project manual.

GENERAL

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A-001 ARCHITECTURAL SYMBOLS AND NOTES
A-101 LOCATION PLAN
A-102 SITE PLAN
A-111 ROOF PLAN
A-112 ROOF SLOPE & DRAINAGE PLAN
A-113 FIRST FLOOR PLAN
A-121 FIRST FLOOR REFLECTED CEILING PLAN
A-201 EXTERIOR ELEVATIONS
A-202 EXTERIOR ELEVATIONS
A-301 SITE SECTIONS
A-302 SITE SECTIONS
A-311 BUILDING SECTION
A-312 BUILDING SECTION
A-313 BUILDING SECTION
A-314 BUILDING SECTION
A-315 BUILDING SECTION
A-316 BUILDING SECTION
A-317 BUILDING SECTION
A-321 WALL SECTIONS
A-323 WALL SECTIONS
A-324 WALL SECTIONS
A-401 ENLARGED BATHROOM PLAN & ELEVATIONS
A-402 ENLARGED KITCHEN PLANS & ELEVATIONS
A-403 ENLARGED MASTER BEDROOM
A-404 ENLARGED SECOND BEDROOM
A-405 SHUTTER PLAN SECTION CUT VIEW

CONSTRUCTION SPECIFICATIONS

SECTION 01 01 15 - LIST OF CD DRAWING SHEETS

1.01 SECTION INCLUDES

List of graphic documents bound separately from the project manual.

GENERAL

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A-421 ENLARGED CASEWORK PLAN & ELEVATIONS
A-422 ENLARGED CASEWORK PLAN & ELEVATION
A-501 TYP. DETAILS
A-502 BATHROOM DETAILS
A-512 LIFT AND SLIDE DOOR JAMB DETAILS
A-513 LIFT AND SLIDE HEADER AND SILL
A-514 FIXED WINDOW WEST SIDE
A-515 FIXED WINDOW EAST SIDE
A-516 TILT AND TURN DETAILS
A-517 SOUTH ENTRY BATHROOM DOOR
A-518 SOUTH ENTRY BATHROOM DOOR JAMBS
A-519 ENTRY DOOR DETAIL
A-520 MECH ROOM DETAILS
A-552 SHUTTER SECTION AND ELEVATION
A-554 SHUTTER DECK DETAILS
A-555 SOUTH SHUTTER PLAN DETAILS
A-556 SHUTTER ELEVATION DETAILS
A-557 SHUTTER SECTION DETAILS
A-591 RAMP DETAILS
A-601 WALL TYPES
A-602 WINDOW TYPES
A-603 DOOR TYPES
A-604 CEILING & ROOF PANELS
A-605 WALL TYPES CONDUCTIVITY
A-901 ARCHITECTURAL RENDERINGS
A-902 ARCHITECTURAL RENDERINGS

CONSTRUCTION SPECIFICATIONS

SECTION 01 01 15 - LIST OF CD DRAWING SHEETS

1.01 SECTION INCLUDES

List of graphic documents bound separately from the project manual.

GENERAL

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I-001 INTERIOR SYMBOLS AND NOTES
I-101 INTERIOR DESIGN PLAN
I-102 INTERIOR FURNISHING PLAN
I-103 INTERIOR DESIGN RCP
I-201 INTERIOR ELEVATIONS
I-202 INTERIOR ELEVATIONS
I-401 LARGE SCALE INTERIOR DESIGN PLANS
I-501 TYP DROP CEILING DETAILS
I-503 DROP CEILING AT MECH ROOM
I-504 BEDROOM DROP CEILING DETAILS
I-505 HALLWAYS CEILING LIGHT
I-601 INTERIOR DESIGN SCHEDULES

F-001 FIRE PROTECTION NOTES AND SYMBOLS
F-101 FIRE DETECTION AND ALARM
F-102 FIRE SUPPRESSION COVERAGE PLAN

P-102 DOMESTIC SUPPLY
P-103 DOMESTIC RETURN
P-602 DOMESTIC SUPPLY AND RETURN DIAGRAMS

M-001 MECHANICAL SYMBOLS AND NOTES
M-101 HVAC EQUIPMENT AND DISTRIBUTION PLAN
M-201 MECHANICAL ELEVATIONS
M-601 SCHEDULES
M-602 HVAC RISERS
M-603 HVAC RISERS - CTD

CONSTRUCTION SPECIFICATIONS

SECTION 01 01 15 - LIST OF CD DRAWING SHEETS

1.01 SECTION INCLUDES

List of graphic documents bound separately from the project manual.

GENERAL

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E-001 ELECTRICAL SYMBOLS AND NOTES
E-101 ELECTRICAL DISTRIBUTION PLAN
E-102 PV WIRING PLAN
E-103 LIGHTING PLAN
E-201 ELECTRICAL ELEVATIONS
E-601 ONE-LINE DIAGRAM
E-602 THREE-LINE DIAGRAM AC
E-603 THREE-LINE DIAGRAM DC
E-604 SCHEDULES

CONSTRUCTION SPECIFICATIONS

SECTION 01 01 15 - LIST OF CD DRAWING SHEETS

1.01 SECTION INCLUDES

List of graphic documents bound separately from the project manual.

GENERAL

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O-101 CRANE LOGISTICS PLAN 2
O-102 CRANE LOGISTICS PLAN 1
O-201 WATER TRUCK & FILL LOCATIONS
O-202 WATER TRUCK & EMPTYING LOCATIONS
O-401 MODULE LOGIC
O-402 MODULE 3D DIMENSIONS
O-603 TEMP TRAVEL ROUTE
O-702 SECONDARY EVACUATION PLAN
O-703 EXTERNAL GATHERING POINTS
O-801 FALL PROTECTION PLAN
O-802 FALL PROTECTION SECTION

CONSTRUCTION SPECIFICATIONS

SECTION 01 12 00 - SUMMARY

PART 1 - GENERAL

1.01 PROJECT INFORMATION SUMMARY

A. This Section includes the following:

1. Work covered by the Documents.
2. Specification formats and conventions.

B. This set of documents, including the Drawings, Specifications, and other data provided, is an incomplete representation of the project. Pricing the project using these documents will result in an estimate that may be more or less than the price for the project when the documents are complete. Commencing or pursuing construction activities using these documents, including ordering of materials or systems, is not permitted.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification : SURE HOUSE, a project of the Stevens Institute of Technology

B. Owner: Board of Trustees, Stevens Institute of Technology

C. The Work consists of the following:

1. The Work includes a single-family home, newly-constructed on a portable module,designed for highway transport in 3 main sections, and for reassembly on site. Work includes structure, interior and exterior finishes, fixtures, appliances, and electrical, mechanical, and plumbing systems. Work also includes some exterior work that is also transportable, and which serves to complete the utility systems and provide access to the home.

2. The Owner desires to have a minimal impact on the environment resulting from this Work, and therefore has established a goal of recycling 50-percent of the demolition and construction waste that is removed from the site.

CONSTRUCTION SPECIFICATIONS

SECTION 01 12 00 - SUMMARY

PART 1 - GENERAL

1.03 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format : The Specifications are organized into Divisions and Sections using the 50-division format and CSI's "MasterFormat 2014 Update" numbering system.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 12 00

CONSTRUCTION SPECIFICATIONS

SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.01 PROJECT MANAGEMENT AND COORDINATION

A. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. List e-mail addresses and telephone numbers.

B. Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work.

C. 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 forms acceptable to Architect and Owner.

D. 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.

1. Record minutes and distribute to everyone concerned, including Owner and Architect.

CONSTRUCTION SPECIFICATIONS

SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.02 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.

a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.

b. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.

B. 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.

CONSTRUCTION SPECIFICATIONS

SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.02 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

C. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with unique identifier, including project identifier, Specification Section number, and revision identifier.
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.

D. Identify options requiring selection by Architect.

E. Identify deviations from the Contract Documents on submittals.

F. Identify deviations from the Contract Documents on submittals.

PART 2 - PRODUCTS

2.01 SUBMITTAL PROCEDURES

B. Product Data: Mark each copy to show applicable products and options. Include the following:

1. Manufacturer's written recommendations, product specifications, and installation instructions.
2. Wiring diagrams showing factory-installed wiring.
3. Printed performance curves and operational range diagrams.
4. Testing by recognized testing agency.
5. Compliance with specified standards and requirements.

CONSTRUCTION SPECIFICATIONS

SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

PART 2 - PRODUCTS

2.01 SUBMITTAL PROCEDURES

C. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with unique identifier, including project identifier, Specification Section number, and revision identifier.
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.

D. Samples : Submit Samples for review of kind, color, pattern, and texture and for a comparison of these characteristics between submittal and actual component as delivered and installed. Include name of manufacturer and product name on label.

1. If variation is inherent in material or product, submit at least three sets of paired units that show variations.

2.02 INFORMATIONAL PROCEDURES

A. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.

B. Qualification Data: Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

C. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

CONSTRUCTION SPECIFICATIONS

SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

PART 2 - PRODUCTS

2.03 DELEGATED DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

2.04 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type schedule within 30 days of date established for commencement of the Work.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

C. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.

CONSTRUCTION SPECIFICATIONS

SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

PART 3 - EXECUTION

3.01 SUBMITTAL REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Architect will review each action submittal, make marks to indicate corrections or modifications required, will stamp each submittal with an action stamp, and will mark stamp appropriately to indicate action.

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

3.02 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Updating: At daily intervals, update schedule to reflect actual construction progress and activities. Issue schedule daily before each regularly scheduled progress meeting.

1. As the Work progresses, indicate Actual Completion percentage for each activity.

B. Distribute copies of approved schedule to Owner, Architect, subcontractors, testing and inspecting agencies, and parties identified by Contractor with a need-to-know schedule responsibility. When revisions are made, distribute updated schedules to the same parties.

END OF SECTION 01 30 00

CONSTRUCTION SPECIFICATIONS

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

B. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements, comply with the most stringent requirement. Refer uncertainties to Architect for a decision.

C. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum. The actual installation may exceed the minimum within reasonable limits. Indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision.

D. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.

E. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.

CONSTRUCTION SPECIFICATIONS

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

E. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

F. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, notices, receipts for fee payments, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

G. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated.

H. Testing Agency Qualifications: An independent agency with the experience and capability to conduct testing and inspecting indicated; and where required by authorities having jurisdiction, that is acceptable to authorities.

I. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

CONSTRUCTION SPECIFICATIONS

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

J. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

K. Special Tests and Inspections: Engage a qualified testing agency, or special inspector to conduct special tests and inspections required by authorities having jurisdiction.

L. Special Tests and Inspections: Conducted by a qualified testing agency, or special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

B. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality control services.

END OF SECTION 01 40 00

CONSTRUCTION SPECIFICATIONS

SECTION 01 42 00 - REFERENCES

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

B. Abbreviations and Acronyms: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association, Inc.
AAADM	American Association of Automatic Door Manufacturers
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ABAA	Air Barrier Association of America
ABMA	American Bearing Manufacturers Association
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies, Inc.
AGA	American Gas Association
AHAM	Association of Home Appliance Manufacturers
AHRI	Air-Conditioning, Heating, and Refrigeration Institute, The
AI	Asphalt Institute
AIA	American Institute of Architects (The)
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALSC	American Lumber Standard Committee, Incorporated
AMCA	Air Movement and Control Association International, Inc.
ANSI	American National Standards Institute
AOSA	Association of Official Seed Analysts, Inc.
APA	APA - The Engineered Wood Association

CONSTRUCTION SPECIFICATIONS

SECTION 01 42 00 - REFERENCES

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

B. Abbreviations and Acronyms: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

API	American Petroleum Institute
ARI	Air-Conditioning & Refrigeration Institute
ARMA	Asphalt Roofing Manufacturers Association
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	ASME International
ASTM	ASTM International(American Society for Testing and Materials International)
AWI	Architectural Woodwork Institute
AWPA	American Wood Protection Association
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association
BIFMA	BIFMA International
BISSC	Baking Industry Sanitation Standards Committee
CCC	Carpet Cushion Council
CDA	Copper Development Association
CFFA	Chemical Fabrics & Film Association, Inc.
CGA	Compressed Gas Association
CIMA	Cellulose Insulation Manufacturers Association
CISCA	Ceilings & Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CPA	Composite Panel Association
CPPA	Corrugated Polyethylene Pipe Association
CRI	Carpet and Rug Institute (The)
CRRC	Cool Roof Rating Council
CRSI	Concrete Reinforcing Steel Institute
CSA	Canadian Standards Association
CSI	Construction Specifications Institute (The)
CSSB	Cedar Shake & Shingle Bureau

CONSTRUCTION SPECIFICATIONS

SECTION 01 42 00 - REFERENCES

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

B. Abbreviations and Acronyms: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

DHI	Door and Hardware Institute
EIA	Electronic Industries Alliance
EIMA	EIFS Industry Members Association
EJCDC	Engineers Joint Contract Documents Committee
EJMA	Expansion Joint Manufacturers Association, Inc.
FRSA	Sheet Metal & Air Conditioning Contractors Association, Inc.
FSA	Fluid Sealing Association
FSC	Forest Stewardship Council
GA	Gypsum Association
GANA	Glass Association of North America
GRI	(Part of GSI)
GS	Green Seal
GSI	Geosynthetic Institute
HI	Hydronics Institute
HPVA	Hardwood Plywood & Veneer Association
IAPSC	International Association of Professional Security Consultants
ICBO	International Conference of Building Officials
ICEA	Insulated Cable Engineers Association, Inc.
ICPA	International Cast Polymer Association
ICRI	International Concrete Repair Institute, Inc.
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The)
IESNA	Illuminating Engineering Society of North America
IEST	Institute of Environmental Sciences and Technology
IGMA	Insulating Glass Manufacturers Alliance
ILI	Indiana Limestone Institute of America, Inc.
ISA	Instrumentation, Systems, and Automation Society, The
ISSFA	International Solid Surface Fabricators Association
ITU	International Telecommunication Union
KCMA	Kitchen Cabinet Manufacturers Association

CONSTRUCTION SPECIFICATIONS

SECTION 01 42 00 - REFERENCES

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

B. Abbreviations and Acronyms: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

LGSEA	Light Gauge Steel Engineers Association
LPI	Lightning Protection Institute
MBMA	Metal Building Manufacturers Association
MCA	Metal Construction Association
MFMA	Maple Flooring Manufacturers Association, Inc.
MFMA	Metal Framing Manufacturers Association, Inc.
MH	Material Handling
MHIA	Material Handling Industry of America
MIA	Marble Institute of America
MPI	Master Painters Institute
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc.
NAAMM	National Association of Architectural Metal Manufacturers
NACE	NACE International
NADCA	National Air Duct Cleaners Association
NAGWS	National Association for Girls and Women in Sport
NAIMA	North American Insulation Manufacturers Association
NBGQA	National Building Granite Quarries Association, Inc.
NCMA	National Concrete Masonry Association
NCTA	National Cable & Telecommunications Association
NEBB	National Environmental Balancing Bureau
NECA	National Electrical Contractors Association
NeLMA	Northeastern Lumber Manufacturers' Association
NEMA	National Electrical Manufacturers Association
NETA	InterNational Electrical Testing Association
NFPA	(National Fire Protection Association)
NFRC	National Fenestration Rating Council
NGA	National Glass Association
NHLA	National Hardwood Lumber Association
NLGA	National Lumber Grades Authority

CONSTRUCTION SPECIFICATIONS

SECTION 01 42 00 - REFERENCES

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

B. Abbreviations and Acronyms: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

NOFMA	NOFMA: The Wood Flooring Manufacturers Association
NOMMA	National Ornamental & Miscellaneous Metals Association
NRCA	National Roofing Contractors Association
NRMCA	National Ready Mixed Concrete Association
NSSGA	National Stone, Sand & Gravel Association
NTMA	National Terrazzo & Mosaic Association, Inc. (The)
PCI	Precast/Prestressed Concrete Institute
PDI	Plumbing & Drainage Institute
PGI	PVC Geomembrane Institute
PHIUS	Passive House Institute US
PTI	Post-Tensioning Institute
RCSC	Research Council on Structural Connections
RFCI	Resilient Floor Covering Institute
RIS	Redwood Inspection Service
SAE	SAE International
SCAQMD	South Coast Air Quality Management District
SCTE	Society of Cable Telecommunications Engineers
SDI	Steel Deck Institute
SDI	Steel Door Institute
SEFA	Scientific Equipment and Furniture Association
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers
SIA	Security Industry Association
SJI	Steel Joist Institute
SMA	Screen Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SPIB	Southern Pine Inspection Bureau (The)
SPRI	Single Ply Roofing Industry
SSINA	Specialty Steel Industry of North America
SSPC	SSPC: The Society for Protective Coatings

CONSTRUCTION SPECIFICATIONS

SECTION 01 42 00 - REFERENCES

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

B. Abbreviations and Acronyms: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

STI	Steel Tank Institute
SWI	Steel Window Institute
TCNA	Tile Council of North America, Inc.
TEMA	Tubular Exchanger Manufacturers Association
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance
TMS	The Masonry Society
TPI	Truss Plate Institute, Inc.
TPI	Turfgrass Producers International
TRI	Tile Roofing Institute
UL	Underwriters Laboratories Inc.
UNI	Uni-Bell
PVC Pipe Association	
USGBC	U.S. Green Building Council
USITT	United States Institute for Theatre Technology, Inc.
WASTEC	Waste Equipment Technology Association
WCLIB	West Coast Lumber Inspection Bureau
WCMA	Window Covering Manufacturers Association
WDMA	Window & Door Manufacturers Association
WI	Woodwork Institute
WMMPA	Wood Moulding & Millwork Producers Association
WSRCA	Western States Roofing Contractors Association
WWPA	Western Wood Products Association

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CONSTRUCTION SPECIFICATIONS

SECTION 01 42 00 - REFERENCES

PART 2 - PRODUCT (NOT USED)

PART3 - EXECUTION (NOT USED)

END OF SECTION 01 42 00

CONSTRUCTION SPECIFICATIONS

SECTION 01 52 00 - CONSTRUCTION FACILITIES

1.00 GENERAL

Code compliance: Code of Federal Regulations (CFR) Title 29, Part 1910 General Industry Safety and Health Standards and Part 1926 Safety and Health Standards for Construction Industry, NFPA 70E Standard for Electrical Safety in the Workplace, DOE Hoisting and Rigging Standard, ANSI Z359.1 Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components, and ANSI Z359.3 Safety Requirements for Positioning and Travel Restraint Systems.

1.02 SUBMITTALS

No datasheet available

1.03 PRODUCTS

Supplied by organizer

END OF SECTION 01 52 00

CONSTRUCTION SPECIFICATIONS

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. The term “product” includes the terms “material,” “equipment,” “system,” and terms of similar intent.

B. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced.

C. Basis-of-Design Product Specification Submittal: Show compliance with requirements.

D. Compatibility of Options: If Contractor is given option of selecting between two or more products, select product compatible with products previously selected.

E. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer’s disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.01 PRODUCT SELECTION PROCEDURES

A. Provide products that comply with the Contract Documents, are undamaged, and, unless otherwise indicated, are new at the time of installation.

1. Provide products complete with accessories, trim, finish, and other devices and components needed for a complete installation and the intended use and effect.
2. Where products are accompanied by the term “as selected,” Architect will make selection.
3. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

CONSTRUCTION SPECIFICATIONS

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 2 - PRODUCTS

2.01 PRODUCT SELECTION PROCEDURES

B. Where the following headings are used to list products or manufacturers, the Contractor's options for product selection are as follows:

1. Products:
   a. Where requirements include "one of the following," provide one of the products listed that complies with requirements.
   b. Where requirements do not include "one of the following," provide one of the products listed that complies with requirements or a comparable product.

2. Manufacturers:
   a. Where requirements include "one of the following," provide a product that complies with requirements by one of the listed manufacturers.
   b. Where requirements do not include "one of the following," provide a product that complies with requirements by one of the listed manufacturers or another manufacturer.

3. Basis-of-Design Product: Provide the product named, or indicated on the Drawings, or a comparable product by one of the listed manufacturers.

C. Where Specifications require "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

D. Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

CONSTRUCTION SPECIFICATIONS

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 2 - PRODUCTS

2.02 COMPARABLE PRODUCTS

A. Architect will consider Contractor's request for comparable product when the following conditions are satisfied:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications.
3. List of similar installations for completed projects, if requested.
4. Samples, if requested.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 60 00

CONSTRUCTION SPECIFICATIONS

SECTION 05 01 10 - MAINTENANCE OF STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: [Shop Drawings]

B. Comply with applicable provisions of the following :

1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.02 SUMMARY

A. Exterior Structural Steel
1. Exterior HSS Columns
2. Exterior HSS Beams
3. Exterior WT Sections
4. Louver Structural Shapes
5. C - Channel
6. Steel Angles

1.03 QUALITY ASSURANCE

A. Fabricator and erector shall maintain a program of quality assurance in conformance with Section 8, Code of Standard Practice for Steel Buildings and Bridges. Work shall be fabricated in an AISC certified Category Std fabrication plant.

B. Before authorizing the commencement of steel erection, the controlling contractor shall ensure that the steel erector is provided with the written notification required by 29 CFR 1926.752. Provide copy of this notification to the Resident Engineer.

CONSTRUCTION SPECIFICATIONS

SECTION 05 01 10 - MAINTENANCE OF STRUCTURAL METAL FRAMING

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 WEATHERING MAINTENANCE

A. To achieve maximum stain (corrosion) resistance the surface of the stainless steel must be kept clean and in some cases requires protection.

1. Initial Cleaning; Clean thoroughly after initial installation with warm water and household soap.
2. Follow with a protective cleaner and marine polish.
3. If you are on the ocean front please consider the Electro Polish process.
4. In salt water environments we encourage customers to simply hose off the stain less steel as often as necessary to prevent salt build-up.

END OF SECTION 05 01 10

CONSTRUCTION SPECIFICATIONS

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: [Shop Drawings]

B. Comply with applicable provisions of the following :

1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.02 SUMMARY

A. Exterior Structural Steel
1. Exterior HSS Columns
2. Exterior HSS Beams
3. Exterior WT Sections
4. Louver Structural Shapes
5. C - Channel
6. Steel Angles

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator.

1. SEE LRFD DATA COMPILED IN SECTION 03 - STRUCTURAL CALCULATIONS OF PROJECT MANUAL

CONSTRUCTION SPECIFICATIONS

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 2 - PRODUCTS

2.02 STRUCTURAL STEEL

A. Recycled Content of Steel Products: Post-consumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.

B. W-Shapes: [ASTM A 992/A 992M] [ASTM A 572/A 572M, Grade 50 (345)].

C. Channels, Angles[, M] [, S]-Shapes: [ASTM A 36/A 36M] [ASTM A 572/A 572M, Grade 50 (345)].

D. Plate and Bar: [ASTM A 36/A 36M] [ASTM A 572/A 572M, Grade 50 (345)].

E. Cold-Formed Hollow Structural Sections: ASTM A 500, [Grade B] [Grade C], structural tubing.

F. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.

2.03 ACCESSORIES

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers.

B. Anchor Rods: ASTM F 1554, Grade 36.
1. Configuration: [Straight] [Hooked].
2. Nuts: ASTM A 563 (ASTM A 563M) [heavy-]hex carbon steel.
3. Plate Washers: ASTM A 36/A 36M carbon steel.
4. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.

C. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

CONSTRUCTION SPECIFICATIONS

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 2 - PRODUCTS

2.04 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303 and AISC 360.

B. Weld Connections: Comply with AWS D1.1/D1.1M[and AWS D1.8/D1.8M] for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

C. Shop Priming: Prepare surfaces according to SSPC-SP 2 or SSPC-SP 3. Shop prime steel to a dry film thickness of at least 1.5 mils (0.038 mm). Do not prime surfaces to be embedded in concrete or mortar or to be field welded.

PART 3 - EXECUTION

3.01 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Baseplates [Bearing Plates] [and] [Leveling Plates]: Clean concrete and masonry surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of base plate.
3. [Snug-tighten] [Pretension] anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure.
5. Structural steel will be bolted to :
    a. Exterior of deck
    b. Overhead Beam To Beam

C. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

CONSTRUCTION SPECIFICATIONS

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 3 - EXECUTION

3.01 ERECTION

D. Do not use thermal cutting during erection[unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M].

E. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: [Snug tightened] .

F. Weld Connections: Comply with AWS D1.1/D1.1M[and AWS D1.8/D1.8M] for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

3.01 ERECTION

A. Grout shall be sanded and painted by approval of architect.

B. Finish color (gray) to be approved by architect.

END OF SECTION 05 12 00

CONSTRUCTION SPECIFICATIONS

SECTION 05 13 00 - STAINLESS STEEL ROD ASSEMBLIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Stainless steel rod assemblies for Structural Bracing.

B. Related Sections :

1. 05 10 00 – Structural Metal Framing
2. SEE DIVISION 05 13 00 PRODUCT CUTSHEETS

1.02 SUBMITTALS

A. Shop Drawings: Indicate materials, sizes, styles, fabrication, anchorage details, installation details and lengths for stainless steel rod assemblies.

B. Samples:

1. Rod samples – minimum 4-inch long piece of each diameter specified herein.
2. Fitting samples – minimum 1 each fitting specified herein.

C. Quality Assurance/Control Submittals:

1. Qualifications: Proof of manufacturer's qualifications.
2. Manufacturer's Installation Instructions.

D. Closeout Submittals; submit following items:

1. Maintenance Instructions:
   a. Manufacturer's recommendation for periodic cleaning.
   b. Manufacturer's recommendation for periodic checking and adjusting of rods to maintain proper tension.

2. Special Warranties.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Minimum five years experience in producing stainless steel rods and fittings.

CONSTRUCTION SPECIFICATIONS

SECTION 05 13 00 - STAINLESS STEEL ROD ASSEMBLIES

PART 1 - GENERAL

1.03 QUALITY ASSURANCE

B. Field Samples :

1. Reference to manufacturer's Quality Control.
2. Install one complete rod assembly system at location selected by Architect.
3. Obtain Architect's approval prior to installing additional rod systems.
4. Approved sample may remain as part of completed work.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Follow manufacturer's instructions.

1.05 QUALITY ASSURANCE

A. Warranty :

1. Special Warranty: Rods & Connectors—2 year limited warranty against defects in materials and workmanship under normal use, installation and maintenance.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Feeney Inc.
Tel: (510) 893-9473
Fax: (510) 893-9484
Website: http://www.stalokrods.com
1. **Product** : Sta-Lok® Stainless Steel Rod Assemblies

B. ALT : Ronstan Tensile Architecture
Tel: (401) 293-0539
Fax: (510) 293-0538
Website: http://www.ronstantensilearch.com
1. **Product** : ARS1A - 316 Stainless Steel Rods
2. **Product** : ARS2 - S520 Stainless Steel Rods

C. Stainless Steel Rods, Rod Connectors and Fittings: 316 Stainless Steel.

CONSTRUCTION SPECIFICATIONS

SECTION 05 13 00 - STAINLESS STEEL ROD ASSEMBLIES

PART 2 - PRODUCTS

2.02 COMPONENTS

A. Fittings: Type(s) specified below.

1. Sta-Lok® part number F34-____ L/R Tension Forks, standard capacity, type 316 stainless-steel, satin finish, with right and left-hand UNF threads, including conical nut and double headed clevis pin.

2. Sta-Lok® part number F24-____ Fixed Fork Ends, standard capacity, type 316 stainless-steel, satin finish, with right-hand UNF threads, including double headed clevis pin.

3. Sta-Lok® part number RC-____ Rod Connectors, standard capacity, type 316 stainless-steel, satin finish, with right and left-hand UNF threads. Required for rod assemblies over 12-feet (4-meters) long.

4. Stainless steel end fittings and hardware [as identified by manufacturer's model number on Drawings] [as specified by architect on Drawings] [as recommended by manufacturer for installation conditions].

B. Fasteners for Connecting Components to Other Construction (e.g.: structural members eyelets, or eyebolts): Type and size as shown on Drawings.

2.03 ACCESSORIES

A. Isolation Washers & Sleeves

1. Install washers or sleeves per manufacturer's installation instructions, to alleviate direct contact of dissimilar metals and control vibration

2.04 FABRICATION

A. Fabricate systems in accordance with approved [shop drawings] [fabrication detail list].

B. Shop assembly: Preassemble items in shop to greatest extent practicable to minimize assembly at project site. Disassemble units only to extent necessary for shipping and handling limitations. Mark units for reassembly.

CONSTRUCTION SPECIFICATIONS

SECTION 05 13 00 - STAINLESS STEEL ROD ASSEMBLIES

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine work to which rod assemblies system will be attached.

B. Coordinate with responsible entity to correct unsatisfactory conditions.

C. Commencement of work by installer is acceptance of substrate conditions.

3.02 INSTALLATION

A. Follow manufacturer's installation instructions.

3.03 CLEANING

A. Clean rod assembly components thoroughly using warm soapy water (or, if needed, denatured alcohol) to remove any residual lubricants, dirt and stains; rinse thoroughly with clear water and wipe dry with soft, clean cloths.

3.04 PROTECTION

A. Protect system from damage until Date of Substantial Completion.

B. Repair or replace damaged products before Substantial Completion.

END OF SECTION 05 13 00

CONSTRUCTION SPECIFICATIONS

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section specifies materials and services required for installation of cold formed steel, including tracks and required accessories as shown and specified. This Section includes the following:

1. Interior non load-bearing steel stud ceiling framing.

1.02 RELATED WORK

A. Structural steel framing: Section 05 12 00, STRUCTURAL STEEL FRAMING.

B. Non-load-bearing metal stud framing assemblies: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

C. Drop Ceiling assemblies: Section 06 20 23, INTERIOR FINISH CARPENTRY.

1.03 DESIGN REQUIREMENTS

A. Design steel in accordance with American Iron and Steel Institute Publication “Specification for the Design of Cold Formed Steel Structural Members”

B. Structural Performance: Engineer, fabricate and erect cold-formed metal framing with the minimum physical and structural properties indicated.

1.04 SUBMITTALS

A. Shop Drawings: Shop and erection drawings showing steel unit layout, connections to supporting members, and information necessary to complete installation as shown and specified.

1.05 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

CONSTRUCTION SPECIFICATIONS

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.05 APPLICABLE PUBLICATIONS

B. American Iron and Steel Institute (AISI): Specification and Commentary for the Design of Cold-Formed Steel Structural Members (1996)

C. American Society of Testing and Materials (ASTM): A307-10 Standard Specifications for Carbon Steel Bolts and Studs

PART 2 - PRODUCTS

2.01 MATERIALS

A. Sheet Steel for joists, studs and accessories 18 gage and lighter: ASTM A653, structural steel, zinc coated // G60 // // G90 //, with a yield of 230 MPa (33 ksi) minimum.

2.02 JOIST FRAMING

A. Steel Joists: Manufacturer's standard C-shaped steel joists, unpunched, of web depths indicated, with lipped flanges, and complying with the following:

1. Design Uncoated-Steel Thickness: 1.20 mmOR 1.52 mm
2. Flange Width: 41 mm (1 5/8 inches) minimum.

B. Steel Joist Track: Manufacturer's standard U-shaped steel joist track, unpunched, of web depths indicated, with straight flanges, and complying with the following:

1. Design Uncoated-Steel Thickness: Matching steel joists.
2. Flange Width: 41 mm (1 5/8-inches) minimum.

2.03 FRAMING ACCESSORIES

A. Fabricate steel framing accessories of the same material and finish used for framing members, with a minimum yield strength of 230 MPa (33 ksi).

CONSTRUCTION SPECIFICATIONS

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 2 - PRODUCTS

2.03 FRAMING ACCESSORIES

A. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Joist hangers and end closures.

2.04 ANCHORS,CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A36, zinc coated by the hot-dip process according to ASTM A123.

PART 3 - EXECUTION

3.01 FABRICATION

A. Framing components may be preassembled into panels. Panels shall be square with components attached.

B. Cut framing components squarely or as required for attachment. Cut framing members by sawing or shearing; do not torch cut.

C. Hold members in place until fastened.

D. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.

1. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
2. Locate mechanical fasteners and install according to cold-formed metal framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.

E. Where required, provide specified insulation in double header members and double jamb studs which will not be accessible after erection.

CONSTRUCTION SPECIFICATIONS

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 3 - EXECUTION

3.02 ERECTION

A. Handle and lift prefabricated panels in a manner as to not distort any member.

B. Securely anchor tracks to supports as shown.

C. At butt joints, securely anchor two pieces of track to same supporting member or butt weld or splice together.

D. Plumb, align, and securely attach studs to flanges or webs of both upper and lower tracks.

E. All axially loaded members shall be aligned vertically to allow for full transfer of the loads down to the foundation. Vertical alignment shall be maintained at floor/wall intersections.

F. Install jack studs above and below openings and as required to furnish support. Securely attach jack studs to supporting members.

G. Install headers in all openings that are larger than the stud spacing in that wall.

H. Attach bridging for studs in a manner to prevent stud rotation. Space bridging rows as shown.

L. Provide end blocking where joist ends are not restrained from rotation.

M. Provide an additional joist under parallel partitions, unless otherwise shown, when partition length exceeds one half joist span and when floor and roof openings interrupt one or more spanning members.

N. Provide temporary bracing and leave in place until framing is permanently stabilized.

O. Do not bridge building expansion joints with cold-formed metal framing. Independently frame both sides of joints.

P. Fasten reinforcement plate over web penetrations that exceed size of manufacturer's standard punched openings.

CONSTRUCTION SPECIFICATIONS

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 3 - EXECUTION

3.03 TOLERANCES

A. Vertical alignment (plumbness) of studs shall be within 1/960th of the span.

B. Horizontal alignment (levelness) of walls shall be within 1/960th of their respective lengths.

C. Spacing of studs shall not be more than 3 mm (1/8 inch) +/- from the designed spacing providing that the cumulative error does not exceed the requirements of the finishing materials.

D. Prefabricated panels shall be not more than 3 mm (1/8 inch) +/- out of square within the length of that panel.

END OF SECTION 05 40 00

CONSTRUCTION SPECIFICATIONS

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. SUBMITTALS : Shop drawings

PART 2 - PRODUCTS

2.01 METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 240/A 240M or ASTM A 666, Type 304.

C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

D. Zinc-Coated Steel Wire Rope: ASTM A 741.

1. Wire-Rope Fittings: Hot-dip galvanized-steel connectors with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.

E. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.

2.02 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless-steel fasteners for fastening aluminum.
2. Provide stainless-steel fasteners for fastening stainless steel.

CONSTRUCTION SPECIFICATIONS

SECTION 05 50 00 - METAL FABRICATIONS

PART 2 - PRODUCTS

2.03 FABRICATION

A. General: Shear and punch metals cleanly and accurately. Remove burrs and ease exposed edges. Form bent-metal corners to smallest radius possible without impairing work.

B. Comply with AWS for recommended practices in shop brazing. Braze behind finished surfaces without distorting or discoloring exposed side. Clean exposed brazed joints of flux, and dress exposed and contact surfaces.

C. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.

D. Fabricate steel columns with 1/2-inch (12-mm) steel base plates and 1/4-inch steel top plates welded to pipe with continuous fillet weld same size as pipe wall thickness. Drill top plates for connection bolts and base plates for 5/8-inch (16-mm) anchor bolts.

E. Fabricate louver supports, metal of type and thickness indicated below, with end closures:

1. Aluminum Sheet: 0.063 inch (1.60 mm) with [high-performance organic coating] [clear anodic] [color anodic] finish.
2. Stainless-Steel Sheet: 0.050 inch (1.27 mm)

2.04 STEEL FINISHES

A. Hot-dip galvanize steel fabrications at exterior locations.

B. Prepare uncoated ferrous metal surfaces to comply with SSPC-SP 3 and paint with a fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.

CONSTRUCTION SPECIFICATIONS

SECTION 05 50 00 - METAL FABRICATIONS

PART 3 - EXECUTION

3.01 INSTALLATION

A. Provide anchorage devices and fasteners where needed to secure items to in-place construction.

B. Perform cutting, drilling, and fitting required for installing miscellaneous metal

fabrications. Set metal fabrication accurately in location, alignment, and elevation, with edges and surfaces level, plumb, true, and free of rack.

C. Fit exposed connections accurately together to form hairline joints or, where indicated, with uniform reveals and spaces for sealants and joint fillers.

D. Attach steel supports to each louver mid-span.

E. Coat concealed surfaces of aluminum that will come into contact with grout, concrete, wood, or dissimilar metals with a heavy coat of bituminous paint.

END OF SECTION 05 50 00

CONSTRUCTION SPECIFICATIONS

SECTION 05 52 00 - METAL RAILINGS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: [Shop Drawings] [Structural analysis data signed and sealed by a qualified professional engineer registered in the state where Project is located]

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers are to be selected and approved by the architect.

2.02 PERFORMANCE REQUIREMENTS

A. Railings shall be capable of withstanding a uniform load of 50 lbf/ft. (0.73 kN/m) and a concentrated load of 200 lbf (0.89 kN) applied to handrails and top rails of guards in any direction. Uniform and concentrated loads need not be assumed to act concurrently.

B. Railing infill shall be capable of withstanding a concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m). Infill load and other railing loads need not be assumed to act concurrently.

2.03 METALS

A. Steel Pipe: ASTM A 53/A 53M, Schedule 40.

B. Extruded-Aluminum Structural Pipe and Round Tubing: ASTM B 429/B 429M

C. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.

D. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

E. Stainless-Steel Wire Rope: [1-by-19] [7-by-7] wire rope made from wire complying with ASTM A 492, Type 316.

F. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

CONSTRUCTION SPECIFICATIONS

SECTION 05 52 00 - METAL RAILINGS

PART 2 - PRODUCTS

2.04 OTHER MATERIALS

A. Shop Primer for Iron and Steel Railings: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.

B. Shop Primer for Galvanized Railings: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

2.05 FABRICATION

A. Assemble railing systems in shop to the greatest extent possible. Use connections that maintain structural value of joined pieces.

B. Form changes in direction of railing members by [using prefabricated fittings].

C. Fabricate railing systems and handrails for connecting members [with concealed mechanical fasteners and fittings].

D. Provide manufacturer's standard wall brackets, flanges, miscellaneous fittings, and anchors to connect handrail and railing members to other construction.

E. Provide wall returns at ends of wall-mounted handrails.

2.6 FINISHES

A. Steel Railings [Cleaned and shop primed].

B. Aluminum Railings: [Class I, clear anodic finish; complying with AAMA 611] [Baked enamel; primer/topcoat system complying with AAMA 2603]

CONSTRUCTION SPECIFICATIONS

SECTION 05 52 00 - METAL RAILINGS

PART 3 - EXECUTION

3.01 INSTALLATION

A. Fit exposed connections accurately together to form tight, hairline joints.

B. Set railings accurately in location, alignment, and elevation and free of rack.

C. Coat concealed aluminum surfaces that will be in contact with cementitious materials or dissimilar metals with a heavy coat of bituminous paint.

D. Attach handrails to wall with wall brackets.

END OF SECTION 05 52 00

CONSTRUCTION SPECIFICATIONS

SECTION 06 00 00 - CONSTRUCTION ADHESIVES

PART 1 - GENERAL

1.01 SECTION INCLUDES'

A. Construction adhesives.

B. Panel adhesives.

C. Specialty adhesives.

D. Adhesive application schedule.

1.2 RELATED SECTIONS

A. Section 07 91 26 - Joint Fillers.

B. SEE DIVISION 06 00 00 PRODUCT CUTSHEETS

1.3 REFERENCES

A. American Plywood Association AFG-01 - Performance Specifications for Adhesives Used for Field-Gluing Plywood to Wood Framing.

B. ASTM International (ASTM):

1. ASTM C 557 - Standard Specification for Adhesives for Fastening Gypsum Wall board to Wood Framing.
2. ASTM D 1779 - Standard Specification for Adhesive for Acoustical Materials.
3. ASTM D 3498 - Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems.
4. ASTM E 72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.

C. CAN/CGSB-71.25 - Adhesives, for Bonding Drywall to Wood Framing and Metal Studs.

D. GreenSeal GS-36 Specifications - Standard for Adhesives For Commercial Use.

E. California Environmental Protection Agency Air Resource Board (CARB):

CONSTRUCTION SPECIFICATIONS

SECTION 06 00 00 - CONSTRUCTION ADHESIVES

PART 1 - GENERAL

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

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. 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

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Liquid Nails Brand, which is located at:
400 Bertha Lamme Dr.; Cranberry Township, PA 16066;
Toll Free Tel: 800-634-0015;
Email:request info (liquidnails@ppg.com); Web:www.liquidnails.com

B. Substitutions: TO BE APPROVED BY ARCHITECT AND STRUCTURAL ENGINEER

2.2 CONSTRUCTION ADHESIVES

A. Heavy Duty Adhesive (Latex Based):
1. Product: LN-907 Extreme Heavy Duty as manufactured by Liquid Nails Brand.

B. Heavy Duty Adhesive (POLYURETHANE Based):

1. LOCTITE® PL PREMIUM® POLYURETHANE CONSTRUCTION ADHESIVE
2. LOCTITE® PL® 400 VOC SUBFLOOR & DECK ADHESIVE

CONSTRUCTION SPECIFICATIONS

SECTION 06 00 00 - CONSTRUCTION ADHESIVES

PART 2 - PRODUCTS

2.2 CONSTRUCTION ADHESIVES

C. Sub Floor Adhesive:

1. Product: LN-902/LNP-902 Subfloor & Deck Construction Adhesive Low-VOC as manufactured by Liquid Nails Brand.
2. LOCTITE® PL® 400 VOC SUBFLOOR & DECK ADHESIVE

D. PVC Adhesive:

1. Product: 8 oz Clear Gorilla PVC™ Cement
2. Product: 16 oz Purple Gorilla PVC™ Cement

2.3 WATERPROOFING ADHESIVES

E. Sheathing Adhesive:

1. Product: TotalBoat Bond Marine Adhesive Sealant by Jamestown Distributors
2. Product: Super Silicone Seal by 3M Company

PART 3 - EXECUTION

3.1 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.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved submittals.

END OF SECTION 06 00 00

CONSTRUCTION SPECIFICATIONS

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: ICC-ES evaluation reports for [wood-preservative treated wood] [fire-retardant treated wood] [engineered wood products] [shear wall panels]

PART 2 - PRODUCTS

2.01 WOOD PRODUCTS,GENERAL

A. Certified Wood: Wood-based materials [produced from tropical forests] shall be certified as “FSC Pure” or “FSC Mixed Credit” according to FSC STD-01-001, “FSC Principles and Criteria for Forest Stewardship,” and to FSC STD-40-004, “FSC Standard for Chain of Custody Certification.”

B. Lumber: Provide dressed lumber, S4S, marked with grade stamp of inspection agency.

C. 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.

1. Allowable Design Stresses: Engineered wood products shall have allowable design stresses, as published by manufacturer that meet or exceed those indicated. Manufacturer’s published values shall be demonstrated by comprehensive testing.

2.2 TREATED MATERIALS

A. Preservative-Treated Materials: AWPA 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].

1. Use treatment containing no arsenic or chromium.[Do not use inorganic boron (SBX) for sill plates.]
2. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.

CONSTRUCTION SPECIFICATIONS

SECTION 06 10 00 - ROUGH CARPENTRY

PART 2 - PRODUCTS

2.2 TREATED MATERIALS

B. 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.

1. Use Exterior type for exterior locations and where indicated.
2. Use Interior Type A unless otherwise indicated.
3. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
4. Identify with appropriate classification marking of a testing and inspecting agency acceptable to authorities having jurisdiction.

C. Provide fire-retardant treated materials for [all rough carpentry] [items indicated on Drawings].

2.3 FRAMING

A. Certified Wood: Wood framing shall be certified as “FSC Pure” or “FSC Mixed Credit” according to FSC STD-01-001, “FSC Principles and Criteria for Forest Stewardship,” and to FSC STD-40-004, “FSC Standard for Chain of Custody Certification.”

B. Dimension Lumber:

1. Non-Load-Bearing Interior Partitions: [Any species]
2. Species groups in “Framing Other Than Non-Load-Bearing Interior Partitions”
3. Framing Other Than Non-Load-Bearing Interior Partitions: [Construction or No. 2]
4. Exposed Framing: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.

C. Laminated-Veneer Lumber: Manufactured with exterior-type adhesive complying with ASTM D 2559. Allowable design values determined according to ASTM D 5456.

1. WEST FRASIER
   a. 1900 EXETER ROAD, SUITE 105, GERMANTOWN,TN 38138

CONSTRUCTION SPECIFICATIONS

SECTION 06 10 00 - ROUGH CARPENTRY

PART 2 - PRODUCTS

2.3 FRAMING

D. Wood I-Joists: Prefabricated units complying with material requirements of and with structural capacities established and monitored according to ASTM D 5055.

1. 504-1100 Canadiens-de-Montréal AvenueMontréal, Quebec H3B 2S2

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.

1. Manufacturer: Provide products by same manufacturer as I-joists.
2. Material: [All-veneer product] [glued-laminated wood] [or] [product made from any combination solid lumber, wood strands, and veneers].

2.4 SHEAR WALL PANELS

A. Wood-Framed Shear Wall Panels: Prefabricated assembly consisting of wood perimeter framing, tie downs, and Exposure I, Structural I plywood or OSB sheathing.

B. Allowable Design Loads: Shear wall panels shall have allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be demonstrated by comprehensive testing.

2.5 MISCELLANEOUS LUMBER

A. Miscellaneous Dimension Lumber: [Construction, or No. 2] grade. Provide for nailers, blocking, and similar members.

2.6 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, [Exterior, AC], fire-retardant treated, not less than [1/2-inch (13-mm)] nominal thickness.

2.7 MISCELLANEOUS PRODUCTS

A. Fasteners: Size and type indicated. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners [with hot-dip zinc coating complying with ASTM A 153/A 153M] [of Type 304 stainless steel].

CONSTRUCTION SPECIFICATIONS

SECTION 06 10 00 - ROUGH CARPENTRY

PART 2 - PRODUCTS

2.7 MISCELLANEOUS PRODUCTS

1. Power-Driven Fasteners: CABO NER-272.
2. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

B. Metal Framing Anchors: Structural capacity, type, and size indicated.

C. Flexible Flashing: Self-adhesive product consisting of a compound, bonded to a backing sheet to produce an overall thickness of not less than 0.025 inch (0.6 mm).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Locate 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. Do not splice structural members between supports unless otherwise indicated.

D.. Securely attach rough carpentry to substrates, complying with the following:

1. CABO NER-272 for power-driven fasteners.
2. Published requirements of metal framing anchor manufacturer.
3. [Table 2304.9.1, "Fastening Schedule," in the IBC] [Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2)

END OF SECTION 06 10 00

CONSTRUCTION SPECIFICATIONS

SECTION 06 05 23 - WOOD FASTENERS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data : SEE DIVISION 06 05 23 CUTSHEETS

PART 2 - PRODUCTS

2.01 MATERIALS

A. Sheathing nails: 8d common nails

B. Frame screws: 4”

C. Simpson Strong-Tie Company Inc.

1. Column Caps: Simpson CCCQ-SDS2.5, Simpson CCTQ-SDS2.5
2. Source: Simpson Strong-Tie Company Inc.

D. Simpson Strong-Tie Company Inc.

1. Face Mount Hangers: Simpson LUC210Z
2. Source: Simpson Strong-Tie Company Inc.

E. Simpson Strong-Tie Company Inc.

1. Hurricane Ties: Simpson H1
2. Source: Simpson Strong-Tie Company Inc.

CONSTRUCTION SPECIFICATIONS

SECTION 06 05 23 - WOOD FASTENERS

PART 3 - EXECUTION

3.01 INSTALLATION

A. Provide 2”x6” blocking at all free edges.

B. All sill plates shall be p.t. and anchored to foundation walls with 1/2” diameter headed anchor bolts (ASTM F1554) at 4’-0” o.c. and within 12” of all sill plate slices (min. 7” embed.).

C. Joist Hangers shall be a minimum of 18 gauge steel.

D. Built-up beams less than 8” deep shall be spiked together with two (2) 16d nails at 16” o.c.

E. Built-up beams greater than 8” deep shall be spiked together with three (3) 16d nails at 16” o.c.

END OF SECTION 06 05 23

CONSTRUCTION SPECIFICATIONS

SECTION 06 11 00 - WOOD FRAMING

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data. Shop Drawings.

B. Provide dressed lumber marked with grade stamp of inspection agency.

C. All wood framing including details for bridging, blocking, fire stopping, etc., shall conform to the latest edition of the “National Design Specification for Wood Construction” and its supplements and shall be installed in accordance with the NFPA “Manual for House Framing”.

D. Fastening shall be in accordance with the most restrictive of: The International Building Code 2012 or the manufacturer’s recommended fastening schedules.

PART 2 - PRODUCTS

2.01 LUMBER

A. Dimensional Lumber:

1. Maximum Moisture Content: 19 percent

2. Non-Load-Bearing Interior Partitions: Standard, Stud, or No. 3

3. Framing Other Than Non-Load-Bearing Interior Partitions: Douglas firlarch: WCLIB or WWPA

4. Exposed Framing: Provide material hand-selected for uniformity of appearance and freedom from characteristics on exposed surfaces and edges that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.

    a. Species:

        1 Beams, Girders, and Headers: Douglas Fir
        2 Studs and Plates: Douglas Fir

CONSTRUCTION SPECIFICATIONS

SECTION 06 11 00 - WOOD FRAMING

PART 2 - PRODUCTS

2.01 LUMBER

B. Miscellaneous Lumber:

1. Standard, Stud, or No. 3 grade with 19 percent maximum moisture content of any species.
2. Provide for nailers, blocking, and similar members

PART 3 - EXECUTION

3.01 INSTALLATION

A. All flush-framed connections shall be made with approved galvanized steel joist or beam hangers, minimum 18 gauge, installed according to manufacturer's recommendations.

B. Where framing lumber is flush framed to microlam, steel or flitch-plate girder, set these girders 1/4" clear (min.) below top of framing lumber, to allow for shrinkage.

C. Stud walls are to be constructed of 2"x4" at 16" o.c. at the interior unless noted otherwise on plan.

D. Use double studs at ends of wall and ends of wall openings.

E. Use double trimmers and headers at all floor openings where beams are not designated.

F. Built-up beams less than 8" deep shall be spiked together with two (2) 16d nails at 16"o.c.

G. Built-up beams greater than 8" deep shall be spiked together with three (3) 16d nails at 16" o.c.

H. No joists shall be cut or notched without approval.

END OF SECTION 06 11 00

CONSTRUCTION SPECIFICATIONS

SECTION 06 11 13 - ENGINEERED WOOD PRODUCTS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data : SEE DIVISION 06 PRODUCT CUTSHEETS

B. Manufacturer's published values of allowable design stresses shall be demonstrated by comprehensive testing.

PART 2 - PRODUCTS

2.01 WEST FRASER LVL

A. Dimension: 3-1/2" x 9-1/2" nominal, 5-1/2" x 9-1/2" nominal, 5-1/2" x 11-7/8" nominal.

B. Span is measured center to center of supports. The maximum uniform loads are based on a load duration factor CD of 1.00.

C. Assume lateral support is provided at each support and continuously along the compression edge of the beam.

D. Sufficient bearing length shall be provided at supports. The bearing length requirements are based on the maximum total uniform loads and have been adjusted per NDS 2005, 3.10.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Nordic Lam Column:

1. Install to full compliance with specifications and details of manufacturer.

B. Nordic Lam Headers:

1. Install to full compliance with specifications and details of manufacturer.

END OF SECTION 06 11 13

CONSTRUCTION SPECIFICATIONS

SECTION 06 16 23 - SUBFLOORING

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Roof sheathing.
2. Subflooring.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Capable of demonstrating that all wood procurement operations are conducted in accordance with procedures and policies of the Sustainable Forestry Initiative (SFI) Program.

B. Code Compliance: Comply with requirements of the following:

1. International Code Council Evaluation Service, ICC-ES ESR-1785.
2. Voluntary Product Standard, DOC PS2-10, “Performance Standard for Wood-Based Structural-Use Panels.”

1.04 WARRANTY

A. Special Warranty: Manufacturer’s standard form in which manufacturer agrees to repair or replace components of flooring and sheathing system that fail due to manufacturing defects within specified warranty period.

1. For subflooring and roof and wall sheathing applications, manufacturer shall warrant that the panels will not delaminate nor require sanding due to moisture absorption during installation within 300 days of purchase.
2. Warranty Period: 50 years from date of manufacture.

CONSTRUCTION SPECIFICATIONS

SECTION 06 16 23 - SUBFLOORING

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from [UL's "Fire Resistance Directory."] [GA-600, "Fire Resistance Design Manual."]

2.2 WOOD PANEL PRODUCTS

A. Oriented Strand Board: DOC PS 2-10.

B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated. Thickness shall satisfy minimum and maximum requirements for referenced performance category.

C. Factory mark panels to indicate compliance with applicable standard.

2.3 ROOF SHEATHING

A. Oriented-Strand-Board Roof Sheathing: Exposure 1, Structural I sheathing.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Huber Engineered Woods LLC; AdvanTech Sheathing or a comparable product by one of the following:
2. Span Rating and Performance Category: Not less than [32/16, 1/2]
3. Edge Profile: [Square edge] [Tongue and groove].
4. Provide fastening guide on top panel surface with pre-spaced fastening symbols for 16-inches (406 mm) and 24-inches (610 mm) on center spacing

2.4 SUBFLOORING

A. Oriented-Strand-Board Combination Subfloor-Underlayment: Exposure 1 single-floor panels.

CONSTRUCTION SPECIFICATIONS

SECTION 06 16 23 - SUBFLOORING

PART 2 - PRODUCTS

2.4 SUBFLOORING

1. Basis-of-Design Product: Subject to compliance with requirements, provide Huber Engineered Woods LLC; AdvanTech Flooring or a comparable product by one of the following:
2. Span Rating and Performance Category: Not less than [20 oc, 19/32 Performance Category]
3. Edge Detail: Tongue and groove.
4. Surface Finish: Fully sanded face.
5. Performance Standard: [DOC PS2-10] [DOC PS2-10 and ICC-ES ESR-1785 (24 oc, 23/32 Performance Category].
6. Provide fastening guide on top panel surface with pre-spaced fastening symbols for 16-inches (406 mm), 19.2-inches (488 mm) and 24-inches (610 mm) on center spacings.

2.5 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article by the authority having jurisdiction, International Building Code, International Residential Code, Wood Frame Construction manual, and National Design Specification.

2.6 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Subfloor Panels to Framing: [Polyurethane-based] Formulation complying with APA AFG-01 or ASTM D 3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

1. Adhesives shall have a VOC content of 50g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

CONSTRUCTION SPECIFICATIONS

SECTION 06 16 23 - SUBFLOORING

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. ICC-ES ESR-1539 or NES NER-272 for power-driven fasteners.
2. Chapter 23 in ICC's "International Building Code."

D. Use common wire 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. Install fasteners without splitting wood.

E. Coordinate [wall] [and] [roof] sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exteri or moisture from passing through completed assembly.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.1 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in American Wood Council, "ASD/LRFD Manual for Engineered Wood Construction," 2012 edition for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Combination Subfloor-Underlayment:

   a. [Glue and nail] [Glue and screw] to wood framing.
   b. Glue and screw to cold-formed metal framing.
   c. Space panels 1/8 inch (3 mm) apart at edges and ends.
   d. Install fasteners 3/8 inch (9.5 mm) to 1/2 inch (12.7 mm) from panel edges.
   e. Space fasteners 6 inches (152 mm) on centers on supported edges and 12 inches on centers at intermediate support locations.

CONSTRUCTION SPECIFICATIONS

SECTION 06 16 23 - SUBFLOORING

PART 3 - EXECUTION

3.1 WOOD STRUCTURAL PANEL INSTALLATION

B. Fastening Methods: Fasten panels as indicated below:

2. Wall and Roof Sheathing:
   a. Nail to wood framing.
   b. Screw to cold-formed metal framing.
   c. Space panels 1/8 inch (3 mm) apart at edges and ends.
   d. Install fasteners 3/8 inch (9.5 mm) to 1/2 inch (12.7 mm) from panel edges.
   e. Space fasteners in compliance with requirements of authority having jurisdiction.

END OF SECTION 06 16 23

CONSTRUCTION SPECIFICATIONS

SECTION 06 16 33 - SHEATHING

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.01 WOOD PANEL PRODUCTS, GENERAL

A. ZIP SYSTEM WALL SHEATHING

2.02 ROOF AND FLOOR SHEATHING

A. OSB ADVANTECH Roof Sheathing: 3/4” thick, 48/24 span rating

2.04 MISCELLANEOUS PRODUCTS

A. Fasteners: 8d common nails at 4” o.c. at each sheet perimeter and 12” o.c.

B. Adhesives for Field Gluing Panels to Framing: BF Goodrich PL400 or equal

PART 3 - EXECUTION

3.01 INSTALLATION

A. Securely attach to substrates, complying with the following:

1. “Alternate Attachments,” in ICC’s International Residential Code for One- and Two-Family Dwellings.

B. FasteningMethods:

1. Roof Sheathing:

   a. Nail to wood framing.
   b. Screw to cold-formed metal framing.

END OF SECTION 06 16 00

CONSTRUCTION SPECIFICATIONS

SECTION 06 16 53 - MOISTURE RESISTANT SHEATHING BOARD

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Combination wall sheathing, water resistive barrier and air barrier..
2. Combination roof sheathing and roof underlayment.

B. Related Requirements:

1. Section 061000 “Rough Carpentry”.
2. Section 072500 “Weather Barriers” for water-resistive barrier applied over wall sheathing.
3. Section 072700 “Air Barriers”.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. For panels with integral water resistive barrier, include data on air/-moisture-infiltration protection based on testing according to referencing standards.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Capable of demonstrating that all wood procurement operations are conducted in accordance with procedures and policies of the Sustainable Forestry Initiative (SFI) Program.

CONSTRUCTION SPECIFICATIONS

SECTION 06 16 53 - MOISTURE RESISTANT SHEATHING BOARD

PART 1 - GENERAL

1.4 QUALITY ASSURANCE

A. Code Compliance: Comply with requirements of the following:

1. International Code Council (ICC), ICC-ESR1474 (ZIP System Wall Sheathing).
2. International Code Council (ICC), ICC-ESR2227 (ZIP System Tape).
3. Florida Building Code Compliance: Provide sheathing complying with Florida Building Code product and installation requirements for locations outside of high velocity wind zone.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Outdoor Storage: Comply with manufacturer's recommendations.

1. Set panel bundles on supports to keep off ground.
2. Cover panels loosely with waterproof protective material.
3. Anchor covers on top of stack, but keep away from sides and bottom to assure adequate air circulation.
4. When high moisture conditions exist, cut banding on panel stack to prevent edge damage.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sheathing system that fail due to manufacturing defects within specified warranty period.

1. Construction Period Warranty: Manufacturer shall warrant the panels and tape for weather exposure for a period of 180 days from installation.
2. System Warranty Period: 30 years from date of Substantial Completion.

CONSTRUCTION SPECIFICATIONS

SECTION 06 16 53 - MOISTURE RESISTANT SHEATHING BOARD

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory

2.2 WOOD PANEL PRODUCTS

A. Oriented Strand Board: DOC PS 2-10.

B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated. Thickness shall satisfy minimum and maximum requirements for referenced performance category.

C. Factory mark panels to indicate compliance with applicable standard.

2.3 COMBINATION WALL SHEATHING, WATER-RESISTIVE BARRIER, AND AIR BARRIER

A. Oriented-Strand-Board Wall Sheathing: With integral water-resistive barrier, Exposure 1 sheathing.

1. Span Rating, Panel Grade and Performance Category: Not less than [24/16; Rated Sheathing; 7/16 Performance Category]
2. Provide fastening guide on top panel surface with pre-spaced fastening symbols for 16-inches (406 mm) and 24-inches (610 mm) on centers spacings.
3. Performance Standard: DOC PS2-10 and ICC-ES ESR-1474.
4. Factory laminated integral water-resistive barrier facer.
5. Perm Rating of Integral Water-Resistive Barrier: 12-16 perms.
6. Assembly maximum air leakage of 0.0072 cfm/sq. ft. infiltration and 0.0023 cfm/sq. ft. exfiltration at a pressure differential of 1.57 (psf 75 Pa).
7. Exposure Time: Designed to resist weather exposure for 180 days.

CONSTRUCTION SPECIFICATIONS

SECTION 06 16 53 - MOISTURE RESISTANT SHEATHING BOARD

PART 2 - PRODUCTS

2.4 FASTENERS

A. General: Provide fasteners of size and type that comply with requirements specified in this article by the authority having jurisdiction, International Building Code, International Residential Code, Wood Frame Construction manual, and National Design Specification.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. ICC-ES 1539 or NES NER-272 for power-driven fasteners.
2. Chapter 23 in ICC's "International Building Code."
3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."

D. Use common wire 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. Install fasteners without splitting wood.

E. Coordinate [wall] sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

CONSTRUCTION SPECIFICATIONS

SECTION 06 16 53 - MOISTURE RESISTANT SHEATHING BOARD

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

G. Only mechanically attached and drainable EIFS and exterior insulation should be used with ZIP System wall sheathing.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in American Wood Council, "ASD/ LRFD Manual for Engineered Wood Construction," 2012 edition for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall and Roof Sheathing:
   a. Nail or staple to wood framing.
   b. Screw to cold-formed metal framing.
   c. Space panels 1/8 inch (3 mm) apart at edges and ends.
   d. Install fasteners 3/8 inch (9.5 mm) to 1/2 inch (12.7 mm) from panel edges.
   e. Space fasteners with requirements of authority having jurisdiction.

3.3 SHEATHING JOINT TREATMENT

A. Seal sheathing joints according to sheathing manufacturer's written instructions.

1. Apply ZIP System proprietary seam tape to joints between sheathing panels.
2. Utilize ZIP System tape gun or hard rubber roller provided by manufacturer to ensure tape is completely adhered to substrates.

CONSTRUCTION SPECIFICATIONS

SECTION 06 16 53 - MOISTURE RESISTANT SHEATHING BOARD

PART 3 - EXECUTION

3.4 FLEXIBLE FLASHING INSTALLATION

A. Apply ZIP System Tape flexible flashing or ZIP System Liquid Flash liquid applied flashing membrane where indicated to comply with manufacturer's written instructions.

1. After flexible flashing tape has been applied, roll surfaces with a hard rubber to ensure that flashing is completely adhered to substrates.
2. Width for Flexible Flashing: 6 inch (154.4 mm).

END OF SECTION 06 16 00

CONSTRUCTION SPECIFICATIONS

SECTION 06 17 13 - LAMINATED VENEER LUMBER

PART 1 - GENERAL

1.1 GENERAL SUMMARY

A. Section Includes: This Section specifies laminated veneer lumber (LVL) headers, beams.

B. Related Sections:

1. Connectors and Brackets, Anchor Bolts, Bearing Plate Anchors, and Hardware: Division 05 metal fabrication sections.
2. Permanent Bridging and Bracing and Sheathing: Division 06 carpentry sections.
3. Framing Connectors and Hangers: Division 06 carpentry sections.

C. REFERENCE STANDARDS

ASTM International (ASTM):
ASTM D5456 Standard Specification for Evaluation of Structural Composite Lumber Products.
ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials.
Canadian Construction Materials Centre (CCMC):
CCMC Report Number 13310-R.
Forest Stewardship Council A.C. (FSC):
STD-40-003 Standard for Multi-site Certification of Chain of Custody Operations.
STD-40-004 V2.0 FSC Standard for Chain of Custody Certification.
STD-40-005 V2.1 Standard for Company Evaluation of FSC Controlled Wood.
ICC Evaluation Service Inc. (ICC-ES):
ICC-ES Report Number ESR-1210.

D. ADMINISTRATIVE REQUIREMENTS

1. Coordination: Coordinate work of this Section with work of other trades for proper time and sequence to avoid construction delays.

E. QUALITY ASSURANCE

1. Designer Qualifications: A professional structural engineer registered in the [State of NJ]

CONSTRUCTION SPECIFICATIONS

SECTION 06 17 13 - LAMINATED VENEER LUMBER

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. West Fraser
1900 Exeter Road, Suite 105
Germantown, TN 38138

2.2 SUBSTITUTION LIMITATIONS

A. Substitutions: Substitutions must be approved by architect and structural engineer.

2.3 DESIGN CRITERIA

A. Design Live [and Dead] Load for Floors: TO BE APPROVED BY STRUCTURAL ENGINEER

B. Design Live [and Dead] Load for Roofs: TO BE APPROVED BY STRUCTURAL ENGINEER

2.4 MATERIALS

A. Laminated Veneer Lumber: To ASTM D5456.

B. Laminated Veneer Lumber Studs: To ASTM E119.

1. Plies: [4 ply].
2. Thickness: [31⁄2 inches (89 mm)]
3. Depth: As indicated on drawings

2.5 ACCESSORIES

A. Fasteners: [Galvanized steel] OR [Stainless steel], sized to suit application.

1. Acceptable Manufacturers: Simpson Strong-Tie. OR USP Structural Connectors.

CONSTRUCTION SPECIFICATIONS

SECTION 06 17 13 - LAMINATED VENEER LUMBER

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that conditions of substrates previously installed under other sections or contracts are acceptable for product installation in accordance with manufacturer's instructions prior to laminated veneer lumber (LVL) headers, beams and studs installation.

1. Inform [Architect] of unacceptable conditions immediately upon discovery.

3.2 INSTALLATION

A. Coordinate installation of laminated veneer lumber (LVL) headers, beams and studs in accordance with Section [01 73 19 - Installation].

B. Coordinate laminated veneer lumber (LVL) headers, beams and studs work with work of other trades for proper time and sequence to avoid construction delays.

C. Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions, for installation.

D. Install members plumb, level and as indicated.

E. Fasten members to supporting framing as recommended by the LVL manufacturer and the hanger manufacturer.

F. Provide temporary bracing to hold members in position until permanently secured.

G. Cut holes in members only as allowed by the manufacturer.

END OF SECTION 06 17 13

CONSTRUCTION SPECIFICATIONS

SECTION 06 17 33 - WOOD I-JOISTS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections

1. Permanent Bridging and Bracing, Headers and Supports to Frame Openings, and Sheathing: Division 06 carpentry sections.
2. Framing Connectors and Hangers: Division 06 carpentry sections.

1.2 REFERENCES

1. ASTM International (ASTM):
2. ASTM D5055 Standard Specification for Establishing and Monitoring Structural
3. Capacities of Prefabricated Wood I-Joists.
4. Canadian Construction Materials Centre (CCMC):
5. CCMC Report Number 13323-R.
6. Forest Stewardship Council A.C. (FSC):
7. STD-40-003 Standard for Multi-site Certification of Chain of Custody Operations.
8. STD-40-004 V2.0 FSC Standard for Chain of Custody Certification.
9. STD-40-005 V2.1 Standard for Company Evaluation of FSC Controlled Wood.
   International Code Council Evaluation Service (ICC-ES)

1.3 ACTION SUBMITTALS

A. Product Data: Submit for specified products as follows:

1. Manufacturer's product data, including descriptions of component materials, dimensions of specified products, design properties, allowable spans and construction details.

B. Shop Drawings: Submit drawings sealed by the designer indicating member types, sizes, locations and connection details.

C. Design Data: Submit design calculations sealed by the designer for representative structural members.

CONSTRUCTION SPECIFICATIONS

SECTION 06 17 33 - WOOD I-JOISTS

PART 1 - GENERAL

1.4 QUALITY ASSURANCE

D. Designer Qualifications: A professional structural engineer registered in the [state where the project is located].

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Nordic Structures Inc.
504-1100 Canadiens-de-Montréal Avenue
Montréal, Quebec H3B 2S2

2.2 DESIGN CRITERIA

A. Design Live [and Dead] Load for Floors: TO BE APPROVED BY STRUCTURAL ENGINEER

B. Design Live [and Dead] Load for Roofs: TO BE APPROVED BY STRUCTURAL ENGINEER

C. JOIST DEPTH : Not less than 9.5 inches

D. Assembly Fire Resistance Rating: SEE CONSTRUCTION DOCUMENTATION

2.3 MATERIALS

A. I-Joist: To ASTM D5055.

1. Height: 9.5 inches
2. Flange Material: Laminated Veneer Lumber (LVL)
3. Web Material: Oriented Strand Board (OSB) in accordance with PS 2
4. Adhesive: Meets requirements of ASTM D5055

CONSTRUCTION SPECIFICATIONS

SECTION 06 17 33 - WOOD I-JOISTS

PART 2 - PRODUCTS

2.4 ACCESSORIES

A. FASTENERS [Stainless steel], sized to suit application.

1. Acceptable Manufacturers:
   a. Simpson Strong-Tie.
   b. USP Structural Connectors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that conditions of substrates previously installed under other sections or contracts are acceptable for product installation in accordance with manufacturer's instructions prior to engineered wood I-joist installation.

3.2 INSTALLATION

A. Coordinate I-joist installation with work of other trades for proper time and sequence to avoid construction delays.

B. Comply with manufacturer's product data, including product technical bulletins, for installation.

C. Install I-joists plumb, level and as indicated.

D. Fasten joists to supporting framing as recommended by the I-joist manufacturer and hanger manufacturer.

E. Provide temporary bracing as recommended by the manufacturer to hold joists in position until permanently secured.

F. Cut openings in joist webs only as allowed by the manufacturer.

END OF SECTION 06 17 33

CONSTRUCTION SPECIFICATIONS

SECTION 06 20 13 - EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Exterior wood trim.
2. Cedar shake siding.
3. Cedar wall planking
4. Exterior birch plywood paneling

B. Related Requirements:

1. Section 06 10 00 “Rough Carpentry” for furring, blocking, and other carpentry work not exposed to view and for framing exposed to view.

1.02 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

B. Compliance Certificates:

1. For lumber that is not marked with grade stamp.
2. For preservative-treated wood that is not marked with treatment-quality mark.
3. For fire-retardant-treated wood that is not marked with classification marking of testing and inspecting agency.

C. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Cellular PVC trim.
4. Foam plastic moldings.

CONSTRUCTION SPECIFICATIONS

SECTION 06 20 13 - EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.02 SUBMITTALS

D. Sample Warranties: For manufacturer's warranties.

1.03 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

1.05 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecast weather conditions permit work to be performed and at least one coat of specified finish can be applied without exposure to rain, snow, or dampness.

1. For exterior ornamental wood columns, comply with manufacturer's written instructions and warranty requirements.

B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

CONSTRUCTION SPECIFICATIONS

SECTION 06 20 13 - EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.06 WARRANTY

A. Manufacturer's Warranty for Cedar Shake Siding: Manufacturer agrees to repair or replace siding that fails in materials or workmanship within specified warranty period. Failures include, but are not limited to, deformation or deterioration beyond normal weathering.

1. Warranty Period for Siding (Excluding Finish): 7 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

A. Regional Materials: The following wood products shall be manufactured within 500 miles (800 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.

1. Exterior trim.
2. Exterior lumber and high-density fiber-cement siding.

B. Lumber: DOC PS 20 and the following grading rules:

1. WCLIB: West Coast Lumber Inspection Bureau, Standard No. 17, "Grading Rules for West Coast Lumber."
2. WWPA: Western Wood Products Association, "Western Lumber Grading Rules."

C. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.

1. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.

CONSTRUCTION SPECIFICATIONS

SECTION 06 20 13 - EXTERIOR FINISH CARPENTRY

PART 2 - PRODUCTS

2.02 EXTERIOR TRIM

A. Lumber Trim for Unfinished Applications :

1. Species and Grade: Western red cedar, Clear Heart; , WCLIB, or WWPA.
2. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
3. Finger Jointing: Not allowed.
4. Face Surface: Surfaced (smooth).

B. Primed Hardboard Trim: High-temperature-cured, high-resin, wood-fiber composite; factory primed on faces and edges. Recommended by manufacturer for exterior use.

2.03 LUMBER SIDING

A. Species and Grade: Clear VG (Vertical Grain) Heart western red cedar; NLGA, WCLIB, or WWPA.

2.04 CEDAR SHAKE SIDING

A. To be approved by architect.

2.05 MISCELLANEOUS MATERIALS

A. Fasteners for Exterior Finish Carpentry: Provide screws, in sufficient length to penetrate not less than 1-1/2 inches (38 mm) into wood substrate.

1. Provide stainless-steel fasteners.

B. Flashing: Comply with requirements in Section 07 62 00 “Sheet Metal Flashing and Trim” for flashing materials installed in exterior finish carpentry.

1. Horizontal Joint Flashing for Cedar Shakes: Preformed, stainless-steel, Z-shaped flashing.

CONSTRUCTION SPECIFICATIONS

SECTION 06 20 13 - EXTERIOR FINISH CARPENTRY

PART 2 - PRODUCTS

2.06 FABRICATION

A. Back out or kerf backs of standing and running trim wider than 5 inches (125 mm), except members with ends exposed in finished work.

B. Ease edges of lumber less than 1 inch (25 mm) in nominal thickness to 1/16-inch (1.5-mm) radius and edges of lumber 1 inch (25 mm) or more in nominal thickness to 1/8-inch (3-mm) radius.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Prime lumber and moldings to be painted, including both faces and edges, unless factory primed. Cut to required lengths and prime ends. Comply with requirements in Section 09 91 13 “Exterior Painting.”

3.03 INSTALLATION

A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.

1. Do not use manufactured units with defective surfaces, sizes, or patterns.

CONSTRUCTION SPECIFICATIONS

SECTION 06 20 13 - EXTERIOR FINISH CARPENTRY

PART 3 - EXECUTION

3.03 INSTALLATION

B. Cedar Shake Siding will be installed as individual panels for ease of transport.

1. PANELS WILL ATTACH TO EXTERIOR WALL AS RAINSCREEN.

C. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut exterior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
2. Install to tolerance of 1/8 inch in 96 inches (3 mm in 2438 mm) for level and plumb. Install adjoining exterior finish carpentry with 1/32-inch (0.8-mm) maximum offset for flush installation and 1/16-inch (1.5-mm) maximum offset for reveal installation.
3. Coordinate exterior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate exterior finish carpentry.

3.04 STANDING AND RUNNING TRIM INSTALLATION

A. Install flat-grain lumber with bark side exposed to weather.

B. Install trim with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches (610 mm) long except where necessary.

1. Use scarf joints for end-to-end joints.
2. Stagger end joints in adjacent and related members.

C. Fit exterior joints to exclude water. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Plane backs of casings to provide uniform thickness across joints, where necessary for alignment.

CONSTRUCTION SPECIFICATIONS

SECTION 06 20 13 - EXTERIOR FINISH CARPENTRY

PART 3 - EXECUTION

3.04 STANDING AND RUNNING TRIM INSTALLATION

D. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.

3.05 CEDAR SHAKE INSTALLATION

A. Install siding to comply with manufacturer's written instructions and warranty requirements.

B. Cedar Shake Siding: Start by applying Cedar Breather to 3/4" Plywood Panel. Install subsequent courses spaced as detailed over course below. Do not allow nails to penetrate plywood or become exposed. Stagger shakes.

1. Leave 1/8-inch (3-mm) gap at trim and corners unless otherwise recommended by manufacturer. 5-1/2" horizontal spacing, to the weather.
2. Butt joints only over framing or blocking, nailing top and bottom on each side and staggering joints in subsequent courses.

C. Flashing: Install metal flashing as indicated on Drawings and as recommended by siding manufacturer.

3.06 ADJUSTING

A. Replace exterior finish carpentry that is damaged or does not comply with requirements. Exterior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.07 CLEANING

A. Clean exterior finish carpentry on exposed and semiexposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

END OF SECTION 06 20 13

CONSTRUCTION SPECIFICATIONS

SECTION 06 20 23 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Interior trim, including non-fire-rated interior door frames.
2. Baltic Birch Plywood Cabinetry
3. Baltic Birch Plywood Ceiling Panels
4. Baltic Birch Plywood Wall Panels

B. Related Requirements:

1. Section 09 91 23 “Interior Painting” for priming and backpriming of interior finish carpentry.

1.02 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

1. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.
2. Include copies of warranties from chemical-treatment manufacturers for each type of treatment.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

B. Deliver interior finish carpentry materials only when environmental conditions meet requirements specified for installation areas.

CONSTRUCTION SPECIFICATIONS

SECTION 06 20 23 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.04 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

A. Regional Materials: The following wood products shall be manufactured within 500 miles (800 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.

1. (3/4") Baltic birch plywood

B. Lumber: DOC PS 20 and the following grading rules:

1. NeLMA: Northeastern Lumber Manufacturers' Association, "Standard Grading Rules for Northeastern Lumber."
2. NHLA: National Hardwood Lumber Association, "Rules for the Measurement and Inspection of Hardwood & Cypress."
3. NLGA: National Lumber Grades Authority, "Standard Grading Rules for Canadian Lumber."
4. SPIB: The Southern Pine Inspection Bureau, "Standard Grading Rules for Southern Pine Lumber."

CONSTRUCTION SPECIFICATIONS

SECTION 06 20 23 - INTERIOR FINISH CARPENTRY

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

B. Lumber: DOC PS 20 and the following grading rules:

5. WCLIB: West Coast Lumber Inspection Bureau, Standard No. 17, “Grading Rules for West Coast Lumber.”
6. WWPA: Western Wood Products Association, “Western Lumber Grading Rules.”

C. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.

1. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.

D. Softwood Plywood: DOC PS 1.

E. Hardboard: AHA A135.4.

F. MDF: ANSI A208.2, Grade 130, made with binder containing no urea-formaldehyde resin.

G. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no ureaformalde hyde resin.

H. Melamine-Faced Particleboard: Particleboard complying with ANSI A208.1, Grade M-2, finished on both faces with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

1. Color: Match Architect’s samples.

2.02 INTERIOR TRIM

A. Lumber Trim for Opaque Finish (Painted Finish White or Polyeurathane) :

CONSTRUCTION SPECIFICATIONS

SECTION 06 20 23 - INTERIOR FINISH CARPENTRY

PART 2 - PRODUCTS

2.02 INTERIOR TRIM

B. INTERIOR FINISH CARPENTRY

1. Species and Grade: Eastern white pine, Premium or 2 Common; NeLMA or NLGA.
2. Maximum Moisture Content: 10 percent.
3. Finger Jointing: Allowed.
4. Face Surface: Surfaced (smooth).
5. Optional Material: Primed MDF of same actual dimensions as lumber indicated may be used in lieu of lumber.

2.03 SHELVING

A. Utility Shelving: Made from one of the following materials, 3/4 inch (19 mm) thick.

1. MDF with radiused or solid-wood front edge.
2. Baltic Birch softwood plywood with solid-wood edge.

B. Shelf Brackets without Rod Support: BHMA A156.16, B04041; prime-painted formed steel.

C. Standards for Adjustable Shelf Brackets: BHMA A156.9, B04102; powder-coatfinished steel.

D. Adjustable Shelf Brackets: BHMA A156.9, B04112; powder-coat-finished steel.

E. Standards for Adjustable Shelf Supports: BHMA A156.9, B04071; powder-coatfinished steel.

CONSTRUCTION SPECIFICATIONS

SECTION 06 20 23 - INTERIOR FINISH CARPENTRY

PART 2 - PRODUCTS

2.04 MISCELLANEOUS MATERIALS

A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secureattachment, concealed where possible.

B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.

1. Wood glue shall have a VOC content of 30 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.

1. Adhesive shall have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.05 FABRICATION

A. Back out or kerf backs of the following members except those with ends exposed in finished work:

1. Interior standing and running trim except shoe and crown molds.
2. Wood-board paneling.

B. Ease edges of lumber less than 1 inch (25 mm) in nominal thickness to 1/16-inch (1.5-mm) radius and edges of lumber 1 inch (25 mm) or more in nominal thickness to 1/8-inch (3-mm) radius.

CONSTRUCTION SPECIFICATIONS

SECTION 06 20 23 - INTERIOR FINISH CARPENTRY

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.03 INSTALLATION, GENERAL

A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, too small to fabricate with proper jointing arrangements, or with defective surfaces, sizes, or patterns.

B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
2. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.

CONSTRUCTION SPECIFICATIONS

SECTION 06 20 23 - INTERIOR FINISH CARPENTRY

PART 3 - EXECUTION

3.03 INSTALLATION, GENERAL

3. Install to tolerance of 1/8 inch in 96 inches (3 mm in 2438 mm) for level and plumb. Install adjoining interior finish carpentry with 1/32-inch (0.8-mm) maximum offset for flush installation and 1/16-inch (1.5-mm) maximum offset for reveal installation.
4. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.04 STANDING AND RUNNING TRIM INSTALLATION

A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches (610 mm) long, except where necessary. Stagger joints in adjacent and related standing and running trim. Cope at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.

1. Install trim after gypsum-board joint finishing operations are completed.
2. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.

END OF SECTION 06 20 23

CONSTRUCTION SPECIFICATIONS

SECTION 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Interior standing and running trim.

B. Wood veneer flat panel surfaces.

C. Solid surface materials and fabrication.

D. Shelving not integral with cabinets.

E. Shop finish of interior woodwork.

1.02 RELATED SECTIONS

A. Division 6: Miscellaneous Rough Carpentry for wood furring, blocking, shims, hanging strips, and other details required for installing woodwork.

B. Division 8: Glass for use in millwork where indicated.

C. Division 22: Sections to provide sinks, faucets, traps, strainers and tailpieces required in casework,including templates for countertop sink cutouts.

1.03 DEFINITIONS

A. Exposed Portions of Cabinets: Surfaces visible when doors and drawers are closed, including bottoms of cabinets more than 48 inches above floor, and surfaces visible in open cabinets.

B. Semi-exposed Portions of Cabinets: Surfaces behind opaque doors, such as interiors of cabinets,shelves, dividers, interiors and sides of drawers, and interior faces of doors. Tops of cabinets 72 inches or more above the floor are defined as semi-exposed.

C. Concealed Portions of Cabinets: Surfaces usually visible after installation, including sleepers, web frames, dust panels, and ends and backs that are placed directly against walls or other cabinets.

CONSTRUCTION SPECIFICATIONS

SECTION 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.04 SUBMITTALS

A. Shop drawings

1. Show location of each item, dimensioned plans and elevations, large-scale details,attachment devices, and other components.
2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement.
3. Show locations and sizes of cutouts and holes for plumbing fixtures and other itemsi nstalled in architectural woodwork.
4. Provide one set of shop drawings which includes all products within this section, engineered and built by a single source manufacturer, with seamless coordination amongst all products.

B. Samples for Selection

1. Samples with applied transparent finishes to be provided upon request.
2. High pressure decorative laminate sample chains to be provided upon request.
3. PVC edgebanding color charts to be provided upon request.
4. Solid surface color samples to be provided upon request.

C. Samples for Final Verification

1. Lumber with / for transparent finish, not less than 15 square inches, for each species and cut, finished on one side.
2. Veneer faced panel products with / for transparent finish, not less than 15 square inches, for each species and cut. Include at least one face-veneer seam and finish as specified.
3. Laminated sample blocks: 4 inch x 4 inch, applied to substrate, with PVC edgebanding on two edges. Provide one sample block for each color/pattern selection upon request.
4. Solid surface sample blocks: 2 inch x 2 inch. Provide one sample block for each color/pattern selection upon request.

D. Mockups: Build mockups to verify selections made, to demonstrate aesthetic effects, and set quality standards for materials and execution.

1. Approved mockups may become part of the completed work if undisturbed at time of substantial completion.

CONSTRUCTION SPECIFICATIONS

SECTION 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.05 PROJECT CONDITIONS

A. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying work.

1. Locate concealed framing, blocking and reinforcements that support woodwork by field measurements before being enclosed.
2. Where field dimensions cannot be made without delaying the work, project general contractor will guarantee dimensions in order to proceed with manufacturing of woodwork.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide materials that comply with requirements of AWS Sections 5, 6, 10, and 11 and the referenced product standards indicated:

1. Laminate: NEMA Test LD-3, 2005.
   a. If colors are not indicated in Room Finish Schedule, selection will be from standard IKEA color offerings
2. Hardboard: ANSI / AHA A135.4
3. Particleboard: ANSI A208.1-2009, M-2 requirements, Industrial grade.
4. Veneer Faced Panels (MDF or particleboard core): HPVA HP-1
5. Interior Wood Trim: Provide finished wood lumber and moldings complying with the following requirements.
6. Solid Surface: Meeting ANSI Z124.3 or ANSI Z124.6 standards
   a. Species and Cut: Plain-sawn, clear, kiln dried BALTIC BIRCH selected for compatible grain and color

CONSTRUCTION SPECIFICATIONS

SECTION 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK

PART 2 - PRODUCTS

2.02 LAMINATE CLAD KITCHEN CABINETS

A. Quality Standard: Comply with AWS Section 10 – Casework (2009 AWI, AWMAC, WI –Architectural Woodwork Standards – 1st Edition).

B. Grade: Custom

C. Face Construction: Reveal Overlay design.

D. Core: Industrial grade particleboard.

E. Laminate Cladding on Surfaces

1. Exposed surfaces: High pressure decorative laminate VGS (0.028 thickness) balanced with high pressure cabinet linter CLS (0.020 thickness). Use of TFM on exposed exterior surfaces will not be permitted.
2. Semi-Exposed surfaces: Thermally fused melamine laminate.
3. Unfinished core surfaces, even on concealed surfaces (excluding edges), will not be permitted.

PART 3 – EXECUTION

3.01 PREPARATION AND INSTALLATION

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installation of woodwork items unless concealed within other construction before woodwork installation.

B. Condition woodwork to humidity conditions as specified in Project Conditions.

C. Quality Standard: Install woodwork to Comply with AWS Sections 5, 6, 10, and 11.

D. Install woodwork plumb, level, true, and straight with no distortions. Shim as required with concealed shims. Install to a tolerance of 1/8 inch in 96 inches for plumb and level, with no variations in flushness of adjoining surfaces.

E. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.

CONSTRUCTION SPECIFICATIONS

SECTION 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK

PART 3 – EXECUTION

3.01 PREPARATION AND INSTALLATION

G. Install cabinets without distortion so that doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide easy operation.

H. Anchor countertops securely to base units and other support systems as indicated.

J. Install standing and running trim, and rails with minimum number of joints possible, using full-length pieces from maximum length lumber available. Stagger joints in adjacent and related members. Cope returns and miter corners.

1. Fill gaps between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base.

K. Install miscellaneous accessories per manufacturer's instructions using fasteners appropriate to substrate and recommended by manufacturer. Install units plumb and level, firmly anchored, in locations indicated on drawings.

L. Touch up finishing work specified in this section after installation of woodwork. Fill nail holes with matching filler where exposed.

3.03 PROTECTION

A. Provide final protection and maintain environmental conditions in a manner acceptable to manufacturer and installer which insures that without damage or deterioration at the time of substantial completion.

END OF SECTION 06 40 23

CONSTRUCTION SPECIFICATIONS

SECTION 06 51 00 - STRUCTURAL PLASTIC SHAPES AND PLATES

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product data [and Samples].

PART 2 - PRODUCTS

2.01 ABS PLASTIC SHEET PANELING

A. General: Gel-coat-finished, glass-fiber-reinforced plastic panels complying with ASTM D 5319.[Panels shall be USDA accepted for incidental food contact.]

1. Nominal Thickness: Not less than [0.12 inch (3.0 mm)]
2. Surface Finish: [Smooth] [Molded pebble texture]

B. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners,[outside corners,] and caps as needed to conceal edges.

C. Adhesive: As recommended by plastic paneling manufacturer.

D. Sealant: [Mildew-resistant silicone] [Latex] sealant recommended by plastic paneling manufacturer and complying with requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.01 INSTALLATION

A. Lay out paneling before installing. Locate panel joints so that trimmed panels at corners are not less than 12 inches (300 mm) wide.

B. Install panels in a full spread of adhesive.

C. Install trim accessories with adhesive and nails or staples. Do not fasten through panels.

D. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.

END OF SECTION 06 51 00

CONSTRUCTION SPECIFICATIONS

SECTION 06 60 00 - PLASTIC FABRICATIONS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Cellular pvc trim boards for corner boards, soffits, fascias, battens, door pilasters, frieze boards, rake boards, architectural millwork and door/window trim.

B. Install trim accessories with adhesive and nails or staples. Do not fasten through panels.

C. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.

1.03 REFERENCES

A. ASTM D792 - Density and Specific Gravity of Plastics by Displacement.

B. ASTM D570 - Water Absorption of Plastics.

C. ASTM D638 - Tensile Properties of Plastics.

D. ASTM D790 - Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

E. ASTM D1761 - Mechanical Fasteners in Wood.

F. ASTM D5420 - Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by means of a Striker Impacted by a Falling Weight.

1.04 SUBMITTALS

A. Product Data: Submit product data, manufacturer's catalogs, SPEC-DATA® product sheet, for specified products.

1.07 WARRANTY

A. Provide manufacturer's 25 year warranty against defects in manufacturing that cause the products to rot, corrode, delaminate, or excessively swell from moisture.

CONSTRUCTION SPECIFICATIONS

SECTION 06 60 00 - PLASTIC FABRICATIONS

PART 2 - PRODUCTS

2.01 MATERIALS

A. Acceptable products: AZEK® Trimboards manufactured by Vycom Corporation, 801 Corey Street, Moosic, PA 18507.

B. Material: Free foam cellular pvc material with a small-cell microstructure and density of .55 grams/cm3.

C. Performance and physical characteristic requirements :

Property	Units	Value	ASTM Method
PHYSICAL			
Density	g/cm³	0.55	D 792
Water Absorption	%	0.15	D 570
MECHANICAL			
Tensile Strength	psi	2256	D 638
Tensile Modulus	psi	144,000	D 638
Flexural Strength	psi	3329	D 790
Flexural Modulus	psi	144,219	D 790
Nail Hold	Lbf/in of penetration	35	D 1761
Screw Hold	Lbf/in of penetration	680	D 1761
Staple Hold	Lbf/in of penetration	180	D 1761
Gardner Impact	in-lbs	103	D 5420
Charpy Impact (@23°C)	ft-lbs	4.5	D 256
THERMAL			
Coefficient of Linear Expansion	in/in/°F	3.2 x 10-5	D 696
Burning Rate	in/min	No burn when flame removed	D 635
Flame Spread Index	--	25	E 84
Heat Deflection Temp 264 psi	°F	150	D 648
Oil Canning (@140°F)	°F	Passed	D 648

2.02 ACCESSORY PRODUCTS

A. Fasteners:

1. Use fasteners designed for wood trim and wood siding (thinner shank, blunt point, full round head) with AZEK®.
2. Use a highly durable fastener such as stainless steel or hot-dipped galvanized.
3. Use 2 fasteners per every framing member for trimboards applications. Trimboards 12” or wider, as well as sheets, will require additional fasteners.

CONSTRUCTION SPECIFICATIONS

SECTION 06 60 00 - PLASTIC FABRICATIONS

PART 2 - PRODUCTS

2.02 ACCESSORY PRODUCTS

B. Adhesives:

1. Glue all AZEK to AZEK joints such as window surrounds, long fascia runs, etc. with AZEK Adhesive, a cellular pvc cement, to prevent joint separation.
2. The glue joint should be secured with a fastener and/or fastened on each side of the joint to allow adequate bonding time.
3. If standard pvc cements are used, keep in mind these products typically cure quickly which will result in limited working time and may reduce adhesive strength.

C. Sealants:

1. Use urethane, polyurethane or acrylic based sealants without silicone.

2.03 FINISHES

A. AZEK products do not require paint for protection, but may be painted to achieve a custom color.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Cutting :

1. AZEK products can be cut using the same tools used to cut lumber.
2. Carbide tipped blades designed to cut wood work well. Avoid fine tooth metal cutting blades.

B. Drilling :

1. AZEK products can be drilled using the same tools used to drill lumber.
2. Drilling AZEK products is similar to drilling a hardwood. Care should be taken to avoid frictional heat buildup.
3. Use standard woodworking drills. Do not use drills made for normal rigid pvc.

CONSTRUCTION SPECIFICATIONS

SECTION 06 60 00 - PLASTIC FABRICATIONS

PART 3 - EXECUTION

3.01 INSTALLATION

C. Milling :

1. AZEK products can be milled using standard milling machines used to mill lumber.

D. Thermal Expansion and Contraction :

1. AZEK products expand and contract with changes in temperature.
2. Properly fastening AZEK material along its entire length will minimize expansion and contraction.
3. When properly fastened, allow for 1/8” per 18 foot of AZEK product for expansion and contraction.
4. Joints between pieces of AZEK should be glued to eliminate joint separation. When gaps are glued on a long run of AZEK, allow expansion and contraction at ends of the run.

END OF SECTION 06 60 00

CONSTRUCTION SPECIFICATIONS

SECTION 06 73 00 - FIBER-REINFORCED HYBRID DECKING

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Fiber reinforced hybrid decking finished with stain and sealers for exterior applications.

1.2 RELATED SECTIONS

A. Section 06 10 00 - Rough Carpentry.

B. Section 07 10 00 - Dampproofing and Waterproofing.

C. Section 09 90 00 - Painting and Coating.

D. SEE DIVISION 06 PRODUCT CUTSHEETS

1.3 REFERENCES

A. ASTM International (ASTM):

1. ASTM E 84-11a - Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM D 1037-2006a - Standard Test Methods for Evaluating Properties of Wood-Based Fiber
3. ASTM D 1413-2007e1 - Standard Test Method for Wood Preservatives
4. ASTM F 1679-04 - Standard Test Method for Using a Variable Incidence Tribometer (VIT)
5. ASTM D 2047 - 2011 - Standard Test Method for Static Coefficient of Friction of Polished-Coated
6. ASTM D 2395-2002: Standard Test Methods for Density and Specific Gravity of Wood
7. ASTM D 2565- (Reapproved 2008), Practice for Operating Xenon-Arc-Type Light- Exposure Apparatus With and Without Water for Exposure of Plastics.
8. ASTM D 5071-06 Standard Practice for Exposure of Photodegradable Plastics in a Xenon Arc Apparatus.
9. ASTM D 696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30 degrees C and 30 Degrees C With a Vitreous Silica Dilatometer ; 2008.
10. ASTM D 2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine; 2004.

B. AWPA E1-09, Standard Method for Laboratory Evaluation to Determine Resistance to Subterranean Termites.

C. AWPA E10-11 Standard Method of Testing Wood Preservatives by Laboratory Soil Block Cultures.

CONSTRUCTION SPECIFICATIONS

SECTION 06 73 00 - FIBER-REINFORCED HYBRID DECKING

PART 1 – GENERAL

1.4 SYSTEM DESCRIPTION

A. TruGrain decking and sleeper systems are for outdoor deck and porch applications in residential and commercial construction that includes areas exposed to weather, humidity or coastal conditions.

B. Decking can be designed and installed with Westech railings and handrails.

C. TruGrain profile products are made with Resysta, an agricultural waste made with recycled rice husks (60 percent) and agricultural waste, common salt and mineral oil.

D. TruGrain profiles are produced by Westech Building Products using Resysta, a rapidly renewable resource.

E. The product provides a wood-like appearance, and sustainability and improved durability compared to hardwood and wood composites.

F. Finish staining can be achieved in 6 standard colors or 20 custom colors. Stain colors can be mixed to create other custom colors. Resysta 2K sealing provides UV resistance for the Resysta stain. Resysta 2K Sealer RFS is a diluted, transparent two component polyurethane sealer for outdoor use.

G. TruGrain has expansion and contraction coefficients that need to be considered during the installation of the material, comply with manufacturer's installation guides.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Shop Drawings: Indicate substrate deck framing system, loads and cambers, bearing details, and framed openings.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years of code compliant products for 10 years.

CONSTRUCTION SPECIFICATIONS

SECTION 06 73 00 - FIBER-REINFORCED HYBRID DECKING

PART 1 – GENERAL

1.6 QUALITY ASSURANCE

A. Material Disclosures Required:

1. Health Product Declaration

C. Installer Qualifications: Minimum 2 year experience installing similar products.

D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship is approved by Architect.
3. Refinish mock-up area as required to produce acceptable work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store in ventilated areas with constant minimum temperature of 60 degrees F and maximum relative humidity of 55 percent.

1.8 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 recommended limits.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: TruGrain™ made with Resysta®; a Westech Product, which is located at: 2801 Post Oak Blvd.; Houston, TX 77056; Toll Free Tel: 866-423-2385; Tel: 713-585-2570; Fax: 713-343-8440; Email:request info (technicalinfo@westechbp.com); Web:www.tru-grain.com

B. Substitutions: Not permitted.

CONSTRUCTION SPECIFICATIONS

SECTION 06 73 00 - FIBER-REINFORCED HYBRID DECKING

PART 2 PRODUCTS

2.2 MATERIALS

A. TruGrain products contain Resysta, a bio-based wood substitute made of ARF (Active Resysta Filler). proprietary blend of rice husks (60 percent by volume of recycled content) that would otherwise become landfill waste, and mineral oil.

1. Properties:
   a. Bending Strength: 4,696 psi per ASTM D 790.
   b. Bending E-Modulus: 535,600 psi per ASTM D 790.
   c. Tensile Strength: 3,162 psi per ISO 527.
   d. Tensile E-Modulus: 339,440 psi per ISO 527.
   e. Screw Withdrawal: 1,299 lbf.
      1) Screw extension stability according to ASTM E 330.
         a) Axial extraction force: 609,456 psi (4202 N/sq.mm).
         b) Axial extraction resistance: 40,615 psi (280 N/sq.mm).
   f. Thermal Conductivity (DIN EN 12664): 1.38 BTU-in/hr-sq.ft.
   g. Coefficient of Thermal Expansion (3.6x10(-5) m/m degrees C).
   h. Density (Approximate): 1.46 g/cm3
   i. Moisture Effect: Product does not absorb moisture.
   j. Fungal Decay Resistance (AWPA E 10-11):
   k. No cracks, blisters or other visible changes after 1500 hours.

2. Rapidly Renewable Materials: 60 percent.

B. Decking:

1. Deck Profile: Gold.
   a. Size: 1 inch thick, 5-1/2 inches wide hollow core board with internal ribs.
   b. Texture: Sanded both sides; one side with radius
      1) Place radius side as the walking surface as indicated on drawings
   c. Texture: Sanded on both sides; one side with radius

2. Decking Field Boards and Perimeter boards: Manufacturer's proprietary hollow core floor decking with hidden fasteners.

3. End Plates, Perimeter Boards:
   a. Size: 3/4 inch (19 mm) thick, 2-3/4 inches (70 mm) wide solid board.

4. Edge Cap:
   a. Size: 1/2 inch (12 mm) thick, 1/2 inch (12 mm) wide solid board.

CONSTRUCTION SPECIFICATIONS

SECTION 06 73 00 - FIBER-REINFORCED HYBRID DECKING

PART 2 PRODUCTS

2.3 ACCESSORIES

A. Substructure Frame:

1. Standard wood frame substructure
2. DexSpan Extruded Aluminum Deck and Dock Framing Systems

B. Fasteners and Anchors:

1. Fastener Type and Finish: Plastic clips with provided stainless steel screws for coastal regions; coated steel clips with provided treated screws for all areas. Stainless steel corrosion resistant type #10 x 2-1/2 inches wood screws for hidden face fastening applications. Comply with manufacturer's installation guides.
2. Fastener Type and Finish for Hybrid Decking: Stainless steel, type as recommended by manufacturer.

C. Accessory Components: 1/2 inch diameter Dowel, Fascia board, edge guard, and end cap of same material and finish as decking or adjacent trim as indicated on Drawings.

D. Stains and Sealer:

1. Resysta Provided Standard Stain Color:
   a. C-42 Cape Cod.
   b. C-51 Walnut.
2. Use of Resysta's proprietary stains and sealer is highly recommended. Use of non-approved water borne or oil based stain is not recommended and may violate the product warranty

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrate conditions before beginning installation; verify dimensions and acceptability of substrate.

1. Determine substrate was installed to accommodate all loads imposed upon it by the TruGrain Fiber Reinforced Decking and components supplied by other parties.

CONSTRUCTION SPECIFICATIONS

SECTION 06 73 00 - FIBER-REINFORCED HYBRID DECKING

PART 3 EXECUTION

3.1 EXAMINATION

B. Do not proceed with installation until unacceptable conditions have been corrected.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

D. If the decking is being installed in a location where the air gap below the decking is equal to or less than 6 inches (152 mm) from the underside of the decking substructure to the ground / solid structure the joist spacing shall be reduced to 12 inches (305 mm) center-to-center. Comply with manufacturer's installation guidelines.

3.2 PREPARATION

A. Coordinate placement of bearing items.

B. Apply one coat of bituminous paint to concealed surfaces that will be in contact with cementitious or dissimilar materials.

C. Do not install materials until site pre-finishing is complete and dry.

3.3 INSTALLATION - BOARD DECKING

A. Install sleepers, decking, trim and accessories per manufacturer's recommendations.

B. Apply finish stain to individual decking planks and trim prior to installation before or after installation.

C. Install decking perpendicular to framing members, with ends staggered over minimum 1-1/2 inches (38 mm) minimum firm bearing.

D. Always take into account the expansion/contraction of TruGrain material and plan gaps at board abutment joints, termination points, and trim locations accordingly. Comply with manufacturer's installation guidelines.

CONSTRUCTION SPECIFICATIONS

SECTION 06 73 00 - FIBER-REINFORCED HYBRID DECKING

PART 3 EXECUTION

3.3 INSTALLATION - BOARD DECKING

E. Framing and decking shall be installed using the manufacturer's recommended joist spacing for the specific decking product being installed. If the decking is to be installed at any angle with respect to the framing substructure the maximum joist spacing must be reduced to maintain joist spacing along the length of the decking boards.

F. Touch-up prefinished stained surfaces that are disfigured. Unsightly touch-up wall require removal and replacement of affected decking

G. Sand work smooth with 24-36 grit sandpaper for color uniformity prior to staining.

3.4 TOLERANCES

A. Surface Flatness of Decking Without Load: 1/4 inch in 10 feet (2 mm/m) maximum, and 1/2 inch in 30 feet (12 mm / 9 m) maximum.

END OF SECTION 06 73 00

CONSTRUCTION SPECIFICATIONS

SECTION 06 83 00 - COMPOSITE PANELING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division Specification Sections apply to this Section.

1.02 SUMMARY

A. Section Includes: Composite Reinforced Fiberglass Panels and hardware.

1.03 DEFINITION

"Composte Reinforced Fiberglass Panel" means a panel manufactured using glass fibers and polyester resin in a thermoset matrix. Typically water proof / water resistant.

1.04 RELATED SECTIONS

A. Section 05400-Cold Formed Metal Framing

B. Section 07920-Joint Sealants

1.05 REFERENCE STANDARDS

A. ASTM De38: Test Method for Tensile Properties of Plastic.

B. ASTM D695: Test Method for Compressive Strength of Rigid Plastics.

C. ASTM D790: Test Methods for Properties of un-reinforced and Reinforced Plastics and Electrical Insulating Materials.

D. ASTM E84: Test Method for Surface Burning Characteristics of Building Materials.

CONSTRUCTION SPECIFICATIONS

SECTION 06 83 00 - COMPOSITE PANELING

PART 1 - GENERAL

1.06 DESIGN REQUIREMENTS

A. Structural Requirements: Engineering calculations shall account for the following loads:

1. Dead Loads: Include the weight of the Composite Reinforced Fiberglass Panels and attached items.
2. Live Loads: As required by applicable code,
3. Wind Loads: As required by applicable code.
4. Snow Loads: As required by applicable codes.
5. Load Combinations: Consider applicable load combinations.
6. Flood Loads: As required by applicable codes.

B. Provisions for Movement

1. Design and detail anchorage, connections, and joints to allow for dimensional changes of theComposite Reinforced Fiberglass Panels due to thermal and similar effects.
2. Where the piece is restrained, allow for effects of restraint in design.

C. Anchorage and Connections

1. Suggested anchorage and connections are shown on the design drawings. Proposed substitutions may be submitted for review. Substitutions shall satisfy the function of the connection as indicated or implied on the drawings and shall not vary to indicated building loading. 2. Anchorage and connection designs shall consider tolerances and eccentricities of load applications. Provide proper edge and end distances for inserts.

1.07 SUBMITTALS

A. Product Data: Submit manufacturer's data on the Composite Reinforced Fiberglass Panels.

B. Product Samples: Submit minimum of three (3) - 6" x 6" samples in specified color, texture and finish. Architect will select finish, color and texture from manufacturer's offerings.

CONSTRUCTION SPECIFICATIONS

SECTION 06 83 00 - COMPOSITE PANELING

PART 1 - GENERAL

1.07 SUBMITTALS

C. Shop Drawings: Submit drawings indicating:

1. Panel shapes and dimensions;
2. Panel surface finish;
3. Part numbers;
4. Jointing and connection details;
5. Adjacent structure details;
6. Hardware location and details; and
7. Lifting and erection details.

D. Manufacturers Instructions: Submit manufacturer's instructions and recommendations for:

1. Product delivery, storage and handling.
2. Erection, lifting and connecting of Composite Reinforced Fiberglass Panels.

1.08 DELIVERY, STORAGE AND HANDLING

A. Handle, store and transport panels according to rnanufacturer's recommendations and in a manner that prevents cosmetic and structural damage.

B. Verify those areas where panels will be unloaded are clear of obstructions and well drained.

C. Do not subject panels to undue stress.

D. Brace and stabilize panels to prevent warping.

E. Damage Responsibility: Except for damage caused by others, the installer is responsible for chipping,cracking, or other damage to composite panels.

CONSTRUCTION SPECIFICATIONS

SECTION 06 83 00 - COMPOSITE PANELING

PART 1 - GENERAL

1.08 DELIVERY, STORAGE AND HANDLING

Reinforced Fiberglass Panels after delivery to the job site and until installation is completed and inspected and found acceptable by the Architect.

1.09 QUALITY ASSURANCE

A. Manufacturer: Provide panels manufactured by a firm specializing in the fabrication of reinforced fiberglass panels with a minimum of ten years experience.

1.10 PRE-INSTALLATION CONFERENCE

A. Convene a pre-installation conference prior to commencing panel installation.

B. Require attendance of parties directly affected by work of this Section.

C. Review conditions of installation, installation procedures and coordination required with related work necessary to achieve a satisfactory installation.

1.11 WARRANTY

A. Warrant Composite Reinforced Fiberglass Panels to be free from delamination, chalking, cracking, crazing, discoloration, breakage or loosing from mountings (other than by malicious cause) for a period of (1) one year from the date of substantial completion.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Provide products as manufactured by Goetz Composites. Products (401) 253-2670 or approved equal.

2.02 FABRICATED PRODUCTS

A. Fabrications required are shown on the accompanying drawings.

CONSTRUCTION SPECIFICATIONS

SECTION 06 83 00 - COMPOSITE PANELING

PART 2 - PRODUCTS

2.03 MATERIAL CHARACTERISTICS

A. MOLDED EXTERIOR SURFACE. U-V inhibited, NPG-ISO polyester gel coat, 18 to 22 mils thick.

1. Gel Coat Color: Match sample supplied by Architect.

B. BACK UP LAMINATE:

1. Resin: Fire retardant, isophthalic polyester resin, ASTM E84, Class I (flame spread rating of 25 or less)
2. Fiberglass Reinforcement
   a. "E" type fiberglass.
   b. Random Chopped glass fibers.
   c. Glass content approximately 25% to 30% except, 15% for filled resin systems.
3. Laminate Thickness:
   a. Nominal thickness 3/16"
   b. Additional thickness and reinforcement, and sandwich structures as indicated and as required for structural integrity

2.04 FINISH

A. Color and finish shall be as selected by the Architect from the manufacturer's standard finishes.

2.05 TOLERANCES

A. Gel Coat Thickness: + or - 2.5 mils.

B. Length: + or - 1/8 inch in 10 feet.

C. Overall thickness tolerance: +/- 1/16".

D. Variation from Square: 1/8 inch in 10 feet.

CONSTRUCTION SPECIFICATIONS

SECTION 06 83 00 - COMPOSITE PANELING

PART 2 - PRODUCTS

2.06 IDENTIFICATION

A. Identify each part with a permanent serial number.

B. Number parts to coordinate with shop drawings.

2.07 CURING AND CLEANING

A. Cure and clean components prior to shipment and remove material which may be incompatible with adjacent building materials.

2.08 HARDWARE

A. Metal Anchors and Fasteners: Provide anchors and fasteners as recommended by panel manufacturer and conforming to the following standards of the American Society for Testing and Materials.

1. Stainless steel: ASTM A666, Type 304.
2. Anchor bolts ASTM A307 or ASTM AS25.

PART 3 - EXECUTION

3.01 INSTALLERS PRE-INSTALLATTON INSPECTION

A. Observe field conditions and verify that building lines, centers, and grades will allow proper installation of Composite Reinforced Fiberglass Panels.

B. Verify that bearing surfaces are true and level.

C. Verify that support framing has been constructed to allow accurate placement and alignment of anchor bolts, plates, dowels, or other connections on the structure.

D. Check field dimensions affecting the installation of Composite Reinforced Fiberglass Panels.

CONSTRUCTION SPECIFICATIONS

SECTION 06 83 00 - COMPOSITE PANELING

PART 3 - EXECUTION

3.01 INSTALLERS PRE-INSTALLATTON INSPECTION

E. Report discrepancies between design dimensions and field dimensions, which could adversely affect installation, to the Architect.

F. Do not proceed with installation until discrepancies are corrected, or until installation requirements are modified and approved by the Architect.

3.02 ERECTION

A. Install fabrications in accordance with manufacturer's instructions and approved shop drawings.

B. Unloading: Use equipment that will prevent delays in installation process. Do not block access to panel installation area or other construction areas with equipment and materials.

C. Lifting and Positioning: Lift Composite Reinforced Fiberglass Panels with suitable lifting devices at points as recommended by the manufacturer.

D. Set panels level, plumb, square, and true within the allowable tolerances.

E. Temporarily support and brace panels as required to maintain position, stability and alignment during and until permanent connection.

F. Fastening: Fasten Composite Reinforced Fiberglass Panels as shown on approved shop drawings.

CONSTRUCTION SPECIFICATIONS

SECTION 06 83 00 - COMPOSITE PANELING

PART 3 - EXECUTION

3.03 ALLOWABLE TOLERANCES FOR ERECTED PANELS

A. Tolerances for Location of Composite Reinforced Fiberglass Panels: Non-cumulative.

B. Width of Joint: ¼”to ¾” depending upon engineering criteria. C Gap tolerances between joints for panel dimensions of:

1. <l0 ft: +/-3/16” (5mm)
2. l0 ft. - 20ft: +/- 1/4” (7rnrn)
3. >20 ft: +/- 5/16” (9mm)

3.04 CLEANING

A. Clean soiled panels using cleaning methods and materials approved by panel manufacturer.

3.05 PROTECTION OF INSTALLED FABRICATIONS

A. Comply with manufacturer’s recommendations and instructions for protecting installed fabrications during construction activities.

END OF SECTION 06 83 00

CONSTRUCTION SPECIFICATIONS

SECTION 07 13 26 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following :

1. Concealed rubberized-asphalt strip flashing at exterior openings.
2. Concealed rubberized-asphalt strip flashing under roofing.

B. Related Sections include the following:

1. Division 07 Section “Joint Sealing” for joint-sealant materials and installation.
2. SEE DIVISION 07 13 54 PRODUCT CUTSHEETS

1.02 PERFORMANCE REQUIREMENTS

A. Provide waterproofing that prevents the passage of water.

1.03 SUBMITTALS

A. Product Data: Include manufacturer’s written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who is acceptable to waterproofing manufacturer to install manufacturer’s products.

B. Source Limitations: Obtain waterproofing materials through one source from a single manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver liquid materials to Project site in original packages with seals unbroken, labeled with manufacturer’s name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer.

CONSTRUCTION SPECIFICATIONS

SECTION 07 13 26 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.05 DELIVERY, STORAGE, AND HANDLING

C. Remove and replace liquid materials that cannot be applied within their stated shelf life.

D. Store rolls according to manufacturer's written instructions.

E. Protect stored materials from direct sunlight.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

1. Do not apply waterproofing in snow, rain, fog, or mist.

B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.07 WARRANTY

A. Special Manufacturer's Warranty: Written warranty, signed by waterproofing manufacturer agreeing to replace waterproofing material that does not comply with requirements or that does not remain watertight during specified warranty period.

1. Warranty does not include failure of waterproofing due to failure of substrate prepared and treated according to requirements or formation of new joints and cracks in substrate exceeding 1/16 inch (1.6 mm) in width.
2. Warranty Period: Three years after date of Substantial Completion.

B. Special Installer's Warranty for Roofing Underlayment: Written waterproofing Installer's warranty, signed by Installer, covering Work of this Section, for warranty period of two years.

CONSTRUCTION SPECIFICATIONS

SECTION 07 13 26 - SELF-ADHERING SHEET WATERPROOFING

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

2.02 RUBBERIZED-ASPHALT STRIP FLASHING

A. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Grace Ice and Water Shield
2. W. R. Grace & Co.; Vycor V40.
3. W. R. Meadows, Inc.; AirShield.

B. Rubberized-Asphalt Strips: 40-mil- (1.02-mm-) thick, self-adhering sheet consisting of 37-mil (0.95-mm) of rubberized asphalt laminated to a 3-mil- (0.07-mm-) thick, polyethylene film with release liner on adhesive side and formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction. Provide minimum 9-inch wide strips.

1. Physical Properties: As follows, measured per standard test methods referenced:

   a. Tensile Strength: 250 psi (1.7 MPa) minimum; ASTM D 412, Die C, modified.
   b. Ultimate Elongation: 200 percent minimum; ASTM D 412, Die C, modified.
   c. Low-Temperature Flexibility: Unaffected at minus 45 deg F (minus 43 deg C); ASTM D 1970.
   d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch (3-mm) movement; ASTM C 836.
   e. Vapor Permeance: 0.05 perms (2.9 ng/Pa x s x sq. m); ASTM E 96, Water Method.
   f. MUST MEET ALL TESTING REQUIREMENT FOR PHIUS.

2.03 RUBBERIZED-ASPHALT STRIP ROOFING UNDERLAYMENT

A. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

CONSTRUCTION SPECIFICATIONS

SECTION 07 13 26 - SELF-ADHERING SHEET WATERPROOFING

PART 2 - PRODUCTS

2.03 RUBBERIZED-ASPHALT STRIP ROOFING UNDERLAYMENT

1. Carlisle Corporation, Carlisle Coatings & Waterproofing Div.; Window & Door Flashing.
2. W. R. Grace & Co.; Vycor V40.
3. W. R. Meadows, Inc.; AirShield.

B. Rubberized-Asphalt Strips: 40-mil- (1.02-mm-) thick, self-adhering sheet consisting of 37-mil (0.95-mm) of rubberized asphalt laminated to a 3-mil- (0.07-mm-) thick, polyethylene film with release liner on adhesive side and formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction. Provide minimum 9-inch wide strips.

1. Physical Properties: As follows, measured per standard test methods referenced:

    a. Tensile Strength: 250 psi (1.7 MPa) minimum; ASTM D 412, Die C, modified.
    b. Ultimate Elongation: 200 percent minimum; ASTM D 412, Die C, modified.
    c. Low-Temperature Flexibility: Unaffected at minus 45 deg F (minus 43 deg C); ASTM D 1970.
    d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch (3-mm) movement; ASTM C 836.
    e. Vapor Permeance: 0.05 perms (2.9 ng/Pa x s x sq. m); ASTM E 96, Water Method.
    f. MUST MEET ALL TESTING REQUIREMENT FOR PHIUS.

2.04 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.

1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

B. Primer: Liquid primer recommended for substrate by manufacturer of sheet waterproofing material.

CONSTRUCTION SPECIFICATIONS

SECTION 07 13 26 - SELF-ADHERING SHEET WATERPROOFING

PART 2 - PRODUCTS

2.04 AUXILIARY MATERIALS

C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.

D. Sheet Strips: Self-adhering, rubberized-asphalt composite sheet strips of same material and thickness as sheet waterproofing.

E. Tape: Self-adhering strips of same material and thickness as sheet waterproofing or compatible material as recommended by the membrane manufacturer.

F. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity.

G. Substrate Patching Membrane: Low-viscosity, two-component, asphalt-modified coating.

H. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.

1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
2. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

CONSTRUCTION SPECIFICATIONS

SECTION 07 13 26 - SELF-ADHERING SHEET WATERPROOFING

PART 3 - EXECUTION

3.02 SURFACE PREPARATION

A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.

E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.

1. Install sheet strips and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch (1.6 mm).

F. Bridge and cover isolation joints, expansion joints, and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips.

1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.

G. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.

1. Install membrane strips centered over vertical inside corners. Install 3/4-inch (19-mm) fillets of liquid membrane on horizontal inside corners and as follows:
   a. At footing-to-wall intersections, extend liquid membrane each direction from corner or install membrane strip centered over corner.
   b. At plaza deck-to-wall intersections, extend liquid membrane or sheet strips onto deck waterproofing and to finished height of sheet flashing.

H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

CONSTRUCTION SPECIFICATIONS

SECTION 07 13 26 - SELF-ADHERING SHEET WATERPROOFING

PART 3 - EXECUTION

3.03 RUBBERIZED-ASPHALT SHEET AND STRIP APPLICATION

A. Install self-adhering sheets according to waterproofing manufacturer's written instructions and recommendations in ASTM D 6135.

B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- (64-mm-) minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.

1. When ambient and substrate temperatures range between 25 and 40 deg F (minus4 and plus 5 deg C), install self-adhering, rubberized-asphalt sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F (16 deg C).

D. Horizontal Application: Apply sheets from low point to high point of decks to ensure that side laps shed water.

E. Application at Openings: Apply strips at sill first, then jambs, and lastly at head of openings. Install over fins and flanges, and install weatherproofing membranes for general wall areas over the strips.

F. Application at Roofs: Apply strips from low point to high point of roofs to ensure that side laps shed water and in accordance with roofing manufacturer's recommendations.

1. At roof eaves: Install from edge to a height 24-inches away from the roof edge.
2. Valleys: Install from center of valley to 24 inches from the valley in both directions.

G. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.

H. Seal exposed edges of sheets at terminations not concealed by metal counterflashings or ending in reglets with mastic or sealant.

I. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheets extending 6 inches (150 mm) beyond repaired areas in all directions.

CONSTRUCTION SPECIFICATIONS

SECTION 07 13 26 - SELF-ADHERING SHEET WATERPROOFING

PART 3 - EXECUTION

3.03 RUBBERIZED-ASPHALT SHEET AND STRIP APPLICATION

J. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements, repair substrates, reapply waterproofing, and repair sheet flashings.

3.04 PROTECTION AND CLEANING

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 13 26

CONSTRUCTION SPECIFICATIONS

SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes :

1. Mineral wool board insulation.
2. Mineral wool batt insulation.
3. Spray polyurethane foam insulation.
3. Vapor retarders

B. Related Work specified elsewhere includes:

1. SEE DIVISION 07 PRODUCT CUTSHEETS for insulations and sealing tapes.

1.02 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Schedule: Indicate where each type of product is to be applied. Provide drawings if necessary to show where insulation is to be installed.

PART 2 - PRODUCTS

2.01 MINERAL WOOL BOARD INSULATION

A. Stone wool insulation product for use in both new residential construction .
This semi-rigid batt has a unique flexible edge designed to compress as the batt is inserted into walls, attics, ceilings and floor frames.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ROXUL Inc.
2. R-5 at 1.25” thick
   a. Fire Performance:
      ASTM E 136 Behaviour of Materials at 750°C (1382°F) Non-Combustible
      CAN/ULC-S114 Test for Non-Combustibility Non-Combustible
      ASTM E 84 (UL 723) Surface Burning Characteristics Flame Spread = 0

CONSTRUCTION SPECIFICATIONS

SECTION 07 21 00 - THERMAL INSULATION

PART 2 - PRODUCTS

2.01 MINERAL WOOL BOARD INSULATION

A. Stone wool insulation product for use in both new residential construction . This semi-rigid batt has a unique flexible edge designed to compress as the batt is inserted into walls, attics, ceilings and floor frames.

3. Thermal Resistance:

ASTM C 518 (C 177) R-value/inch @ 75°F 4.0 hr.ft^2.F/Btu
RSI value/25.4 mm @ 24°C 0.70 m^{2}K/W

2.02 MINERAL WOOL BATT INSULATION

A. Stone wool insulation productcompensates for normal variations in stud centres caused by distortion or warping. The special flexible characteristic at the insulation edge ensures the expected R-value is achieved.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ROXUL Inc.

2. ROXUL COMFORTBATT® R-23 for Wood Studs/Joists on 16” Centers
3. COMFORTBATT® R-15 for Wood Studs/Joists on 16” Centers

B. Fire Performance:

ASTM E 136 Behaviour of Materials at 750°C (1382°F) Non-Combustible
CAN/ULC-S114 Test for Non-Combustibility Non-Combustible
ASTM E 84 (UL 723) Surface Burning Characteristics Flame Spread = 0

C. Thermal Resistance:

ASTM C 518 (C 177) R-value/inch @ 75°F 4.0 hr.ft^2.F/Btu
RSI value/25.4 mm @ 24°C 0.70 m^{2}K/W

CONSTRUCTION SPECIFICATIONS

SECTION 07 21 00 - THERMAL INSULATION

PART 2 - PRODUCTS

2.03 SPRAY FOAM INSULATION

A. Closed-Cell Polyurethane Foam Insulation: ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. 3M 78 Polystyrene Foam Spray Adhesive

2.04 VAPOR RETARDERS

A. Reinforced-Polyethylene Vapor Retarders: Two outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than 25 lb/1000 sq. ft. (12 kg/100 sq. m), with maximum permeance rating of 0.0507 perm (2.9 ng/Pa x s x sq. m).

1. Products: Subject to compliance with requirements, provide one of the following:

    a. INTELLO® and INTELLO® PLUS system

B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. PROCLIMA - Tescon Vana
    b. PROCLIMA - Tescon Profil
    c. PROCLIMA - Contega
    d. PROCLIMA - Extoseal
    e. GRACE Tape

C. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.

CONSTRUCTION SPECIFICATIONS

SECTION 07 21 00 - THERMAL INSULATION

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.02 INSTALLATION OF CAVITY-WALL INTERIOR INSULATION

A. Roxul ComfortBatt: Install pads of adhesive spaced approximately 16 inches (610 mm) o.c. both ways on inside face, and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.

3.03 INSTALLATION OF EXTERIOR INSULATION

A. Roxul ComfortBoard: Edges butted tightly in both directions. Press units firmly against inside substrates. Friction fit underneath rainscreen system.

CONSTRUCTION SPECIFICATIONS

SECTION 07 21 00 - THERMAL INSULATION

PART 3 - EXECUTION

3.04 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Mineral Wool Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

D. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Loose-Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).
2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

E. Electrical Boxes: Install sheet caulking at each electrical switch and outlet box and at cavity spaces where required to prevent air infiltration through boxes in framed and cavity walls.

CONSTRUCTION SPECIFICATIONS

SECTION 07 21 00 - THERMAL INSULATION

PART 3 - EXECUTION

3.05 INSTALLATION OF VAPOR RETARDERS

A. Place vapor retarders on side of construction indicated on Drawings. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives or other anchorage system as indicated. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs.

1. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches (406 mm) o.c.

C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.

D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

END OF SECTION 07 21 00

CONSTRUCTION SPECIFICATIONS

SECTION 07 22 22 - POLYISOCYANURATE ROOF INSULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Tapered Polyisocyanurate Roof Insulation.

1.02 RELATED INCLUDES

A. Section 07200 - Building Insulation.

B. Section 07540 - Thermoplastic Membrane Roofing.

1.03 REFERENCES

A. ASTM C 209 - Methods of Testing Insulating Board, Structural and Decorative.

B. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

C. ASTM C 1289 - Standard Specification for Faced Rigid Cellular Thermal Insulation Board.

D. UL 1256 - Fire Test of Roof Deck Constructions.

1.04 SYSTEM DESCRIPTION

A. Performance Requirements:

1. UL Assemblies:
   a. Component of Class A Roof System – UL 790.

1.05 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.

CONSTRUCTION SPECIFICATIONS

SECTION 07 22 22 - POLYISOCYANURATE ROOF INSULATION

PART 1 - GENERAL

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall be a company that regularly manufactures polyisocyanurate and fully assembled nailbase insulation panels in-house with no outside fabrication operations.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Hunter Panels, 15 Franklin Street, Portland, Maine 04101. ASD. Phone: (207) 761-5678 or (888) 746-1114. Fax: (877) 775-1769. E-mail: info@hpanels.com.

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 MATERIALS

A. Roof Board Insulation: Provide products that comply with the following:

1. ASTM standards specified.
2. Factory Mutual (FM) approvals specified.
3. Underwriters Laboratories Inc. (UL) classifications specified.
4. Florida Building Code Approval FL#5968.
5. Miami Dade County, Florida Product Control No. 09-0915.15.

B. Flat Foam Roof Insulation with Fiber-Reinforced Facers: H-Shield; closed-cell polyiso cyanurate foam core bonded to fiber-reinforced facers on both sides; conforming to ASTM C 1289, Type II, Class 1 with square edges.

1. Blowing Agent: Zero ODP, 3rd generation.

CONSTRUCTION SPECIFICATIONS

SECTION 07 22 22 - POLYISOCYANURATE ROOF INSULATION

PART 2 PRODUCTS

2.3 ACCESSORIES

A. Approved Fasteners: Appropriate for purpose intended and approved by FM Approvals and system manufacturer; length required for thickness of insulation material and penetration of deck substrate, with distribution plates if required.

B. Base Ply: As recommended by membrane manufacturer.

C. Asphalt Bitumen: ASTM D 312, Type III, or Type IV.

1. Use only on approved board insulation types.
2. Provide with labels indicating flash point, softening point, finished blowing temperature and equiviscous temperature.

D. Cant Strip and Tapered Edge Strip: Standard machine cut perlite or wood fiberboard strips in sizes indicated or required.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Examine roof deck for suitability to receive insulation. Verify that substrate is dry, clean, and free of foreign material that will damage insulation installation.

C. Verify that roof drains, scuppers, roof curbs, nailers, equipment supports, vents, and other roof accessories are secured properly and installed in conformance with drawings and submittals.

D. Verify that deck is structurally sound to support installers, materials, and equipment without damaging or deforming work.

E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

CONSTRUCTION SPECIFICATIONS

SECTION 07 22 22 - POLYISOCYANURATE ROOF INSULATION

PART 3 EXECUTION

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. Apply vapor barrier and or retarder, as specified by the Architect or required by the local building code, to decking prior to installation of insulation.

3.3 INSTALLATION

A. Install specified insulation in accordance with manufacturer's latest printed instructions and as required by governing codes and Owner's insurance carrier.

B. Do not leave installed insulation exposed to weather. Cover and waterproof immediately after installation.

C. Seal exposed insulation joints at the end of each day. Remove seal when work resumes.

D. Remove installed insulation that has become wet or damaged and replace with new solid and dry insulation material.

E. Built-Up Systems:

1. Secure each H-Shield panel to the roof deck with Factory Mutual approved fasteners and plates (appropriate to the deck type).
2. Adhere maximum 4 foot by 4 foot (1220 mm by 1220 mm) panels of H-Shield to a prepared concrete deck with a full mopping of hot steep asphalt.
3. Adhere maximum 4 foot by 4 foot (1220 mm by 1220 mm) panels of H-Shield to a prepared concrete deck with FM approved cold adhesive.
4. Butt edges and stagger joints of adjacent panels.
5. Multi-layer systems: Adhere subsequent layers with a full mopping of hot steep asphalt.
6. Multi-layer systems: Adhere subsequent layers with FM approved cold adhesive.
7. In multi-layer installations, stagger joints in top and bottom layers. Do not align joints in insulation.
8. Install the roof covering according to the roof manufacturer's specifications.

CONSTRUCTION SPECIFICATIONS

SECTION 07 22 22 - POLYISOCYANURATE ROOF INSULATION

PART 3 EXECUTION

3.4 CLEANING

A. Remove trash and construction debris from insulation before application of roofing membrane.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Protect installed insulation traffic by use of protective covering materials during and after installation.

C. Cover the top and edges of unfinished roof panel work to protect it from the weather and to prevent accumulation of water in the cores of the panels. Only apply enough insulation per day that can be covered by the finished roofing system.

D. Do not leave panels exposed to moisture. Wet panels shall be removed or allowed to completely dry prior to application of vapor barrier and/or roof covering.

E. Repair or replace damaged products before Substantial Completion.

END OF SECTION 07 22 22

CONSTRUCTION SPECIFICATIONS

SECTION 07 25 00 - WEATHER BARRIER

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: ICC-ES evaluation reports for water-resistive barrier.

PART 2 - PRODUCTS

2.01 WATER-RESISTIVE BARRIERS

A. Building Paper: ASTM D 226, Type 1 (No. 15 asphalt-saturated organic felt), unperforated.

B. ZIP Sheathing System in Section 06 16 53

C. ABS sheet plastic

2.02 ACCESSORIES

A. Flexible Flashing: Adhesive [butyl rubber] [or] [rubberized-asphalt] compound, bonded to plastic film or spunbonded polyolefin, with an overall thickness of 0.030 inch (0.8 mm).

B. Building Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. PROCLIMA - Tescon Vana
    b. PROCLIMA - Tescon Profil
    c. PROCLIMA - Contega
    d. PROCLIMA - Extoseal
    e. GRACE Tape

C. Silicone Water Repellants:

1. Products: Subject to compliance with requirements, provide one of the following:

    a. TOTAL BOAT BOND
    b. 3M Silicone Adhesive

CONSTRUCTION SPECIFICATIONS

SECTION 07 25 00 - WEATHER BARRIER

PART 3 - EXECUTION

3.01 INSTALLATION

A. Building Paper Installation:

1. Apply building paper immediately after sheathing is installed.
2. Apply horizontally with a 2-inch (50-mm) overlap and a 6-inch (150-mm) end lap.
3. Seal seams, edges, fasteners, and penetrations with tape.
4. Extend into jambs of openings and seal corners with [flexible flashing] [tape].

B. Building Wrap Installation:

1. Apply building wrap immediately after sheathing is installed.
2. Seal seams, edges, fasteners, and penetrations with building wrap tape.
3. Extend into jambs of openings and seal corners with building wrap tape.

C. Flexible Flashing Installation:

1. Prime substrates as recommended by flashing manufacturer.
2. Lap seams and junctures with other materials at least 3 inches (75 mm), except that at flashing flanges of other construction, laps need not exceed flange width.
3. Lap flashing over water-resistive barrier at bottom and sides of openings.
4. Lap water-resistive barrier over flashing at heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller.

END OF SECTION 07 25 00

CONSTRUCTION SPECIFICATIONS

SECTION 07 31 29.16 - WOOD SHAKES

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data[, Samples,] and ICC-ES evaluation reports.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, provide products by the following or similar:
a. WAKSA CEDAR SHAKES

2.02 PERFORMANCE REQUIREMENTS

A. Fire-Test-Exposure Classification: [Class B] [Class C]; UL 790 or ASTM E 108 with ASTM D 2898, for application and roof slopes indicated.

B. Grading Rules: Cedar Shake & Shingle Bureau's (CSSB) grading rules for products indicated.

2.03 SHAKES

A. Hand-Split and Resawn Cedar Roof Shakes: [Premium] [No. 1] grade; [18 inches (455 mm) long, 1/2 inch (13 mm)] [18 inches (455 mm) long, 3/4 inch (19 mm)] [24 inches (610 mm) long, 1/2 inch (13 mm)] [24 inches (610 mm) long, 3/4 inch (19 mm)] thick at butt.

2.03 ACCESSORIES

A. Self-Adhering Sheet Underlayment: ASTM D 1970/D 1970M, SBS-modified asphalt; mineral-granule or slip-resisting-polyethylene surfaced; with release backing; cold applied.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. CertainTeed Corporation.
   b. Owens Corning.
   c. Obdyke, Benjamin Incorporated

CONSTRUCTION SPECIFICATIONS

SECTION 07 31 29.16 - WOOD SHAKES

PART 2 - PRODUCTS

2.03 ACCESSORIES

B. Flexible Ridge Vent: Compression-resisting, three-dimensional, open-nylon or polyester-mat filter[bonded to a nonwoven, nonwicking, geotextile fabric cover].

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. Coravent

C. Roofing Nails: Stainless-steel or hot-dip galvanized-steel box-type wire nails, of sufficient length to penetrate 3/4 inch (19 mm) into sheathing.
1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

D. Sheet Metal Flashing and Trim: Comply with requirements in Section 076200 “Sheet Metal Flashing and Trim.”

1. Sheet Metal: [Copper] [Stainless steel] [Zinc-tin alloy-coated stainless steel] [Zinc-tin alloy-coated steel] [Aluminum] <Insert sheet material>.
2. Drip Edge: Formed sheet metal with at least a 2-inch (50-mm) roof deck flange and a 1-1/2-inch (38-mm) fascia flange with a 3/8-inch (9.6-mm) drip at lower edge.

CONSTRUCTION SPECIFICATIONS

SECTION 07 31 29.16 - WOOD SHAKES

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install wood wall shingles according to manufacturer's written instructions and recommendations in CSSB's "Exterior and Interior Wall Manual."

B. Apply wall shingles to plywood panels to later be attached to façade, for ease of transport.

C. Apply self-adhering sheet underlayment extending 18 inches (450 mm) on each side of 3/4" plywood.

D. Attach to Rainscreen Z-clips to both the 3/4" Plywood panels, and facade.

END OF SECTION 37 31 29.16

CONSTRUCTION SPECIFICATIONS

SECTION 07 42 33 - EXTERIOR WALL CLADDING SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Composite panels, wood/composite louvers, and rainscreen system for wall cladding system application.

1. Aluminum clip and sub-girt secondary support system.

B. Related Sections: Section(s) related to this section include:

1. Rough Carpentry: Division 06 Rough Carpentry Section.
2. Air and moisture barriers: Division 07.

1.02 SYSTEM DESCRIPTION

A. Performance Requirements: Provide panels that have been manufactured, fabricated and installed to maintain performance criteria stated by manufacturer without defects, damage or failure.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's product data for specified products.

B. Shop Drawings: Submit shop drawings showing layout, profiles and product components, including edge conditions, panel joints, fixture location, anchorage, accessories, finish colors, patterns and textures.

C. Samples: Submit selection and verification samples for finishes, colors and textures.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Manufacturer producing product in ISO 9001 certified facility, capable of providing field service representation during fabrication and approving application method.
   a. Obtain from a single manufacturer.

CONSTRUCTION SPECIFICATIONS

SECTION 07 42 33 - EXTERIOR WALL CLADDING SYSTEM

PART 1 - GENERAL

1.04 QUALITY ASSURANCE

A. Qualifications:

2. Fabricator/Installer Qualifications: Installer shall be approved by the manufacturer and experienced in performing work of similar type and scope.

1.05 PROJECT CONDITIONS

A. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.06 WARRANTY

A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

PART 2 - PRODUCTS

2.02 WOOD WALL PANELS

Provide one of the following louver systems :

A. Wood Louvers: Louvers constructed from milled ProTeak boards as specified in Division 06 Section, "Exterior Finish Carpentry" with smooth texture.

1. Louver Profiles:
   a. Nearly horizontal louvers, evenly spaced, with slight slope to shed water.
   b. Sloped fixed louvers, evenly spaced.

2. Finish: Clear Sealer and finish.

CONSTRUCTION SPECIFICATIONS

SECTION 07 42 33 - EXTERIOR WALL CLADDING SYSTEM

PART 2 - PRODUCTS

2.02 WALL PANELS

B. Tru-Grain Louver constructed from milled from composite as specified in Division 06 Section, “COMPOSITE PANELING” with smooth texture.

1. Louver Profiles:
    a. Nearly horizontal louvers, evenly spaced, with slight slope to shed water.
    b. Sloped fixed louvers, evenly spaced.
2. Finish: Clear Sealer and finish.

C. Panelized Wooden Shakes. constructed from Waska Cedar Shakes as specified in Division 07 Section, “WOOD SHAKES” with smooth texture.

1. Finish: Clear Sealer and finish.
2. Finish: STD light gray.
3. Finish: Bleached with clear sealer.

2.03 ACCESSORIES

A. Supporting system; Fastening method: A complete, pre-engineered aluminum clip and sub-girt system, complying with the following requirements:

1. The panels are through-fastened to aluminum clips.
2. To ensure proper structural performance, the clips should be located at appoint equal to 20% of the length of the tile from the edge of the panel.
3. The aluminum clips must be fastened to horizontal aluminum sub-frame in order to maintain an accurate horizontal gap.
4. Panels must be capable of easy and fast assembly
5. The replacement of damaged panels, particularly in the middle sections, must be possible using simple methods and should not require special tools.
6. Under no circumstances shall it be possible to remove individual panels unless they are first destroyed.

CONSTRUCTION SPECIFICATIONS

SECTION 07 42 33 - EXTERIOR WALL CLADDING SYSTEM

PART 2 - PRODUCTS

2.04 FABRICATION

A. Fabricate wall panels and accessory items in accordance with manufacturer's recommendations and approved submittals.

B. Fabricate panels to profiles indicated.

PART 3 - EXECUTION

3.01 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.

3.02 PREPARATION

A. Surface Preparation: Provide air and moisture barriers, insulation, and primary support structure with sheathing.

3.03 INSTALLATION

A. Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

B. Install wall panels plumb and level and accurately spaced in accordance with manufacturer's recommendations and approved submittals.

C. Fasten wall panels to supporting substrate with fasteners and adhesive approved for use with adjoining construction.

D. Accessory Items: Install corner profiles, gaskets and trim with fasteners and adhesive appropriate for use with adjoining construction as indicated on drawings and as recommended by manufacturer.

CONSTRUCTION SPECIFICATIONS

SECTION 07 42 33 - EXTERIOR WALL CLADDING SYSTEM

PART 3 - EXECUTION

3.04 CLEANING

A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and legally dispose of debris.

3.05 PROTECTION

A. Protection: Protect installed product and finish surfaces from damage during construction.

END OF SECTION 07 42 33

CONSTRUCTION SPECIFICATIONS

SECTION 07 46 46 - FIBER CEMENT WALL PANELS

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.02 DESCRIPTION OF WORK

A. Work Included: The Work of this Section includes Fibre cement panels of the following types:

1. Through color high density fibre cement EQUITONE [tectiva] panels.
   a. EQUITONE [tectiva] is a through colored panel with no coating. As the panel has an honest, pure and natural appearance color differences are possible. The surface of the sheet is characterised by fine sanding lines.
2. Fixed with Visible EQUITONE rivets colored to match the panel.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Carefully examine Contract Documents for requirements that affect work of this section.

B. Other specifications sections that directly relate to work of this section include, but are not limited to, the following:

1. Section 05 40 00 - Cold-Formed Metal Framing.
2. Section 06 10 00 - Mechanically Graded Lumber.
3. Section 07 21 00 – Thermal Insulation; exterior insulation, if required for NFPA 285 compliance, is not included in the scope of Section 07450.
4. Section 07 27 29 - Air Barriers Coatings: Exterior wall air and moisture barrier

1.4 REFERENCES

A. ASTM International (ASTM):

1. ASTM C 1185 - 08 Standard Test Methods for Sampling and Testing Non-Asbestos Fibre-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards.

CONSTRUCTION SPECIFICATIONS

SECTION 07 46 46 - FIBER CEMENT WALL PANELS

PART 1 - GENERAL

1.4 REFERENCES

A. ASTM International (ASTM):

2. ASTM C 1186 - 08 Standard Specification for Flat Fibre-Cement Sheets.
3. ASTM E 84 - Surface Burning Characteristics of Building Materials.
4. ASTM E 136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degree C.

B. Materials and Equipment Acceptance (MEA) - New York City Department of Buildings Division.

C. CEN - European Committee For Standardization: EN12467 - Fibre Cement Flat Sheets - Product Specification and Test Methods.

D. CCHD - Coding Center Heidelberg: Performance Test Report.

1.5 SUBMITTALS

A. Products Submittals shall be per Section 01 33 00 – Submittal Procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including, but not limited to:

1. Preparation instructions and recommendations for EQUITONE [tectiva].
2. Storage and handling requirements and recommendations.
3. Installation methods for the supporting framework and the EQUITONE [tectiva] panels.

C. Shop Drawings: Provide detailed drawings of non-standard applications of fibre cement materials which are outside the scope of the standard details and specifications provided by the manufacturer.

CONSTRUCTION SPECIFICATIONS

SECTION 07 46 46 - FIBER CEMENT WALL PANELS

PART 1 - GENERAL

1.4 REFERENCES

D. Code Compliance: Documents showing product compliance with local building code shall be submitted prior to the bid. These documents shall include, but not be limited to, appropriate Evaluation Reports and/or test reports supporting the use of the product.

E. Engineering Calculations: Submit engineering calculations as required by the local building code, showing that the installed panels and attachment system meets the wind load requirements for the project.

F. Selection Samples: For each finish product specified, two complete sets of 5 ¼" x 2 1/2" (160x65mm) color chips representing manufacturer's full range of colors and patterns available in the US shall be provided upon request.

G. Verification Samples: For each finish product specified, two samples, minimum size 12 inches (305 mm) square, representing actual product, color, and patterns.

1.6 QUALITY ASSURANCE

A. Color Evaluation: No change, 2000 hours of accelerated weathering with color evaluation, CCHD Performance Test Report.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. As a basis of Design, Fibre Cement Panels shall be manufacturerd by Equitone: 1731 Fred Lawson Dr, TN 37801. Tel: (888) 681-0155 Fax: (865) 681-0016. Email: mleroy@equitone.com. Web: http://www.equitone.com.

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

CONSTRUCTION SPECIFICATIONS

SECTION 07 46 46 - FIBER CEMENT WALL PANELS

PART 2 - PRODUCTS

2.2 WALL PANELS

A. Through Color High Density Fibre Cement Panels:

1. Product: EQUITONE [tectiva] Fibre Cement Panel
   a. Application: Exterior.
   b. Thickness: 5/16 inch (8 mm).
   c. Finish: EQUITONE [tectiva] is a through colored panel with no coating.
   d. Physical Characteristics:ASTM C1185, ASTM C1186,EN 12467 'Fibre-cement flat sheets
      1. Fire reaction (EN 13501-1) ASTM E-136 - passed.
      2. Impermeability test: Ok.
      3. Warm water test: Ok.
      4. Soak dry test: Ok.
      5. Freeze thaw test: Ok.

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 panel surfaces thoroughly prior to installation. Remove any cutting or drilling dust from the surface of the panel using a micro-soft cloth. [This is especially important when panels are being adhesively fixed]

B. Prepare surfaces using the methods recommended by Equitone for achieving the best result for the substrate under the project conditions.

CONSTRUCTION SPECIFICATIONS

SECTION 07 46 46 - FIBER CEMENT WALL PANELS

PART 3- EXECUTION

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved submittals.

B. For exterior applications, comply with local codes and structural engineer's fastening calculations along with manufacturer's recommendations for fastener spacing.

3.4 EXTERIOR CLADDING FOR RAINSCREEN APPLICATIONS

A. Detailing Requirements:

1. Air space inlets and outlets are required at top and bottom of building or wall termination and shall be equivalent to a continuous 1/2 inch to 3/4 inch (12 mm to 18 mm) to facilitate airflow behind the panels. Do not block vertical airflow at windows, doors, eaves, or at the base of the building. Airflow shall be continuous from bottom to top so there is air movement behind each panel. The minimum cavity width should be atleast 25/32" (20mm) for facades up to 33' (10m) high. For facades between 66'-165' (20-50 m) the cavity width needs to increase to 1 3/16" (30mm). Air flow behind the fiber cement panels is critical to the performance of the rain screen constructions.
2. Fasteners in profile shall accommodate thermal expansion/contraction of metal and not interfere with panel application.
3. Install panels starting from top of building and work down the facade.
4. For straight walls, start panel installation in center and work outward.

B. Rain Screen Installation: Comply with manufacturer's installation requirements.

END OF SECTION 07 46 46

CONSTRUCTION SPECIFICATIONS

SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN ROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Thermoplastic Polyvinyl Chloride Membrane Roofing.

B. Membrane Flashings.

C. Roof Insulation.

1.2 RELATED SECTIONS

A. Section 06 10 00 - Rough Carpentry.

1.3 REFERENCES

A. American Society of Civil Engineers (ASCE) - ASCE 7 - Minimum Design Loads for Buildings and Other Structures, Current Revision.

B. Factory Mutual (FM Global):

1. Approval Guide.
   a. Factory Mutual Standard 4470 - Standard for Class 1 Roof Covers.
   b. Loss Prevention Data Sheets 1-28, 1-29

C. International Code Council (ICC):

1. International Building Code (IBC).

D. National Roofing Contractors Association (NRCA) - Slope Roofing and Waterproofing

1.4 SUBMITTALS

A. Detail Drawings:

1. Submit approved plan, section, elevation or isometric drawings which detail the appropriate methods for all flashing conditions found on the project.
2. Coordinate approved drawings with locations found on the Contract Drawings.

CONSTRUCTION SPECIFICATIONS

SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN ROOFING

PART 1 GENERAL

1.4 SUBMITTALS

B. Selection Samples: For each finish product specified, two complete sets of chips representing manufacturer's full range of available colors, membranes, and thicknesses.

C. Verification Samples: For each finish product specified, two samples, minimum size 4 inches (100 mm) square representing actual product, color, and patterns.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: SIKA ROOFING, which is located at:

1. Delta Contracting Services, Inc. 12 Connerty Court East Brunswick, NJ 08816 732-432-4870 http://www.deltaroofnj.com/

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 SCOPE / APPLICATION

A. Roof System: Provide a waterproof roof system, capable of withstanding uplift forces as specified in this section.

1. Membrane Attachment: Mechanically Attached.
2. Membrane Attachment: Fully Adhered.

B. Base Flashing: Provide a waterproof, fully adhered base flashing system at all penetrations, plane transitions and terminations.

C. Insulation: Provide a roof insulation system beneath the finish membrane.

CONSTRUCTION SPECIFICATIONS

SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN ROOFING

PART 2 PRODUCTS

2.3 INSULATION

A. Polyisocyanurate MP-H: Rigid board with fiber reinforced facers on both sides, meeting or exceeding the requirements of ASTM C 1289. Hunter Panels MPH

1. Compressive Strength: 20 psi (138 kPa).
2. Density: 2 lb per cubic foot (24 kg/cu m) minimum.

2.4 POLYVINYL CHLORIDE (PVC) MEMBRANE

A. SIKA SARNAFIL Membrane:

1. Color: White.
2. Membrane Thickness: 60 mil nominal.
   a. Thickness over Scrim (ASTM D 4434): 0.016 inches (0.406mm).
   b. Breaking Strength (ASTM D 751): 200 lbf/in (35 kN/m) minimum.
   c. Tearing Strength (ASTM D 751): 45 lbf/in (200 N/m) minimum.
   d. Elongation (ASTM D 751): 15 percent.
   e. Field Sheet Width: 81 inches (2057 mm) maximum.
   f. Length: 80 feet (24.4 m) maximum.

2.5 SEALANTS

A. SIKA PVC Adhesive: Solvent-based contact adhesive that allows bonding of SIKA - SikaSarnafil G410 PVC 60 mil MEMBRANE to various porous and non-porous substrates.

1. Base: Synthetic Rubber.
2. Color: Pale Yellow.
3. Solids: 24.2 percent.
4. VOC: 600 to 700 grams/liter.

B. Aqua Base 120 Bonding Adhesive: Semi-pressure-sensitive water-based adhesive used as a two-sided contact adhesive.

CONSTRUCTION SPECIFICATIONS

SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN ROOFING

PART 2 PRODUCTS

2.5 SEALANTS

C. PVC Low VOC Bonding Adhesive: Solvent-based contact adhesive to various porous and non-porous substrates. This product meets the requirements of the < 250 gpl VOC content requirements for the OTC Model Rule for Single-Ply Roofing Adhesives.

D. Water Cut-Off Mastic: A one-component, low viscosity, self wetting, Butyl blend mastic used as a compression sealing agent between membrane and applicable substrates.

E. Universal Single-Ply Sealant: A 100% solids, solvent free, one-part polyether sealant that is used as a termination bar sealant. Available in white only.

F. White One-Part Pourable Sealant: Single component, moisture curing, elastomeric polyether sealant that is compatible with SIKA's Thermoplastic membranes. Provides a flexible, durable and long lasting seal around hard-to-flash penetrations in Thermoplastic Roofing Systems.

G. PVC Membrane Cleaner: Clear, solvent-based cleaner used to loosen and remove contaminants from the surface of exposed membrane.

2.6 EDGINGS AND TERMINATIONS

A. SIKA PARAPET COPING: Anchor bar roof edge fascia system consisting of 0.100 inch (2.5 mm) thick extruded aluminum bar, corrosion resistant stainless steel fasteners and snap-on fascia cover.

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.

CONSTRUCTION SPECIFICATIONS

SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN ROOFING

PART 3 EXECUTION

3.2 SUBSTRATE PREPARATION

A. Wood Deck (ADVANTECH Plywood Deck):

1. ADVANTECH Plywood sheathing shall be OSB grade, minimum 4 ply, and not less than 3/4 inch (12 mm) thick.
2. Install deck over joists spaced 24 inches (610 mm) o.c. or less. Install deck with all sides bearing on and secured to joist and cross blocking.

3.3 INSULATION - SYSTEM DESIGN

A. Tapered System:

1. SEE SECTION 07 22 22 FOR ROOF INSULATION

3.4 INSULATION PLACEMENT

A. Install insulation or membrane underlayment over the substrate with boards butted tightly together with no joints or gaps greater than 1/4 inch (6 mm). Stagger joints both horizontally and vertically if multiple layers are provided.

B. Secure insulation to the substrate with the required mechanical fasteners or insulation adhesive in accordance with the manufacturer's current application guidelines.

C. Do not install wet, damaged or warped insulation boards.

D. Stagger joints in one direction unless joints are to be taped. Install insulation boards snug. Gaps between board joints shall not exceed 1/4 inch (6 mm). Fill all gaps in excess of 1/4 inch (6 mm) with same insulation material.

E. Wood nailers shall be at least 3 1/2 inches (89 mm) wide or 1 inch (25 mm) wider than adjacent metal flange. Thickness shall equal that of insulation but not less than 1 inch (25 mm) thickness.

CONSTRUCTION SPECIFICATIONS

SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN ROOFING

PART 3 EXECUTION

3.5 INSULATION ATTACHMENT

A. Securely attach insulation to the roof deck for fully adhered or mechanically attached roofing systems. Attachment shall have been successfully tested to meet or exceed the calculated uplift pressure required by the International Building Code (ASCE-7) or ANSI/SPRI WD-1.

B. Enhance the perimeter and corner areas in accordance with the International Building Code (ASCE-7) or ANSI/SPRI WD-1.

C. Install insulation layers, maximum 4 feet by 4 feet (1220 mm by 1220 mm) board size, in a full and uniform mopping of hot asphalt applied at the rate of 25 lb/square (1.2 kg/sm). Stagger the joints of additional layers in relation to the insulation joints in the layer(s) below by a minimum of 6 inches (152 mm).

D. Install insulation layers applied with adhesive, coverage rate as necessary to achieve the specified attachment and uplift rating. Press each board firmly into place after adhesive develops strings when touched, typically 1 1/2 to 2 minutes after adhesive was applied, and roll with a weighted roller. Add temporary weight and use relief cuts to ensure boards are well adhered. Stagger the joints of additional layers by a minimum of 6 inches (152 mm).

3.6 MEMBRANE PLACEMENT AND ATTACHMENT (Fully Adhered)

A. Position SIKA SARNAFIL membrane over the acceptable substrate. Fold membrane sheet back lengthwise so half the underside of the membrane is exposed.

B. Apply SIKA SARNAFIL Bonding Adhesive in accordance with the manufacturer's published instructions, to the exposed underside of the membrane and the corresponding substrate area. Do not apply Bonding Adhesive along the splice edge of the membrane to be hot air welded over the adjoining sheet. Allow the adhesive to dry until it is tacky but will not string or stick to a dry finger touch.

CONSTRUCTION SPECIFICATIONS

SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN ROOFING

PART 3 EXECUTION

3.6 MEMBRANE PLACEMENT AND ATTACHMENT (Fully Adhered)

C. Position adjoining sheets to allow a minimum overlap of 2 inches (51mm).

D. Hot-air weld the SIKA SARNAFIL membrane sheets using the Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's hot air welding procedures.

E. Continue to install adjoining membrane sheets in the same manner, overlapping edges a minimum of 2 inches (51mm) and complete bonding procedures as stated previously.

3.7 MEMBRANE PLACEMENT AND ATTACHMENT (Mechanically Attached)

A. Provide and secure both perimeter and field membrane sheets in accordance with the manufacturer's most current specifications and details.

B. Secure the membrane with the required. Fasteners and Plates centered over the pre-printed marks approximately 1 1/2 inches (39mm) from the edge of the membrane sheet.

3.8 SEAM WELDING

A. Hot-air weld membrane using an Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's current guidelines. At all splice intersections, roll the seam with a roller to ensure a continuous hot air welded seam.

B. Overlay all splice intersections with SIKA SARNAFIL T-Joint Covers.

C. Probe all seams once the hot air welds have thoroughly cooled.

D. Repair all seam deficiencies the same day they are discovered.

E. Apply Cut Edge Sealant on all cut edges of reinforced membrane after seam probing is complete. Cut Edge Sealant is not required on vertical splices.

SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN ROOFING

PART 3 EXECUTION

3.9 MEMBRANE PLACEMENT AND ATTACHMENT (Fully Adhered)

A. Flashing of parapets, curbs, expansion joints and other parts of the roof shall be performed using SIKA SARNAFIL reinforced membrane. SIKA SARNAFIL non-reinforced membrane may be used for flashing pipe penetrations, Sealant Pockets, and scuppers, as well as inside and outside corners, when the use of pre-molded accessories is not feasible.

B. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal edging/coping and roof drain applications.

C. in accordance with the manufacturer's current application guidelines.

END OF SECTION 07 54 23

CONSTRUCTION SPECIFICATIONS

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following sheet metal flashing and trim:

1. Formed roof drainage system.
2. Formed wall flashing and trim.

B. Related Sections include the following:

1. Division 06 Section “Rough Carpentry” for wood nailers, curbs, and blocking.
2. Division 07 Section “Hot Fluid-Applied Waterproofing” for installing sheet metal flashing and trim integral with roofing membrane.

3. Division 07 Section “Roof Accessories” for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

4. Division 07 Section “Joint Sealing” for field-applied sheet metal flashing and trim sealants.

1.02 PERFORMANCE REQUIREMENTS

A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

CONSTRUCTION SPECIFICATIONS

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 2 - PRODUCTS

2.01 SHEET METALS

A. Aluminum Sheet: ASTM B 209 (ASTM B 209M), Alloy 3003, 3004, 3105, or 5005, Temper suitable for forming and structural performance required, but not less than H14, finished as follows:
1. Mill Finish: One-side bright.

B. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality, mill phosphatized for field painting.

2.02 UNDERLAYMENT MATERIALS

A. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft. (0.16 kg/sq. m).

2.03 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.

1. Nails for Copper Sheet: Copper, hardware bronze, or Series 300 stainless steel, 0.109 inch (2.8 mm) minimum and not less than 7/8 inch (22 mm) long, barbed with large head.
2. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
3. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
4. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
5. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

C. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

CONSTRUCTION SPECIFICATIONS

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 2 - PRODUCTS

2.04 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.

B. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.

C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

1. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

D. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.

CONSTRUCTION SPECIFICATIONS

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 2 - PRODUCTS

2.04 FABRICATION, GENERAL

F. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.

G. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, non-corrosive metal.

1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" and FMG Loss Prevention Data Sheet 1-49 for application but not less than thickness of metal being secured.

2.05 ROOF DRAINAGE SHEET METAL FABRICATIONS

B. Downspouts: Fabricate round downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.

1. Manufactured Hanger Style: Concealed straps.
2. Fabricate downspouts from the following material:
   a. Copper: 16 oz./sq. ft. (0.55 mm thick).
   b. Galvanized Steel: 0.0217 inch (0.55 mm) thick.

CONSTRUCTION SPECIFICATIONS

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 2 - PRODUCTS

2.06 STEEP SLOPE ROOF SHEET METAL FABRICATIONS

A. Valley Flashing: Fabricate from the following material:
1. Prepainted, Metallic-Coated Steel: 0.0276 inch (0.7 mm) thick.

B. Drip Edges: Fabricate from the following material:
1. Aluminum: 0.0320 inch (0.8 mm) thick.

C. Eave, Rake, Ridge, and Hip Flashing: Fabricate from the following material:
1. Aluminum: 0.0320 inch (0.8 mm) thick.

D. Roof-Penetration Flashing: Fabricate from the following material:
1. Lead: 4.0 lb/sq. ft. (1.6 mm thick), hard tempered.

2.07 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- (2438-mm-) long, but not exceeding 12 foot (3.6 m) long, sections, under copings, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches (152 mm) beyond each side of wall openings. Form with 2-inch- (51-mm-) high end dams. Fabricate from the following material:
1. Stainless Steel: 0.0156 inch (0.4 mm) thick.

B. Openings Flashing in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches (102 mm) beyond wall openings. Form head and sill flashing with 2-inch- (51-mm-) high end dams. Fabricate from the following material:
1. Aluminum-Zinc Alloy-Coated Steel: 0.0217 inch (0.55 mm) thick.

2.08 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

CONSTRUCTION SPECIFICATIONS

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 2 - PRODUCTS

2.08 FINISHES

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.

1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.

CONSTRUCTION SPECIFICATIONS

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 3 - EXECUTION

3.01 EXAMINATION

1. Coat side of uncoated aluminum, stainless-steel, and lead sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene underlayment.
3. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.

C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.

D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and elastomeric butyl sealant.

E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

1. Space cleats not more than 12 inches (305 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.

F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25.4 mm) deep, filled with elastomeric butyl sealant concealed within joints.

CONSTRUCTION SPECIFICATIONS

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 3 - EXECUTION

3.01 EXAMINATION

G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
1. Galvanized or Prepainted, Metallic-Coated Steel: Use stainless-steel fasteners.
2. Aluminum: Use aluminum or stainless-steel fasteners.
3. Copper: Use copper, hardware bronze, or stainless-steel fasteners.
4. Stainless Steel: Use stainless-steel fasteners.

H. Seal joints with elastomeric butyl sealant as required for watertight construction.
1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch (25.4 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section “Joint Sealing”.

I. Aluminum Flashing: Rivet or weld joints in uncoated aluminum where necessary for strength.

3.03 ROOF DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

B. Hanging Gutters: Join sections with riveted and soldered joints or with lapped joints sealed with elastomeric butyl sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored gutter brackets and straps spaced not more than 36 inches (914 mm) apart. Provide end closures and seal watertight with sealant. Slope to downspouts.

CONSTRUCTION SPECIFICATIONS

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 3 - EXECUTION

3.03 ROOF DRAINAGE SYSTEM INSTALLATION

C. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:

1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.
2. Seal with elastomeric butyl sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent piping.

3.05 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Openings Flashing in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches (102 mm) beyond wall openings.

3.06 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 62 00

CONSTRUCTION SPECIFICATIONS

SECTION 07 70 00 - RIDGE,SOFFIT AND SIDING VENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Siding Vents

1.02 RELATED SECTIONS

A. Section 06 10 00 – ROUGH CARPENTRY
B. Section 07 31 29.16 – WOOD SHAKES

1.03 SUBMITTALS

A. Product Data: Manufacturer's catalog data.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Manufacturer: Provide vents fabricated by Cor-A-Vent, Inc.; P.O. Box 428; Mishawaka, IN 46546-0428. ASD. Tel: (800) 837-8368. Fax: (800) 645-6162.

B. Substitutions will not be acceptable.

2.2 MATERIALS

A. Siding Vents: SV-3.

1. Net free area: 5 sq in per lin ft (10585 sq mm/m).
2. Dimensions: 7/16 inches (10.5mm) wide by 48 inches (1220 mm) long by 3 inch (75 mm) high.
3. Color: Black.

CONSTRUCTION SPECIFICATIONS

SECTION 07 70 00 - RIDGE,SOFFIT AND SIDING VENTS

PART 3 - EXAMINATION

3.1 EXAMINATION

A. Verify that framing, sheathing, and shingles are secured and ready to receive vents.

B. Verify that there is a 1 inch (25 mm) wide clear air space between sheathing and each side of ridge board or, if trusses are used, a 1-1/2 inches (40 mm) wide continuous clear air space centered on ridge.

3.2 INSTALLATION

A. Cedar Shakes:

1. Select shakes of uniform thickness to provide an even surface for the vent to rest on.
2. Lay a bead of sealant on top of and between edges of shakes to provide weather seal between shakes and vent.
3. Install wet sheet on top of vent and cap with shakes. Use nails of sufficient length to penetrate sheathing.

3.3 SIDING VENTS

A. Nail SV-3 or SV-5 in a continuous band along the wall at the level where the siding will start. A continuous band of SV-3 or SV-5 may also be nailed at the top of the wall where the siding ends if full ventilation behind the siding is desired. SV-3 and SV-5 may also be used above and below windows and above doors to provide drainage/ ventilation in these areas as well.

B. Remove any scrap from the site, and leave in a neat and clean condition.

END OF SECTION 07 70 00

CONSTRUCTION SPECIFICATIONS

SECTION 07 71 00 - ROOF SPECIALTIES

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data and Product Samples.

B. Warranties: Provide manufacturer's standard written warranty, signed by manufacturer agreeing to promptly repair or replace roof specialties that show evidence of deterioration of factory-applied finishes within 5 years from date of Substantial Completion.

C. SPRI Wind Design Standard: Provide roof-edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressures:

1. Design Pressure: ANSI/SPRI ES-1 Test Method RE-1 Test for Roof Edge Termination of Single-Ply Roofing Membranes: The fascia system shall be tested to secure the membrane to minimum 100 lbs./ft.

PART 2 - PRODUCTS

2.01 ROOF SPECIALTIES

A. Siding Vents: heat resistant polypropylene

1. Cor-A-Vent SV-3 Siding Vent
   a. ¾" x 3" x 4' heat resistant polypropylene siding vent, 8.5 sq. in. NFVA per lineal foot
   b. http://www.cor-a-vent.com/siding-vent-sv-3.cfm

B. Gutters and Downspouts

1. Guttersupply Aluminum Downspouts
   a. 2" x 3" Aluminum downspout, .019" gauge, Almond color
   b. http://guttersupply.com/m-aluminum-downspout-rectangular.gstml
2. Guttersupply Aluminum Elbows
   a. 2" x 3" A style Aluminum elbow, .019" gauge, Almond color
   b. http:/guttersupply.com/m-aluminum-elbows-rectangular-A.gstml

CONSTRUCTION SPECIFICATIONS

SECTION 07 71 00 - ROOF SPECIALTIES

PART 2 - PRODUCTS

2.01 ROOF SPECIALTIES

B. Gutters and Downspouts

3. Guttersupply Aluminum Outlets
   a. Wide flange rectangular Aluminum outlet
   b. Manufactured to fit 2” x 3” downspout
   c. http://www.guttersupply.com/p-2x3-Outlet-Wide-Flange.gstml
4. Guttersupply PVC Adapter
   a. 2” x 3” x 3” Flush Downspout Tile Adapter
   b. Manufactured to connect a 2” x 3” downspout to a 3” PVC pipe
   c. http://guttersupply.com/p-tile-adapter-2x3x3-Flush-Downspout-Ad.gstml

2.02 ACCESSORIES

A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper as recommended by manufacturer for use and finish indicated.

B. Aluminum Finish: Mill finish

C. Fasteners: Manufacturer’s recommended fasteners, suitable for application and designed to meet performance requirements.

1. Exposed Penetrating Fasteners: Gasketed screws with heads matching color of metal.
2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
3. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel.

D. Butyl Sealant: ASTM C 1311, solvent-release butyl rubber sealant.

E. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.03 FINISHES

A. Finish to be selected by Architect from manufacturer’s full range of standard colors.

CONSTRUCTION SPECIFICATIONS

SECTION 07 71 00 - ROOF SPECIALTIES

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement.

B. Coat back side of aluminum and stainless-steel roof specialties with bituminous coating where they will contact wood, ferrous metal, or cementitious construction.

C. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers ofroof specialties for waterproof performance.

D. Space movement joints at a maximum of 12 feet (3.6 m) with no joints within 24 inches (609.6 mm) of corners or intersections unless indicated.

E. Fastener Sizes: Use fasteners of sizes that will penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

END OF SECTION 07 71 00

CONSTRUCTION SPECIFICATIONS

SECTION 07 72 00 - ROOF ACCESSORIES

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Section Includes: Underlayment for Wood Shingle & Shake Construction (also Metal Roofing)

B. Related Sections
1. Division 6 Section: Rough Carpentry (06 10 00), Finish Carpentry (06 20 00).
2. Division 7 Section: Roofing and Siding Panels

1.02 REFERENCES

A. ASTM C 165-00: Standard Test Method for Measuring Compressive Properties of Thermal Insulations

B. ASTM D 6818: Standard Test Method for Ultimate Tensile Properties of Rolled Erosion Control Products

C. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials

1.03 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.

B. Product Data: Submit manufacturer's product data and installation instructions.

C. Samples: Submit selection and verification samples.

D. Closeout Submittals: Submit the following:

1. Warranty documents specified herein.

CONSTRUCTION SPECIFICATIONS

SECTION 07 72 00 - ROOF ACCESSORIES

PART 1 - GENERAL

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Utilize an installer having demonstrated experience on projects of similar size and complexity.

B. Mock-Ups: [Specify requirements for mock-up.].

1. Subject to acceptance by owner, mock-up may be retained as part of finish work.
2. If mock-up is not retained, remove and properly dispose of mock-up.

1.05 DELIVERY, STORAGE & HANDLING

A. General: Comply with Division 1 Product Requirement Section.

B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Storage and Protection: Store materials protected from exposure to harmful environmental condition and at temperature and humidity conditions recommended by the manufacturer.

1.06 WARRANTY

A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under contract documents.

CONSTRUCTION SPECIFICATIONS

SECTION 07 72 00 - ROOF ACCESSORIES

PART 2 - PRODUCTS

2.01 UNDERLAYMENT

A. Manufacturer: Benjamin Obdyke Incorporated.

1. Contact: 400 Babylon Road, Suite A, Horsham, PA 19044;
Telephone: (800) 523-5261;
Website: www.benjaminobdyke.com

B. Proprietary Products/Systems: Rainscreen, including the following:

1. Cedar Breather® :
   a. Description: Three-dimensional matrix in roll form.
   b. Color: Black
   c. Material: Nylon
   d. Width: 39.37 inches (1 m).
   e. Length: 46 1/2 feet (14.2 m).
   f. Coverage Area: 200 ft2
   g. Thickness: 0.277 inches (7.04 mm).
   h. Weight: 9.7 lbs/roll
   i. Fire Rating: A

2.02 PRODUCT SUBSTITUTIONS

A. Substitutions: No substitutions permitted.

PART 3 - EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

A. Comply with the instructions and recommendations of the underlayment manufacturer

CONSTRUCTION SPECIFICATIONS

SECTION 07 72 00 - ROOF ACCESSORIES

PART 3 - EXECUTION

3.02 EXAMINATION

A. Site Verification of Conditions:

1. Verify that site conditions are acceptable for installation of the underlayment.
2. Do not proceed with installation of rainscreen until unacceptable conditions are corrected.

3.03 INSTALLATION

A. Cedar Shake Installation :

a. Install plywood sheathing onto roof framing as specified in related section.
b. Install 36” (914mm) of 30lb (14kg) roofing felt for eave protection extending 1/4” beyond edge of roof deck.
c. Tack down underlayment with 1 tack (or nail) approximately every 3 square feet.
d. Install underlayment with dimples down to present the flat side as the nailing surface.
e. Butt each course of underlayment against previous course. Do not lap layers of underlayment.
f. Work from fascia to ridge just ahead of shake and felt installation to avoid walking directly on the underlayment.
g. Install an 18” (457mm) wide strip of 30lb (14kg) roofing felt over the top portion of the shakes and extend onto the underlayment. Position the bottom edge of the felt above the butt of the shake at a distance equal to twice the weather exposure in compliance with manufacturer’s installation instructions. Use a nail of sufficient length to allow for 3/4” (19.1mm) penetration into the sheathing.

3.04 PROTECTION

A. Protect installed work from damage due to subsequent construction activity on the site.

END OF SECTION 07 72 00

CONSTRUCTION SPECIFICATIONS

SECTION 07 92 00 - JOINT SEALING

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes but is not limited to interior and exterior horizontal and vertical joint sealing.

B. Related Sections

1. Division 08 Section “Hollow Metal Doors and Frames.”
2. Division 08 Section “Glazing.”
3. Division 09 Section “Gypsum Board.”
4. Division 10 Section “Toilet and Bath Accessories.”

1.02 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide joint sealants that have been produced and installed to establish and maintain continuous seals that cause no staining or deterioration of joint substrates.

1.03 SUBMITTALS

A. Product data from manufacturers for each joint sealant product required.
1. Certification by joint sealant manufacturer that sealants plus the primers and cleaners required for sealant installation comply with local regulations controlling use of volatile organic compounds.

B. Samples for verification purposes of each type and color of joint sealant required. Install joint sealant samples in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed joint sealant applications similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.

CONSTRUCTION SPECIFICATIONS

SECTION 07 92 00 - JOINT SEALING

PART 1 - GENERAL

1.04 QUALITY ASSURANCE

B. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, potlife, curing time, and mixing instructions for multi-component materials.

B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.06 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer or below 40 deg F (4.4 deg C).
2. When joint substrates are wet.

B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.07 SEQUENCING AND SCHEDULING

A. Sequence installation of joint sealants to occur not less than 21 nor more than 30 days after completion of waterproofing, unless otherwise indicated.

CONSTRUCTION SPECIFICATIONS

SECTION 07 92 00 - JOINT SEALING

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

A. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

B. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

C. Colors: Provide color of exposed joint sealants to comply with the following:

1. Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

2.02 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing elastomeric sealants that comply with ASTM C 920, including those requirements referencing ASTM C 920 classifications for Type, Grade, Class, and Uses.

B. One-Part Neutral Cure Silicone Sealant: Type S; Grade NS; Class 25; where specifically approved by the Architect.

1. Additional Capability: When tested per ASTM C 719, to withstand 50 percent increase and decrease of joint width as measured at time of application.

CONSTRUCTION SPECIFICATIONS

SECTION 07 92 00 - JOINT SEALING

PART 2 - PRODUCTS

2.03 LATEX JOINT SEALANTS

A. General: Provide manufacturer's standard one-part, nonsag, mildew-resistant, paintable latex sealant of formulation indicated that is recommended for exposed applications on interior and protected exterior locations and that accommodates indicated percentage change in joint width existing at time of installation without failing either adhesively or cohesively.

B. Acrylic-Emulsion Sealant: Provide product complying with ASTM C 834 that accommodates joint movement of not more than 5 percent in both extension and compression for a total of 10 percent.

C. Silicone Emulsion Sealant: Provide product complying with ASTM C 834 and, except for weight loss measured per ASTM C 792, with ASTM C 920 that accommodates joint movement of not more than 25 percent in both extension and compression for a total of 50 percent.

D. Products: Subject to compliance with requirements, latex joint sealants that may be incorporated in the Work include, but are not limited to, the following:

1. Acrylic-Emulsion Sealant:
   a. "AC-20," Pecora Corp.
   b. "Sonolac," Sonneborn Building Products Div., ChemRex, Inc.
   c. "Tremco Acrylic Latex 834," Tremco, Inc.
2. Silicone-Emulsion Sealant:
   a. "Trade Mate Paintable Glazing Sealant," Dow Corning Corp.

2.04 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following requirements:

1. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies per ASTM E 90.

CONSTRUCTION SPECIFICATIONS

SECTION 07 92 00 - JOINT SEALING

PART 2 - PRODUCTS

2.04 ACOUSTICAL JOINT SEALANTS

B. Acoustical Sealant for Concealed Joints: Manufacturer's standard, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.

C. Products: Subject to compliance with requirements, acoustical joint sealants that may be incorporated in the Work include, but are not limited to, the following:

1. Acoustical Sealant:
   a. "Sheetrock Acoustical Sealant," United States Gypsum Corp.
   b. "AC-20 FTR Acoustical and Insulation Sealant," Pecora Corp.
2. Acoustical Sealant for Concealed Joints:
   a. "BA-98," Pecora Corp.
   b. "Tremco Acoustical Sealant

2.05 MISCELLANEOUS MATERIALS

A. Joint Cleaners: Provide joint cleaning compounds as recommended by sealant manufacturer(s).

B. Joint Prime Sealer: Provide type(s) of joint primers as recommended by sealant manufacturer(s).

PART 3 - EXECUTION

3.01 PRE-INSTALLATION MEETING

A. Prior to all work of this Section, schedule a job site pre-installation meeting to review the procedures and time schedule proposed for installation of all sealant work.

B. Present at meeting shall be Contractor, Architect, Installer, sealant manufacturer's technical representative and other trades involved in coordination with sealant work.

CONSTRUCTION SPECIFICATIONS

SECTION 07 92 00 - JOINT SEALING

PART 3 - EXECUTION

3.02 SURFACE CONDITIONS

A. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to point where this installation may properly commence. In the event of discrepancy do not proceed with installation until all such discrepancies have been fully resolved.

3.03 JOINT SURFACE PREPARATION

A. Clean joint surfaces immediately before installation of sealant. Remove dirt, insecure coatings, moisture and other substances which would interfere with bond of sealant.

B. For polyurethane sealants, do not proceed with installation of sealant over joint surfaces which have been painted, lacquered, waterproofed or treated with water repellent or other treatment or coating unless a laboratory test for durability (adhesion), in compliance with Paragraph 4.3.9 of FS TT-S-227 has successfully demonstrated that sealant bond is not impaired by the coating or treatment. If laboratory test has not been performed, or shows bond interference, remove coating or treatment from joint surfaces before installing sealant.

C. Etch concrete surfaces to remove excess alkalinity, unless sealant manufacturer's printed instructions indicate that alkalinity does not interfere with sealant bond and performance. Etch with 5% solution of muriatic acid; neutralize with dilute ammonia solution, rinse thoroughly with water and allow to dry before sealant installation.

D. Roughen joint surfaces on non-porous materials, wherever sealant manufacturer's data indicates lower bond strength than for porous surfaces. Rub with fine abrasive cloth or wool to produce a dull sheen.

3.04 INSTALLATION

A. Comply with sealant manufacturer's printed instructions except where more stringent requirements are shown or specified and except where manufacturer's technical representative directs otherwise.

CONSTRUCTION SPECIFICATIONS

SECTION 07 92 00 - JOINT SEALING

PART 3 - EXECUTION

3.04 INSTALLATION

B. Prime or seal the joint surfaces wherever recommended by the sealant manufacturer. Do not allow primer/sealer to spill or migrate onto adjoining surfaces.

C. Install sealant backer rod for liquid elastomeric sealants, except where shown to be omitted or recommended to be omitted by sealant manufacturer for the application shown.

D. Install bond breaker tape wherever shown and wherever required by manufacturer's recommendations to ensure that elastomeric sealants will perform properly.

E. Employ only proven installation techniques, which will ensure that sealants will be deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of the joint bond surfaces equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface and a vertical surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt.

F. Install sealants to depths as shown or, if not shown, as recommended by sealant manufacturer but within the following general limitations, measured at center section of bead.

1. For normal moving joints sealed with one component silicone sealants, but not subject to traffic, fill joints to a depth equal to 50% of joint width, but neither more than 1/2" deep nor less than 1/4" deep.
2. For joints sealed with acrylic-latex sealant, fill joints to a depth in the range of 75% to 125% of joint width.

G. Spillage: Do not allow sealants or compounds to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces. Use masking tape or other precautionary devices to prevent staining of adjoining surfaces, by either the primer/sealer or the sealant compound.

CONSTRUCTION SPECIFICATIONS

SECTION 07 92 00 - JOINT SEALING

PART 3 - EXECUTION

3.04 INSTALLATION

H. Remove excess and spillage of compounds promptly as work progresses. Clean adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage, without damage to adjoining surfaces or finishes.

I. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and complying with sealant manufacturer's directions for installation methods, materials and tools which produce seal continuity at ends, turns, and intersections of joints. For application at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer's recommendations.

3.05 CURE AND PROTECTION

A. Cure sealant compounds in compliance with manufacturer's instructions and recommendations, in order to obtain high early bond strength, cohesive strength and surface durability.

B. Adopt procedures as required for the curing and protection of sealants and caulking compounds during construction period, so that they will be without deterioration or dam age (other than normal wear and weathering) at time of Owner's acceptance.

END OF SECTION 07 92 00

CONSTRUCTION SPECIFICATIONS

SECTION 08 06 71 - DOOR HARDWARE SCHEDULE

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Door Hardware Schedule”.
2. Division 08 Section “Plastic Doors”.
3. Division 08 Section “Flush Wood Doors”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 101 - Life Safety Code.
4. State Building Codes, Local Amendments.

E. Standards: All hardware specified shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series

1.02 SUBMITTALS

A. Product Data: Manufacturer’s product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

CONSTRUCTION SPECIFICATIONS

SECTION 08 06 71 - DOOR HARDWARE SCHEDULE

PART 1 - GENERAL

1.02 SUBMITTALS

A. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:
   a. Type, style, function, size, label, hand, and finish of each door hardware item.
   b. Manufacturer of each item.
   c. Fastenings and other pertinent information.
   d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
   e. Explanation of abbreviations, symbols, and codes contained in schedule.
   f. Mounting locations for door hardware.
   g. Door and frame sizes and materials.
4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

1.03 QUALITY ASSURANCE

A. Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

CONSTRUCTION SPECIFICATIONS

SECTION 08 06 71 - DOOR HARDWARE SCHEDULE

PART 1 - GENERAL

1.03 QUALITY ASSURANCE

B. Regulatory Requirements: Comply with NFPA 70, NFPA 80, NFPA 101 and ANSI A117.1 requirements and guidelines as directed in the model building code including, but not limited to, the following:

1. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), “Accessibility Guidelines for Buildings and Facilities (ADAAG),” ANSI A117.1 as follows:
    a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
    b. Door Closers: Comply with the following maximum opening-force requirements indicated:
        1. Interior Hinged Doors: 5 lbf applied perpendicular to door.
        2. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
    c. Thresholds: Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.
2. NFPA 101: Comply with the following for means of egress doors:
    a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
    b. Thresholds: Not more than 1/2 inch high.
3. Fire-Rated Door Assemblies: Provide door hardware for assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252 (neutral pressure at 40” above sill) or UL-10C.
    a. Test Pressure: Positive pressure labeling.

C. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

CONSTRUCTION SPECIFICATIONS

SECTION 08 06 71 - DOOR HARDWARE SCHEDULE

PART 1 - GENERAL

1.04 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Continuing Service: Beginning at Substantial Completion, and running concurrent with the specified warranty period, provide continuous (6) months full maintenance including repair and replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door opening operation. Provide parts and supplies as used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

1. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
   a. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

B. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

CONSTRUCTION SPECIFICATIONS

SECTION 08 06 71 - DOOR HARDWARE SCHEDULE

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity, unless otherwise indicated:
   a. Two Hinges: For doors with heights up to 60 inches.
   b. Three Hinges: For doors with heights 61 to 90 inches.
   c. Four Hinges: For doors with heights 91 to 120 inches.
   d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
   a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
   b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
   a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.

B. Sliding Door Hardware: Sliding door hardware is to be of type and design as specified and should comply with ANSI/BHMA A156.14.

1. Sliding Bi-Passing Pocket Door Hardware: Provide complete sets consisting of track, hangers, stops, bumpers, floor channel, guides, and accessories indicated.
2. Bi-folding Door Hardware: Rated for door panels weighing up to 125 lb.
3. Sliding Door Hardware: Rated for doors weighing up to 200 lb.
   a. Acceptable Manufacturers:
      1. Schuco

CONSTRUCTION SPECIFICATIONS

SECTION 08 06 71 - DOOR HARDWARE SCHEDULE

PART 2 - PRODUCTS

2.3 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

1. Acceptable Manufacturers:
   a. Schuco

C. Cylinders: Original manufacturer cylinders complying with the following:

1. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Keyway: Manufacturer's Standard.

D. Keying System: Each type of lock and cylinders to be factory keyed. Conduct specified "Keying Conference" to define and document keying system instructions and requirements. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner. Incorporate decisions made in keying conference, and as follows:

E. Key Quantity: Provide the following minimum number of keys:

1. Top Master Key: One (1)
2. Change Keys per Cylinder: Two (2)

F. Construction Keying: Provide construction master keyed cylinders or temporary keyed construction cores where specified. Provide construction master keys in quantity as required by project Contractor. Replace construction cores with permanent cores. Furnish permanent cores for installation as directed under specified "Keying Conference".

CONSTRUCTION SPECIFICATIONS

SECTION 08 06 71 - DOOR HARDWARE SCHEDULE

PART 3 - EXECUTION

3.1 DOOR HARDWARE SETS

A. The door hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. The supplier is responsible for handing and sizing all products as listed in the door hardware sets. Quantities listed are for each pair of doors, or for each single door.

C. Products listed in the Door Hardware Sets must meet the requirements described in the specification sections noted.

1. Section 08 71 00 – Door Hardware. D. Manufacturer's Abbreviations:

   a. SC - Schuco
   b. SCH - Schlage

CONSTRUCTION SPECIFICATIONS

SECTION 08 06 71 - DOOR HARDWARE SCHEDULE

PART 3 - EXECUTION

3.2 DOOR HARDWARE SCHEDULE

A. SET ONE

1. Doors: 3’ x 8’ x 1 ¾” WDD (2 LH, 2 RH)
   a. Description: Bedroom/Bathroom/Mechanical
   b. 8 Surface Mounted Invisible Hinge
   c. 4 Tubular Lock
   d. 4 Door Stop
   e. 4 Lever Sets Model
2. Door Manufacturers
   a. Masonite Max
3. Door Hardware Manufacturers
   a. Schlage
      1. SATIN CHROME

C. SET TWO

1. Doors: 1’ 6” x 8’ x 1 ¾” WDD (French)
   a. Description: 2-DR Bifold Door Track Laundry Room
   b. 1 Sliding Door Hardware
   c. 2 French Pull
2. Door Manufacturers
   a. Masonite Max
3. Door Hardware Manufacturers
   a. MC MASTER CARR
      1. SILVER

D. SET THREE

1. Doors: 3’ 11” x 8’ x 1” (LH) CT70
   a. Description: Front Door
   b. 2 Surface Mounted Hinge
2. Door and Hardware Manufacturers
   a. Schuco
      1. SILVER

CONSTRUCTION SPECIFICATIONS

SECTION 08 06 71 - DOOR HARDWARE SCHEDULE

PART 3 - EXECUTION

3.2 DOOR HARDWARE SCHEDULE

A. SET ONE

1. Doors: 3’ x 8’ x 1 ¾” WDD (2 LH, 2 RH)
   a. Description: Bedroom/Bathroom/Mechanical
   b. 8 Surface Mounted Invisible Hinge
   c. 4 Tubular Lock
   d. 4 Door Stop
   e. 4 Lever Sets Model
2. Door Manufacturers
   a. Masonite Max
3. Door Hardware Manufacturers
   a. Schlage
      1. SATIN CHROME

C. SET TWO

1. Doors: 1’ 6” x 8’ x 1 ¾” WDD (French)
   a. Description: 2-DR Bifold Door Track Laundry Room
   b. 1 Sliding Door Hardware
   c. 2 French Pull
2. Door Manufacturers
   a. Masonite Max
3. Door Hardware Manufacturers
   a. MC MASTER CARR
      1. SILVER

D. SET THREE

1. Doors: 3’ 11” x 8’ x 1” (LH) CT70
   a. Description: Front Door
   b. 2 Surface Mounted Hinge
2. Door and Hardware Manufacturers
   a. Schuco
      1. SILVER

CONSTRUCTION SPECIFICATIONS

SECTION 08 06 71 - DOOR HARDWARE SCHEDULE

PART 3 - EXECUTION

3.2 DOOR HARDWARE SCHEDULE

E. SET THREE

1. Doors: 3’ 2.5” x 8’ x 1” (RH) CT70
   a. Description: Bathroom Exterior Door
   b. 2 Surface Mounted Hinge
2. Door and Hardware Manufacturers
   a. Schuco
      1. SILVER

END OF SECTION 08 06 71

CONSTRUCTION SPECIFICATIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Solid core doors with wood veneer, hardboard or MDF faces.

B. Related Sections:

1. Section 08 71 00 Section “Door Hardware” for door hardware for flush wood doors and hollow metal frames.
2. Division 09 “Painting”

C. Standards and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A208.1 – Wood Particleboard.
2. Window and Door Manufacturers Association - WDMA I.S.1-A Architectural Wood Flush Doors.

1.02 SUBMITTALS

A. Product Data: For each type of door indicated. Include details of core and edge construction, louvers, trim for openings, and WDMA I.S.1-A or AWS classifications. Include factory finishing specifications.

B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the wood door supplier in order to prepare the doors and frames to receive the finish hardware items.

C. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate finish requirements.

CONSTRUCTION SPECIFICATIONS

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.03 GENERAL

A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer wherever possible.

B. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, latest edition, “Industry Standard for Architectural Wood Flush Doors’.

C. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section “Project Meetings” with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for receiving, handling, and installing flush wood doors.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer’s written instructions.

B. Package pre-finished doors individually in plastic bags or cardboard cartons and wrap bundles of doors in plastic sheeting.

C. Mark each door on top rail with opening number used on Shop Drawings.

1.05 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

CONSTRUCTION SPECIFICATIONS

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.06 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Warping (bow, cup,or twist) more than 1/4 inch in a 42-by-84-inch section.
   b. Telegraphing of core construction in wood face veneers exceeding 0.01 inch in a 3-inch span.
   c. Telegraphing of core construction and delaminating of face in decorative laminate-faced doors.
2. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid Core Interior Doors: Life of installation according to manufacturer's written warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. MASONITE MAX, Home Depot, 180 Twelfth Street Jersey City, NJ 07310

1. Bedroom Doors.
2. Bathroom Door.
3. Mechanical Room Door.
4. Laundry Room Door.

CONSTRUCTION SPECIFICATIONS

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 2 - PRODUCTS

2.02 PASSAGE DOORS

A. Core and Frame

1. Solid core with [combination wood/MDF] [all-wood] frame.
   a. Thickness: 1-3/4 inch with 45-minute fire rating.
2. Solid mineral core with mineral composite frame.
   a. Thickness: 1-3/4 inch with [45-minute] [60-minute] [90-minute] fire rating.
3. Hollow core with MDF frame.
   a. Thickness: 1-3/8 inch.3

2.03 DOOR HARDWARE

A. Door Handles

1. To be specified by architect.
   a. Finish
      1. Satin Chrome or Satin Nickel

B. Finish

1. Prefinished Smooth : Based on material samples. Finishes to be chosen by architect.
   a. Baltic Birch

CONSTRUCTION SPECIFICATIONS

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 3 - EXECUTION

3.01 GENERAL

A. Install doors in accordance with manufacturer's installation guidelines and recommendations.

3.02 EXAMINATION

A. Inspect door prior to installation.

B. Inspect rough opening for compliance with door manufacturer recommendations.

3.03 PREPARATION

A. Prepare door for installation in accordance with manufacturer's recommendations.

B. Trim bottom of jamb sides to achieve desired distance between door bottom and finished floor height.

3.04 INSTALLATION

A. Place door unit into opening and level hinge side of jamb. Use shims fastened through jamb and stop to level and temporarily secure in place.

B. Use shims fastened through jamb and stop to level and temporarily secure in place.

C. Verify spacing between jamb and door is uniform on all sides. Adjust as necessary.

D. Shim top of jamb in center of opening and fasten with nail.

E. Re-check for square, level and even spacing around door.

F. Set nails.

G. Install trim on both sides using nails every 12 to 16 inches.

END OF SECTION 08 14 16

CONSTRUCTION SPECIFICATIONS

SECTION 08 15 00 - PLASTIC DOORS (EXTERIOR)

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Out-swing entry doors.

1.02 PERFORMANCE REQUIREMENTS

A. Doors shall have a certified rating in accordance with WDMA CS2 Hallmark Program Guide for Side-hinged Exterior Door Systems.

B. Door Unit Air Leakage, ASTM E 283, 1.57 psf (25 mph): 0.30 cfm per square foot of frame or less.

C. Door Unit Water Penetration: No water penetration through door unit when tested in accordance with ASTM E 331 with water applied at rate of 5 gallons per hour per square foot. Doors with standard sill shall have water resistance performance level up to 7.5 psf and low profile sill (ADA) shall have water resistance performance level of 0 psf.

D. ALL DOOR PERFORMANCE REQUIREMENTS MUST COMPLY WITH PASSIVE HOUSE CERTIFICATION

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's product data, including installation instructions.

B. Shop Drawings: Submit manufacturer's shop drawings, indicating dimensions, construction, component connections and locations, anchorage methods and locations, hardware locations, and installation details.

C. Samples: Submit full-size or partial full-size sample of door illustrating glazing system, quality of construction, and color of finish.

D. Warranty: Submit manufacturer's standard warranty.

CONSTRUCTION SPECIFICATIONS

SECTION 08 15 00 - PLASTIC DOORS (EXTERIOR)

PART 1 - GENERAL

1.04 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site undamaged in manufacturer's or sales branch's original, unopened containers and packaging, with labels clearly identifying manufacturer and product name. Include installation instructions.

B. Storage: Store materials in an upright position, off ground, under cover, and protected from weather, direct sunlight, and construction activities.

C. Handling: Protect materials and finish during handling and installation to prevent damage.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Schüco USA L.P.
240 Pane Road
CT 06111 Newington
United States of America
Toll Free: +1 877 472 4826

2.02 OUT-SWING ENTRY DOORS

A. Out-Swing Entry Doors: Factory-assembled doors with outward-swing door panels installed in frames.

B. Frames

1. UPVC Door
   a. Gray

CONSTRUCTION SPECIFICATIONS

SECTION 08 15 00 - PLASTIC DOORS (EXTERIOR)

PART 2 - PRODUCTS

2.02 OUT-SWING ENTRY DOORS

C. UPVC Door Panels

1. Hardware Preparation
   a. Factory prepared Multi-point with lock installed
   b. 2-3/8-inch backset
   c. 6 inches on center
2. Door Closer and Panic Hardware Reinforcement: Solid reinforcement positioned to support surface-mounted closer and panic hardware.

D. Weather Strip:

1. Head: Dual-seal weather strip shall contact interior face and side of door panel and extruded leaf rain screen shall cover the exterior face of door panel.
2. Jambs: Dual-seal weather strip shall contact interior face and side of door panel.
3. Sill: Bristle rain screen at exterior face of door panel with bulb weather strip on threshold shall contact interior face of door panel.

2.04 HARDWARE

A. Hinges: Three (3) per door panel on 6’ 8” and 7’ 0” panel heights; four (4) per door panel on 8’ 0” heights for operable units.

1. Type:
   a. 4-inch by 4-inch by 0.100-inch thick cold-rolled steel with non-removal pin.
   b. 4-inch by 4-inch by 0.100-inch thick cold-rolled steel with spring and non-removal pin.
2. Finish: US26, polished chrome-plated

B. Frames are prepared for hardware to match door panel boring.

CONSTRUCTION SPECIFICATIONS

SECTION 08 15 00 - PLASTIC DOORS (EXTERIOR)

PART 2 - PRODUCTS

2.05 TOLERANCES

C. Doors shall accommodate the following opening tolerances:

1. Vertical Dimensions Between High and Low Points: Plus 1/4 inch, minus 0 inch.
2. Width Dimensions: Plus 1/4 inch, minus 0 inch.
3. Building Columns or Masonry Openings: Plus or minus 1/4 inch from plumb.

2.06 FINISH

A. Door Frame Exterior Finish System: SCHUCO Thermoclad System.

1. Exterior aluminum door frame surfaces shall be finished with the following multi-stage system:
   a. Clean and etch aluminum surface of oxides.
   b. Pre-treat with chrome phosphate conversion coating.
   c. Pre-treat with chromic acid sealer/rinse.
   d. Prime with baked-on modified polyester primer.
   e. Top coat with baked-on polyester enamel.
2. Color: White

B. Exterior Finish System Performance Requirements:

1. Exterior UPVC finishes shall meet or exceed the following performance requirements:
   a. Ozone Deterioration, ASTM D 1149, Modified: 5 ppm ozone, 160 degrees F, 60 percent relative humidity, 100 hours exposure, little or no loss of cure.
   b. Taber Abrasion Resistance, ASTM D 4060: 500 g weight, CS-10 wheel, 500 cycles, less than 25 g weight loss.
   c. Cyclic Acidified Salt Fog Test, ASTM G 85, Appendix A-2.

CONSTRUCTION SPECIFICATIONS

SECTION 08 15 00 - PLASTIC DOORS (EXTERIOR)

PART 2 - PRODUCTS

2.06 FINISH

C. Door Panel Exterior Finish:

1. UPVC Door Panels: Factory pre-finished, paint; color Gray.

D. Door Frame Interior Finish: Factory pre-finished, paint; Gray.

E. Door Panel Interior Finish:

1. UPVC Door Panels: Factory pre-finished, paint; color Gray.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas to receive doors. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and approved shop drawings.

B. Install doors to be weather-tight and freely operating.

C. Maintain alignment with adjacent work.

D. Secure assembly to framed openings, plumb and square, without distortion.

E. Integrate door system installation with exterior weather-resistant barrier using flashing/sealant tape. Apply and integrate flashing/sealant tape with weather-resistant barrier using watershed principles in accordance with door manufacturer's instructions.

CONSTRUCTION SPECIFICATIONS

SECTION 08 15 00 - PLASTIC DOORS (EXTERIOR)

PART 3 - EXECUTION

3.02 INSTALLATION

F. Place interior seal around door perimeter to maintain continuity of building thermal and air barrier using insulating-foam sealant.

G. Seal door to exterior wall cladding with sealant and related backing materials at perimeter of assembly.

H. Leave doors closed.

3.03 CLEANING

A. Clean door frames and glass in accordance with Division 1 requirements.

B. Do not use harsh cleaning materials or methods that would damage finish.

C. Remove manufacturer's proprietary labels and visible markings.

SECTION 08 15 00

CONSTRUCTION SPECIFICATIONS

SECTION 08 32 00 - SLIDING GLASS DOORS

PART 1 - GENERAL

1.01 SUMMARY

A. UPVC Lift and Slide Glass Doors.

1.02 RELATED SECTIONS

A. Section 07270 (07 27 00) - Air Barriers: Water-resistant barrier.

B. Section 07920 (07 92 00) - Joint Sealants: Sealants and caulking.

1.02 PERFORMANCE REQUIREMENTS

A. Doors shall have a certified rating in accordance with WDMA CS2 Hallmark Program Guide for Side-hinged Exterior Door Systems.

B. Door Unit Air Leakage, ASTM E 283, 1.57 psf (25 mph): 0.30 cfm per square foot of frame or less.

C. Door Unit Water Penetration: No water penetration through door unit when tested in accordance with ASTM E 331 with water applied at rate of 5 gallons per hour per square foot. Doors with standard sill shall have water resistance performance level up to 7.5 psf and low profile sill (ADA) shall have water resistance performance level of 0 psf.

D. ALL DOOR PERFORMANCE REQUIREMENTS MUST COMPLY WITH PASSIVE HOUSE CERTIFICATION

1.06 QUALITY ASSURANCE

A. Mockup

1. Provide sample installation for field testing door performance requirements and to determine acceptability of door installation methods.
2. Approved mockup shall represent minimum quality required for the Work.
3. Approved mockup shall [not] remain in place within the Work.

CONSTRUCTION SPECIFICATIONS

SECTION 08 32 00 - SLIDING GLASS DOORS

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Schüco USA L.P.
240 Pane Road
CT 06111 Newington
United States of America
Toll Free: +1 877 472 4826

2.02 PERFORMANCE REQUIREMENTS

A. Product Standard: AAMA/WDMA/CSA 101/I.S.2/A440.

1. Product Certification: AAMA certified with label attached to each door.

B. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum total fenestration product SHGC of .62

C. Thermal Transmittance: NFRC 100 maximum total fenestration product U-factor of.14 U Value

D. Low - E coating, Argon Gas Triple Pane Glass

E. MUST COMPLY WITH PASSIVE HOUSE CERTIFICATION

2.02 GLASS LIFT AND SLIDE DOOR

A. EAS ThermoSlide

1. SHGC of .62
2. .7 watts per m^2 U -Factor
3. Argon Gas Triple Pane Glass
4. Finish : White Specified By Architect
5. UPVC Frame

CONSTRUCTION SPECIFICATIONS

SECTION 08 32 00 - SLIDING GLASS DOORS

PART 2 - PRODUCTS

2.03 GLAZING AND ACCESSORIES

A. Glaze units with clear, low-e coated,argon-filled,sealed, and insulating glass complying with Section 088000 “Glazing” and with testing requirements in 16 CFR 1201 for Category II materials.

B. Floor Track: Exterior type, low profile, ADA-ABA compliant.

C. Lock: Install manufacturer’s keyed cylinder lock and multipoint locking device on each movable panel, lockable from the inside and outside.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Set doors level, plumb, and true to line, without warp or rack of frames and panels. Provide proper support and anchor securely in place.

B. Set sill members in bed of sealant or with gaskets, as indicated, to provide weathertight construction.

C. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

D. Adjust operating panels, screens, and hardware to provide a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

E. Clean frame surfaces and glass immediately after installing sliding glass doors. Remove nonpermanent labels from glass surfaces.

END OF SECTION 08 23 00

CONSTRUCTION SPECIFICATIONS

SECTION 08 53 00 - PLASTIC WINDOWS

PART 1 - GENERAL

1.01 SUMMARY

A. UPVC Lift and Slide Glass Doors.

1.02 RELATED SECTIONS

A. Section 07270 (07 27 00) - Air Barriers: Water-resistant barrier.

B. Section 07920 (07 92 00) - Joint Sealants: Sealants and caulking.

1.03 PERFORMANCE REQUIREMENTS

A. Window Unit Air Leakage, ASTM E 283, 1.57 psf (25 mph): 0.30 cfm per square foot of frame or less.

B. Window Unit Water Penetration: No water penetration through door unit when tested in accordance with ASTM E 331 with water applied at rate of 5 gallons per hour per square foot. Windows with standard sill shall have water resistance performance level up to 7.5 psf.

C. ALL WINDOW PERFORMANCE REQUIREMENTS MUST COMPLY WITH PASSIVE HOUSE CERTIFICATION.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Schüco USA L.P.
240 Pane Road
CT 06111 Newington
United States of America
Toll Free: +1 877 472 4826

CONSTRUCTION SPECIFICATIONS

SECTION 08 53 00 - PLASTIC WINDOWS

PART 2 - PRODUCTS

2.02 PERFORMANCE REQUIREMENTS

A. Product Standard: AAMA/WDMA/CSA 101/I.S.2/A440.

1. Window Certification: WDMA certified with label attached to each window.

B. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of .5.

C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of .14.

2.03 PLASTIC WINDOWS

A. Window Types - The following types, as indicated on Drawings:

1. Tilt and Turn Window
2. Fixed

B. SCHUCO SL82 UPVC FIXED WINDOW

1. SHGC of .5
2. .14 watts per m^2 U -Factor
3. Argon Gas Triple Pane Glass
4. Finish : White or Gray Specified By Architect
5. UPVC Frame

C. SCHUCO SL82 UPVC TILT AND TURN WINDOW

1. SHGC of .5
2. .14 watts per m^2 U -Factor
3. Argon Gas Triple Pane Glass
4. Finish : White or Gray Specified By Architect
5. UPVC Frame

CONSTRUCTION SPECIFICATIONS

SECTION 08 53 00 - PLASTIC WINDOWS

PART 2 - PRODUCTS

2.03 PLASTIC WINDOWS

C. Equip units with removable grilles as indicated; attach to inside face of each lite.

D. Trim: Provide indicated trim, matching material and finish of frame members.

E. Provide prefabricated window units as indicated.

F. Equip units with vinyl-coated, glass-fiber mesh insect screens at operable sashes.

G. Glaze units with clear, low-E-coated, argon-filled, sealed insulating glass, complying with Section 08 80 00 “Glazing.”

2.04 WINDOW HARDWARE

A. Handle and Hardware to be supplied by manufacturer.

B. Schuco Handle
1. Style : Stainless Steel

PART 3 - EXECUTION

3.01 INSTALLATION

A. Set units level, plumb, and true to line, without warp or rack of frames and panels. Provide proper support and anchor securely in place.

B. For installation procedures and requirements not addressed in manufacturer’s written instructions, comply with installation requirements in ASTM E 2112.

C. Set sill members in bed of sealant or with gaskets, as indicated, to provide weather tight construction.

CONSTRUCTION SPECIFICATIONS

SECTION 08 53 00 - PLASTIC WINDOWS

PART 3 - EXECUTION

3.02 INSTALLATION

D. Adjust operating panels, screens, and hardware to provide a tight fit at contact points and weather stripping for smooth operation and weather tight closure. Lubricate hardware and moving parts.

E. Clean glass and vinyl surfaces immediately after installing windows. Remove non permanent labels from glass surfaces.

SECTION 08 53 00

CONSTRUCTION SPECIFICATIONS

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Flush Wood Doors”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 101 - Life Safety Code.
4. State Building Codes, Local Amendments.

E. Standards: All hardware specified here in shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series

CONSTRUCTION SPECIFICATIONS

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.02 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:

   a. Type, style, function, size, label, hand, and finish of each door hardware item.
   b. Manufacturer of each item.
   c. Fastenings and other pertinent information.
   d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
   e. Explanation of abbreviations, symbols, and codes contained in schedule.
   f. Mounting locations for door hardware.
   g. Door and frame sizes and materials.

CONSTRUCTION SPECIFICATIONS

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.02 SUBMITTALS

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

    a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
    b. Complete (risers, point-to-point) access control system block wiring diagrams.

D. Warranties and Maintenance: Special warranties and maintenance agreements specified in this Section.

1.03 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: Installers, trained by the primary product manufacturers, with a minimum 3 years documented experience installing both standard and electrified builders hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in- service performance.

CONSTRUCTION SPECIFICATIONS

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.03 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: Installers, trained by the primary product manufacturers, with a minimum 3 years documented experience installing both standard and electrified builders hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in- service performance.

C. Regulatory Requirements: Comply with NFPA 70, NFPA 80, NFPA 101 and ANSI A117.1 requirements and guidelines as directed in the model building code including, but not limited to, the following:

1. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), “Accessibility Guidelines for Buildings and Facilities (ADAAG),” ANSI A117.1 as follows:
   a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
   b. Door Closers: Comply with the following maximum opening-force requirements indicated:
      1) Interior Hinged Doors: 5 lbf applied perpendicular to door.
      2) Fire Doors: Minimum opening force allowable.
   c. Thresholds: Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.
2. NFPA 101: Comply with the following for means of egress doors:
   a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
   b. Thresholds: Not more than 1/2 inch high.

CONSTRUCTION SPECIFICATIONS

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.06 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:

1. Twenty five years for manual surface door closers.

PART 2 - PRODUCTS

1.06 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.

CONSTRUCTION SPECIFICATIONS

SECTION 08 71 00 - DOOR HARDWARE

PART 2 - PRODUCTS

2.02 HANGING DEVICES

1. Quantity: Provide the following hinge quantity, unless otherwise indicated:

    a. Two Hinges: For doors with heights up to 60 inches.
    b. Three Hinges: For doors with heights 61 to 90 inches.
    c. Four Hinges: For doors with heights 91 to 120 inches.
    d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

    a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
    b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

    a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless standard weight.

4. Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:

    a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the following applications:

        1) Out-swinging exterior doors.

5. Acceptable Manufacturers:

    a. Schlage

CONSTRUCTION SPECIFICATIONS

SECTION 08 71 00 - DOOR HARDWARE

PART 2 - PRODUCTS

2.02 HANGING DEVICES

B. Interior Hinges: Surface mounted invisible hinges

1. Acceptable Manufacturers:
   a. Schlage

C. Sliding Door Hardware: Sliding door hardware is to be of type and design as specified and should comply with ANSI/BHMA A156.14.

2.03 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

1. Acceptable Manufacturers:
   a. Schuco
   b. Schlage

C. Cylinders: Original manufacturer cylinders complying with the following:

1. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Keyway: Manufacturer's Standard**.**

CONSTRUCTION SPECIFICATIONS

SECTION 08 71 00 - DOOR HARDWARE

PART 2 - PRODUCTS

2.02 HANGING DEVICES

D. Keying System: Each type of lock and cylinders to be factory keyed. Conduct specified “Keying Conference” to define and document keying system instructions and requirements. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner. Incorporate decisions made in keying conference, and as follows:

E. Key Quantity: Provide the following minimum number of keys:

1. Top Master Key: One (1)
2. Change Keys per Cylinder: Two (2)

2.04 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer’s standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latch bolts, as recommended by manufacturer.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.

C. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non- handed with full sized covers including installation and adjusting information on inside of cover.

CONSTRUCTION SPECIFICATIONS

SECTION 08 71 00 - DOOR HARDWARE

PART 2 - PRODUCTS

2.05 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

2.06 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.

D. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

CONSTRUCTION SPECIFICATIONS

SECTION 08 71 00 - DOOR HARDWARE

PART 2 - PRODUCTS

2.08 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

a. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

b. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.02 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

CONSTRUCTION SPECIFICATIONS

SECTION 08 71 00 - DOOR HARDWARE

PART 3 - EXECUTION

3.02 INSTALLATION

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section “Joint Sealants.”

3.03 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.04 ADJUSTING

A. Initial 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.

3.05 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. and provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

END OF SECTION 08 71 00

CONSTRUCTION SPECIFICATIONS

SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Glazing Manufacturers and Fabricators: Subject to compliance with requirements, firms producing glass products which may be incorporated into the work include the following:

1. EAS Schuco

2.02 GLASS, GENERAL

A. Primary Glass Standard: Provide primary glass which complies with ASTM C 1036 requirements for type, class and quality.

B. Heat-Treated Glass Standard: Provide heat-treated glass which complies with ASTM C 1048 requirements. Surface compression of heat strengthened glass shall be in the range of 3500 to 6500 psi.
1. Provide heat treated glass where glass would be vulnerable to thermal breakage and where required for safety of persons.
2. Provide fully tempered or heat strengthened glass where indicated or required by authorities having jurisdiction.
3. Tempered glass shall comply with ANSI Z97.1.

C. Sizes: Fabricate glass to sizes required, with edge clearances and tolerances complying with recommendations of glass manufacturer. Provide thicknesses to comply with Building Code, and as recommended by glass manufacturer, unless greater thickness is indicated.

CONSTRUCTION SPECIFICATIONS

SECTION 08 80 00 - GLAZING

PART 2 - PRODUCTS

2.05 COATED GLASS

A. Low-Emittance Coated Vision Glass: ASTM C 1376, coated by vacuum deposition (sputter-coating) process, and complying with other requirements specified.

1. Kind: Kind CV (coated vision glass), except that Kind CO (coated overhead glass) may be used where the lower edge of the glass is more than 6 feet (1.8 m) above the adjacent floor level or cannot be approached closer than 10 feet.
2. Glass: Clear float.

2.06 INSULATING GLASS UNITS

A. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units.

1. Provide Low-E vacuum deposition-coated glass with coating on surface 2.
2. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 “Performance Requirements” Article.
3. Provide Kind FT (fully tempered) or laminated glass lites where safety glass is indicated.
4. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit’s edge.
5. Sealing System: Dual seal, with manufacturer’s standard primary and secondary sealants.
6. Sealing System: Dual seal, with custom color primary and secondary sealants.
7. Spacer: Manufacturer’s standard spacer material and construction.

B. U-Factor: As indicated.

C. Solar Heat-Gain Coefficient (SHGC): Provide aluminum windows with a whole-window SHGC maximum of 0.65, determined according to NFRC 200 procedures.

CONSTRUCTION SPECIFICATIONS

SECTION 08 80 00 - GLAZING

PART 2 - PRODUCTS

2.07 GLAZING MATERIALS

A. General: Provide standard color of glazing materials as selected by Architect. Comply with manufacturer's recommendations for applications and conditions at time of installation.

B. Polyurethane Glazing Gasket: Polyurethane gasket or stick tape, color to be selected by Architect, thickness and size as shown on drawings.

C. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.

D. Setting Blocks: Neoprene, silicone or EPDM, 70-90 durometer hardness, with proven compatibility with glazing materials used.

E. Spacers: Neoprene, silicone or EPDM, 40-50 durometer hardness with proven compatibility with glazing materials used.

F. Compressible Fillers: Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, proven to be compatible with sealants used, flexible and resilient, with 5-10 psi compression strength for 25% deflection.

G. Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.

CONSTRUCTION SPECIFICATIONS

SECTION 08 80 00 - GLAZING

PART 3 - EXECUTION

3.01 GENERAL

A. Each glazing installation must withstand normal temperature changes, and impact loading without failure of glass, failure of sealants or gaskets, deterioration of glazing materials and other defects in the work.

B. Protect glass from damage during handling and installation, and subsequent operation of glazed components of the work. Discard units with edge damage or other imperfections.

C. Glazing channel dimensions are intended to provide for necessary bite on glass, minimum edge clearance, and adequate tape or sealant thicknesses, with reasonable tolerances.

D. Comply with recommendations by manufacturers of glass and glazing products, except where more stringent requirements are indicated, including those of referenced glazing standards.

CONSTRUCTION SPECIFICATIONS

SECTION 08 80 00 - GLAZING

PART 3 - EXECUTION

3.02 PREPARATION

A. Clean glazing channel and other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to substrate.

B. Where sealants are used, apply primer or sealant to joint surfaces where recommended by sealant manufacturer.

3.03 GLAZING

A. Where indicated, provide spacers for size and spacing required for glass sizes larger than 50 united inches, except where gaskets or pre-shimmed tapes are used for glazing.

B. Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.

C. Where sealants are used at butt joints, apply sealant in thin continuous clear bead. Tool sealant to a uniform, continuous, even profile.

D. Unless otherwise indicated mirrors in exercise and athletic rooms shall extend from top of base to ceiling and from wall to wall, with no horizontal joints and a minimum number of vertical joints. Penetrations of mirrors shall be accomplished solely with drilled holes or with cuts in the edge of the mirror. Splicing of mirror pieces is not permitted.

3.04 PROTECTION AND CLEANING

A. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.

B. Wash and polish glass on both faces not more than 4 days prior to date scheduled for inspections intended to establish Date of Substantial Completion in each area of project. Comply with glass manufacturer's recommendations for final cleaning.

END OF SECTION 08 80 00

CONSTRUCTION SPECIFICATIONS

SECTION 08 90 00 - LOUVERS AND VENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes fixed, extruded-aluminum storm-resistant louvers, fixed formed metal acoustic louvers.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated.[For louvers specified to bear AMCA seal, include printed catalog pages showing AMCA Certified Ratings Seals.]

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.

1. Verify louver openings by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Tuttle and Bailey

2.03 FABRICATION, GENERAL

A. Fabricate frames to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

CONSTRUCTION SPECIFICATIONS

SECTION 08 90 00 - LOUVERS AND VENTS

PART 2 - PRODUCTS

2.03 FABRICATION, GENERAL

B. Join frame members to each other and to louver blades with fillet welds concealed from view.

C. Join frame members to each other and to louver blades with fillet welds, threaded fasteners, or both, as standard with louver manufacturer, concealed from view.

2.05 LOUVER SCREENS

A. General: Provide screen at interior face of each exterior louver.

B. Louver Screen Frames: Same kind and form of metal as indicated for louver to which screens are attached.

C. Louver Screening:

1. Bird Screening: Aluminum or stainless steel, 1/2-inch- (12.7-mm-) square mesh, 0.063-inch (1.6-mm) wire.

2.06 FINISHES

A. Aluminum, High-Performance Organic Finish: Two-coat thermocured system with fluoropolymer coats containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.

1. Color and Gloss: As selected from manufacturer's full range.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.

CONSTRUCTION SPECIFICATIONS

SECTION 08 90 00 - LOUVERS AND VENTS

PART 3 - EXECUTION

3.01 INSTALLATION

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

D. Repair damaged finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.

E. Protect galvanized and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.

END OF SECTION 08 90 00

CONSTRUCTION SPECIFICATIONS

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - GENERAL

A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

B. STC-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 90 and classified per ASTM E 413 by a qualified independent testing and inspecting agency.

2.02 PANEL PRODUCTS

A. Provide in maximum lengths available to minimize end-to-end butt joints.

B. Interior Gypsum Board: ASTM C 1396/C 1396M, in thickness indicated, with manufacturer's standard edges. Regular type unless otherwise indicated Sag-resistant type for ceiling surfaces.

1. Core: Regular
2. Surface Paper: 100% recycled content paper on front, back and long edges
3. Long Edges: Square
4. Overall thickness: 5/8 inch
5. Manufacturers:
    a. American Gypsum.
    b. CertainTeed Corp.
    c. Georgia-Pacific Gypsum LLC.

CONSTRUCTION SPECIFICATIONS

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

2.02 PANEL PRODUCTS

C. Water-Resistant Gypsum Backing Board: ASTM C 1396/C 1396M, in thickness indicated. Regular type unless otherwise indicated.

1. Core: mold and moisture resistant gypsum core
2. Surface Paper: 100% recycled content moisture/mold/mildew resistant paper on front, back and long edges
3. Long Edges: Square
4. Overall thickness: 5/8 inch
5. Manufacturers:
   a. American Gypsum.
   b. CertainTeed Corp.
   c. Georgia-Pacific Gypsum LLC.

D. Cementitious Backer Units: ANSI A118.9, ASTM C 1288, or ASTM C 1325 compliant.

1. Overall Thickness: ½ inch
2. Install in all locations receiving tile finish material or as indicated in drawings.
3. Retain option in “Products” Subparagraph below to limit products to those listed.
4. Products:
   a. C-Cure; C-Cure Board 990.
   b. CertainTeed Corp.; Fiber Cement
   c. USG Corporation; DUROCK Cement Board.

E. Trim Accessories: ASTM C 1047, formed from galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.

1. Provide corner bead at outside corners unless otherwise indicated.
2. Provide LC-bead (J-bead) at exposed panel edges.
3. Provide control joints where indicated.

CONSTRUCTION SPECIFICATIONS

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

2.02 PANEL PRODUCTS

F. Joint-Treatment Materials: ASTM C 475/C 475M.

1. Joint Tape: Paper unless otherwise recommended by panel manufacturer.
2. Joint Compounds: Drying-type, ready-mixed, all-purpose compounds or Setting type taping compound and drying-type, ready-mixed, compounds for topping.
3. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.
4. Cementitious Backer Unit Joint-Treatment Materials: Products recommended by cementitious backer unit manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install gypsum board to comply with ASTM C 840.

1. Isolate gypsum board assemblies from abutting structural and masonry work. Provide edge trim and acoustical sealant.
2. Single-Layer Fastening Methods: Fasten gypsum panels to supports with screws.

B. Install cementitious backer units to comply with ANSI A108.11.

C. Finishing Gypsum Board: ASTM C 840.

1. At concealed areas, unless a higher level of finish is required for fire-resistance rated assemblies, provide Level 1 finish: Embed tape at joints.
2. At substrates for tile, provide Level 2 finish: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges.
3. Unless otherwise indicated, provide Level 4 finish: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges.

D. Cementitious Backer Units: Finish according to manufacturer's written instructions.

END OF SECTION 09 29 00

CONSTRUCTION SPECIFICATIONS

SECTION 09 30 00 - TILING

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data and Samples.

B. Obtain tile of each type and color or finish from same production run for each contiguous area

C. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.

PART 2 - PRODUCTS

2.01 CERAMIC TILE

A. Ceramic tile that complies with Standard grade requirements in ANSI A137.1, “Specifications for Ceramic Tile.”

B. Tile Type CT-1: Factory-mounted, impervious natural clay or porcelain cushion-edged ceramic mosaic tile.

1. Manufacturers: DALTILE, www.daltile.com
2. Basis-of-Design Product:
    a. White
        1. Module Size 12” x 12”
        2. Color : White
    b. Wood Texture
        1. Module Size 6” x 24”
        2. Color : Wood Texture

CONSTRUCTION SPECIFICATIONS

SECTION 09 30 00 - TILING

PART 2 - PRODUCTS

2.01 CERAMIC TILE

B. Tile Type CT-1: Factory-mounted, impervious natural clay or porcelain cushion-edged ceramic mosaic tile.

4. Surface: Smooth.
5. Finish: As selected.
6. Grout Color: As selected.
7. Trim Units: Coordinated with sizes and coursing of adjoining flat tile.

C. Accessories: Provide vitreous china accessories of type and size indicated, suitable for installing by same method as adjoining wall tile.

1. One soap holder for each shower and tub indicated.
2. Color and Finish: Match adjoining glazed wall tile .

CONSTRUCTION SPECIFICATIONS

SECTION 09 30 00 - TILING

PART 2 - PRODUCTS

2.04 INSTALLATION MATERIALS

A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, 1/2 inch thick.

1. Products:
    a. USG Corporation; DUROCK Cement Board.
    b. Hardie Cement Backer Board
    c. Kerdi Board
    d. Kerdi Floor Board

B. Low-Emitting Materials: Adhesives and fluid-applied waterproofing membranes shall have a VOC content of 65 g/L or less.

C. Setting and Grouting Materials: Comply with material standards in ANSI's "Specifications for the Installation of Ceramic Tile" that apply to materials and methods indicated.

1. Thin-Set Mortar Type: latex-portland cement.
2. Grout Type: Standard cement, unless otherwise indicated.
    a. Finish
        1. White
3. Grout Type: Polymer modified, unless otherwise indicated.
    a. Finish
        1. Earth

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

CONSTRUCTION SPECIFICATIONS

SECTION 09 30 00 - TILING

PART 3 - EXECUTION

3.01 INSTALLATION

1. For installations indicated below, follow procedures in ANSI's "Specifications for the Installation of Ceramic Tile" for providing 95 percent mortar coverage.
a. Tile floors + walls in wet areas.

B. 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.

C. Lay tile in grid pattern unless otherwise indicated. Align joints where adjoining tiles on floor, base, walls, and trim are the same size.

D. Install cementitious backer units and treat joints according to ANSI A108.11.

E. Install KERDI BOARD ontop of backer units.

F. Install waterproofing to comply with ANSI A108.13.

G. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thin set).

H. Interior Floor+ Wall Tile Installation Method(s):

1. Over Wood Subfloors: TCA F144 (thin-set mortar bonded on cementitious backer units or fiber cement underlayment) TCA F150/160 (thin-set mortar on exterior-glue plywood).

I. Interior Wall Tile Installation Method(s):

1. Over Wood Studs or Furring: TCA W244 (thin-set mortar on either cementitious backer units or fiber cement underlayment).
2. Bathtub/Shower Wall Installations, Wood Studs or Furring: TCA B412 (thin-set mortar on either cementitious backer units or fiber cement underlayment).

END OF SECTION 09 30 00

CONSTRUCTION SPECIFICATIONS

SECTION 09 51 00 - WOOD CEILING PANELS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 REFERENCES

A. ASTM C635, Standard Specifications for Metal Suspension Systems

B. ASTM C636, Recommended Practice for Installation of Metal Suspension System

C. ATSM E84, Standard Test Method for Surface Burning Characteristics of Building Materials

D. CISCA Ceiling Systems Installation Handbook.

E. CISCA Wood Ceilings Technical Guidelines

1.03 SUMMARY

A. Section Includes:

1. Acoustical ceilings panels
2. Exposed grid suspension system.
3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.

B. Related Sections include the following:

1. Section 01 41 13 (01450) - Codes
2. Section 01 45 33 (01450) - Code-required Special Inspections and Procedures
3. Section 09 20 00 (09250) - Plaster and Gypsum Board
4. Divisions 23 (15) - HVAC
5. Division 26 (16) Sections - Electrical Work

CONSTRUCTION SPECIFICATIONS

SECTION 09 51 00 - WOOD CEILING PANELS

PART 1 - GENERAL

1.04 SUBMITTALS

A. Samples: Submit panel finish and suspension system main and cross tees for acceptance.

B. Shop drawings:

1. Reflected ceiling plans: Submit ceiling suspension system layout indicating dimensions, lighting fixture locations, and related mechanical components.
2. Assembly drawings: Indicate installation details, accessory attachments and installation of related lighting fixtures and related mechanical system components.
3. Samples: Minimum 4 inch x 6 inch samples of specified acoustical panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.

C. Manufacturer's data:

1. System details: Submit manufacturer's catalog cuts, literature, or standard drawings showing details of system with project conditions clearly identified and manufacturer's recommended installation instructions.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Delivery of materials: Deliver materials in original unopened packages, clearly labeled with manufacturer's name, item description, specification number, type, and class as applicable.

B. Inspection: Promptly inspect delivered materials, file freight claims for damage during shipment, and order replacement materials as required. Any damaged materials shall be promptly removed from the job site.

C. Storage: Store in manner that will prevent warpage, water damage, or damage of any kind. Prevent interference to/by other trades and any other adverse job conditions due to storage locations or methods.

CONSTRUCTION SPECIFICATIONS

SECTION 09 51 00 - WOOD CEILING PANELS

PART 1 - GENERAL

1.06 QUALITY ASSURANCE

A. Subcontractor qualifications: Installer shall have not less than three years of successful experience in the installation of ceiling suspension systems on projects with requirements similar to requirements specified.

B. Requirements of regulatory agencies: Codes and regulations of authorities having jurisdiction.

C. Source quality control: Manufacturer will provide test certification for ceiling system as required to meet industry performance standards specified by various agencies.

D. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section “Project Meetings.”

1.07 PROJECT CONDITIONS

A. Building conditions: Building shall be enclosed with all windows and exterior doors in place and glazed, and the roof watertight before installation of suspension system.

B. Interior temperature/humidity in building: Climatic conditions in areas to receive ceiling suspension systems shall range from 60°F (16°C) to 85°F (29°C) and relative humidity of not more than 55% shall be maintained before installation of components.

PART 2 - PRODUCTS

2.01 PRODUCTS AND MANUFACTURERS

Architect shall specify ceiling product between :

A. USG TRUE WOOD ceiling panels

B. 3/4” Finished Baltic Birch Plywood

CONSTRUCTION SPECIFICATIONS

SECTION 09 51 00 - WOOD CEILING PANELS

PART 2 - PRODUCTS

2.02 MATERIALS

A. USG TRUE WOOD ceiling panels:

1. PART 1 - USG TRUE WOOD ceiling panels will be made with a [veneer species] face veneer, [veneer cut] [veneer match], applied to a 3/4" thick core material. The edge treatment on the Wood Square panels shall be finished.
   The standard TRUE WOOD ceiling panel shall be 3/4" thick and [7.5' x 4'] (nominal). Wood is a natural product that will undergo changes with variations in the environment. Therefore, all dimension tolerances shall be ± 1/8".
2. Accessories:
   a. M9 wall molding: 15/16"x9/16"x12' -long angle shape of prepainted steel.

B. 3/4" Finished Birch Plywood

1. Finished Birch Plywood shall be bough in nominal sheet sized and cut down to 4' x 7.5'

2.03 METAL SUSPENSION SYSTEMS

A. STEEL STUD CEILING SYSTEM

1. See Section " COLD-FORMED METAL FRAMING 05 40 00"

CONSTRUCTION SPECIFICATIONS

SECTION 09 51 00 - WOOD CEILING PANELS

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and structural framing to which ceiling systems attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage, and other conditions affecting performance of ceiling systems.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Work to be concealed: Verify work above ceiling system is complete and installed in manner that will not affect layout and installation of system components.

3.02 PREPARATION

A. Coordination: Furnish layouts for cast-in-place anchors, clips, and other ceiling anchors whose installation is specified in other Sections.

B. Measure each ceiling area and establish layout of 3-dimensional ceiling systems. Comply with layout shown on reflected ceiling plans.

C. Field dimensions: Installer must verify actual field dimensions prior to installation.

3.03 INSTALLATION

A. Ceiling Framing:

1. Standard reference: Install grid members in accordance with ASTM C636, CISCA installation standards, and other applicable references.
2. Manufacturer's reference: Install in accordance with manufacturer's current printed recommendations.
3. Drawing reference: Install in accordance with approved shop drawings and locate ceiling in accordance with main tee dimensions relative to elevations.
4. Hanger Wire Installation: Secure hanger wires to upper structural elements and space hangers so that each hanger wire supports a maximum of 16 sq. ft.
5. Space main tee members a maximum span of 48" on center. Space cross tees to achieve a 2' x 2' grid for 2' x 2' panels or 4' x 4' grid for 4' x 4' panels.

CONSTRUCTION SPECIFICATIONS

SECTION 09 51 00 - WOOD CEILING PANELS

PART 3 - EXECUTION

3.03 INSTALLATION

B. Ceiling Panels

1. Preparation: Remove dirt and debris from surrounding area. Comply with manufacturer's written instructions.
2. Install ceiling panels in accordance with approved shop drawings.

3.04 CLEANING

A. Suspension system: Remove infill material and perform any necessary cleaning maintenance with non-solvent based commercial cleaner.

B. Touch up all minor scratches and spots, as acceptable, or replace damaged sections when touch up is not permitted.

C. Painting: Repainting of suspension members shall be with a high-quality solvent base paint and applied as recommended by paint manufacturer.

D. Removal of debris: Remove all debris resulting from work of this section.

E. Clean exposed surfaces of ceiling systems. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling system components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and deformed members.

END OF SECTION 09 51 00

CONSTRUCTION SPECIFICATIONS

SECTION 09 64 29 - WOOD STRIP AND PLANK FLOORING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes :

1. Field-finished wood BATHROOM flooring.
2. Pre-finished wood LIVING ROOM + BEDROOM flooring.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each type of floor assembly and accessory. Include plans, elevations, sections, details, and attachments to other work. Include expansion provisions and trim details.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Plank Flooring: Comply with NOFMA's "Official Flooring Grading Rules" for species, grade, and cut.

1. Certification: Provide flooring that carries NOFMA grade stamp on each bundle or piece.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver wood flooring materials in unopened cartons or bundles.

B. Protect wood flooring from exposure to moisture. Do not deliver wood flooring until after concrete, masonry, plaster, ceramic tile, and similar wet work is complete and dry.

C. Store wood flooring materials in a dry, warm, ventilated, weathertight location.

CONSTRUCTION SPECIFICATIONS

SECTION 09 64 29 - WOOD STRIP AND PLANK FLOORING

PART 1 - GENERAL

1.05 PROJECT CONDITIONS

A. Conditioning period begins not less than seven days before wood flooring installation, is continuous through installation, and continues not less than seven days after wood flooring installation.

1. Wood Flooring Conditioning: Move wood flooring into spaces where it will be installed, no later than the beginning of the conditioning period.

B. Install factory-finished wood flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.01 FIELD-FINISHED WOOD FLOORING

A. TRU GRAIN COMPOSITE DECKING: Kiln dried to 6 to 9 percent maximum moisture content, and with backs channeled. **SEE SECTION "COMPOSITE DECKING 06 73 00"**

1. Species and Grade: Select TRU GRAIN.
2. Cut: Plain sawn.
3. Thickness: 3/4 inch (19 mm).
4. Nominal/Actual Sizes
   a. 1 x 5 / 7/8"
5. Lengths: VIF

B. Urethane Finish System: Complete water-based system of compatible components that is recommended by finish manufacturer for application indicated.

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:

CONSTRUCTION SPECIFICATIONS

SECTION 09 64 29 - WOOD STRIP AND PLANK FLOORING

PART 2 - PRODUCTS

2.01 FIELD-FINISHED WOOD FLOORING

a. RESYSTA

2. VOC Content: When calculated according to 40 CFR 59, Subpart D (EPA Method 24), as follows:
   a. Finish Coats and Floor Sealers: Not more than 350 g/L.
   b. Stains: Not more than 250 g/L.
3. Floor Sealer: Pliable, penetrating type.
4. Finish Coats: Formulated for multicoat application on wood flooring.

C. Wood Filler: Compatible with finish system components and recommended by filler and finish manufacturers for use indicated. If required to match approved Samples, provide pigmented filler.

D. Wood Overlayment : As specified in Section :

1. 22 40 00 “PLUMBING FIXTURES”
2. 22 41 23 “RESIDENTIAL SHOWERS”

2.02 FACTORY-FINISHED WOOD FLOORING

C. BELLAWOOD 3/4” x 5” Natural Maple: Kiln dried to 6 to 9 percent maximum moisture content, tongue and groove and end matched, and with backs channeled.

1. Species and Grade: Natural Maple.
2. Cut: Plain sawn.
3. Thickness: 3/4 inch (19 mm).
4. Nominal/Actual Sizes
   a. 5”
5. Lengths: Random - Stagger at seams
6. Edge Style: [Square] .
7. Finish: UV urethane system.

CONSTRUCTION SPECIFICATIONS

SECTION 09 64 29 - WOOD STRIP AND PLANK FLOORING

PART 2 - PRODUCTS

2.4 ACCESSORY MATERIALS

A. Vapor Retarder: ASTM D 4397, polyethylene sheet not less than 6.0 mils (0.15 mm) thick.

B. Asphalt-Saturated Felt: ASTM D 4869, Type II.

C. Wood Flooring Adhesive: Mastic recommended by flooring and adhesive manufacturers for application indicated.

1. Low-Emitting Materials: Adhesives shall have a VOC content of 100 g/L or less.
2. Low-Emitting Materials: Adhesives shall comply with Green Seal's GS-36 and 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."

D. Fasteners: As recommended by manufacturer, but not less than that recommended in NWFA's "Installation Guidelines: Wood Flooring."

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of wood flooring.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

CONSTRUCTION SPECIFICATIONS

SECTION 09 64 29 - WOOD STRIP AND PLANK FLOORING

PART 3 - EXECUTION

3.02 PREPARATION

A. Broom or vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 INSTALLATION

A. Comply with flooring manufacturer's written installation instructions, but not less than applicable recommendations in NWFA's "Installation Guidelines: Wood Flooring.".

B. Provide expansion space at walls and other obstructions and terminations of flooring of not less than 3/4 inch (19 mm).

C. Vapor Retarder: Comply with NOFMA's "Installing Hardwood Flooring" for vapor retarder installation and the following:

1. Wood Flooring Nailed to Wood Subfloor: Install flooring over a layer of asphalt-saturated felt.

D. Solid-Wood Flooring: Blind nail to perimeter furring in shower stall.

1. For flooring of face width more than 3 inches (75 mm):

    a. Install countersunk screws at each end of each piece in addition to blind nailing. Cover screw heads with wood plugs glued flush with flooring.

CONSTRUCTION SPECIFICATIONS

SECTION 09 64 29 - WOOD STRIP AND PLANK FLOORING

PART 3 - EXECUTION

3.04 FIELD FINISHING

A. Machine-sand flooring to remove offsets, ridges, cups, and sanding-machine marks that would be noticeable after finishing. Vacuum and tack with a clean cloth immediately before applying finish.

B. Apply floor-finish materials in number of coats recommended by finish manufacturer for application indicated, but not less than one coat of floor sealer and three finish coats.

1. Apply stains to achieve an even color distribution matching approved Samples.
2. For water-based finishes, use finishing methods recommended by finish manufacturer to minimize grain raise.

C. Cover wood flooring before finishing.

D. Do not cover wood flooring after finishing until finish reaches full cure, and not before seven days after applying last finish coat.

END OF SECTION 09 64 29

CONSTRUCTION SPECIFICATIONS

SECTION 09 65 19- RESILIENT TILE FLOORING

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. The AQUA-LOK floorcovering needs to be installed by a professional installer. LTA will not be responsible for poor workmanship or problems due to improper installation. Tiles are the most appropriate floor covering for raised floors.

1.02 PERFORMANCE SPECIFICATION

A. Density : ASTM D6111-13A
B. Critical Radiant Flux : ASTM-E648-08
C. Static Coefficient of Friction : ASTM 1028-07
D. Static Load : ASTM F970-07
E. Castor Chair : NALFA 3.9

PART 2 - PRODUCTS

2.01 SOLID VINYL TILE

A. Submittals: Product Data and Samples.

B. Extra Materials: Deliver to Team SIT 2 boxes of type and color of resilient floor vinyl tile installed.

C. Manufacturer

APPOLLO Distributing Company
128 Passaic Avenue, Fairfield, NJ 07004
http://www.apollodist.com/

D. Tile Standard: ASTM F 1700; [Type B, embossed surface].

E. Thickness 3.3 mm

CONSTRUCTION SPECIFICATIONS

SECTION 09 65 19 - RESILIENT TILE FLOORING

PART 2 - PRODUCTS

2.01 SOLID VINYL TILE

F. Hardness: [Not less than 85 as required by ASTM F 1344, measured using Shore, Type A durometer per ASTM D 2240] [Manufacturer's standard hardness].

G. Wearing Surface: [Textured]

1. Molded-Pattern Figure: WOOD TEXTURE

H. Thickness: 3.3 mm

I. Size19.69" x 19.69"

J. Colors Specified: see product cutsheets

1. Mechanical Room : GRAY WOOD

2.2 INSTALLATION ACCESSORIES

A. Trowel-able Leveling and Patching Compounds: Latex-modified, portland-cement- or blended-hydraulic-cement-based formulation provided or approved by flooring manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit floor covering and substrate conditions indicated.

1. Low-Emitting Materials: Adhesives shall have a VOC content of [50] [60] g/L or less.
2. Low-Emitting Materials: Adhesives shall comply with Green Seal's GS-36 and with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Floor Polish: Protective liquid floor polish products as recommended by manufacturer.

CONSTRUCTION SPECIFICATIONS

SECTION 09 65 19 - RESILIENT TILE FLOORING

PART 3 - EXECUTION

3.1 NEW CONSTRUCTION

A. Sub-Floor Preparation

1. Treat the surface with a primer.
2. Apply afterwards a self leveling compound, 24 hours prior to installation. This compound is then grinded and vacuum cleaned. Take heed, depending on the construction of the floor, of the allowed residual humidity and possible rising moisture.
3. If necessary, apply a damp screen as a moisture barrier.

3.2 STOCKING THE TILES AND MATERIAL CHECK

A. Before installation, tiles are to be kept in the original packing and original pallet. The boxes should be stored flat, in straight piles of maximum 12 boxes. To avoid damages, 2 pallets should never be piled up. Make sure the reference matches the order and check if you have identical batch numbers.

3.2. ACCLIMATISATION

A. The following indoor climate conditions are to be met: a floor temperature of at least 15°C (60°F}, a room temperature between 18°C (65°F) and 25°C (7rF) and a relative humidity of the air not to exceed 75%. Allow the tiles a period of at least 48 hours to adapt to the temperature in the room before installation.

CONSTRUCTION SPECIFICATIONS

SECTION 09 65 19 - RESILIENT TILE FLOORING

PART 3 - EXECUTION

3.4. INSTALLATION

A. PRIOR TO INSTALLATION

1. Check each tile for visual defects prior to installing or cutting. Otherwise notily the manufacturer before proceeding with installation.

B. ADHESIVE APPUCATION

1. Carpet tiles do not require the use of a permanent bond adhesive. These tiles should be installed with a peel up adhesive by Blitzfix from Wulff Gmbh or any comparable product with a permanent low adhesive strength once dried. 80g/m2 (or 0.26oz/sq ft) of adhesive needs to be applied on the surface with a short pile roller. The adhesive should be perfectly dry (transparent colour) before fitting otherwise permanent adhesion may occur. Use a black adhesive when placing Aqua Lok.

END OF SECTION 09 65 19

CONSTRUCTION SPECIFICATIONS

SECTION 09 74 13 - WALL COVERINGS

PART 1 - GENERAL

1.01 GENERAL

A. Provide wood wallcovering, complete.

B. Related Sections

1. Section 165000 - Lighting: Permanent during installation.
2. Section 092500 - Gypsum Board: Wall Substrates.
3. Section 099000 - Painting: Preparation and priming of substrate

1.02 REFERENCES

A. United States Testing Company, Inc.

1. Testing performed “in accordance with the specification set forth in ASTM E84 “Standard Test Method for Surface Burning Characteristics of Building Materials,” both as to equipment and test procedures. Test procedure is similar to UL-723, ANSI No. 2.5, NFPA No. 255 and UBC in UBC1994 & 1997.

1.03 SUBMITTALS

A. Submit manufacturer’s product data and installation instructions for each type of wood veneer wallcovering, adhesive and accessory required.

1. Include data on physical properties, fire hazard classification and fire detection characteristics of wallcoverings.
2. Include manufacturer’s recommendations for maximum permissible moisture content of substrates.

B. Submit 6” X 9” samples of each type of wood wallcovering specified, inclusive of product name, wood species and cut and/or figure labeled on the back of each sample.

1.04 QUALITY ASSURANCE

A. Provide each type of wood wallcovering required produced by one manufacturer whose published literature clearly indicated compliance of wood wall covering.

CONSTRUCTION SPECIFICATIONS

SECTION 09 74 13 - WALL COVERINGS

PART 1 - GENERAL

1.04 QUALITY ASSURANCE

B. Applicator: Installation by skilled commercial wallcovering applicators with no less than three years of documented experience installing wallcovering of the types and extent specified for the project.

C. Composition:

1. A five-ply wood wallcovering consisting of genuine wood veneer, bonded to paper, foil, glue line barrier, and paper.
2. Factory applied protective urethane coating to ensure quality and help maintain the integrity of the wood veneer wallcovering.

D. Fire Hazard Classification: Provide materials that comply with Class A Fire Rating when tested in accordance with ASTM E84

1. Flame Spread: 10
2. Smoke Developed: 25

E. Field Test Panels: Install not less than three (3) full-width sheets of each pattern specified in an area designated by the architect and or designer. Review installation area for conformance to manufacture's standard installation instructions. Maintain approved test area as part of the finished installation work and as a standard of comparison for the installation throughout the project

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver all wood wallcovering to the job site in the distributor's undamaged packaging clearly labeled and properly identified.

B. Store materials in a clean, dry, protected area where temperature and humidity remain stable and within the ranges specified by the distributor.

CONSTRUCTION SPECIFICATIONS

SECTION 09 74 13 - WALL COVERINGS

PART 1 - GENERAL

1.06 PROJECT CONDITIONS

A. Maintain a constant temperature range of 65 degrees F to 85 degrees F, with not more than 50% relative humidity and not less than the relative humidity specified for the project area in the AWI Quality Standards Section 1700-T-19, for at least 4 days prior to, throughout the installation period and maintained consistently there after.

B. Surface preparation: Provide hanging surface that is smooth and free of all excess dust, oils or other foreign matter.

C. Select Surface Finish:

1. Provide Gypsum board finish in compliance AWCI Specification, Level 4
2. Finish plaster walls to the manufacturer's specification and free from undulations and surface defects.
3. Prepare metal surfaces to clean, dry and smooth finish with a rust inhibitor applied as indicated by written wood wallcovering product installations instructions.
4. Prepare wood composite surface Select: [BIRCH Hardwood] as indicated in manufacturer's written installation instructions. Apply non-woven wall liner to any surface showing cracks or splits.

D. Lighting: Provide permanent lighting during the installation process. If temporary lighting is required, provide not less than an 80 foot candles per square foot lighting level minimum measured mid-height at substrate surfaces.

PART 2 - PRODUCTS

2.01 DISTRIBUTOR

A. Substitutions: Permitted.

B Distributor chosen at the discretion of contractor.
1. Finish must be approved by Architect.

CONSTRUCTION SPECIFICATIONS

SECTION 09 74 13 - WALL COVERINGS

PART 2 - PRODUCTS

2.02 MATERIALS

A. Wallcovering: Flexible Wood Veneer Wallcovering
1. Species : Baltic Birch Wood
2. Cut and figure : Flat Cut
3. Sheet Size : 4'x8' - Dictated by Area of Wall Surface
4. Factory Finish: Select: Ultra 70

2.03 ACCESSORIES

A. Substrate Primer/Sealer: Acrylic/latex base primer specifically formulated for use with flexible wood veneer wallcovering.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and installation conditions.

B. Test substrates with suitable moisture meter and verify that moisture content does not exceed 4%.

C. Verify that substrate surfaces are clean, dry, smooth, structurally sound and free from surface defects and imperfections that would show through the finished surface.

D. Notify the contractor and architect in writing of any conditions detrimental to the proper and timely completion of the installation.

E. Do not proceed with work until conditions have been corrected.

CONSTRUCTION SPECIFICATIONS

SECTION 09 74 13 - WALL COVERINGS

PART 3 - EXECUTION

3.02 INSTALLATION

A. Install flexible wood veneer wall coverings in strict accordance with manufacturer's written installation instructions.

B. Do not use oil based primers when installing Arbor Series Flexible Wood Wallcoverings

C. After the application of three sheets of wood wallcovering, request inspection by Architect/Designer for material quality and proper installation.

D. Notify the contractor and architect in writing of any conditions detrimental to the proper and timely completion of the installation.

E. Install as delivered from the factory with the standard urethane finish applied by the manufacturer.

3.03 CLEAN-UP COMPLETION

A. Upon completion of the work, remove excess materials, debris and rubbish resulting from the installation and leave the area in a clean and orderly condition.

B. Protect the finished wood wallcovering from damage that may occur from other trades until project has been completed.

END OF SECTION 09 72 13

CONSTRUCTION SPECIFICATIONS

SECTION 09 91 23 - INTERIOR PAINTING

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals:

1. Product Data:[Include printout of MPI's "MPI Approved Products List" with product highlighted.]
2. Samples.

B. Mockups: Full-coat finish Sample of each type of coating, color, and substrate, applied where directed**.**

PART 2 - PRODUCTS

2.1 PAINT

A. BENJAMIN MOORE
130 WASHINGTON ST, HOBOKEN, NJ 07030
Telephone: (201) 659-006

B. MPI Standards: Provide materials that comply with MPI standards indicated and listed in its "MPI Approved Products List."

1. Block Filler, Latex: MPI #4.
2. Primer Sealer, Latex: MPI #50.
3. Primer, Galvanized, Water Based: MPI #134.
4. Latex, Interior, Flat, (Gloss Level 1): MPI #53.

C. Material Compatibility: Provide materials that are compatible with one another and with substrates.

1. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

CONSTRUCTION SPECIFICATIONS

SECTION 09 91 23 - INTERIOR PAINTING

PART 2 - PRODUCT

2.01 PAINT

D. Paints and coatings shall comply with the following limits for VOC content :

1. Flat Paints and Coatings: 27 g /L.
2. Nonflat Paints, Coatings: 27 g/L.
3. Primers, Sealers, and Undercoaters: 27 g/L.
4. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 90 gr / l
5. Floor Coatings: 90 gr / l
6. Colors: As [selected] [scheduled].

2.02 FINISHES

A. Color Schedule

1. Master Bedroom Wall
   a. Benjamin Moore “Dune White”
2. Master Bedroom Ceiling
   a. Benjamin Moore “Pearl White”
3. Second Bedroom Wall
   a. Benjamin Moore “White”
   b. Benjamin Moore “Banan-Appeal”
   c. Benjamin Moore “San Clemente”
4. Second Bedroom Ceiling
   a. Benjamin Moore “Pearl White”
5. Laundry Room
   a. Benjamin Moore “White”
6. Bathroom Ceiling
   a. Benjamin Moore “White”

CONSTRUCTION SPECIFICATIONS

SECTION 09 91 23 - INTERIOR PAINTING

PART 3 - EXECUTION

3.1 PREPARATION

A. Comply with recommendations in MPI's "MPI Architectural Painting Specification 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. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Paint exposed surfaces[, new and existing,] unless otherwise indicated.

1. Paint behind movable equipment and furniture same as exposed surfaces.
2. Paint the back side of access panels.
3. Color-code mechanical piping in accessible ceiling spaces.
4. Do not paint prefinished items, items with an integral finish, operating parts, and labels unless otherwise indicated.

PART 3 - EXECUTION

3.2 APPLICATION

C. Apply paints according to manufacturer's written instructions.

1. Use brushes only where the use of other applicators is not practical.
2. Use rollers for finish coat on interior walls and ceilings.

CONSTRUCTION SPECIFICATIONS

SECTION 09 91 23 - INTERIOR PAINTING

PART 3 - EXECUTION

3.2 APPLICATION

D. 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 23

CONSTRUCTION SPECIFICATIONS

SECTION 09 93 00 - STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals:

1. Product Data:[Include printout of MPI's "MPI Approved Products List" with product highlighted.]
2. Samples.

B. Mockups: Full-coat finish Sample of each type of coating, color, and substrate, applied where directed**.**

PART 2 - PRODUCTS

2.1 STAINED AND TRANSPARENT FINISHES

A. BENJAMIN MOORE
130 WASHINGTON ST, HOBOKEN, NJ 07030
Telephone: (201) 659-0061

B. MPI Standards: Provide materials that comply with MPI standards indicated and listed in its "MPI Approved Products List."

1. Varnish, Water Based, Clear, Satin (Gloss Level 4): MPI #128.
2. Varnish, Water Based, Clear, Semigloss (Gloss Level 5): MPI #129.
3. Varnish, Water Based, Clear, Gloss (Gloss Level 6): MPI #130.
4. Varnish, Interior, Flat (Gloss Level 1): MPI #73.
5. Varnish, Interior, Semigloss (Gloss Level 5): MPI #74.
6. Varnish, Interior, Gloss (Gloss Level 6): MPI #75.
7. Varnish, Interior, Polyurethane, Oil Modified, Satin (Gloss Level 4): MPI #57.
8. Varnish, Interior, Polyurethane, Oil Modified, Gloss (Gloss Level 6): MPI #56.
9. Varnish, Polyurethane, Moisture Cured, Gloss (Gloss Level 6): MPI #31.

C. Material Compatibility: Provide materials that are compatible with one another and with substrates.

1. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

CONSTRUCTION SPECIFICATIONS

SECTION 09 93 00 - STAINING AND TRANSPARENT FINISHING

PART 2 - PRODUCTS

2.1 STAINED AND TRANSPARENT FINISHES

D. Interior stains and clear finishes shall comply with the following limits for VOC content:

1. Primers, Sealers, and Undercoaters : 150 g/L.
2. Clear Wood Finishes, Varnishes : 150 g/L.
3. Stains : 150 g/L.

E. Colors: As [selected]

2.2 STAINED AND TRANSPARENT FINISHES

A. Interior Wood Finishes Polyurethane – Low Lustre
1. Benjamin Moore

B. Interior Wood Finishes Polyurethane – High Gloss
1. Benjamin Moore

PART 3 - EXECUTION

3.1 PREPARATION

A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove hardware, lighting fixtures, and similar items that are not to be finished. Mask items that cannot be removed. Reinstall items in each area after finishing is complete.

C. Clean and prepare surfaces in an area before beginning finishing in that area. Schedule finishing so cleaning operations will not damage newly finished surfaces.

CONSTRUCTION SPECIFICATIONS

SECTION 09 93 00 - STAINING AND TRANSPARENT FINISHING

PART 3 - EXECUTION

3.2 APPLICATION

A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Finish exposed surfaces

C. Apply stains and transparent finishes according to manufacturer's written instructions.

D. Apply stains and transparent finishes to produce surface films without color irregularity, or other imperfections. Use coats to produce a smooth surface film of even luster.

END OF SECTION 09 93 00

CONSTRUCTION SPECIFICATIONS

SECTION 09 93 13 - EXTERIOR STAINING AND FINISHING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Submittal: Product Data, Selection Samples, Verification Samples.

B. Quality Assurance

1. Installer qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
2. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship. Provide samples that designate primer and finish coats.

C. Project Conditions

1. 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.

D. Extra Materials

1. Furnish one percent of each material and color to the Owner, but not less than 1 gal or 1 case, as appropriate.

1.01 ASSOCIATED SECTIONS

A. **"**WOOD SHAKES 07 31 29.16"

B. **"**COMPOSITE DECKING 06 73 00"

CONSTRUCTION SPECIFICATIONS

SECTION 09 93 13 - EXTERIOR STAINING AND FINISHING

PART 2 - PRODUCTS

2.01 STAINS AND SEALERS

A. Siding Stain

1. Materials: Wood siding (raw cedar),
2. Manufacturer: Sikkins
3. Stain: Cetol Water based SRD translucent GRAY finish
   a. Color: GRAY
   b. Coats: 1
   c. Description: contains an optimal amount of translucent iron oxide pigments and UV light stabilizers.

B. Decking Stain

1. Materials: Decking,Deck skirts (Tru - Grain)
2. Manufacturer: WESTECH with Resysta
3. Stain: Cetol Water based SRD translucent Walnut finish
   a. Color: Walnut
   b. Coats: 1

4. Sealer: Cetol Water based SRD translucent clear finish
   a. Color: Clear
   b. Coats: 1
   c. Description: contains an optimal amount of translucent iron oxide pigments and UV light stabilizers.

CONSTRUCTION SPECIFICATIONS

SECTION 09 93 13 - EXTERIOR STAINING AND FINISHING

PART 2 - PRODUCTS

2.01 STAINS AND SEALERS

B. Louver Stain

1. Materials: Louver (Tru - Grain)
2. Manufacturer: WESTECH with Resysta
3. Stain: Cetol Water based SRD translucent Cape Cod Gray finish
   a. Color: Cape Cod Gray
   b. Coats: 1

4. Sealer: Cetol Water based SRD translucent clear finish
   a. Color: Clear
   b. Coats: 1
   c. Description: contains an optimal amount of translucent iron oxide pigments and UV light stabilizers.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared; notify Architect of unsatisfactory conditions before proceeding. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

B. Proceed with work only after conditions have been corrected and approved by all parties, otherwise application of coatings will be considered as an acceptance of surface conditions.

3.02 SURFACE PREPARATION

A. General: Surfaces shall be dry and in sound condition. Remove oil, dust, dirt, loose rust, peeling paint or other contamination to ensure good adhesion.

CONSTRUCTION SPECIFICATIONS

SECTION 09 93 13 - EXTERIOR STAINING AND FINISHING

PART 3 - EXECUTION

3.03 INSTALLATION

A. Apply all coatings and materials with manufacture specifications in mind. Mix and thin coatings according to manufacturer's recommendations.

B. Do not apply to wet or damp surfaces.

C. Apply coatings using methods recommended by manufacturer.

D. Uniformly apply coatings without runs, drips, or sags, without brush marks, and with consistent sheen.

E. The coated surface must be inspected and approved by the Architect immediately prior to each coat.

3.04 PROTECTION

A. Protect finished coatings from damage until completion of project.

B. Touch-up damaged coatings after substantial completion, following manufacturer's recommendation for touch up or repair of damaged coatings. Repair any defects that will hinder the performance of the coatings.

END OF SECTION 09 93 13

CONSTRUCTION SPECIFICATIONS

SECTION 09 97 13 - STEEL COATINGS

PART 1 - GENERAL

1.01 SUBMITTALS

A. All submittals and finish schedules shall include all exterior and interior items such as siding, doors, frames, trim, base, sills, walls, decks, and railings. Indicate color number and gloss required for each item.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide the best quality grade of coating as regularly manufactured by acceptable paint material manufacturers.

B. Materials not displaying the manufacturer's identification as a standard, best grade product will not be acceptable.

C. All paints and coatings shall be industrial grade as opposed to contractor grade. Listed manufacturers are for traditional paint products. Manufacturers for epoxy and urethane coatings must be pre-approved.

D. Material Safety Data Sheets shall be included for all products used.

2.2 MANUFACTURERS FOR PAINT PRODUCTS

A. Sherwin Williams

B. Benjamin Moore

2.3 FINISHES

A. Marine Gray to be approved by architect.

CONSTRUCTION SPECIFICATIONS

SECTION 09 97 13 - STEEL COATINGS

PART 3 - EXECUTION

3.1 PREPARATION

A. Steel Structures Painting Council: All preparation and painting shall be done according to the Steel Structures Painting Council (SSPC).

B. Rust Converter: Use of a rust converter in lieu of normal methods of cleaning is not allowed.

C. Surface Preparation Standards:

1. Solvent Cleaning: Remove oil, grease, dirt, soil, salts, and contaminants by cleaning with solvent, vapor, alkali, emulsion, or steam.
2. Hand Tool Cleaning: Remove loose rust, mill scale, and paint to degree specified by hand chipping, scraping, sanding, and wire brushing.
3. Power Tool Cleaning: Remove loose rust, mill scale, and paint to degree specified by power tool chipping, scraping, sanding, and wire brushing.

D. Ferrous Metals: Remove all corrosive deposits down to a bright metal and sound surface. Loose scale and rust found on new or unquoted iron or steel surfaces shall be removed. If surface has been protected with a coating of oil or grease it shall be solvent washed as described in this section. Steel exposed to abnormal conditions such as chemicals, condensation, frosting, and high humidity requires a primer with hard-drying characteristics and moisture resistance.

3.2 APPLICATION

A. Apply paint and coatings within an appropriate timeframe after cleaning when environmental conditions encourage flash rusting, rusting, contamination, or the manufacturer's specifications require earlier applications. Do not apply finishes that are not sufficiently dry unless manufacturer's directions state otherwise.

CONSTRUCTION SPECIFICATIONS

SECTION 09 97 13 - STEEL COATINGS

PART 3 - EXECUTION

3.3 QUALITY CONTROL

A. All surfaces, preparation and paint application shall be inspected.

B. Painted surfaces shall be considered to lack uniformity and soundness if any of the following defects are apparent to the inspector.

1. Runs, sags, hiding, or shadowing due to inefficient application methods.
2. Evidence of poor coverage at rivet heads, plate edges, lap joints, crevices, pockets, corners, and re-entrant angles.

SECTION 09 97 13

CONSTRUCTION SPECIFICATIONS

SECTION 10 28 16 - RESIDENTIAL BATH ACCESSORIES

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals : Product Data

PART 2 - PRODUCTS

2.01 TOILET TISSUE DISPENSER

A. IKEA Grundtal
1. Model No. 20047898
2. Type: Single-roll dispenser
3. Mounting: Surface mounted with concealed anchorage
4. Material/Finish: White

2.02 MIRROR UNIT

A. DULLES GLASS AND MIRROR

1. Model No. N1Z-A7-Z1G5
2. Mirror, aluminum
3. Size: Custom , 43” x 32”

2.03 TOWEL BAR

A. IKEA Grundtal

1. Model No. 60047896
2. Model No. 30061247
3. Chrome Plated
4. Mounting: Surface mounted with concealed anchorage

CONSTRUCTION SPECIFICATIONS

SECTION 10 28 16 - RESIDENTIAL BATH ACCESSORIES

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install accessories using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated in drawings.

1. Install grab bars to withstand a downward load of at least 250 lbf (1112 N), when tested according to method in ASTM F 446.

B. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items. Remove temporary labels and protective coatings.

C. Repair, refinish, or replace finishes damaged during installation or transit, as directed by Architect.

END OF SECTION 10 28 16

CONSTRUCTION SPECIFICATIONS

SECTION 10 56 16 - FABRICATED WOOD STORAGE SHELVING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Storage shelving.

B. Wall mounted standards.

C. Shelf support brackets.

1.02 RELATED SECTIONS

A. Section 06 10 00 - Rough Carpentry.

B. Section 06 20 00 - Finish Carpentry.

C. Section 06 40 00 - Architectural Woodwork.

D. Section 06 41 13 - Wood-Veneer-Faced Architectural Cabinets.

E. Section 09 29 00 - Gypsum Board.

1.3 REFERENCES

A. AAMA 605.2 - Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.

B. AAMA 606.1 - Voluntary Guide Specification and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum.

C. AAMA 607.1 - Voluntary Guide Specification and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.

D. ASTM B 221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.

CONSTRUCTION SPECIFICATIONS

SECTION 10 56 16 - FABRICATED WOOD STORAGE SHELVING

PART 1 - GENERAL

1.04 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including installation instructions.

B. Shop Drawings: Submit plan, section, elevation and perspective drawings as necessary to properly depict the design, fabrication and installation of each product specified.

C. Verification Samples: For each finish product specified, two samples representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten years' experience in designing and fabricating unique aluminum storage systems, support brackets and other architectural specialties.

1.6 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.

1.7 WARRANTY

A. At project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

CONSTRUCTION SPECIFICATIONS

SECTION 10 56 16 - FABRICATED WOOD STORAGE SHELVING

PART 2 - PRODUCTS

2.02 SCOPE / APPLICATION

A. Provide complete shelving system as detailed on Drawings consisting of modular components that can be field assembled using simple hand tools. System shall provide:
1. Fully compatible components allowing integration into total system.
2. Total shelf adjustability without slots or visible hardware.
3. Capability to expand.
4. Capability for disassembly, relocation, and reconfiguration.

B. Provide wall mounted, heavy duty, welded aluminum brackets for supporting the following surfaces:
1. Counter tops.
2. Work surfaces.
3. Vanities.
4. Shelves.
5. Displays.

2.03 WALL MOUNTED STANDARDS

A. Type: Channel type, extruded aluminum standard mounted on walls and designed to hold shelf support brackets inserted into channel ends or access slots and slid to desired position; RESOURCE FURNITURE as manufactured by RESOURCE FURNITURE.

1. Mounting: Surface.
2. Mounting: Recessed.

CONSTRUCTION SPECIFICATIONS

SECTION 10 56 16 - FABRICATED WOOD STORAGE SHELVING

PART 2 - PRODUCTS

2.03 WALL MOUNTED STANDARDS

B. Spline Connectors: Provide 4 inch (102 mm) long aluminum splines to insert into channels of connecting poles. Secure splines with set screws.

C. Access Slots: Provide poles with slots in channels for insertion and removal of shelf support brackets. Size slots for type of bracket being provided.

D. Threaded Inserts: Where indicated on Drawings or required for screw attachment of cabinets and other components, provide threaded inserts designed to accept 1/4 - #20 screws. Inserts shall slide into pole channel and be secured with set screw.

E. Channel Covers: Model No. CC-096 PVC, snap-in channel covers. 96 inch (2438 mm) lengths.

1. Finish: White
2. Finish: Translucent.

F. Door Hinges: Where indicated on Drawings or scheduled, provide polished aluminum door hinges for attachment to support poles.

G. Grommets: Circular delrin grommets to epoxy into counter tops to receive case work mounted pole supports:

1. For single rectangular support poles: 2-1/2 inch (64 mm) diameter grommets.
2. For double channel square poles: 3-1/2 inch (89 mm) diameter grommets.

H. Pole Corner Adapters: Where scheduled or indicated on Drawings, provide screw applied channel extrusion installed in side recess of support pole to accommodate corner condition.

2.04 SHELF SUPPORT BRACKETS

A. Rectangular Bracket: Fabricated from 1/4 inch (4 mm) thick extruded aluminum bar with steel pin to retain and hold bracket in support channel.

CONSTRUCTION SPECIFICATIONS

SECTION 10 56 16 - FABRICATED WOOD STORAGE SHELVING

PART 2 - PRODUCTS

2.04 SHELF SUPPORT BRACKETS

B. T-Style Brackets With Shelf Attachment Plates: 1 inch (25 mm) wide PVC extrusions pinned to top of bracket and pre-drilled to provide means of screw attaching shelves to brackets.

1. Finish: As specified by the architect from the manufacturer's available options.

C. Retaining Pins: 5/32 inch (4 mm) diameter by 0.3 inch (8 mm) long steel pin to secure shelf from shifting on bracket.

D. Desk Bracket: Where scheduled or indicated on Drawings provide 18 inch (457 mm) long T-shaped brackets with diagonal braces for support of work surface and capable of supporting 120 pounds (54 kilograms) per bracket.

2.05 COUNTER AND SILL SUPPORT BRACKETS

A. General: Support brackets fabricated by welding miter cut extruded aluminum sections, grinding and deburring sharp edges and welds, drilling holes for field attachment, and factory finishing.

B. Flush Mounted Counter Brackets: Fabricated from horizontal aluminum T section and vertical aluminum L section. Vertical leg designed to attach to side of supporting stud and be concealed by gypsum board or other wall finish.

C. Custom EH Bracket: Custom sloped, surface mounted bracket for supporting sloping counter or shelf. Fabricated from aluminum T sections and pre drilled to provided means for anchoring bracket and attaching sloping surface.

D. Vanity Brackets: Surface mounted bracket fabricated from miter cut and welded aluminum sections; with wooden strips on the front faces to provide for the convenient mounting, or removal, of laminated or solid surface panels.

CONSTRUCTION SPECIFICATIONS

SECTION 10 56 16 - FABRICATED WOOD STORAGE SHELVING

PART 2 - PRODUCTS

2.05 COUNTER AND SILL SUPPORT BRACKETS

E. Face Plates: EH-FP22, 2.75 inch (70 mm) projection, 2 inch (51 mm) deep slot.

F. Face Plates: EH-FP23, 2.75 inch (70 mm) projection, 3 inch (76 mm) deep slot.

G. Wire Management Grommets: Where indicated in the Contract Documents, provide brackets with holes and rubber grommets with 5/8 inch (16 mm) diameter opening to accommodate RJ-45 connector or wire ties.

H. Length: Provide aluminum shelves in quantities and lengths as scheduled.

I. Aluminum Shelf Accessories:

1. Shelf Lip Brackets: Where scheduled or indicated on Drawings, provide 2 inch (51 mm) aluminum shelf lip bar to be secured in notched brackets and to retain shelf and display material.

2. Shelf-Hold-Down Clip: Where scheduled, provide clips to anchor aluminum shelf to support bracket. Secure clip to both bracket and shelf with set screws.

2.07 FABRICATION

A. Material: Fabricate components from extruded aluminum sections complying with ASTM B221, 6063-T5.

B. Fasteners: No. 6 Phillips flat head plated steel screws. Exposed to view fasteners finished to match standards and other components.
1. Length: 1 1/4 inches (32mm)
2. Length: 2 inches (51 mm).

CONSTRUCTION SPECIFICATIONS

SECTION 10 56 16 - FABRICATED WOOD STORAGE SHELVING

PART 3 - EXECUTION

3.01 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.

3.02 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.

3.03 COORDINATION - STORAGE SHELVING

A. Coordinate provision of shelving system with locations of other wall and ceiling mounted components such as visual display boards, casework, structural framing, light fixtures, and air diffusers to eliminate potential conflicts.

B. Coordinate requirements for stud spacing, blocking, and auxiliary structural supports to ensure adequate means for installation of shelving system.

C. Coordinate installation of shelving system with application of wall and ceiling finishes. To the extent possible install shelving components after finishes have been applied.

3.04 INSTALLATION - STORAGE SHELVING

A. Install shelving system and accessories in accordance with approved shop drawings and manufacturer's installation instructions**.**

B. Install shelving at locations and heights indicated on Drawings. Verify locations in field with Architect.

CONSTRUCTION SPECIFICATIONS

SECTION 10 56 16 - FABRICATED WOOD STORAGE SHELVING

PART 3 - EXECUTION

3.04 INSTALLATION - STORAGE SHELVING

C. Install standards and other support components rigidly to supporting substrate so that components are secure, plumb, and level.

D. Install with fasteners of type, size, and quantity as supplied or recommended by shelving manufacturer for type of application and substrate.

E. Ensure screws used to anchor wall standards are set flush and do not project into channel.

F. Provide double sided foam tape between adjoining sections of aluminum shelving to maintain alignment.

G. Thoroughly clean and polish storage system components and protect from subsequent construction activities. Remove and replace damaged components.

3.05 INSTALLATION - ALUMINUM SUPPORT BRACKETS

A. Install support brackets in accordance with reviewed shop drawings and manufacturer's installation instructions.

B. Install brackets at locations and heights indicated on Drawings. Verify locations in field with Architect.

C. Install with fasteners of type, size, and quantity as supplied or recommended by bracket manufacturer for type of application and substrate.

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 10 56 16

CONSTRUCTION SPECIFICATIONS

SECTION 10 71 00 - EXTERIOR PROTECTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Division 01 General Requirements, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.02 SUMMARY

A. Scope: Provide design and engineering, labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for exterior sun control devices as required for the complete performance of the work, and as shown on the Drawings and as herein specified.

B. Section Includes: The work specified in this Section includes, but shall not be limited to, the following:

C. Related Sections: Related sections include, but shall not be limited to, the following:

1. Section 05 12 00 Structural Steel Framing.
2. Section 06 10 00 Rough Carpentry.
3. Section 07 60 00 Flashing and Sheet Metal.
4. Section 07 92 00 Joint Protection.
5. Section 06 83 00 – Composite Paneling

1.03 SYSTEM DESCRIPTION

A. General: Work shall be designed to perform under conditions specified here in or required by site conditions with no permanent damage to or deforming of the sun control panel/storm shutter or assembly, or permanent damage to fasteners and anchors.

CONSTRUCTION SPECIFICATIONS

SECTION 10 71 00 - EXTERIOR PROTECTION

PART 1 GENERAL

1.03 SYSTEM DESCRIPTION

B. Performance Requirements:

1. Sun control panel/storm shutter devices shall be factory engineered to with stand all applicable design loads, including, but not limited to, dead loads, live loads, and snow loads. Minimum design loads shall be calculated to comply with ASCE/SEI 7, or with requirements of authorities having jurisdiction.

2. Sun control panel/storm shutter devices shall be factory engineered to with stand wind loads, acting inwards and outwards. Minimum design loads shall be calculated to comply with ASCE/SEI 7, or with requirements of authorities having jurisdiction.

3. Sun control panel/storm shutter devices shall be factory engineered to withstand seismic loads. Minimum design loads shall be calculated to comply with ASCE/SEI 7, or with requirements of authorities having jurisdiction.

1.04 SUBMITTALS

A. Product Data: Submit product data showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications. Product data shall include, but shall not be limited to, device components and finishes.

B. Shop Drawings: Submit shop drawings for each product and accessory required. Include information not fully detailed in manufacturer's standard product data, including, but not limited to, layout, dimensions, spacing of components, and anchorage and installation details.

C. Samples:

1. Submit samples for initial color selection. Submit samples of each specified finish. Where finishes involve normal color variations, include samples showing the full, range of variations expected.

CONSTRUCTION SPECIFICATIONS

SECTION 10 71 00 - EXTERIOR PROTECTION

PART 1 GENERAL

1.04 SUBMITTALS

C. Samples:

2. Submit samples for verification purposes. Submit 10 inch (254 mm) by 10 inch (254 mm) minimum size sample of sun control panel/storm shutter illustrating de sign, fabrication workmanship, and selected color coating. Additional samples may be required to show fabrication techniques and workmanship.

E. Quality Control Submittals:

1. Design Data: For installed products indicated to comply with certain design loadings, include structural analysis data signed and sealed by the professional engineer who was responsible for their preparation.
2. Qualification Data: Submit documentation demonstrating capability and experience in performing installations of the same type and scope as specified by this Section. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

F. Maintenance Data: Submit maintenance data for exterior sun control devices to include in operation and maintenance manuals specified in Division 01 General Requirements.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Fabricator Qualifications: Fabricator shall be a firm engaged in the fabrication of sun control panel/storm shutter of types and sizes required.
2. Installer Qualifications: Installer shall be a firm that shall have a minimum of five years of successful installation experience with projects utilizing exterior sun control devices similar in type and scope to that required for this Project, and shall be approved by the manufacturer.

CONSTRUCTION SPECIFICATIONS

SECTION 10 71 00 - EXTERIOR PROTECTION

PART 1 GENERAL

1.05 QUALITY ASSURANCE

B. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

C. Mock Ups: Prior to installation of the work, fabricate and erect mock ups for each type of finish and application required to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mock ups to comply with the following requirements, using materials indicated for final unit of work. Locate mock ups on site in location and of size indicated or, if not indicated, as directed by the Architect. Demonstrate the proposed range of aesthetic effects and workmanship to be expected in the completed work. Obtain the Architect's acceptance of mock ups before start of final unit of work. Retain and maintain mock ups during construction in undisturbed condition as a standard for judging completed unit of work.

1. When directed, demolish and remove mock ups from the Project site.
2. Accepted mock ups in undisturbed condition at time of Substantial Completion may become part of completed unit of work.

D. Single Source Responsibility: Obtain sun control panel/storm shutter devices from a single source with resources to produce products of consistent quality in appearance and physical properties without delaying the work.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and lot number, if any.

B. Store materials in their original, undamaged packages and containers, inside a well ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

CONSTRUCTION SPECIFICATIONS

SECTION 10 71 00 - EXTERIOR PROTECTION

PART 1 - GENERAL

1.07 PROJECT CONDITIONS

A. Field Measurements: Take field measurements prior to fabrication of the work and preparation of shop drawings, to ensure proper fitting of the work. Show recorded measurements on final shop drawings. Notify the Owner and the Architect, in writing, of any dimensions found which are not within specified dimensions and tolerances in the Contract Documents, prior to proceeding with the fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the work.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Items specified are to establish a standard of quality for design, function, materials, and appearance. Equivalent products by other manufacturers are acceptable. The Architect will be the sole judge of the basis of what is equivalent.

2.02 MATERIALS

A. See Product Cut Sheets Division 10 – “Specialties”

B. Section 06 83 00 – Composite Panels for Specifications

C. Anchors and Inserts: Provide type, size, and material required for loading and installation indicated. Use non ferrous metal or hot dip galvanized anchors and inserts for exterior installations and elsewhere as needed for corrosion resistance. Use toothed steel or expansion bolt devices for drilled in place anchors. Provide types of size and spacing as recommended by manufacturer for specific condition and as de tailed on final shop drawings.

CONSTRUCTION SPECIFICATIONS

SECTION 10 71 00 - EXTERIOR PROTECTION

PART 2 - PRODUCTS

2.03 MANUFACTURED UNITS

A. Exterior Sun Control / Stormshutter Device:

1. Type: Provide exterior sun control device consisting of modular framed panels with indicated infill and outriggers for mounting on window framing or exterior wall surfaces, as indicated on the Drawings.
   a. Material: Fiberglass Composite.
   b. Infill: Foam Insulation.
2. Panel: Modular bi-fold panel with perimeter flange.
   a. Panel Size: As indicated on the Drawings.
3. Support System: Provide means for support of exterior sun control / stormshutter devices. System shall be designed to resist applicable dead, live, wind, and seismic loads. Provide type as indicated on the Drawings. Provide welded fabrication as detailed and dimensioned on the Drawings and final shop drawings. Provide size as required to provide sufficient structural support.

2.04 FABRICATION

A. Assemble exterior sun control / stormshutter devices in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1. Exterior sun control / stormshutter devices shall be assembled entirely by welding.
2. Include supports, anchorages, and accessories required for complete assembly.
3. Join fixed blades, fascia, outriggers, mounting plates, etc., concealed from view, unless size of assembly makes concealed, bolted connections between frame members necessary.

2.05 FINISHES

A. General: Comply with NAAMM MFM for recommendations for applying and designating finishes.

1. Variations in appearance of units are acceptable if they are within range of final samples. Noticeable variations in the same unit are not acceptable.

CONSTRUCTION SPECIFICATIONS

SECTION 10 71 00 - EXTERIOR PROTECTION

PART 2 - PRODUCTS

2.05 FINISHES

B. White Gel Coat Composite – Smooth or Textured

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

1. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.02 PREPARATION

A. Coordinate installation of exterior sun control devices with provision of exterior wall system, window framing system, curtain wall system, etc., to ensure proper structural support is provided, attachment of exterior sun control / stormshutter devices is compatible with substrate, and weathertightness of exterior envelope is maintained.

3.03 INSTALLATION

A. Install exterior sun control / stormshutter devices in accordance with reviewed product data, final shop drawings, the Drawings, and fabricator's written instructions.

1. Provide separation as recommended by manufacturer on concealed metal surfaces that will be in contact with grout, concrete, masonry, wood, or dissimilar metals.

CONSTRUCTION SPECIFICATIONS

SECTION 10 71 00 - EXTERIOR PROTECTION

PART 3 - EXECUTION

3.03 INSTALLATION

2. Allow for thermal expansion and contraction of metal components.
3. Install exterior sun control / stormshutter devices plumb, level, free from distortion, and aligned with building elements and adjacent construction.
4. Do not install bent, bowed, or otherwise damaged devices. Remove damaged components from site and replace.
5. Attach devices with appropriate fasteners for secure, permanent installation.

3.04 ADJUSTING AND CLEANING

A. Touch Up: Immediately after installation, touch up scratched, nicked, abraded, chipped, or otherwise damaged areas of the finish so as to be unnoticeable. Performance of touch up shall be in all ways equal to that of the factory finish.

B. Cleaning: Wash to remove any deleterious material from finished surfaces immediately. Cleaning and protective methods shall be carefully selected, applied, and maintained so that finishes shall not become uneven or otherwise impaired as a result of unequal exposure to light and weathering conditions.

3.5 PROTECTION

A. Provide final protection and maintain conditions in a manner acceptable to the Installer that shall ensure that the exterior sun control devices shall be without damage at time of Substantial Completion.

END OF SECTION 10 71 00

CONSTRUCTION SPECIFICATIONS

SECTION 10 71 16.13 - DEMOUNTABLE STORM PANELS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division Specification Sections apply to this Section.

1.02 SUMMARY

A. Section Includes: Composite Reinforced Fiberglass Panels and hardware.

1.03 DEFINITION

"Composte Reinforced Fiberglass Panel" means a panel manufactured using glass fibers and polyester resin in a thermoset matrix. Typically water proof / water resistant.

1.04 RELATED SECTIONS

A. Section 05400-Cold Formed Metal Framing

B. Section 07920-Joint Sealants

1.05 REFERENCE STANDARDS

A. ASTM De38: Test Method for Tensile Properties of Plastic.

B. ASTM D695: Test Method for Compressive Strength of Rigid Plastics.

C. ASTM D790: Test Methods for Properties of un-reinforced and Reinforced Plastics and Electrical Insulating Materials.

D. ASTM E84: Test Method for Surface Burning Characteristics of Building Materials.

CONSTRUCTION SPECIFICATIONS

SECTION 10 71 16.13 - DEMOUNTABLE STORM PANELS

PART 1 - GENERAL

1.06 DESIGN REQUIREMENTS

A. Structural Requirements: Engineering calculations shall account for the following loads:

1. Dead Loads: Include the weight of the Composite Reinforced Fiberglass Panels and attached items.
2. Live Loads: As required by applicable code,
3. Wind Loads: As required by applicable code.
4. Snow Loads: As required by applicable codes.
5. Load Combinations: Consider applicable load combinations.
6. Flood Loads: As required by applicable codes.

B. Provisions for Movement

1. Design and detail anchorage, connections, and joints to allow for dimensional changes of theComposite Reinforced Fiberglass Panels due to thermal and similar effects.
2. Where the piece is restrained, allow for effects of restraint in design.

C. Anchorage and Connections

1. Suggested anchorage and connections are shown on the design drawings. Proposed substitutions may be submitted for review. Substitutions shall satisfy the function of the connection as indicated or implied on the drawings and shall not vary to indicated building loading. 2. Anchorage and connection designs shall consider tolerances and eccentricities of load applications. Provide proper edge and end distances for inserts.

1.07 SUBMITTALS

A. Product Data: Submit manufacturer's data on the Composite Reinforced Fiberglass Panels.

B. Product Samples: Submit minimum of three (3) - 6" x 6" samples in specified color, texture and finish. Architect will select finish, color and texture from manufacturer's offerings.

CONSTRUCTION SPECIFICATIONS

SECTION 10 71 16.13 - DEMOUNTABLE STORM PANELS

PART 1 - GENERAL

1.07 SUBMITTALS

C. Shop Drawings: Submit drawings indicating:

1. Panel shapes and dimensions;
2. Panel surface finish;
3. Part numbers;
4. Jointing and connection details;
5. Adjacent structure details;
6. Hardware location and details; and
7. Lifting and erection details.

D. Manufacturers Instructions: Submit manufacturer's instructions and recommendations for:

1. Product delivery, storage and handling.
2. Erection, lifting and connecting of Composite Reinforced Fiberglass Panels.

1.08 DELIVERY, STORAGE AND HANDLING

A. Handle, store and transport panels according to rnanufacturer's recommendations and in a manner that prevents cosmetic and structural damage.

B. Verify those areas where panels will be unloaded are clear of obstructions and well drained.

C. Do not subject panels to undue stress.

D. Brace and stabilize panels to prevent warping.

E. Damage Responsibility: Except for damage caused by others, the installer is responsible for chipping,cracking, or other damage to composite panels.

CONSTRUCTION SPECIFICATIONS

SECTION 10 71 16.13 - DEMOUNTABLE STORM PANELS

PART 1 - GENERAL

1.08 DELIVERY, STORAGE AND HANDLING

Reinforced Fiberglass Panels after delivery to the job site and until installation is completed and inspected and found acceptable by the Architect.

1.09 QUALITY ASSURANCE

A. Manufacturer: Provide panels manufactured by a firm specializing in the fabrication of reinforced fiberglass panels with a minimum of ten years experience.

1.10 PRE-INSTALLATION CONFERENCE

A. Convene a pre-installation conference prior to commencing panel installation.

B. Require attendance of parties directly affected by work of this Section.

C. Review conditions of installation, installation procedures and coordination required with related work necessary to achieve a satisfactory installation.

1.11 WARRANTY

A. Warrant Composite Reinforced Fiberglass Panels to be free from delamination, chalking, cracking, crazing, discoloration, breakage or loosing from mountings (other than by malicious cause) for a period of (1) one year from the date of substantial completion.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Provide products as manufactured by Goetz Composites. Products (401) 253-2670 or approved equal.

2.02 FABRICATED PRODUCTS

A. Fabrications required are shown on the accompanying drawings.

CONSTRUCTION SPECIFICATIONS

SECTION 10 71 16.13 - DEMOUNTABLE STORM PANELS

PART 2 - PRODUCTS

2.03 MATERIAL CHARACTERISTICS

A. MOLDED EXTERIOR SURFACE. U-V inhibited, NPG-ISO polyester gel coat, 18 to 22 mils thick.

1. Gel Coat Color: Match sample supplied by Architect.

B. BACK UP LAMINATE:

1. Resin: Fire retardant, isophthalic polyester resin, ASTM E84, Class I (flame spread rating of 25 or less)
2. Fiberglass Reinforcement
   a. “E” type fiberglass.
   b. Random Chopped glass fibers.
   c. Glass content approximately 25% to 30% except, 15% for filled resin systems.
3. Laminate Thickness:
   a. Nominal thickness 3/16”
   b. Additional thickness and reinforcement, and sandwich structures as indicated and as required for structural integrity

2.04 FINISH

A. Color and finish shall be as selected by the Architect from the manufacturer’s standard finishes.

2.05 TOLERANCES

A. Gel Coat Thickness: + or - 2.5 mils.

B. Length: + or - 1/8 inch in 10 feet.

C. Overall thickness tolerance: +/- 1/16”.

D. Variation from Square: 1/8 inch in 10 feet.

CONSTRUCTION SPECIFICATIONS

SECTION 10 71 16.13 - DEMOUNTABLE STORM PANELS

PART 2 - PRODUCTS

2.06 IDENTIFICATION

A. Identify each part with a permanent serial number.

B. Number parts to coordinate with shop drawings.

2.07 CURING AND CLEANING

A. Cure and clean components prior to shipment and remove material which may be incompatible with adjacent building materials.

2.08 HARDWARE

A. Metal Anchors and Fasteners: Provide anchors and fasteners as recommended by panel manufacturer and conforming to the following standards of the American Society for Testing and Materials.

1. Stainless steel: ASTM A666, Type 304.
2. Anchor bolts ASTM A307 or ASTM AS25.

PART 3 - EXECUTION

3.01 INSTALLERS PRE-INSTALLATTON INSPECTION

A. Observe field conditions and verify that building lines, centers, and grades will allow proper installation of Composite Reinforced Fiberglass Panels.

B. Verify that bearing surfaces are true and level.

C. Verify that support framing has been constructed to allow accurate placement and alignment of anchor bolts, plates, dowels, or other connections on the structure.

D. Check field dimensions affecting the installation of Composite Reinforced Fiberglass Panels.

CONSTRUCTION SPECIFICATIONS

SECTION 10 71 16.13 - DEMOUNTABLE STORM PANELS

PART 3 - EXECUTION

3.01 INSTALLERS PRE-INSTALLATTON INSPECTION

E. Report discrepancies between design dimensions and field dimensions, which could adversely affect installation, to the Architect.

F. Do not proceed with installation until discrepancies are corrected, or until installation requirements are modified and approved by the Architect.

3.02 ERECTION

A. Install fabrications in accordance with manufacturer's instructions and approved shop drawings.

B. Unloading: Use equipment that will prevent delays in installation process. Do not block access to panel installation area or other construction areas with equipment and materials.

C. Lifting and Positioning: Lift Composite Reinforced Fiberglass Panels with suitable lifting devices at points as recommended by the manufacturer.

D. Set panels level, plumb, square, and true within the allowable tolerances.

E. Temporarily support and brace panels as required to maintain position, stability and alignment during and until permanent connection.

F. Fastening: Fasten Composite Reinforced Fiberglass Panels as shown on approved shop drawings.

CONSTRUCTION SPECIFICATIONS

SECTION 10 71 16.13 - DEMOUNTABLE STORM PANELS

PART 3 - EXECUTION

3.03 ALLOWABLE TOLERANCES FOR ERECTED PANELS

A. Tolerances for Location of Composite Reinforced Fiberglass Panels: Non-cumulative.

B. Width of Joint: ¼”to ¾” depending upon engineering criteria. C Gap tolerances between joints for panel dimensions of:

1. <l0 ft: +/-3/16” (5mm)
2. l0 ft. - 20ft: +/- 1/4” (7rnrn)
3. >20 ft: +/- 5/16” (9mm)

3.04 CLEANING

A. Clean soiled panels using cleaning methods and materials approved by panel manufacturer.

3.05 PROTECTION OF INSTALLED FABRICATIONS

A. Comply with manufacturer’s recommendations and instructions for protecting installed fabrications during construction activities.

3.06 DEPLOYMENT OF PANELS

A. Panels will shall be deployed only in times of emergency. Panels will be bolted through potted inserts

END OF SECTION 10 71 16.13

CONSTRUCTION SPECIFICATIONS

SECTION 11 31 00 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals : Product Data

PART 2 - PRODUCTS

2.01 RESIDENTIAL APPLIANCES

A. Regulatory Requirements: Comply with the following:
1. NFPA: Provide electrical appliances listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Accessibility: Where residential appliances are indicated to comply with accessibility requirements, comply with ICC A117.1.

C. Electric Induction Cooktop: 36-inch, built-in cooktop with five burner elements.

1. Manufacturers: GE - IKEA
2. Product Number: 501.826.20
3. Dimensions: 33 3/8” x 2.5” x 20.8”
4. Finish: Black

D. Electric Wall Oven: Built-in, single, electric, self-cleaning wall oven with broiler unit.

1. Manufacturers: LG
2. Product Number: JT5000DFBB
3. Dimensions: 36” x 3.2” x 20.8”
4. Finish: Black

E. Downdraft: 36-inch, suspended-island-canopy exhaust hood with three-speed automatic fan.

1. Manufacturers: Frigidaire
2. Product Number: UCVM36FS
3. Dimensions: 35-7/8” x 19-11/16” x 57”
4. Finish: Silver/Glass

CONSTRUCTION SPECIFICATIONS

SECTION 11 31 00 - RESIDENTIAL APPLIANCES

PART 2 - PRODUCTS

2.01 RESIDENTIAL APPLIANCES

F. Refrigerator:Counter-Depth Bottom-Freezer Refrigerator

1. Manufacturers: Liebherr
2. Product Number: HC 1030 / HC 1050B 091014 7086148
3. Dimensions: 78 7/8” x 23 1/2” x 23 7/8”
4. Finish: Stainless Steel

G. Dishwasher: Built-in, under counter, automatic dishwasher, sized to replace 24-inch base cabinet, 7 wash cycles with hot-air and heat-off drying cycles.

1. Manufacturers: Blomberg
2. Product Number: DWT57500FBI
3. Dimensions: 34 1/16’’-36 7/16’’ x 24 ‘’ x 24 ‘’
4. Finish: Integrated

H. Clothes Washer: Freestanding, Front-loading, automatic clothes washer with 3.6-cu. ft. capacity stainless-steel tub and 9 wash cycles including regular.

1. Manufacturers: LG
2. Product Number: WM4070H_A
3. Color: White
4. Energy Performance: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.

I. Television: 1080p Smart LED TV

1. Manufacturers: LG
2. Product Number: 719192597044
3. Color: BLACK
4. Energy Performance: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.

CONSTRUCTION SPECIFICATIONS

SECTION 11 31 00 - RESIDENTIAL APPLIANCES

PART 2 - PRODUCTS

2.01 RESIDENTIAL APPLIANCES

J. Dryer 7.3 Cu. Ft. EcoHybrid Heat Pump Front Load Dryer

1. LG
2. Product Number: DLHX4072
3. Dimensions: 27” x 39” x 30”
4. Finish:White

PART 3 - EXECUTION

3.01 INSTALLATION

A. Built-in Appliances: Securely anchor to supporting cabinetry or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.

B. Freestanding Appliances: Place in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

C. Test each item of residential appliances to verify proper operation. Make necessary adjustments.

D. Verify that accessories required have been furnished and installed.

END OF SECTION 11 31 00

CONSTRUCTION SPECIFICATIONS

SECTION 12 21 23 - ROLL DOWN BLINDS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Provide manually operated, sunscreen and blackout roller shades as applicable.

1. Division 09 - Gypsum Board Assemblies: Coordination with gypsum board assemblies for blocking, installation of shade pockets, closures and related accessories.
2. Division 09 - Acoustical Ceilings: Coordination with acoustical ceiling systems for blocking, installation of shade pockets, closures and related accessories.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
3. Storage and handling requirements and recommendations.
4. Mounting details and installation methods.

C. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

D. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shade cloth samples and aluminum finish sample as selected. Mark face of material to indicate interior faces.

E. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

F. Warranty: Provide manufacturer's warranty documents as specified in this Section.

CONSTRUCTION SPECIFICATIONS

SECTION 12 21 23 - ROLL DOWN BLINDS

PART 1 - GENERAL

1.02 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain roller shades system through one source from a single manufacturer with a minimum of ten years experience and minimum of five projects of similar scope and size in manufacturing products comparable to those specified in this section. This includes but is not limited to all required extrusions, accessories, controls and fabricated roller shades or else all stated and published warranties may be void.

B. Installer Qualifications: Engage an installer, which shall assume responsibility for installation of all system components, with the following qualifications.

1. Installer for roller shade system shall be trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.

C. Fire-Test-Response Characteristics: Passes NFPA 701-99 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

D. Shadecloth Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, and ATCC9645.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Deliver components in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.04 PROJECT CONDITIONS

A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

CONSTRUCTION SPECIFICATIONS

SECTION 12 21 23 - ROLL DOWN BLINDS

PART 1 - GENERAL

1.04 PROJECT CONDITIONS

B. Power and control wiring shall be complete and certified, fully operational with uninterrupted communication on the lines and minimal noise certified by a commissioning agent (engaged by others).

1. 485, ICON, Lonmark and Dry Contract Network: Noise on the line not to exceed shade manufacturer's limits.

1.5 WARRANTY

A. Warranty: Provide manufacturer's standard warranties, including the following:

1. Roller Shade Hardware, and Shadecloth: Manufacturer's standard non-depreciating twenty-five year limited warranty.
   a. EcoVeil standard non-depreciating 10-year limited warranty.

2. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to access to the work above 12' Feet AFF, which are the responsibility of others.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Hunter Douglas Contract/ 13915 Danielson St., Ste.100/ Poway, CA 92064/ Phone: 800-727-8953 Fax: 800-205-9819/ Website: www.hunterdouglascontract.com, or architect approved equivalent.

B. Product substitutions must be approved by architect minimum of 30 days prior to close of bid.

CONSTRUCTION SPECIFICATIONS

SECTION 12 21 23 - ROLL DOWN BLINDS

2.2 SHADE BANDS

A. Shade Bands: Construction of shade band includes the fabric, the enclosed hem weight, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.

1. Shade Band and Shade Roller Attachment:
   a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection.
   b. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable / replaceable with a “snap-on” snap-off” spline mounting, without having to remove shade roller from shade brackets.
   c. Mounting Spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.
   d. Any method of attaching shade band to roller tube that requires the use of: adhesive, adhesive tapes, staples, and/or rivets, does not meet the performance requirements of this specification and shall not be accepted.

2.03 ROLLER SHADE FABRICATION

A. Fabricate shade cloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design.

B. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shade bands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer’s standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.

CONSTRUCTION SPECIFICATIONS

SECTION 12 21 23 - ROLL DOWN BLINDS

2.03 ROLLER SHADE FABRICATION

C. For railroaded shade bands, provide seams in railroaded multi-width shade bands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shade bands

D. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shade bands.

2.04 ROLLER SHADE COMPONENTS

A. Access and Material Requirements:

1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
3. Use similar products to Delran engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and /or polyester, or reinforced polyester shall not be accepted.

CONSTRUCTION SPECIFICATIONS

SECTION 12 21 23 - ROLL DOWN BLINDS

2.04 ROLLER SHADE COMPONENTS

B. Manual Operated Chain Drive Hardware and Brackets:

1. Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.
2. Provide hardware capable for installation of a removable fascia, for both regular and/or reverse roll, which shall be installed without exposed fastening devices of any kind.
3. Provide shade hardware system that allows for removable regular and/or reverse roll fascias to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.
4. Provide shade hardware system that allows for operation of multiple shade bands (multi-banded shades) by a single chain operator, subject to manufacturer's design criteria. Connectors shall be offset to assure alignment from the first to the last shade band.
5. Provide shade hardware system that allows multi-banded manually operated shades to be capable of smooth operation when the axis is offset a maximum of 6 degrees on each side of the plane perpendicular to the radial line of the curve, for a 12 degrees total offset.
6. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable.
7. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel or heavier as required to support 150 percent of the full weight of each shade.

2.05 FABRICS

1. FABRICS: Inherently anti-static, flame retardant, fade and stain resistant, light filtering, room darkening, & blackout fabrics providing 0% - 15% openness factors. Fabric weights to range between 6.00 oz/sq.yd. – 20.70 oz/sq.yd. containing fiberglass, PVC, polyester, acrylic, vinyl laminates, cotton, & vinyl coatings. Finish selected by architect from manufacturer's available contract colors.

CONSTRUCTION SPECIFICATIONS

SECTION 12 21 23 - ROLL DOWN BLINDS

2.06 ROLLER SHADE ACCESSORIES

A. Shade Pocket: For recessed mounting in acoustical tile or drywall ceilings as indicated on the drawings.

1. Either extruded aluminum and or formed steel shade pocket, sized to accommodate roller shades, with exposed extruded aluminum closure mount, tile support and removable closure panel to provide access to shades.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.02 PREPARATION

A. Contractor Furnish and Install Responsibilities:

1. Window Covering Contractor (WC) shall provide an on site, Project Manager, and shall be present for all related jobsite scheduling meetings.
2. WC shall supervise the roller shade installation.

CONSTRUCTION SPECIFICATIONS

SECTION 12 21 23 - ROLL DOWN BLINDS

3.02 PREPARATION

A. Contractor Furnish and Install Responsibilities:

3. WC shall be responsible for field inspection on an area-by- area and floor-by-floor basis during construction to confirm proper mounting conditions per approved shop drawings.
4. Verification of Conditions: examine the areas to receive the work and the conditions under which the work would be performed and notify General Contractor and Owner of conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected. Commencement of installation shall constitute acceptance of substrate conditions by the installer.
5. WC shall provide accurate to 0.0625 inch (1.5875mm); field measurements for custom shade fabrication on the Roller Shades manufacturers input forms.
6. WC Installer shall install roller shades level, plumb, square, and true according to manufacturer's written instructions, and as specified here in. Blocking for roller shades installed under the contract of the interior General Contractor shall be installed plumb, level, and fitted to window mullion as per interior architect's de sign documents and in accordance with industry standard tolerances. The horizontal surface of the shade pocket shall not be out-of-level more than 0.625 inch (15.875mm) over 20 linear feet (6.096 meters)
7. Shades shall be located so the shade band is not closer than 2 inches (50 mm) to the interior face of the glass. Allow proper clearances for window operation hardware.
8. Adjust, align and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
9. Installer shall set Upper, Lower and up to 3 intermediate stop positions of all motorized shade bands, and assure alignment in accordance with the above requirements.
10. WC shall certify the operation of all motorized shades and turn over each floor for preliminary acceptance.
11. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
12. WC shall train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.
13. Protect installed products until completion of project.
14. Touch-up, repair or replace damaged products before Substantial Completion.

CONSTRUCTION SPECIFICATIONS

SECTION 12 21 23 - ROLL DOWN BLINDS

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 12 21 23

CONSTRUCTION SPECIFICATIONS

SECTION 12 35 00 - SPECIALITY CASEWORK

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. All wooden casework shall be furnished, installed and shall be demonstrated to properly perform in accordance with the specifications stated herein.

1.02 PRODUCTS

A. Wood Casework of a Stock or Custom Design.

1.03 RELATED SECTIONS

A. Section “Rough Carpentry” for wood blocking to anchor manufactured polyethylene casework.

B. Section “Solid Surface Fabrications” for countertops, including backsplash.

1.04 PRODUCT HANDLING

A. Schedule delivery of polyethylene casework after installation area is sufficiently complete to allow for immediate installation.

B. Protect finished surfaces from soiling or damage during handling and installation with a protective covering.

1.05 SUBMITTALS

A. Product Data: Manufacturer’s data and installation instructions on each item of casework to be used. Include component dimensions and configurations, construction details, description of joinery, preparation and installation instructions and maintenance recommendations.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Show fabrication details, including types and locations of hardware. Show installation details, including filler panels. If available, indicate manufacturer’s catalog numbers for casework.

CONSTRUCTION SPECIFICATIONS

SECTION 12 35 00 - SPECIALITY CASEWORK

PART 1 - GENERAL

1.05 SUBMITTALS

A. Samples: Submit samples of wood variation material and the full range of colors available.

1.06 REFERENCES

A. Comply with all applicable trade standards, ordinances, building codes and regulations and those standards and references listed (where applicable).

B. Approval for Food-Safe Contact from the Food and Drug Administration (FDA).

C. Meet or exceed standards established by American Nat'l Stand. Institute/Business & Institutional Furniture Mfr. Assoc. (ANSI/BIFMA) for casework, X5.9-2004 – Storage Units.

D. Adjustable to ADA Height Requirements of 33-1/2".

1.07 WARRANTY

A. Casework and hardware shall be warrantied for a period three (3) years, from the date of delivery by Manufacturer, and shall cover only defects in material and/or workmanship.

B. Defects reported to Manufacturer in writing prior to the expiration of the warranty period shall be repaired or replaced at Manufacturer's option.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. All wooden casework shall be the product of one manufacturer and shall be fabricated at one geographic location to ensure product consistency, shipping continuity, and single-source responsibility.

CONSTRUCTION SPECIFICATIONS

SECTION 12 35 00 - SPECIALITY CASEWORK

PART 2 - PRODUCTS

2.01 MANUFACTURERS

B. Products of other polyethylene casework manufacturers may be used as an approved equal provided they meet the product characteristics specified herein. No known equal exists.

2.02 MATERIALS, GENERAL

A. Materials:

1. Casework.

    a. Casework bodies, drawer heads, drawer bodies, drawer guides, shelves, and door assemblies shall be fabricated from Baltic Birch Plywood.
    b. Stais shall be chosen by the Architect from the full range of standard colors available from the manufacturer.
    c. Door and drawer styles shall be chosen by the Architect from the full range of standard door and drawer styles available from the manufacturer.

2. Casework Hardware

    a. Doors shall be equipped with 304 stainless steel 110 degree self-closing hinges securely fastened to doors and casework with stainless steel screws.
    b. Door and drawer pulls shall be made of stainless steel, securely fastened to doors and drawers with screws (if applicable).
    c. Casework and extendible elements may contain stainless steel screws and or nails for non-support purposes.
    d. Casework shall be equipped with plastic cabinet legs adjustable from 3 3/4” to 5 ¾” with a load capacity of not less than 250 pounds per leg.
    e. Shelving height shall be adjustable, but shelf pins shall secure the shelf in place using corrosive resistant pins.

CONSTRUCTION SPECIFICATIONS

SECTION 12 35 00 - SPECIALITY CASEWORK

PART 2 - PRODUCTS

2.03 CASEWORK FABRICATION

A. Casework shall be constructed using FINISHED BIRCH PLYWOOD sheets with the following thicknesses:

1. Side panels shall be cut from ¾" solid FINISHED BIRCH PLYWOOD.
2. Floor panel shall be cut from ¾" solid FINISHED BIRCH PLYWOOD.
3. Back panel shall be cut from ½" solid FINISHED BIRCH PLYWOOD.
4. Drawer face shall be cut from ¾" solid FINISHED BIRCH PLYWOOD.
5. Drawer box sides shall be cut from ½" solid FINISHED BIRCH PLYWOOD.
6. Door panels shall be cut from ¾" solid FINISHED BIRCH PLYWOOD.
7. Shelves shall be cut from ¾" solid FINISHED BIRCH PLYWOOD.
8. Top spreaders shall be constructed of ¾" FINISHED BIRCH PLYWOOD.
9. Drawer guides shall be constructed of ½" solid FINISHED BIRCH PLYWOOD.

B. Casework Assembly: Shall be cut and assembled without any supporting metal or hardware.

1. Adjustable shelves shall have a mechanism for securing the shelves from moving, using non-metal corrosive-resistant pins.
2. Drawer faces shall be attached to the face of a drawer box to provide for additional strength to the drawer.
3. Drawer slides shall be made from a non-metal corrosive resistant material.
4. Door panels shall be attached to side panels using not less than three (3) 304 stainless steel 110 degree self-closing hinges.
5. Top spreaders shall be designed to enable use of a countertop adhesive to adhere the countertop to the casework.
6. Casework adjustable leg bases shall be attached from the underside of the bottom panels using four (4) stainless steel screws.

CONSTRUCTION SPECIFICATIONS

SECTION 12 35 00 - SPECIALITY CASEWORK

PART 2 - PRODUCTS

2.03 CASEWORK FABRICATION

C. Performance Requirements: All casework shall meet the following MINIMUM standards:

1. Casework body shall be waterproof;
2. Casework shall be UV stabilized for direct sun exposure;
3. Casework shall be manufactured from solid color material;
4. Casework shall be FDA approved for food-safe contact;
5. Casework material shall be rated as not less than a Class C under ASTM E-84

PART 3 - EXECUTION

3.01 INSTALLATION

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.

3.02 COORDINATION

A. Coordination with appropriate contractors, who shall furnish plumbing and electrical services which shall be passing through the casework.

3.03 INSTALLATION OF CASEWORK

A. All exterior surface protective covering shall be left in place and removed only when the casework is ready for installation and only on surfaces that will be concealed during installation.

B. Set casework components plumb, square, and straight with no distortion. Adjust leveling legs as needed. Where casework abuts other finished work, apply filler panels and scribe for accurate fit with fasteners concealed where practical.

END OF SECTION 12 35 00

CONSTRUCTION SPECIFICATIONS

SECTION 12 36 61 - SIMULATED STONE COUNTERTOPS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Acrylic agglomerate countertops.

1.02 SUBMITTALS

A. Product Data: For countertop materials.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

1.03 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace simulated stone countertops that fail in materials or workmanship within specified warranty period.

1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective simulated stone countertops.
2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 ACRYLIC AGGLOMERATE COUNTERTOPS

A. Configuration: Provide countertops with the following front and backsplash style:

1. Front: Straight, slightly eased at top.
2. Backsplash: Straight, slightly eased at corner, Custom CNC Pattern

B. Countertops: 1/2-inch- (12.7-mm-) thick, LG Hi-Macs with front edge built up with same material.

CONSTRUCTION SPECIFICATIONS

SECTION 12 36 61 - SIMULATED STONE COUNTERTOPS

PART 2 - PRODUCTS

2.01 QUARTZ AGGLOMERATE COUNTERTOPS

C. Backsplashes: 1/2-inch- (12.7-mm-) thick, quartz agglomerate.

D. Fabrication: Fabricate tops in one piece with shop-applied edges and backsplashes unless otherwise indicated. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

E. Fabricate countertops without joints.

2.02 COUNTERTOP MATERIALS

A. Certified Wood Materials: Fabricate countertops with wood and wood-based products 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."

B. Adhesives: Adhesives shall contain no added urea formaldehyde.

1. Stone Adhesive: Manufacturer's recommended adhesive, formulated specifically for bonding simulated stone to simulated stone with a VOC content of 65 g/L or less.

C. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with the "Physical Characteristics of Materials" Article of ANSI SS1.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following :
   a. LG Hi Macs
   b. Dupont Corian

2. Color : Arctic White

CONSTRUCTION SPECIFICATIONS

SECTION 12 36 61 - SIMULATED STONE COUNTERTOPS

PART 3 - EXECUTION

3.01 PREPARATION

A. Clean surfaces to receive countertops; remove loose and foreign matter that could interfere with adhesion.

3.02 INSTALLATION

A. Install countertops in accordance with manufacturer's written instructions and approved Shop Drawings.

B. Install countertops level to a tolerance of 1/8 inch in 8 feet (3 mm in 2.4 m) , and with a maximum variation in plane between adjacent pieces at joint of plus or minus 1/16 inch.

C. For quartz agglomerate countertops, fasten by applying continuous bead of adhesive along all base cabinet surfaces, or if underlayment is used, apply continuous bead of adhesive along perimeter and around openings. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's recommended written instructions. Carefully dress joints smooth; remove excess adhesive and sealant, and clean entire surface.

1. Bond joints with stone adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
   a. Fill joints with stone adhesive level with quartz surfacing.
   b. Clamp or brace quartz-agglomerate surfacing in position until adhesive sets.

2. Install backsplashes to comply with manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

END OF SECTION 12 36 61

CONSTRUCTION SPECIFICATIONS

SECTION 21 13 13 - WET PIPE SPRINKLER SYSTEM

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data for valves, sprinklers, specialties, and alarms.
1. Submit sprinkler system drawings identified as “working plans” and calculations according to NFPA 13. Submit required number of sets to authorities having jurisdiction for review, comment, and approval. Include system hydraulic calculations.
2. Submit test reports and certificates as described in NFPA 13.

B. Design and Installation Approval: Acceptable to authorities having jurisdiction.

C. Hydraulically design sprinkler systems according to NFPA 13.

D. Comply with NFPA 13D and NFPA 70, and IRC 2009 Section P2904. E. UL listed and labeled and FM-approved pipe and fittings.

E. Verify dimensions in field measurements before fabrication & indicate on shop drawings. **SEE “DIVISION 21 FIRE SUPPRESSION CUTSHEETS”** for additional specifications.

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS

A. CPVC Plastic Pipe: ASTM F 442/F 442M, UL 1821, 175-psig rating, made in NPS for sprinkler service. Include “Listed” and “CPVC Sprinkler Pipe” marks on pipe.

B. CPVC Plastic Pipe Fittings: ASTM F 438 for NPS 3/4 to NPS 1-1/2 and ASTM F 439 for NPS 2, UL listed, 175-psig rating, for sprinkler service. Include “Listed” and “CPVC Sprinkler Fitting” marks on fittings.

C. Black steel piping shall be provided in all exposed areas.

D. Provide hangers, supports, and seismic restraints with UL listing and FM approval for fire-protection systems.

CONSTRUCTION SPECIFICATIONS

SECTION 21 13 13 - WET PIPE SPRINKLER SYSTEM

PART 2 - PRODUCTS

2.02 VALVES

A. Fire-Protection Service Valves: UL listed and FM approved, with 175-psig non-shock minimum working-pressure rating. Indicating valves shall be butterfly or ball type, bronze body, and integral indicat ing device wi th 115-V ac, elect r ic, singlecircuit supervisory switch indicator.

B. **SEE "DIVISION 21 FIRE SUPPRESSION CUTSHEETS"** for additional specifications.

2.03 SPRINKLERS

A. Automatic Sprinklers: With heat-responsive element complying with the following:

1. UL 1626, for residential applications.

B. Sprinkler Types and Categories: Nominal 1/2-inch orifice for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

C. Sprinkler types include the following:

1. Pendent Sprinkler: RELIABLE Model F1 Res Sprinklers : Chrome Pendant
2. Pendent Sprinkler: RELIABLE Model RFC30 (SIN RA0611)
3. Pendent Sprinkler: RELIABLE Model F1 Res Sprinklers : White Concealed

D. Sprinkler Escutcheons: steel, one piece, with finish to match sprinklers.

E. Sprinklers shall be low flow residential hidden pendent sprinklers engineered to provide a minimum design density of 0.05 gpm/ft2 over the listed coverage area.

F. Sprinkler frame and deflector shall be of bronze frame construction having a ½" NPT thread.

G. Water seal assembly shall consist of a Teflon-coated Belleville spring washer with top- loaded extruded or cold head cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of 155°F, 165°F or 175°F.

CONSTRUCTION SPECIFICATIONS

SECTION 21 13 13 - WET PIPE SPRINKLER SYSTEM

PART 3 - EXECUTION

3.01 INSTALLATION

A. Fasten securely in place, with provisions for thermal and structural movement. Install with concealed fasteners, unless otherwise indicated.

B. Correct deficiencies in or remove and reinstall sprinkler that does not comply with requirements.

C. Repair, refinish, or replace sprinklers damaged during installation, as directed by Architect.

D. Adjust operating parts and hardware for smooth, quiet operation and weather tight closure. Lubricate hardware and moving parts.

3.02 PIPE AND FITTING APPLICATION

A. Use steel pipe with threaded, press-seal, roll-grooved, or cut-grooved joints; copper tube with wrought-copper fittings and brazed joints; or CPVC plastic pipe and fittings and metal-to-plastic transition fittings with solvent-cemented joints.

B. **SEE "DIVISION 21 FIRE SUPPRESSION CUTSHEETS"** for additional specifications.

3.03 PIPING INSTALLATION

A. Install "Inspector's Test Connections" in sprinkler piping, complete with shutoff valve.

3.04 TESTING

A. Flush, test, and inspect sprinkler piping systems according to NFPA 13.

END OF SECTION 21 13 13

CONSTRUCTION SPECIFICATIONS

SECTION 22 11 16 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

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

2.01 PIPE AND FITTINGS

A. Hard Copper Tubing: ASTM B 88, Type L (ASTM B 88M, Types B and C), water tube, drawn temper with wrought-copper, solder-joint fittings and pro-press fittings.

1. Copper Unions: Cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint ends.
2. Joining Materials: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder.

B. Watts

1. PEX tubing: ½” type A: Part #: WPTC08 (red) and WPTC08 (blue)
2. PEX tubing: ¾” type A: Part #: WPTC12
3. PEX tubing: ¾” type A: Part #: WPTC12

C. Uponor

1. PEX tubing: 1” type A: Part #: F3061000

D. PVC Pipe: ASTM D 1785, Schedule 40.

1. PVC Fittings: 1 1 / 2 ” , ASTM D 2466, Schedule 40, socket type
2. PVC Fittings: 1 1 / 4 ” , ASTM D 2466, Schedule 40, socket type
3. PVC Fittings: 2 ” , ASTM D 2466, Schedule 40, socket type
4. PVC Fittings: 3 ” , ASTM D 2466, Schedule 40, socket type

E. 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.

CONSTRUCTION SPECIFICATIONS

SECTION 22 11 16 - DOMESTIC WATER PIPING

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with requirements in Division 22 Section “Common Work Results for Plumbing” for basic piping installation requirements.

B. Install floor penetration system at each service pipe penetration through foundation floor. Make installation watertight. Comply with requirements in Division 22 Section.

C. “Common Work Results for Plumbing” for wall penetration systems.

D. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Comply with requirements in Division 22 Section “Common Work Results for Plumbing” for pressure gages and Division 22 Section “Domestic Water Piping Specialties” for drain valves and strainers.

E. Install domestic water piping without pitch for horizontal piping and plumb for vertical piping.

F. Rough-in domestic water piping for water-meter installation according to utility company’s requirements.

G. Comply with requirements in Division 22 Section “Common Work Results for Plumbing” for basic piping joint construction.

1. Soldered Joints: Comply with procedures in ASTM B 828 unless otherwise indicated.

H. Comply with requirements in Division 22 Section “Common Work Results for Plumbing” for pipe hanger and support devices.

3.02 INSPECTION AND CLEANING

CONSTRUCTION SPECIFICATIONS

SECTION 22 11 16 - DOMESTIC WATER PIPING

PART 3 - EXECUTION

3.02 INSPECTION AND CLEANING

A. Inspect and test piping systems as follows:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired by visual inspection of all joints.

B. Clean and disinfect potable domestic water piping by filling system with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time by flushing out a volume equal to the system volume, then stopping the flow of water for one hour, and then flushing the system.

3.03 PIPING SCHEDULE

A. Aboveground Distribution Piping: PEX piping

B. Mechanical Room Piping: Copper pipe and PEX piping

3.04 VALVE SCHEDULE

A. Drawings indicate valve types to be used.

B. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use bronze ball valve
2. Throttling Duty: Use bronze ball valve
3. Drain Duty: Hose-end drain valves

C. Install 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. PVC ball, butterfly, and check valves may be used in matching piping materials.

CONSTRUCTION SPECIFICATIONS

SECTION 22 11 16 - DOMESTIC WATER PIPING

PART 3 - EXECUTION

3.04 VALVE SCHEDULE

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 spring 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

CONSTRUCTION SPECIFICATIONS

SECTION 22 11 19 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.01 BACKFLOW PREVENTER

A. Watts

1. Brass construction. Temperature Range: -20 degrees F – 100 degrees F. Max pressure: 400 psi.

2.02 BALL VALVES

A. Watts

1. 3/4” and 1” Ball Valve with full-port, Barbed end connectors, Rated to 400WOG, crimped joint rated at 160 psi at 70 degrees F

2.03 WATER CONDITIONER

A. Watts

1. 1” Connections, rated operating pressure 15-1 0 0 ps i

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install backflow preventers at each water-supply connection to mechanical equipment and where required by authorities having jurisdiction.

B. Install hose bibs with integral or field-installed vacuum breaker.

END OF SECTION 22 11 19

CONSTRUCTION SPECIFICATIONS

SECTION 22 11 23 - DOMESTIC WATER PUMP

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data. Include certified performance curves with operating points plotted on curves, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Comply with NFPA 70, “National Electrical Code.”

C. Comply with UL 778 for motor-operated water pumps.

PART 2 - PRODUCTS

2.01 MAIN PRESSURIZING DOMESTIC WATER PUMP

A. Use one of the two options listed below:

B. Davey

1. 3/4 Horsepower, 120 Volt
2. Part #: HS18-40HT2

C. Davey

1. 3/4 Horsepower, 120 Volt
2. Part #: BT20-40

2.02 MOTORS

A. NEMA MG 1, “Standard for Motors and Generators.” Include NEMA listing and labeling.

B. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

C. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 26 Sections.

CONSTRUCTION SPECIFICATIONS

SECTION 22 11 23 - DOMESTIC WATER PUMP

PART 2 - PRODUCTS

2.03 CONTROLS

A. Thermostats: Electric; adjustable for control of hot-water circulation pump.

1. Type: Water-immersion temperature sensor, for installation in piping.
2. Settings: Pump turned on and off by remotely

PART 3 - EXECUTION

3.01 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. Connect piping with valves that are same size as piping connecting to pumps.

F. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.

G. Install shutoff valve on suction and discharge side of pumps.

H. Install strainer on suction side of pumps.

I. Install non-slam check valve and throttling valve on discharge side of pumps.

J. Install thermostats in hot-water return piping.

K. Install test plugs on suction and discharge of each pump.

END OF SECTION 22 11 23

CONSTRUCTION SPECIFICATIONS

SECTION 22 12 19 - FACILITY POTABLE-WATER STORAGE TANKS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.01 SUPPLY TANK

A. HUSKY PORTABLE CONTAINMENT - SWT-1
1. Custom collapsable bladder
2. 1,000 gal. capacity
3. Dimension : 8'x8'x2'
4. Will provide the necessary 250 gallons of water to the fire suppression system.

2.02 WASTE TANK

A. HUSKY PORTABLE CONTAINMENT - WT-1
1. Custom pillow bladder
2. 400 gal. capacity
3. Dimension : 8'x8'x2'

2.03 MOTORS

A. NEMA MG 1, "Standard for Motors and Generators." Include NEMA listing and labeling.

B. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

C. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 26 Sections.

CONSTRUCTION SPECIFICATIONS

SECTION 22 12 19 - FACILITY POTABLE-WATER STORAGE TANKS

PART 3 - EXECUTION

3.01 INSTALLATION

A. Set units level, plumb, and true to line, without warp or rack of frames and panels and anchor securely in place.

B. Fasten securely in place, with provisions for thermal and structural movement. Install with concealed fasteners, unless otherwise indicated.

C. Separate dissimilar metals and metal products from contact with wood or cementitious materials, by painting each metal surface in area of contact with a bituminous coating or by other permanent separation.

D. Correct deficiencies in or remove and reinstall products that do not comply with requirements.

E. Repair, refinish, or replace products damaged during installation, as directed by Architect.

F. Adjust operating parts and hardware for smooth, quiet operation.

END OF SECTION 22 12 19

CONSTRUCTION SPECIFICATIONS

SECTION 22 13 16 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Minimum Pressure Requirement for Soil, Waste, and Vent: 10-foot head of water (30 kPa).

B. Comply with NSF 14, “Plastic Piping Components and Related Materials,” for plastic piping components.

PART 2 - PRODUCTS

2.01 PIPES AND FITTINGS

A. PVC Pipe

1. 2” pipe, ASTM D 1785, Schedule 40.
2. 1-1/2” pipe, ASTM D 1785, Schedule 40.
3. 3” pipe, ASTM D 1785, Schedule 40.

B. ASTM D 2466, Schedule 40, socket type and npt.

PART 3 - EXECUTION

3.01 PIPING INSTALLATION

A. Install wall penetration system at each pipe penetration through foundation wall. Make installation watertight.

B. 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.

CONSTRUCTION SPECIFICATIONS

SECTION 22 13 16 - SANITARY WASTE AND VENT PIPING

PART 3 - EXECUTION

3.01 PIPING INSTALLATION

C. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 (DN 80) and smaller; 1 percent downward in direction of flow for piping NPS 4 (DN 100) and larger.
2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

D. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.

E. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.02 PIPE SCHEDULE

A. Above ground Applications: PVC plastic, DWV pipe and fittings with solventcemented joints.

END OF SECTION 22 13 16

CONSTRUCTION SPECIFICATIONS

SECTION 22 14 29 - SUMP PUMP

PART 1 GENERAL

1.01 DESCRIPTION

A. Sump pumps. See schedule on Drawings for pump capacity and head.

1.02 RELATED WORK

A. Division 22, PLUMBING.

1.03 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Pump:
   a. Manufacturer and model.
   b. Operating speed.
   c. Capacity.
   d. Characteristic performance curves.
2. Motor:
   a. Manufacturer
   b. Speed.
   c. Current Characteristics and W (HP).
   d. Efficiency.

C. Certified copies of all the factory and construction site test data sheets and reports.

D. Complete operating and maintenance manuals including wiring diagrams, technical data sheets and information for ordering replaceable parts:

1. Include complete list which indicates all components of the system.
2. Include complete diagrams of the internal wiring for each item of equipment.
3. Diagrams shall have their terminals identified to facilitate installation, operation and maintenance.

CONSTRUCTION SPECIFICATIONS

SECTION 22 14 29 - SUMP PUMP

PART 1 - GENERAL

1.04 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. National Electrical Manufacturers Association (NEMA): ICS6-93 (2006) Industrial Control and Systems Enclosures 250 2008 Enclosures for Electrical Equipment (1000 Volts Maximum)

C. Underwriters' Laboratories, Inc. (UL):
508-99 (R2008) Standards For Industrial Control Equipment

PART 2 - PRODUCTS

2.01 PUMP OPTION

A. GRUNDFOS
1. MODEL : KP 150
2. DIMENSION 11-1/8" X 13-3/4"
3. MOTOR 1/3 HP. 60HZ

2.02 SUMP PUMP

A. Starting Switch: Manually operated, tumbler type, as specified in Section 26 29 11, LOW-VOLTAGE MOTOR STARTERS.

1. Sensors that detect the level of water in the sump shall be so arranged as to allow the accumulation of enough volume of liquid below the normal on level that the pump will run for a minimum cycle time as recommended by the pump manufacturer. Sensors shall be located to activate the alarm adequately before the water level rises to the inlet pipe.

CONSTRUCTION SPECIFICATIONS

SECTION 22 14 29 - SUMP PUMP

PART 2 - PRODUCTS

2.02 SUMP PUMP

2. Provide two separate power supplies to the control panel, one for the control/ alarm circuitry and one for power to the pump motors. Each power supply is to be fed from its own breaker so that if a pump overload trips a breaker, the alarm system will still function. Each power supply is to be wired in its own conduit.
3. Wiring from the sump to the control panel shall have separate conduits for the pump power and for the sensor switches. All conduits are to be sealed at the basin and at the control panel to prevent the intrusion of moisture and of flammable and/or corrosive gases.

B. Sump: Furnish cast iron or fiberglass basin with gas tight covers. Cover shall have 280 mm by 380 mm (11 inch by 15 inch) manhole with bolted cover, vent connection, openings for pumps and controls. Sump shall be sized to allow an adequate volume of water to accumulate for a minimum one minute cycle of pump operation.

2.02 SUMP PUMP BASIN

1. MANFACTURER : JACKEL
2. MODEL : SF 15

PART 3 - EXECUTION

3.01 STARTUP AND TESTING

A. Make tests as recommended by product manufacturer and listed standards and under actual or simulated operating conditions and prove full compliance with design and specified requirements. Tests of the various items of equipment shall be performed simultaneously with the system of which each item is an integral part.

CONSTRUCTION SPECIFICATIONS

SECTION 22 14 29 - SUMP PUMP

PART 3 - EXECUTION

B. The tests shall include system capacity and all control and alarm functions.

C. When any defects are detected, correct defects and repeat test.

3.02 COMMISSIONING

A. Provide commissioning documentation accordance with the requirements for all inspection, startup, and contractor testing required above and required by the System Readiness Checklist provided by the Commissioning Agent.

3.02 COMMISSIONING

B. Components provided under this section of the specification will be tested as part of a larger system.

3.02 DEMONSTRATION AND TRAINING

A. Provide services of manufacturer's technical representative for four hours to instruct VA Personnel in operation and maintenance of units.

B. Submit training plans and instructor qualifications in accordance with the requirements of Section 22 08 00, COMMISSIONING OF PLUMBING SYSTEMS.

END OF SECTION 22 14 29

CONSTRUCTION SPECIFICATIONS

SECTION 22 33 01 - DOMESTIC WATER HEATER ELECTRIC RESIDENTIAL

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data

1. **SEE DIVISION 22 and DIVISION 48 CUTSHEETS**

B. Comply with NFPA 70, “National Electrical Code.”

C. Warranty: 6-year limited tank and parts warranty.

CONSTRUCTION SPECIFICATIONS

SECTION 22 33 01 - DOMESTIC WATER HEATER ELECTRIC RESIDENTIAL

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Advanced Energy Industries, Inc.
1625 Sharp Point Drive
Fort Collins, CO 80525 USA

B. Vaughn Water Heater Controllers
26 Old Elm Street
P.O. Box 5431, Salisbury,MA 01952-5431

2.02 PRODUCT

A. Vaughn Water Heater Controllers
1. Part #: S80WHPT3838I

B. AE PV Heater

1. 1,500 W Heating Capacity
2. Reccomended PV power, kWp 1.5..2.7
3. Part #: 401R1K5

2.03 ACCESSORIES - SOLAR ENERGY COLLECTOR

A. Solbian PV Energy Collector

1. SEE DIVISON 48 14 13 SOLAR ENERGY COLLECTORS

B. Amtrol Pressure Tank

1. Part #: WX-202-H

CONSTRUCTION SPECIFICATIONS

SECTION 22 33 01 - DOMESTIC WATER HEATER ELECTRIC RESIDENTIAL

PART 3 - EXECUTION

3.01 INSTALLATION

A. Set units level, plumb, and true to line, without warp or rack of frames and panels and anchor securely in place.

B. Fasten securely in place, with provisions for thermal and structural movement. Install with concealed fasteners, unless otherwise indicated.

C. Separate dissimilar metals and metal products from contact with wood or cementations materials, by painting each metal surface in area of contact with a bituminous coating or by other permanent separation.

D. Correct deficiencies in or remove and reinstall products that do not comply with requirements.

E. Repair, refinish, or replace products damaged during installation, as directed by Architect.

F. Adjust operating parts and hardware for smooth, quiet operation.

END OF SECTION 22 33 00

CONSTRUCTION SPECIFICATIONS

SECTION 22 41 00 - RESIDENTIAL PLUMBING FIXTURES

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals : Product Data **SEE DIVISION 22 PRODUCT CUT SHEETS**

PART 2 - PRODUCTS

2.01 RESIDENTIAL APPLIANCES

A. Bathroom Sink Faucet
1. Manufacturers: KITCHEN SOURCE
2. Product Number: Vigo Olus Antique
3. Finish: Brushed Nickel

B. Bathroom Sink - **SEE A-528 FOR FABRICATION DETAIL SPECIFICATIONS**
1. Manufacturers: PRECISION CUSTOM COUNTERS
2. Product Number: Custom
3. Finish: White

C. Bathroom Sink Drain
1. Manufacturers: Glacier Bay
2. Product Number: 02545
3. Finish: Stainless Steel

D. Kitchen Sink
1. Manufacturers: Blanco
2. Product Number: 440220
3. Finish: White

E. Kitchen Faucet
1. Manufacturers: Blanco
2. Product Number: 441196
3. Finish: Satin Nickel

CONSTRUCTION SPECIFICATIONS

SECTION 22 41 00 - RESIDENTIAL PLUMBING FIXTURES

PART 2 - PRODUCTS

2.01 RESIDENTIAL APPLIANCES

F. Bathroom Toilet
1. Manufacturers: Kohler
2. Product Number: Veil
3. Finish: White

G. Toilet Carrier
1. Manufacturers: Kohler
2. Product Number: K-6284-NA

END OF SECTION 22 41 00

CONSTRUCTION SPECIFICATIONS

SECTION 22 41 23 - RESIDENTIAL SHOWERS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals : Product Data **SEE DIVISION 22 PRODUCT CUT SHEETS**

PART 2 - PRODUCTS

2.01 RESIDENTIAL SHOWERS

A. Shower Base
1. Manufacturers: KBRS
2. Product Number: DLT-1136360
3. Finish: White

B. Shower Knobs
1. Manufacturers: HUDSON REED
2. Product Number: UFG-BDL0707
3. Finish : Stainless Steel

C. Shower Hardware + Thermostatic Mixing Valves + Tubspout
1. Manufacturers: HUDSON REED
2. Product Number: UFG-BDL0707
3. Finish : Stainless Steel

D. Shower Head
1. Manufacturers: DELTA
2. Product Number: 75174
3. Finish : Stainless Steel

E. Shower Drain
1. Manufacturers: ZURN
2. Product Number: FD2254

CONSTRUCTION SPECIFICATIONS

SECTION 22 41 23 - RESIDENTIAL SHOWERS

PART 2 - PRODUCTS

2.01 RESIDENTIAL SHOWERS

F. Shower Decking
1. Manufacturers: Tru Grain
2. Product Name: 4 Channel Decking
3. Finish: STD Walnut

END OF SECTION 22 41 23

CONSTRUCTION SPECIFICATIONS

SECTION 23 07 00 - HVAC INSULATION

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals : Product Data

B. Quality Assurance: Labeled with maximum flame-spread index of 25 and maximum smoke-developed index of 50 according to ASTM E 84.

PART 2 - PRODUCTS

2.01 INSULATION MATERIALS

A. Refrigerant Insulation

1. Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
2. K-Flex USA INSUL-TUBE Coil

B. SHURTAPE HVAC Tape

1. Polypropylene Film

C. Duct Insulation

1. Zhender Comfopipe : SEE DIVISION 23 PRODUCT CUTSHEETS

D. FSK Facing Tape

1. Scrim on polyethylene coated kraft paper

CONSTRUCTION SPECIFICATIONS

SECTION 23 07 00 - HVAC INSULATION

PART 3 - EXECUTION

3.01 INSULATION INSTALLATION

A. Comply with requirements of the Midwest Insulation Contractors Association's "National Commercial & Industrial Insulation Standards" for insulation installation on pipes and equipment.

B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

C. Insulation Installation at Fire-Rated Wall, Partition, and Floor Penetrations: Install insulation continuously through penetrations. Seal penetrations. Comply with requirements in Division 07 Section "Penetration Firestopping."

D. Plenums and Ducts Not Insulated:

1. Metal ducts with duct liner.
2. Factory-insulated plenums and casings.
3. Flexible connectors.
4. Vibration-control devices.
5. Factory-insulated access panels and doors.

E. Piping Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawlspaces.
2. Chrome-plated pipes and fittings unless there is a potential for injury.

END OF SECTION 23 07 00

CONSTRUCTION SPECIFICATIONS

SECTION 23 20 00 - HVAC PIPING AND PUMPS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals : Product data. Shop Drawings.

B. Comply with NFPA 70, “National Electrical Code.”

PART 2 - PRODUCTS

2.01 PIPING

A. PEX Tube and Fittings

1. Comply with: ASTM F 877, SDR 9 PEX tubing and ASTM F 1807, metal inserttype fittings with copper or stainless-steel crimp rings.
2. Uponor F2060750 PEX-a

B. PEX Tubing

1. 3/4” type A
2. Uponor F1060750

C. Duct Insulation

1. Zhender Comfopipe : SEE DIVISION 23 PRODUCT CUTSHEETS

D. FSK Facing Tape

1. Scrim on polyethylene coated kraft paper

CONSTRUCTION SPECIFICATIONS

SECTION 23 20 00 - HVAC PIPING AND PUMPS

PART 3 - GENERAL

3.01 INSTALLATION

A. Comply with requirements for basic piping installation.

B. Install wall penetration system at each service pipe penetration through exterior wall. Make installation watertight.

C. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance.

D. Install domestic water piping with 0.25 percent slope downward toward drain for horizontal piping and plumb for vertical piping.

E. Install flexible connectors in suction and discharge piping connections to each domestic water pump and in suction and discharge manifold connections to each domestic water booster pump.

END OF SECTION 23 20 00

CONSTRUCTION SPECIFICATIONS

SECTION 23 23 00 - REFRIGERANT PIPING

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Comply with ASME B31.5, “Refrigerant Piping,” and with ASHRAE 15, “Safety Code for Mechanical Refrigeration.”

PART 2 - PRODUCTS

2.01 TUBES AND FITTINGS

A. Copper Tube: ASTM B 88, Types K and L (ASTM B 88M, Types A and B) and ASTM B 280, Type ACR.

B. Wrought-Copper Fittings: ASME B16.22.

C. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.

D. Brazing Filler Metals: AWS A5.8.

2.02 VALVES

A. Thermostatic Expansion Valve: Comply with ARI 750; forged brass or steel body, stainless-steel internal parts, copper tubing filled with refrigerant charge for 46 deg F heating and 71 deg F cooling suction temperature; 102-411 psig working pressure, and 240 deg F operating temperature.

B. Solenoid Valves: Comply with ARI 760; 240 deg F temperature rating, 400-psig (2760-kPa) working pressure, 240 deg F operating temperature; and 24-V normally closed holding coil.

C. Reversing Valve: Max operating temp. 250 deg F, 2500 minimum burst pressure.

CONSTRUCTION SPECIFICATIONS

SECTION 23 23 00 - REFRIGERANT PIPING

PART 1 - GENERAL

2.03 REFRIGERANT PIPING SPECIALTIES

A. Filter Drier: Comply with ratings in accordance to ARI standard 710-86, 500 psi maximum working pressure

B. Moisture/Liquid Indicators: 500-psig operating pressure, 240 deg F operating temperature; with replaceable, polished, optical viewing window and color-coded moisture indicator

C. Refrigerant: ASHRAE 34; R-410A.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install wall penetration system at each pipe penetration through foundation wall. Make installation watertight.

B. Install refrigerant piping and charge with refrigerant according to ASHRAE 15.

C. Below ground, install copper tubing in PVC conduit. Vent conduit outdoors.

D. Insulate suction lines to comply with Division 23 Section “HVAC Insulation.”

E. Slope refrigerant piping as follows:

1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
2. Install horizontal suction lines with a uniform slope downward to compressor.
3. Install traps and double risers to entrain oil in vertical runs.
4. Liquid lines may be installed level.

CONSTRUCTION SPECIFICATIONS

SECTION 23 23 00 - REFRIGERANT PIPING

PART 3 - EXECUTION

3.01 INSTALLATION

F. Install solenoid valves upstream from each thermostatic expansion valve. Install solenoid valves in horizontal lines with coil at top.

G. Install thermostatic expansion valves as close as possible to distributors on evaporator coils.

H. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.

I. Install strainers upstream from and adjacent to solenoid valves, thermostatic expansion valves, and compressors unless they are furnished as an integral assembly for device being protected:

J. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

3.02 PIPING APPLICATIONS FOR REFRIGERANT R-410A

A. Suction Lines: Copper, Type L (B), annealed- or drawn-temper tubing and wrought copper fittings with soldered joints.

END OF SECTION 23 23 00

CONSTRUCTION SPECIFICATIONS

SECTION 23 23 23 - REFRIGERANTS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data

PART 2 - PRODUCTS

2.01 REFRIGERANT

A. R-410A, ASHRAE 34.

1. Non-ozone depleting refrigerant

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install refrigerant piping and charge with refrigerant according to ASHRAE 15.

END OF SECTION 23 23 23

CONSTRUCTION SPECIFICATIONS

SECTION 23 31 00 - HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data for fire and smoke dampers and Shop Drawings detailing duct layout and including locations and types of duct accessories, duct sizes, transitions, radius and vaned elbows, special supports details, and inlets and outlet types and locations**.**

B. Comply with NFPA 90A, “Installation of Air Conditioning and Ventilating Systems,” and with NFPA 90B, “Installation of Warm Air Heating and Air Conditioning Systems.”

C. Comply with NFPA 96 for ducts connected to commercial kitchen hoods.

D. Comply with UL 181 for ducts and closures.

PART 2 - PRODUCTS

2.01 DUCTS

A. Duct Insulation - (AC + HEAT)

1. Zhender Comfopipe : SEE DIVISION 23 PRODUCT CUTSHEETS

A. Fresh Air Tube Intake

1. Zhender Comfotube : SEE DIVISION 23 PRODUCT CUTSHEETS

2.02 ACCESSORIES

A. Volume Dampers and Control Dampers: Single-blade and multiple opposed-blade dampers, standard leakage rating, and suitable for horizontal or vertical applications.

CONSTRUCTION SPECIFICATIONS

SECTION 23 31 00 - HVAC DUCTS AND CASINGS

PART 3 - EXECUTION

3.01 INSTALLATION

B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Outdoor, Supply-Air Ducts: Seal Class A.
2. Outdoor, Exhaust Ducts: Seal Class C.
3. Outdoor, Return-Air Ducts: Seal Class C.
4. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg (500 Pa) and Lower: Seal Class C.
5. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg (500 Pa): Seal Class B.
6. Conditioned Space, Exhaust Ducts: Seal Class B.

C. Conceal ducts from view in finished and occupied spaces.

D. Avoid passing through electrical equipment spaces and enclosures.

E. Support ducts to comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 4, "Hangers and Supports."

F. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

H. Clean new duct system(s) before testing, adjusting, and balancing.

3.02 TESTING, ADJUSTING, AND BALANCING

A. Balance airflow within distribution systems, including sub-mains, branches, and terminals to indicated quantities.

END OF SECTION 23 31 13

CONSTRUCTION SPECIFICATIONS

SECTION 23 33 00 - DIFFUSERS, REGISTERS AND GRILLES

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data and color charts for factory finishes.

PART 2 - PRODUCTS

2.01 REGISTERS

A. Tuttle and Bailey - SEE DIVISION 10 PRODUCT CUT SHEETS

1. Material: Steel; Finish: Appliance White; Mounting: Flush.
2. Sidewall/Ceiling Register Part #: A52, A62

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install registers.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel unless otherwise indicated. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. After installation, adjust registers to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 23 33 00

CONSTRUCTION SPECIFICATIONS

SECTION 23 56 00 - SOLAR ENERGY HEATING EQUIPMENT

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data and color charts for factory finishes.

PART 2 - PRODUCTS

2.01 REGISTERS

A. Tuttle and Bailey - SEE DIVISION 10 PRODUCT CUT SHEETS

1. Material: Steel; Finish: Appliance White; Mounting: Flush.
2. Sidewall/Ceiling Register Part #: A52, A62

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install registers.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel unless otherwise indicated. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. After installation, adjust registers to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 23 33 00

CONSTRUCTION SPECIFICATIONS

SECTION 23 72 00 - AIR-TO-AIR ENERGY RECOVERY EQUIPMENT

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data, Shop Drawings.

B. Comply with NFPA 70, “National Electrical Code.”

C. Warranties: Provide standard manufacturer’s written warranty, without monetary limitation, signed by manufacturer agreeing to promptly repair or replace products that fail in materials or workmanship for the period of 5 years.

PART 2 - PRODUCTS

2.01 ENERGY RECOVERY VENTILATOR

A. Zehnder

1. Model No. : Zehnder Novus 300
2. 177 CFM
3. Variable speed energy recovery ventilator providing filtration and ventilation, removing particles from both incoming and outgoing air.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install unit per Manufacturer’s instructions under supervision of HVAC contractor.

B. Connect and install ducts as described in Section 23 31 13.

END OF SECTION 23 72 00

CONSTRUCTION SPECIFICATIONS

SECTION 23 74 00 - AIR COOLED CONDENSING UNIT

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data, Shop Drawings.

B. Comply with NFPA 70, “National Electrical Code.”

C. Warranties: Provide standard manufacturer’s written warranty, without monetary limitation, signed by manufacturer agreeing to promptly repair or replace products that fail in materials or workmanship for the period of 5 years.

PART 2 - PRODUCTS

2.01 OUTDOOR UNIT

A. Daikin
1. Model No. : RZQ24PVJU9
2. 24,000 Btu

2.02 INDOOR VARIABLE SPEED MODULAR COMUNICATING AIR HANDLER

A. Daikin
1. Model No. : FBQ24PVJU
2. Multi-position, variable airflow, independently controlled units

2.03 INSTALLATION MATERIALS

A. Daiken unit comes with wall mount installation plates, remote control holder, hardware, and anti allergen and deodorizing filters.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation shall be executed as per installation manuals provided by the Manufacturer.

CONSTRUCTION SPECIFICATIONS

SECTION 23 74 00 - AIR COOLED CONDENSING UNIT

PART 3 - EXECUTION

3.01 INSTALLATION

B. Set units level, plumb, and true to line, without warp or rack of products and anchor securely in place as described in manufacturer's specifications.

C. Correct deficiencies in or remove and reinstall units that do not comply with requirements.

D. Repair, refinish, or replace products or finishes damaged during installation or transit, as directed by Architect.

END OF SECTION 23 81 26

CONSTRUCTION SPECIFICATIONS

SECTION 25 10 00 - INTEGRATED AUTOMATION NETWORK EQUIPMENT

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals:

1. Product Data.

B. Compliance:

1. NFPA 70, “National Electrical Code”

PART 2 - PRODUCTS

2.01 POWER SUPPLY

A. Power supply will be chosen by Electrical Engineer + Architect

2.02 DATABASE COMPUTER

A. Database computer will be chosen by Electrical Engineer + Architect

2.03 ROUTER

A. Internet router will be chosen by Electrical Engineer + Architect

2.04 SENSOR MODULE

A. Microcontroller will be chosen by Electrical Engineer + Architect

B. Wireless communication will be chosen by Electrical Engineer + Architect

C. Sensors will be chosen by Electrical Engineer + Architect

CONSTRUCTION SPECIFICATIONS

SECTION 25 10 00 - INTEGRATED AUTOMATION NETWORK EQUIPMENT

PART 2 - PRODUCTS

2.05 CURRENT MONITORING

A. Current monitoring will be chosen by Electrical Engineer + Architect

2.06 LIGHTING CONTROL

A. Lighting controls will be chosen by Electrical Engineer + Architect

PART 3 - EXECUTION

3.01 INSTALLATIONS

A. Prepare substrate by cleaning, removing projections, filling voids, sealing joints, and as otherwise recommended in manufacturer's written instructions.

B. Network equipment to be installed according to manufacturer's specifications.

C. Set units level, plumb, and true to line and anchor securely in place.

D. Correct deficiencies in or remove and reinstall materials that do not comply with requirements.

E. Repair, refinish, or replace substrate damaged during installation or transit, as directed by Architect.

END OF SECTION 25 10 00

CONSTRUCTION SPECIFICATIONS

SECTION 26 05 00- COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

A. Institute of Electrical and Electronic Engineers (IEEE):

1. IEEE C37.90-2005, Standard for Relays and Relay Systems Associated with Electric Power Apparatus
2. IEEE C37.90.1-2002, Standard Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems
3. IEEE C37.90.2-2004, Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers
4. IEEE C37.90.3-2001, Standard for Electrostatic Discharge Tests for Protective Relays

1.02 ADMINISTRATIVE REQUIREMENTS

A. Systems and items indicated on Drawings and Specifications are only nominally described and may not be completely specified or noted, however, where additional components are obviously necessary to make a complete working installation; they shall be included as if specified in their entirety.

B. Drawings indicate various electrical devices, particularly wall mounted devices, which take up more space on the Drawings than the device does in the actual installation:

1. This allows the Drawings to provide sufficient detail and a maximum degree of clarity when indicating the intent of work using symbols.
2. Drafting limitations allow only for indication of symbolic locations rather than exact physical locations of the devices.
3. Devices shall be installed with prime regard for convenience of operation and the best usage of wall space for this and other purposes rather than stringing the devices out along a wall so as to coincide with the scaled locations of the symbols.
4. Coordinate and confirm locations of devices and fixtures provided by other Divisions of Work, and confirm location of devices with Consultant before completing installation.

CONSTRUCTION SPECIFICATIONS

SECTION 26 05 00- COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.03 QUALITY ASSURANCE

A. Standards Organizations: Reference is made to the following standards organizations within the text of these specifications:

1. American National Standards Institute (ANSI)
2. Institute of Electrical and Electronic Engineers (IEEE)
3. Insulated Cable Engineers Association (ICEA)
4. National Electrical Manufacturers Association (NEMA)

B. Supply and install materials, and perform the work as though called for to minimum Code standards

.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Where materials or equipment are specified by the technical description only without reference to manufacturer or trade name,.

B. Where materials are specified by reference to “Acceptable Materials” or similar words, use any one of the materials listed maintaining same source of supply and manufacture where related products are used in a system, as follows:

1. Where equipment or materials are specified by manufacturer or trade name, this is for the purpose of establishing a standard of quality and Subcontractors quoting on materials other than those specified or approved for substitution do so at their own risk.
2. Manufacturers named as acceptable materials are required to comply completely with the intent of the specifications, even if this implies custom made products or standard products modified to comply.
3. Naming an acceptable material does not imply that a standard product of the manufacturer will be accepted. If it deviates from the specifications in any way whatsoever, the standard product will not be approved for use on the project.
4. Any substitute material or equipment installed without acceptance from the Consultant will be removed.

CONSTRUCTION SPECIFICATIONS

SECTION 26 05 00- COMMON WORK RESULTS FOR ELECTRICAL

PART 2 - PRODUCTS

2.2 FASTENINGS AND SUPPORTS

A. All equipment loads imposed on the building structure must be reviewed by the Consultant.

B. All supports and attachments to the building structure are the Contractor's responsibility and shall be designed by a professional engineer registered in the Province of the Work.

2.3 ACCESS DOORS

A. Provide access doors for electrical equipment, junction boxes, and controls as required to provide access for servicing and maintenance.

PART 3 - EXECUTION

3.1 PROTECTION

1. Protect all finished and unfinished work of this and other Divisions from damage due to carrying out of this work.
2. Keep equipment dry and clean at all times.
3. Cover openings in equipment and materials.
4. Be responsible for and make good any damage caused directly or indirectly to walls, floors, ceilings, woodwork, finishes, etc.
5. Store switchgear, transformers and sensitive electrical equipment in a dry heated location.

3.2 START UP

A. Instruct operating personnel in operation, care and maintenance of installation, at times arranged with the Team Project Manager, team member or team Crew Member assigned to such duties and the operating personnel.

CONSTRUCTION SPECIFICATIONS

SECTION 26 05 00- COMMON WORK RESULTS FOR ELECTRICAL

PART 3 - EXECUTION

3.2 START UP

B. Where specified herein and where necessary, arrange and pay for the services of the manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components:

1. Provide these services as often as necessary to put installation in working order and to ensure that operating personnel are conversant with all aspects of operation, care and maintenance.

2. Provide these services for such period and for as many visits as necessary to put equipment into operation and to ensure that operating personnel are conversant with its care and operation.

END OF SECTION 26 05 00

CONSTRUCTION SPECIFICATIONS

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data

B. Comply with NFPA 70, “National Electrical Code.”

PART 2 - PRODUCTS

2.01 THHN/THWN COPPER WIRE

A. SEE DIVISION 26 CUTSHEETS FOR ALL COPPER WIRE

2.02 CAT5E SHIELDED CABLE

A. SEE DIVISION 26 CUTSHEETS FOR ALL SHIELDED CABLE

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation according to manufacturer’s specifications inside flexible ENT. For an explanation of options and Contractor’s product selection procedures, see Section 01 60 00 “Product Requirements.”

END OF SECTION 26 05 19

CONSTRUCTION SPECIFICATIONS

SECTION 26 05 26 - GROUNDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals:

1. Product Data

B. Comply with NFPA 70, “National Electrical Code”

PART 2 - PRODUCTS

2.01 GROUND ROD

A. Ground Electric System

B. McMaster-Carr

C. http://www.mcmaster.com/#grounding-rods/=lg6ul

PART 3 - EXECUTION

3.01 INSTALLATION

A. Prepare grounding location set by the DOE by clearing debris and other obstructions.

B. Drive grounding rod(s) into pre-selected location(s) at depths set forth by competition organizers

C. Bond Main Service Panel and V circuit bare ground copper wires to grounding rod.

D. Correct deficiencies in or remove and reinstall wires and connectors that do not comply with requirements.

END OF SECTION 26 05 26

CONSTRUCTION SPECIFICATIONS

SECTION 26 05 33 - RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals:

1. Product Data

B. Comply with NFPA 70, “National Electrical Code”

PART 2 - PRODUCTS

2.01 RACEWAY AND CONDUIT

A. SEE DIVISION 26 CUTSHEETS FOR ALL RACEWAY AND CONDUIT

2.02 BOXES

A. SEE DIVISION 26 CUTSHEETS FOR ALL BOXES

PART 3 - EXECUTION

3.01 INSTALLATION

A. Set units level. plumb true to lines, without warp of frames and panels and anchor securely in place.

B. Fasten raceway and boxes securely in place, with provisions for thermal and structural movement. Install with concealed fasteners, unless otherwise indicated.

END OF SECTION 26 05 33

CONSTRUCTION SPECIFICATIONS

SECTION 26 08 13 - STARTING OF EQUIPMENT AND SYSTEMS

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS

1. Section 26 08 23 - Electrical Starting and Testing by Team Crew Member

1.02 ADMINISTRATION PROCEDURES

1. Scheduling and Coordinating Facility Start-Up Procedures: A detailed start-up procedure is required for this project, schedule sufficient time to all for testing, adjusting, fine tuning and verification procedures.

2. Coordination: Coordinate starting of electrical equipment and systems with testing, adjusting and balancing, and demonstration and instruction of the following after verifying that equipment of system requiring testing is fully adjusted and balanced prior to starting of electrical equipment and systems:
   a. Division 21 – Fire Suppression: Coordination of pipes and pipe fittings and other materials.
   b. Division 22 – Plumbing: Coordination of pipes and pipe fittings and other materials.
   c. Division 23 – Heating, Ventilation and Air Conditioning: Coordination of ductwork and other materials.
   d. Division 25 – Integrated Automation: Coordination conduit, wiring, communications cabling, cable trays and other materials.
   e. Division 26 – Electrical: Coordination conduit, wiring, communications cabling,cable trays and other materials.
   f. Division 27 – Communications: Coordination conduit, wiring, communications cabling, cable trays and other materials.
   g. Other equipment and systems specified in other Divisions of the Project Manual.

3. Manufacturer's Site Services: Arrange and pay for appropriately qualified manufacturer's representatives to supervise starting of the following electrical equipment and systems:
   a. Fire Alarm System
   b. Solar Electricity Generation System
   c. Data Collection System

CONSTRUCTION SPECIFICATIONS

SECTION 26 08 13 - STARTING OF EQUIPMENT AND SYSTEMS

PART 2 - NOT USED

PART 3 - EXECUTION

3.1 PROCEDURES

1. Energizing Main Electrical System: Verify the following before energizing main electrical system:

    a. Supply authority voltage and phase rotation
    b. Correct mechanical operation by closing and opening operable devices

2. Energizing Equipment: Verify equipment nameplate data match characteristics of power supply before energizing equipment provided under other Sections and equipment provided by Owner.

END OF SECTION 26 08 13

CONSTRUCTION SPECIFICATIONS

SECTION 26 08 19 - TESTING,ADJUSTING AND BALANCING OF ELECTRICAL EQUIPMENT AND SYSTEMS

PART 1 - GENERAL

1.1 INTENT

1. Arrange and pay for testing, adjusting and balancing, and related requirements as specified in this section.

2. Repair, replace, adjust or balance equipment and systems where test results do not conform with applicable requirements.

3. Repeat testing and adjusting until acceptable results are achieved.

1.2 RELATED REQUIREMENTS

1. Section 26 08 13 – Starting of Equipment and Systems
2. Section 26 08 23 – Electrical Starting and Testing by Team Crew Member

1.3 REFERENCE DOCUMENTS

1. Perform tests in accordance with:

    a. The Contract Documents.
    b. Requirements of authorities having jurisdiction.
    c. Manufacturer's published instructions.
    d. Applicable CSA, IEEE, IPCEA, EEMAC and ASTM standards.

2. Notify Consultant before proceeding with test and obtain clarification where requirements of any items listed in 1.3.1 above conflict.

1.4 SEQUENCING AND SCHEDULING

1. Perform testing, adjusting, balancing and related requirements before declaration of Substantial Performance.

2. Perform voltage testing and adjusting after user occupancy or utilization of facility.

CONSTRUCTION SPECIFICATIONS

SECTION 26 08 19 - TESTING,ADJUSTING AND BALANCING OF ELECTRICAL EQUIPMENT AND SYSTEMS

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

1. Provide all equipment and tools necessary to perform testing, adjusting and balancing specified herein and as otherwise required.

Part 3 EXECUTION

3.1 STARTING AND TESTING

A. Refer to Section 26 08 23.

END OF SECTION 26 08 19

CONSTRUCTION SPECIFICATIONS

SECTION 26 08 23 - STARTING,TESTING BY QUALIFIED TEAM MEMBER

PART 1 - GENERAL

1.1 INTENT

1. Read this Section in conjunction with Section 26 08 19 – Electrical Starting and Testing, and other related starting and test sections.

Part 2 - PRODUCTS - NOT USED

Part 3 - EXECUTION

3.1 BASIC ELECTRICAL START-UP AND TESTING

A. Energizing Main Electrical System: Perform the following operations prior to energizing main electrical system:

1. Verify supply authority voltage and phase rotation.
2. Verify that testing as specified has been completed and deficiencies have been corrected.
3. Megger all feeders and record results on approved test report forms.

B. Testing and Wiring and Wiring Devices:

1. Test conductors at distribution centres and panelboards for insulation resistance to ground (megger test).
2. Test service grounding conductors for ground resistance.
3. Test all wiring devices for correct operation and circuitry.

C. Ground Resistance Testing:

1. Measure ground resistance of ground grids with earth test megger to verify compliance with CSA C22.2 No. 0.4 and Canadian Electrical Code.

D. Load Balance Testing:

1. Perform load tests with as many building loads activated as possible.
2. Test load balance on feeders at distribution centres, motor control centres, and panelboards.

CONSTRUCTION SPECIFICATIONS

SECTION 26 08 23 - STARTING,TESTING BY QUALIFIED TEAM MEMBER

Part 3 - EXECUTION

3.1 BASIC ELECTRICAL START-UP AND TESTING

E. Voltage Testing and Adjusting:

1. Test voltage at service entry point.
2. Adjust transformer tap settings to compensate for under-voltage or over-voltage conditions, if directed to do so by the Consultant.

3.2 LIGHTING

A. Function test all light switches, luminaries, dimmers, and lighting control equipment such as photo-cells and time clock settings.
1. Function test light dimming systems.

3.3 FIRE SAFETY SYSTEMS

A. Prior to requesting verification of the Fire Alarm system by an Engineer, Division 16 and the system manufacturer's technical staff shall perform the following operations:

1. Inspect system in conjunction with the Manufacturer and verify that fire alarm system is correctly installed, connected, and fully operational in accordance with requirements of the Contract Documents and Manufacturer's recommendations with auxiliary equipment connected to the fire alarm system including, but not limited to, the following:
   a. Sprinklers
   b. Other devices.

END OF SECTION 26 08 23

CONSTRUCTION SPECIFICATIONS

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals:

1. Product Data

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NEMA PB 1.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Enclosures: Flush and Surface-mounted cabinets; Type 1.

1. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.

B. Incoming Mains Location: Bottom

C. Phase, Neutral, and Ground Buses: Plated Copper

D. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Tin-plated copper.
2. Main and Neutral Lugs: Mechanical Type.

E. Panelboard Short-Circuit Current Rating: Rated for series-connected system with integral overcurrent protective devices and labeled by UL.

F. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short circuit current available at terminals.

CONSTRUCTION SPECIFICATIONS

SECTION 26 24 16 - PANELBOARDS

PART 2 - PRODUCTS

2.02 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Mains : Circuit Breaker Outside

B. Branch Overcurrent Protective Devices: For Circuit-Breaker Frame Sizes 125 A and Smaller: Plug-in circuit breakers

C. See DIVISION 26 CUTSHEETS FOR LOADCENTERS

D. See DIVISION 26 CUTSHEETS FOR PANELBOARDS

PART 3 - EXECUTION

3.01 INSTALLATION

A. Receive, inspect, handle, store and install panelboards and accessories according to NECA 407 and NEMA PB 1.1.

B. Mount bottom of trim 55 inches above finished floor unless otherwise indicated. C. Arrange conductors into groups; bundle and wrap with wire ties.

C. Create a directory to indicate installed circuit loads and incorporating Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory.

END OF SECTION 26 24 16

CONSTRUCTION SPECIFICATIONS

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals:
1. Product Data

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.01 RECEPTACLES

A. DIVISION 26 CUTSHEETS FOR RECEPTACLES

2.02 SWITCHES

A. DIVISION 26 27 00 CUTSHEETS FOR ALL STANDARD & LIGHT SWITCHES

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.

B. Install devices and assemblies plumb, level, and square with building lines.

C. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

CONSTRUCTION SPECIFICATIONS

SECTION 26 27 26 - WIRING DEVICES

PART 3 - EXECUTION

3.01 INSTALLATION

D. Install unshared neutral conductors on line and load side of dimmers.

E. Mount devices flush, with long dimension vertical, and grounding terminal of receptacles on top unless otherwise indicated. Group adjacent devices under single, multigang wall plates.

END OF SECTION 26 27 26

CONSTRUCTION SPECIFICATIONS

SECTION 26 31 00 - PHOTOVOLTAIC COLLECTORS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals:

1. Product Data

B. Comply with NFPA 70, “National Electrical Code.”

C. Related Sections: 481916 Electrical Power Generation Inverters

PART 2 - PRODUCTS

2.01 SOLAR COLLECTORS

A. LG

1. Model No. : 280 S1C-G4
2. Copper Indium Gallium diSelenide with tempered glass

B. Solbian by PVillion

1. Model No. : Custom Panels
2. Storm Shutter Panels

2.02 INVERTER

A. Sunnyboy Inverter

1. Sunny Boy 3800TL - US
2. Usable DC Power 4200 W

2.03 ACCESSORIES

A. DIVISION 26 + 48 CUTSHEETS FOR PV COLLECTORS

CONSTRUCTION SPECIFICATIONS

SECTION 26 32 00 - PHOTOVOLTAIC COLLECTORS

PART 3 - EXECUTION

3.01 INSTALLATION

A. Prepare substrate by cleaning, removing projections, filling voids, sealing joints, and as otherwise recommended in photovoltaic cell manufacturer's written instructions. Adjust operating parts and hardware for smooth, quiet operation. Lubricate hardware and moving parts.

B. Set units level, plumb, and true to line, without warp of shingles and anchor securely in place to torque pressures required in manufacturer's specifications.

C. Make connections between the individual shingles as per manufacturer instructions.

D. Correct deficiencies in or remove and reinstall mountings and modules that do not comply with requirements.

E. Repair, refinish, or replace mountings and modules damaged during installation or transit, as directed by Architect.

F. Wire PV system to the Inverter as per manufacturers instructions.

END OF SECTION 26 32 00

CONSTRUCTION SPECIFICATIONS

SECTION 26 50 00 - LIGHTING

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data for each luminaire, including lamps.

B. Fixtures, Emergency Lighting Units, Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with IEEE C2, “National Electrical Safety Code.”

D. Coordinate ceiling-mounted luminaires with ceiling construction, mechanical work, and security and fire-prevention features mounted in ceiling space and on ceiling.

PART 2 - PRODUCTS

2.01 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.

B. Fluorescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA Le 5 and NEMA LE 5A as applicable.

C. Exterior Luminaires: Comply with UL 1598 and listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.

D. Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.

E. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

CONSTRUCTION SPECIFICATIONS

SECTION 26 50 00 - LIGHTING

PART 2 - PRODUCTS

2.02 REQUIREMENTS FOR INDIVIDUAL LIGHTING FIXTURES

A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.

B. Fluorescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA Le 5 and NEMA LE 5A as applicable.

C. Exterior Luminaires: Comply with UL 1598 and listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.

D. Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.

E. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

2.02 REQUIREMENTS FOR INDIVIDUAL LIGHTING FIXTURES

A. Fixture L1A

1. 2 Circuit 120v Track
2. LITELAB BUSRUN 08H
3. Wattage:N/A

B. Fixture L1B

1. 1 Circuit 120v Track
2. JUNO 1 CIRCUIT TRACK
3. Wattage:N/A

CONSTRUCTION SPECIFICATIONS

SECTION 26 50 00 - LIGHTING

PART 2 - PRODUCTS

2.02 REQUIREMENTS FOR INDIVIDUAL LIGHTING FIXTURES

B. Fixture L2A

1. Track mounted adjustable LED spot
2. LITELAB J19 MR16
3. Wattage : 9W
4. Count : 12
5. Total Wattage : 108W

C. Fixture L2B

1. Track mounted adjustable LED wall wash
2. LITELAB J21 MR16
3. Wattage : 9W
4. Count : 6
5. Total Wattage : 54W

D. Fixture L3A

1. Linear LED graze
2. KETRA G2 Linear LED narrow - 400 Lumen
3. Wattage : 11W
4. Count : 5
5. Total Wattage : 55W

E. Fixture L3Ba

1. Linear LED medium flood
2. KETRA G2 Linear LED medium - 700 Lumen
3. Wattage : 19W
4. Count : 9
5. Total Wattage :171W

CONSTRUCTION SPECIFICATIONS

SECTION 26 50 00 - LIGHTING

PART 2 - PRODUCTS

2.02 REQUIREMENTS FOR INDIVIDUAL LIGHTING FIXTURES

B. Fixture L3Bb

1. Linear LED medium flood
2. KETRA G2 Linear LED medium - 700 Lumen
3. Wattage : 19W
4. Count : 9
5. Total Wattage : 171W

C. Fixture L3Ca

1. Linear LED wide flood
2. KETRA G2 Linear LED wide - 400 Lumen
3. Wattage : 11W
4. Count : 4
5. Total Wattage : 44W

D. Fixture L3Cb

1. Linear LED wide flood
2. KETRA G2 Linear LED medium - 700 Lumen
3. Wattage : 19W
4. Count : 7
5. Total Wattage : 133W

E. Fixture L4A

1. Track mounted adjustable LED flood
2. KETRA S38 PAR 38 LED GU24 TA track adapter
3. Wattage : 17W
4. Count : 3
5. Total Wattage :51W

CONSTRUCTION SPECIFICATIONS

SECTION 26 50 00 - LIGHTING

PART 2 - PRODUCTS

2.02 REQUIREMENTS FOR INDIVIDUAL LIGHTING FIXTURES

F. Fixture L4B

1. Recessed ceiling LED downlight
2. KETRA S38 PAR38 LED GU 6” HALO RECESSED DOWNLIGHT
3. Wattage : 17W
4. Count : 2
5. Total Wattage : 34W

G. Fixture L5

1. Surface mounted LED downlight
2. B-K LIGHTING ARTISTAR MR 16 downlight
3. Wattage : 9W
4. Count : 6
5. Total Wattage : 54W

H. Fixture L6

1. Retrofit E26 LED lamp
2. KETRA A20 LED retrofit lamp Edison Base
3. Wattage : 11W
4. Count : 3
5. Total Wattage : 33W

I. Fixture L7

1. Wall mounted linear LED
2. TBD (Bedroom Linear 3’ Fixture)
3. Wattage : 50W
4. Count : 1
5. Total Wattage : 50W

CONSTRUCTION SPECIFICATIONS

SECTION 26 50 00 - LIGHTING

PART 2 - PRODUCTS

2.02 REQUIREMENTS FOR INDIVIDUAL LIGHTING FIXTURES

J. Fixture L8

1. Surface mounted ingrade LED uplight
2. BK LIGHTING ARTISTAR recessed in-grade uplight
3. Wattage : 9W
4. Count : 6
5. Total Wattage : 54W

2.03 LIGHTING ACCESSORIES

A. Unit D1

1. Linear LED drive
2. KETRA N3 Satellite
3. Wattage : 5W
4. Count : 2
5. Total Wattage : 10W

B. Unit D2

1. 120V DMX DIMMER
2. DMX DIMMER
3. Wattage : 5W

C. Unit D3

1. 12V ELECTRONIC DRIVER
2. B-K LIGHTING
3. Wattage : 5W
4. Count : 2
5. Total Wattage : 10W

CONSTRUCTION SPECIFICATIONS

SECTION 26 50 00 - LIGHTING

PART 3 - EXECUTION

2.03 LIGHTING ACCESSORIES

D. Unit R1

1. 120V CONTACT CLOSURE RELAY
2. Functional Devices

3.01 INSTALLATION

A. Set units level, plumb, and square with ceiling and walls, and secure.

B. Terminate appropriate fixtures with corresponding transformer and secure trans former.

C. Wire fixtures to scheduled switch legs.

D. Correct deficiencies in or remove and reinstall mountings and modules that do not comply with requirements.

E. Repair, refinish, or replace mountings and modules damaged during installation or transit, as directed by Architect.

END OF SECTION 26 50 00

CONSTRUCTION SPECIFICATIONS

SECTION 28 31 46 - SMOKE DETECTOR SENSORS

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals: Product Data and system operating description.

B. Submittals to Authorities Having Jurisdiction: In addition to distribution requirements for submittals, make an identical submittal to authorities having jurisdiction. To facilitate review, include copies of annotated Contract Drawings as needed to depict component locations.

C. Comply with NFPA 72.

D. D. UL listed and labeled.

E. E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 2 - PRODUCTS

2.01 SMOKE DETECTORS

A. SIMPLEX TrueAlarm Photoelectric Smoke Detector - TrueSense® Smoke/Heat Detection

B. TYCO Riser Manifold

C. TYCO RAPID RESPONSE Series LFII Residential Sprinklers

2.02 WIRE AND CABLE

A. UL listed and labeled as complying with NFPA 70, Article 760.

B. Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation. No. 12 AWG or larger as required by local codes.

CONSTRUCTION SPECIFICATIONS

SECTION 28 31 46 - SMOKE DETECTOR SENSORS

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install and test systems according to NFPA 72. Comply with NECA 1.

B. Install wiring “finished” in concealed spaces and exposed on ceilings and walls where indicated.

C. Wire system per manufacturer specifications.

END OF SECTION 28 31 46

CONSTRUCTION SPECIFICATIONS

SECTION 28 40 00 - ELECTRONIC MONITORING AND CONTROL

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

A. Submittals:

1. Product Data.

B. Compliance:

1. NFPA 70, “National Electrical Code”

C. Referring Sections

1. 262726: Wiring Devices
   a. Smart Switches

PART 2 - PRODUCTS

2.01 POWER SUPPLY

A. 12 Volt Power Supply
1. Phoenix Contact - 2868567

B. 24 Volt Power Supply
1. Phoenix Contact - 2868648

2.02 DATABASE COMPUTER

A. Home Database Computer
1. Moxa UC-8162-LX

B. Main Sensor Hub
1. Web Energy Logger (WEL) Rev 4.3

C. Energy Sensor Hub
1. (2) eGauge 3 Series

CONSTRUCTION SPECIFICATIONS

SECTION 28 40 00 - ELECTRONIC MONITORING AND CONTROL

PART 2 - PRODUCTS

2.03 NETWORKING

A. Ethernet Switch
1. Moxa EDS-208

2.04 MONITORING ENCLOSURE

A. Wallmount Enclosure with Window
1. Hammond -EN45D242012WLG

2.05 SENSORS

A. Split-core Current Trsansformer (CT)
1. Magnelab SCT Series

B. High Accuracy Split-core Current Trsansformer (CT)
1. Continental Control Systems ACT Series

C. Environmental 1-Wire Sensor
1. iButtonLink SS-WALL-TH
2. Web Energy Logger Temp Sensor- TSENSE-SS3

2.06 LIGHTING CONTROLS

A. Lighting Nodes :

1. Ketra N3 Satellite
   a. 11.05” x 5.13” x 2.38”

B. Lighting Switches :

1. Ketra X1 Touchpad
2. Lutron Maestro

CONSTRUCTION SPECIFICATIONS

SECTION 28 40 00 - ELECTRONIC MONITORING AND CONTROL

PART 3 - EXECUTION

3.01 INSTALLATIONS

A. Prepare substrate by cleaning, removing projections, filling voids, sealing joints, and as otherwise recommended in manufacturer's written instructions.

B. Network equipment to be installed according to manufacturer's specifications.

C. Set units level, plumb, and true to line and anchor securely in place.

D. Correct deficiencies in or remove and reinstall materials that do not comply with requirements.

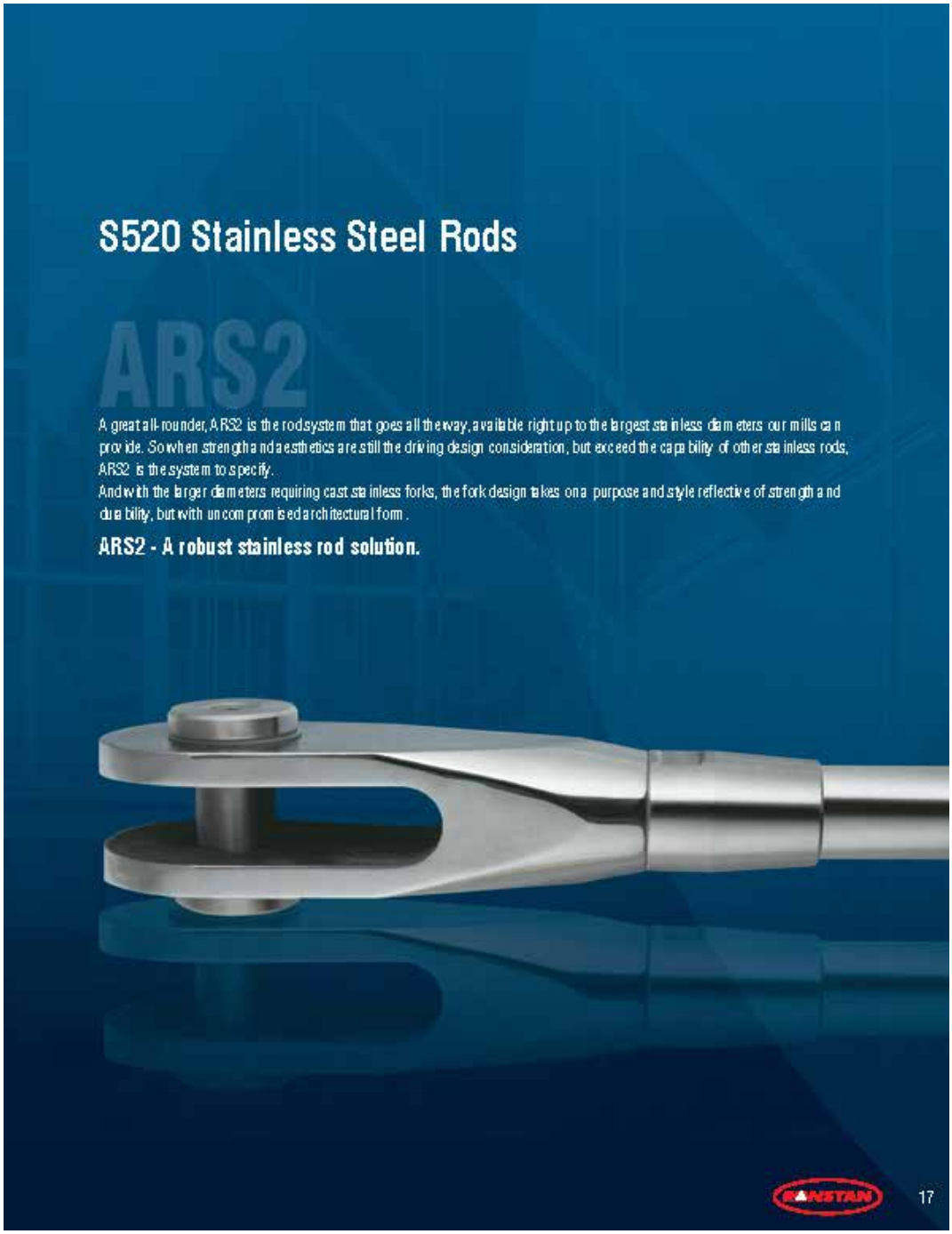
E. Repair, refinish, or replace substrate damaged during installation or transit, as directed by Architect.

END OF SECTION 28 40 00

11 PRODUCT CUT SHEETS

Division 05
Metals

CSI #: 05 13 00

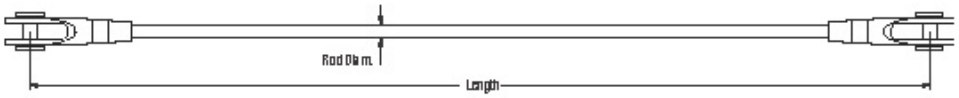

S520 Stainless Steel Rods
ARS2
A great all-rounder, ARS2 is the rod system that goes all the way, available right up to the largest stainless diameters our mills can provide. So when strength and aesthetics are still the driving design consideration, but exceed the capability of other stainless rods, ARS2 is the system to specify.
And with the larger diameters requiring cast stainless forks, the fork design takes on a purpose and style reflective of strength and durability, but with uncompromised architectural form.
ARS2 - A robust stainless rod solution.
17

CSI #: 05 13 00

STRUCTURAL ROD SYSTEM SPECIFICATIONS

SS520 ARS2 - S520 Stainless Steel Rods

ARS2 - Systems



METRIC

PRODUCT No.	THREAD TYPE	ROD Ø mm	ROD MASS kg/m	ADJUSTMENT ± PER ASSY mm	**ADJUSTMENT ± PER T & IF USED mm	*MAX. SINGLE ROD LENGTH m	MIN. YIELD LOAD kN	MIN. ULT. LOAD kN
ARS2-SSM12	M12	11	0.72	15.0	25.0	6	44.0	55
ARS2-SSM16	M16	15	1.39	15.0	25.0	6	82.0	104
ARS2-SSM20	M20	18	2.23	15.0	50.0	7.5	127	162
ARS2-SSM24	M24	22	2.98	20.0	50.0	7.5	184	233
ARS2-SSM30	M30	27	4.83	20.0	50.0	7.5	292	370
ARS2-SSM36	M36	33	7.13	20.0	50.0	7.5	425	539
ARS2-SSM42	M42	39	9.38	25.0	50.0	7.5	583	740
ARS2-SSM48	M48	45	12.5	25.0	50.0	7.5	677	898
ARS2-SSM56	M56	52	16.7	25.0	50.0	6	933	1238

IMPERIAL

		in.	lbs/ft	in.	in.	ft	kips	kips
ARS2-SSM12	M12	0.433	0.484	0.591	0.984	19.7	9.85	12.5
ARS2-SSM16	M16	0.591	0.934	0.591	0.984	19.7	18.3	23.3
ARS2-SSM20	M20	0.709	1.498	0.591	1.969	24.6	28.55	36.3
ARS2-SSM24	M24	0.866	2.002	0.787	1.969	24.6	41.36	52.3
ARS2-SSM30	M30	1.063	3.246	0.787	1.969	24.6	65.64	83.1
ARS2-SSM36	M36	1.299	4.791	0.787	1.969	24.6	95.54	121.2
ARS2-SSM42	M42	1.535	6.303	0.984	1.969	24.6	131.06	166.4
ARS2-SSM48	M48	1.772	8.386	0.984	1.969	24.6	152.20	201.9
ARS2-SSM56	M56	2.047	11.202	0.984	1.969	19.7	209.75	278.3

* Adjusters or turnbuckles may be used if maximum rod length material is not available and/or to reduce kitting costs or time.

** Where Turnbuckle required order: ARS2-SSxxxTB

CSI #: 05 13 00

STRUCTURAL ROD SYSTEM SPECIFICATIONS

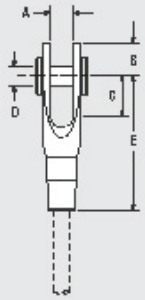
ARS2 - S520 Stainless Steel Rods

ARS2 - Component Dimensions

Fork Ends - Internal RH or LH Threads. Including Lock Covers.

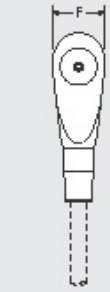
METRIC

THREAD TYPE	ROD Ø	A	B	C	D	E	F	WEIGHT
	mm	mm	mm	mm	mm	mm	mm	kg
M12	11	14	21	25	12	94	32	0.43
M16	15	16	27	30	16	111	43	0.94
M20	18	19	33	42	20	139	51	1.61
M24	22	24	41	50	24	159	62	2.24
M30	27	30	52	59	30	187	79	4.26
M36	33	36	61	68	36	211	93	5.79
M42	39	39	69	78	42	234	107	13.1
M48	45	44	78	87	48	248	121	16.2
M56	52	49	96	105	56	292	145	23.9



IMPERIAL

	In.	In.	In.	In.	In.	In.	In.	lbs
M12	0.433	0.551	0.827	0.984	0.472	3.701	1.260	0.94
M16	0.591	0.630	1.063	1.181	0.630	4.370	1.693	2.06
M20	0.709	0.748	1.299	1.654	0.787	5.472	2.008	3.55
M24	0.866	0.945	1.614	1.969	0.945	6.260	2.441	4.94
M30	1.063	1.181	2.047	2.323	1.181	7.362	3.110	9.39
M36	1.299	1.417	2.402	2.677	1.417	8.307	3.661	12.8
M42	1.535	1.535	2.717	3.071	1.654	9.213	4.213	28.9
M48	1.772	1.732	3.071	3.425	1.890	9.764	4.764	35.7
M56	2.047	1.929	3.780	4.134	2.205	11.496	5.709	52.7

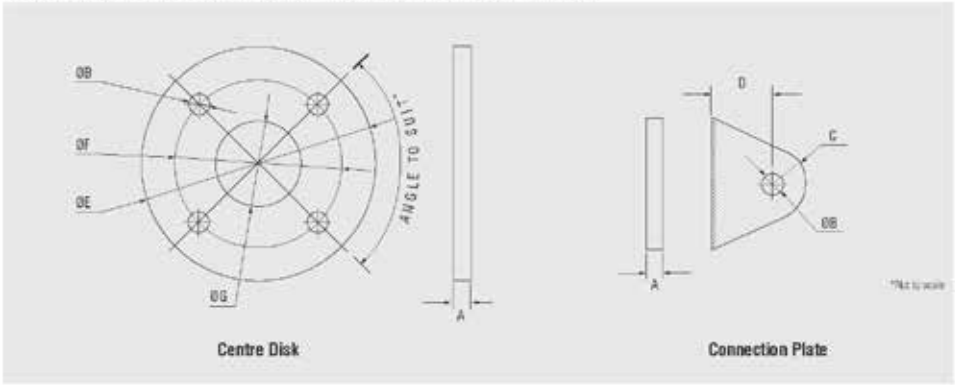


CSI #: 05 13 00

CONNECTION PLATE & CENTRE DISC PLATE SYSTEMS

Joining Systems & Custom Components

Centre Discs and Connection Plates - Carbon Steel or Stainless Steel



Centre Disk — Connection Plate

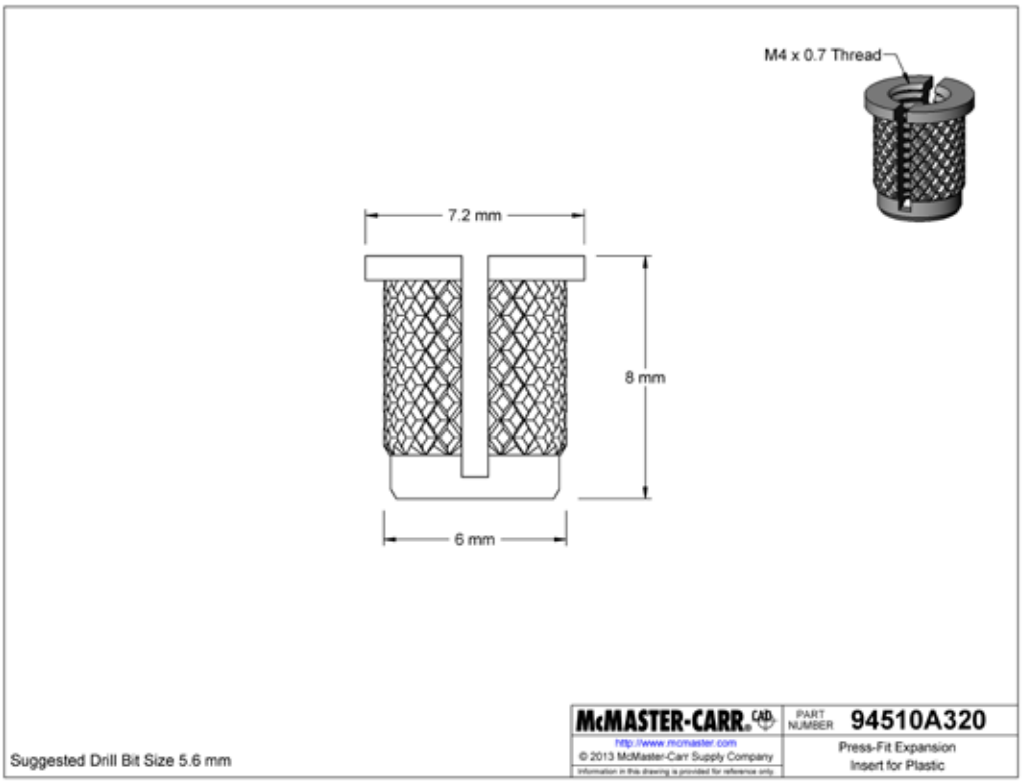
METRIC

MATCHING ROD SIZE THREAD	A mm	B mm	C mm	D mm	E mm	F mm	(Optional) G mm
M12	10	13.0	21.0	32	145	110	50
M16	12	17.0	27.0	38	185	140	60
M20	15	21.0	33.0	52	245	180	70
M24	20	25.0	41.0	62	285	210	90
M30	25	31.0	52.0	74	350	260	100
M36	30	37.0	61.0	87	420	310	120
M42	35	43.0	69.0	97	490	360	140
M48	40	49.0	78.0	107	560	410	160
M56	45	57.0	96.0	125	660	480	200

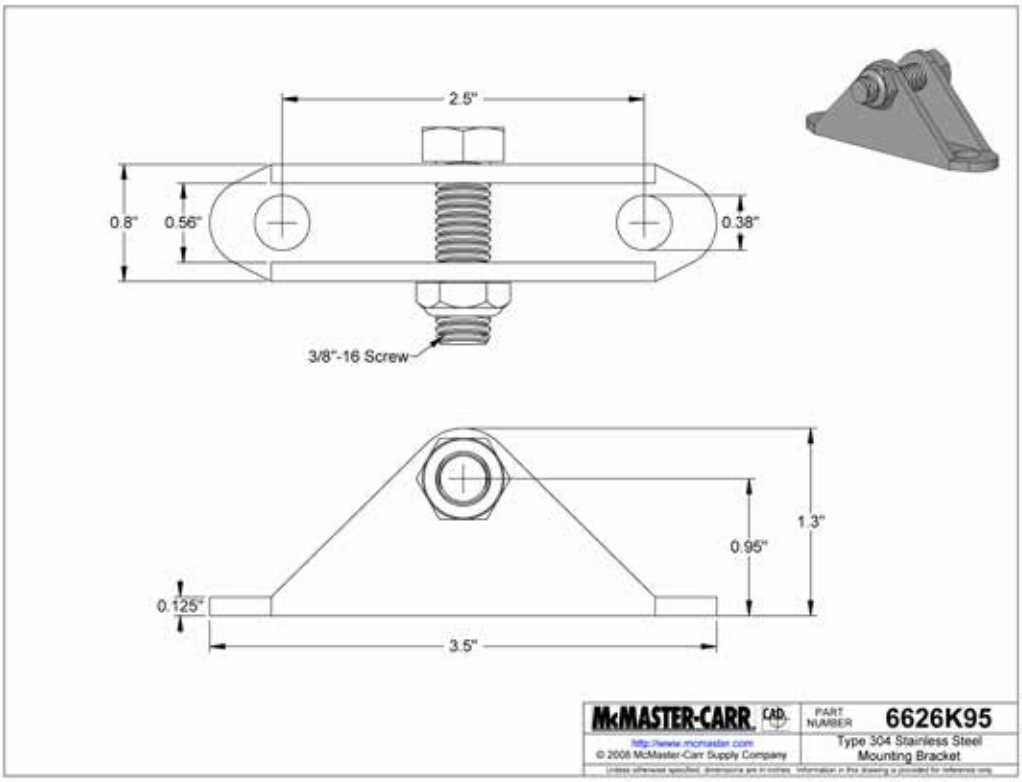
IMPERIAL

TYPE	in.	in.	in.	in.	in.	in.	in.
M12	0.394	0.512	0.827	1.260	5.709	4.331	1.969
M16	0.472	0.669	1.063	1.496	7.283	5.512	2.362
M20	0.591	0.827	1.299	2.047	9.646	7.087	2.756
M24	0.787	0.984	1.614	2.441	11.220	8.268	3.543
M30	0.984	1.220	2.047	2.913	13.780	10.236	3.937
M36	1.181	1.457	2.402	3.425	16.535	12.205	4.724
M42	1.378	1.693	2.717	3.819	19.291	14.173	5.512
M48	1.575	1.929	3.071	4.213	22.047	16.142	6.299
M56	1.772	2.244	3.780	4.921	25.984	18.898	7.874

CSI #: 05 45 00


M4 x 0.7 Thread
7.2 mm
8 mm
6 mm
Suggested Drill Bit Size 5.6 mm
McMASTER-CARR
CAD
http://www.mcmaster.com
© 2013 McMaster-Carr Supply Company
Information in this drawing is provided for reference only
PART NUMBER 94510A320
Press-Fit Expansion Insert for Plastic

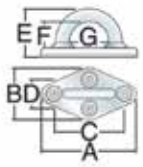
CSI #: 05 45 00


2.5"
0.8"
0.56"
0.38"
3/8"-16 Screw
1.3"
0.95"
0.125"
3.5"
McMASTER-CARR
CAD
PART NUMBER
6626K95
http://www.mcmaster.com
© 2008 McMaster-Carr Supply Company
Type 304 Stainless Steel
Mounting Bracket

CSI #: 05 45 00

HARKEN

HOME > HARDWARE > TRAVELERS & GENOA LEADS > 22 MM SMALL BOAT > 22 MM SMALL BOAT ACCESSORIES



Standard Padeyes

56 mm Padeye — 2 Fasteners

$13.25

Part No. 2759

IN STOCK

Maximum Working Load - angle 1 (kg)	1156 kg	Maximum Working Load - angle 2 (kg)	1111 kg
Maximum Working Load - angle 1 (lb)	2550 lb	Maximum Working Load - angle 2 (lb)	2450 lb

Padeyes are great for mounting blocks and are also used as attachment points for staysails, reefing blocks, and hundreds of other items. The 2759 is 316 cast stainless steel.

A (mm)	56 mm	Weight (g)	39 g
A (in)	2 1/4 in	Weight (oz)	1.34 oz
B (mm)	19 mm	Maximum Working Load - angle 1 (kg)	1156 kg
B (in)	3/4 in	Maximum Working Load - angle 1 (lb)	2550 lb
C (mm)	38 mm	Maximum Working Load - angle 2 (kg)	1111 kg
C (in)	1 1/2 in	Maximum Working Load - angle 2 (lb)	2450 lb
E (mm)	26 mm	Breaking load - angle 1 (kg)	2313 kg
E (in)	1 in	Breaking load - angle 1 (lb)	5100 lb
F (mm)	15 mm	Breaking load - angle 2 (kg)	2223 kg
F (in)	9/16 in	Breaking load - angle 2 (lb)	4900 lb
G (mm)	16 mm	Fasteners (mm)	6 mm
G (in)	5/8 in	Fasteners (in)	1/4 in

DWG: 2759.dwg.zip (open/save)

DXF: 2759.dxf.zip (open/save)

IGS: 2759.igs.zip (open/save)

EPS: 2759.eps (open/save)

High-res JPG: 2759.jpg (open/save)

DO NOT use Harken Equipment for Human suspension.

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CSI #: 05 45 00

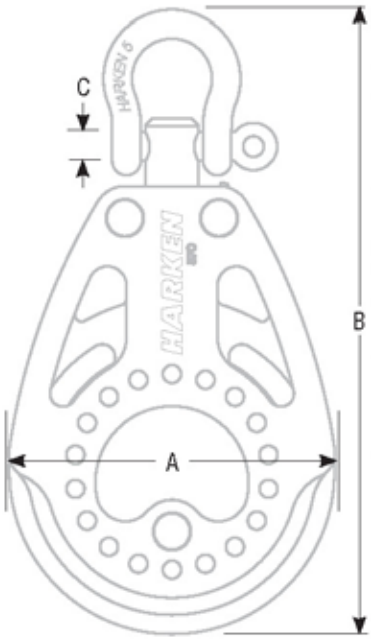
HARKEN®

INSTRUCTIONS

57 mm Carbo AirBlock®
All blocks except 2607 Ti-Lite

USA – Tel: (+1) 262-691-3320 • **Web:** www.harken.com • **Email:** harken@harken.com
Italy – Tel: (+39) 031.3523511 • **Web:** www.harken.it • **Email:** techservice@harken.it

Strictly follow all instructions to avoid an accident, damage to your vessel, personal injury or death. See www.harken.com for additional safety information.



IMPORTANT: See Inspection and Maintenance at end of manual.

Features

Glass-filled nylon sideplates: load-carrying curved bearing races.

Single fixed: Integral becket allows 2:1 or 3:1 purchase.

Doubles/triples: U-Locks holds the swivel in front/side position, or lets block spin freely.

Triple w/cam: Compact cam arm supports high-load purchases of 5:1 or 6:1.

Cam arm locking plates: Allows cam arms to be locked in more than five positions for fair leads.

Cheek: Line-shedding, small mounting footprint and drain holes.

Common uses: Main/jib sheets, mainsheet fine-tune, outhauls, cunninghams, vangs, control lines

Max Line Size: 7/16" (10 mm)

Do not apply a load greater than the Maximum working load (MWL) of the Carbo AirBlock listed below.

Part No.	Description	A in	A mm	B in	B mm	C in	C mm	Maximum working load lb	Maximum working load kg	Breaking load lb	Breaking load kg
2600	Single/swivel	2 1/4	57	4 5/16	110	3/16	5	792	359	2380	1079
2601	Single/swivel/becket	2 1/4	57	5 3/16	132	3/16	5	792	359	2380	1079
2606	Cheek	2 1/4	57	3 3/8	92	—	—	792	359	2380	1079
2607	Ti-Lite*	*Important: Consult instruction sheet at:* **http://www.harken.com/pdf/4927.pdf**									
2615	Single/swivel/150 Cam-Matic®**	2 1/4	57	4 5/16	110	3/16	5	300	136	750	340
2616	Single/swivel/150 Cam-Matic®/becket**	2 1/4	57	5 3/16	132	3/16	5	600	272	1500	680
2621	Fiddle	2 1/4	57	6	153	3/16	5	792	359	2380	1079
2622	Fiddle/becket	2 1/4	57	6 3/8	175	3/16	5	792	359	2380	1079
2623	Fiddle/150 Cam-Matic®	2 1/4	57	6	153	3/16	5	792	359	2380	1079
2624	Fiddle/150 Cam-Matic®/becket	2 1/4	57	6 3/8	175	3/16	5	792	359	2380	1079
2602	Double/swivel	2 1/4	57	4 3/4	121	—	6	1584	720	3300	1500
2603	Double/swivel/becket	2 1/4	57	5 3/8	142	—	6	1584	720	3300	1500

CSI #: 05 45 00

2606 Cheek Block

Using block as template, mark holes using a centerpunch. Remove block and drill holes using a 13/64" (5.2 mm) drill. Bevel top of deck holes using a small knife to allow sealant to mass. Through-bolt block using recommended stainless steel fasteners, washers and locknuts.

Part No.	Fasteners	A in	A mm	B in	B mm
2606	M5 or #10 PH/RH*	1 7/8	47	1/2	12

**Fastener length: Add deck thickness and overhang for nut and washer.*

3-Way Cam-Lock—2600 / 2601 / 2615 / 2616 / 2621 - 2624

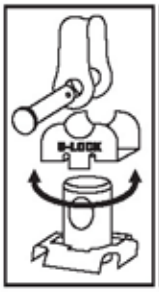
1

1. *Cam lever up. Block locks in front or side position.*
2. *Cam lever down. Block turns freely.*

2

3-Way U-Lock—2602 / 2603 / 2604 / 2605 / 2617 / 2618 / 2629 / 2631

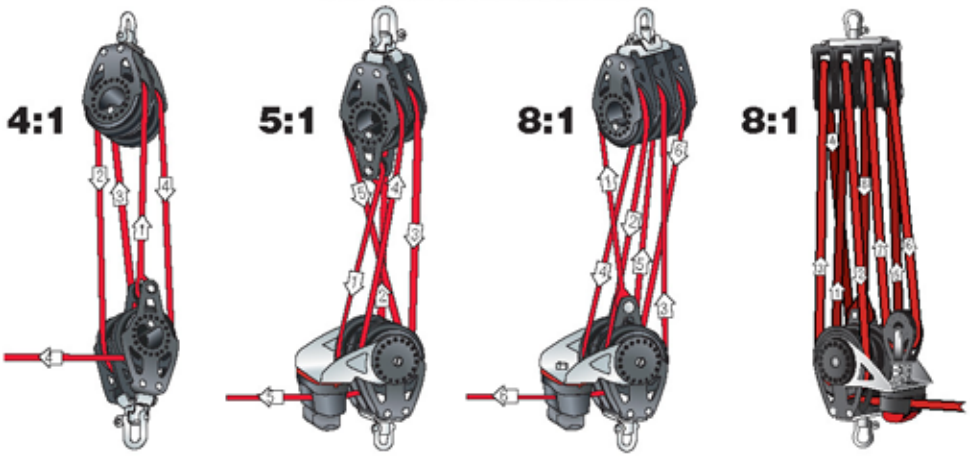
The 3-Way U-Lock on doubles and triples allows a change of headpost direction from front to side or allows the block to swivel. To change headpost direction, remove shackle, turn post, install shackle. Remove U-Lock to allow block to swivel.



CSI #: 05 45 00

Reeving Multi-Purchase Systems

Right-angle reeving dead-end on becket



For larger, printable diagrams, please see: **www.harken.com**.

Inspect Block and Shackle Before You Sail

WARNING! Failure to inspect and replace damaged metal parts and/or worn or frayed line can cause block or system to break suddenly causing an accident, damage to your vessel, personal injury or death. See www.harken.com for additional safety information.

Frequently inspect shackles and shackle posts for signs of corrosion, cracks, or elongation. When replacing shackles, use the correct Harken parts to maintain the proper strength. Replace line as necessary, taking into consideration the maximum size recommendation.

Maintenance

Harken equipment is designed for minimal maintenance. However, some upkeep is required to give the best service and comply with the Harken limited warranty.

Keep your equipment clean and free-running by frequently flushing with fresh water. Periodically clean with mild detergent and water solution. Spin sheaves to distribute soap solution evenly. Flush with fresh water.

Important: Exposure to some teak cleaners and other caustic solutions can result in discoloration of part and is not covered under the Harken warranty.

Warranty

For additional safety, maintenance and warranty information see www.harken.com or the Harken catalog.

M1002/1-17-11

CSI #: 05 45 00

HARKEN

HOME > HARDWARE > COMPLEMENTARY HARDWARE > EYESTRAPS

Eyestraps

32 mm Eyestrap

$2.15

IN STOCK

Part No. 073

Breaking load (kg) **726 kg** Breaking load (lb) **1600 lb**

Eyestraps are useful accessories. They form light-duty mounting bases for blocks, serve as lash-down points, and can be used for fairleads.

A (mm)	**43 mm**	B (in)	**3/8 in**
A (in)	**1 11/16 in**	F (mm)	**11 mm**
B (mm)	**12 mm**	F (in)	**7/16 in**
B (in)	**1/2 in**	Weight (g)	**4.5 g**
C (mm)	**32 mm**	Weight (oz)	**.16 oz**
C (in)	**1 1/4 in**	Fasteners (mm)	**5 mm**
D (mm)	**11 mm**	Breaking load (kg)	**725 kg**
D (in)	**7/16 in**	Breaking load (lb)	**1600 lb**
E (mm)	**10 mm**		

DWG: 073.dwg **(open/save)**

DXF: 073.dxf **(open/save)**

IGS: 073.igs **(open/save)**

EPS: 073.eps **(open/save)**

High-res JPG: 073.jpg **(open/save)**

DO NOT use Harken Equipment for Human suspension.

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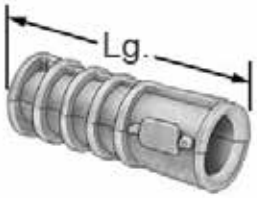
CSI #: 05 45 00

McMASTER-CARR. OVER 555,000 PRODUCTS
(609) 259-8900
(609) 259-3575 (fax)
nj.sales@mcmaster.com
Text 58926

Internally Threaded Lag Screw Anchor

for Concrete/Block/Brick, 1/4" Screw Size, 1-1/2" Long

97039A029



For Screw Size	1/4"
Length	1 1/2"
Minimum Install. Depth	1 1/2"
Drill Size	1/2"
Ultimate Strength, lbs.	
Pull Out	300
Shear	1,000
Additional Specifications	Lag Screw
RoHS	Compliant

All you need is a hammer—just tap into a drilled hole and position your fixture. Then insert a compatible threaded fastener (screw, rod, or lag screw not included) and tighten. Ultimate pull-out and shear strength are based on tests in 4,000 psi concrete. Ultimate shear strength is the force the side of an anchor can withstand before breaking.

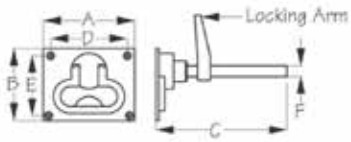
Lag screw anchors have a slight taper that prevents spinning. Install flush or slightly below the surface. Designed for use with lag screws (not included). Each diameter is available in two lengths. The shorter length reduces drilling time; the longer length provides more strength. Made of zinc.

Warning! Allowable pull-out and shear strength are 25% of ultimate values or less, as required by building authorities.

CSI #: 05 45 00

SEADOG LINE
QUALITY MARINE GEAR
WHOLESALE ONLY

Home > Cabinet & Hatch Hardware > **Hatch Handle**



HATCH HANDLE/LATCH

Investment Cast 316 Stainless

Bulk	Display	A	B	C	D	E	F	Fastener	Weight	Std. Pack
221835	221835-1	3-3/4"	3"	6"	3-1/8"	2-7/16"	1/2"	#8 FH	1.28	1 ea

CSI #: 05 45 00

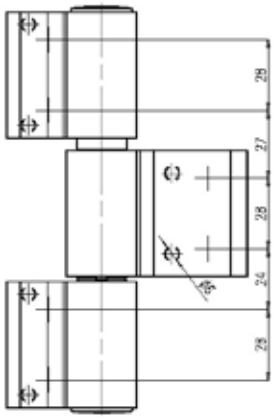
Sobinco K15.13

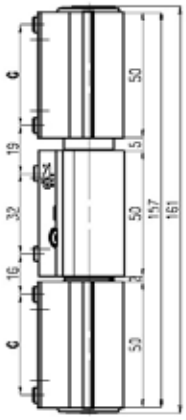
FACE FIXED DOOR HINGES

3. 3-part hinge

3.1. General, dimensions

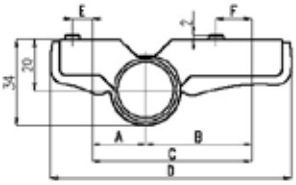
- Vent weights up to **160 kg** with 2 hinges.
- In accordance with standard EN 1935:2002 with CE-classification 4 7 7 0 1 4 1 14.
- SKG tested, 3 stars, on condition that 3 hinges are mounted on the door.





SKG

Note:
With minimum 3 hinges on the door!



	Drilling distance			
	63 mm	78 mm	84 mm	99 mm
A	21	21	42	42
B	42	57	42	57
C	63	78	84	99
D	95,5	110,5	115,5	130,5
E	8	8	-14	-14
F	14	14	14	14
G	40	40	32	32

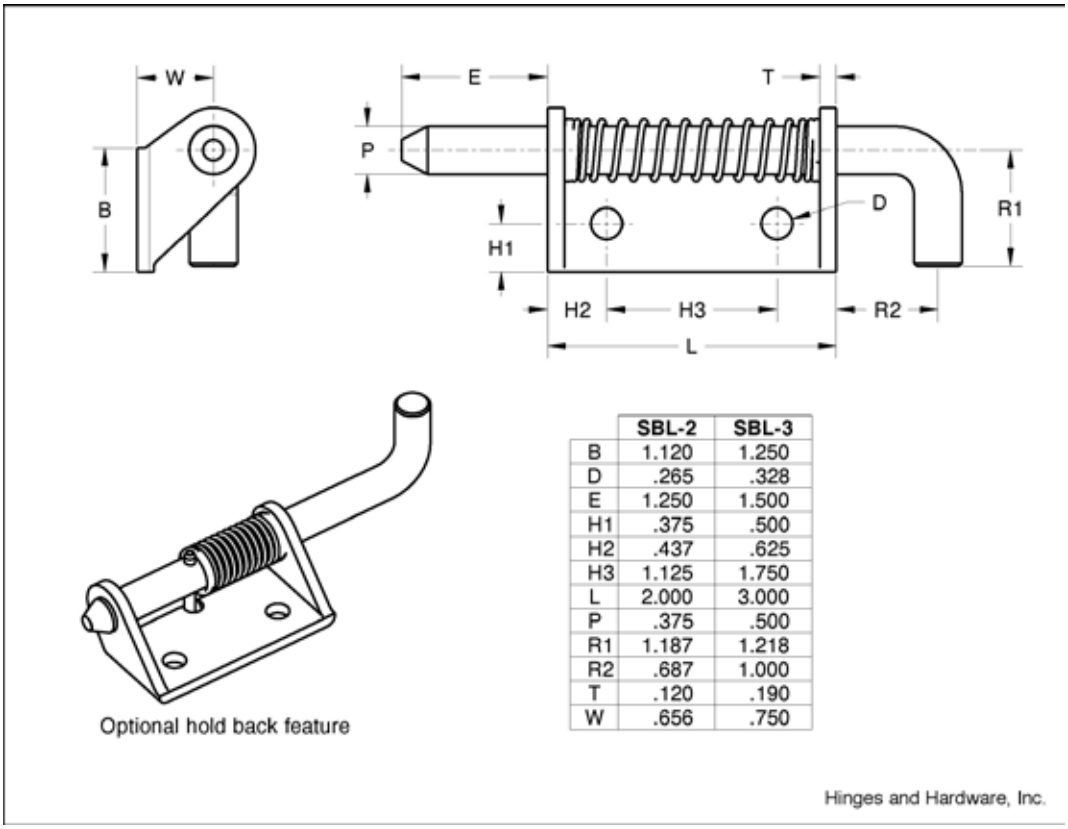
3.2. Versions

With direct screwing

- Screws in treated steel or stainless steel.
- Length screws: 60 mm or 76 mm.

With clamping plates

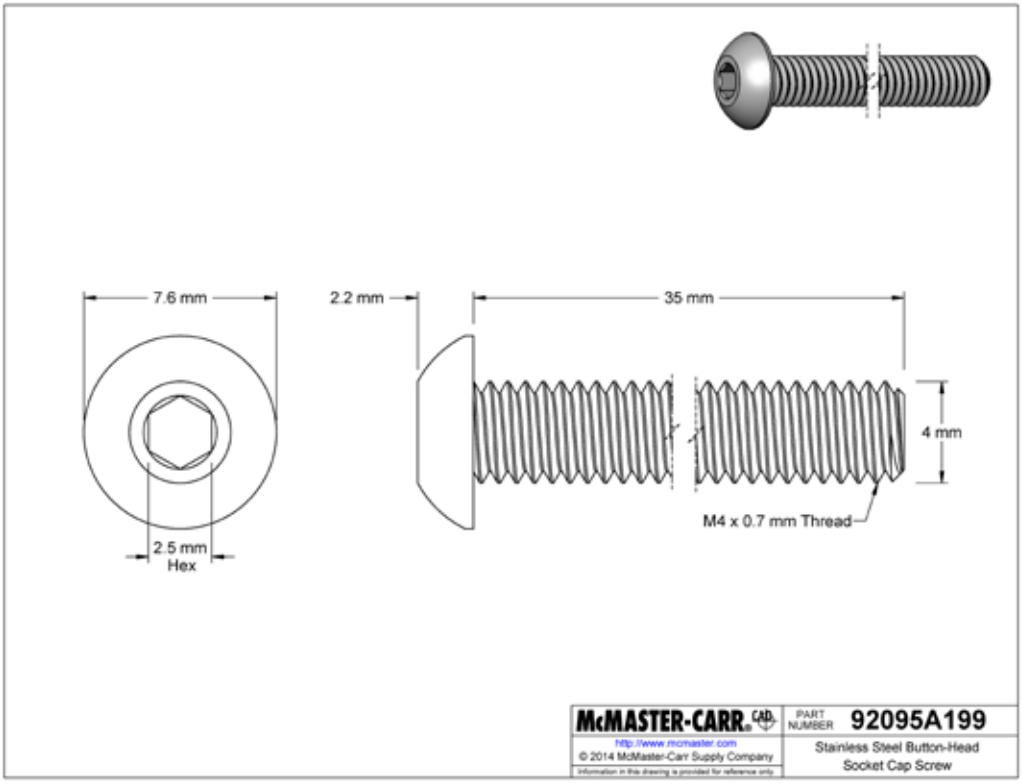
CSI #: 05 45 00



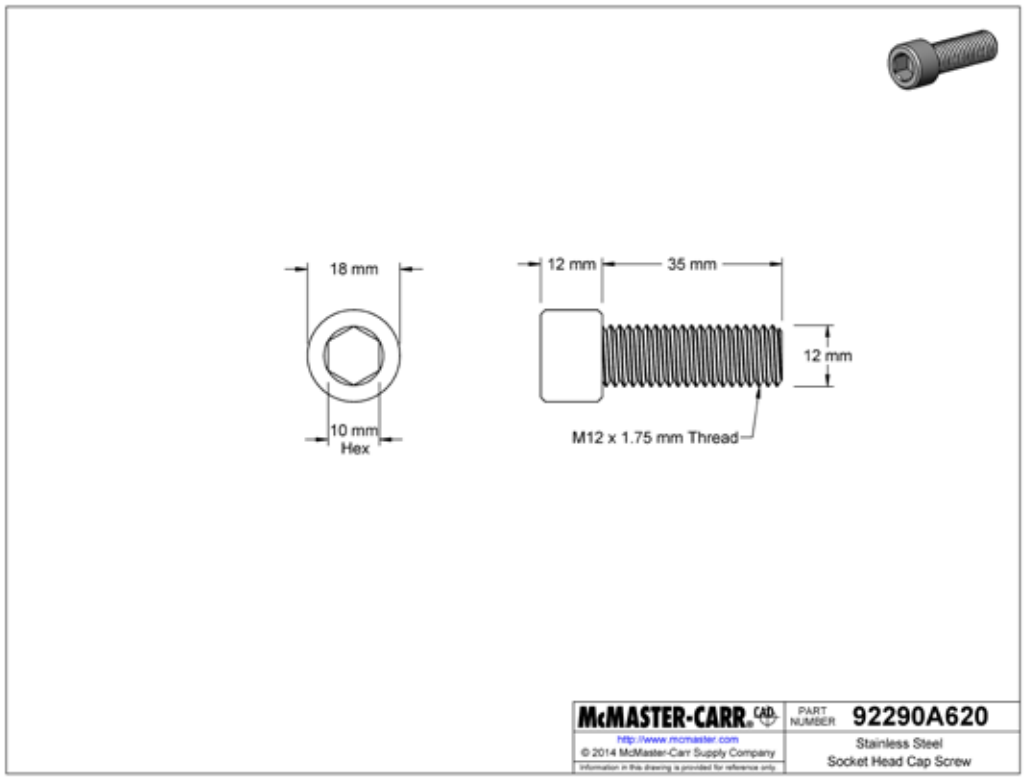
	SBL-2	SBL-3
B	1.120	1.250
D	.265	.328
E	1.250	1.500
H1	.375	.500
H2	.437	.625
H3	1.125	1.750
L	2.000	3.000
P	.375	.500
R1	1.187	1.218
R2	.687	1.000
T	.120	.190
W	.656	.750

Hinges and Hardware, Inc.

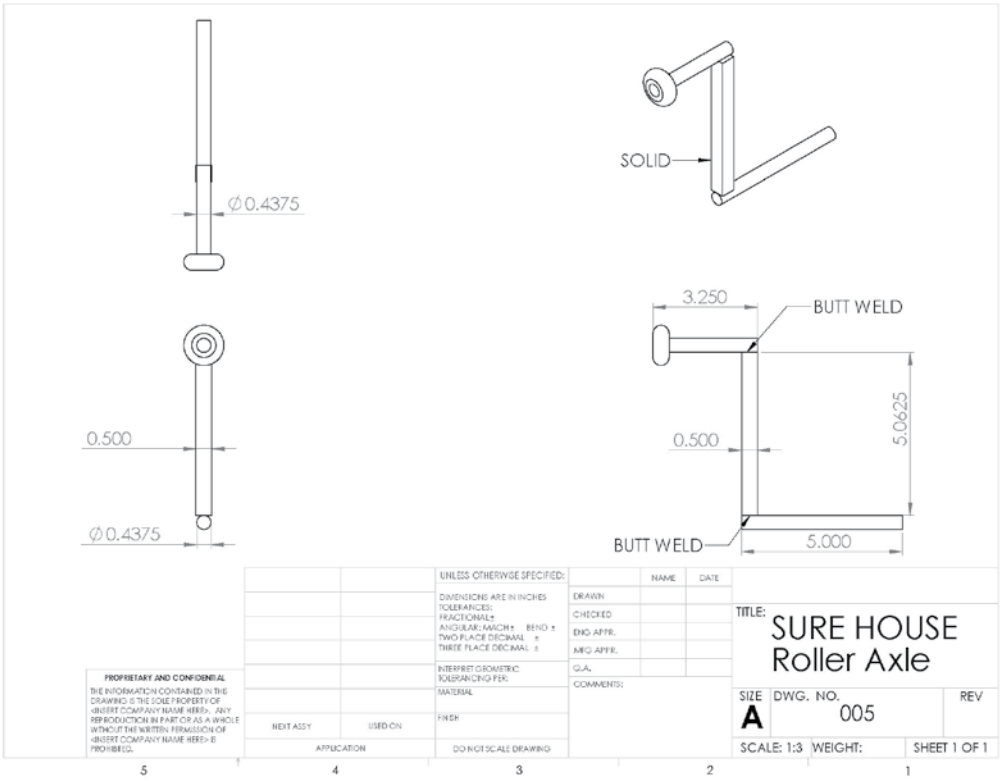
CSI #: 05 45 00


7.6 mm
2.2 mm
35 mm
4 mm
M4 x 0.7 mm Thread
2.5 mm
Hex
McMASTER-CARR
PART NUMBER 92095A199
Stainless Steel Button-Head
Socket Cap Screw
© 2014 McMaster-Carr Supply Company

CSI #: 05 45 00


18 mm
10 mm
Hex
12 mm
35 mm
12 mm
M12 x 1.75 mm Thread
McMASTER-CARR
http://www.mcmaster.com
© 2014 McMaster-Carr Supply Company
PART NUMBER
92290A620
Stainless Steel
Socket Head Cap Screw

CSI #: 05 45 00


Ø0.4375
SOLID
3.250
BUTT WELD
0.500
5.0625
0.500
Ø0.4375
BUTT WELD
5.000
UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±
ANGULAR: MACH ± BEND ±
TWO PLACE DECIMAL ±
THREE PLACE DECIMAL ±
INTERPRET GEOMETRIC TOLERANCING PER:
MATERIAL
FINISH
NEXT ASSY
USED ON
APPLICATION
DO NOT SCALE DRAWING
NAME
DATE
DRAWN
CHECKED
ENG APPR.
MFG APPR.
Q.A.
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TITLE:
SURE HOUSE
Roller Axle
SIZE
A
DWG. NO.
005
REV
SCALE: 1:3
WEIGHT:
SHEET 1 OF 1
5
4
3
2
1

CSI #: 05 45 00

McMASTER-CARR. OVER 555,000 PRODUCTS
(609) 259-8900
(609) 259-3575 (fax)
nj.sales@mcmaster.com
Text 58926

Lag Screw for Wood

Type 316 Stainless Steel, 3/8" Diameter, 3" Long

90123A383

Length	3"
Additional Specifications	Type 316 Stainless Steel 3/8" Dia.—Hex Size 9/16"
RoHS	Compliant

Also known as lag bolts, these screws come in longer lengths than traditional wood screws. Screws are threaded at least two-thirds their length (unless noted). Length is measured from under head. Hex size is measured from flat to flat. All screws meet ASME B18.2.1.

Hot-dipped galvanized steel conforms to ASTM A307 or SAE J429; zinc coating conforms to ASTM 153.

CSI #: 05 45 00

McMASTER-CARR. OVER 555,000 PRODUCTS

(609) 259-8900
(609) 259-3575 (fax)
nj.sales@mcmaster.com
Text 58926

Lag Screw for Wood

Type 316 Stainless Steel, 1/2" Diameter, 5" Long

90123A457

Length	5"
Additional Specifications	Type 316 Stainless Steel 1/2" Dia.—Hex Size 3/4"
RoHS	Compliant

Also known as lag bolts, these screws come in longer lengths than traditional wood screws. Screws are threaded at least two-thirds their length (unless noted). Length is measured from under head. Hex size is measured from flat to flat. All screws meet ASME B18.2.1.

Hot-dipped galvanized steel conforms to ASTM A307 or SAE J429; zinc coating conforms to ASTM 153.

CSI #: 05 45 00

McMASTER-CARR. OVER 555,000 PRODUCTS

(609) 259-6900
(609) 259-3575 (fax)
nj.sales@mcmaster.com
Text 58926

Lag Screw for Wood

Type 316 Stainless Steel, 1/4" Diameter, 1-1/2" Long

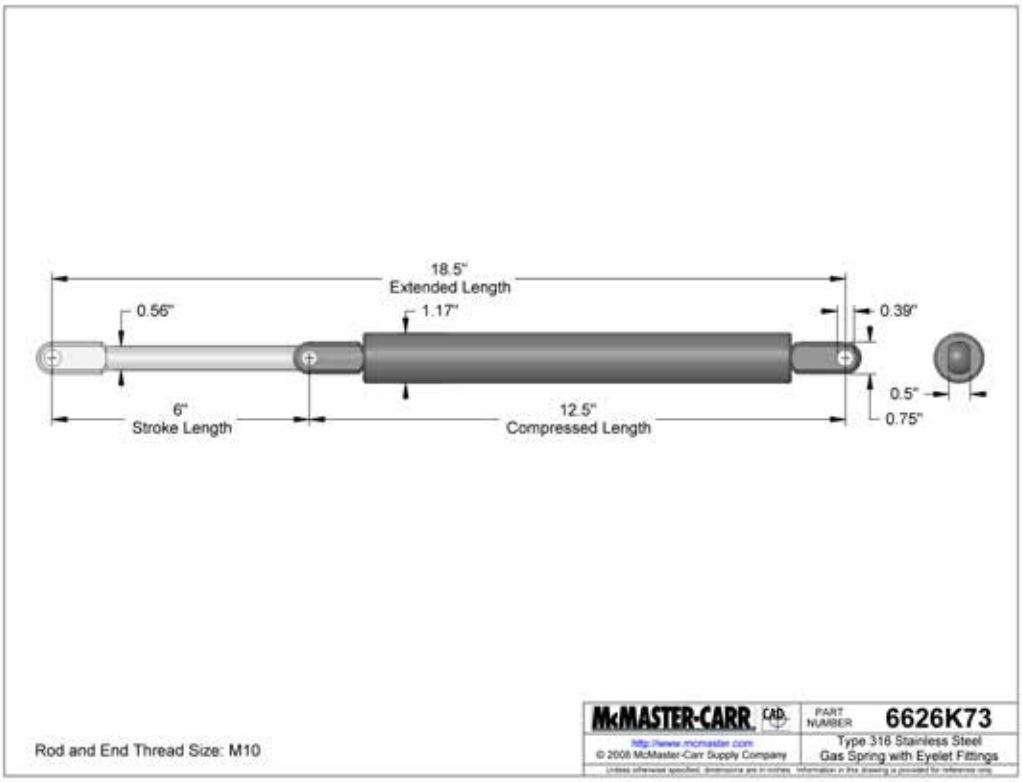
90123A119

Length	1 1/2"
Additional Specifications	Type 316 Stainless Steel 1/4" Dia.—Hex Size 7/16"
RoHS	Compliant

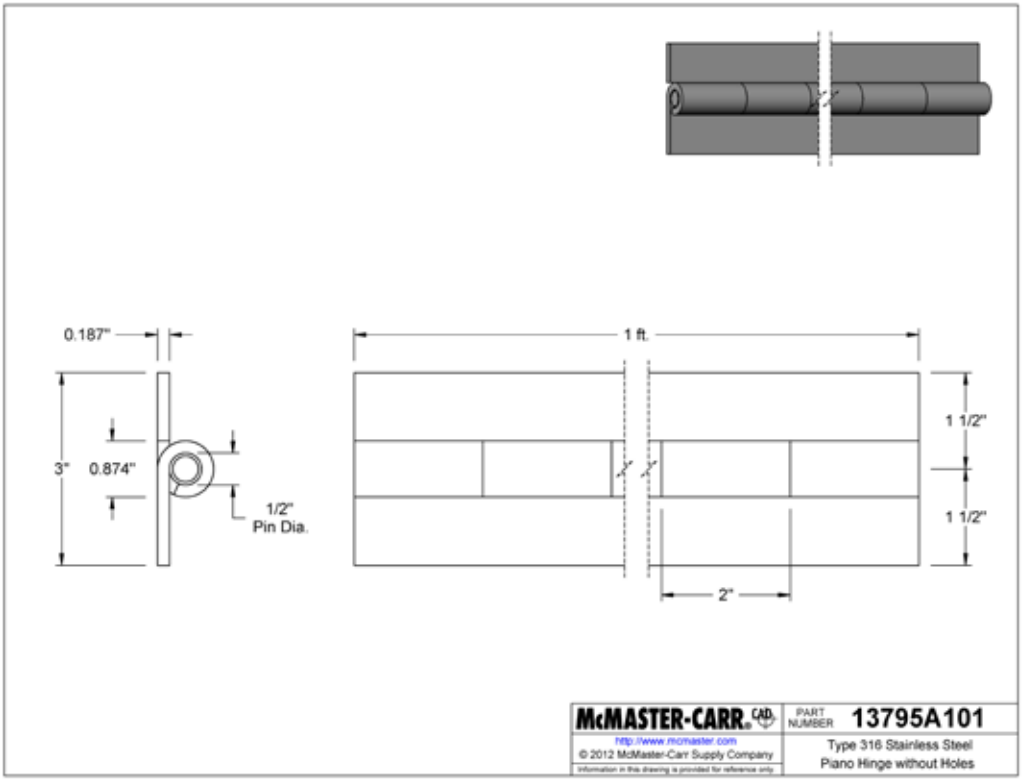
Also known as lag bolts, these screws come in longer lengths than traditional wood screws. Screws are threaded at least two-thirds their length (unless noted). Length is measured from under head. Hex size is measured from flat to flat. All screws meet ASME B18.2.1.

Hot-dipped galvanized steel conforms to ASTM A307 or SAE J429; zinc coating conforms to ASTM 153.

CSI #: 05 45 00


18.5"
Extended Length
0.56"
1.17"
0.39"
0.5"
0.75"
6"
Stroke Length
12.5"
Compressed Length
Rod and End Thread Size: M10
McMASTER-CARR
CAD
PART NUMBER
6626K73
http://www.mcmaster.com
© 2008 McMaster-Carr Supply Company
Type 316 Stainless Steel
Gas Spring with Eyelet Fittings

CSI #: 05 45 00


0.187"
1 ft.
3"
0.874"
1/2"
Pin Dia.
1 1/2"
1 1/2"
2"
McMASTER-CARR
PART NUMBER 13795A101
Type 316 Stainless Steel
Piano Hinge without Holes

CSI #: 05 45 00

WITTEN FASTENERS

METRIC 150 SERIES - "SPIRAL RIB"
THREADED INSERT, BLIND, REGULAR HEAD STYLE
HEAVY DUTY, "HIGH PERFORMANCE"

TABLE I

CODE NO.	T THREAD	A DIA ±.010	B SELF-LK ±.06	C DIA ±.010	INSTL HOLE +.005/-.000
M3.5	M3.5X.6	.490	.12	.460	.500
M4	M4X.7	.490	.12	.460	.500
M5	M5X.8	.520	.12	.490	.530
M6	M6X1	.583	.16	.553	.593
M8	M8X1.25	.646	.20	.616	.656
M10X1.25	M10X1.25	.708	.20	.678	.718
M10X1.5	M10X1.5	.708	.20	.678	.718
M12X1.5	M12X1.5	.833	.20	.803	.843
M12X1.75	M12X1.75	.833	.20	.803	.843
M14X1.5	M14X1.5	.895	.20	.862	.906
M14X2.0	M14X2.0	.895	.20	.862	.906
M16X1.5	M16X1.5	.958	.22	.924	.968
M16X2	M16X2	.958	.22	.924	.968

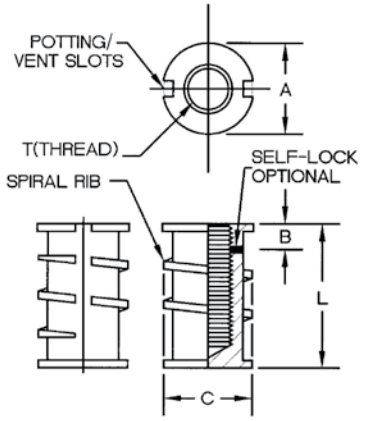


TABLE II

DASH NO.	L ±.03 LENGTH	MINIMUM FULL THREAD DEPTH								
		M3.5	M4	M5	M6	M8	M10	M12	M14	M16
-5	.312	.162	.162	--	--	--	--	--	--	--
-6	.375	.225	.225	.175	--	--	--	--	--	--
-7	.437	.276	.287	.237	--	--	--	--	--	--
-8	.500	.276	.315	.300	.225	--	--	--	--	--
-10	.625	.276	.315	.375	.350	.350	.350	--	--	--
-12	.750	.276	.315	.393	.472	.475	.475	.400	.400	.350
-14	.875	.276	.315	.393	.472	.600	.600	.525	.525	.475
-16	1.000	.276	.315	.393	.472	.625	.725	.650	.650	.600
-18	1.125	.276	.315	.393	.472	.629	.750	.775	.775	.725
-20	1.250	.276	.315	.393	.472	.629	.786	.874	.900	.850
-22	1.375	.276	.315	.393	.472	.629	.786	.944	1.000	.975
-24	1.500	.276	.315	.393	.472	.629	.786	.944	1.100	1.150

EXAMPLE: PART NUMBERING SYSTEM

150 — M5 — L — 12 — SS

- 150 — Series Prefix
- M5 — Thread Code No. (Table I)
- L — Add "LK" for Self-Lock (Nylon) / Add "L" for Self-Lock (Metallic Crimp)
- 12 — Length Dash No. (Table II)
- SS — Material:
  - A=Alum Alloy (Chem Film Finish)
  - C=Carbon Steel (CAD Plate Finish)
  - Z=Carbon Steel (Zinc Plate)
  - SS=Stainless Steel (Plain Finish)
  - SP=Stainless Steel (Passivate)

WITTEN COMPANY, INC.
918-272-9567

Notes:
1. Threads per MIL-S-7742
2. Patent No. 4,941,785 and 5,082,405
3. No. of Spiral Ribs varies with length
4. Installation tabs are available

CSI #: 05 45 00

Packing Slip

WITTEN COMPANY, INC.
8199 North 116th East Avenue
P.O. Box 269
Owasso, Oklahoma 74055
Tel (918) 272-9567
Fax(918) 272-9411

NUMBER : 23381
PAGE 1 OF 1
DATE : 4/17/15

To: STEVENS INSTITUTE OF TECHNOLOGY
600 SINATRA DR
SURE HOUSE SOLAR DECATHLON
HOBOKEN NJ 07030

Ship To: STEVENS INSTITUTE OF TECHNOLOGY
600 SINATRA DR, ROOM #SOLAR
HOBOKEN NJ 07030
ATTN CHRIS JURADO

Customer's Number: 21557
Shipper's Number: SIT13173

ITEM	QUANTITY	DESCRIPTION
1	100	INSERT, P/N 150-M12X1.75-LK-24-SS -- LOT NO. L5H8 (WITH INSTALLATION TABS)
2	1	MATERIAL TEST REPORT
		*****SHIPMENT COMPLETE*****

PACKED BY	CHECKED BY	NUMBER OF BOXES	TOTAL WEIGHT	SHIPPED VIA
KE	TW	1	12 LBS	UPS GROUND PPA 1Z 113 E9W 03 4790 2920

THANK YOU FOR YOUR BUSINESS!

Form G-104A

ISO 9001:2008 CERTIFIED
AS9100: 2009 CERTIFIED
HubZone CERTIFIED
QSLM CERTIFIED

CSI #: 05 45 00

CERTIFICATE OF COMPLIANCE

WITTEN COMPANY INC.

"Tradition of Quality Excellence"

Address: 5109 North 119th East Ave.
Owasso, OK. 74055
Phone: (918)272-9567
Fax: (918)272-9411

Friday, April 17, 2015

Ship to: STEVENS INSTITUTE OF TECHNOLOGY
600 SINATRA DR, ROOM #SOLAR
SURE HOUSE SOLAR DECATHLON
HOBOKEN NJ 07030
ATTN CHRIS JURADO

Bill to: STEVENS INSTITUTE OF TECHNOLOGY
600 SINATRA DR
HOBOKEN NJ 07030

Packing Slip No: 23391
GO Number: SIT13173
Purchase Order: 21557

Quantity	Part Number	Customer Number	Description	Drawing Rev	Spec & Rev	Lot, Batch No.	Material Type	Finish
100	100-M12X1.75-LX-24-SS		INSERT	NC		LSHI	303 STAINLESS STEEL (ASTM A582)	NO FINISH SPECIFIED

Witten Company, Inc. certifies that the products delivered against the aforementioned purchase order conform to the specifications, requirements, drawings and descriptions stated in the purchase order. Material test reports, processing certification and other quality documentation are on file and available for an additional charge.

DFARS Compliance: Witten Company, Inc. is located and manufactures products in the United States of America. Raw Materials acquired to manufacture the products delivered comply with DFARS part 252.225 & part 225.11

Country of Origin: The undersigned declares that the above listed goods shipped on the date of this certification consigned to the above customer are the products of the United States of America

Parts are free of Mercury contamination.

Witten Company, Inc. maintains and flows down a Counterfeit Prevention Program conforming to DODI 4140.67

Witten Company, Inc. certifies that the products that we supply do not contain conflict minerals as described in SEC# 34-67716 Conflict Minerals Final Rule and Pursuant to Section 1502 of the Dodd-Frank Wall Street Reform and Consumer Protection Act (the "Act").

Quality Control Representative

Please contact Customer Service and or Quality department at 918.272.9567 with any comments or concerns

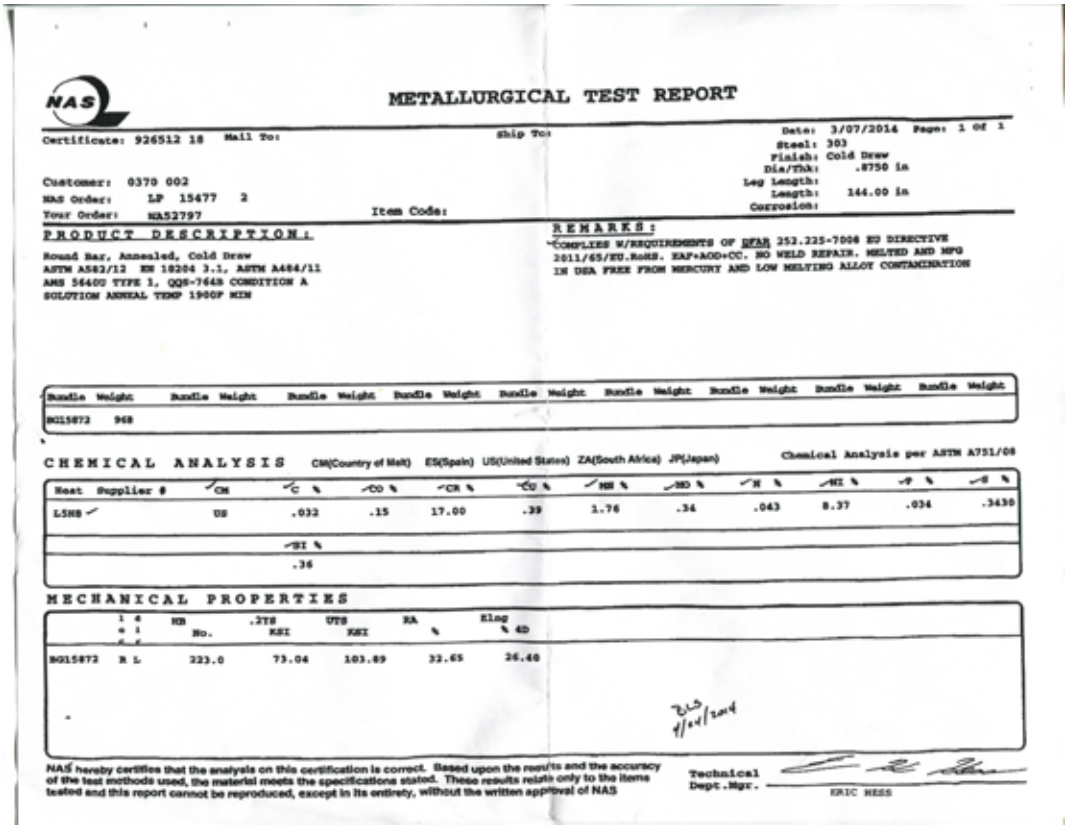
Thank you for your business!

CAGE CODE: 0JHK5 • ISO 9001: 2008 CERTIFIED • AS9100:2009 CERTIFIED • HUBZONE CERTIFIED • QSLM CERTIFIED

CERTIFICATE + Certificate + CERTIFICATE + Certificate + CERTIFICATE

G-105D

CSI #: 05 45 00



NAS

METALLURGICAL TEST REPORT

Certificate: 926512 18 Mail To: Ship To:

Date: 3/07/2014 Page: 1 Of 1
Steel: 303
Finish: Cold Drew
Dia/Thk: .8750 in
Leg Length:
Length: 144.00 in
Corrosion:

Customer: 0370 002
NAS Order: LP 15477 2
Your Order: NA52797 Item Code:

PRODUCT DESCRIPTION:

Round Bar, Annealed, Cold Drew
ASTM A582/12 EN 10204 3.1, ASTM A484/11
AMS 5640U TYPE 1, QQS-764B CONDITION A
SOLUTION ANNEAL TEMP 1900F MIN

REMARKS:

COMPLIES W/REQUIREMENTS OF DFAR 252.225-7008 EU DIRECTIVE 2011/65/EU.RoHS. EAF+AOD+CC. NO WELD REPAIR. MELTED AND MFG IN USA FREE FROM MERCURY AND LOW MELTING ALLOY CONTAMINATION

Bundle	Weight	Bundle	Weight	Bundle	Weight	Bundle	Weight	Bundle	Weight	Bundle	Weight	Bundle	Weight	Bundle	Weight	Bundle	Weight
BG15872	968																

CHEMICAL ANALYSIS CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan) Chemical Analysis per ASTM A751/08

Heat	Supplier #	CM	C %	CO %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
L5N8		US	.032	.15	17.00	.39	1.76	.34	.043	8.37	.034	.3430

SI %
.36

MECHANICAL PROPERTIES

	T e s t	H B No.	.2YS KSI	UTS KSI	RA %	Elng % 4D
BG15872	R L	223.0	73.04	103.89	32.65	26.40

TCS 4/04/2014

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS

Technical Dept.Mgr. ERIC NESS

Division 06

Woods, Plastics, and Composites

CSI #: 06 00 00

3M *Document Library*
Technical Data Sheet

Rev: 2
Effective: 12/1/2004
Status: Active
Supersedes: 07/06/2000

3M™ Marine Adhesive/Sealant 5200

3M Part No.(s)	3M Part Descriptor(s)
06500	10 fl. oz. cartridge (295 ml) - White
05203	3 fl. oz. tube (90 ml) - White
05206	1fl. oz. tube (30 ml) - White
21463	5 gal. pail (18.93 L) – White
06504	10 fl. oz. cartridge (295 ml) - Black
05205	3 fl. oz. tube (90 ml) – Black
06502	10 fl. oz. cartridge (295 ml) - Mahogany

Description

3M™ Marine Adhesive/Sealant 5200 is a one-part polyurethane that chemically reacts with moisture to deliver strong, flexible bonds. It has excellent adhesion to wood, gelcoat and fiberglass. It forms a watertight, weather-resistant seal on joints and boat hardware, above and below the waterline. In addition, its flexibility allows for dissipation of stress caused by shock, vibration, swelling or shrinking.

Features

- Tough/flexible polyurethane polymer
- Non-shrinking
- One-part moisture cure
- Long working time

Typical Physical Properties

Base	Polyurethane
Density lbs/Gallon (Approx.)	11.3 lbs/gallon
Color	White
Solids Content (Approx.)	97%
Consistency	Medium paste
Service Temperature - °F	-40°F (-40°C) to 190°F (88°C)
Shore A Hardness (cured)	68
Specific Gravity	1.36
Coverage (10 oz.)	1/8 inch (0.3175 cm) bead = 120 lineal feet (36.6 m)

Performance Properties

Tensile, Elongation, and effect of water submersion:
A 1/8-inch (0.3175 cm) dumbbell specimen with a 1/8-inch (0.3175 cm) square cross section was tested at 2.0 inches/minute (5.08 cm/minute). All samples tested at 50% Relative Humidity and 70°F (21°C).

CSI #: 06 00 00

Environmental Conditions	Time	Tensile Strength psi (kg/cm^2)	Elongation (%)
50% R.H./ 70°F (21°C)	*52 days*	*705 (49.6)*	*762*
Fresh Water	*52 days*	*634 (44.6)*	*805*
Salt Water	*52 days*	*638 (44.9)*	*802*

Overlap Shear Strength

One inch (2.54 cm) overlap specimens (0.093 inch (0.2362 cm thickness). Samples cured at 70°F (21°C), 50% Relative Humidity.

Substrate	psi	kg/cm^2
Wood(s):		
Teak	502	35.3
Pine	680	47.8
Oak	549	38.6
Maple	656	46.1
Fir	700	49.2
Mahogany	564	39.7
Metal(s):		
Steel	538	37.8
Stainless Steel	352	24.7
Aluminum	393	27.6
Brass	474	33.3
Bronze	252	17.7
Copper	198	13.9
Lead	107	7.5
Zinc (Galvanized)	484	34.0
Plastics/Polymers:		
Fiberglass	362	25.5
Gelcoat	519	36.5
Polycarbonate	381	26.8
Acrylic	217	15.3
Nylon	175	12.3
ABS	231	16.2
Polypropylene	55	3.9
Polyethylene	48	3.4

Note: Because actual use conditions can vary for each application, each user must determine the suitability of 3M Marine Adhesive/Sealant 5200 for the intended use.

Application Information

Directions for Use

Surface Preparation:

There are waxes, coatings, sealants, grease, oil and other contaminants used in the marine industry, making it very important to clean all surfaces to be bonded before applying 3M™ Marine Adhesive/ Sealant 5200. Recommended procedures include cleaning with 3M™ General Purpose Adhesive Cleaner*, P. N. 08984.

CSI #: 06 00 00

Application of Adhesive Sealant:

Abrading the surfaces with a 180 grit to 220 grit abrasive, and subsequently wiping off residue, will enhance the bond strength. Cut tip of the nozzle to desired bead size. Puncture seal inside the threaded nozzle end and screw on nozzle. If using a 10 fl. oz. cartridge, knock out the bottom seal with a hammer and place the cartridge in a caulk gun. Apply 3M™ Marine Adhesive/Sealant 5200 to the seam or part to be bonded. Position parts. Tool material to desired appearance. Remove excess material with 3M™ General Purpose Adhesive Cleaner*, P. N. 08984.

Cure:

	Relative Humidity	Temperature	Time	Cure Depth
Open Time	50%	70°F (21°C)	30 hours	N/A
Open Time	90%	90°F (32°C)	4 hours	N/A
Full Cure	50%	70°F (21°C)	5 days	1/8 inch (0.3175 cm)

Cleanup:

For cleaning 3M™ Marine Adhesive/Sealant 5200 before it is cured, use a dry cloth to remove the majority of sealant, followed by a cloth damp with General Purpose Adhesive Cleaner*, P. N. 08984, toluene or acetone. Cured 5200 can be removed mechanically with a knife, razor blade, or sanding.

Limitations -

- Alcohol should not be used in preparation for bonding as it will stop the curing process, causing the adhesive to fail..

- Heat resistance - Due to the decreased value in bond strength at elevated temperatures, we do not recommend use of this product above 190°F (88°C).

- Do not apply at temperatures below 40°F (4°C) or on frost covered surfaces. Do not apply at surface temperatures above 100°F (38°C).

- 3M™ Marine Adhesive/Sealant 5200 is not recommended for use as a teak deck seam sealer. Extended exposure to chemicals (teak cleaners, oxalic acid, gasoline, strong solvents and other harsh chemicals) may cause permanent softening of the sealant.

- 3M™ Marine Adhesive/Sealant 5200 is not recommended for the installation of glass, polycarbonate or acrylic windows that are not also mechanically fastened with a system designed by the manufacturer. Inconsistent adhesion of these unprimed substrates, specific design of the window, and movement due to thermal expansion and flexing, may cause application failure. It is strongly recommended that the customer contact the window/port light/hatch manufacturer for recommendations on proper sealing procedures.

- When using 3M™ Marine Adhesive/Sealant 5200 with metals, it may be necessary to prime the surface to achieve adequate adhesion and durability of the bond. Scotch-Weld™ Structural Adhesive Primer EC-1945 B/A may be used for priming of most metals.

CSI #: 06 00 00

Applications:

Typical bonding and sealing applications include:
- Fiberglass deck to fiberglass hull
- Wood to fiberglass
- Porthole frames
- Deck fittings
- Moldings
- Trunk joints
- Between struts and planking
- Stern joints and hull planking

Structural bonding and sealing of:
- Wood
- Fiberglass
- Gelcoat
- Primed metal

Sealing of:
- Some plastics (test before assembly)
- Glass
- Metals

Storage and Handling:
Recommended Storage Temperature Range: 60°F (16°C) to 80°F (26°C)
Expected Shelf Life at Recommended Storage Temperature: 24 Months

---

Precautionary Information
Refer to Product Label and Material Safety Data Sheet for Health and Safety Information before using this product.

Country
US

Important Notice to Purchaser
Technical Data: All physical properties, statements and recommendations are either based on tests we believe to be reliable or our experience, but they are not guaranteed. Because actual use conditions can vary for each application, each user must determine the suitability of 3M Marine Adhesive/Sealant 5200 for the intended use

* If 'Directions for Use' reference P.N.'s 08984, 08986, or 08987, please read. Federal and local air quality regulations may regulate or prohibit the use of surface preparation and cleanup solvents based on VOC content. Consult your local and Federal air quality regulations for information. When using solvents, use in a well ventilated area. Extinguish all sources of ignition in the work area and observe precautionary measures for handling these materials. Refer to product label and MSDS for P.N. 8984, 8986, or 8987 for detailed precautionary information.

Warranty and Limited Remedy: 3M warrants this product will be free from defects in materials and manufacture. **3M MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** If the product is proved to be defective your exclusive remedy and 3M's and seller's sole obligation will be, at 3M's option, to replace the product or refund the purchase price.

Limitation of Liability: 3M and seller will not be liable for any loss or damage arising from this product, whether direct, indirect, special, incidental or consequential, regardless of the legal theory asserted, including warranty, contract, negligence or strict liability.

For Additional Health and Safety Information
3M Marine
3M Center, Building 223-1N-13
Saint Paul, MN 55144-1000
1-877-366-2746 (1-877-3M MARINE)
http://www.3m.com/marine

CSI #: 06 00 00

Technical data sheet

ccp COMPOSITES

ArmorStar® VE

VE MC • VE SX • VE BX

IVEXC210, IVEXC410, and IVEXM120

Vinyl Ester/DCPD Blend Infusion Resin

Copyright 2010-2014

Description

ArmorStar® IVEXC210, IVEXC410, and IVEXM120 are pre-promoted vinyl ester/DCPD blend resins containing styrene monomer. They are formulated for building reinforced plastic parts using closed molding processes and specifically infusion processes such as vacuum bagging, SCRIMP, and resin injection. ArmorStar® IVEXC210, IVEXC410, and IVEXM120 are intended for use in large parts that contain thick (>400 mils) cross-sections requiring suppressed exotherm temperatures. ArmorStar® IVEXM120 is specifically formulated for use with Syrgis NOROX® MCP-75 for extended working times and low exotherms.

Features and Benefits

- Low viscosity for good fiber wetting and mold filling performance
- Rapid fill times
- C versions have cool thick section exotherm combined with good thin section cure
- M version specifically formulated for use with Syrgis NOROX® MCP-75 for extended working times and thick parts.
- Resistance to fiberglass print-through yields better surface cosmetics
- Excellent strength and toughness for crack resistance

Liquid Properties (77°F)

Liquid properties of ArmorStar® IVEXC210, IVEXC410, and IVEXM120 are shown below. These values may or may not be manufacturing control criteria; they are listed for a reference guide only. Particular batches will not conform exactly to the numbers listed because storage conditions, temperature changes, age, testing equipment (type and procedure) can each have a significant effect on the results. Products outside of these readings can perform acceptably. Final suitability of this product is in the end use performance.

CSI #: 06 00 00

Technical data sheet

IVEXC210, IVEXC410, & IVEXM120 - Copyright 2010-2014

Test	IVEXC210	IVEXC410	IVEXM120
Viscosity [1]	100 cps	100 cps	100 cps
Gel Time	20 minutes [2]	43 minutes [2]	120 minutes [3]
Gel to Peak Exotherm	18 minutes [2]	21 minutes [2]	55 minutes [3]
Peak Exotherm	280°F (138°C) [2]	275°F (135°C) [2]	270°F (132°C) [3]
Weight per Gallon	9.1 lbs./gallon	9.1 lbs./gallon	9.1 lbs./gallon

[1]Brookfield, LV #2 Spindle @ 60 rpm
[2]100 g mass, 1.5% Luperox® DDM-9
[3]100g mass, 1.5% Syrgis NOROX® MCP-75

Physical Properties

The physical properties of ArmorStar® IVEXC210 and IVEXC410 are shown below. Properties are shown for a neat resin casting. These are typical values and are provided for reference only.

Note: The physical properties of thermoset resins evolve as the resin cures. The properties given below are for well cured castings. Resin at different stages of cure will have varying properties.

Test	Test Method[1]	Casting[2]
Tensile Strength	ASTM D638	8,600 psi (59 MPa)
Tensile Modulus		580,000 psi (4,000 MPa)
Tensile Elongation		1.8 %
Flexural Strength	ASTM D790	16,000 psi (110 MPa)
Flexural Modulus		590,000 psi (4,0469 MPa)
Heat Distortion Temperature	ASTM D648	190°F (88°C)
Barcol Hardness	ASTM D2583	40

[1]All tests are run per CCP internal test methods. These methods are based on the ASTM methods listed.
[2]Neat resin for casting was catalyzed with 1.5% Arkema Luperox DDM-9. The casting was cured for 16 hours at room temperature and then post cured for 4 hours at 150°F.

CSI #: 06 00 00

Technical data sheet

IVEXC210, IVEXC410, & IVEXM120 - Copyright 2010-2014

Application

ArmorStar® IVEXC210, IVEXC410, and IVEXM120 are intended for use in large parts that contain areas with thick (>400 mils) cross-sections and require extended cure times. The resin is formulated to suppress exotherm temperatures in the thick areas.

The cure rate of polyester resins depends on a number of factors including the product's age, temperature, catalyst type, catalyst level and ambient humidity. When used in an infusion application, the laminate cure rate also depends on reinforcement content and laminate thickness as well as other factors. For these reasons, we recommend that customers check the cure rate in your plant.

ArmorStar® IVEXC210 and IVEXC410 are quality control tested using Arkema Luperox® DDM-9, but are formulated for use with a range of catalyst systems. These include other 9% oxygen MEKP catalysts such as Syrgis NOROX® MEKP-9 and NOROX® MEKP-9H, Akzo Nobel CADOX® L-50a and CADOX® D-50. These will result in cure performance similar to Luperox® DDM-9.

Higher dimer MEKP peroxides such as Arkema Luperox® DHD-9, NOROX® MEKP-925 and NOROX® MEKP-925H, and Chemtura HP®-90 may also be used, but gel and cure times may vary. Regardless of which MEKP catalyst is used, the level should not exceed 2.5% or fall below 0.9% for proper cure. Recommended range is 0.9-2.5% with 1.5% at 77°F being ideal.

ArmorStar® IVEXC210 and IVEXC410 may also be cured with MEKP/CHP blended catalysts to further reduce exotherm in thick sections.

ArmorStar® IVEXM120 is specifically formulated for use with Syrgis NOROX® MCP-75 or similar MEKP/CHP blended peroxides.

The table below shows expected reactivity with Syrgis NOROX® MCP-75.

Test	IVEXC210	IVEXC410	IVEXM120
Gel Time [1]	27 minutes	55 minutes	120 minutes
Gel to Peak Exotherm [1]	20 minutes	30 minutes	55 minutes
Peak Exotherm [1]	310°F (138°C)	300°F (135°C)	270°F (132°C)
Weight per Gallon	9.1 lbs./gallon	9.1 lbs./gallon	9.1 lbs./gallon

[1] 100g mass, 1.5% Syrgis NOROX® MCP-75

Use of CHP blended catalysts during cool weather conditions can result in an inadequate cure at low catalyzation levels. Use of straight CHP catalyst is not recommended.

ArmorStar® IVEXC210, IVEXC410, and IVEXM120 should not be used when temperature conditions are below 60°F, as curing may be adversely affected.

CSI #: 06 00 00

CCP POLYCOR® STYPOL®

DS-44A
POLYCOR® 944W005 WHITE ISOPHTHALIC GEL COAT

DESCRIPTION:

POLYCOR® white gel coat 944W005 is a high quality coating developed for use in the fiberglass industry. This gel coat yields a quality finish, with good chemical/water resistance, gloss retention, weatherability, and resiliency. An un-tinted straight white gel coat, 944W005 is in the color match "C" category, meaning that batch-to-batch color variation can occur.

944W005 is formulated to meet the rigid requirements of transportation, boating, and sanitary applications. It has enabled customers to meet and surpass all requirements of the American National Standard for plastic bath tubs, shower receptors and shower stalls, ANSI Z124.1, .2 – 1995, Sec. 6.1.1.

POLYCOR® 944W005 is ready to use, easy to spray, sag resistant, fast curing and requires only the addition of the proper amount of an appropriate methyl ethyl ketone peroxide to cure.

TYPICAL PROPERTIES (at 77°F):

These values may or may not be manufacturing control criteria; they are listed for a reference guide only. Particular batches may not conform exactly to the numbers listed because storage conditions, temperature changes, age, testing equipment (type and procedure) can each have a significant effect on the test results. Gel coats with properties outside of these ranges can perform acceptably.

Test	Value
Viscosity, Brookfield RVF #4 Spindle @ 4 rpm	16,000 - 20,000 cps
Thixotropic Index (2/20)	5.5 - 7.5
Flash Point	82°F
Hazardous Air Pollutants	(See MSDS for amounts)
Volatile Organic Compounds	34.8 – 36.8%
Weight per Gallon	10.7- 11.0 pounds
Gel Time at 77°F with 1.8 % MEKP	10.5 - 16.5 minutes
Lay-up Time	45 - 60 minutes
Sag Resistance	Good at 20 mils
Hide	Complete at 8 - 13 mils
Color Match	CMC maximum DE of 1 unit

Refer to the MSDS for handling precautions. MSDS's will be supplied automatically with the first order for material, and are available by product code upon request from CCP's Regulatory Department, or on CCP's website at www.ccponline.com.

10/03 (Supersedes 10/00)
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COOK COMPOSITES AND POLYMERS
P.O. Box 419389, Kansas City, MO 64141-6389
(816) 391-6000 Fax: (816) 391-6215
www.ccponline.com

CSI #: 06 00 00

APPLICATION:

CCP 944 gel coats are generally formulated for both airless and conventional spray applications. Brushing or rolling is not recommended. Refer to PB-16 (Application Guide) and PB-3 (Equipment Selection) Bulletins for additional specific recommendations.

CCP recommends a gel coat delivery rate of no more than 2.5 pounds per minute with conventional air atomized equipment, and no more than 4 pounds per minute with airless equipment.

Batch mixing is recommended to achieve the best catalyst mix and cure because even with the equipment properly calibrated, potential problems can occur due to poorly atomized catalyst; surging problems (gel coat or catalyst); poor tip alignment (catalyst to gel coat mix); contamination; and poor application procedures, which will quickly negate all benefits of calibration. Equipment (and application procedures) must be monitored on a routine basis to ensure proper application and cure of the gel coat. Ask about and adhere to all equipment manufacturers' recommendations.

Avoid over-spray settling on mold surfaces by beginning spray pattern closest to the vapor/air exhaust and progressing to the opposite mold end. Maintain recommended spray distances from the mold surface. Closer spray distances or larger tips may be required in hot weather to avoid dry spray buildup.

For best overall performance properties, a wet film thickness of 18±2 mils is recommended as ideal. Films less than 12 mils may not cure properly, may be hard to patch, have more print-through, and are more susceptible to water blisters. Films above 24 mils may pre-release, trap porosity, or crack, and are more subject to weathering discoloration. If water blisters are of great concern (boat hulls), 20 to 24 mils would perform better than a thinner film, but resistance to sag, porosity and cracking could suffer. If weathering (yellowing from sunlight, decks) is of great concern, then thinner films (12 to 16 mils) would perform better, but patchability, and resistance to print-through and blistering could suffer.

Proper mold maintenance is important. Although 944W005 has excellent patching properties, keeping repair work to a minimum is always desirable. Sanding and compounding can hasten the chalking and loss of gloss of all gel coats.

CURE:

It is recommended that gel time be checked in the customer's plant because age, temperature, humidity and catalyst will produce varied gel times. All data referencing gel or cure refers specifically to ATOFINA Luperox® DDM-9 catalyst. Norac NOROX MEKP-9 and NOROX MEKP-9H, Akzo Nobel CADOX L-50a and CADOX D-50 are expected to yield similar performance. ATOFINA Luperox® DHD-9, NOROX MEKP-925 and NOROX MEKP-925H, and Crompton HP-90 may yield slightly shorter gel and cure times.

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The catalyst level should not exceed 3% or fall below 1.2% for proper cure. Recommended range is 1.2% to 3.0% with 1.8% at 77°F being ideal. Normally, the gel coat film is ready for lamination in 45 to 60 minutes. This time element is dependent on material temperature, room temperature, humidity, air movement, and catalyst concentration. Special fast-cure versions are available but must be requested. These products offer lay-up times of 30 minutes or less, depending on gel times. Fast cure products have shorter stability and should not be inventoried over 45 days.

These products (standard or fast-cure) should not be used when temperature conditions are below 60°F, as curing may be adversely affected.

CAUTION:

Isophthalic gel coats are not compatible in the liquid state with ISO/NPG gel coats or ISO/NPG resins. Spray and pumping equipment must be completely clean of these gel coats or resins before isophthalics can be used.

Do not over-mix gel coats. Over-mixing breaks down gel coat viscosity, increasing tendencies to sag, and causes styrene loss, which could contribute to porosity. Gel coats should be mixed once a day for 10 minutes. The gel coat should be mixed to the sides and bottom of the container with the least amount of turbulence possible. Air bubbling should not be used for mixing. It is not effective and only serves as a potential for water or oil contamination.

Do not add any material, other than a recommended methyl ethyl ketone peroxide, to this product without the advice of a representative of the Cook Composites and Polymers Company.

STORAGE LIMITATIONS:

Uncatalyzed, 944W005 has a usage life of 120 days from date of manufacture when stored at 73°F or below, in a closed, factory sealed, opaque container, and out of direct sunlight. The usage life is cut in half for every 20°F over 73°F. Totes of product can have even shorter usage life--66% of that for drums.

SHIPPING:

Shipment is normally made in open head 55-gallon drums.

RDS 10/03

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INSTRUCTIONS FOR USE

The product is optimised for use at 15 - 25°C. At lower temperatures the components thicken and may eventually become unworkable. To ensure accurate mixing and good workability pre-warm the resin & hardener as well as the surfaces to be bonded before use.

SURFACE PREPARATION

Before using the product ensure that surfaces to be bonded are clean, dry and dust-free. Prepare all surfaces by abrading with medium grit paper (or other suitable abrasive), remove dust then wipe with fresh acetone or Gurit Fast Epoxy Solvent (Solvent A).

Metals usually require a chemical pre-treatment to create the best bond. Please contact Gurit for a Guide to Surface Preparation and Pre-treatments.

Ensure that polyester or vinylester laminates are fully cured before bonding, then prepare as above.

When bonding epoxy laminates, the use of a suitable Peel Ply as the last stage in their manufacture is recommended, otherwise prepare as above. Trials may be required to test Peel Ply suitability.

For ferrocement, etch with 5% solution of hydrochloric acid, wash with fresh water, then dry.

For all timber, sand with abrasive paper across grain. Degrease oily timber with a fast evaporating solvent (e.g. Gurit Fast Epoxy Solvent). For resinous or gummy timber, etch with 2% caustic soda solution, wash off with fresh water and dry.

MIXING & HANDLING

Spabond 345 resin should be combined with Spabond 345 fast (purple or black), Spabond 345 slow (red) or extra slow (blue) hardener in the following mix ratio:

Spabond 345 resin		Spabond 345 hardener
100	:	48 (by weight)
100	:	50 (by volume)

Mix thoroughly for at least one minute, paying particular attention to the sides and bottom of the mixing vessel, to ensure no streaks remain. Once fully mixed the adhesive should have a uniform brown, black, orange or pale green colour, depending on the hardener used. Use from pot quickly to maximise resin working life.

CARTRIDGE USE

If dispensing product from twin cartridges with a mixing / dispensing head , please discard the first mix head length of resin and hardener components, prior to applying adhesive to the job, in order to ensure thorough mixing of the system. We recommend the use of a new mix head for each application, particularly where the time between each application approaches the pot life.

HEALTH AND SAFETY

The following points must be considered:

1. Skin contact must be avoided by wearing protective gloves. Gurit recommends the use of disposable nitrile gloves for most applications. The use of barrier creams is not recommended, but to preserve skin condition a moisturising cream should be used after washing.

2. Overalls or other protective clothing should be worn when mixing, laminating or sanding. Contaminated work clothes should be thoroughly cleaned before re-use.

3. Eye protection should be worn if there is a risk of resin, hardener, solvent or dust entering the eyes. If this occurs flush the eye with water for 15 minutes, holding the eyelid open, and seek medical attention.

4. Ensure adequate ventilation in work areas. Respiratory protection should be worn if there is insufficient ventilation. Solvent vapours should not be inhaled as they can cause dizziness, headaches, loss of consciousness and can have long term health effects.

5. If the skin becomes contaminated, then the area must be immediately cleansed. The use of resin-removing cleansers is recommended. To finish, wash with soap and warm water. The use of solvents on the skin to remove resins etc must be avoided.

Washing should be part of routine practice:

- before eating or drinking
- before smoking
- before using the lavatory
- after finishing work

6. The inhalation of sanding dust should be avoided and if it settles on the skin then it should be washed off. After more extensive sanding operations a shower/bath and hair wash is advised.

Gurit produces a separate full Safety Data Sheet for all hazardous products. Please ensure that you have the correct SDS to hand for the materials you are using before commencing work. A more detailed guide for the safe use of Gurit resin systems is also available from Gurit, and can be found at www.gurit.com.

APPLICABLE RISK & SAFETY PHRASES

Please refer to product SDS for up to date information specific to this product.

CSI #: 06 00 00

Product description	Certification
Sikabond 345 thixotropic, toughened epoxy adhesive	Lloyds
Two component epoxy resin system with Fast, Slow and Extra Slow hardeners	Germanischer Lloyd

COMPONENT PROPERTIES

	Resin	Hardener		
		Fast	Slow	Extra Slow
Mix Ratio (by weight)	100	48	48	48
Mix Ratio (by volume)	100	50	50	50
Viscosity @ 15°C (cP)	125,000	45,000	125,000	12,000
Viscosity @ 20°C (cP)	105,000	30,000	85,000	7500
Viscosity @ 25°C (cP)	95,000	20,000	50,000	5,000
Viscosity @ 30°C (cP)	70,000	15,000	35,000	4,000
Shelf Life (months)	12	12	12	12
Colour	yellow	purple/black	red	blue
Mixed Colour	-	brown	pink	green
Component Dens. (g/cm³)	1.17	1.00	1.092	1.012
Mixed Density (g/cm³)	-	1.14	1.165	1.116

WORKING PROPERTIES

	Resin/Fast Hardener				Resin/Slow Hardener				Resin/Extra Slow Hardener			
	15°C	20°C	25°C	30°C	15°C	20°C	25°C	30°C	15°C	20°C	25°C	30°C
Initial Mixed Viscosity (cP)	52000	42,000	34,000	27000	106,000	82000	75,000	64,000	74,000	44,000	36,000	24000
†*Gel Time - 150g mix in water (hrs:mins)	0:39	0:28	0:20	0:15	5:15	3:50	2:48	2:00	8:27	6:00	4:16	2:55
†Pot Life - 500g mix in air (hrs:mins)	0:20	0:17	0:13	0:10	1:19	1:12	1:05	1:01	3:06	2:41	2:16	1:57
†Clamp Time (hrs:mins)	3:50	5:30	3:55	2:48	16:32	12:10	9:52	8:24	25:04	19:25	14:19	10:42
Sag Resistance (mm)	17	16	15	14	30	29	26	24	30	28	26	24

	Room Temp. Cure (56 days @ 21°C)			Cured 24 hours @ 21°C+16 hours @ 50°C			Cured 8 hrs @ 70°C		
	Fast	Slow	Extra Slow	Fast	Slow	Extra Slow	Fast	Slow	Extra Slow
Tg1 - DMTA (°C)	57	55	55	68	74	71	78	84	79
Tg Ult - DMTA (°C)	92	107	104	92	107	104	92	107	104
Tg2 - DSC (°C)	55	59	59	68	69	81	78	81	77
Cured Density (g/cm³)	-	-	-	-	-	-	1.16	1.17	1.13
Linear Shrinkage (%)	-	-	-	-	-	-	1.15	1.22	1.06
Cleavage Strength (kN)	12	12	11	12	14	13	13	15	11
Shear Strength on Steel (MPa)	37	38	29	37	39	37	42	40	36
Shear Strength Wet Retention (%)	95	93	115	94	94	88	82	-	-

Notes: *Due to the thixotropic and filled nature of this system, these values are only indicative.
All figures quoted are indicative of the properties of the product concerned. Some batch to batch variation may occur.
† All times are measured from when resin and hardener are first mixed together.

CSI #: 06 00 00

TOTALBOAT
JAMESTOWN DISTRIBUTORS

TotalBoat Bond

High quality, elastic adhesive and joint filler

Product data

Description:
For general assembly in industry and craft. 1C moisture curing
Base:
MS-Polymer
Colour:
White, grey, black
Density:
1.41 g/cm³ at 20 °C
Solids content:
100%
Stability:
Stable
Shore A Hardness:
Approx. 57 at 20 °C
Shrinkage:
Maximum 4%
Storage:
Cool and well sealed 12 months
Packaging:
290 ml cartridges, white, black or grey
aluminium sachets, white

Application data

Preparation:
Bonding surfaces must be dry, free from any dust, grease, oil, rust and any other dirt. Remove grease with an appropriate cleaning agent, e.g. BKP Solvent or Ebo clean.
Coatability:
With acrylic emulsion paints and baking varnish (subject to suitability tests)
Application temperature:
5 - 40 °C (component temperature)
Skin-forming time:
Approx. 10-15 minutes
Curing time:
Dependent on depth of joint, temperature and level of moisture
Complete hardening:
1-2 mm per day, measured on a track under normal ambient conditions of 23 °C / 55%
Clean-up:
Use BKP Solvent or ethanol for non-hardened adhesive, otherwise clean mechanically
Application quantity:
Fully adhered approx. 250-500 g/m²
Beads approx. 20 g/m

Usage

Universal adhesive and joint filler suitable for metals, synthetics, wood and building constructions. For metal constructions and sheet-metal work, car bodies, vehicle and ship building, air-conditioning and ventilation systems, general metal work application, corner jointing of aluminium window frames, glazing with wood, metal and synthetic frames, fascia elements, plumbing connections, mirror gluing, industrial assembly.

Pre-testing of "hard to glue" materials is essential!

Not suitable for use with: bituminous surfaces, polyolefins and Teflon.

Application

Use a hand or pneumatic caulking gun. Cut nozzle to suit joint width. Smooth over with a spatula which, when necessary, can be moistened in a soapsuds solution.

Yield

bead Ø in mm	290 ml cartridge Running meters	600 ml Alu-sachet Running meters
4 mm	Approx. 20 m	Approx. 40 m
8 mm	Approx. 10 m	Approx. 20 m

Working safety:
Use of protective gloves and safety glasses is recommended.

Please follow the instructions on the safety specification sheet.

Requirements

Shear strength:
3.3 Mpa according to DIN 53504
E-modulus:
1.2 Mpa according to DIN 53504
Lap shear strength:
2 MPa on aluminium (EN 1465)
Elongation at break:
400% according to DIN 53504
Max. admissible elongation: 25 %
Water resistance:
Good
Temperature resistance:
-40 up to +100 °C
Short-term thermal load:
Up to 180 °C (e.g. baking varnish)

Contact

T +41 41 469 92 75
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verkauf@collano.com

Guarantee
We guarantee the consistency and faultless quality of this product, manufactured in accordance with ISO quality standards, which has been developed on the basis of our longstanding experience with the recommended applications under the specified conditions. Material, processing, and application conditions may significantly influence product properties. Pre-application tests by the user are therefore essential. For non-specified applications or deviations in application conditions, we recommend that Collano's technical support service be consulted first. Collano's general sales and delivery terms and conditions shall apply.

CSI #: 06 16 53

AdvanTech FLOORING

HUBER ENGINEERED WOODS

The FLAT OUT BEST™ for a quiet, stiff floor.

ADVANTECH® FLOORING

MANUFACTURER

Huber Engineered Woods LLC
10925 David Taylor Drive, Suite 300, Charlotte, NC 28262
800.933.9220 • Technical Service: 800.933.9220 x2716
ZIPSystem.com • HuberArchitectLibrary.com

BASIC USE AND APPLICATIONS

AdvanTech® flooring is a high-performance engineered panel designed to replace plywood and commodity oriented strand board (OSB) floor sheathing. Fabricated in highly-controlled production facilities utilizing advanced resin technology, AdvanTech flooring exhibits higher strength, greater stability and enhanced moisture resistance. AdvanTech flooring far exceeds the code minimums representing other subfloor products, providing owners with a more stable floor and builders with a more reliable product that retains its qualities under environmental exposure during construction.

AdvanTech flooring is nailed or screwed to floor framing members; long edges are precision tongue-and-groove, and the panel surface is fully sanded. Using a polyurethane or solvent based subfloor adhesive is recommended for optimal performance. Panels are available in 5 performance categories for a wide range of conditions.

AVAILABLE SIZES AND RATINGS

AdvanTech flooring panels are available in nominal 4 by 8 foot* sheets in the following DOC PS 2 Sheathing span ratings and performance categories. All panels are Exposure 1 rated.

- 20 oc, 19/32" Performance Category
- 24 oc, 23/32" Performance Category – Structural 1
- 32 oc, 7/8" Performance Category
- 32 oc, 1" Performance Category
- 48 oc, 1-1/8" Performance Category

Third party independent compliance testing of AdvanTech flooring performed by Timberco, Inc. (TECO).

*Are face dimensions are approximately 47-1/2" x 95 7/8"

AdvanTech Physical Properties** Vs. OSB/Plywood		
Bending Stiffness, EI (lbf-in/ft)	AdvanTech: 383,8000	OSB Ply: 300k/330k
Bending Strength, FbS (lbf-in/ft)	AdvanTech: 1,250	OSB Ply: 770
** For 23/32 in thick panel, primary strength axis. For design capacities, section properties, and equivalent specific gravity values of AdvanTech, refer to ICC-ES ESR-1783. For OSB and Plywood values, refer to 2012 APA Panel Design Specification.		

AdvanTech Sheathing Benefits	
Superior Design Strength	Provides a quality, stiff floor
Superior Design Stiffness	Outperforms plywood and commodity OSB sheathing to minimize floor bounce and squeaks
Superior Moisture Resistance	Minimizes swelling, warping, cupping, and delamination
Higher Density	Greater nail and screw holding power

GENERAL SUSTAINABLE DESIGN CONTRIBUTIONS

- Low-Emitting Material: No added urea formaldehyde or VOC constituents
- Sustainable Forestry Initiative Certified Wood: Harvested, transported, manufactured, and distributed utilizing sustainable practices
- Renewable Forest Resources: Composed of primarily young growth bio-based resources
- Regional Materials: Made in the United States at one of our four regional manufacturing facilities

POTENTIAL LEED CREDIT CONTRIBUTION

- Credit IEQ 4.4 Low-Emitting Materials, Composite Wood and Agrifiber: AdvanTech contains no added urea formaldehyde
- Credit MR 5.1 or 5.2 Regional Materials: Materials harvested, processed, and manufactured within 500 miles of project site.
- Credit MR 2.2 Environmentally Preferable Products – Local Production (LEED for Homes)

CSI #: 06 16 53

SUBSTRATE

Before beginning installation, verify framing is properly spaced and aligned to support panel edges. Install AdvanTech sheathing in accordance with:

- AdvanTech sheathing installation instructions
- ICC-ES ESR 1785
- Requirements of authorities having jurisdictions

Tongue and groove edges are self-spacing; panel ends should be spaced 1/8" (3 mm) apart. Space panel joints at expansions joints at spacing equal to spacing of structural supports.

INSTALLATION METHODS

AdvanTech sheathing can be installed over wood or cold-formed metal floor framing. Install over wood using nail or screw fasteners, and over metal with screw fasteners. Subfloor adhesive is recommended for all applications.

Fasteners: Install fasteners approved by applicable building code. Fasteners should penetrate wood members minimum 1 inch (25.4 mm). Install fasteners 3/8 inch (9.5 mm) to 1/2" (12.7 mm) from panel edges. Space fasteners 6-inches (152 mm) on-center on supported panel ends and 12-inches (305mm) on-center at intermediate support location. AdvanTech flooring panels have a printed fastening guide for 16-inch (406 mm), 19.2-inch (488 mm), and 24-inch (610 mm) on-center fastener locations on the panel surface.

Adhesives: Polyurethane or solvent-based subfloor adhesives conforming to APA AFG-01 or ASTM D3498.

For projects requiring low-VOC adhesives, consult adhesive manufacturer for compliant products.

Apply a single 1/4" inch (6 mm) bead on floor framing, and double bead on framing members supporting ends of two panels.

FINISHED FLOORING APPLICATIONS

Field-applied sealers or water repellents are not required and not recommended for use of AdvanTech flooring.

- Typical Residential Carpet and Pad: May be installed directly over AdvanTech flooring
- Commercial Carpet, VCT, Sheet Vinyl: Minimum 1/4 inch (6 mm) thick plywood underlayment per flooring manufacturer recommendations
- Hardwood: Apply #15 felt or equivalent per flooring manufacturer recommendations
- Ceramic Tile: Apply underlayment as required by ANSI A108. Install tile and underlayment in accordance with TCNA installation methods
- Gypsum Concrete Underlayment: Apply directly over primed AdvanTech flooring following underlayment manufacturer's instructions

STORAGE AND HANDLING

Store and handle products according to manufacturer's written recommendations. Support panel bundles off the ground. Cover stored panels with weatherproof protective material; allow sides of protective material to remain loose to assure adequate air circulation. In high moisture conditions, cut bundle banding to prevent edge damage to the panels.

AVAILABILITY

Huber Engineered Wood's AdvanTech Sheathing panels are manufactured at multiple locations in the U.S. and are available through distributors nationwide. Visit advantechperforms.com or contact Huber Engineered Woods for a retailer near you.

WARRANTY

AdvanTech is guaranteed not to delaminate nor require sanding, based on the National Wood Flooring Association's recommendations, for 500 days after purchase in addition to a Limited Lifetime warranty against manufacturing defects. See the AdvanTech warranty on advantechperforms.com for limitations and restrictions.

NOTES AND LIMITATIONS

When a building's uninterrupted flooring length or width exceeds 80- feet, designers should incorporate expansion joints to accommodate the cumulative effect of incremental panel expansion. This is an industry recommendation and is not unique to AdvanTech.

- Do not paint with water-based coatings such as latex paints
- Do not use water-sealers
- Do not use in permanent exterior applications
- Do not use salt-based ice melts

TECHNICAL SERVICE

Detailed information including specifications, product literature, test reports, installation instructions, and special applications is available through Huber Engineered Woods. Please visit advantechperforms.com or call 800.933.9220 Ext 2716 to speak to a technical representative.

AVAILABLE RESOURCES

Section 06 16 00 SHEATHING guide specification for AdvanTech flooring and sheathing products in CSI 3-part format is available at HuberWood.com or HuberArchitectLibrary.com.

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CSI #: 06 16 53

ZIPsystem™ SHEATHING & TAPE

HUBER ENGINEERED WOODS

ZIP SYSTEM® SHEATHING

MANUFACTURER

Huber Engineered Woods LLC
10925 David Taylor Drive, Suite 300, Charlotte, NC 28262
800.933.9220 • Technical Service: 800.933.9220 x2716
ZIPSystem.com • HuberArchitectLibrary.com

BASIC USE AND APPLICATIONS

ZIP System Roof and Wall Sheathing panels are oriented strand board (OSB) structural panels with built-in protective overlays that eliminates the need for building wrap or roofing felt. Install the panels, tape the seams with Huber's Zip System tape, and the building is rough dried-in. A wide range of roof coverings and wall claddings can be installed directly over ZIP System Sheathing.

When used on a wall, ZIP System Sheathing functions as a combination wall sheathing, code-recognized water-resistive, and air barrier. The sheathing panel seams are sealed with ZIP System tape, protecting the wall from water intrusion.

When Huber's ZIP System Sheathing is utilized for roof applications, felt underlayment are not required. In wall and roof coverings system requiring multiple layers of water-resistive barriers or underlayment, ZIP System is intended to replace on the first layer.

ZIP System Sheathing uses a tough, phenolic resign-impregnated overlay to provide permanent weather resistance, in contact with a proprietary seam tape that has been extensively tested for long-term adhesion and flexibility. This combination meets performance requirements for Grad D weather-resistive barriers in accordance with ICC Acceptance Criteria AC38.

Zip System Sheathing may be used for roofs and walls in Type V construction, in Type III construction as roof sheathing only, and other construction permitted under the International Residential Code.

AVAILABLE SIZES

ZIP System Roof and Wall Sheathing panels are available in 4' x 8' sheets with self-spacing edge profiles and tongue and groove edge profile (5/8 only). ZIP System panels are Exposure 1 rated and are available in the following span ratings and performance categories.

- 24/16, Rated Sheathing, 7/16 PERF CAT (4' x 8')
- 24/16, Structural 1, 7/16 PERF CAT (4' x 9' and 4' x 10' only)
- 32/16, Structural 1, 1/2 PERF CAT
- 40/20, Structural 1, 5/8 PERF CAT

Longer length panels are available for wall applications. Third party independent testing for ZIP System Roof and Wall Sheathing by Timberco, Inc. (TECO).

ZIP System Benefits	
Superior Moisture Resistance	Continuous vapor permeable moisture barrier that blocks out liquid water but still allows walls to dry out
Ease of Installation	No more delays because of felt or building wraps blowing off
Energy Efficient	Code-recognized built in weather and air barrier

LIMITATIONS

When used as a roof sheathing, ZIP System sheathing is limited to roofs with slopes of 2:12 (16.67 percent) or greater. Felt underlayment is not required on the roof. In roof covering systems requiring multiple layers of underlayment, ZIP System is intended to replace only the first layer. In wall covering systems requiring multiple layers of water-resistive barriers, ZIP System is intended to replace only the first layer.

ZIP System Sheathing should not be used with adhesively-attached EFIS, but can be used with mechanically attached EIFS. Avoid exposing ZIP System Sheathing for more than 180 days.

SUSTAINABLE DESIGN CONTRIBUTIONS

- Low-Emitting Material: No added urea formaldehyde
- Sustainable Forestry Initiative Certified Wood: Harvested, transported, manufactured, and distributed utilizing sustainable practices
- Renewable Forest Resources: Composed of primarily young growth bio-based resources
- Regional Materials: Made in the United Sates at one of our 4 regional manufacturing facilities: Commerce, GA; Broken Bow, OK; Crystal Hill, VA; and Easton, ME

CSI #: 06 16 53

POTENTIAL LEED CREDIT CONTRIBUTIONS

- Credit IEQ 4.4 Low-Emitting Materials, Composite Wood and Agrifiber: AdvanTech contains no added urea formaldehyde
- Credit MR 5.1 or 5.2 Regional Materials: Materials harvested, processed, and manufactured within 500 miles of project site.
- Credit MR 2.2 Environmentally Preferable Products – Local Production (LEED for Homes)
- EA 3 Air Infiltration – Meet air leakage requirements

SUBSTRATE

Before beginning installation, verify wood wall framing is properly spaced and aligned to continuously support panel edges.

PANEL INSTALLATION

Install ZIP System R-Sheathing in accordance with:

- ZIP System Sheathing Installation Manual
- ICC-ES ESR-1473
- ICC-ES ESR-1474
- Requirements of authorizes having jurisdiction

When used as roof sheathing, install panels with moisture barrier surface facing out, with long edge perpendicular to framing members, and with short edges fully supported. Stagger short edge seams. Long edges are self-spacing; 4-foot panel edges should be space manually approximately 1/8-inch (3 mm) apart.

When used as wall sheathing, install panels positioned with the water-resistive barrier facing out. The panels may be installed with the long side of the panel oriented either horizontally or vertically to the framing members. Walls that are designed to resist lateral shear forces and sheathed with wood structural panels typically require solid framing or blocking behind all panel edges. Long edge are self-spacing; 4-foot panel edges should be manually spaced approximately 1/8-in (3 mm) apart.

Fasteners:
Install fasteners approved by applicable building code. Install fasteners 3/8-inch (9.5 mm) form panel edges. Space fasteners 6-inches (152 mm) on centers on supported panel ends and 12-inches (305 mm) on center at intermediate supports unless otherwise specified. ZIP System panels have a printed fastening guide for 16-inch (406 mm) and 24-inch (610 mm) on center fasteners locations.

Tape Installation:
Install ZIP System tape in accordance with manufacturer's written instructions as seams, openings, and penetrations. Install windows and window flashing in accordance with window manufacturer's written instructions. Details of installation recommendations are available in AutoCAD and PDF formats at ZIPSystem.com or HuberArchitectLibrary.com.

STORAGE AND HANDLING

Store and handle products according to manufacturer's written recommendations. Support panel bundles off the ground. Cover stored panels with weatherproof protective material; allow sides of protective material to remain loose to assure adequate air circulation. In high-moisture conditions, cut bundle banding to prevent edge damage to panels. Factory applied packaging is intended only for protection during transit.

AVAILABILITY

Huber Engineered Wood's ZIP System Roof and Wall Sheathing panels are manufactured at multiple locations in the U.S. They are available through distributors nationwide. Visit ZIPSystem.com or contact Huber Engineered Woods for a retailer near you.

WARRANTY

ZIP System Roof and Wall Sheathing is furnished with a 30-year system warranty as well as a 30-year warranty against manufacturing defects. Visit ZIPSystem.com for limitations and restrictions.

NOTES AND LIMITATIONS

- Do not use on roof with slopes less than 2:12
- Do not install ZIP System tape in temperatures less than 20 F
- Roof panels edge clips are only required with 7/16 inch thick ZIP System sheathing on supports spaced greater than 16-inches oc. Panel edge clips approved to be used with ZIP System Sheathing are: Simpson Strong-Tie®, PSCA, PSCL and Tamlyn™ PCS models

TECHNICAL SERVICE

Detailed information including specifications, product literature, test reports, installation instructions, and special applications is available through Huber Engineered Woods. Please visit ZIPSystem.com or call 800.933.9220 EXT 2716 to speak to a technical representative.

AVAILABLE RESOURCES

Section 06 16 13 SHEATHING guide specifications ZIP System Roof and Wall Sheathing products in CSI 3-part format is available in MasterSpec®, ARCAT.com, BSD SpecLink®, at ZIPSystem.com, and HuberArchitectLibrary.com.

ZIP System R Sheathing Performance Properties		
Exposure Durability Classification	DOC PS 2	Exposure 1
Panel Grade	DOC PS 2	Structural 1 (except 4' x 8' 7/16 PER CAT)
Moisture Barrier	AC38	Grade D WRB
Water Penetration	ASTM E331	Passed
Vapor Transmission	ASTM E96-B (panel overlay)	12-16 perms
Air Barrier Assembly	ASTM E2357	0.037 L/(s*m2)
Air Barrier Material	ASTM E2178	0.0016 L/(s*m2) @300 Pa
Wind Driven Rain	TAS 100 (at 100 mph)	Passed

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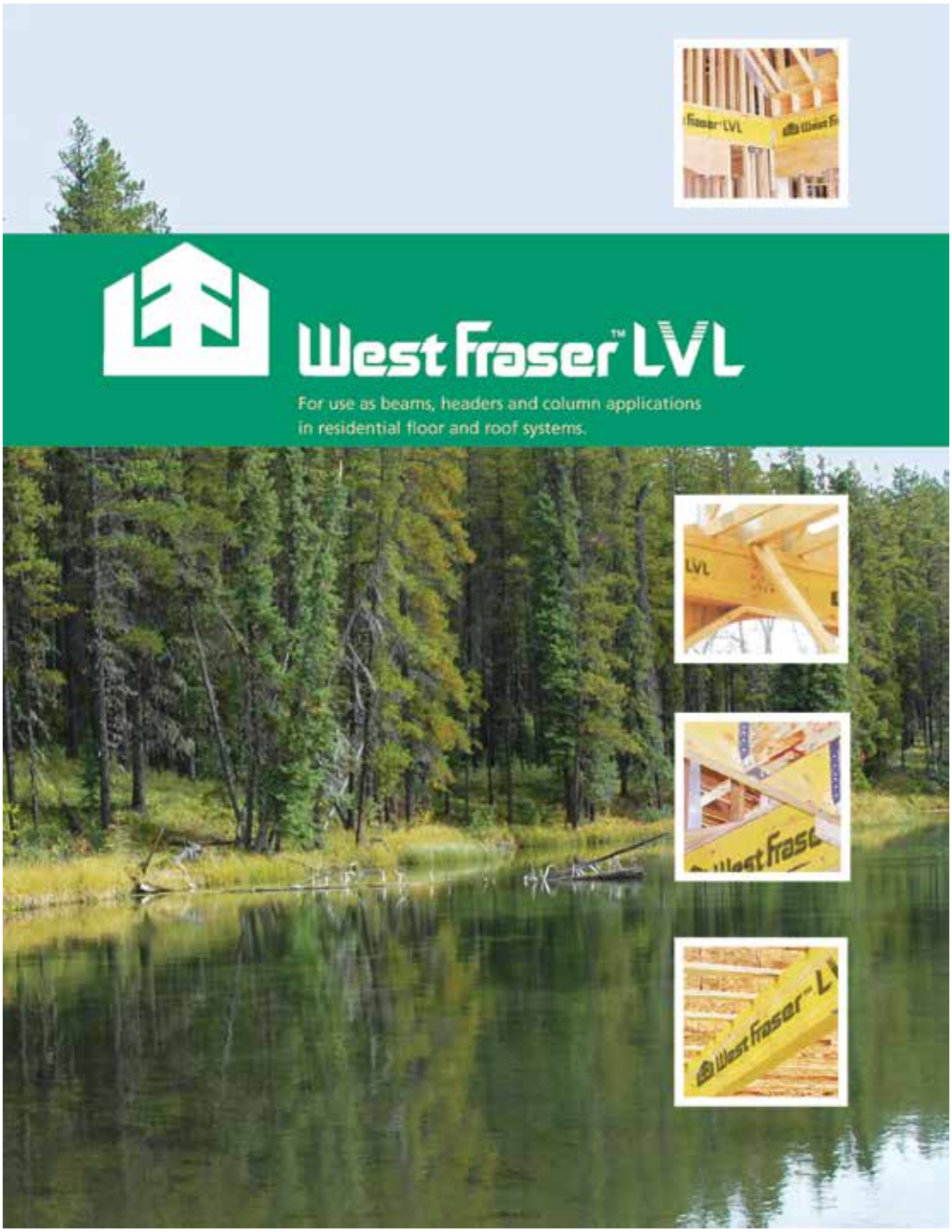

West Fraser™ LVL
For use as beams, headers and column applications
in residential floor and roof systems.
LVL

CSI #: 06 17 13

West Fraser™ LVL

For use as beams, headers and column applications in residential floor and roof systems.

You've probably been building with traditional sawn lumber beams and headers for as long as you've been building. Now through advances in technology and design, there is a better choice — West Fraser™ LVL headers, beams and columns. They are simply a better alternative than traditional sawn lumber pieces.

Work with a stronger, stiffer, more consistent and more predictable building material. Compared with similar sized sections, our LVL headers and beams can support heavier loads and allows greater spans than conventional lumber.

PRODUCT LINE

With the use of ultrasonic grading technology, West Fraser wisely utilizes the inherent attributes of its wood resources to manufacture products that effectively satisfy the needs of the market while at the same time, contribute to a greener, more sustainable environment. In addition, these attributes also allow for superior fiber bending strength and workability.

West Fraser™ LVL 3100F_b-2.0E
- 1¾" and 3½" thick in I-Joist and lumber compatible depths to 24" deep

West Fraser™ LVL 3000F_b-1.9E
- 1¾" thick in I-Joist and lumber compatible depths to 24" deep

West Fraser™ LVL 3000F_b-1.8E
- 1½", 1¾", and 3½" thick in I-Joist and lumber compatible depths to 18". (1¾" and 3½" to 24"), 3½" thick in columns

West Fraser™ LVL 2750F_b-1.7E
- 1¾" and 3½" thick in I-Joist and lumber compatible depths to 24" deep

All products have face, back and edges sealed for improved performance under normal construction exposure

CODE EVALUATION REPORT NUMBERS:

CANADA: CCMC 12904-R

UNITED STATES: ICC ESR-1618, CITY OF LOS ANGELES – RR 25570
for seismic design, see California Building Code.

West Fraser LVL

(250) 991-5350

EMAIL: LVL@WESTFRASER.COM

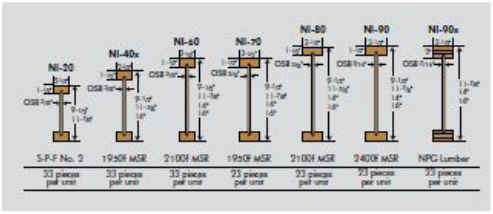
WWW.WESTFRASER.COM/PRODUCTS/LVL-LAMINATED-VENEER-LUMBER

CSI #: 06 17 33

NORDIC JOIST™

Chantiers Chibougamau Ltd. harvests its own trees, which enables Nordic products to adhere to strict quality control procedures throughout the manufacturing process. Every phase of the operation, from forest to the finished product, reflects our commitment to quality.

Nordic Engineered Wood I-joists use only finger-jointed black spruce lumber in their flanges, ensuring consistent quality, superior strength, and longer span carrying capacity.



For further technical information, please refer to the *Nordic Joist Construction Guide* or contact your local distributor. Consult the *Installation Guide for Residential Floors* for proper procedures.

MAXIMUM FLOOR SPANS

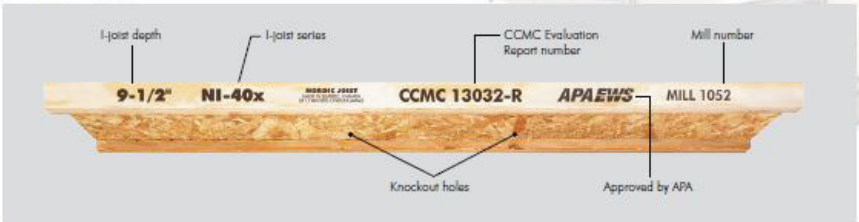
LIVE LOAD = 40 psf, DEAD LOAD = 15 psf

JOIST DEPTH	JOIST SERIES	SIMPLE SPANS ON CENTRE SPACING				MULTIPLE SPANS ON CENTRE SPACING			
		12"	16"	19.2	24"	12"	16"	19.2"	24"
9-1/2"	NI-20	15'-1"	14'-2"	13'-9"	13'-5"	16'-3"	15'-4"	14'-10"	14'-7"
	NI-40x	16'-1"	15'-2"	14'-8"	14'-9"	17'-5"	16'-5"	15'-10"	15'-5"
	NI-60	16'-3"	15'-4"	14'-10"	14'-11"	17'-7"	16'-7"	16'-0"	16'-1"
	NI-70	17'-1"	16'-1"	15'-6"	15'-7"	18'-7"	17'-4"	16'-9"	16'-10"
	NI-80	17'-3"	16'-3"	15'-8"	15'-9"	18'-10"	17'-6"	16'-11"	17'-0"
11-7/8"	NI-20	16'-11"	16'-0"	15'-5"	15'-6"	18'-4"	17'-3"	16'-8"	16'-7"
	NI-40x	18'-1"	17'-0"	16'-5"	16'-6"	20'-0"	18'-6"	17'-9"	17'-7"
	NI-60	18'-4"	17'-3"	16'-7"	16'-9"	20'-3"	18'-9"	18'-0"	18'-1"
	NI-70	19'-6"	18'-0"	17'-4"	17'-5"	21'-6"	19'-11"	19'-0"	19'-1"
	NI-80	19'-9"	18'-3"	17'-6"	17'-7"	21'-9"	20'-2"	19'-5"	19'-4"
	NI-90	20'-2"	18'-7"	17'-10"	17'-11"	22'-3"	20'-7"	19'-8"	19'-9"
	NI-90x	20'-4"	18'-9"	17'-11"	18'-0"	22'-5"	20'-9"	19'-10"	19'-11"
14"	NI-40x	20'-1"	18'-7"	17'-10"	17'-11"	22'-2"	20'-6"	19'-8"	19'-4"
	NI-60	20'-5"	18'-11"	18'-1"	18'-2"	22'-7"	20'-11"	20'-0"	20'-1"
	NI-70	21'-7"	20'-0"	19'-1"	19'-2"	23'-10"	22'-1"	21'-1"	21'-2"
	NI-80	21'-11"	20'-3"	19'-4"	19'-5"	24'-3"	22'-5"	21'-5"	21'-6"
	NI-90	22'-5"	20'-8"	19'-9"	19'-10"	24'-9"	22'-10"	21'-10"	21'-10"
	NI-90x	22'-7"	20'-11"	19'-11"	20'-0"	25'-0"	23'-1"	22'-0"	22'-2"
16"	NI-60	22'-3"	20'-8"	19'-9"	19'-10"	24'-7"	22'-9"	21'-9"	21'-10"
	NI-70	23'-6"	21'-9"	20'-9"	20'-10"	26'-0"	24'-0"	22'-11"	23'-0"
	NI-80	23'-11"	22'-1"	21'-1"	21'-2"	26'-5"	24'-5"	23'-3"	23'-4"
	NI-90	24'-5"	22'-6"	21'-5"	21'-6"	26'-11"	24'-10"	23'-9"	23'-9"
	NI-90x	24'-8"	22'-9"	21'-9"	21'-10"	27'-3"	25'-2"	24'-0"	24'-1"

NOTES:

1. Maximum clear span applicable to residential floor construction with a design live load of 40 psf and dead load of 15 psf. The ultimate limit states are based on the factored loads of 1.50L + 1.25D. The serviceability limit states include the consideration for floor vibration, a live load deflection limit of L/480 and a total load deflection limit of L/240. For multiple-span applications, the end spans shall be 40% or more of the adjacent span.
2. Spans are based on a composite floor with glued-nailed oriented strand board (OSB) sheathing with a minimum thickness of 5/8 inch for a joist spacing of 19.2 inches or less, or 3/4 inch for joist spacing of 24 inches. Adhesive shall meet the requirements given in CGBS-71.26 Standard. No concrete topping or bridging element was assumed.
3. Minimum bearing length shall be 1-3/4 inches for the end bearings, and 3-1/2 inches for the intermediate bearings.
4. Bearing stiffeners are not required when I-joists are used with the spans and spacing given in these tables, except as required for hangers.
5. This span chart is based on uniform loads. For applications with other than uniformly distributed loads, an engineering analysis may be required based on the use of the design properties.

NORDIC JOIST™



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MAXIMUM ROOF SPANS
SNOW LOAD = 40 psf, DEAD LOAD = 15 psf

JOIST DEPTH	JOIST SERIES	SLOPE OF 1/4:12 TO 4:12			SLOPE OF >4:12 TO 8:12			SLOPE OF >8:12 TO 12:12		
		ON CENTRE SPACING			ON CENTRE SPACING			ON CENTRE SPACING		
		12"	16"	24"	12"	16"	24"	12"	16"	24"
9-1/2"	NI-20	17'-4"	15'-8"	13'-7"	16'-7"	15'-0"	13'-0"	15'-5"	14'-0"	12'-1"
	NI-40x	19'-10"	17'-11"	15'-4"	19'-0"	17'-2"	14'-11"	17'-8"	16'-0"	13'-11"
	NI-60	20'-2"	18'-3"	15'-10"	19'-5"	17'-6"	15'-2"	18'-0"	16'-4"	14'-2"
	NI-70	22'-2"	20'-0"	17'-4"	21'-3"	19'-2"	16'-8"	19'-9"	17'-11"	15'-6"
	NI-80	22'-7"	20'-5"	17'-8"	21'-8"	19'-7"	17'-0"	20'-2"	18'-3"	15'-10"
11-7/8"	NI-20	20'-11"	18'-11"	16'-5"	20'-0"	18'-2"	15'-9"	18'-8"	16'-11"	14'-8"
	NI-40x	23'-9"	21'-5"	17'-6"	22'-9"	20'-7"	17'-2"	21'-2"	19'-2"	16'-8"
	NI-60	24'-3"	21'-11"	19'-0"	23'-3"	21'-1"	18'-3"	21'-8"	19'-7"	17'-0"
	NI-70	26'-5"	23'-11"	20'-9"	25'-5"	23'-0"	19'-11"	23'-8"	21'-5"	18'-7"
	NI-80	27'-0"	24'-5"	21'-1"	25'-11"	23'-5"	20'-4"	24'-1"	21'-10"	18'-11"
	NI-90	27'-10"	25'-2"	21'-9"	26'-9"	24'-2"	20'-11"	24'-10"	22'-6"	19'-6"
	NI-90x	28'-1"	25'-4"	21'-11"	26'-11"	24'-4"	21'-1"	25'-1"	22'-8"	19'-8"
14"	NI-40x	26'-11"	23'-7"	19'-2"	25'-10"	23'-2"	18'-10"	24'-1"	21'-9"	18'-5"
	NI-60	27'-8"	25'-0"	21'-8"	26'-6"	24'-0"	20'-10"	24'-8"	22'-4"	19'-5"
	NI-70	30'-0"	27'-2"	23'-6"	28'-10"	26'-1"	22'-7"	26'-10"	24'-3"	21'-1"
	NI-80	30'-8"	27'-9"	24'-1"	29'-6"	26'-8"	23'-2"	27'-5"	24'-10"	21'-7"
	NI-90	31'-7"	28'-7"	24'-9"	30'-4"	27'-6"	23'-10"	28'-3"	25'-7"	22'-2"
	NI-90x	32'-0"	28'-11"	25'-1"	30'-9"	27'-10"	24'-1"	28'-7"	25'-11"	22'-6"
16"	NI-60	30'-9"	27'-10"	23'-9"	29'-6"	26'-8"	23'-2"	27'-5"	24'-10"	21'-7"
	NI-70	33'-3"	30'-1"	25'-9"	31'-11"	28'-11"	25'-1"	29'-9"	26'-11"	23'-4"
	NI-80	34'-1"	30'-10"	26'-9"	32'-8"	29'-7"	25'-8"	30'-5"	27'-7"	23'-11"
	NI-90	35'-0"	31'-8"	27'-5"	33'-7"	30'-5"	26'-5"	31'-4"	28'-4"	24'-7"
	NI-90x	35'-7"	32'-2"	27'-11"	34'-2"	30'-11"	26'-10"	31'-10"	28'-9"	25'-0"

MAXIMUM ROOF SPANS
SNOW LOAD = 50 psf, DEAD LOAD = 15 psf

JOIST DEPTH	JOIST SERIES	SLOPE OF 1/4:12 TO 4:12			SLOPE OF >4:12 TO 8:12			SLOPE OF >8:12 TO 12:12		
		ON CENTRE SPACING			ON CENTRE SPACING			ON CENTRE SPACING		
		12"	16"	24"	12"	16"	24"	12"	16"	24"
9-1/2"	NI-20	16'-0"	14'-6"	12'-6"	15'-4"	13'-11"	12'-0"	14'-7"	13'-2"	11'-5"
	NI-40x	18'-4"	16'-7"	14'-0"	17'-7"	15'-11"	13'-9"	16'-8"	15'-1"	13'-1"
	NI-60	18'-8"	16'-11"	14'-7"	17'-11"	16'-3"	14'-0"	17'-0"	15'-5"	13'-4"
	NI-70	20'-5"	18'-6"	16'-0"	19'-8"	17'-9"	15'-4"	18'-8"	16'-11"	14'-8"
	NI-80	20'-11"	18'-10"	16'-4"	20'-1"	18'-2"	15'-8"	19'-1"	17'-3"	14'-11"
11-7/8"	NI-20	19'-4"	17'-6"	15'-1"	18'-7"	16'-9"	14'-7"	17'-7"	15'-11"	13'-10"
	NI-40x	21'-11"	19'-8"	16'-0"	21'-1"	19'-1"	15'-9"	20'-0"	18'-1"	15'-5"
	NI-60	22'-5"	20'-3"	17'-7"	21'-6"	19'-6"	16'-10"	20'-5"	18'-6"	16'-1"
	NI-70	24'-6"	22'-1"	19'-1"	23'-6"	21'-3"	18'-5"	22'-4"	20'-2"	17'-6"
	NI-80	24'-11"	22'-7"	19'-6"	24'-0"	21'-8"	18'-9"	22'-9"	20'-7"	17'-10"
	NI-90	25'-9"	23'-3"	20'-1"	24'-9"	22'-4"	19'-4"	23'-6"	21'-3"	18'-5"
	NI-90x	25'-11"	23'-5"	20'-3"	24'-11"	22'-6"	19'-6"	23'-8"	21'-5"	18'-7"
14"	NI-40x	24'-11"	21'-7"	17'-7"	23'-11"	21'-3"	17'-4"	22'-9"	20'-7"	17'-0"
	NI-60	25'-7"	23'-2"	20'-0"	24'-7"	22'-3"	19'-3"	23'-4"	21'-1"	18'-4"
	NI-70	27'-9"	25'-1"	21'-8"	26'-8"	24'-1"	20'-11"	25'-4"	22'-11"	19'-11"
	NI-80	28'-5"	25'-8"	22'-3"	27'-3"	24'-8"	21'-4"	25'-11"	23'-5"	20'-4"
	NI-90	29'-3"	26'-5"	22'-10"	28'-1"	25'-5"	22'-0"	26'-8"	24'-2"	20'-11"
	NI-90x	29'-7"	26'-9"	23'-2"	28'-5"	25'-9"	22'-3"	27'-0"	24'-5"	21'-2"
16"	NI-60	28'-5"	25'-9"	21'-8"	27'-4"	24'-8"	21'-5"	25'-11"	23'-6"	20'-4"
	NI-70	30'-9"	27'-10"	21'-8"	29'-7"	26'-9"	23'-2"	28'-1"	25'-5"	22'-1"
	NI-80	31'-6"	28'-6"	23'-1"	30'-3"	27'-5"	23'-9"	28'-9"	26'-0"	22'-7"
	NI-90	32'-5"	29'-3"	25'-4"	31'-1"	28'-2"	24'-5"	29'-7"	26'-9"	23'-3"
	NI-90x	32'-11"	29'-9"	25'-9"	31'-7"	28'-7"	24'-9"	30'-0"	27'-2"	23'-7"

NOTES:

1. Allowable clear span applicable to simple-span roof construction with a design roof snow load as shown and dead load of 15 psf. The allowable span is based on the horizontal distance between inside face of supports. The snow load deflection is limited to L/240 and the total load deflection to L/180. Spans are based on a duration of load (DOL) factor of 1.15.
2. Spans include a cantilever of up to 2 feet on one end of the I-joist.
3. Minimum bearing length shall be 1-3/4 inches for the end bearings, and 3-1/2 inches on end bearing adjacent to cantilever.
4. Bearing stiffeners are not required when I-joists are used with the spans and spacing given in these tables, except as required for hangers.
5. These span charts are based on uniform loads. For applications with other than uniformly distributed loads, an engineering analysis may be required based on the use of the design properties.

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TABLE 1
HOLE SIZES AND LOCATIONS — Simple or Multiple Span

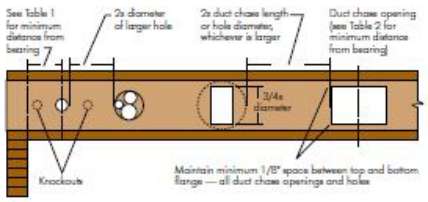
JOIST DEPTH	JOIST SERIES	MINIMUM DISTANCE FROM INSIDE FACE OF ANY SUPPORT TO CENTRE OF HOLE (ft-in.) ROUND HOLE DIAMETER (in.)														
		2	3	4	5	6	6-1/4	7	8	8-5/8	9	10	10-3/4	11	12	12-3/4
9-1/2"	NI-20	0'-7"	1'-6"	2'-10"	4'-3"	5'-8"	6'-0"	---	---	---	---	---	---	---	---	---
	NI-40x	0'-7"	1'-6"	3'-0"	4'-4"	6'-0"	6'-4"	---	---	---	---	---	---	---	---	---
	NI-60	1'-3"	2'-6"	4'-0"	5'-4"	7'-0"	7'-5"	---	---	---	---	---	---	---	---	---
	NI-70	2'-0"	3'-4"	4'-9"	6'-3"	8'-0"	8'-4"	---	---	---	---	---	---	---	---	---
	NI-80	2'-3"	3'-6"	5'-0"	6'-6"	8'-2"	8'-8"	---	---	---	---	---	---	---	---	---
11-7/8"	NI-20	0'-7"	0'-8"	1'-0"	2'-4"	3'-8"	4'-0"	5'-0"	6'-6"	7'-9"	---	---	---	---	---	---
	NI-40x	0'-7"	0'-8"	1'-3"	2'-8"	4'-0"	4'-4"	5'-5"	7'-0"	8'-4"	---	---	---	---	---	---
	NI-60	0'-7"	1'-0"	3'-0"	4'-3"	5'-9"	6'-0"	7'-3"	8'-10"	10'-0"	---	---	---	---	---	---
	NI-70	1'-3"	2'-6"	4'-0"	5'-4"	6'-9"	7'-2"	8'-4"	10'-0"	11'-2"	---	---	---	---	---	---
	NI-80	1'-6"	2'-10"	4'-2"	5'-6"	7'-0"	7'-5"	8'-6"	10'-3"	11'-4"	---	---	---	---	---	---
	NI-90	0'-7"	0'-8"	1'-5"	3'-2"	4'-10"	5'-4"	6'-9"	8'-9"	10'-2"	---	---	---	---	---	---
	NI-90x	0'-7"	0'-8"	0'-9"	2'-5"	4'-4"	4'-9"	6'-3"	---	---	---	---	---	---	---	---
14"	NI-40x	0'-7"	0'-8"	0'-8"	1'-0"	2'-4"	2'-9"	5'-9"	5'-7"	6'-0"	6'-6"	8'-3"	10'-2"	---	---	---
	NI-60	0'-7"	0'-8"	1'-8"	3'-0"	4'-3"	4'-8"	5'-8"	7'-2"	8'-0"	8'-8"	10'-4"	11'-9"	---	---	---
	NI-70	0'-8"	1'-10"	3'-0"	4'-5"	5'-10"	6'-2"	7'-3"	8'-9"	9'-9"	10'-4"	12'-0"	13'-5"	---	---	---
	NI-80	0'-10"	2'-0"	3'-4"	4'-9"	6'-2"	6'-5"	7'-6"	9'-0"	10'-0"	10'-8"	12'-4"	13'-9"	---	---	---
	NI-90	0'-7"	0'-8"	0'-10"	2'-5"	4'-0"	4'-5"	5'-9"	7'-5"	8'-8"	9'-4"	11'-4"	12'-11"	---	---	---
	NI-90x	0'-7"	0'-8"	0'-8"	2'-0"	3'-9"	4'-2"	5'-5"	7'-3"	8'-5"	9'-2"	---	---	---	---	---
16"	NI-60	0'-7"	0'-8"	0'-8"	1'-6"	2'-10"	3'-2"	4'-2"	5'-6"	6'-4"	7'-0"	8'-5"	9'-8"	10'-2"	12'-2"	13'-9"
	NI-70	0'-7"	1'-0"	2'-3"	3'-6"	4'-10"	5'-3"	6'-3"	7'-8"	8'-6"	9'-2"	10'-8"	12'-0"	12'-4"	14'-0"	15'-6"
	NI-80	0'-7"	1'-3"	2'-6"	3'-10"	5'-3"	5'-6"	6'-6"	8'-0"	9'-0"	9'-8"	11'-0"	12'-3"	12'-9"	14'-5"	16'-0"
	NI-90	0'-7"	0'-8"	0'-8"	1'-9"	3'-3"	3'-8"	4'-9"	6'-5"	7'-5"	8'-0"	9'-10"	11'-3"	11'-9"	13'-9"	15'-4"
	NI-90x	0'-7"	0'-8"	0'-9"	2'-0"	3'-6"	4'-0"	5'-0"	6'-9"	7'-9"	8'-4"	10'-2"	11'-6"	12'-0"	---	---

TABLE 2
DUCT CHASE OPENING SIZES AND LOCATIONS — Simple Span Only

JOIST DEPTH	JOIST SERIES	MINIMUM DISTANCE FROM INSIDE FACE OF ANY SUPPORT TO CENTRE OF OPENING (ft-in.) DUCT CHASE LENGTH (in.)							
		8	10	12	14	16	18	20	22	24
9-1/2"	NI-20	4'-1"	4'-5"	4'-10"	5'-4"	5'-8"	6'-1"	6'-6"	7'-1"	7'-5"
	NI-40x	5'-3"	5'-8"	6'-0"	6'-5"	6'-10"	7'-3"	7'-8"	8'-2"	8'-6"
	NI-60	5'-4"	5'-9"	6'-2"	6'-7"	7'-1"	7'-5"	8'-0"	8'-3"	8'-9"
	NI-70	5'-1"	5'-5"	5'-10"	6'-3"	6'-7"	7'-1"	7'-6"	8'-1"	8'-4"
	NI-80	5'-3"	5'-8"	6'-0"	6'-5"	6'-10"	7'-3"	7'-8"	8'-2"	8'-6"
11-7/8"	NI-20	5'-9"	6'-2"	6'-8"	7'-1"	7'-5"	7'-9"	8'-3"	8'-9"	9'-4"
	NI-40x	6'-8"	7'-2"	7'-6"	8'-1"	8'-6"	9'-1"	9'-6"	10'-1"	10'-9"
	NI-60	7'-3"	7'-8"	8'-0"	8'-6"	9'-0"	9'-3"	9'-9"	10'-3"	11'-0"
	NI-70	7'-1"	7'-4"	7'-9"	8'-3"	8'-7"	9'-1"	9'-6"	10'-1"	10'-4"
	NI-80	7'-2"	7'-7"	8'-0"	8'-5"	8'-10"	9'-3"	9'-8"	10'-2"	10'-8"
	NI-90	7'-6"	7'-11"	8'-4"	8'-9"	9'-2"	9'-7"	10'-1"	10'-7"	10'-11"
	NI-90x	7'-7"	8'-1"	8'-5"	8'-10"	9'-4"	9'-8"	10'-2"	10'-8"	11'-2"
14"	NI-40x	8'-1"	8'-7"	9'-0"	9'-6"	10'-1"	10'-7"	11'-2"	12'-0"	12'-8"
	NI-60	8'-9"	9'-3"	9'-8"	10'-1"	10'-6"	11'-1"	11'-6"	13'-3"	13'-0"
	NI-70	8'-7"	9'-1"	9'-5"	9'-10"	10'-4"	10'-8"	11'-2"	11'-7"	12'-3"
	NI-80	9'-0"	9'-3"	9'-9"	10'-1"	10'-7"	11'-1"	11'-6"	12'-1"	12'-6"
	NI-90	9'-2"	9'-8"	10'-0"	10'-6"	10'-11"	11'-5"	11'-9"	12'-4"	12'-11"
	NI-90x	9'-4"	9'-9"	10'-3"	10'-7"	11'-1"	11'-7"	12'-1"	12'-7"	13'-2"
16"	NI-60	10'-3"	10'-8"	11'-2"	11'-6"	12'-1"	12'-6"	13'-2"	14'-1"	14'-10"
	NI-70	10'-1"	10'-5"	11'-0"	11'-4"	11'-10"	12'-3"	12'-8"	13'-3"	14'-0"
	NI-80	10'-4"	10'-9"	11'-3"	11'-9"	12'-1"	12'-7"	13'-1"	13'-8"	14'-4"
	NI-90	10'-9"	11'-2"	11'-8"	12'-0"	12'-6"	13'-0"	13'-6"	14'-2"	14'-10"
	NI-90x	11'-1"	11'-5"	11'-10"	12'-4"	12'-10"	13'-2"	13'-9"	14'-4"	15'-2"

NOTES:
1. Above table may be used for I-joist spacing of 24 inches on centre or less.
2. Hole and duct chase opening location distance is measured from inside face of supports to centre of hole or opening.
3. For continuous joists with more than one span, use the longest span to determine hole location in either span.
4. Distances are based on uniformly loaded floor joists that meet the span requirements for a design live load of 40 psf and dead load of 15 psf, and a live load deflection limit of L/480.
5. The maximum size hole or the maximum depth of a duct chase opening that can be cut into an I-joist web shall equal the clear distance between the flanges of the I-joist minus 1/4 inch (maintain a minimum of 1/8 inch between the top or bottom of the hole or opening and the adjacent I-joist flange).
6. The duct chase opening table is based on simple-span joists only. For other applications, contact your local distributor.
7. The above tables are based on the I-joists being used at their maximum spans. The minimum distance as given above may be reduced for shorter spans; contact your local distributor.

FIELD-CUT HOLE LOCATOR



Knockouts are prescored holes provided for the contractor's convenience to install electrical or small plumbing lines. They are 1-1/2 inches in diameter, and are spaced 15 inches on centre along the length of the I-joist. Where possible, it is preferable to use knockouts instead of field-cut holes.

Never drill, cut or notch the flange, or over-cut the web.

Holes in webs should be cut with a sharp saw.

For rectangular holes, avoid over-cutting the corners, as this can cause unnecessary stress concentrations. Slightly rounding the corners is recommended. Starting the rectangular hole by drilling a 1-inch diameter hole in each of the four corners and then making the cuts between the holes is another good method to minimize damage to the I-joist.

NORDIC ENGINEERED WOOD

Sustainable Wood Solutions

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CSI #: 06 40 23

SHOP TALK

Why we use Baltic Birch Plywood

Strong, stable, and void-free, Baltic birch is the perfect choice for jigs, fixtures, and shop storage projects.

I like to build projects just as much as the next guy. But one of the things about woodworking I really enjoy is making the jigs and fixtures that make building projects easier, quicker, and more accurate.

Whenever I build a jig or fixture that I know I'll be using over and over, it's important that it be strong, stable, and most importantly, it needs to maintain its accuracy each and every time I use it.

Baltic Birch – The material I turn to for most jigs and fixtures is Baltic birch plywood — a premium, hardwood plywood that's strong and stable. This plywood gets it's name from the birch trees that grow in a number of countries in the Baltic region in Europe.

While that's interesting, what makes Baltic birch plywood a great choice for use in the shop is the number of plies that make up each sheet. The ¾" plywood you see on this page consists of 13 plies. Typical ¾" hardwood plywood made in the U.S. has seven plies.

These extra plies give Baltic birch a number of advantages. For starters, it's stronger and more stable. Since it doesn't change much in length or width, it's great for jigs and fixtures where you want to maintain accuracy over the long haul.

▲ **Joinery.** *Since the plies in Baltic birch are free of voids, traditional joinery and screws make for rock-solid assemblies.*

The added plies also make for clean, solid joinery — whether you're cutting grooves, dadoes, rabbets (see inset above), or even dovetails. Finally, the plies hold screws better than a typical sheet of plywood — whether you're close to an edge, or screwing into "end grain," like you see in the main photo above.

The Baltic birch you'll typically find is graded B-BB. So the face veneer (B) will be a single piece without any patches. The back face (BB) and inner plies may be tightly patched. These patches on the inner plies make it highly unlikely that you'll run across a void or seam, something that's fairly common with other plywood. And since any cut will be "clean," the finished edge looks great, as in the photo at left.

Metric Thicknesses – One thing I like about Baltic birch is that you can buy it in thicknesses listed from ⅛" up to ¾". But Baltic birch comes from Europe, so it's actually manufactured in metric dimensions.

The reason for this is that each layer of Baltic birch is about 1.5mm thick. (The face veneers are about half as thick.) So the actual thickness is in increments of 3mm. Although this is pretty close to ⅛" thick, each sheet will run thinner (0.04" in the case of ¾" Baltic birch). I know. That doesn't sound like a big deal. But it's important to allow for that when cutting joinery like dadoes.

Overall Size – You'll also want to be aware of the overall size of the sheet you'll end up buying. Instead of picking up a typical 4' x 8' sheet, Baltic birch is sold in 5' x 5' sheets. (Note: You can often find it in half and quarter sheets.)

Things to Consider – The size and thickness aren't the only things to consider before choosing Baltic birch plywood for your next project.

Although the large number of plies form a very stable product, it is a plywood product and can warp. This is especially true with the thinner sheets. I don't consider that much of a problem since most jigs consist of smaller pieces that are glued and screwed together.

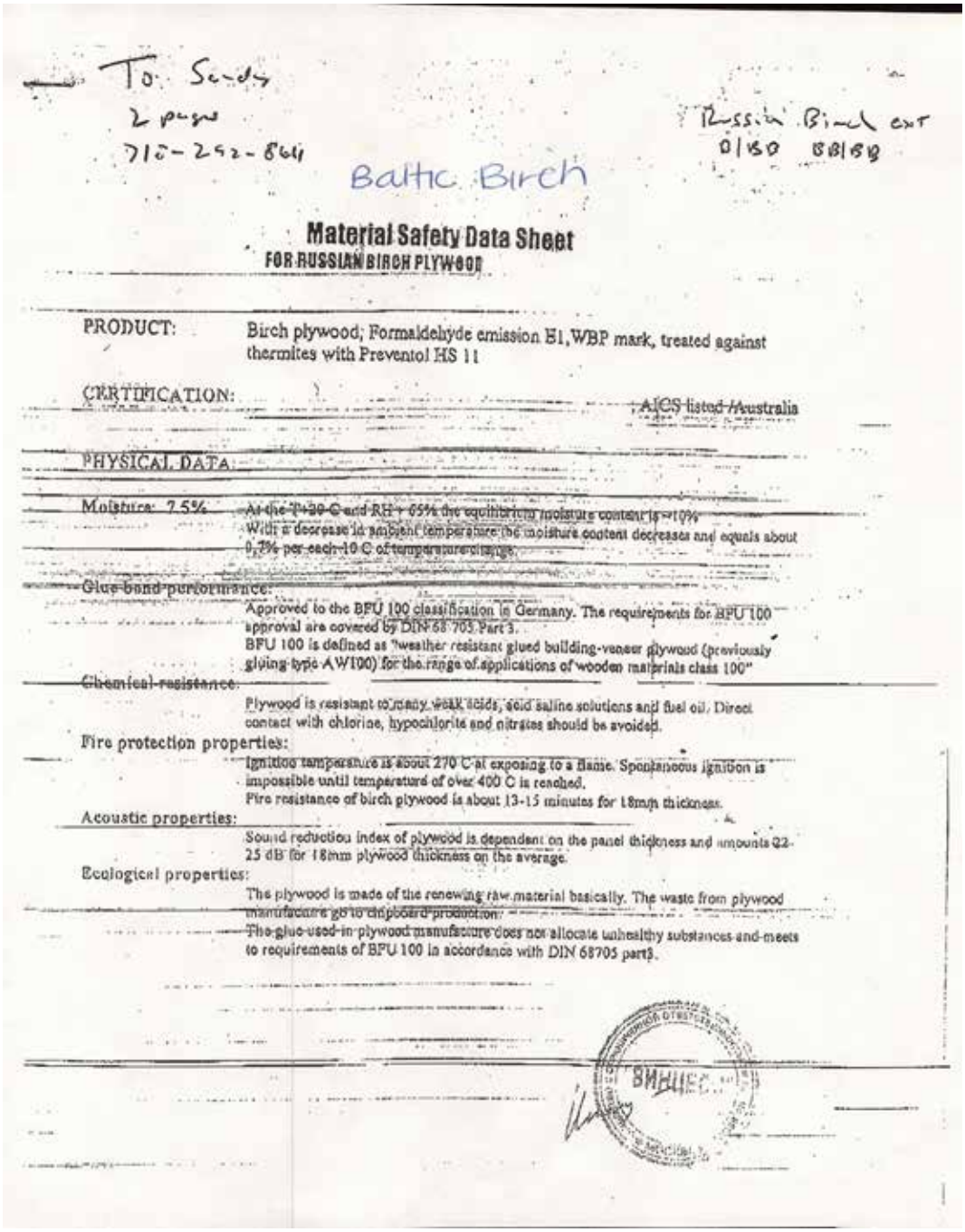
Also, Baltic birch plywood is more expensive. Since higher-quality plies and more work go into assembling each sheet, Baltic birch will cost about twice as much per square foot compared to a typical sheet of plywood.

Availability – You're most likely to find Baltic birch plywood at a hardwood lumber dealer. But if you can't find it locally, there are a number of mail-order sources that carry it in a variety of sizes and thicknesses. (Refer to the margin on the opposite page.)

Still, I think you'll find that Baltic birch is the best choice for making jigs and fixtures you'll be using in your shop for years to come.

◄ **Great Looks.** *No matter how you cut it, the void-free layers of Baltic birch plywood ensure that you'll have an edge that looks great.*

CSI #: 06 40 23



To: Sandy
2 pages
718-292-8661

Russian Birch ext
0/80 BB/BB

Baltic Birch

Material Safety Data Sheet
FOR RUSSIAN BIRCH PLYWOOD

PRODUCT: Birch plywood; Formaldehyde emission E1,WBP mark, treated against thermites with Preventol HS 11

CERTIFICATION: AICS listed Australia

PHYSICAL DATA:

Moisture: 7.5% At the T+20 C and RH+ 65% the equilibrium moisture content is ~10%. With a decrease in ambient temperature the moisture content decreases and equals about 0,7% per each 10 C of temperature change.

Glue bond performance:
Approved to the BFU 100 classification in Germany. The requirements for BFU 100 approval are covered by DIN 68 705 Part 3.
BFU 100 is defined as "weather resistant glued building-veneer plywood (previously gluing type AW100) for the range of applications of wooden materials class 100"

Chemical resistance:
Plywood is resistant to many weak acids, cold saline solutions and fuel oil. Direct contact with chlorine, hypochlorite and nitrates should be avoided.

Fire protection properties:
Ignition temperature is about 270 C at exposing to a flame. Spontaneous ignition is impossible until temperature of over 400 C is reached.
Fire resistance of birch plywood is about 13-15 minutes for 18mm thickness.

Acoustic properties:
Sound reduction index of plywood is dependent on the panel thickness and amounts 22-25 dB for 18mm plywood thickness on the average.

Ecological properties:
The plywood is made of the renewing raw material basically. The waste from plywood manufacture go to chipboard production.
The glue used in plywood manufacture does not allocate unhealthy substances and meets to requirements of BFU 100 in accordance with DIN 68705 part3.

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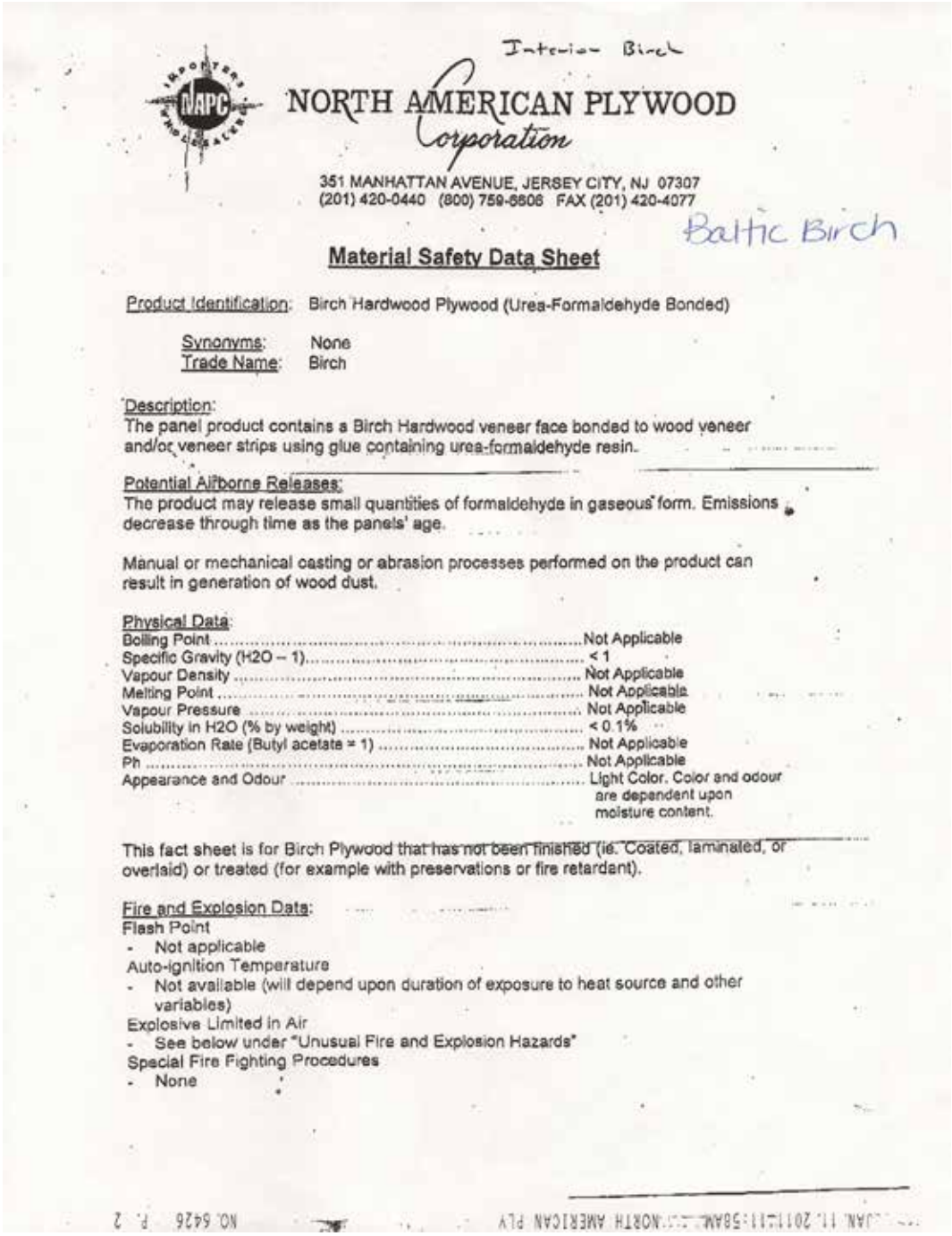


Interior Birch

NORTH AMERICAN PLYWOOD Corporation

351 MANHATTAN AVENUE, JERSEY CITY, NJ 07307
(201) 420-0440 (800) 759-6506 FAX (201) 420-4077

Baltic Birch

Material Safety Data Sheet

Product Identification: Birch Hardwood Plywood (Urea-Formaldehyde Bonded)

Synonyms: None
Trade Name: Birch

Description:
The panel product contains a Birch Hardwood veneer face bonded to wood veneer and/or veneer strips using glue containing urea-formaldehyde resin.

Potential Airborne Releases:
The product may release small quantities of formaldehyde in gaseous form. Emissions decrease through time as the panels' age.

Manual or mechanical casting or abrasion processes performed on the product can result in generation of wood dust.

Physical Data:

Boiling Point	Not Applicable
Specific Gravity (H2O – 1)	< 1
Vapour Density	Not Applicable
Melting Point	Not Applicable
Vapour Pressure	Not Applicable
Solubility in H2O (% by weight)	< 0.1%
Evaporation Rate (Butyl acetate = 1)	Not Applicable
Ph	Not Applicable
Appearance and Odour	Light Color. Color and odour are dependent upon moisture content.

This fact sheet is for Birch Plywood that has not been finished (ie. Coated, laminated, or overlaid) or treated (for example with preservations or fire retardant).

Fire and Explosion Data:
Flash Point
- Not applicable

Auto-ignition Temperature
- Not available (will depend upon duration of exposure to heat source and other variables)

Explosive Limited in Air
- See below under "Unusual Fire and Explosion Hazards"

Special Fire Fighting Procedures
- None

CSI #: 06 65 00

AZEK Trim is the perfect replacement for wood trim and also performs beautifully as fascia, soffit, beadboard, cornerboards, window and door surrounds, column wraps, decorative mouldings, millwork, and much more.

PRODUCT DESCRIPTION	AZEK Item Number		
	12'	18'	20'
TRIMBOARD 5/8" THICKNESS			
5/8 x 3-1/2 Trimboard Traditional	AT06204144	AT06204216	
5/8 x 3-1/2 Trimboard Frontier	AF06204144	AF06204216	
5/8 x 5-1/2 Trimboard Traditional	AT06206144	AT06206216	
5/8 x 5-1/2 Trimboard Frontier	AF06206144	AF06206216	
5/8 x 7-1/4 Trimboard Traditional	AT06208144	AT06208216	
5/8 x 7-1/4 Trimboard Frontier	AF06208144	AF06208216	
5/8 x 9-1/4 Trimboard Traditional	AT06210144	AT06210216	
5/8 x 9-1/4 Trimboard Frontier	AF06210144	AF06210216	
5/8 x 11-1/4 Trimboard Traditional	AT06212144	AT06212216	
5/8 x 11-1/4 Trimboard Frontier	AF06212144	AF06212216	
5/8 x 15-1/4 Trimboard Traditional	AT06216144	AT06216216	
5/8 x 15-1/4 Trimboard Frontier	AF06216144	AF06216216	

AZEK 21

CSI #: 06 65 00

PRODUCT DESCRIPTION	AZEK Item Number		
	12'	18'	20'
TRIMBOARD 3/4" THICKNESS			
3/4 x 1-1/2 Trimboard Traditional		AT10002218	
3/4 x 1-1/2 Trimboard Frontier		AF10002218	
3/4 x 3-1/2 Trimboard Traditional	AT10004144	AT10004218	
3/4 x 3-1/2 Trimboard Frontier	AF10004144	AF10004218	
3/4 x 4-1/2 Trimboard Traditional	AT10005144	AT10005218	
3/4 x 4-1/2 Trimboard Frontier	AF10005144	AF10005218	
3/4 x 5-1/2 Trimboard Traditional	AT10006144	AT10006218	
3/4 x 5-1/2 Trimboard Frontier	AF10006144	AF10006218	
3/4 x 7-1/4 Trimboard Traditional	AT10008144	AT10008218	
3/4 x 7-1/4 Trimboard Frontier	AF10008144	AF10008218	
3/4 x 9-1/4 Trimboard Traditional	AT10010144	AT10010218	
3/4 x 9-1/4 Trimboard Frontier	AF10010144	AF10010218	
3/4 x 11-1/4 Trimboard Traditional	AT10012144	AT10012218	
3/4 x 11-1/4 Trimboard Frontier	AF10012144	AF10012218	
3/4 x 15-1/4 Trimboard Traditional	AT10016144	AT10016218	
3/4 x 15-1/4 Trimboard Frontier	AF10016144	AF10016218	
TRIMBOARD 1" THICKNESS			
1 x 3-1/2 Trimboard Traditional	AT12504144	AT12504218	AT12504240
1 x 3-1/2 Trimboard Frontier	AF12504144	AF12504218	AF12504240
1 x 4-1/2 Trimboard Traditional	AT12505144	AT12505218	AT12505240
1 x 4-1/2 Trimboard Frontier	AF12505144	AF12505218	AF12505240
1 x 5-1/2 Trimboard Traditional	AT12506144	AT12506218	AT12506240
1 x 5-1/2 Trimboard Frontier	AF12506144	AF12506218	AF12506240
1 x 7-1/4 Trimboard Traditional	AT12508144	AT12508218	AT12508240
1 x 7-1/4 Trimboard Frontier	AF12508144	AF12508218	AF12508240
1 x 9-1/4 Trimboard Traditional	AT12510144	AT12510218	AT12510240
1 x 9-1/4 Trimboard Frontier	AF12510144	AF12510218	AF12510240
1 x 11-1/4 Trimboard Traditional	AT12512144	AT12512218	AT12512240
1 x 11-1/4 Trimboard Frontier	AF12512144	AF12512218	AF12512240
1 x 15-1/4 Trimboard Traditional	AT12516144	AT12516218	AT12516240
1 x 15-1/4 Trimboard Frontier	AF12516144	AF12516218	AF12516240


TRIMBOARD


RABBETED TRIM


AZEK TO MILL


BEADBOARD


SHEET


CORNERBOARD

CSI #: 06 65 00

PRODUCT DESCRIPTION			AZEK Item Number		
			12'	18'	20'
TRIMBOARD 1-1/4" THICKNESS					
1-1/4 x 3-1/2 Trimboard Frontier					AF15004240
1-1/4 x 5-1/2 Trimboard Frontier					AF15006240
1-1/4 x 7-1/4 Trimboard Frontier					AF15008240
1-1/4 x 9-1/4 Trimboard Frontier					AF15010240
1-1/4 x 11-1/4 Trimboard Frontier					AF15012240
RABBETED TRIM					
1 x 3-1/2 Rabbeted Trim Traditional				ATR12504216	
1 x 3-1/2 Rabbeted Trim Frontier				AFR12504216	
1 x 5-1/2 Rabbeted Trim Traditional				ATR12506216	
1 x 5-1/2 Rabbeted Trim Frontier				AFR12506216	
1 x 7-1/4 Rabbeted Trim Traditional				ATR12508216	
1 x 7-1/4 Rabbeted Trim Frontier				AFR12508216	
AZEK TO MILL (ATM)					
			8'	18'	20'
1-1/4 x 9-1/4 AZEK to Mill Traditional				AT15010216	
1-1/4 x 48 AZEK to Mill Traditional			AS11448096		
BEADBOARD					
5/8 x 3-1/2 Beadboard Traditional				AM0620418	
1/2 x 5-1/2 Beadboard Traditional				AM0120618F	
SHEET					
	8'	10'	12'	18'	20'
3/8 x 48 Sheet Traditional	AS03848096	AS03848120			
1/2 x 48 Sheet Traditional	AS01248096	AS01248120			
5/8 x 48 Sheet Traditional	AS05848096	AS05848120		AS05848216	
3/4 x 48 Sheet Traditional	AS03448096	AS03448120	AS03448144	AS03448216	
1 x 48 Sheet Traditional	AS10048096	AS10048120	AS10048144		AS10048240
CORNERBOARDS					
				10'	20'
1 x 3-1/2 Cornerboards Traditional				AMT04120C	AMT04240C
1 x 3-1/2 Cornerboards Frontier				AMF0412OC	AMF04240C
1 x 5-1/2 Cornerboards Traditional				AMT06120C	AMT06240C
1 x 5-1/2 Cornerboards Frontier				AMF06120C	AMF06240C
1-1/4 x 3-1/2 Cornerboards Traditional				AMT12504120C	
1-1/4 x 3-1/2 Cornerboards Frontier				AMF12504120C	
1-1/4 x 5-1/2 Cornerboards Traditional				AMT12506120C	
1-1/4 x 5-1/2 Cornerboards Frontier				AMF12506120C	

AZEK Trim 23

CSI #: 06 65 00

PRODUCT DESCRIPTION	AZEK Item Number		
	10'	18'	20'
RABBETED CORNERBOARDS			
1 x 3-1/2 Rabbeted Cornerboards Traditional	AMTR04120C		AMTR04240C
1 x 3-1/2 Rabbeted Cornerboards Frontier	AMFR04120C		AMFR04240C
1 x 5-1/2 Rabbeted Cornerboards Traditional	AMTR06120C		AMTR06240C
1 x 5-1/2 Rabbeted Cornerboards Frontier	AMFR06120C		AMFR06240C
1 x 7-1/4 Rabbeted Cornerboards Traditional	AMTR08120C		AMTR08240C
UNIVERSAL SKIRT BOARD			
1 x 5-1/2 Universal Skirt Board		AFUS07216	
1 x 7-1/4 Universal Skirt Board		AFUS09216	
1 x 9-1/4 Universal Skirt Board		AFUS11216	
INTEGRATED DRIP EDGE			
1 x 3-1/2 Integrated Drip Edge		AFWB05216	
1 x 5-1/2 Integrated Drip Edge		AFWB07216	
FINISH GRADE TRIM			
1-1/4 x 4 Finish Grade Trim Traditional		ATFG04216	
1-1/4 x 6 Finish Grade Trim Traditional		ATFG06216	
			Item Number
3X3 Corner Reinforcement			ATFG03001

ADHESIVE						
	4 OZ.	8 OZ.	16 OZ.	32 OZ.	128 OZ.	5 GAL.
Adhesive	AAD004OZ	AAD008OZ	AAD016OZ	AAD032OZ	AAD128OZ	AAD640OZ


RABBETED CORNERBOARDS


UNIVERSAL SKIRT BOARD


INTEGRATED DRIP EDGE


FINISH GRADE TRIM

ADHESIVE

CSI #: 06 72 00

NEW ENGLAND ROPES MARINE PRODUCTS

PERFORMANCE TESTED

New England Ropes is a resource that is unique in the industry. Consider New England Ropes uncompromising. That's the reputation you get when you develop products for the toughest customers in the pleasure cruising, performance racing, and competitive dinghy sailing markets.

PRODUCTS FOR POWER AND SAIL

In fact, as you'll see in the following pages, we develop and produce more marine rope products than anyone else in the business.

Regardless of your sailing style, products by New England Ropes are engineered to offer superior feel, handling, and performance. Our ropes enable cruisers to feel safe and comfortable in any waters. Our high tech rope assortment allows racing sailors to push their personal limits, as well as the limits of their sport. And our small cords reassure competitive dinghy sailors that we'll keep them light without skimping on performance.

Small wonder. Innovation here is the order of the day – every day. Through ceaseless research and development, we're able to advance the technology of performance on a regular basis. Our insistence upon strict quality control is second to none, as evidenced by the punishing product testing that each and every New England Ropes product must withstand.

At New England Ropes, we're proud to be able to offer you a broad array of running rigging, dock, and anchor line products that combine superior quality and durability with unsurpassed reliability and value. For products that work harder, smarter, and better, count on New England Ropes.

NEW ENGLAND ROPES
TOGETHER IN MOTION

CSI #: 06 72 00

A FEW THINGS YOU SHOULD KNOW

MANUFACTURING AND CONSTRUCTION

What does performance mean to you? If you're an AC syndicate racer, it's ultra high strength, ultra low stretch. If you're a casual cruiser, it's great handling and durability. If you're a power boater, it's that extra bit of stretch and strength whenever the wind kicks up at the dock.

> How does New England Ropes consistently deliver such performance, regardless of application?
It comes down to the choices we create and make available in both fiber and construction. For your "great race," we've developed matchless high modulus fiber lines to give you a lasting competitive edge. For family cruising, peace of mind comes in the form of high quality polyester lines that are durable, UV resistant, and comfortable to grip and handle. For docking or mooring, our nylon lines withstand the seas' fury to ensure the safety of your boat.

> What you should know about fibers.
One of the building blocks of any line, regardless of the ultimate use, is fibre. We feel that it is important for you, as the end-user expecting certain performance, to have a basic understanding of the characteristics of the various fibers used in the manufacture of rope today. The following table will help.

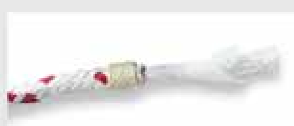
Fiber Type	Strength	Stretch	Resistance to UV	Cost
Nylon	high	high	good	moderate
Polyester	high	low	good	moderate
HMPE	very high	very low	good	high
Aramids	very high	very low	fair	high
LCP	very high	very low	fair	high
PBO	very high	very very low	poor	very high
Polypropylene	low	moderate	poor	very low

> So where should these fibers be used?
Nylon: Application where strength and shock absorption are important, i.e. dock and anchor lines.
Polyester: Situations where strength, low stretch, and durability are key, i.e. most running rigging applications.
HMPE, Aramids, and LCP: These are all generic fiber types. HMPE refers to Dyneema® or Spectra®, Aramids refer to Kevlar®, Technora®, and Twaron®, while LCP refers to Vectran®. These are all considered very extremely low stretch but come with a high

A WIDE RANGE OF DIFFERENT CONSTRUCTIONS

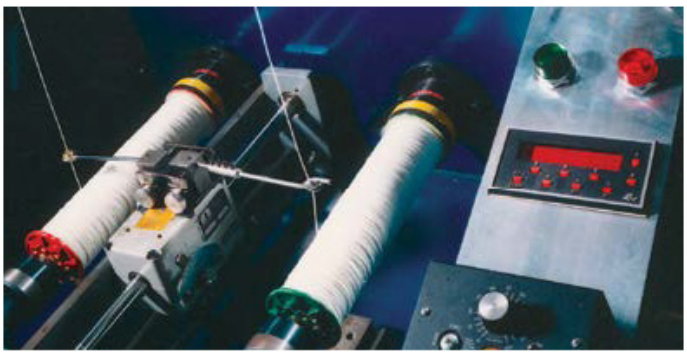
New England Ropes goes to great lengths to achieve optimum performance from every line. We have a specific type of line to meet each of your needs.

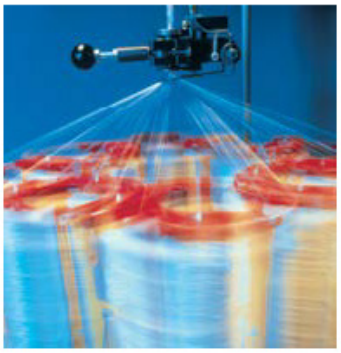
DOUBLE BRAID
A braided core inside a braided cover produces an easy-to-handle rope that is strong and very durable. A popular construction for running rigging and docking lines. Used in Sta-Set, Endura Braid, T-900, V-100, and Double Braid docklines.



PARALLEL CORE
A patented unidirectional fiber core with a braided cover produces a line with significantly less stretch and greater strength than the same size double braid line. Ideal for halyards, sheets, and guys where low stretch is required. Used in Sta-Set X.

CSI #: 06 72 00





price tag. Generally found on very serious racing sailboats and larger yachts for running rigging.
PBO: Generic fiber type which refers to the brand name Zylon®. PBO is a high performance fiber with the highest strength and lowest stretch of any other commercially available fiber. It is extremely expensive and experiences progressive strength loss when exposed to UV rays. For this reason, PBO is typically only used in extremely high load applications in only the highest level of competitive sailing. In most cases the best use is for abrasion resistance in covers.
Polypropylene: Applications where lightweight or very low cost is important such as light air spinnaker sheets or barrier rope for swimming.

> What you should know about construction.
At New England Ropes we utilize many different types of constructions. Most people recognize three strand, single braid and double braid as the basic methods of twisting or braiding fibers into a finished line. The process of twisting fibers by its very nature reduces strength and increases stretch.

At New England Ropes, we pioneered a fourth construction technique called parallel (fiber) core construction (Sta Set X). By keeping the fibers in parallel, we align the fibers with little or no twist. Our patented construction technique of wrapping the core and braiding a cover produces a line that has higher strength and significantly less stretch than a comparable single or double braid. Innovation, experience, and high standards of quality are what set New England Ropes apart from the field.

As an ISO 9001 accredited manufacturer, our commitment is to consistency in manufacturing for reliability in delivery. We utilize all our resources to maintain our position as one of the leading innovators in rope performance and technology. At New England Ropes we select only the highest quality fiber from leading worldwide suppliers.

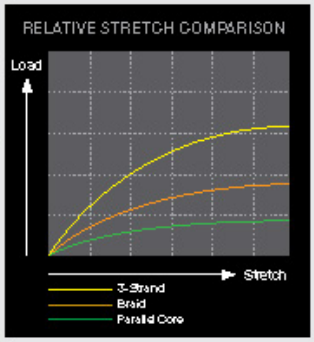
The challenge is to blend the fiber's characteristics and our years of design and manufacturing experience into finished products that perform to your exacting standards. Those standards depend on your particular application and expectations.
Predictability and control of strength, stretch, and durability are the ultimate goals for rope performance, or all boaters. Our choice of materials, construction techniques, and years of experience makes New England Ropes the leader in rope technology.

> How do we at New England Ropes define performance...
Exactly as you choose to define it.

Dyneema® is a registered trademark of DSM
Vectran® is a registered trademark of Hoechst Celanese
Kevlar® is a registered trademark of Dupont
Zylon® is a registered trademark of Toyo
We reserve the right to modify technical specifications and misprints

SINGLE BRAID
A flexible and supple construction that absorbs twist and does not kink. Perfect for mainsheets, furling lines, and large dock lines. Used in Regatta Braid, Regatta lite, STS-12, V-12, and Mega Braid.

3-STRAND
A special stabilization process and a four-stage, balanced construction produce a durable, long-lasting, flexible, and easy-to-handle rope that won't harden with age. Ideal for anchor, dock, mooring, and tow lines, and for running rigging on traditional cruising boats.



CSI #: 06 72 00

COMPETITION AND REGATTA TESTED

GRAND PRIX RACING LINES

CUSTOM PRODUCTS

THE ULTIMATE IN CUSTOM PERFORMANCE
this high performance protective cover is made out of 100% Zylon® and is used in specialized applications. As with all custom products, grand prix racing enthusiasts should consult a rigging professional for proper use and application.

APPLICATIONS: Sheets, guys, and runner tails

PRO-PBO

Sizes: 8mm, 9mm, 11mm

PRO-PBO FEATURES an extremely durable, 24-carrier polyester cover and a 12-strand coated Zylon® core.

APPLICATIONS: Sheets, halyards, and guys

V-100

Sizes: 5mm, 6mm, 8mm, 10mm, 11mm, 12mm, 14mm, 16mm

THE ULTIMATE IN HIGH LOAD PERFORMANCE
V-100 features a braided 100% Vectran® 12-strand single braid core treated with our unique Marine-Tech coating with a highly durable and attractive polyester cover.

BENEFITS: The strong, low stretch high-tech line for its size, good abrasion resistance, and virtually no creep.

APPLICATIONS: Main halyards, genoa halyards, afterguys, and guys.

	5mm	6mm	8mm	9mm	10mm	11mm	12mm	14mm	16mm
Tensile	2,400	4,600	8,600	9,100	12,600	17,200	19,200	23,500	26,000
Weight	1.5	2.1	3.5	4.4	5.2	6.5	7.1	9.9	13.4

ENDURA BRAID

Sizes: 5mm, 6mm, 8mm, 10mm, 11mm, 12mm, 14mm, 16mm, 18mm

PERFORMANCE, STRENGTH, AND DURABILITY FOR THE COMPETITIVE SAILOR, ENDURA BRAID FEATURES a specially engineered 12-strand Dyneema® core, with Marine-Tech coating, and a 24 carrier braided polyester cover.

BENEFITS: Size for size, outperforms any other UHMWPE line! Very high strength-to-weight ratio, very low stretch, low creep and outstanding durability. Coated braided core is ideal for durable, tapered sheets and halyards.

APPLICATIONS: All running rigging requiring a durable, low stretch, lightweight line, such as sheets, halyards, guys, topping lifts, reeflines, or low-stretch control lines.

	5mm	6mm	8mm	10mm	11mm	12mm	14mm	16mm	18mm
Tensile	3,100	4,500	8,100	11,000	14,900	21,500	25,200	29,000	40,000
Weight	1.1	1.8	3.0	4.5	5.4	6.5	9.5	11.8	15.8

6

CSI #: 06 73 00


made with Resysta
NATURAL ENDURANCE. LIMITLESS INNOVATION.
The DECKING System
DGD010055144 GOLD
1" x 5½" x 12'
Available in 12', 16' and 20' length.
Your Deck Has Finally Arrived
BURMA C 08
SIAM C 14
AGED C 23
JAVA C 24
CAPE COD C 42
WALNUT C 51
Through material innovation and product design, TruGrain™ made with Resysta® effectively combines nature and science to produce a beautiful, durable product at a competitive price. TruGrain has the visual appearance and feel of tropical wood, and is wood free. We use a renewable resource, rice husks, that is replaced in short cycles. TruGrain provides many benefits over wood.
• Does not absorb moisture
• Dimensionally stable
• Weather resistant
• No swelling
• No cracking
• High slip resistance
• No fungal decay
Choose from 6 natural shades to complement your project. Resysta RFS, sold separately, easily seals the surface. Thanks to this sealed structure, dirt particles only adhere to the surface and can be removed easily with a gentle rinse of water. The proprietary TruGrain formula makes maintaining your deck easier.
See Tru-Grain.com for more design inspiration.
Call us at (866) 423-2381
AEC007007072
ADW005000036
HPC000001000
HPC000002000
AEC004004072
Westech

CSI #: 06 73 00

HIDDEN FASTENING

1. In the middle of each plank, place a screw at a 45° angle and fix the plank into the joint. The screw hole should be predrilled.
2. Apply clips on every joist, leaving the screw a little loose. This allows for easier installation of the next board.
3. Use recommended clips at each end of the board on both sides. Place clip as close to the end as possible.
4. Install next board and repeat steps 1–3. Finally, go back and tighten screws in previous row. Do not over-tighten screw as this could cause the screw to strip out.

INSTALLATION TIPS

- It is important to preplan the deck layout so you know double joist locations, required gapping and finishing/trimming options.
- As the temperature changes during installation, the material will expand and/or contract. Using a precut "control piece" and picking a "control gap" will help ensure consistent board lengths and gapping.
- If sanding is needed, sand in the longitudinal direction. Use a grit between 24 and 40; the closer to 24, the better the results. Sand by hand or by using a handheld belt sander. Do not over-sand, as this will weaken the material. Rotary sanders are not recommended.
- Material should be stored out of direct sunlight or extreme heat, and should be on even, flat ground.
- If stored on wooden blocks, space blocks no more than 3' apart.

Consult the complete installation guide for more details.

GAPPING FOR THERMAL EXPANSION

Expansion/Contraction: The first table below indicates average expansion/contraction. (This is a general guideline and can vary based on geographical region.)

Always consider linear expansion of TruGrain profiles prior to and during the installation of the product. If temperatures fluctuate during the installation, the profile length will change and gaps will change with the temperature. Use the guide below to gap boards during installation.

TruGrain Expansion/Contraction Guide

Profile length	8 ft.	12 ft.	16 ft.	20 ft.
Expansion/Contraction amount (approx. 0.2% over 50°F variation in temperature)	5/16" (7.938")	7/16" (11.430")	9/16" (13.970")	11/16" (17.780")

TruGrain Decking Board Gap Guide

	End-to-End of Decking Boards				Wall Gap
Temperature at Installation	Below 20°F	60°F	90°F	120°F	
Amount for Decking Profile Length of 12 ft.	7/16"	1/4"	1/16"	0"	1/4"
Amount for Decking Profile Length of 16 ft.	9/16"	3/8"	2/16"	0"	3/8"

SURFACE FINISH

The following guidelines are recommended to ensure a smooth finish and ideal color result:

- Apply the finish during consistent conditions. Applying the finish to planks individually prior to installation is suggested.
- The ideal temperature for application is 40°F - 80°F and relative air humidity of 50% - 60%.
- Do not apply under direct sunlight or in case of rain.
- A water-based stain and sealer should be applied with a broad bristle brush (surface brush). If the surface finish is applied after installation, please adhere to the points mentioned above and stain a maximum surface of 40 – 50 sq. ft. at once.

See **Tru-Grain.com** for more design inspiration.

Call us at **(866) 423-2381**

TRU made with resysta

NATURAL ENDURANCE. LIMITLESS INNOVATION.

CSI #: 06 83 13

General Datasheet

Gurit

Gurit® PVC

STRUCTURAL FOAM CORE

- Optimised properties
- Improved shear elongation
- Suitable for all sandwich composites applications
- Superior strength and stiffness to weight ratio
- Self extinguishing
- Outstanding chemical resistance
- DNV, RINA, Lloyds and Germanischer Lloyd certified

INTRODUCTION

Gurit® PVC is a closed cell, cross-linked PVC foam. It provides superior strength to weight ratio for all composite applications.

Other key features of Gurit® PVC include outstanding chemical resistance, negligible water absorption, and excellent thermal insulation capabilities. It is compatible with most common resin systems including epoxy, polyester and vinylester.

Gurit® PVC is available in a wide range of formats with all standard cut patterns and finishes possible.

CSI #: 06 83 13

MECHANICAL PERFORMANCE

Type	Test Method	Units	Gurit® PVC40	Gurit® PVC60	Gurit® PVC80	Gurit® PVC90	Gurit® PVC100	Gurit® PVC130	Gurit® PVC200	Gurit® PVC250
Foam Colour	-	-	Azure	Lilac	Yellow	Green	Red	Blue	Brown	Green
Nominal Sheet Size	-	mm	1330 x 2850	1270 x 2730	1150 x 2450	1020 x 2180	950 x 2050	850 x 1900	750 x 1600	700 x 1500
		Inches	52.4 x 112.2	50 x 107.5	45.3 x 96.4	40.2 x 85.8	37.4 x 80.7	33.5 x 74.8	29.5 x 63	27.6 x 59
Nominal Density	ASTM D1622	Kg/m³	40	48	60	80	100	130	200	250
		Lb/ft³	2.5	3.0	3.7	5.0	6.3	8.1	12.5	15.6
Compressive Strength	ASTM D1621-10	MPa	0.52	0.62	0.98	1.60	2.05	3.22	5.07	6.88
		psi	75	90	142	232	297	467	735	998
Compressive Modulus	ASTM D1621-10	MPa	29	34	48	74	95	138	234	296
		psi	4206	4931	6962	10733	13779	20015	33939	42931
	ASTM D1621-73	MPa	37	44	67	97	121	183	300	384
		psi	5366	6382	9718	14069	17550	26542	43511	55694
Shear Strength	ASTM C273	MPa	0.47	0.52	0.79	1.20	1.48	2.44	3.44	4.37
		psi	68	75	115	174	215	354	499	634
Shear Modulus	ASTM C273	MPa	15	16	21	30	36	55	77	98
		psi	2175	2320	3046	4351	5221	7977	11168	14214
Shear Elongation at break	ASTM C273	%	6	7	18	19	25	32	35	35
Tensile Strength	ASTM D1623	MPa	0.72	0.98	1.82	2.74	3.18	4.35	6.26	7.19
		psi	103	142	264	397	460	631	908	1043
Tensile Modulus	ASTM D1623	MPa	68	71	100	146	162	227	358	439
		psi	9863	10298	14504	21176	22916	32924	51924	63672
HDT	DIN 53424	°C	100	115	125	125	125	125	N/A	N/A
		°F	212	239	257	257	257	257	N/A	N/A
Thermal Conductivity	ASTM C518	W/(m·K)	0.031	0.030	0.031	0.033	0.033	0.036	0.042	0.050
		BTU·in/(h·ft2·°F)	0.216	0.209	0.217	0.227	0.229	0.248	0.292	0.344

Users are advised to contact Gurit to confirm that Gurit® PVC is compatible with their particular processing parameters.

CSI #: 06 83 13

Gurit

NOTICE

All advice, instruction or recommendation is given in good faith but Gurit AG (the company) only warrants that advice in writing is given with reasonable skill and care. No further duty or responsibility is accepted by the Company. All advice is given subject to the terms and conditions of sale (the Conditions) which are available on request from the Company or may be viewed at the Company's Website: www.gurit.com/terms-and-conditions.aspx.

The Company strongly recommends that Customers make test panels and conduct appropriate testing of any goods or materials supplied by the Company to ensure that they are suitable for the Customer's planned application. Such testing should include testing under conditions as close as possible to those to which the final component may be subjected. The Company specifically excludes any warranty of fitness for purpose of the goods other than as set out in writing by the Company. The Company reserves the right to change specifications and prices without notice and Customers should satisfy themselves that information relied on by the Customer is that which is currently published by the Company on its website. Any queries may be addressed to the Technical Services Department.

Gurit are continuously reviewing and updating literature. Please ensure that you have the current version, by contacting Gurit Marketing Communications or your sales contact and quoting the revision number in the bottom right-hand corner of this page.

CSI #: 06 83 13

Product Information

ITW Insulation Systems

TRYMER® 200L Polyisocyanurate Foam

TRYMER® 200L polyisocyanurate foam is a cellular polymer supplied in bunstock form. It is ideal for applications in which a lightweight, low-density core material is needed. This product is easily fabricated into sheets and other shapes and is less brittle than conventional polyisocyanurate foams, for improved handling.

Applications

TRYMER® 200L foam is used extensively in composite panel applications. It has a low index compared to conventional polyisocyanurate foams, a feature that offers improved shear, tensile and flexural strengths, and allows better adhesion to facers using standard adhesives.
The foam is also compatible with most thermoset resin adhesives, including vinyl esters and epoxies. ITW can provide general guidelines and recommendations for TRYMER® 200L foam.
Call 1-800-231-1024 or contact your local ITW representative for details. Some typical applications include:

- Core material for insulated architectural and structural panels
- Core material for factory built panelized construction systems
- Insulation for shipping containers, trucks or railcars
- Core material for boats and yacht hulls
- Core material for military shelter applications

SIZE

Height:	24" (56 cm)
Width:	48" (122 cm)
Length:	96" (244 cm)

Custom lengths are also available. Contact your local ITW representative for details.

PHYSICAL/CHEMICAL PROPERTIES

TRYMER® 200L foam exhibits the properties and characteristics indicated in Table 1 when tested as represented.
Like all cellular polymers, this product will degrade upon prolonged exposure to sunlight. A covering must be used to block ultraviolet radiation and prevent degradation. Other coverings to protect the foam from the elements and to meet applicable fire regulations may also be required. Consultation with local building code officials, design engineers/specifiers or insurance personnel is recommended before application.

ENVIRONMENTAL DATA

TRYMER® 200L foam is specifically formulated to provide excellent thermal insulation properties without the use of chlorofluorocarbon (CFC) or hydrochlorofluorocarbon (HCFC) blowing agents. In compliance with the Montreal Protocol and the Clean Air Act, TRYMER® 200L foam is manufactured with hydrocarbon blowing agents, which have no ozone depletion potential.

FIRE PROTECTION

Consideration should be given to the benefits of and the costs of additional fire protection gained by installing automatic fire detection, alarm and suppression systems. Consultation with local building code officials, design engineers/specifiers or insurance personnel is recommended before application.

Safety Considerations

TRYMER® 200L foam requires care in handling. All persons who work with this material must know and follow the proper handling procedures. The current Material Safety Data Sheet (MSDS) and handling guide contain information on the safe handling, storage and use of this material. For a copy of the MSDS, call 1-800-231-1024, visit www.itwinsulation.com or contact your local ITW representative.

Fabrication/ Installation

TRYMER® 200L foam is easy to fabricate into various sizes and shapes to meet specific design needs. However, because of the critical technical design aspects of many of its applications, ITW recommends that qualified designers or consultants design the total system. Contact a local ITW representative or access the literature library at www.itwinsulation.com for more specific instructions.

®Trademark of ITW Insulation Systems

TRYMER 200L Polyisocyanurate Foam

CSI #: 06 83 13

Product Information

Table 1

Physical Properties of TRYMER® 200L Polyisocyanurate Foam			
Property and Test Method	**Value**	**Property and Test Method**	**Value**
Density, ASTM D1622, lb/ft³ (kg/m³)	2.0 (32.0)	Closed Cell Content, ASTM D2845, %	95
Compressive Strength, ASTM D1621, lb/in² (kPa), parallel to rise	30 (207)	k-Factor, ASTM C518, 75°F (24° C) mean temp., Btu-in/hr-ft²-°F (W/m°C)	0.150 (0.027)
Compressive Modulus, ASTM D1621, lb/in² (kPa), parallel to rise	750 (5171)	R-Value per inch, ASTM C578, °F-ft²-h/Btu (m²-°C/W), aged 180 days	5.3 (0.93)
Shear Strength, ASTM C273, lb/in² (kPa), average of parallel to rise and extruded directions	23 (159)	Dimensional Stability, ASTM D2126, % change At -30°F (-34°C), 7 days	 -0.4
Shear Modulus, ASTM C273, lb/in² (kPa), parallel to rise	260 (1793)	At 158°F (70°C)/ 97% relative humidity, 7 days At 200°F (93°C), 7 days	2.0 0.8
Tensile Strength, ASTM D1623, lb/in² (kPa), 3D average	30 (207)	Water Absorption, ASTM C272, % by vol., 24-hour immersion	<0.7
Tensile Modulus, ASTM D1623, lb/in² (kPa), parallel to rise	1200 (8274)	Service Temperature, °F (°C)	-297 to +300 (-183 to +149)
Flexural Strength, ASTM C203, lb/in² (kPa), parallel to rise	39 (269)	Surface Burning Characteristics, ASTM E84, Flame Spread/Smoke Developed	25/450 up to 4" thickness
Flexural Modulus, ASTM C203, lb/in² (kPa), parallel to rise	590 (4068)		

Availability

TRYMER® 200L foam is distributed through an extensive network of fabricators and distributors. For more information, call 1-800-231-1024.

Technical Services

ITW can provide technical information to help address questions when using TRYMER® 200L foam. Technical personnel are available at 1-800-231-1024.

- **For Technical Information: 1-800-231-1024**
- **For Sales Information: 1-800-231-1024**
- ITW Insulation Systems
- 1370 East 40th Street, Building 7, Suite 1, Houston, TX 77022-4104
- **www.itwinsulation.com**

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CSI #: 06 83 13

AIREX BALTEK BANOVA

DATA SHEET

07.2011 (replaces 08.2010)

AIREX® PXc

Fiber-Reinforced Structural Foam

CHARACTERISTIC

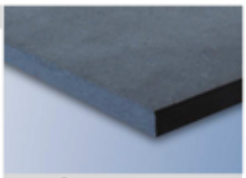
- High shear and compression properties
- Replacement for wood and plywood
- Good fastener pull-out strength
- High heat resistance
- Compatible with a wide range of resins and adhesives
- Dimensionally stable
- High styrene resistance
- Very low water absorption
- Non biodegradable
- Excellent chemical resistance

APPLICATIONS

- **Marine**
  Transoms, bulkheads, stringers, engine beds, floors, interiors, local reinforcements, tooling and molds
- **Road and Rail**
  Floors, sidewalls, roofs, engine covers, interior panels
- **Industrial**
  Covers, tanks, containers, tooling and molds, local reinforcements, architectural panels, sporting goods

PROCESSING

- Contact molding (hand/spray)
- Resin infusion / injection (VARTM / RTM)
- Adhesive bonding
- Pre-preg processing
- Processing molding (GMT, SMC)



AIREX® PXc is a closed-cell, fiber reinforced polymer foam with very high mechanical properties ideally suited as core material for structurally loaded sandwich applications.

The sophisticated manufacturing process evenly distributes continuous glass fibers throughout the foam generating a very consistent foam with enhanced mechanical properties especially in compression and shear.

AIREX® PXc is dimensionally stable, has very low water absorption, and is resistant to chemicals and high temperatures.

It is ideally suited as a core material for highly loaded sandwich structures or as a replacement for wood and plywood.

CSI #: 06 83 13

AIREX BALTEK BANOVA

Typical properties for AIREX® PXc		Unit (metrical)	PXc.245	PXc.320	PXc.385	PXc.420
Density	ASTM C-271	kg/m³	240	320	385	420
Compressive strength perpendicular to the plane*	ASTM C-365	N/mm²	2.6	5.1	7.8	9.5
Compressive modulus perpendicular to the plane*	ASTM C-365	N/mm²	56	179	277	326
Shear strength	ASTM C-273	N/mm²	2.1	3.5	4.8	5.5
Shear modulus	ASTM C-273	N/mm²	63	122	170	193
Flexural strength*	ASTM D-790	N/mm²	5.3	8.8	11.5	12.9
Flexural modulus*	ASTM D-790	N/mm²	280	447	581	648
Standard sheet	Width	mm	1219	1219	1219	1219
	Length	mm	2438	2438	2438	2438
	Thickness	mm	12 to 50	12 to 50	12 to 45	12 to 45

Finishing Optioons, other dimensions and closer tolerances upon request

* Evaluated on ¾" (20 mm) rigid sheet

The data provided gives approximate values for the nominal density. Due to density variations these values can be lower than indicated above. Minimum values to calculate sandwich constructions can be provided upon request. The information contained herein is believed to be correct and to correspond to the latest state of scientific and technical knowledge. However, no warranty is made, either expressed or implied, regarding its accuracy or the results to be obtained from the use of such information. No statement is intended or should be construed as a recommendation to infringe any existing patent.

CSI #: 06 83 13

AIREX BALTEK BANOVA

Typical properties for AIREX® PXc		Unit (imperial)	PXc.245	PXc.320	PXc.385	PXc.420
Density	ASTM C-271	lb/ft³	15	20	24	26
Compressive strength perpendicular to the plane*	ASTM C-365	psi	373	738	1136	1373
Compressive modulus perpendicular to the plane*	ASTM C-365	psi	8'044	25'882	40'153	47'288
Shear strength	ASTM C-273	psi	312	511	699	802
Shear modulus	ASTM C-273	psi	9'099	17'697	24'575	28'015
Flexural strength*	ASTM D-790	psi	773	1'272	1'672	1'871
Flexural modulus*	ASTM D-790	psi	40'608	64'827	84'203	93'890
Standard sheet	Width	in	48	48	48	48
	Length	in	96	96	96	96
	Thickness	in	½ to 2	½ to 2	½ to 1 ¾	½ to 1 ¾

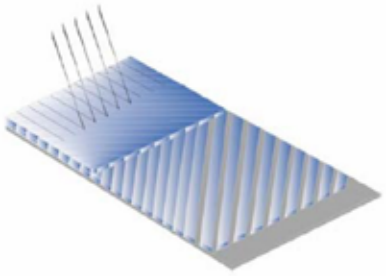
Finishing Optioons, other dimensions and closer tolerances upon request

* Evaluated on ¾" (20 mm) rigid sheet

The data provided gives approximate values for the nominal density. Due to density variations these values can be lower than indicated above. Minimum values to calculate sandwich constructions can be provided upon request. The information contained herein is believed to be correct and to correspond to the latest state of scientific and technical knowledge. However, no warranty is made, either expressed or implied, regarding its accuracy or the results to be obtained from the use of such information. No statement is intended or should be construed as a recommendation to infringe any existing patent.

CSI #: 06 83 13

VECTORPLY
Performance Composite Reinforcements



E-BXM 1208

Fiber Type: E-Glass
Archtecture: +45º/-45º Double Bias
Dry Thickness 0.036 in. / 0.91 mm
Total Weight: 20.64 oz/sq.yd / 700 g/sq.m

DNV

Roll Specifications			Fiber Architecture Data	
Roll Width:	Roll Weight:	Roll Length:	0 ° :	n/a
50 in / 1270 mm	200 lb / 91 kg	107 yd / 98 m	45 ° :	6.27 oz/sq.yd / 213 g/sq.m
			90 ° :	n/a
			- 45 ° :	6.27 oz/sq.yd / 213 g/sq.m
			Chopped Mat :	8.10 oz/sq.yd / 275 g/sq.m

1: Packaging: box or bag.
2: Weights do not include polyester stitching.

Laminated Properties	45 °	45 °
Laminate Weight		
(lb/sq.ft)	E-BXM 1208 Resin Infused	E-BXM 1208 Open Mold
Fiber	0.14	0.14
Resin	0.07	0.18
Total	0.21	0.32

Physical Properties		
	E-BXM 1208 Resin Infused	E-BXM 1208 Open Mold
Density (g/cc))	1.87	1.57
Fiber Content (% by Wt.)	68%	45%
Thickness (in)	0.022	0.039

CSI #: 06 83 13

Laminate Modulii		
(MSI)	E-BXM 1208 Resin Infused	E-BXM 1208 Open Mold
Ex	3.28	1.87
Ey	3.28	1.87
Gxy	0.84	0.39
Ex,flex.	2.99	1.71
Ey,flex.	2.99	1.71

Ultimate Stress		
(KSI)	E-BXM 1208 Resin Infused	E-BXM 1208 Open Mold
Long. Ten.	54	31
Long. Comp.	75	43
Trans. Ten.	54	31
Trans. Comp.	75	43
In-Plane Shear	21	13
Long. Flex.	81	46
Trans. Flex.	81	46

In-Plane Stiffness, "EA"		
10^3 lb/in	E-BXM 1208 Resin Infused	E-BXM 1208 Open Mold
(EA)x	71	73
(EA)y	71	73
(GA)xy	18	15

Ultimate In-Plane Load		
lb/in	E-BXM 1208 Resin Infused	E-BXM 1208 Open Mold
Long. Ten.	1,167	1,199
Long. Comp.	1,622	1,666
Trans. Ten.	1,167	1,199
Trans. Comp.	1,622	1,666
In-Plane Shear	450	502

Notes:
1: Resin infused laminate made with vinyl ester resin 200 cps viscosity @ 77° F.
2: Open mold laminate made with polyester resin.
3: All standard reinforcements should be infused with a flow aid or Vectorfusion® reinforcements.

VECTORPLY CORPORATION
3500 Lakewood Dr. Phenix City, AL 36867 tel. 334 291 7704 fax. 334 291 7743

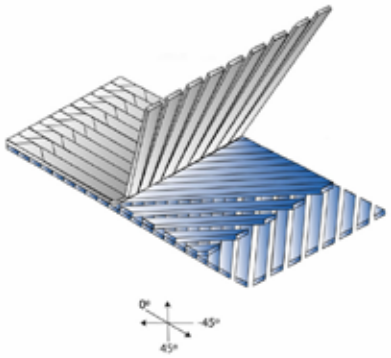
Disclaimer:

As a service to customers, Vectorply Corporation ("VP") may provide computer-generated predictions of the physical performance of a product using a reinforcement fabric produced by VP in combination with other materials or systems.

VP makes no warranty whatsoever as to the accuracy of any such predicted physical performance, and customer acknowledges that customer is solely responsible for determining the performance and fitness for a particular use of any product produced by customer utilizing a fabric or material produced or manufactured by VP. Specifications of reinforcements may change without notice.

CSI #: 06 83 13

VECTORPLY
Performance Composite Reinforcements



E-TLX 2400

Fiber Type: E-Glass
Archtecture: 0°/+45°/-45° Triaxial
Dry Thickness 0.035 in. / 0.89 mm
Total Weight: 26.11 oz/sq.yd / 885 g/sq.m

VECTORSPORTS™

DNV

Roll Specifications			Fiber Architecture Data	
Roll Width:	Roll Weight:	Roll Length:	0 ° :	15.36 oz/sq.yd / 521 g/sq.m
50 in / 1270 mm	224 lb / 102 kg	96 yd / 88 m	45 ° :	5.38 oz/sq.yd / 182 g/sq.m
			90 ° :	n/a
			- 45 ° :	5.38 oz/sq.yd / 182 g/sq.m
			Chopped Mat :	n/a

1: Packaging: box or bag.
2: Weights do not include polyester stitching.

Laminated Properties	0 °	0 °
Laminate Weight		
(lb/sq.ft)	E-TLX 2400 Resin Infused	E-TLX 2400 Open Mold
Fiber	0.18	0.18
Resin	0.08	0.15
Total	0.26	0.33

Physical Properties		
	E-TLX 2400 Resin Infused	E-TLX 2400 Open Mold
Density (g/cc))	1.90	1.69
Fiber Content (% by Wt.)	70%	55%
Thickness (in)	0.026	0.037

CSI #: 06 83 13

Laminate Modulii		
(MSI)	E-TLX 2400 Resin Infused	E-TLX 2400 Open Mold
Ex	4.06	2.95
Ey	1.89	1.35
Gxy	0.97	0.69
Ex,flex.	3.52	2.53
Ey,flex.	1.63	1.16

Ultimate Stress		
(KSI)	E-TLX 2400 Resin Infused	E-TLX 2400 Open Mold
Long. Ten.	77	56
Long. Comp.	77	56
Trans. Ten.	19	14
Trans. Comp.	19	14
In-Plane Shear	28	20
Long. Flex.	97	70
Trans. Flex.	19	14

In-Plane Stiffness, "EA"		
10^3 lb/in	E-TLX 2400 Resin Infused	E-TLX 2400 Open Mold
(EA)x	107	111
(EA)y	50	51
(GA)xy	26	26

Ultimate In-Plane Load		
lb/in	E-TLX 2400 Resin Infused	E-TLX 2400 Open Mold
Long. Ten.	2,021	2,094
Long. Comp.	2,021	2,094
Trans. Ten.	496	506
Trans. Comp.	496	506
In-Plane Shear	724	735

Notes:
1: Resin infused laminate made with vinyl ester resin 200 cps viscosity @ 77° F.
2: Open mold laminate made with polyester resin.
3: All standard reinforcements should be infused with a flow aid or Vectorfusion® reinforcements.

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Division 07

Thermal and Moisture Protection

CSI #: 07 13 54

PRIMEX PLASTICS CORPORATION

Prime ABS 750 is a general purpose ABS product that has good impact strength, and good hot strength for thermoforming. It is an amorphous thermoplastic material and therefore, processes easier than some other thermoplastic materials.

PRIME ABS 750

Prime ABS 750	High	Avg.
Impact Strength	*	
Low Temperature Impact Strength		*
Tensile Strength	*	
Flexural Modulus	*	
Heat Deflection Temperature	*	

Property	Test Method	Value	Unit
Specific Gravity	D-792	1.04	
Melt Flow	D-1238	1.7	g/10min
Gloss, 60° Angle	D-523	90	%
Tensile @ Yield	D-638	5,100	psi
Flexural Strength	D-790	8,000	psi
Flexural Modulus	D-790	270,000	psi
Notched Izod @ 73°F	D-256	6.3	ft-lb/in
Notched Izod @ - 40°F	D-256	2.2	ft-lb/in
Rockwell Hardness	D-785	102	R Scale
HDT @ 264 psi, Annealed	D-648	198	°F
Vicat Softening Point	D-1525	224	°F

Complies with UL 94-HB at thickness > .060 in. Complies with FMVSS # 302 at thickness > .050 in. Complies with FDA Regulation 21 CFR 181.32

Applications:

Prime ABS 750 may be used for interior applications such as appliance parts, tub and shower wall surrounds, and interior automotive trim. With the addition of a weatherable cap it may also be used in many outdoor applications.

Finishing:

Parts made with Prime ABS 750 may be joined with machine screws, bolts, nuts, rivets, and spring steel fasteners. Thread cutting or thread-forming screws is an economical means of securing separate joints. Formed parts may be joined with Methylene Chloride if maximum impact strength is not required. Press and snap techniques and sonic welding may also be used for the bonding of Prime ABS 750.

Processing:

Prime ABS 750 is rather easy to thermoform due to its exceptional hot strength. It can be formed on wood, epoxy, ceramic and or aluminum tools. The forming temperature has a range of 300 - 350ºF. For best results the mold temperature should be 150-190ºF. In some cases it is necessary to dry the sheet before forming.

Colors, Textures and Capabilities:

Prime ABS 750 can be color matched to meet your specific requirements. Prime ABS 750 is available in Thicknesses from .030 - .400. Textures include; Calf Grain, HC, RM, Seville, Levant II, FL/HC and Diamond Plate.

Please contact your Primex Plastics representative for more information on finishing, fabricating, or the thermoforming process.

Notice:: All statements, information, and data given herein are believed to be accurate and reliable but are presented without guarantee, warranty, or responsibility of any kind, expressed or implied. Statements or suggestions concerning possible use of our products are made without representation of warranty that such use is free of patent infringement and are not recommendations to infringe any patent. The user should not assume that all safety measures are indicated, or that other measures may not be required.

Large enough to handle YOUR requirements, small enough to handle YOUR needs.

Primex Plastics Corporation
800-222-5116
www.primexplastics.com

CSI #: 07 21 00

ROXUL
The Better Insulation

Technical Product Information

ROXUL ComfortBatt
Thermal Home Insulation

BATT INSULATION 07210*
BLANKET INSULATION 07 21 16**

General Product Information:

ROXUL® products are stone wool insulations made from basalt rock and slag. This combination results in a non-combustible product with a melting point of approximately 2150°F (1177°C), which gives it excellent fire resistance properties. ROXUL stone wool is a water repellent yet vapour permeable material.

Description & Common Applications:

ROXUL COMFORTBATT™ R10, R15, R22.5, R23, R24 & R30 are stone wool insulation products designed as a thermal insulation for wood and steel frame construction. This semi-rigid batt has a unique flexible edge designed to compress as the batt is inserted into walls, attics, ceiling and floor frames. The flexible edge springs back, expanding the batt against the frame studs to give a complete fill. COMFORTBATT compensates for normal variations in stud centres caused by distortion or warping. The special flexible characteristic at the insulation edge ensures the expected R-value is achieved.

Compliance and Performance:

ASTM C 665	Mineral Fiber Blanket Insulation	Type 1, Complies
ASTM E 136	Determination of Non-Combustibility	Non-Combustible
ASTM E 84	Surface Burning Characteristics	Flame Spread = 0 Smoke Developed = 0

Installation:

The flexible edge is identified by the marking.

INSERT

Place COMFORTBATT into opening, flexible edge against stud

FIT

Compress COMFORTBATT edge and fit batt

RELEASE

Let COMFORTBATT expand to give a full fit

The friction fit created by the COMFORTBATT expansion principle means the product will perform equally well in horizontal, sloped dormer, vertical or overhead situations. The product is notable for its "stay put" ability when installed. COMFORTBATT is easier and faster to install than traditional insulation products and achieves full R-value.

Tests carried out in 1993 by the National Research Council Of Canada (NRC) confirm that accurate fitting of insulation is essential to achieve R-values and to maintain thermal design requirements in practice. ROXUL COMFORTBATT has been designed with a flexible edge to ensure the best fit possible.

*MASTER FORMAT 1995 EDITION **MASTER FORMAT 2004 EDITION

CSI #: 07 21 00

ROXUL ComfortBatt
Thermal Home Insulation

Dimensions:

	Wood Stud	Steel Stud
R15	15.25" x 47" x 3.5" (387 mm x 1194 mm x 89 mm) 23" x 47" x 3.5" (584 mm x 1194 mm x 89 mm)	**R10** 16.25" x 48" x 2.5" (413 mm x 1219 mm x 64 mm) 24.25" x 48" x 2.5" (616 mm x 1219 mm x 64 mm)
R23	15.25" x 47" x 5.5" (387 mm x 1194 mm x 140 mm) 23" x 47" x 5.5" (584 mm x 1194 mm x 140 mm)	**R15** 16.25" x 48" x 3.5" (413 mm x 1219 mm x 89 mm) 24.25" x 48" x 3.5" (616 mm x 1219 mm x 89 mm)
R30	15.25" x 47" x 7.25" (387 mm x 1194 mm x 184 mm) 23" x 47" x 7.25" (584 mm x 1194 mm x 184 mm)	**R22.5** 16.25" x 48" x 6" (413 mm x 1219 mm x 152 mm) 24.25" x 48" x 6" (616 mm x 1219 mm x 152 mm)
		R24 16.25" x 48" x 6" (413 mm x 1219 mm x 152 mm) 24.25" x 48" x 6" (616 mm x 1219 mm x 152 mm)

This product has been specifically designed to meet your needs for wood stud and steel stud construction.

Density:
> 2 lb/ft³ (> 32 kg/m³)

Area Weight:

Thickness	Weight
2.5" (65 mm)	> 2.0 kg/m²
3.5" (89 mm)	> 2.8 kg/m²
5.5" (140 mm)	> 4.8 kg/m²
6.0" (150 mm)	> 4.8 kg/m²
7.25" (184 mm)	> 5.9 kg/m²

GREENGUARD Children & Schools Indoor Air Quality Certified

Key Application Qualifiers:
- Easily cut
- Better fit because the flexible edge compensates for normal frame variability
- Easier and faster to install
- Low moisture sorption
- Water resistant
- Non-combustible
- Fire resistant
- Excellent sound absorbency
- Chemically inert
- Does not rot or sustain vermin
- Does not promote growth of fungi or mildew
- CFC- and HCFC- free product and process
- Made from natural & recycled materials

Please consult ROXUL for all your insulation needs. We have an extensive range of products for all applications from pipe insulation to commercial products to residential batts. ROXUL invites all inquiries and will act promptly to service all of your requirements.

Note
As ROXUL Inc. has no control over installation design and workmanship, accessory materials or application conditions, ROXUL Inc. does not warranty the performance or results of any installation containing ROXUL Inc's. products. ROXUL Inc's. overall liability and the remedies available are limited by the general terms and conditions of sale. This warranty is in lieu of all other warranties and conditions expressed or implied, including the warranties of merchantability and fitness for a particular purpose.

ROXUL INC. **Milton, Ontario Tel: 905-878-8474** **Fax: 905-878-8077**
www.roxul.com **Tel: 1-800-265-6878** **Fax: 1-800-991-0110**
Revised: 26 June, 2013
Supersedes: 10 April, 2013

CSI #: 07 21 29

ROXUL COMFORTBATT®

Superior building envelope performance by ROXUL® Insulation.

ROXUL COMFORTBATT® is a semi-rigid batt insulation designed specifically for exterior wood and steel stud applications in residential and commercial construction. Made from natural stone and recycled slag, ROXUL stone wool is a high density insulation that will fit snugly into wall cavities and will not slump over time. It also adds superior acoustical performance to wall assemblies and floors and can be used in acoustic applications required by building code.

Fire-safe insulation for wall assemblies – won't burn or develop smoke

ROXUL COMFORTBATT stone wool insulation is non-combustible as determined by fire tests ASTM E 136 and CAN4-S114. It will not develop smoke or promote flame spread, even when directly exposed to fire, as most other insulation materials will.

- Extremely high melting point of 1177 °C (2150 °F)
- Does not produce smoke or toxic gases in the event of a fire
- Excellent barrier against the spread of flames to help protect occupants and reduce property damage
- Eliminates the risk of insulation accidently catching fire during installation
- Excellent Passive Fire Protection – COMFORTBATT® can add up to an additional 15 minutes of fire protection to wall assemblies

Fire test performance

CAN/ULC-S702-09	Mineral Wool Thermal Insulation for Buildings	Type 1, Complies
CAN4-S114	Determination of Non-Combustibility	Non-Combustible
ASTM E 136	Determination of Non-Combustibility	Non-Combustible
CAN/ULC S102	Surface Burning Characteristics	Flame Spread = 0 Smoke Developed = 0
ASTM E 84	Surface Burning Characteristics	Flame Spread = 0 Smoke Developed = 0
NBC 2010, Article 3.1.5.2.2	Insulation Materials	Conforms
CCMC Evaluation Listing	Master Format 07212: Mineral Wool Batt Insulation	12818-L

The Insurance Bureau of Canada (IBC) reference to NFPA 285: Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components has led to several rainscreen wall system manufacturers to test with ROXUL cavity wall insulation. The use of Spray Polyurethane Foam insulation does not allow rainscreen manufacturers to meet this requirement.

2

CSI #: 07 21 29

Thermal Batt Insulation

Performance Matters.

Managing moisture in wall assemblies

Depending on your building codes and geographic location, a vapor barrier may be required when insulating exterior wall cavities. The use of a vapor retarder will limit the amount of water vapor that will move to the outside wall – reducing condensation in the wall assembly. ROXUL COMFORTBATT® will not absorb or retain water in the event that moisture does get into the wall assembly.

When insulation material such as fiberglass gets wet, it can absorb moisture, reducing R-value and will slump or sag within the wall cavity. This can also create the risk of mold growth in the insulation. COMFORTBATT® is made from inorganic stone and does not support mold or fungus growth, even when exposed to moisture. COMFORTBATT is also vapor permeable, meaning that it will not absorb water but it if does get wet, it will dry out and maintain its R-value.

Compliance & Specification > 2 lb/ft³ 32 kg/m³

R14/15	89 mm	2.8 kg/m²
R22/23	140 mm	4.8 kg/m²
R28/30	184 mm	5.9 kg/m²
R32	200 mm	6.5 kg/m²
Density	ASTM C 612-00 – 32 kg/m³ (2 lb/ft³)	
Fire	CAN/ULC S102 Surface Burning Characteristics Flame Spread = 0 Smoke Developed = 0	
Moisture Resistance	ASTM C 1104 Moisture Sorption 0.03%	

Studies have proven that wall assemblies with gaps and voids can result in 35% loss of the stated R-value. ROXUL COMFORTBATT's higher density batts make it simple for precise cutting to ensure a fit without gaps and voids.

Better fit equals better wall performance

To ensure the labeled R-value is achieved, batt insulation in wood and steel stud wall cavities must be gap-free and void-free. Gaps and voids are most prevalent around electrical boxes, wires and pipes.

ROXUL COMFORTBATT is produced at a slight over-thickness to ensure a friction fit within the wall cavity. The batts will stay in place and perform equally well in horizontal, sloped, dormer, vertical and overhead applications.

ROXUL COMFORTBATT's unique flexible edge ensures the semi-rigid batts compress and expand between studs and joists to eliminate slumping or sagging and conform to off-standard wood studs.

Higher density batts reduce airflow within the wall cavity, reducing convective losses. This translates into a better performing and more comfortable thermal wall.

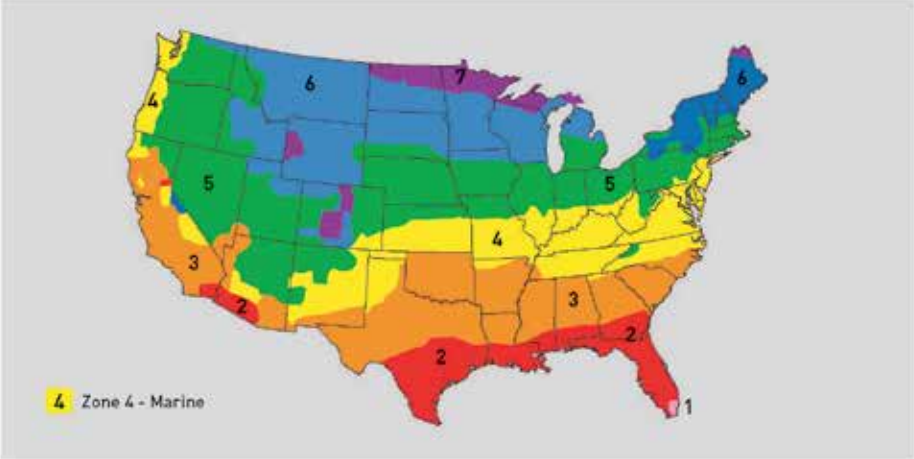
ROXUL® cuts **quickly and accurately** with a serrated knife, such as a bread knife, so you can easily achieve **optimal fit around pipes, electrical boxes, wiring, ductwork, and between studs and joists** that are less than a standard width.

3

CSI #: 07 21 29

ROXUL COMFORTBATT®

Determining your climate zone and building code requirements.



In the northern states and Canada, chances are that building code mandates a vapor control layer be installed on the warm side of the insulation. A vapor control layer in northern climates helps to reduce the moisture diffusion through the wall assembly and through to the drywall.

Vapor control layers and barriers have different permeance levels measured in perms and depending on your building code you may need to install a vapor control layer with a specific perm rating. In Canada and some northern US states, a 6 mil polyethylene sheet is commonly used, but always check with your local building code for guidance.

ASHRAE – history of R-value requirements

The American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE), is an international Society of technical individuals who provide knowledge to the building industry on heating, ventilation, air conditioning, and refrigeration (HVAC&R). The Society developed ASHRAE 90.1, an energy conservation standard that provides the minimum requirements for energy efficient buildings.

This standard, or an equivalent, is applied today in many states for commercial, government and high-rise building applications. In Canada, look to the National Building Code and refer to section A-5.3.1.2 for information on condensation and energy conservation standards.

ASHRAE map of climate zones (above)

Every rating agency has its own maps that divide regions into thermal or climate zones to tailor codes and standards to what is appropriate for that particular region.

In Zone 1, Zone 2, Zone 3 and Zone 4 (except Zone 4 Marine), no vapor retarder is required on the interior surface of insulated wall and floor assemblies while in the northern states, some form of vapor retarder is likely code mandatory.

CSI #: 07 21 29

ROXUL COMFORTBATT®

Ideal applications for COMFORTBATT® insulation.

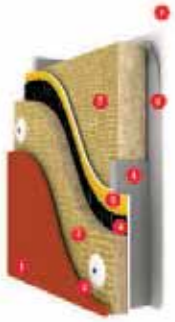
The higher density of ROXUL COMFORTBATT® ensures a snug friction fit in the wall cavity. Note: A vapor retarder may be required in the wall assembly, depending on the geographical location of the building.

The COMFORTBATT Residential Wall Assembly

(shown from outside to inside)

1. Cladding
2. Air Barrier
3. Sheathing
4. 2" x 6" Wood Studs
5. 5.5" COMFORTBATT
6. Vapor Retarder*
7. Gypsum

In addition to residential applications, ROXUL COMFORTBATT is ideal as a component of the BEDR™ cavity wall system.



BEDR Wall Components (shown from outside to inside)

1. Terra Cotta Cladding
2. 1" Air Space (1/2" minimum)
3. 1"–2" CAVITYROCK® MD Insulation (R4.2–R8.4) or 2.5"–5" CAVITYROCK® DD (R10.75–R21.5)
4. Permeable Air Barrier
5. Exterior Gypsum Board
6. 3.5" or 6" Steel Stud
7. 3.5" or 6" COMFORTBATT Insulation
8. Vapor Barrier*
9. 5/8" Gypsum Board

When insulating attics, use two layers of COMFORTBATT to achieve the required R-value. The bottom layer should run parallel to the joists and the top layer run in the opposite direction. For attics and cathedral ceilings, only a single layer of COMFORTBATT is required between the roof trusses.

The COMFORTBATT Roof/Attic Assembly

(shown from outside to inside)

1. Shingles
2. Tar Paper
3. Sheathing
4. 2" x 10" Roof Trusses
5. COMFORTBATT (R30/R32)
6. Ceiling Joists
7. COMFORTBATT (R22/R23 or R26/R30) two layers running perpendicular

4

*To achieve your local building code-approved vapor barrier/retarder requirements.

CSI #: 07 21 29

Thermal Batt Insulation

A range of COMFORTBATT® products to suit all Your building requirements.

R-Value	Available in Canada	Available in US	RSI Value	Stud/Joist Type	Thickness	Width	Length	Coverage Sq. Ft. (per bag)
Wood Stud								
R14	✔	✗	2.47	Wood	3.5"	15.25"	47"	59.7
R14	✔	✗	2.47	Wood	3.5"	23"	47"	90.1
R15	✗	✔	2.64	Wood	3.5"	15.25"	47"	59.7
R15	✗	✔	2.64	Wood	3.5"	23"	47"	90.1
R22	✔	✗	3.87	Wood	5.5"	15.25"	47"	39.8
R22	✔	✗	3.87	Wood	5.5"	23"	47"	37.5
R23	✗	✔	4.05	Wood	5.5"	15.25"	47"	39.8
R23	✗	✔	4.05	Wood	5.5"	23"	47"	37.5
R24	✔	✗	3.87	Wood	5.5"	15"	47"	29.4
R24	✔	✗	3.87	Wood	5.5"	22.75"	47"	29.9
R28	✔	✗	4.92	Wood	7.25"	15.25"	47"	29.9
R28	✔	✗	4.92	Wood	7.25"	23"	47"	30.7
R30	✗	✔	5.28	Wood	7.25"	15.25"	47"	29.9
R30	✗	✔	5.28	Wood	7.25"	23"	47"	30.7
R32	✔	✗	3.87	Wood	8"	15.25"	47"	29.9
R32	✔	✗	3.87	Wood	8"	23"	47"	30.8
Steel Stud								
R10	✔	✔	1.76	Steel	2.5"	16.25	48"	86.7
R10	✔	✔	1.76	Steel	2.5"	24.25	48"	97
R14	✔	✗	2.47	Steel	3.5"	16.25"	48"	65.8
R14	✔	✗	2.47	Steel	3.5"	24.25"	48"	64.7
R15	✗	✔	2.64	Steel	3.5"	16.25	48"	65
R15	✗	✔	2.64	Steel	3.5"	24.25"	48"	64.7
R22.5	✔	✔	3.96	Steel	6.8"	16.25	48"	43.3
R22.5	✔	✔	3.96	Steel	6.8"	24.25	48"	48.4
R24	✔	✔	4.22	Steel	6.8"	16.25	48"	43.3
R24	✔	✔	4.22	Steel	6.8"	24.25	48"	48.4

7

CSI #: 07 21 29

ROXUL COMFORTBOARD™ IS

Welcome to Today's Safe, Quiet, Energy Efficient Home

ROXUL Pushes the Building Envelope Forward

As the building industry seeks new and innovative ways to save energy and create quieter and safer homes, ROXUL leads the way with a multitude of exterior and interior insulation products designed to improve the performance of the building's envelope. The ROXUL line of fire-resistant insulation products include:

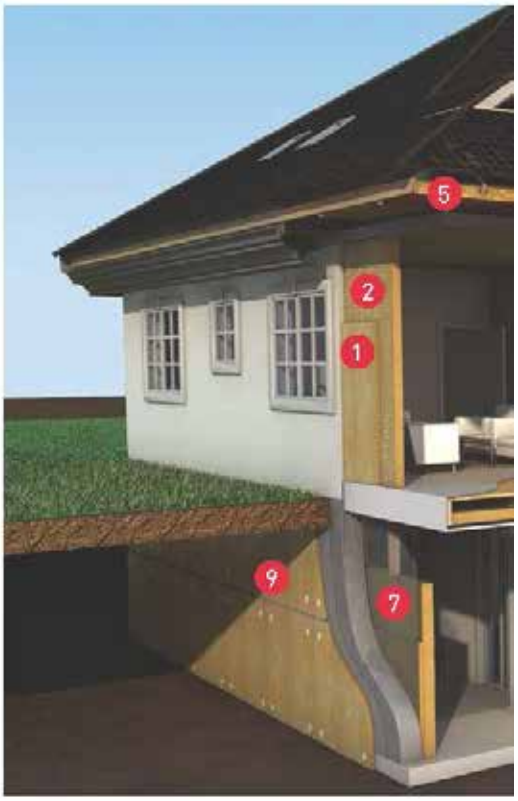
ROXUL COMFORTBOARD™ IS: Rigid stone wool insulation board fastened to outside studs to improve thermal performance to the building envelope.

ROXUL COMFORTBATT™: Thermal insulation for use in exterior walls, attics and crawl spaces. It provides indoor comfort and energy savings all year round.

ROXUL SAFE'N'SOUND™: Soundproofing insulation for use in interior walls, ceilings and floors to help create a quieter home.

ROXUL DRAINBOARD®: Rigid stone wool insulation board for fibrous foundation drainage. Its non-directional fiber structure means the boards can be installed either horizontally or vertically without any loss of drainage ability.

COMFORTBOARD™ FS: Lightweight fire separation board used in combination with ROXUL Batt Insulation as a "partition wall system." This "party" wall system improves sound dampening and fire performance, while guaranteeing moisture resistance. It also reduces labor and material costs usually associated with adding a double layer of gypsum over the wall studs.



1. COMFORTBOARD™ IS on exterior wall (outside)
2. COMFORTBATT™ R14/15 on a 2 x 4 wall
3. COMFORTBATT™ R22/23 on a 2 x 6 wall
4. COMFORTBATT™ R28/R30 in a cathedral ceiling
5. COMFORTBATT™ R28/30 + CB R14/R15 parallel on the attic
6. Multi-unit partition wall with 3.5" COMFORTBATT™ on both sides and COMFORTBOARD™ FS as fire separation board

CSI #: 07 21 29

ROXUL COMFORTBOARD™ IS

What Makes A ROXUL® Building Envelope A Better Wall System

Factors That Contribute to Superior Thermal Performance

With informed consumers and the building industry pushing for innovative solutions that are truly energy efficient, ROXUL raises the bar in developing wall systems with excellent long-term thermal performance. This is the result of two inherent properties in its BEDR™ insulating systems – lack of thermal loss due to dimensional changes, and product that is not produced with blowing agents, which can off-gas and result in lower long-term thermal performance.

As well, the use of ROXUL COMFORTBOARD IS in conjunction with COMFORTBATT in the wall cavity contributes to a higher effective R-value wall system, increasing the performance of the residential building envelope.

Fast Outward Drying

Vapor-permeable insulation like ROXUL COMFORTBOARD IS has the added benefit of allowing fast outward drying during cold weather. This dries the wood-frame cavity very quickly, even if the framing is wet from construction or becomes wet because of incidental water leaks.

Decreased Thermal Bridging

ROXUL COMFORTBOARD IS insulation helps reduce thermal bridging through wood studs, leading to a better performing thermal wall. In a typical single-family building, wood studs make up 25% of the wall surface, so it's important to ensure the use of exterior insulation to complete the building envelope.

Dimensional Stability

The dimensional stability of an insulation material is necessary for the faultless function of the wall system. Dimensional changes in materials vary according to their physical properties.

Thermal expansion co-efficients express the rate at which materials shrink or expand when cooled or heated. Made from stone wool, ROXUL COMFORTBOARD IS insulation has a smaller thermal expansion coefficient than insulation materials such as foam plastics. Poor dimensional stability can cause shrinking, expansion, and buckling of a system's insulation. These actions can lead to thermal bridging, waterproofing breaches, and unpredictable insulation performance.

Material Type	Expansion Co-Efficient 10^{-6} m/m°C	Actual Expansion at Temperature Difference 50° on a 10 Meter Board (mm)
Plywod (Dry)	3.5	2
Stone Wool	5.5	3
Concrete	12	6
Steel	12	6
Expanded Polystyrene	70	35
Extruded Polystyrene	80	40
Polyurethane	100	50
Polyisocyanurate	120	60

Some foam products may be considered vapor retarders when in excess of 2 inches. This can substantially affect the drying potential of the wall cavity and restrict the wall system from drying out, increasing the chance of mold and mildew growth. A 2" layer of XPS has an approximate perm rating of 0.55, which is classified as semi-impermeable. In comparison, COMFORTBOARD IS has a perm rating of 30 and is classified as vapor-permeable.

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BUILDING ENVELOPE DESIGN BY ROXUL®

ROXUL® Stone Wool Outperforms Plastic Foams and Fiberglass

More "Breathability" than Plastic Foams

COMFORTBOARD IS is moisture resistant, yet vapor-permeable insulation (30 perms) and will allow transient vapors to pass through without restriction. This unique vapor-permeable quality of insulation allows for an increased potential for drying "breathability" without trapping moisture in the wall assembly. The stone wool insulation in a BEDR™ wall assembly does not wick water, which means that any bulk water that contacts the outer surface will drain and not be absorbed into the body of the insulation.

Wall with XPS [Water Content [kg/m³]]

Layer/Material	Start of Calc.	End of Calc.	Min.	Max.
Brick (Old)	3.34	9.34	1.76	51.08
Air Layer 25 mm	1.88	7.72	0.89	10.16
1" Extruded Polystyrene Insulation (XPS)	0.31	0.58	0.23	0.77
Spun Bonded Polyolefine Membrane (SBPI	0.00	0.00	0.00	0.00
Oriented Strand Board	88.25	78.66	71.09	89.53
Fiberglass	1.86	0.88	0.41	1.87
Vapor Retarder (0.1 perm)	0.00	0.00	0.00	0.00
Interior Gypsum Board	8.65	4.43	2.75	8.65

Wall with ROXUL COMFORTBOARD IS
[Water Content [kg/m³]]

Layer/Material	Start of Calc.	End of Calc.	Min.	Max.
Brick (Old)	3.34	9.36	1.94	51.50
Air Layer 25 mm	1.88	8.15	0.97	9.71
1.5" ROXUL COMFORTBOARD IS	0.02	0.04	0.01	0.12
Spun Bonded Polyolefine Membrane (SBPI	0.00	0.00	0.00	0.01
Oriented Strand Board	88.25	90.99	49.79	95.28
ROXUL COMFORTBATT	0.07	0.06	0.01	0.10
Vapor Retarder (0.1 perm)	0.00	0.00	0.00	0.00
Interior Gypsum Board	8.65	4.44	2.75	8.65

Better Acoustics

As building trends move towards higher density communities, it's time to start thinking about improving acoustics on exterior walls – planes, trains and automobiles all contribute to noisier living space and with a ROXUL stone wool wall system, that noise can be significantly reduced. Compared to other types of insulation, the stone wool content of BEDR™ wall systems provides increased density and effectively reduces airflow and, essentially, sound transmission.

Acoustical Performance

ASTM C423
CO-EFFICIENTS AT FREQUENCIES

Thickness	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	NRC
1.5"	0.21	0.64	0.92	1.00	0.95	1.01	0.90
2.0"	0.43	0.78	0.90	0.97	0.97	1.00	0.90
3.0"	0.75	0.82	0.89	0.96	1.00	1.00	0.90

Results: Stone wool on the outside of the studs will at a maximum increase water content from 0.01 to 0.12 and COMFORTBATT between the studs from 0.01 to 0.10. XPS has an increase from .23 to .77 and fiberglass between the studs from .41 to 1.87. Ten air changes/hour were included in the calculation.

ROXUL

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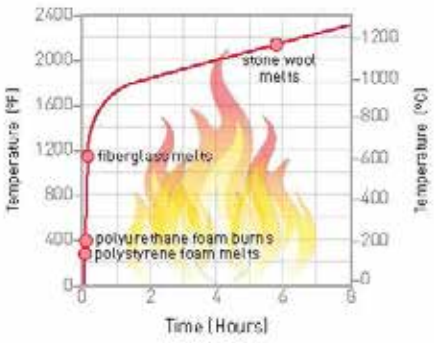
ROXUL COMFORTBOARD™ IS

ROXUL® Stone Wool: Fire-Resistant, Non-Combustible Insulation

A key feature of ROXUL® insulation is fire resistance. COMFORTBOARD IS is classified as "non-combustible" as determined by ASTM E136 and CAN4-S114. It will not develop toxic smoke or promote flame spread, even when directly exposed to fire, as most other insulation materials do. By comparison, combustible extruded polystyrene (XPS) foam results, when tested to ASTM E84, typically achieve smoke developed up to 175 and can contribute to the spread of fire. The risk of fire spread during construction or after occupancy is considerably reduced when non-combustible ROXUL COMFORTBOARD IS is used.

Temperature Development in a Standard Fire (ASTM E119)



Fire Safety: Stone Wool Versus Foam

More recently, as a result of the Shanghai fire in 2010, new concerns have been raised about fire safety during construction. In the case of the Shanghai fire, foam insulation was ignited accidentally during construction and quickly spread through the building exterior. Because of these safety concerns, ROXUL firmly believes in the added value that passive fire resistance provides for buildings.

The severity of the Shanghai fire was partially a result of the use of urethane foam insulation, which aided in the spread of flame and smoke.

Fire Performance

Specification	Test	Result
ASTM E 136	Behavior of Materials at 750 °C (1382°F)	Non-Combustible
CAN/ULC S114	Test for Non-Combustibility	Non-Combustible
ASTM E 84 (UL 723)	Surface Burning Characteristics	Flame Spread = 5 Smoke Developed = 10
CAN/ULC S102	Surface Burning Characteristics	Flame Spread = 5 Smoke Developed = 10

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BUILDING ENVELOPE DESIGN BY ROXUL®

ROXUL® Stone Wool : Meeting the Demands for Higher R-Values of Tomorrow

ROXUL Building Envelope - North American Performance Matrix

				COMFORTBATT® 16" On Center 3.5"		COMFORTBATT® 24" On Center 3.5"		COMFORTBATT® 16" On Center 5.5"		COMFORTBATT® 24" On Center 5.5"		
				CANADA	U.S.	CANADA	U.S.	CANADA	U.S.	CANADA	U.S.	
				R14	R15	R14	R15	R22	R23	R22	R23	
A	COMFORTBOARD™ IS	1.25"	R 5.0	19.00	20.00	19.00	20.00	27.00	28.00	27.00	28.00	NOMINAL R-VALUE
				15.96	16.66	16.36	17.06	23.14	23.84	23.77	22.42	EFFECTIVE R-VALUE
B	COMFORTBOARD™ IS	1.5"	R 6.0	20.00	21.00	20.00	21.00	28.00	29.00	28.00	29.00	NOMINAL R-VALUE
				16.96	17.66	17.36	18.06	22.14	22.84	22.77	23.42	EFFECTIVE R-VALUE
C	COMFORTBOARD™ IS	2.0"	R 8.0	22.00	23.00	22.00	23.00	30.00	31.00	30.00	31.00	NOMINAL R-VALUE
				18.96	19.66	19.36	20.06	24.14	24.84	24.77	25.42	EFFECTIVE R-VALUE
D	COMFORTBOARD™ IS	3.0"	R 12.0	26.00	27.00	26.00	27.00	34.00	35.00	34.00	35.00	NOMINAL R-VALUE
				22.96	23.66	23.36	24.06	28.14	28.84	28.77	29.42	EFFECTIVE R-VALUE
E	NONE			14.00	15.00	14.00	15.00	22.00	23.00	22.00	23.00	NOMINAL R-VALUE
				10.96	11.66	11.36	12.06	16.14	16.84	16.77	17.42	EFFECTIVE R-VALUE

Bridging The Gap Between Stated R-Value Vs Effective R-Value

A material's R-value is the measure of its resistance to heat flow. The higher the R-value, the more the material insulates. Stated R-value tests measure only thermal resistance, not taking into account factors such as:

- Air infiltration due to leakage through gaps
- Permeability of system components
- Convection flows within the wall system
- Thermal mass of components
- Thermal bridging across the building envelope

While the stated or nominal R-value of an insulation product is important, excluding factors such as those listed will alter the effective R-value of the wall system.

In real-world performance, the installation of ROXUL COMFORTBOARD IS as the sheathing and ROXUL COMFORTBATT as the wall cavity insulation results in a building envelope that is less susceptible to air infiltration, slumping, and internal convection, especially when compared to fiberglass, plastic foams and other insulation products.

ROXUL

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ROXUL COMFORTBOARD™ IS

The ROXUL® BEDR™ Wall System: Applications and Installation

BEDR™ Wall Applications (Outside Wall to Interior Wall)

Vinyl Wall Components

1. Vinyl Siding
2. Fasteners
3. 1 x 3 Furring Strips
4. 1.25" (R5) to 3" (R12) of Insulating ROXUL COMFORTBOARD™ IS Sheathing
5. Exterior Air/Moisture Barrier Membrane
6. Structural Sheathing
7. (2 x 6) Stud Wall @ 24" o.c.
8. ROXUL COMFORTBATT™ Cavity Insulation
9. Vapor Control Layer
10. Gypsum Wall Board

Wood Fiber Wall Components

1. Wood Lap Siding
2. Fasteners
3. 1 x 3 Furring Strips,
4. 1.25" (R5) to 3" (R12) of Insulating ROXUL COMFORTBOARD™ IS Sheathing
5. Exterior Air/Moisture Barrier Membrane
6. Structural Sheathing
7. (2 x 6) Stud Wall @ 24" o.c.
8. ROXUL COMFORTBATT™ Cavity Insulation
9. Vapor Control Layer
10. Gypsum Wall Board

Brick Wall Components

1. Brick
2. Air Space
3. Metal Brick Ties
4. 1.25" (R5) to 3" (R12) of Insulating ROXUL COMFORTBOARD™ IS Sheathing
5. Exterior Air/Moisture Barrier Membrane
6. Structural Sheathing
7. (2x6) Stud Wall @ 24" o.c.
8. ROXUL COMFORTBATT™ Cavity Insulation
9. Vapor Control Layer
10. Gypsum Wall Board

Cement Board Wall Components

1. Cement Board
2. Fasteners
3. 1 x 3 Furring Strips
4. 1.25" (R5) to 3" (R12) of Insulating ROXUL COMFORTBOARD™ IS Sheathing
5. Exterior Air/Moisture Barrier Membrane
6. Structural Sheathing
7. (2 x 6) Stud Wall @ 24" o.c.
8. ROXUL COMFORTBATT™ Cavity Insulation
9. Vapor Control Layer
10. Gypsum Wall Board

Installation Recommendations

ROXUL COMFORTBOARD IS high-performance residential wall system boards should be installed on the exterior wood stud frame in combination with COMFORTBATT insulation within the wood stud cavity.

How to Attach the Insulation Boards

COMFORTBOARD IS should be attached to wood studs using roofing nails (or wood screws) with heads/washers with a minimum diameter of 1" (25 mm) at spacing no more than 12" on center along the perimeter of the board and along the studs. When properly installed, the product's rigid, yet flexible edges allow for a tightly butted edge where boards meet on the wall, further increasing the building's thermal performance.

Vinyl and Wood Siding

- Minimum 1" x 3" furring strip be placed vertically with screw attachment of 16" o.c. for 16" on wood studs and 12" o.c. for 24" on center wood studs.
- #8 or #10 screws recommended.
- Each screw must have a minimum embedment of 1" into the wood stud or substrate.

Brick

- Metal ties or anchors required for nailing into the framing through the insulation boards (to building code requirements).
- 1" (25 mm) space between the masonry and insulation required.

Air/Moisture Barrier

- Air/moisture barrier is required as per building code and necessary for effective air tightness.
- Air/moisture barrier should be applied on the inner side of the insulation board and should be continuous.

Available Sizes

Thickness	1.25"	1.5"	2.0"	3.0"
R-value	R5	R6	R8	R12

Standard board sizes available 2' x 4' and 3' x 4'. Check with dealer for non-standard board sizes.

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BUILDING ENVELOPE DESIGN BY ROXUL®

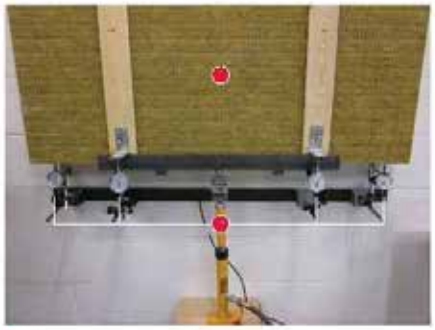
ROXUL COMFORTBOARD™ IS: Superior Cladding Load Performance

Exterior Insulation Deflection Test Results

World-renowned Building Science Corporation (BSC) performed load and deflection testing of COMFORTBOARD IS under various fastener embedded situations with the results shown below.

Under common cladding loads, all the insulations tested showed very little deflection (<0.01" [0.25 mm]) up to 12 pounds per square foot (psf) at the loads imposed by lap siding (of wood, vinyl, or fiber cement).

The testing also showed no significant difference at various fastener embedment (in framing, in OSB or combination) at loads less than 20 psf. The tests assumed studs at 24" o.c. and fasteners at a maximum of 16" vertical spacing through 1 x 3 furring strips to simulate worst-case scenario.



1. ROXUL COMFORTBOARD IS attached to wall frame.
2. Hydraulic ram with load cell and deflection gauge measuring strapping movement.

The purpose of the study was to quantify the relationship between cladding gravity loads and deflection under cladding weights up to 30 pounds PSF. Results: All insulations showed minimal load deflection.

Exterior Insulation Load and Deflection Performance

Summary of Deflection Results at 1000 lbs					Est Deflection (inches) in Service for Typical Cladding Loads	
Test Series	Test Description	1st Loading (inches)	2nd Loading (inches)	3rd Loading (inches)	Vinyl Siding (1 PSF)	Fiber Cement Siding (4 PSF)
1	1 ½" COMFORTBOARD™ IS, #8 3" screws, all embedded in framing	.034	.018	.019	<0.01	<0.01
2	1 ½" COMFORTBOARD™ IS, #8 3" screws, none embedded in framing	.050	.026	.026	<0.01	<0.01
3	1 ½" COMFORTBOARD™ IS, #8 3" screws, embedded in top & bottom plate	.070	.036	.032	<0.01	<0.01
4	1 ½" COMFORTBOARD™ IS, #10 3" screws, all embedded in framing	.030	.016	.016	<0.01	<0.01
5	1 ½" COMFORTBOARD™ IS, 16d 3.5" nails, all embedded in framing	.043	.026	.027	<0.01	<0.01
6	3" COMFORTBOARD™ IS, #10 5" screws, all embedded in framing	.047	.023	.023	<0.01	<0.01

ROXUL

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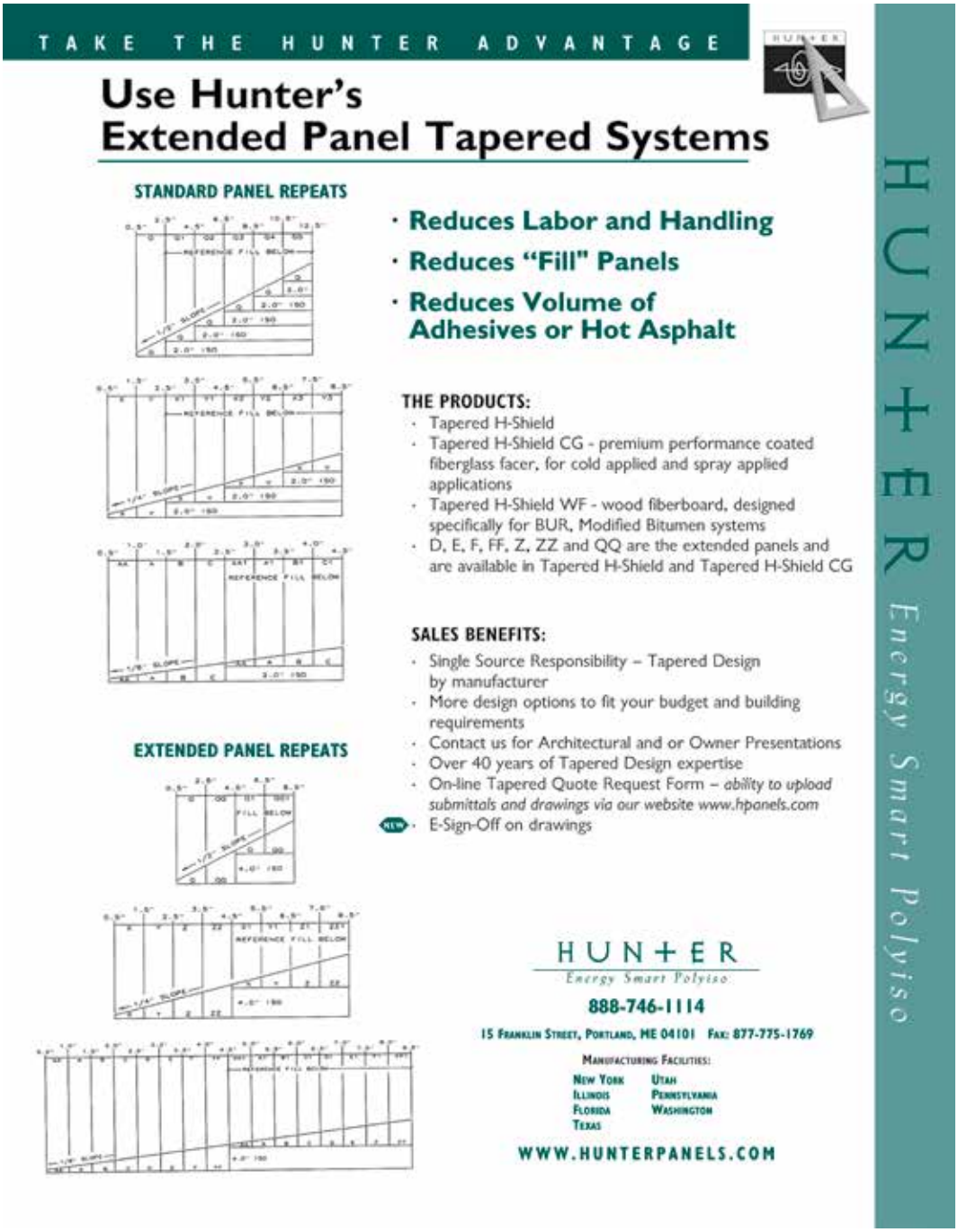
TAKE THE HUNTER ADVANTAGE
Use Hunter's
Extended Panel Tapered Systems
STANDARD PANEL REPEATS
EXTENDED PANEL REPEATS
· Reduces Labor and Handling
· Reduces "Fill" Panels
· Reduces Volume of Adhesives or Hot Asphalt
THE PRODUCTS:
· Tapered H-Shield
· Tapered H-Shield CG - premium performance coated fiberglass facer, for cold applied and spray applied applications
· Tapered H-Shield WF - wood fiberboard, designed specifically for BUR, Modified Bitumen systems
· D, E, F, FF, Z, ZZ and QQ are the extended panels and are available in Tapered H-Shield and Tapered H-Shield CG
SALES BENEFITS:
· Single Source Responsibility – Tapered Design by manufacturer
· More design options to fit your budget and building requirements
· Contact us for Architectural and or Owner Presentations
· Over 40 years of Tapered Design expertise
· On-line Tapered Quote Request Form – ability to upload submittals and drawings via our website www.hpanels.com
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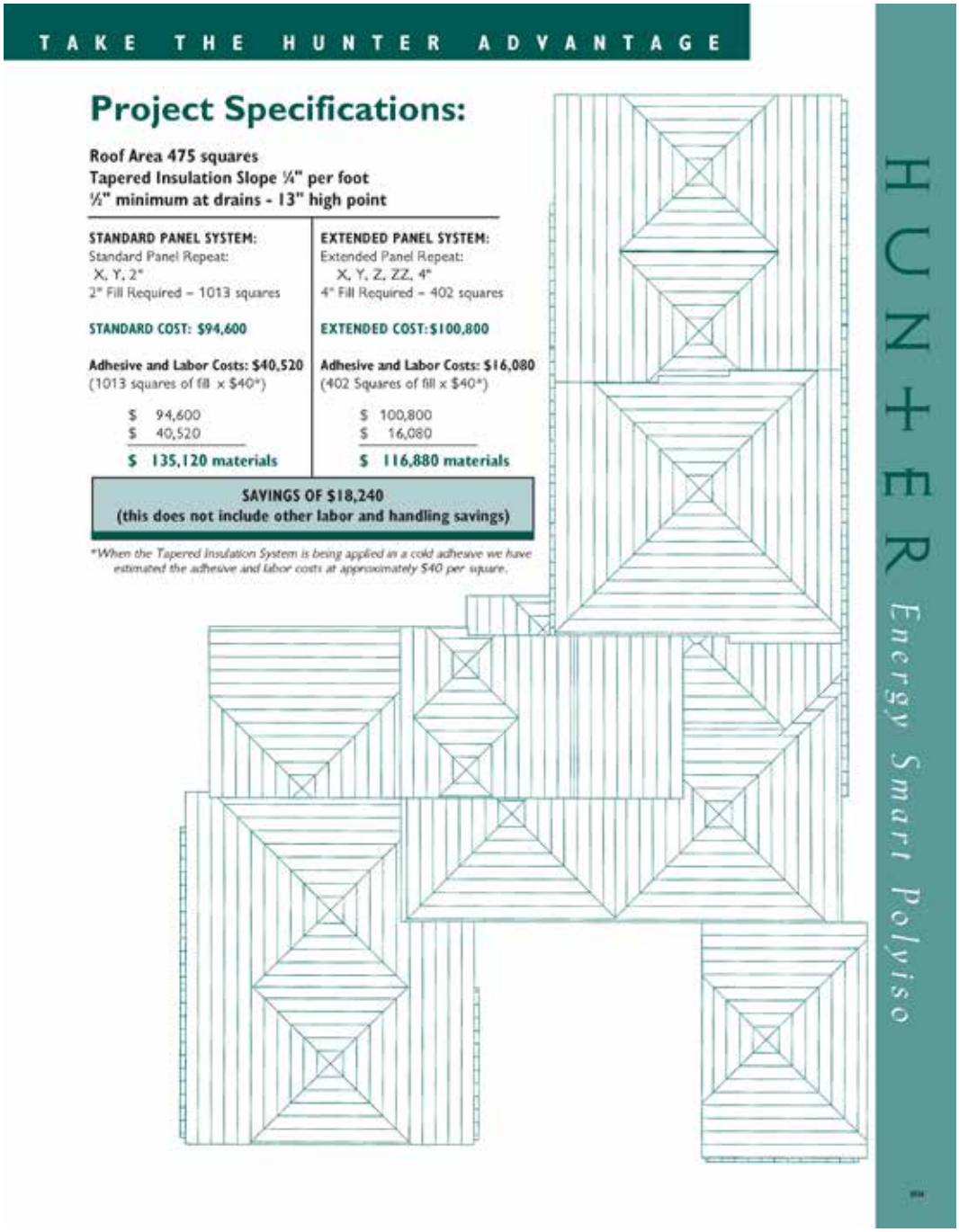
TAKE THE HUNTER ADVANTAGE
Project Specifications:
Roof Area 475 squares
Tapered Insulation Slope ¼" per foot
½" minimum at drains - 13" high point
STANDARD PANEL SYSTEM:
Standard Panel Repeat:
X, Y, 2"
2" Fill Required – 1013 squares
STANDARD COST: $94,600
Adhesive and Labor Costs: $40,520
(1013 squares of fill x $40*)
$ 94,600
$ 40,520
$ 135,120 materials
EXTENDED PANEL SYSTEM:
Extended Panel Repeat:
X, Y, Z, ZZ, 4"
4" Fill Required – 402 squares
EXTENDED COST: $100,800
Adhesive and Labor Costs: $16,080
(402 Squares of fill x $40*)
$ 100,800
$ 16,080
$ 116,880 materials
SAVINGS OF $18,240
(this does not include other labor and handling savings)
*When the Tapered Insulation System is being applied in a cold adhesive we have estimated the adhesive and labor costs at approximately $40 per square.
HUNTER Energy Smart Polyiso

CSI #: 07 22 22

Product Data Sheet
Edition: 01/2014
Version no.: 0010

Sarnatherm - Tapered Insulation

Cellulosic Felt Facer ___ Glass Fiber Mat Facer___

Overview:	Sarnatherm is a rigid polyisocyanurate insulation board that comes with either a glass fiber reinforced cellulosic felt facer or coated polymer bonded glass fiber mat facer. Sarnatherm is installed directly on the roof deck or directly on the old roof surface prior to application of the Sika Sarnafil membrane. Sarnatherm with a felt facer has one marked side that can be used for hot BUR and midified bitumen. Sarnatherm with a glass mat facer CANNOT be used with hot-applied systems.
Composition:	The core of Sarnatherm is isocyanurate foam. Sarnatherm with a felt facer has between 16% and 43% by weight recycled content depending on thickness (55% post consulmer, 45% post-industrial). Sarnatherm with a glass facer does not have any recycled content. Sarnatherm is available in 4 ft x 4 ft (1.2 m x 1.2 m) or 4 ft x 8 ft (1.2 m x 2.4 m) sizes and various thickness depending upon the Sika Sarnafil roof system and thermal resistance requirements.
Features:	Sarnatherm is compatible with all Sarnafil membranes and systems without the use of a separation layer or an overlayment on most applications. Sarnatherm is installed in multiple layers. The tapered configuration enhances rooftop drainage.
Packaging:	Sarnatherm is provided in labeled bundles that are wrapped in a protective polyethylene film for protection ***DURING TRANSIT ONLY***. The amount of Sarnatherm per bundle varies with board thickness and type.
Storage:	Factory applied packaging is intended only for protection during transit. When stored outdoors or on the job site, the insulation should be stacked on pallets at least four inches above ground level and completely covered with a weatherproof covering such as a tarpaulin. The temporary factory-applied packaging should be slit or removed to prevent accumulation of condensation. Roof insulation which has become wet or damaged should be removed and replaced with solid, dry insulation.
Installation:	Sarnatherm is installed by a Sika Sarnafil Authorized Applicator. Sarnatherm may be installed either by mechanical-attachment to the roof deck with Sarnafasteners and Sarnaplates, by full attachment with low rise sprayed urethane foam or hot asphalt, or partial attachment with foam adhesive (options depend on deck type and Sika Sarnafil system to be installed). Contact Sika Sarnafil regarding alternative methods of attachment.
Availability:	Sarnatherm is available directly from Sika Sarnafil Authorized Applicators when used within a Sika Sarnafil Roofing or Waterproofing System. Contact Sika Sarnafil or visit our website usa.sarnafil.sika.com for further information.
Warranty:	As a Sika Sarnafil-supplied accessory, Sarnatherm is included in Sika Sarnafil's System Warranty.
Maintenance:	Sarnatherm requires no maintenance. Areas of frequent rooftop traffic may require protection from damage.

Sika®

Sarnafil®

CSI #: 07 22 22

Technical: Sika Sarnafil provides technical support. Technical staff is available to advise applicators as to the proper installation method.

Technical Data (as manufactured)
for ASTM C1289-06, Type II, Class 1, Grade 2:

THICKNESS		SLOPE		AVERAGE	
in.	mm	foot	30.5 cm	LTTR	[1]RSI
0.5-1.0	12-25	1/8"	3 mm	4.2	0.74
1.0-1.5	25-38	1/8"	3 mm	7.0	1.24
1.5-2.0	38-50	1/8"	3 mm	9.9	1.75
2.0-2.5	50-63	1/8"	3 mm	12.9	2.28
0.5-1.25	12-32	1/4"	6 mm	5.6	0.99
1.5-2.5	38-63	1/4"	6 mm	11.4	2.01
0.5-2.5	12-63	1/2"	12 mm	8.5	1.5
PRE-CUT CRICKETS					
in.	mm	foot	30.5 cm	LTTR	[1]RSI
0.5-1.5	12-38	1/4"	6 MM	6	1.06
1.5-2.5	38-63	1/4"	6 MM	12.1	2.13
0.5-2.5	12-63	1/2"	12 MM	9.0	1.58
2.0	50	N/A	N/A	12.1	2.13

Standard Thicknesses Are Listed. Contact Your Regional Office For Other Available Thicknesses.
LTTR (long term thermal resistance) values were determined in accordance with CAN/ULC-S770-09. Test samples were third party selected and tested by an accredited material testing laboratory. The LTTR results were reviewed by FM Global and certified by the PIMA Quality Mark Program.
[1]RSI is the metric expression of R-value (m²·K/W).
[2]Multilayer application is strongly recommended when the total insulation thickness exceeds 2.5"

Property	Test Method	Typical
Compressive Strength	ASTM D1621	20 psi (140 kPa)
Water Vapor Transmission	ASTM E96 CAN/ULC	<1.5 perm (85.0 ng/(Pa·s·m²)), >60.0ng/ (Pa·s·m²)
Product Density	ASTM D 1622	2.0 pcf nominal (32.04 kg/m³)
Flame Spread	ASTM E84 (10 min.)	[3]40-60
Smoke Development	ASTM E84 (10 min.)	[3]50-170
Dimensional Stability	ASTM D2126	<2.0% (L x W)
Water Absorbtion	ASTM C209 & D2842	<1.5%, <3.5%
Tensile Strength	ASTM D1623	>730 psf (35 kPa)
Service Temperature	--	-100° to 250°F (-73°C / 121°C)

[3]Numerical ratings are not intended to reflect the performance under actual fire conditions. Flame spread index of < 75 and smoke development < 450 meet code requirements for foam plastic roof insulation. Codes exempt foam plastic insulation when used in FM 4450 or UL 1256.

Technical Product Data (typical values): Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

- **ASTM C1289, Type II, Class 1, Grade 2 (20 psi) or Grade 3 (25 psi)** • **CAN/ULC-S704, Type 2, Class 3 or Type 3, Class 3** • **CCMC No. 12464-L**
- **UL Certified for Canada** – Insulated Roof Deck Assemblies Construction No. C38 and 52, Meet CAN/ULC-S126, CAN/ULC-S101 and CAN/ULC-S107
- **UL Standard 1256 Classification** – Construction No. 120, 123 & 292 • **UL Standard 790 (ASTM E108)** Roofing Systems Classification
- **UL Standard 263 (ASTM E119)** Fire Resistance Classification • **UL Standard 1897** Uplift Resistance
- IBC Chapter 26 & NBC Sections on Foam Insulation
- California Water Insulation Quality Standards and Title 24 Foam Flammability Criteria (License #TC 1210) • Miami-Dade County Approved
- State of Florida Product Approval (FL6796) • FM Standard 4450-4470 Approved Refer to FM Approvals® RoofNav for Specific System Details

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CSI #: 07 25 00

CONTEGA FC

pro clima®

Vapor retarding airtight sealing tape to connect corners, window openings/joist penetrations to solid and plastered construction.

Technical properties

- Adhesion by solvent-and plasticizer-free, age-resistant, water-resistant solid adhesive acrylic - waterproof
- Minimum application temp: 15 F°
- Bonding withstands temperatures between -40 F° and 194 F°
- Shelf live: 24 months (dry and cool)
- Very low VOC content
- Permeability 1.4 perm - Sd value: 2.3m
- Color: light blue
- High initial adhesion strength

Roll length:	49'-2.5" (30m)
Roll width:	3-3/8" (85mm)
One adhesive strip with release paper, width	7/8" (20mm)

Technical Specs

Layer	Material
Carrier	Non-woven Polypropylene
Membrane	Special membrane from Polypropylene copolymer
Adhesive	Solid Acrylic
Release paper	Three strips of siliconized PE-Foil

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CSI #: 07 25 00

Grace Below Grade Waterproofing

GRACE

BITUTHENE® EDGEGUARD® TAPE

Specially formulated, solvent resistant overbanding tape for Bituthene applications in chemically contaminated ground

Product Description

Bituthene® Edgeguard® Tape is a specially formulated tape designed for applications where resistance to hydrocarbon contaminated soil is required.

It is constructed of a 0.002 in. (0.05 mm) polyester film with a pressure sensitive, solvent resistant acrylic adhesive. The adhesive bond increases with age.

Advantages

- **Solvent resistant**—protects Bituthene compound from prolonged exposure to organic or fuel oils and solvents in the ground
- **System compatibility**—engineered specifically for use with Bituthene membranes
- **Self-adhered**—easy to use; adhesive bond increases with age

Use

Bituthene Edgeguard Tape is recommended for use over the membrane edges to protect the adhesive from prolonged exposure to hydrocarbon contaminated soil.

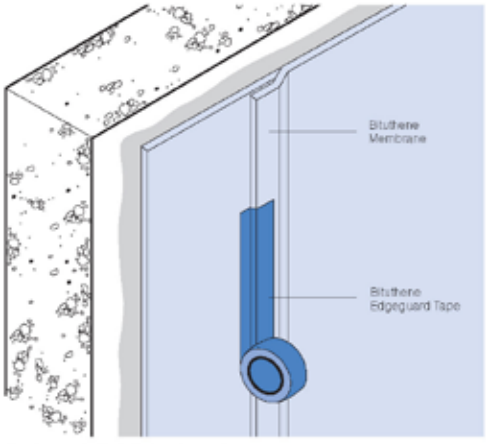
For guidelines on the use of Bituthene membranes in contaminated ground, please refer to Technical Letter 4, available at www.graceconstruction.com or from Technical Service.

Application

On vertical and horizontal applications, place a continuous strip of tape centered on all membrane side and end lap edges. Membrane surface must be clean and dry. In cooler temperatures, gently heat tape to enhance adhesion characteristics. Roll tape application with hand roller to maximize adhesion. Inspect application thoroughly, patch fish-mouths with additional strips of tape as necessary to provide a tight seal.

Product Advantages

- Solvent resistant
- System compatibility
- Self-adhered



Drawings are for illustration purposes only.
Please refer to www.graceconstruction.com for specific application details.

CSI #: 07 25 00

Supply

Bituthene Edgeguard Tape	
Roll size	50 mm x 66 m (2 in. x 216 ft)
Packaging	24 rolls/carton
Weight	8 kg (16 lbs)/carton
Coverage	1 roll per 3 rolls of Bituthene membrane

Equipment by others: Utility knife, hand roller

Physical Properties

Property	Typical Value	Test Method
Thickness	0.002 in. (0.05 mm) nominal	ASTM D3652
Tensile strength	20 lbs/in. (350 N/100 mm) minimum	ASTM D3759
Elongation at break	70% minimum	ASTM D3759
Adhesion to steel	48 oz/in. (53 N/100 mm) minimum	ASTM D3300
Puncture resistance	50 lbs (222 N) minimum	ASTM E154

Solvent Resistance Performance Test

Bituthene Edgeguard Tape is applied to an aluminum substrate 72 hours prior to a 7 2 hour immersion in the following environments: distilled water, lubricating oil, hydraulic oil, motor oil, diesel fuel, kerosene and mineral spirits. In all of the above environments the adhesion is 48 oz/in. (53 N/100 mm).

Safety, Storage and Handling Information

Bituthene products must be handled properly. Vapors from solvent-based primers and mastic are harmful and flammable. For these products, the best available information on safe handling, storage, personal protection, health and environmental considerations has been gathered. Material Safety Data Sheets (MSDS) are available at www.graceconstruction.com and users should acquaint themselves with this information. Carefully read detailed precaution statements on product labels and the MSDS before use.

www.graceconstruction.com

For technical assistance call toll free at 866-333-3SBM (3726)

Bituthene and Edgeguard are registered trademarks of W. R. Grace & Co.–Conn.

We hope the information here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for the users' consideration, investigation and verification, but we cannot warrant the results to be obtained. Please read all statements, recommendations or suggestions in conjunction with our conditions of sale, which apply to all goods supplied by us. No statement, recommendation or suggestion is intended for any use which would infringe any patent or copyright. W. R. Grace & Co.–Conn., 62 Whittemore Avenue, Cambridge, MA 02140. In Canada, Grace Canada, Inc., 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

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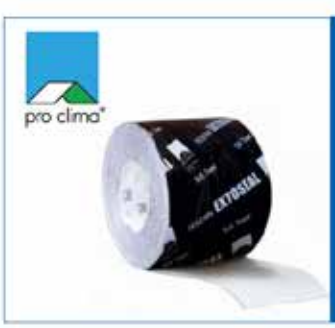
GRACE

CSI #: 07 25 00

EXTOSEAL ENCORS



Waterproof window sill tape with high adhesion strength for extreme flexibility

BENEFITS

Self-sealing watertight adhesive tape with high adhesion for creating window sills, can be applied on damp and cold surfaces. Release strips allow for step by step application to frame, sill and vertical sheathing. Form fitting around surfaces and corners, to form "one-piece" sills. Bonds to brick, concrete, and wood fiber boards, without the need for primers.

PRODUCT PROPERTIES

- Acrylic modified butyl adhesive works in cold weather (min. -4°F)
- Very elastic carrier foil with particularly low restoring forces: it can be flexibly adapted to surfaces and corners - for one-piece sill pans in any size and weather
- Protects structural elements from water ingress: watertight and blocks rising damp
- Extremely high adhesion even to slightly damp and cold surfaces
- Bonds to uPVC, wood, fiberglass, and cementitious/concrete substrates
- Self sealing around nails and screws

	Width	Length
EXTOSEAL ENCORS 6"	5.9" - 150 mm	66' 7" (20 m)
EXTOSEAL ENCORS 8"	7.9" - 200 mm	66' 7" (20 m)
EXTOSEAL ENCORS 12"	11.8" - 300 mm	66' 7" (20 m)

APPLICATION

Follow the EXTOSEAL ENCORS application guide found on fourseventive.com.

To make a durable bond the substrate should be stable, dry, smooth and free of dust, silicones and grease. Taped joints shouldn't be permanently exposed to tensile forces/stresses. Adhesion to objects that have been frozen over is not possible.

The best adhesion results and protection of the structure is achieved by using high-quality substrates. You are responsible for checking the suitability of the substrate, when in doubt an adhesion tests is recommended.

Solution for very cold temperatures: the tape is self-bonding under the effect of heat.

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EXTOSEAL ENCORS

TECHNICAL SPECS	
Carrying membrane	Elastic PE carrier film
Adhesive	Butyl rubber modified with acrylate
Release paper (3 strips)	Double slit siliconized PE-Foil; strips are app. 3/4" - 5/8" - 1" wide (12 / 23/ 25 mm)
Color	Butyl rubber: grey, film: black
Mass per area (DIN EN 1849-2)	App. 3.9lb/sf - 19 kg/m2
Thickness (DIN EN 1849-2)	App. 43mil - 1.1mm
Application temp	From 15 °F to 95 °F, -10 °C to +35 °C
Long term temperature resistance	-20 °F to +176 °F, -20 °C to +80 °C
Storage	Cool and dry

SUBSTRATES

Waterproof tape with high adhesion for creating window sills on most common construction materials. Bonding and adhesion is possible on ProClima SOLITEX membranes, planed and painted wood, high density plastic or metal (e.g. pipes, windows), concrete, OSB, plywood, fiberboard, hard plastics, and metals.

Prep wood fiber insulation boards and other unstable substrates (concrete, brick, Foamglas and splintering/oily OSB) with TESCON Primer RP before taping them.

Also suitable for creating robust valleys in underlayment of roofs.

GENERAL CONDITIONS

Bonds should not be subjected to tensile strain.

Press firmly to secure the adhesive tape. Make sure there is sufficient back-pressure when pressurizing tape. For best airtight/waterproof results avoid creases in membranes/tapes and use PRESSFIX tool for optimal pressurization. When temperatures are below freezing (32F) the tape becomes slightly less stretchy.

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CSI #: 07 25 00

SOLITEX MENTO 1000

pro clima®

3-layer very vapor open, WRB, subroof- and rainscreen membrane for plywood, OSB and insulation-boards. Conforms to all AC38 requirements for weather resistive barriers.

Roll width	59" (1.5m)
Roll length	164' (50m)
Roll area:	807 square feet (150m2)

Technical properties

- Air permeance 0.00004cfm/ft2 – 100x better than the testing threshold
- Withstands temperatures between -40 F° and 194 F°
- Weather exposure: 3 months
- Water column over 32.8' (10m)
- Life Expectancy 60 year +
- 38 Perm (ASTM E96-B), Sd-value < 0.05m (DIN EN 12572)
- Thickness 15.5 mils (0.40mm)
- Tension resistance:
  - 205N/50mm parallel
  - 170N/50mm perpendicular (DIN 12311-1)
- Streches up to 50% parallel, 50% perpendicular (DIN 12311-1)
- Tear resistance: 100N parallel, 100N perpendicular (DIN 12319-1)
- Resistance to nails/staple tearing out: 140N
- Color: dark gray

Technical Specs

Layer	Material
Cover fleece	polypropylene microfiber fleece
Membrane	monolithic TEEE film
non-woven fabric	polypropylene microfiber

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AC 38 Test data:

- Air permeance 0.00004cfm/ft2 (limit is 0.004cfm/ft2)
- Dry breaking force (ASTM D5034) – 73.3 (MD) and 58.5 (XMD)
- Passes AATCC 127 for water resistance per AC 38
- Over 38 Perms (ASTM E96-B), Sd-value < 0.05m (DIN EN 12572)
- Low temperature flexibility AC38 – pass
- Ultraviolet Exposure AC38 – pass
- Accelerated aging AC38 - pass

ASTM E84 (flames spread & smoke density)

- Flame spread : 0 (pass <100)
- Smoke development: 85 (pass <450)

Class A per NFPA No. 101

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CSI #: 07 25 00

TESCON PROFIL

pro clima®

Airtight/Waterproof tape with release paper for sealing window-frames and door openings to airtight layers (INTELLO, membranes, OSB, plywood, ZIP-system, SIPs, concrete). Waterproof so suitable for interior and exterior use

Technical properties

- Adhesion by solvent-and plasticizer-free, age-resistant, water-resistant solid adhesive acrylic – waterproof
- PSA (Pressure sensitive tapes), bond is initiated by pressurization of tape and bond strength increases over time
- Use a PRESSFIX tool for best results/pressurization.
- Minimum application temp: 15 F°
- Bonding withstands temperatures between -40 F° and 194 F°
- Weather exposure: 3 months
- Perm 8 (sd-value 0.4 – DIN 12572)
- Store dry and cool
- No VOC, free of solvents
- Color: dark blue
- High initial adhesion strength
- For air-tight sealing according DIN 4108-7

Roll width	2-3/8" (60mm)
Roll length	98'-5" (30m)

Technical Specs

Layer	Material
Carrying membrane	Special Polypropylene fabric
Adhesive	SOLID Acrylic
Release paper (3 strips)	Double slit siliconized PE-Foil: strips are app. 1/2"- 5/8" – 1" wide (12 / 23/ 25 mm)

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CSI #: 07 25 00

TESCON VANA

Multi-purpose airsealing tape with waterproof solid acrylic adhesive for interior and exterior use

BENEFITS

TESCON VANA air sealing tape is a long-lasting, robust solutions to permanently air-tight taped bonding of air barriers. It may be used with an array of materials such as Pro Clima smart vapor retarders (INTELLO, DB+), airbarriers, Polyethelene, metal, aluminum foil, Pro Clima WRBs, housewraps, sheathing, and ZIP-system. Seal joints airtight between wood based panels (such as OSB and plywood), as well as concrete foundations. TESCON VANA is vapor open, highly durable, waterproof, and adaptable to a variety of high performance construction needs, available in 2.4" to 7.9" widths.

PRODUCT PROPERTIES

- Vapor permeable, Perm 6 (Sd value:0.4m) for enhanced outward drying potential
- Durable waterproof tape adhesion (solid acrylic adhesive)
- UV/weather resistant – 6 months of exposure
- Very high adhesive strength
- Polypropylene backing forms itself to slightly uneven substrates
- Solvent-free, no VOCs
- Rugged fabric backing – for durable airseals
- No loss of adhesion in high humidity construction environments (during concrete/plaster work)
- For air-tight sealing according DIN 4108-7
- Tested and approved by Sentinel-Haus® Institute to meet their stringent standards for healthy buildings with superb indoor air quality.
- In combination with TESCON Primers, adheres to soft/porous wood insulation panels, concrete, sheetrock, rough OSB and brick

	Width	Length
TESCON VANA	2.36" - 60 mm	98' 5" (30 m)
TESCON VANA 75	2.95" - 75 mm	98' 5" (30 m)
TESCON VANA 100	3.94" - 100 mm	98' 5" (30 m)
TESCON VANA 150	5.9" - 150 mm (split release paper)	98' 5" (30 m)
TESCON VANA 200	7.9" - 200 mm	98' 5" (30 m)

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TESCON VANA

TECHNICAL SPECS	
Carrying membrane	Special Polypropylene fleece
Adhesive	Waterproof solid acrylic adhesive
Release paper	Siliconized release paper
Color	Dark blue
Perm rating (DIN EN 12572)	8 (Sd value 0.4m)
Application temp	From 15 °F (-10 °C)
Long term temperature resistance	-40 °F to +194 °F, -40 °C to +90 °C
Maximum recommended Weather-UV exposure:	6 months
Artificial age tested	100 year performance
Adhesion (ASTM D3330)	**OSB** 3.34 lbs/linear inch / **INTELLO**: 4.45 lbs/linear inch
Storage	Cool and dry

APPLICATION

Follow the TESCON VANA application guide found on fourseventive.com.

To make a durable bond the substrate should be stable, dry, smooth and free of dust, silicones and grease. Taped joints shouldn't be permanently exposed to tensile forces/stresses. Adhesion to objects that have been frozen over is not possible.

The best adhesion results and protection of the structure is achieved by using high-quality substrates. You are responsible for checking the suitability of the substrate, when in doubt an adhesion tests is recommended.

To connect to rough/uneven substrates CONTEGA HF or CONTEGA Line adhesives are recommended.

SUBSTRATES

Interior: Airtight tape for airsealing overlaps of Pro Clima membranes (INTELLO, DB+, INTESANA, etc), PE and other vapor retarders/airtight layers as well as bonding airtight materials (OSB, Plywood, metals and plastics).

Exterior: Adhesive tape for wind and waterproof connections of Pro Clima membranes overlaps (SOLITEX MENTO, FRONTA QUATTRO/HUMIDA, DA and INTESANA) or other WRB and roof underlayments.

Bonding and adhesion is possible on planed and painted wood, high density plastic or metal (e.g. pipes, windows etc.), and hardboard (chipboard, OSB and veneers). Prep wood fiber insulation boards and other unstable substrates (concrete, brick, Foamglas and splintering/oily OSB) with TESCON Primer PP before taping them.

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TESCON VANA

GENERAL CONDITIONS

The bonds should not be subjected to tensile strain.
After sealing the airtight/vapor retarding membranes, the weight of the insulating material must be borne by mechanically fastened battens. The tape adhesion should be supported by battens if necessary or by additional pieces of perpendicular tape.

PSA (Pressure sensitive tapes): The final adhesion strength depends on the pressurization force, not the length of time the tape is pressurized. Achesive has high initial strength and sets completely within 24hrs. Make sure there is sufficient back-pressure when pressurizing tape. For best airtight/waterproof results avoid creases in membranes/tapes and use PRESSFIX tool for optimal pressurization.

Avoid excessive humidity in structure by ventilation or using a dehumidifier during construction.

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CSI #: 07 27 00

INTELLO PLUS

High performance smart vapor retarder with reinforcing layer for dense pack insulation

BENEFITS

Provides structural systems and foam free highly insulated assemblies, a previously unachievable degree of protection from moisture damages, even in challenging assemblies and/or climatic conditions. Its optimal vapor variable properties offer a high level of protection aginst moisture induced failures in challenging conditions:

- Vapor closed flat/green-roofs
- Unvented pitched roofs (asphalt shingles, OSB sheathing, valleys covered by ice&water shield)
- Mixed humid climates with cold winters and air-conditioning requirements in summer
- Extreme climates such as in high mountain regions or very cold/arctic conditions

INTELLO remains vapor retarding up to 70% relative humidity. In case such a high humidity level is exceeded, caused by reversed summer time vapor drive or other moisture ingress, it rapidly becomes vapor permeable and allows inward drying of the enclosure.

PRODUCT PROPERTIES

- Intelligent vapor retarding membrane with best in class protection of fibrous/vapor open thermal insulation in roofs, walls and floors
- Largest vapor variability available
  - In dry winter conditions <0.13 perm
  - In summer > 13 perm when inward vapor drive offers maximized drying potential
- Offers insulated assemblies best protection against damages and mold, even in case of unforeseeenmoisture entry
- Durable airtight layer, part of ProClima's Intelligent Airtight System
- Fleece layer protects smart vapor retarding layer during installation over (rough / green) wood
- Very minimal bulging when used as densepack membrane because of reinforcement grid
- Suitable for all types of batts (unfaced fiberglass, mineral wool, cotton, sheepswool, hemp, flax, etc), as well as for all types of insulation boards (wood fiber, mineral wool, glas wool, straw, etc)

	5' Short (10091)	5' Standard (10092)	10' Wide (12222)
Roll width	59-1/16" (1.50m)	59-1/16" (1.50m)	118-1/8"(3.00m) folded on roll with 4" application offset
Roll length	65'-7" (20m)	164'-1/2" (50m)	164'-1/2" (50m)
Roll area	323 SF (30m²)	807SF (75m²)	1614SF (150m²)

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INTELLO PLUS

TECHNICAL SPECS	
Cover	Polypropylene microfiber fleece
Membrane	Polyethylene copolymer
Reinforcing	Polypropylene non-woven fabric
Color	Translucent white

Attribute	Norm	Value
Weight	DIN EN 1849-2	0.36 oz/sf (110 g/m2 - ±5g/m2)
Thickness	DIN EN 1849-2	8 mils (0.2 mm - ±0.5mm)
Avereage vapor resistance	DIN EN 1931	perm 0.44 7.50m ±0.25m
Vapor variability	DIN EN 12572	Perm rate from >13.20 to <0.17m Sd value from 0.25m to >25m
Surface Burning Characteristic	ASTM E84	Famespread:0 – Smoke development:85 Class A fire class material
Fire class	DIN EN 13501-1	E
Tensile strength	MD/CD DIN EN 13859-1	350 N/50 mm / 290 N/50 mm
Elongation at break	MD/CD DIN EN 13859-1	15%/15%
Nail tear resistance	MD/CD DIN EN 13859-1	240 N/ 200N
Durability / artificial age test	DIN EN 1296/1931	passed
Temperature resistance		-40 F° to 196 F° / -40 C° to 80 C°
Thermal conductivity		0.85 hr.ft2°F/BTU.in (0.17 W/mK)
CE labeling	EN 13984	available

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CSI #: 07 27 00

INTELLO PLUS

APPLICATION

Follow the INTELLO PLUS application guide found on fourseventive.com.

For all connections and overlaps use system components of ProClima's Intelligent Airtight System. Use TESCON VANA for overlaps, TESCON PROFIL for corner connections, CONTEGA HF to adhere to rough or uneven substrates, ROFLEX for pipes penetrations, etc.

INTELLO PLUS can be used as a vapor retarder and airtightness membrane for all externally vapor permeable membranes, e.g. with roof underlay (pro clima SOLITEX MENTO), wood fibreboard, or vented sheathing. Additional suitable for a high level of protection against moisture induced failures in structurally challenging constructions such as diffusion-resistant flat/pitched roofs and for walls or roof with vapor retarding exterior sheathing (OSB or plywood).

GENERAL CONDITIONS

Pro Clima INTELLO PLUS should be laid with the printed side facing the installer. It can be laid perpendicular to the sub-structure or parallel along it (such as along the rafters). Membrane should be applied taut and without sags or creases. The maximum on center spacing of the structure behind INTELLO PLUS is 40"/100 cm. After membrane is applied, battens should be installed through the INTELLO PLUS into the structure to support the weight of the blown. The battens should be less then 20' on center (50 cm).

If long term tensile forces on the taped overlaps are expected by dense packed insulation's weight, an additional supporting batten should be placed on each of those overlaps. Alternatively, the taped overlap can be reinforced with TESCON VANA tape applied at right angles to the overlap every 12"/30 cm.

Please note: Airtight seals can only be achieved on vapor control membranes that have been laid without folds or creases. Prevent excessive interior humidity (e.g. during the construction phase) and occupation by providing sufficient ventilation. Natural ventilation is in general not adequate to quickly evacuate large amounts of construction related humidity (Curing concrete, tiling, drywall compounding, plastering etc). Use a dehumidifier if necessary.

To prevent condensation in cavities, INTELLO PLUS should be taped and sealed airtightly immediately after installing the thermal insulation. This particularly applies when working in winter.

Additionally for blown-in insulation: Benefit of applying membrane parallel to substructure when installing dense packed insulation afterwards, is that all overlaps are mechanically fastented and secured to structural elements.

FURTHER INFORMATION

Further information is given in the study "Calculating potential freedom from structural damage of thermal insulation structures in timber-built and steel systems" found at:
http://int.proclima.com/media/downloads/study_english.pdf

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CSI #: 07 46 46

Eternit

1 General information

ETERNIT NV	EQUITONE TECTIVA
Programme holder IBU - Institut Bauen und Umwelt e.V. Rheinufer 108 D-53639 Königswinter	**Owner of the Declaration** Eternit nv Kuiermanestraat 1 1880 Kapelle-op-den-Bos - Belgium
Declaration number EPD-ETE-2013711-E	**Declared product / Declared unit** 1 m² of EQUITONE TECTIVA fibre cement sheets in accordance with Eternit product use and installation recommendations (thickness=8mm)
This Declaration is based on the Product Category Rules: PCR Part B: Fibre cement / Fibre concrete 07-2011 (PCR tested and approved by the independent Committee of Experts (SVA))	**Scope:** This EPD covers the products range of EQUITONE TECTIVA fibre cement sheets manufactured by Eternit at Kapelle-op-den-Bos factory, Belgium. This product is sold in Europe and its mainly used as a cladding sheet for ventilated and insulated lightweight facade-systems. The owner of the declaration shall be liable for the underlying information and evidence.
Issue date 17.06.2013	
Valid to 16.06.2018	**Verification** The CEN standard EN 15804 serves as the core PCR. Verification of the EPD by an independent third party as per ISO 14025 ☐ internally ☒ externally
Prof. Dr.-Ing. Horst J. Bossenmayer (President of Institut Bauen und Umwelt e.V.)	Patricia Wolf (Independent tester appointed by SVA)
Prof. Dr.-Ing. Hans-Wolf Reinhardt (Chairman of SVA)	

2 Product

2.1 Product description

The product covered by this EPD is the EQUITONE TECTIVA calcium silicate Eternit fibre cement sheet produced at Kapelle-op-den-Bos production plant, Belgium. It is mainly made of sand, cement, cellulose, wollastonite, clay and lime. This product is used as panel for exterior (and interior) walls covering.

This average product is representative of the following color range: TE00, TE 10, TE 20, TE 30, TE 40, TE 50, TE 60, TE 80 and TE 90.

Only pigment composition changes from a EQUITONE TECTIVA product to the other.

All products from this range:

- have been manufactured according to the same industrial process, especially the coating formula,
- have homogenous physical properties
- have the same density
- have been since 2007 in the European market
- have been produced in a unique factory (Kapelle-op-den-Bos) since 2007

2.2 Application

EQUITONE TECTIVA product is mainly used as a cladding sheet for ventilated exterior claddings and ceilings and insulated lightweight facade-systems .

The board itself is fixed to a backstructure in wood or metal. This backstructure is mounted on a supporting wall in a massive construction (such as bricks, concrete, ..), lightweight skeleton (steel, wood) or prefabricated solutions. The application field is new construction and renovation of low, middle high and high rise buildings.

In a minor application, the EQUITONE TECTIVA can be used as protection for insulated foundations.

The EQUITONE TECTIVA can also be used in interior decorative apllications for walls and ceilings.

2.3 Technical Data

The following table includes the testing methods average values according to the European standard EN 12467:2004 + A1:2005 + A2:2006 'Fibre-cement flat sheets'.

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A. Testing according to ISO quality management system				
Density	Dry	EN 12467	1.550	kg/m³
Bending strength	Ambient, ⊥	EN 12467	32.0	N/mm²
	Ambient, //	EN 12467	22.0	N/mm²
Modulus of elasticity	Ambient, ⊥	EN 12467	> 14.000	N/mm²
	Ambient, //	EN 12467	> 12.000	N/mm²
Hygric movement	0-100% (max)		1.80	mm/m
Porosity	0-100%		< 25	%
B. Classification				
Durability classification		EN 12467	Category A	
Strength class/section		EN 12467	Class 4	
Fire reaction		EN 13501-1	A2-s1-d0	
C. Type test or test estimate				
Hygrothermal by test		EN 12467	Ok	
Warm water test		EN 12467	Ok	
Soft dry test		EN 12467	Ok	
Freeze thaw test		EN 12467	Ok	
Thermal expansion coefficient	α		< 0.01	mm/mK
Thermal conductivity	λ		0.350	W/mK

2.4 Placing on the market / Application rules

For now, no standard application rules are applied in Europe. Product has to be installed according to EQUITONE TECTIVA guidelines. For the placing on the market the product specification EN 12467:2004 + A1:2005 + A2:2006 'Fibre-cement flat sheets' is valid.

2.5 Delivery status

The fibre cement sheets are transported by road using wooden pallets. They are packaged on wooden pallets covered with cardboards fixed with high density polyethylene. In order to carry 1 m² of EQUITONE TECTIVA product (thickness=8mm),

The sheets are packaged on pallets. They are to be transported by trucks.

The product is delivered within the following standard dimensions:

Thickness: 8 mm
Not rectified: 1 240 x 2 520 mm, 1 240 x 3 070 mm

Rectified: 1 220 x 2 500 mm, 1 220 x 3 050
Humid weight: 14,9 kg/m2 (with 15% humidity)

Dry weight: 12,64 kg/m2

Thicknesses, sizes and types of the sheets which differ from those available as standard from stock are available but subjected to minimum order quantities.

2.6 Base materials / Ancillary materials

EQUITONE TECTIVA products are made out of the following components:

- sand (>30% of main raw materials and additives)
- cement (>30%)
- cellulose (<10%)
- pigments (<10%)
- wollastonite (<10%)
- clay (<10%)
- lime (<10%)

2.7 Manufacture

EQUITONE TECTIVA sheets are manufactured on a Hatschek machine. They are double pressed, autoclaved, calibrated and polished.

Afterwards EQUITONE TECTIVA is made water repellent on front and back by means of a hydrofobation.

2.8 Environment and health during manufacturing

Eternit company is committed to a global approach in order to improve its environmental performance. All production sites are ISO 14001:2004 and OHSAS 18001:2007 certified.

2.9 Product processing / Installation

During the mechanical machining of panels, dust can be released which can irritate the airways and eyes. Adequate machinery with dust extraction and/or ventilation should be foreseen. If dust extraction is not efficient, dust masks of type FFP2 or better according EN149:2001 should be used.

The following tools and accessories are used for processing and installation:

-Cutting/Sawing: Circular saw, Jigsaw, sandpaper

-Drilling: carbide-tipped twist drill (or completely in carbide), sandpaper

-Fastening accessories: Screws, Rivets, Adhesive

Apart from this, the inhalation of fine (respirable size) quartz containing dust, particularly when in high concentrations or over prolonged periods of time can lead to lung disease and an increased risk of lung cancer. Depending on the working conditions, adequate machinery with dust extraction and/or ventilation should be foreseen.

2.10 Packaging

Sheets are packaged on pallets and are to be transported and stored in a covered dry area.

In order to carry 1 m² of EQUITONE TECTIVA product (thickness=8mm), the following amounts of packaging elements are necessary:

- Pallets : 36 g/declared unit

- Cardboard: 1,28 g/declared unit- high density polyethylene: 0,66 g/ declared unit

2.11 Condition of use

EQUITONE TECTIVA does not require special maintenance. EQUITONE TECTIVA is resistant to chipping, impact, mold and termites.

For minor soiling, washing is required with a mild household detergent or soft soap solution followed by rinsing with clear water.

2.12 Environment and health during use

There is no specific recommendation for this product.

2.13 Reference service life

Reference service life (RSL) for this product is 60 years.

2.14 Extraordinary effects

Fire

According to EN 13501-1+A1: 2007 and EN 12467:prA2:2004, EQUITONE TECTIVA product classification in relation to its reaction to fire behavior is A2.

Smoke production classification is s1.

Flaming droplets classification is d0.

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According to the latest classification report following EN 13501-1+A1:2007 and EN 12467:prA2:2004 standards (EN12467:2013 is currently under validation), heat of combustion of EQUITONE TECTIVA is: 1,2 MJ/kg.

Water

Due to the fact that EQUITONE TECTIVA is an inert material, there is no environmental effect with contact with water.

This has been proved by the Flamisch Institute for Technologic Research "VITO". They have done a lot of tests on different fibre-cement products concerning possible effects on the environment for the paramaters which exceeded the normal european values for inert waste, such as TOC, DOC and TDS.

Mechanical destruction

Due to the fact that the EQUITONE TECTIVA sheet is considered as an inert material, there is no effect on the environment.

2.15 Re-use phase

EQUITONE TECTIVA product can be re-used and fully recycled.

See Redco report TR_2012_088_Redco; expert study on the use of fibre cement products as raw material for the production of cement clinker.

2.16 Disposal

The waste code in accordance with the European Waste Index is 17.09.04

2.17 Non re-used or recycled waste products are disposed in sanitary landfills. Further information

Technical sheet available on the Eternit "download center" available at the following address:

http://www.eternit.be/

3 LCA: Calculation rules

3.1 Declared unit

According to **ISO 14025 and EN 15804**, the **declared unit** agreed upon and related to the key function of the product is as follows:

"Produce 1 m² of EQUITONE TECTIVA fibre cement sheets in accordance with Eternit product use and installation recommendations (thickness=8mm)."

The humid mass reference related to the declared unit is 14,9 kg which is the weight of the reference product used for this study. This mass reference excludes the screws (0,025 kg per declared unit), the EPDM (0,24 kg per declared unit) joints and aluminium profile joints (0,07 kg per declared unit) commonly used to implement the EQUITONE TECTIVA. Nevertheless, screws, EPDM joints and aluminum profile joints are included in the system boundaries.

3.2 System boundary

The model for the product's life cycle includes the 3 steps of the "cradle to gate" approach described below according to the EN 15804 European standard:

- A1 Raw material supply: extraction and processing of raw materials, electricity production and supply, fuel production
- A2 Transport: transportation of raw materials up to the factory gate
- A3 Manufacturing: process emissions, landfilling of process wastes (non-hazardous wastes)

3.3 Estimates and assumptions

Raw material supply (A1)

Specific quantities for all raw materials have been taken into account.

Transport of raw materials (A2)

Litres of fuel	diesel: 38 l/100 km
Transport distance	specific for each raw material
Capacity utilisation (including empty runs):	70%
Capacity utilisation volume factor:	1 for all raw materials except Aluminium Hydroxide and Polyelectrolyte (factor=0,6)

Manufacturing (A3)

Process CO2, dust and water emissions have been specificaly calculated. Other impacts have been valuated from fuel consumption data.

3.4 Cut-off criteria

99% (in mass) of all inputs are covered by the present environmental impact assessment. The whole energy consumption is included into the scope of this EPD.

3.5 Background data

The main sources for background data used are Ecoinvent 2.0 and DEAM™.

3.6 Data quality

Reliability, completeness, representativity, reproducibility, and consistency of specific and background data have been checked by PwC.

The data were captured into the LCA model under TEAM™ software and validated by PwC.

3.7 Period under review

Process data have been collected from the production plant through a questionnaire completed by Eternit by PwC in 2010. The collected data is related to the 2009 production year.

3.8 Allocation

Specific data for EQUITONE TECTIVA product were used for raw materials, consumables and packaging consumption data.

Regarding energy manufacturing consumptions, an allocation per weight of product has been applied when the specific data were not available. See below the summary of allocations by process stage:

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Process stage	Electrical energy	Natural gas
Preparation	Mass allocation	No consumption
Hatschek machines	Mass allocation	No consumption
Curing oven	Mass allocation	Specific measurement
Depiling	Mass allocation	No consumption
Autoclaving	Mass allocation	Specific measurement
Finishing	Specific measurement	No consumption
Water treatment	Specific measurement	No consumption

3.9 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to EN 15804 and the building context, respectively the product-specific characteristics of performance, are taken into account.

4 LCA: Scenarios and additional technical information

No additional information are necessary in a cradle-to-gate LCA.

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5 LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m² of EQUITONE TECTIVA product

		PRODUCT STAGE		
		Raw material supply	Transport	Manufacturing
Parameter	Unit	A1	A2	A3
Global warming potential (GWP)	kg CO_2-Eq.	6,0	9,8E-01	1,1
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC11-Eq.	4,9E-07	2,4E-09	4,1E-11
Acidification potential of land and water (AP)	kg SO_2-Eq.	2,1E-02	1,6E-02	2,9E-04
Eutrophication potential (EP)	g PO_4^{3-}- Eq.	2,4	2,8E-01	1,0E-01
Formation potential of tropospheric ozone photo-chemical oxidants (POCP)	kg Ethene Eq.	1,2E-03	6,0E-04	1,5E-05
Abiotic depletion potential for non fossil resources (ADPE)	kg Sb Eq.	3,1E-07	5,1E-12	8,6E-15
Abiotic depletion potential for fossil resources (ADPF)	MJ	71	12	7,2E-04

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m² of EQUITONE TECTIVA product

		PRODUCT STAGE		
Parameter	Unit	A1	A2	A3
Use of renewable primary energy excluding renewable primary energy resources used as raw materials (PERE)	MJ	34	5,5E-03	3,6E-07
Use of renewable primary energy resources used as raw materials (PERM)	MJ	0	0	0
Total use of renewable primary energy resources (PERT)	MJ	34	5,5E-03	3,6E-07
Use of non renewable primary energy excluding non renewable primary energy resources used as raw materials (PENRE)	MJ	59	12	7,3E-04
Use of non renewable primary energy resources used as raw materials (PENRM)	MJ	31	0	0
Total use of non renewable primary energy resources (PENRT)	MJ	90	12	7,3E-04
Use of secondary material (SM)	kg	4,9E-01	0	0
Use of renewable secondary fuels (RSF)	MJ	0	0	0
Use of non renewable secondary fuels (NRSF)	MJ	0	0	0
Use of net fresh water (FW)	m³	6,5E-02	9,6E-05	1,6E-02

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m² of EQUITONE TECTIVA product

		PRODUCT STAGE		
Parameter	Unit	A1	A2	A3
Hazardous waste disposed (HWD)	kg	1,1E-03	1,0E-05	1,7E-08
Non hazardous waste disposed (NHWD)	kg	4,4E-03	7,6E-09	2,4E-02
Radioactive waste disposed (RWD)	kg	1,9E-05	9,6E-07	1,6E-09
Components for re-use (CRU)	kg	0	0	0
Materials for recycling (MFR)	kg	0	0	0
Materials for energy recovery (MER)	kg	0	0	0
Exported energy per energy carrier (EE)	MJ	0	0	0

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6 LCA: Interpretation

6.1 Global warming potential (GWP)

Methodology: CML 3.9 - Greenhouse effect (direct, 100 years)

Greenhouse gases emitted from the system boundaries are mainly due to the raw material supply stage (74%), manufacturing stage (14%), and transport of raw materials (12%). Emissions from the raw material supply stage mainly come from the cement production (64%). 97% of the emissions related to the transport of raw materials come from the fuel consumption during transport stage by boat.

6.2 Depletion potential of the stratospheric ozone layer (ODP)

No CFC gases are emitted during the life cycle of this product.

6.3 Acidification potential of land and water (AP)

Methodolgy: CML 3.9 - Air Acidification

Acidification is related to air pollutants released like sulphur and nitrogen oxides. These emissions mainly come from the raw material supply stage (54%). For this stage, cement production is responsible for 46% of the acidification impact and iron oxide is responsible for 19% of this impact. These emissions also come from the product - transport stage (45%). For this stage, fuel consumption during transport stage by boat is responsible for 99% of the acidification impact and fuel consumption during transport stage by road is responsible for 1% of this impact.

6.4 Eutrophication potential (EP)

Methodology: CML 3.9 - Eutrophication

Water eutrophication mainly comes from the raw material supply stage (86%). For this stage, cement production is responsible for 49% of the water eutrophication impact and Tasman cellulose is responsible for 12% of this impact.

6.5 Formation potential of tropospheric ozone photochemical oxidants (POCP)

Formation potential of tropospheric ozone photochemical oxidants formation mainly comes from the raw material supply stage (66%). For this stage, cement production is responsible for 37% of the photochemical ozone formation and iron oxide is responsible for 13% of this impact.

6.6 Abiotic depletion potential (ADPE and ADPF)

Methodologies: CML 3.9 - Abiotic Depletion Potential (elements) and CML 3.9 - Abiotic Depletion Potential (fossil fuels) - MJ

Natural non fossil resources depletion mainly comes from the raw material supply stage (100%). For this stage, felt is responsible for 38% of the natural non fossil resources depletion impact and cement production is responsible for 37% of this impact.

Natural fuel resources depletion mainly comes from the raw material supply stage (100%). For this stage, cement production is responsible for 27% of the natural fuel resources depletion and iron oxide is responsible for 21% of this impact.

90% of the primary energy consumed is due to the raw material supply stage. Thereof, 62% is due to aluminium hydroxide and 13% to Tasman cellulose. 10% of the primary energy consumed is due to the transport of raw materials stage. Thereof, 89% is due to the fuel consumption during transport stage by boat.

6.7 Waste

The main source of waste generation is the product - raw material supply stage (59% of all wastes).

7 Requisite evidence

7.1 Radioactivity

Radioactivity testing is not relevant for this product.

7.2 Leaching

Tectiva product has been classified as inert according to Flamish regulation (Vito report 2011/SCT/R/119)

The following tests have been performed (Elektro – Physik Aachen GmbH, 62/2007)

- leaching of solved solid particules
- leaching of solved organic carbon
- amount of mineral oil.

Concentration of flue gas in the inhalation

Sample/material no. A7102302		400 °C	
Measured value after		30 min.	60 min.
Carbon monoxide	ppm	1443	2347
Carbon dioxide	ppm	-	5000
Hydrogen cyanide	ppm	-	*
Hydrogen chloride	ppm	-	*
Nitrous vapours	ppm	-	*
Sulphur dioxide	ppm	-	
COHb (calculated from CO value)	%		>50

- = untired / * = undetectable

7.3 VOC emissions

VOC emissions have been measured for a comparable product being produced in the same production line as TECTIVA in 2006.

Calculation of the TVOC (Total Volatile Organic Ccompounds) was performed as defined by AgBB test method by addition of the results of all individual substances in the retention time interval C_6-C_{16}.

Overview of results (Eurofins Product Testing A/S, 764490D 2008):

Name	Value	Unit
TVOC (C6-C16)	<5	µg/m³
Sum SVOC (C16-C22)	<5	µg/m³
R	-	-
VOC without NIK	<5	µg/m³
Carcinogenic Substances	<1	µg/m³

CSI #: 07 54 00

Product Data Sheet
Edition: 02/2013
Version no.: 0003

EnergySmart Roof

Sarnafil® G410 EnergySmart Roof® Membrane

__48 __60 __72 __80 __Feltback

Overview:	The G410 EnergySmart Roof membrane is a heat-weldable membrane produced with an integral fiberglass mat reinforcement for excellent dimensional stability, for use in a Sika Sarnafil Adhered System. Sika Sarnafil's Energy Star qualified EnergySmart Roof color family consists of White, Tan, Light Gray, and Patina Green.
Composition:	The G410 EnergySmart Roof membrane is a high-quality, thermoplastic PVC membrane with a fiberglass reinforcement. The G410 roof membrane has a unique lacquer coating applied to the top of the membrane to reduce dirt pick up.
Features and Benefits:	• Excellent dimensional stability • Meets EnergyStar/Title 24 Requirements for Cool Roofing (see pg. 2) • Meets LEED/Green Globe Requirements for Cool Roofing (see pg. 2) • Recycled content (see pg. 2) • Lacquer coated to reduce dirt pick up • Hot-air welded seams for long-term performance • Proven membrane performance
Codes and Approvals:	Sika Sarnafil's Adhered Systems using G410 PVC membranes are classified by Underwriters Laboratories, Inc., Underwriters Laboratories of Canada, FM Global, Miami-Dade and Florida Building Code. Sika Sarnafil membranes also meet the material requirements of the International building code. For more information, please visit the "technical downloads" section of our website.
Packaging:	The G410 roof membrane rolls are wrapped in a protective film and strapped to a wood pallet. EnergySmart white, tan and light gray are available as 10 ft. (3 meters) wide. EnergySmart patina green is available as 6.5 ft. (2 meters) wide. 6.5 ft. rolls weigh between 161 - 195 lbs and the 10 ft. rolls weigh between 265-375lbs. Weight is dependent on thickness of membrane and/or feltbacking.
Installation:	G410 is installed by a Sika Sarnafil Authorized Applicator. After proper preparation of the substrate, G410 is unrolled into Sarnacol adhesive in accordance with Sika Sarnafil's Technical requirements and then pressed into place with a minimum 100lb linoleum roller. The G410 is then heat-welded together by trained operators using Sika Sarnafil's hot-air welding equipment. Different Sarnacol adhesives require different application methods. Please consult Sika Sarnafil's Applicator Handbook for detailed installation procedures.
Availability:	The G410 roof membrane is available directly from Sika Sarnafil Authorized Applicators. Contact your Sika Sarnafil Regional Office or visit our website for further information.
Warranty:	Upon successful completion of the installed roof by the Sika Sarnafil Authorized Applicator, Sika Sarnafil can provide a Warranty to the Building Owner via the Authorized Applicator.
Maintenance:	The G410 roof membrane requires no maintenance. As a prudent preventative measure, Sika Sarnafil recommends that the Owner or that the Owner's designated representative inspect the installed roof system for damage, plugged drains, weathered sealants, etc. at least twice a year and after each storm.

Sika®

Sarnafil®

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Technical Support: Sika Sarnafil provides technical support. Please contact your local technical representative or technical manager if you need assistance.

Technical Data (as manufactured):

Parameters	ASTM Test Method	ASTM Type II D-4434 Spec. Requirement	Typical Physical Properties 48 Fiberglass	60 Fiberglass	72 Fiberglass	80 Fiberglass
Reinforcing Material	--	--	Fiberglass	Fiberglass	Fiberglass	Fiberglass
Overall Thickness, mil	D638	45	48	60	72	80
Thickness Above Scrim, mil	--	16	24	30	36	40
Felt Weight oz/yd²	--	--	9	9	9	9
Tensile Strength, min., psi, (Mpa)	D638					
Machine Direction		1500psi (10.4)	1500	1575	1625	1675
Cross Direction		1500psi (10.4)	1500	1550	1575	1625
Elongation at Break, min.	D638					
Machine Direction %		250	250	250	250	250
Cross Direction %		220	220	220	220	220
Seam Strength, min., (% of original)*	D638	75	Pass	Pass	Pass	Pass
Retention of Properties After Heat Aging	D3045					
Tensile Strength, min., (% of original)	D638	90	Pass	Pass	Pass	Pass
Elongation, min., (% of original)	D638	90	Pass	Pass	Pass	Pass
Tearing Resistance (M.D.), min., lbf (N)	D1004	10 (45.0)	15	17.5	20.5	22
Low Temperature Bend, -40 °F (-40 °C)	D2136	Pass	Pass	Pass	Pass	Pass
Accelerated Weathering Test (Florescent Light, UV exposure)	G154	5,000 Hours	10,000 Hours	10,000 Hours	10,000 Hours	10,000 Hours
Cracking (7x magnification)		None	None	None	None	None
Discoloration (by observation)		Negligible	Negligible	Negligible	Negligible	Negligible
Crazing (7x magnification)		None	None	None	None	None
Linear Dimensional Change (C.D.), %	D1204	0.10% max	-0.02	-0.02	-0.01	-0.01
Weight Change After Immersion in Water, %	D570	± 3.0% max	2.4	1.9	1.8	1.7
Static Puncture Resistance, 33 lbf (15 kg)	D5602	Pass	Pass	Pass	Pass	Pass
Dynamic Puncture Resistance, 7.3 ft-lbf (10 J)	D5635	Pass	Pass	Pass	Pass	Pass
Recycled Content (10' & 5' sheet only)		9% Pre-Consumer / 1% Post-Consumer				

** Failure occurs through membrane rupture not seam failure.*

EnergySmart Colors	Initial Solar Reflectance	3 Year Reflectance	Initial Thermal Emittance	3 Year Thermal Emittance	Initial Solar Reflectance Index	3 Year Solar Reflectance Index
EnergySmart White *1	0.83	0.70	0.90	0.86	104	85
EnergySmart Tan *1	0.73	0.65	0.85	0.86	89	78
EnergySmart Light Grey *2	0.50	0.44	0.84	0.85	56	49
EnergySmart Patina Green *2	0.55	0.46	0.86	0.85	64	51

**1 Sika Sarnafil EnergySmart White and Tan membranes meet ENERGY STAR®, LEED, Green Globes and California's Title 24 criteria for Low and Steep Slope applications. *2 Sarnafil EnergySmart Light Grey and Patina Green membranes meet ENERGY STAR®, LEED and Green Globes criteria for Steep Slope applications. EnergySmart Light Grey meets California's Title 24 criteria for Steep Slope applications. EnergySmart Patina Green meets Title 24 criteria for steep slope applications with a 3 year calculated value of 0.445 when using Title 24's aged reflectance equation.*

Miami-Dade County Product Control Approved

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Disclaimer: *The information, and, in particular, the recommendation relating to the application and end-use of Sika Sarnafil products, are given in good faith based on Sika Sarnafil's current knowledge and experience of the products when properly stored, handled and applied under normal conditions in accordance with Sika Sarnafil recommendations. In practice, the differences in materials, substrates and actual site conditions are such that* ***no warranty in respect of merchantability or fitness for a particular purpose, nor any liability arising out of any legal relationship whatsoever, may be inferred from this information.*** *The user of the product must determine the product's suitability for the intended application and purpose. Sika Sarnafil reserves the right to change the properties of its products. The proprietary rights of third parties must be observed. All orders are accepted subject to our current terms of sale and delivery. Users must always refer to the most recent issue of the local Product Data Sheet for the product concerned, copies of which will be supplied on request.*

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ENERGY STAR for roofing products is only valid in the United States.

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Product Data Sheet
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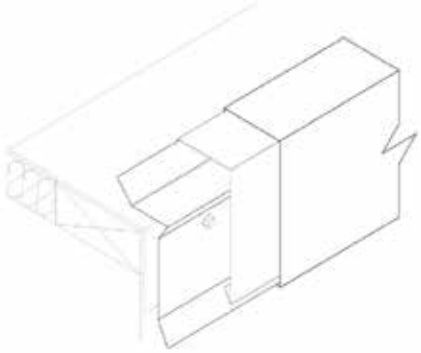
Edge Grip Fascia



Overview:	Edge Grip Fascia is a low profile retainer bar and fascia assembly used with either an adhered or mechanically attached Sika Sarnafil Roof System, which clamps the roof membrane against the building to help prevent leaks and blow-offs.
Composition:	Edge Grip Fascia is a two part assembly with a rigid terminator base plate and decorative snap on fascia cover. The fascia will be formed aluminum, 040" (1.00 mm), .050" (1.25 mm) or .063" (1.60 mm) or 24 ga. Kynar 500 coated galvanized steel and with concealed splices plates. Retainer base plate will be 20 guage galvanized steel with 9/23" pre-punched holes for fasteners at 12" (304.8 mm) on center in 10' - 0" (304.8 mm) standard lengths. (optional retainer: .050" aluminum)
Features:	Edge-Grip's unique design provides labor savings during installation, aesthetic appeal, high corrosion resistance and strong wind resistance. ANSI/SPRI ES-1 tested (part #'s 375, 525 and 675)
Packaging:	The entire Edge-Grip's assembly is packaged in job specific crates to provide maximum protection dureing transportation.
Installation:	Postion the Sarnafil membrane (non-feltbacked) over the roof edge and down outside face of wall, covering treated wood nailer(s) completely. The edge of the membrane should extend over the face of the building approx. 3" (76.2 mm) and be secured with the retainer bar. Hot-air weld all seams making sure there are no voids in welds. Make sure the retainer bar is clean and free of dirt or dust. Apply a 3/8 in. (10 mm) bead of multi-purpose sealant to the intersection of the right angle on the bar. Install bar from right to left as seen from rooftop lapping joints 1 in. (25 mm). Fasten bar 12 in. (305 mm) o.c. through slots using fasteners provided. Field cut sections as necessary. Install joint covers between each fascia section. Hook the joint cover from the top and allow it to hang down the face of the retainer. Do not hook on the drip. Install fascia by hooking the back flange over the top of the retainer. Leave a 1/4" gap for thermal movement.

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CSI #: 07 62 00

Availability:	Edge-Grip is available directly from Sika Sarnafil Authorized Applicators when used within Sika Sarnafil Roof Systems. Contact your Sika Sarnafil Regional Office or visit our website for further information.
Warranty:	As a Sika Sarnafil-supplied accessory, Edge-Grip is included in Sika Sarnafil's Standard or System Warranty to the Building Owner.
Maintenance:	Edge-Grip requires no maintenance.
Technical:	Sika Sarnafil provides technical support. Technical staff is available to advise applicators as to the correct installation method of Edge-Grip.

Technical Data:

Face Heights	Lengths
3.75 in. (96 mm)	10 ft. (3048 mm)
5.25 in. (133 mm)	10 ft. (3048 mm)
6.75 in. (171 mm)	10 ft. (3048 mm)
8 in. (203 mm)	10 ft. (3048 mm)

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CSI #: 07 62 00

Product Data Sheet
Edition: 2/2013
Version no.: 0007

Sarnaclad

Overview:	Sarnaclad is a heat-weldable flashing product used with Sarnafil G and S membranes to form a monolithic roofing or waterproofing system.
Composition:	Sarnaclad is a 24 gauge, G90 galvanized metal sheet with a 20 mil (0.5 mm) unsupported Sarnafil membrane laminated on one side. Sarnaclad is available in seven standard colors. Standard colors are Copper Brown, White, Evergreen, Lead Gray, Light Gray, Patina Green, and Tan. Sika Sarnafil's Energy Star rated EnergySmart Roof® color family consists of White, Tan, Light Gray, and Patina Green. The dimensions of Sarnaclad are 4 ft x 8 ft (1.2 m x 2.4 m) or 4 ft x 10 ft (1.2 m x 3.0 m). Recycled Content (metal): 25% Post Consumer, 6% Pre Consumer Recycled Content (membrane): 0%
Features:	Sarnaclad is a durable and attractive flashing product capable of being formed into a large variety of shapes and profiles. Heat-welding of Sarnafil G and S membranes to Sarnaclad assures watertight integrity. The Sarnaclad has a unique lacquer coating to resist staining from airborne dirt and pollutants.
Packaging:	See Technical Data section for information.
Installation:	Sarnaclad is cut to size and formed to shape on standard sheet metal equipment. Sarnaclad is fastened in position in accordance with Sika Sarnafil Technical requirements. The Sarnaclad joints are covered by 2 inch (50 mm) wide aluminum foil tape and then made watertight by heat-welding a 4 inch (100 mm) wide G410 membrane strip over the tape. By use of a Sarnafil G or S coverstrip, the roofing or waterproofing membrane is then heat-welded to the Sarnaclad.
Availability:	Sarnaclad is available directly from Sika Sarnafil Authorized Applicators when used within a Sika Sarnafil roofing or waterproofing system. Contact your Sika Sarnafil Regional Office or visit our website for further information.
Warranty:	As a Sika Sarnafil-supplied accessory, Sarnaclad is included in Sika Sarnafil's Standard or System Warranty to the Building Owner.

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Sarnafil®

CSI #: 07 62 00

Maintenance: Sarnaclad requires no maintenance

Technical Data: Sika Sarnafil provides technical support. Technical staff is available to advise Applicators as to the correct installation method of Sarnaclad.

Sheets/Pallet	Size	Weight/Sheet	Weight/Pallet
25	4 ft x 8 ft (1.2 m x 2.4 m)	35 lbs (16 kg)	905 lbs (410.5 kg)
25	4 ft x 10 ft (1.2 m x 3.0 m)	44 lbs (20 kg)	1,130 lbs (512.6 kg)

Recycled Content (metal): 25% Post Consumer, 6% Pre Consumer
Recycled Content (membrane): 0%

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Web: can.sika.com

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CSI #: 07 70 00

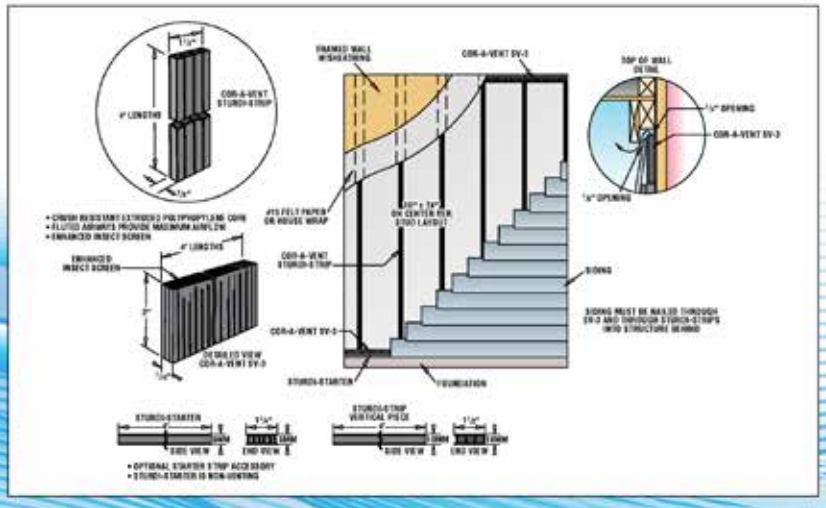
SV-3™ Siding Vent

- 7/16" thick by 3" high
- Easy-to-handle 4-foot long sections
- Pairs great with Sturdi-Strips, or other 3/8" to 1/2" thick furring
- 24 pieces per carton (96 lineal feet)
- Color: Black
- Heat-resistant: made from profile extruded polypropylene plastic
- Impact-resistant: screw, staple or power-nail in place
- Crush-resistant: Will not compress like "drainage mat" products
- James Hardie® recommended, unlike "drainage mat" products

(see: http://www.jameshardiecommercial.com/pdf/HardiePanel-Rainscreen-Quick-Reference-Guide.pdf)

Q: How much SV-3 do I need?

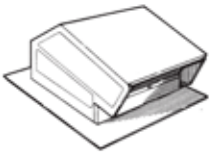
A: SV-3 runs linearly along the top and bottom of the wall, as well as above and below windows or doors. Take the total length of all walls and multiply by 2 (for top and bottom), then account for above and below wall penetrations to determine how many linear feet of SV-3 you will need.

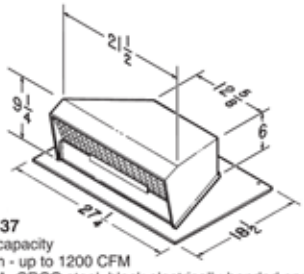


CSI #: 07 71 00

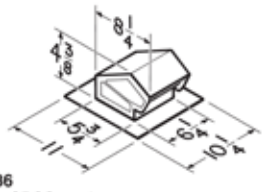
BROAN NuTone **SPECIFICATION SHEET**

ROOF CAPS



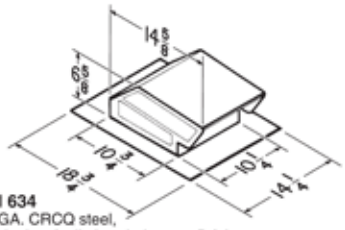


Model 437
- High-capacity design - up to 1200 CFM
- 24 GA. CRCQ steel, black electrically-bonded epoxy finish
- Built-in spring-loaded backdraft damper and bird screen
- For use with High Performance blower system



Model 636
- 24 GA. CRCQ steel, black electrically-bonded epoxy finish
- Built-in backdraft damper and bird screen
- For 3" or 4" round duct

Model 636AL
- Same as Model 636 .025 - in Aluminum
- Natural finish



Model 634
- 24 GA. CRCQ steel, black electrically-bonded epoxy finish
- Built-in backdraft damper and bird screen
- For 3¼" x 10" or up to 8" round duct

Model 634M
- Same as Model 634 except with 6" round duct collar

Model 644
- Same as Model 634 except .025 aluminum
- Natural finish

Model 443 Flexible Roof Ducting Kit
- Includes 8 ft. of 4", flexible, vinyl ducting, 4" diameter metal duct connector, 2 duct clamps, 4" to 3" reducer and Model 636 Roof Cap

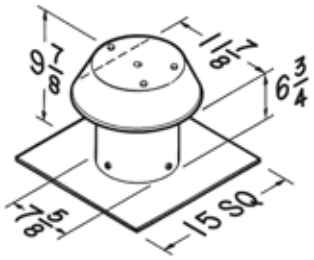
Model RVK1A Flexible Roof Ducting Kit
- Includes 8 ft. of 4", flexible, 2-ply metallic laminate ducting, 4" diameter metal duct connector, 2 duct clamps, 4" to 3" reducer and Model 636 Roof Cap
- Duct conforms to UL181 Class 1 air connector requirements
- Not recommended for dryer venting

Broan-NuTone LLC, 926 West State Street, Hartford, WI 53027 (1-800-637-1453)
NuTone, Inc., 4820 Red Bank Road, Cincinnati, OH 45227 (1-800-543-8687)
Broan-NuTone Canada, Inc., 1140 Tristar Drive, Mississauga, Ontario, L5T 1H9 (1-888-882-7626)

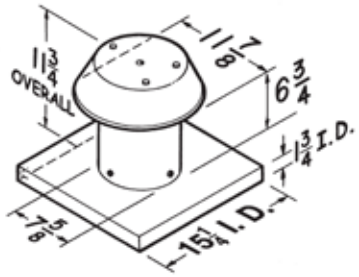
REFERENCE	QTY.	REMARKS	Project
			Location
			Architect
			Engineer
			Contractor
			Submitted by Date

50F 99041930N

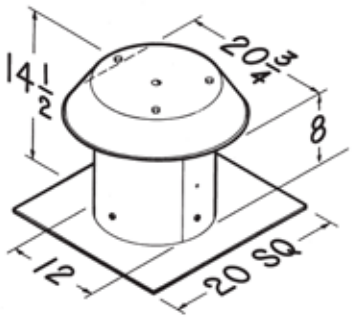
CSI #: 07 71 00



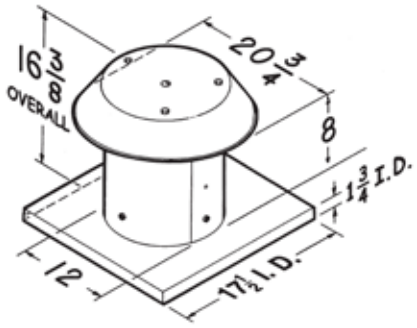
Model 611
- For flat roof installation
- .025 Aluminum - natural finish
- Built-in bird screen
- For up to 8" round duct



Model 611CM
- For curb mount installation
- Other features same as Model 611



Model 612
- For flat roof installation
- .025 Aluminum - natural finish
- Built-in bird screen
- For up to 12" round duct



Model 612CM
- For curb mount installation
- Other features same as Model 612

BROAN NuTone

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Broan-NuTone Canada, Inc., 1140 Tristar Drive, Mississauga, Ontario, L5T 1H9 (1-888-882-7626)

CSI #: 07 71 00

Scupper RetroDrain

PRODUCT DATA SPECIFICATIONS

PRODUCT DESCRIPTION

Designed for existing through-wall/ side-wall or scupper drainage pipes, the aluminum and stainless steel drain components provide durability and compatibility with single ply, BUR and modified bitumen roofing systems. A metal clamping assembly creates a compression type termination in both vertical and horizontal wall flashings. The Scupper RetroDrain features the patented RAC Backflow Compression Seal for attachment to PVC or cast iron leader pipes, and a removable drain strainer. Available in 3-in., 4-in., 5-in. and 6-in. sizes. Custom configurations are also available.

FEATURES & BENEFITS

- Pre-punched drain flange provides stable attachment to the wall and roof deck.
- The RAC Backflow Compression Seal is quickly activated at drain flange level to protect the roofing system and building contents from water backup damage.
- .125-in. metal clamping ring assembly provides a compression type termination for the vertical and horizontal roof flashings. Stainless steel studs and lock nuts secure the clamping ring assembly to the drain flange.
- .060-in thick drain strainer is easily secured to the drain body with four stainless steel wing nuts and provides protection against rooftop debris.
- Simple and easy to install, saving the contractor time and money.

APPROVALS & STANDARDS

ANSI/SPRI RD-1 – developed by SPRI (Sheet membrane and component suppliers to the commercial roofing industry) a certified canvasser of ANSI (American National Standards Institute), and features a test protocol designed to assure a leak-free connection to existing plumbing.

IAPMO PS 97-96 – a standard plumbing industry test designed to check for leakage at connections under a 10 foot head of water for a 24 hour period. This test was performed by the Smith-Emery Company, a nationally recognized independent test laboratory providing physical testing of construction related materials. The Scupper RetroDrain produced no leakage.

PHYSICAL DATA

The data below is constant for all OMG Scupper RetroDrains.

DRAIN BODY	SEAL
.080" thick aluminum	Watertight RAC Backflow Compression Seal requires 1/16" wrench
FLANGE	**STRAINER DOME**
16" x 10" x 10"	.060" thick aluminum
STEM	**CLAMP RING**
9" length	.125" thick metal

ORDERING INFORMATION

CAT. NO.	SIZE	PKG	WEIGHT
SCUPRD3	3"	Each	20 lbs.
SCUPRD4	4"	Each	20 lbs.
SCUPRD5	5"	Each	20 lbs.
SCUPRD6	6"	Each	20 lbs.

OMG
ROOFING PRODUCTS
153 BOWLES ROAD, AGAWAM, MA 01001
800-633-3800 WWW.OLYFAST.COM INFO@OLYFAST.COM
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MADE IN USA

CSI #: 07 71 00

Scupper RetroDrain

INSTALLATION PROCEDURE

FOR USE WITH
All types of roof covers.

JOB PREPARATION
The existing leader pipe shall be cleaned of excess bitumen build-up, dirt and debris. Remove the clamping ring assembly and bolts from the existing drain and discard. If required, comply with roof manufacturer's directions for additional cleaning or detailing.

STEP 1
Important – The aluminum activation cone may have settled into the backflow seal during shipping, which may partially activate the seal. To deactivate the seal, simply push down on the top of the two backflow bolts. **Note:** The top of the tapered metal cone should remain inside the bottom of the urethane seal. Do not fully disengage the cone from the urethane seal.

STEP 2
Place the Scupper Retrofit Drain Assembly into the existing drain leader (vertical or horizontal) pipe. The drain flange(s) should be in contact with the surface of both the wall and roof.

STEP 3
Using the pre-punched holes in the perimeter of the flange, secure the drain flange to the substrate with appropriate fasteners.

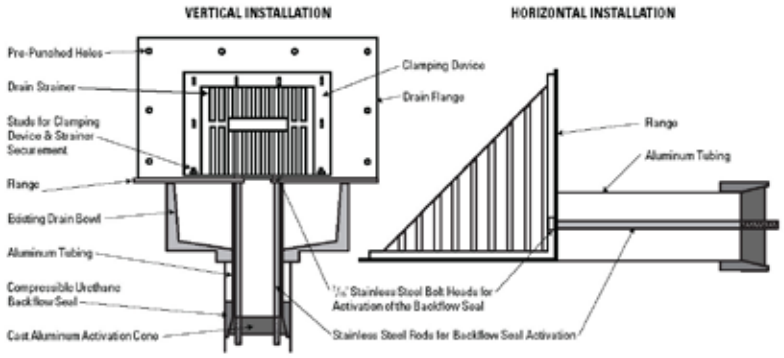
STEP 4
Hand tighten the 3/16-in. bolts on the backflow rods to activate the seal. **Alternate tightening** between the bolts for an even seal expansion. Do not overtighten.

STEP 5
Install roof flashing material into place per primary roofing manufacturer's drain flashing details.

STEP 6
Install the metal clamping assembly into position by **hand-tightening** the lock nuts provided. Do not overtighten.

STEP 7
Install the drain strainer over the center of the drain opening and secure to 4 studs with the wing nuts provided.

For technical assistance contact OMG at 800-633-3800.



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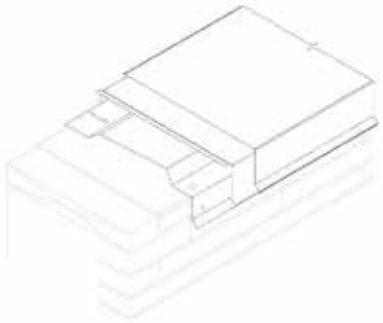
CSI #: 07 71 13

Product Data Sheet
Edition: 3/2011
Version no.: 0004

Wall Grip Coping Plus



Overview:	Wall Grip Coping Plus is a metal coping with hold down cleats and metal drain chairs for capping most any parapet. Wall Grip Coping is used with either an adhered or mechanically attached Sika Sarnafil Roof System to secure and protect Sarnafil membrane flashings in higher wind speed areas (contact your Sika Sarnafil representative for details).
Composition:	Wall Grip Coping Plus is formed from .063" (1.60 mm) or .050" (1.25 mm) aluminum; 24ga. galv. steel with Kynar 500® coating. Standard coping cap length is 10'. Cleats are 16ga. galvanized steel. Chairs are metal in the same color and finish as the coping cap. Fabricated to the wall width required between 6" and 32". Face and back leg are 4" (102mm) nominal length with tested approvals up to 6" (152mm).
Features and Benefits:	• Higher Wind Speed Coverage (see overview section) • Internal metal chair drainage system eliminates caulked joints. • True welded radius, matching corners, end caps, and other accessories, are factory fabricated. • UL Classified to meet the ANSI/SPRI ES-1 Roof Edge Standard Test Protocol RE-3 for coping. • FM Approved • Pre-punched holes and supplied stainless steel fasteners for proper attachment and fast installation. • Wall Grip Coping Plus utilizes a metal chair which functions as both a gutter chair to channel water and as an internal splice plate in the same color and finish as the coping cap.
Packaging:	The entire Wall Grip Coping Plus assembly is packaged in job specific crates to provide maximum protection during transportation.
Installation:	The substrate should be flat and level from front to back. Shim areas not level. The first cleat/chair set should be installed with the center line of the cleat set to the miter leg length and 24" (300mm) from the end of a wall. Install cleats/chairs sets at all corners and ends first, then work along the wall to the center locating sets every 60" on center for walls less than 17" and 40" on center for walls 17" - 32". Adjust the cleat location in the middle of a run to fit a short coping length. This procedure will provide a symmetrical appearance of the installed coping. Install metal gutter chair/concealed joint covers at joint locations. Hook coping face leg over the cleat face (front) leg and swing over the top. Snap the roof side (back) leg by pressing firmly down on the back edge directly over the cleat chair sets. Leave a ¼" (6mm) joint for thermal movement.

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Sarnafil®

CSI #: 07 71 13

Availability:	Wall Grip Coping Plus is available directly from Sika Sarnafil Authorized Applicators when used within Sika Sarnafil Roof Systems. Contact your Sika Sarnafil Regional Office or visit our website for further information.
Warranty:	As a Sika Sarnafil-supplied accessory, Wall Grip Coping Plus is included in Sika Sarnafil's Standard or System Warranty to the Building Owner.
Maintenance:	Wall Grip Coping requires no maintenance.
Technical:	Sika Sarnafil provides technical support. Technical staff is available to advise applicators as to the correct installation method of Wall Grip Coping.

Technical Data:

Standard Sizes	Material	Gauge	Finishes
Wall Sizes - 6" - 32"	Aluminum	Standard is .050" & .063"	Mill Finish Kynar 500 Colors Clear Anodize Bronze Anodize
Standard Leg Size-4" Minimum Leg Size-2.125" Maximum Leg Size-12"	Galvanized Steel Galvanized Steel Galvanized Steel	Standard is 24 Gauge up to a 24" wall	
Miter Leg Lengths < 16" Wall = 23-1/4" 17"-23" Wall = 29-1/4" 24"-32" = Custom Length	Copper & Stainless Steel by Request	Other Metal Thicknesses by Request	

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Web: www.sika.ca

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CSI #: 07 91 00

McMASTER-CARR.
(609) 259-8900
(609) 259-3575 (fax)
nj.sales@mcmaster.com
Text 58926

Weather-Resistant Rubber Bulb Seal

EPDM, 5/8" Overall Width, 3/8" Overall Height

1142A33

Material	EPDM
Backing Type	Plain
Overall Width (A)	5/8"
Overall Height (B)	3/8"
Color	Black
Length	10 ft., 20 ft., 50 ft., Other
Temperature Range	-20° to 200°F
Durometer	A60-A70 (medium-hard to hard)

Weather-Resistant EPDM—Use these seals outdoors as well as with steam and salts. Durometer is A60-A70 (medium-hard to hard). Temperature range is -20° to 200°F.

Division 08
Openings

CSI #: 08 14 00

Masonite

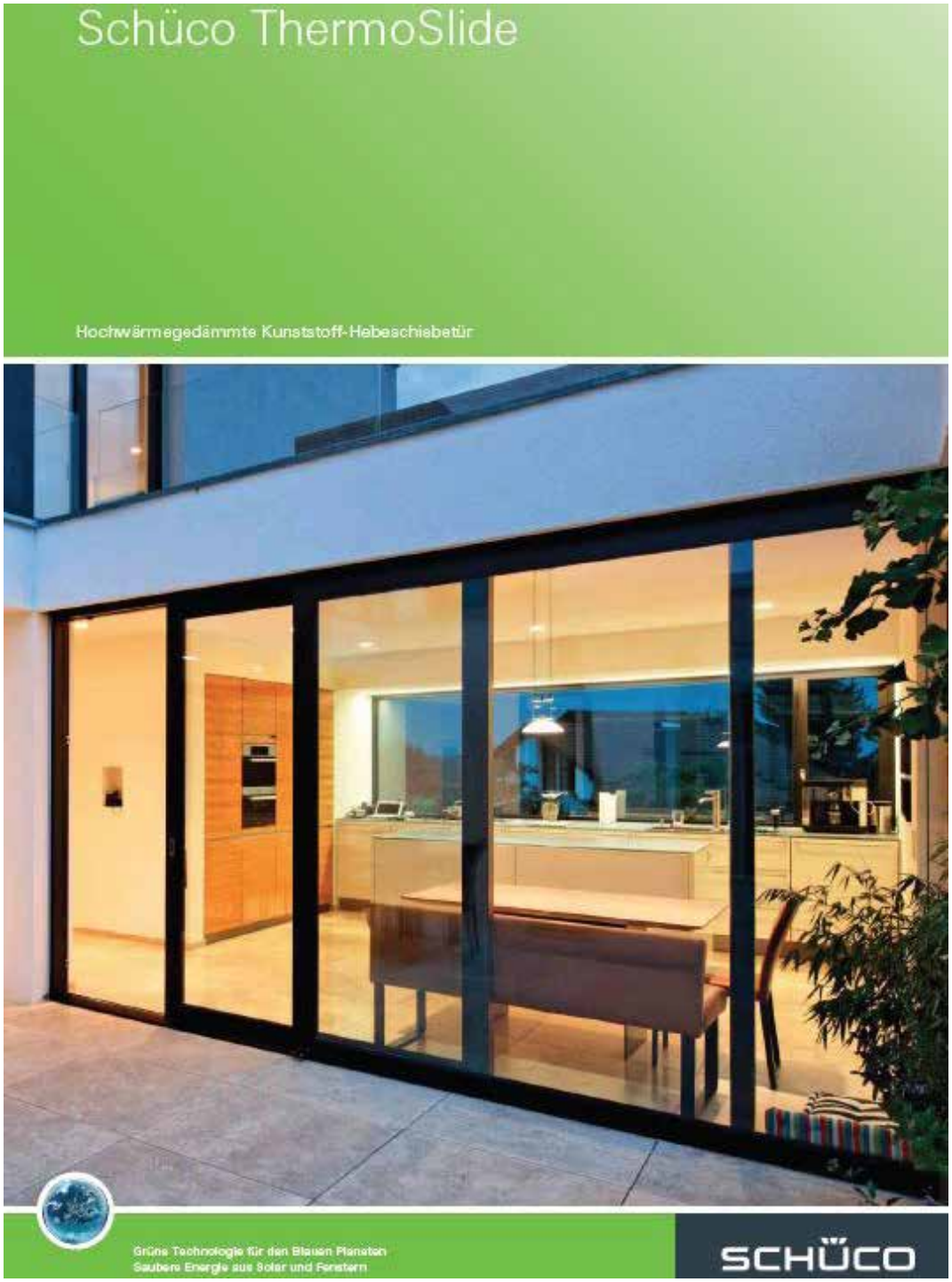
Product Description	Qty	Price
Masonite Wood Veneer Flush Door Slab Material: Masonite Wood Veneer Flush Glass: Size: 80" X 30" Panel: Flush Color:	1	See Store for Price

CSI #: 08 14 00

Masonite

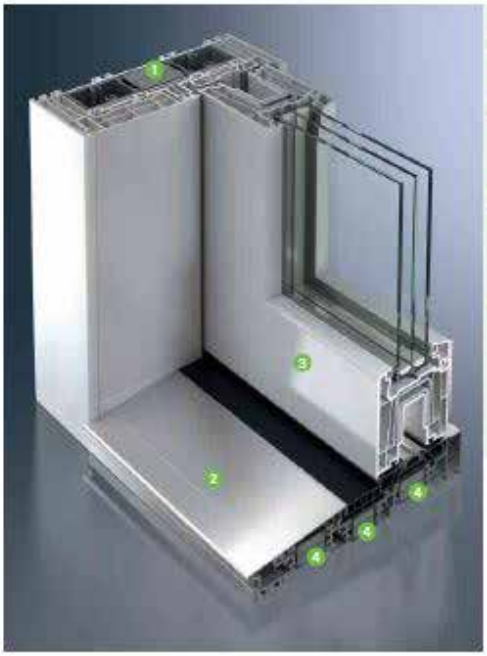
Product Description	Qty	Price
Masonite Wood Veneer Flush Bifold Material: Masonite Wood Veneer Flush Glass: Size: 80" X 30" Panel: Flush Color: Golden Oak	1	See Store for Price

CSI #: 08 32 00


Schüco ThermoSlide
Hochwärmegedämmte Kunststoff-Hebeschiebetür
Grüne Technologie für den Blauen Planeten
Saubere Energie aus Solar und Forstern
SCHÜCO

CSI #: 08 32 00

… mit Schüco ThermoSlide.



1. Thermische Entkopplung verhindert Wärmebrücken
2. Flache Schwelle für hohen Komfort und barrierefreies Wohnen
3. Schlanke Konstruktion bei maximalen Flügelgrößen sorgt für höchstmöglichen Lichteinfall
4. 3-fach thermisch getrennte Bodenschwelle verhindert fußkalte Bereiche

Mehr Licht und Raum zum Wohlfühlen.

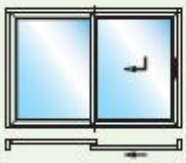
Energie sparen bedeutet nicht nur etwas für den Klimaschutz zu tun, sondern auch Geld sparen – und das ist angesichts rasant steigender Energiekosten im Sinne eines jeden Bauherren. Mit durchdachten Kunststoff-Mehrkammer-Profilen, einer Bautiefe von 82 Millimetern und hochwertigen 3-Scheiben-Verglasungen erreicht Schüco ThermoSlide herausragende Wärmedämmwerte bis auf Passivhausniveau ($U_w \leq 0{,}8$ W/(m²K)).
Das bedeutet einen hohen Wohnkomfort durch ein angenehmes, konstantes Raumklima und spart zusätzlich wertvolle Energie und hohe Kosten. Und das nicht nur an kalten Tagen, sondern auch im Sommer. Denn dann bleibt die Hitze außen vor und eventuelle Klimatisierungskosten können so erheblich gesenkt werden. Optimaler Wohnkomfort und enormes Energiesparpotenzial – also eine perfekte Kombination. Die 3-fach thermisch getrennte Aluminiumbodenschwelle der Hebeschiebetür ist so konstruiert, dass fußkalte Bodenbereiche vor dem Fenstertür-System so wirksam vermieden werden.

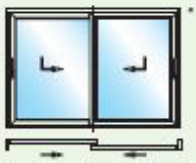
Ein innovatives Dichtungssystem mit drei Dichtungsebenen garantiert maximale Wind- und Schlagregendichtigkeit sowie optimalen Schallschutz. Und das bewährte Verriegelungssystem erfüllt höchste Ansprüche im Hinblick auf die Einbruchhemmung.

CSI #: 08 32 00

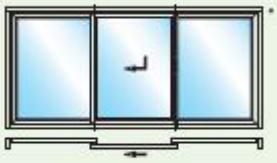
Individuelle Vielfalt für lichtdurchflutete Wohnräume

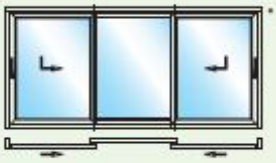
In der zweiteiligen Version wählen Sie zwischen je einem beweglichen Flügel und zwei wechselseitig verschiebbaren Elementen.





Ob großzügiger Durchgang durch die Mitte oder wahlweise durch die äußeren Schiebeflügel – dem Zugang in den Außenbereich sind keine Grenzen gesetzt.





*In Vorbereitung

Hebeschiebetüren von Schüco überzeugen durch perfekte Funktionalität – und bieten dabei ganz besondere Gestaltungsmöglichkeiten. Der Farbgestaltung von Schüco ThermoSlide sind keine Grenzen gesetzt. Die Profiloberflächen können innen wie außen verschiedenfarbig gestaltet werden, um so den individuellen Ansprüchen gerecht zu werden.

Schüco ThermoSlide basiert auf dem System Schüco Corona SI 82. Mit diesem umfassenden Profilsystem gestalten wir für Sie auch hochwärmegedämmte Thermo 6-Energiesparfenster und -türen.
Wir informieren Sie gern ausführlich über das gesamte Angebot.

Wählen Sie aus einer breiten Farbpalette an Unifarben und Holzdekoren.

CSI #: 08 53 00

Schüco SI82

Passive House Performance Triple-Pane Windows

Schüco SI82 Bloc

uPVC systems with a basic depth of 82 mm achieve high thermal insulation values with the narrowest of face widths. These profile systems are the ideal answer to rising energy costs and more stringent environmental protection demands.

When selecting uPVC window systems, you look for quality, design and innovation. The Schüco uPVC window systems combine these features in a diverse product range, offering architects a great degree of design flexibility. Choose the ideal window system to suit the requirements of your building project. The SI82 window system with the 82 mm basic depth is the perfect choice for high efficiency triple-pane applications.

Schüco SI82 window systems have three levels of drainage and conventional steel reinforcing profiles. Thanks to industrial fabrication and fast availability, they can now be used to build low energy windows for houses economically and to high standards. SI82 window and door systems are suitable for a wide variety of uses in both new-build and renovation projects. An extensive range of accessories ensures a high level of system security.

Passive House Performance

Combined with R-10 triple-pane glass, SI82 is capable of achieving Passive House performance metrics, making it the most affordable uPVC option for PH projects. The added strength of SI82 frames enables the use of larger window openings up to 8 ft in height.

Glass up to R-14, SHGC 0.62

Partnering with Saint Gobain Glass, we use the most innovative glass substrates in the world. Our triple-pane glass reaches up to R-14 and SHGC=0.62, giving PH designers greater flexibility when modeling projects in PHPP.

Premium Finish Options

Our uPVC windows are available in a wide selection of wood grain and single color decorative foils. Our RAL-certified, high quality decorative foils are weather-resistant, fade-resistant and have been successfully used for decades.

Palette of wood and color finishes

Matching Doors

The SI82 profile system is also available for entry doors, patio doors and tilt-sliding doors providing for a unified frame and sash design.

North American Distributor of Fine European Windows

MARVIN

ERS | 15

CSI #: 08 53 00

Schüco SI82

Passive House Performace Triple-Pane Windows

Energy Efficiency

- Profile construction with optimized chamber geometry and a basic frame depth of 82 mm for excellent thermal insulation
- U_f value from 1.0 to 1.1 W/(m²K)
- Vent overlap of 8 mm minimizes heat loss
- Glass edge cover of 18 mm guarantees minimal heat loss in the glass edge seal area
- Triple glazing with a glass thickness of up to 52 mm possible
- Optimum thermal insulation due to weather-resistant outer-frame rebate gasket

Design

- Vent profiles are available in two different contours (Classic, Rondo)
- Narrow face width of 120 mm (standard profile combination) highlights the slim-lined look of the window
- Remarkable contours with concise softform radii and sloping exposed faces
- Various glazing bead contours as a design feature
- White profiles are supplied with modern, silver-grey gaskets; foiled profiles with black gaskets as standard
- The flush fitting gaskets blend perfectly with the window's appearance
- Profiles can be colored with a large selection of wood grains and single color decorative foils
- A comprehensive range of aluminum cover caps is available for integration in aluminum façades

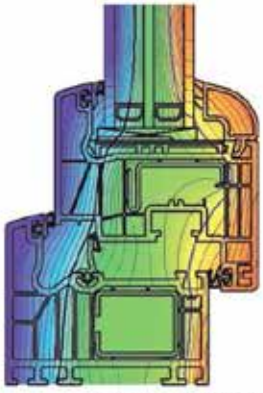
Security

- Corner pivot fixed in the vent with screws through three uPVC walls
- Depending on structural requirements, various reinforcing profiles in the outer and vent frames ensure that the windows are highly robust and durable
- Special screw ports for fixing the corner pivot in the vent
- Fittings axis of 13 mm allows the use of burglar-resistant hardware
- Security locking keeps with a screw fixing in the steel reinforcement can be used for increased security requirements
- All hardware components are protected from corrosion and against dirt by the outer-frame rebate gasket

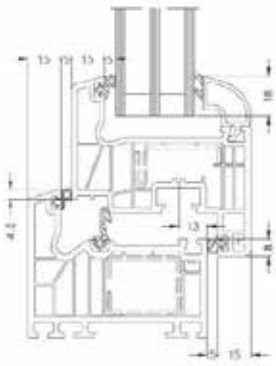
Comfort

- Narrow face widths ensure maximum light penetration
- Excellent sound reduction values (depending on the profile combination and glazing, sound insulation values up to $R_{w,P}$ 47 dB are possible)
- Flush glazing bead makes the windows easy to clean
- Gasket clearance of 5 mm ensures the windows close smoothly

Parameters	
Frame depth	82 mm 3.28 in
Frame face width	120 mm 4.72 in
Possible glazing thickness	18 - 52 mm 0.71 - 2.05 in
Thermal insulation U_f	1.0 - 1.1 W/(m².K) 0.18 - 0.19 Btu/(h.ft².°F)
Sound insulation $R_{w,P}$	47 dB



Isothermal flow in Schüco SI82 Classic



Section detail of Schüco SI82 Classic

CSI #: 08 53 00

EUROPEAN ARCHITECTURAL SUPPLY
FINE WINDOWS FOR ALL SEASONS

Passive House Windows

Passive House Certified and Recommended Systems

Schüco SR2 ThermoPlus uPVC Window

The Schüco SR2 ThermoPlus uPVC system with three drainage levels and patented aluminum reinforcement rolling technology is based on 7-chamber uPVC technology. This high-insulation system can be used to build passive and net-zero energy buildings with narrow face widths for houses, economically and to high standards.

Schüco SR2 Rondo uPVC Window

Schüco SR2 window systems have three levels of drainage and conventional steel reinforcing profiles. Thanks to industrial fabrication and fast availability, they can now be used to build low-energy windows for houses economically and to high standards. SR2 window and door systems are suitable for a wide variety of uses in both new build and renovation projects. An extensive range of accessories ensures a high level of system security.

Schüco AWS 90.SI+ Aluminum Window

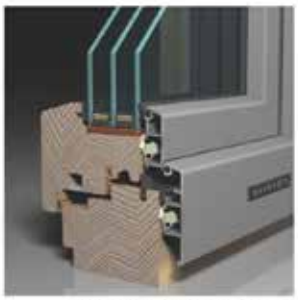
The Schüco AWS 90.SI+ aluminum window combines the benefits of aluminum with pioneering thermal insulation for sustainable architecture.

Makrowin MW88 G2 Wood Window

As the most recent addition to our Passive House fenestration offering, the MW88 G2 window represents the state-of-the-art in engineered wood frame technology. This window was recently certified at the PassivHaus Institute (PHI) in Darmstadt, achieving $U_f = 0.13$ Btu/(hr·ft²·°F). At 88 mm thickness, this window profile represents the thinnest PHI-certified wood window design.

Makrowin MW88 Wood Window

Makrowin produces some of the most energy efficient wood windows in Europe. MW88 is their most widely used window frame for applications utilizing high performance triple-pane glass. At 88 mm deep, the sash frame is capable of utilizing insulated glass up to 8-14, enabling the frame to achieve PH-level U_w values. The sash and frame are exceptionally strong, making them suitable for extra large window assemblies up to 8 ft in height.



Makrowin MW88 Classic Wood/Aluminum Window

For demanding customers who desire the rich warm texture of wood on the inside and the durability of aluminum on the outside, these outstanding windows offer uncompromising performance and beautiful styling. The aluminum cladding provides the window frame with decades of protection from rain, ice and harmful UV radiation. Our aluminum frames are of the absolute best quality available. We utilize 100% extruded materials, we weld all mitered corners and use the highest quality powder coated finishes.

CSI #: 08 53 00

Passive House Certified and Recommended Windows

Passive House Window Parameters

	SI82 ThermoPlus	SI82	AWS 90.SI+	MW88 G2	MW88	MW88 Classic	
Product family	Schüco	Schüco	Schüco	Makrowin	Makrowin	Makrowin	
Material	uPVC	uPVC	Aluminium	Wood	Wood	Wood with Aluminium Clad	
Passive House Institute	Certified	Specification	Specification	Certified	Specification	Specification	
Frame depth	82 **3.23**	82 **3.23**	82 **3.23**	88 **3.46**	88 **3.46**	105 **4.13**	[mm] [in]
Frame face width (sill / head / jamb)	120 **4.72**	120 **4.72**	117 **4.61**	151 / 131 /131 **5.94 / 5.15 / 5.15**	137 / 119 /119 **5.39 / 4.69 / 4.69**	119 **4.69**	[mm] [in]
Possible glazing thickness	18 - 52 **0.71 - 2.05**	18 - 52 **0.71 - 2.05**	26 - 52 **1.02 - 2.05**	44 **1.73**	44 **1.73**	44 **1.73**	[mm] [in]
Thermal insulation U_f	0.75 - 0.96 **0.13 - 0.17**	1.0 - 1.1 **0.18 - 0.19**	1.0 **0.176**	0.773 **0.132**	1.014 **0.173**	1.084 **0.185**	[W/(m²·K)] [Btu/(hr.ft2.°F)]
Thermal bridge coefficient Ψ_{glass}	0.028 **0.016**	0.028 **0.016**	- -	0.030 **0.017**	0.030 **0.017**	0.033 **0.019**	[W/(m.K)] [Btu/(hr.ft.°F)]

Passive House Glass Parameters

	Climatop ONE		Climatop ULTRA N		Climatop LUX		
Fill (90%)	Argon	Krypton	Argon	Krypton	Argon	Krypton	
Number of glass panes	3	3	3	3	3	3	[]
Thermal insulation U_g	0.515 **0.088**	0.410 **0.070**	0.615 **0.105**	0.515 **0.088**	0.721 **0.123**	0.615 **0.105**	[W/(m2.K)] [Btu/(hr.ft2.°F)]
Solar heat gain coefficient (SHGC)	0.34	0.34	0.50	0.50	0.62	0.62	[]
Visual Transmittance	0.58	0.58	0.71	0.71	0.73	0.73	[]
R-Value	R-11	R-14	R-10	R-11	R-8	R-10	[hr.ft2.°F/Btu]
Sound Insulation	32	35	32	35	32	35	[dB]

All glazings are manufactured in the configuration 4-16-4-16-4 mm with thermal spacer SWISSPACER V.

EUROPEAN ARCHITECTURAL SUPPLY

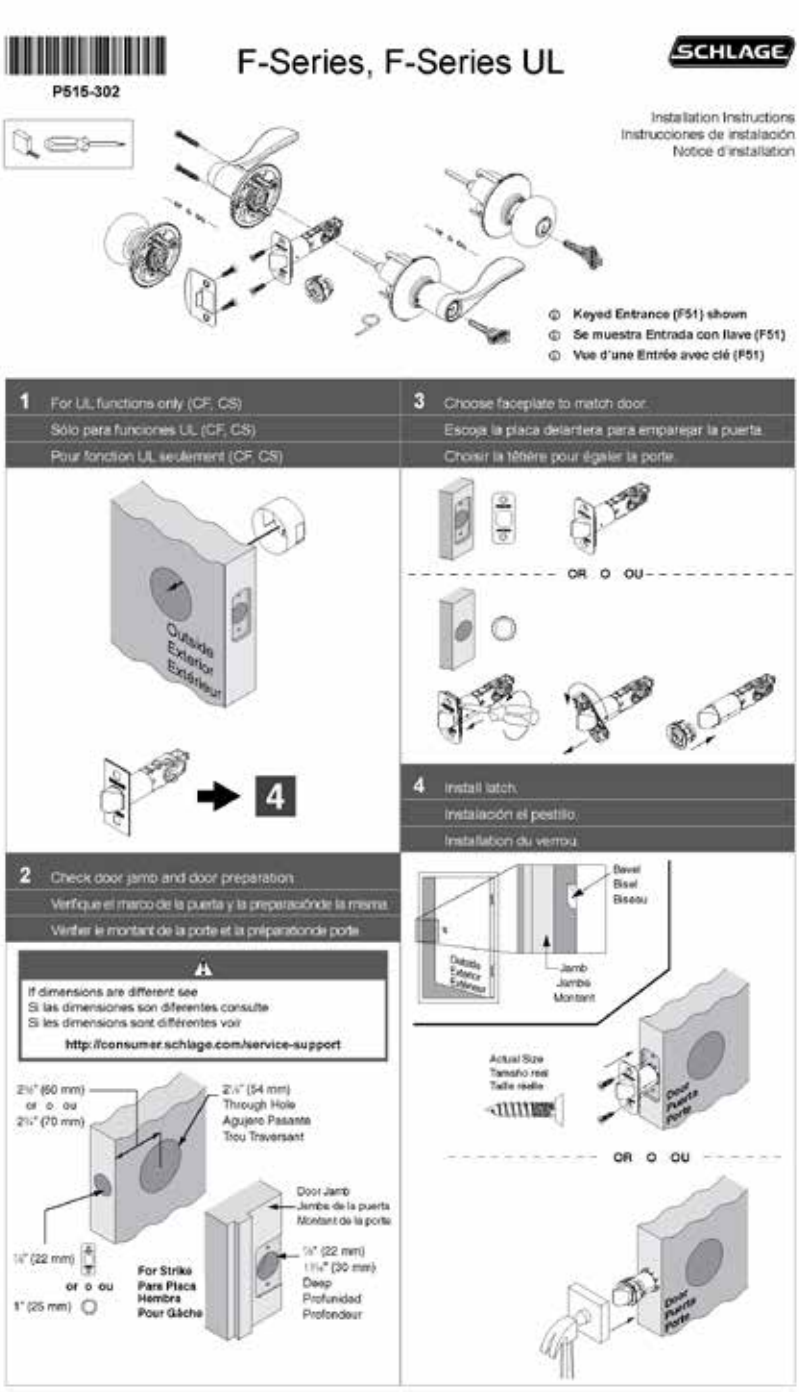
SCHÜCO

North American Distributor of Fine European Windows

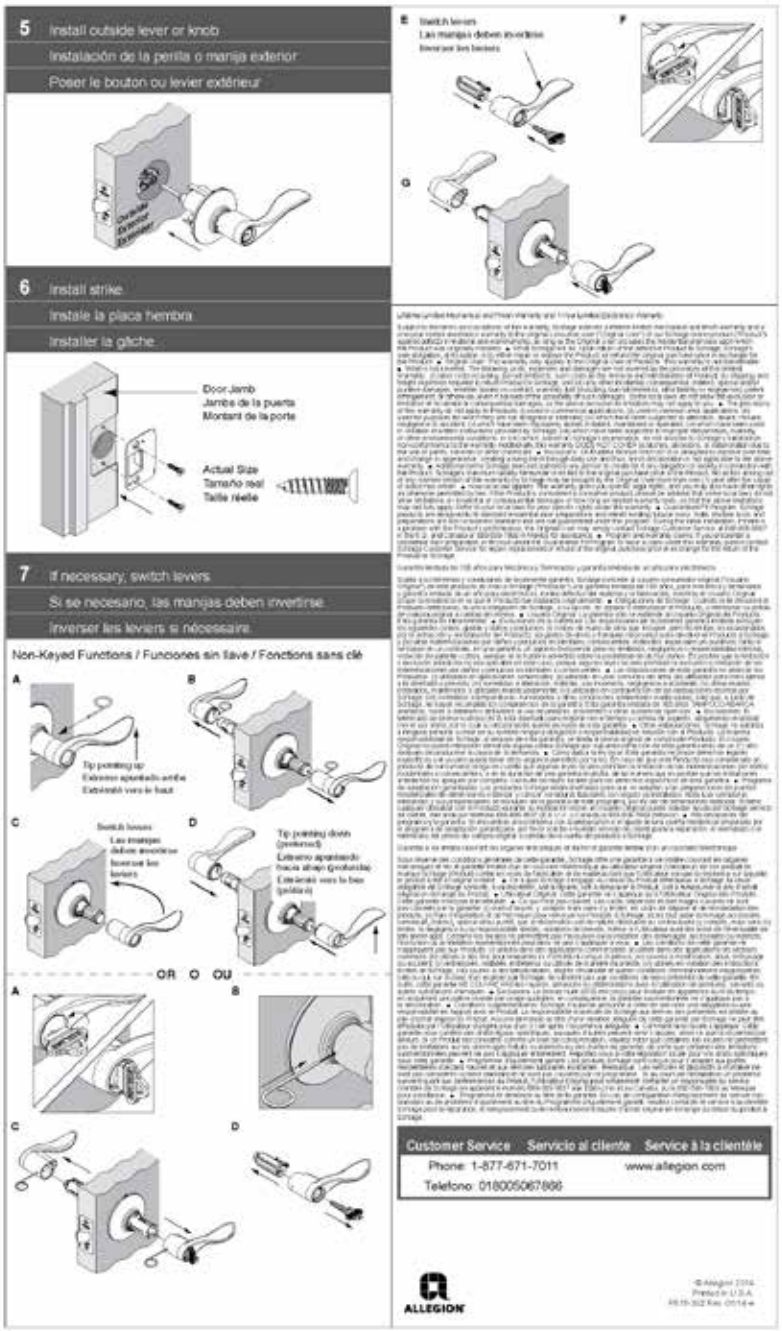
SUPERVIZED DELIVERY | INSTALLATION | TRAINING | SERVICE

144 North Road Suite 2500 | Sudbury, MA 01776 | 1.781.647.4432 | www.FineWindows.com

CSI #: 08 71 00


P515-302
F-Series, F-Series UL
SCHLAGE
Installation Instructions
Instrucciones de instalación
Notice d'installation
Keyed Entrance (F51) shown
Se muestra Entrada con llave (F51)
Vue d'une Entrée avec clé (F51)
1 For UL functions only (CF, CS)
Sólo para funciones UL (CF, CS)
Pour fonction UL seulement (CF, CS)
Outside
Exterior
Extérieur
4
2 Check door jamb and door preparation
Verifique el marco de la puerta y la preparaciónde la misma
Vérifier le montant de la porte et la préparationde porte
If dimensions are different see
Si las dimensiones son diferentes consulte
Si les dimensions sont différentes voir
http://consumer.schlage.com/service-support
2⅜" (60 mm)
or o ou
2¾" (70 mm)
2⅛" (54 mm)
Through Hole
Agujero Pasante
Trou Traversant
Door Jamb
Jambs de la puerta
Montant de la porte
⅞" (22 mm)
or o ou
1" (25 mm)
For Strike
Para Placa
Hembra
Pour Gâche
⅞" (22 mm)
1⅛" (30 mm)
Deep
Profundidad
Profondeur
3 Choose faceplate to match door
Escoja la placa delantera para emparejar la puerta
Choisir la têtière pour égaler la porte
OR O OU
4 Install latch
Instalación el pestillo
Installation du verrou
Bevel
Bisel
Biseau
Outside
Exterior
Extérieur
Jamb
Jambs
Montant
Actual Size
Tamaño real
Taille réelle
Door
Puerta
Porte
OR O OU
Door
Puerta
Porte

CSI #: 08 71 00

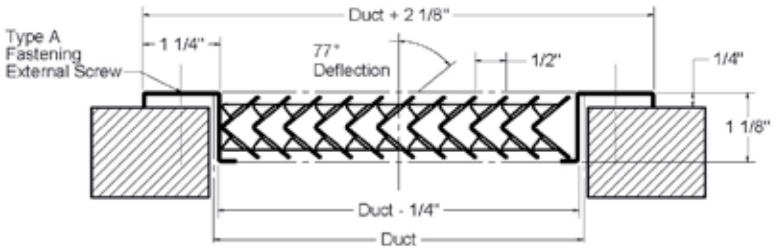

5 Install outside lever or knob
Instalación de la perilla o manija exterior
Poser le bouton ou levier extérieur
6 Install strike
Instale la placa hembra
Installer la gâche
Door Jamb
Jambe de la puerta
Montant de la porte
Actual Size
Tamaño real
Taille réelle
7 If necessary, switch levers
Si se necesario, las manijas deben invertirse
Inverser les leviers si nécessaire
Non-Keyed Functions / Funciones sin llave / Fonctions sans clé
OR O OU
Customer Service Servicio al cliente Service à la clientèle
Phone: 1-877-671-7011
Teléfono: 018005067866
www.allegion.com
ALLEGION

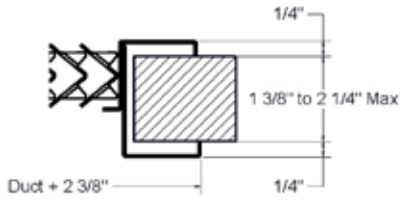
CSI #: 08 90 00

TUTTLE & BAILEY
The First Name In Air Distribution

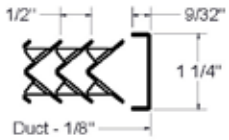
Submittal Drawing

- Constructed of heavy duty 20 gauge steel
- Large free area while maintaining a sight proof design and stiffness
- Designed for installation on doors
- Can also be used in place of exhaust and return grilles where concealing plenums and ductworks is desired
- Minimum size is 6" wide x 4" high and maximum size is 30" x 30" - sizes available in 1" increments





Auxiliary Frame



Channel Frame

Options:
- ☐ Horizontal Blades
- ☐ Vertical Blades

Accessories:
- ☐ Auxiliary Frame
- ☐ Channel Frame

Finishes:
- ☐ White (WH)
- ☐ Aluminum Paint (AP)
- ☐ Off-White (OW)
- ☐ Flat Black (FB)
- ☐ Match Paint (MP)

Dimensions in inches

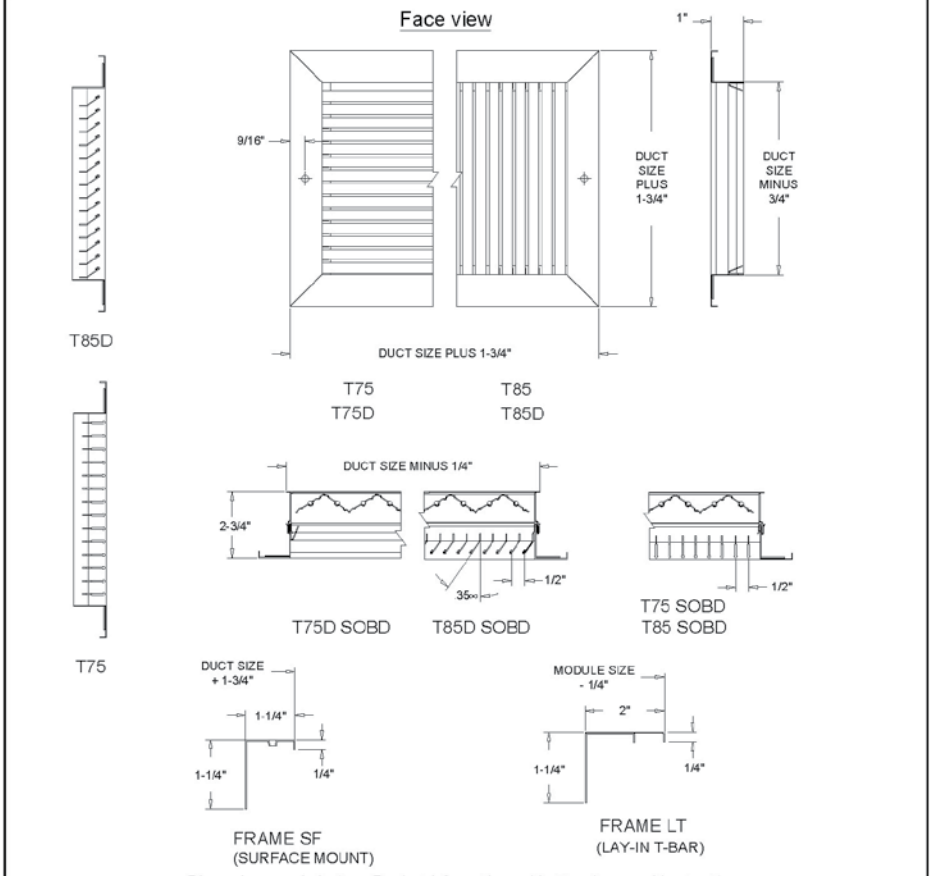
Job: Location: Architect: Engineer: Contractor:	Tag: Submitted By:	**DXFR** **Transfer Grilles and Frames** **Steel**
	SD - 2198 | Rev: A (06/14)	

These drawings do not detail every aspect of the product. This submittal demonstrates general product dimensions; drawings are not to scale. Tuttle & Bailey reserves the right to make changes without notice. Copyright © 2014 Tuttle & Bailey www.tuttleandbailey.com

CSI #: 08 90 00

Tuttle & Bailey® SUBMITTAL DRAWING

- Bars spaced on 1/2" centers
- Model T75: horizontal bars, 0° fixed deflection
- Model T85: vertical bars, 0° fixed deflection
- Model T75D: horizontal bars, 35° fixed deflection
- Model T85D: vertical bars, 35° fixed deflection
- Steel construction
- Standard grille finish is white (WH), standard finish for SOBD is mill



Dimensions are in inches. Product information subject to change without notice.

JOB NAME:	SUBMITTED BY:	DATE: 8-1-00	SD-1760
LOCATION:		**T75 & T85**	
ARCHITECT:		**Fixed Bar Return Grilles & Registers**	
ENGINEER:		1/2" Bar Spacing	
CONTRACTOR:			

Tuttle & Bailey • 1200 Executive Drive East • Suite 125 • Richardson, Texas 75081 • 972-497-0471 Phone • 972-497-0481 Fax

Division 09
Finishes

CSI #: 09 20 00


09 29 00/NGC
Gold Bond® BRAND
eXP®
Interior Extreme® Gypsum Panel
Gold Bond® BRAND
Gypsum Board
National Gypsum.

CSI #: 09 20 00

Gold Bond® BRAND

eXP®

Extended Exposure
Interior Extreme®

Interior Mold and Moisture Resistance

The XP® family of gypsum board products has become the solution of choice among building owners and specifiers who require extra protection against mold and moisture in interior applications. We have established our purple XP brand as the industry standard for superior mold and moisture resistance.

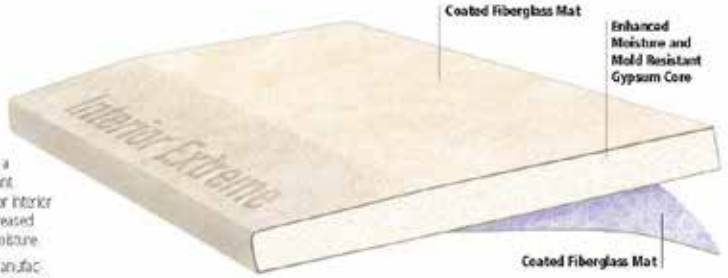
There are many conditions within a construction environment that require mold and moisture resistant properties and XP is the appropriate solution in most. Yet there are certain extreme applications where the limitations of a paper faced product preclude it from being utilized.

Introducing eXP Interior Extreme Gypsum Panels

National Gypsum has developed Gold Bond® BRAND eXP® Interior Extreme®, a fiberglass faced mold and moisture resistant gypsum panel ideally suited for extreme interior applications. It is the latest addition to National Gypsum's expanding portfolio of eXP Extended Exposure products.

CSI #: 09 20 00

Gold Bond® BRAND eXP Interior Extreme® Gypsum Panel



Description

eXP® Interior Extreme® is a moisture and mold resistant gypsum panel designed for interior applications requiring increased resistance to incidental moisture.

eXP Interior Extreme is manufactured with an enhanced moisture and mold resistant gypsum core and facer. The facers are composed of a coated fiberglass mat which provides superior moisture resistance capabilities.

It is produced in 1/2" Regular and 5/8" Fire-Shield® Type X, 4' wide in standard lengths. eXP Interior Extreme is lightweight, scores and cuts easily and is specially coated on the front, back and sides for easy handling. eXP Interior Extreme is easily identified by the back facer in our original PURPLE® color.

Basic Uses

eXP Interior Extreme can be used in both wood and metal framed construction for interior wall and ceiling finishing while providing increased moisture and mold resistance. eXP Interior Extreme is recommended for use on the interior side of exterior walls, where moisture exposure is more likely.

Enhanced performance is provided in pre-rock applications before the building envelope is completely enclosed.

eXP Interior Extreme can be used as a substrate for tile applications outside of wet areas.

With eXP Interior Extreme, a single gypsum panel product can be used throughout the entire project wherever gypsum board is specified.

On projects where the owner or specifier have designated fiberglass faced gypsum board exclusively for the interior, the ideal solution is eXP Interior Extreme.

Features/Benefits

- Manufactured to meet ASTM C 1658 and applicable sections of ASTM C 1396.
- Will withstand up to 12 months of interior exposure to the elements, subject to the terms, conditions and exclusions of National Gypsum's Limited Warranties.
- Resists the growth of mold per ASTM D 3273 with a score of 10, the best possible score.*
- Provides the best moisture resistance solution for the interior side of exterior walls where moisture exposure is more likely.
- A preferred alternative to paper faced gypsum board in pre-rock applications before the building envelope is fully enclosed, which may shorten construction cycles.
- Coated fiberglass mat on face and back for easy handling.
- 5/8" Fire-Shield eXP Interior Extreme is an approved component in specific UL fire-rated designs.
- Approved for use in protected exterior soffit applications.
- Less than 5% water absorption per ASTM C 473.
- eXP Interior Extreme is GREENGUARD Children & Schools® Certified for indoor air quality.
- GREENGUARD Environmental Institute listed as microbial-resistant when tested per ASTM D 6329.
- GREENGUARD Certified® as a low-emitting material. Meets CHPS and CA Section 01350.

Limitations

- eXP Interior Extreme is intended for interior use only.
- Panels are nonstructural and are not a nailing base.
- Do not finish joints until building is properly closed in and conditioned.
- Exposure to excessive or continuous moisture and extreme temperatures should be avoided. Gypsum panels are not recommended where they will be exposed to temperatures exceeding 125°F (52°C) for extended periods of time.
- eXP Interior Extreme should not be used in areas subject to constant and/or excessive moisture and high humidity such as gang showers, saunas, steam rooms or swimming pool enclosures.
- eXP Interior Extreme should not be used as a backer board directly behind tile in tub and shower areas.
- Although eXP Interior Extreme can be utilized in horizontal assemblies such as ceilings, it should not be installed in pre-rock conditions where the potential for ponding water may occur.
- Forced air heaters should not be used to the point of creating water condensation.

Recommendations

- eXP Interior Extreme must be stored off the ground and under cover. Sufficient risers must be used to assure support for the entire length of the gypsum panel to prevent sagging.
- Care should be taken to ensure that the panels are kept dry prior to and during installation. Adequate care should be taken while transporting, storing, applying and maintaining panels. For additional information, refer to the Gypsum Association publication, "Guidelines for Prevention of Mold Growth on Gypsum Board" (GA-238-03), which is available at gypsum.org under the "Download Free Gypsum Association Publications" section.

***Mold and Mildew Resistance:**

eXP Interior Extreme was designed to provide extra protection against mold and mildew compared to standard gypsum board products. When tested by an independent lab per ASTM D 3273 ("Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber"), eXP Interior Extreme achieved a score of 10, the best possible score for this test. No material can be considered "mold proof," nor is it certain that any material will resist mold or mildew indefinitely. When used in conjunction with good design, handling, and construction practices, eXP Interior Extreme can provide increased mold resistance versus standard gypsum board products. As with any building material, avoiding water exposure during handling, storage and installation, and after installation is complete, is the best way to avoid the formation of mold or mildew.

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Installation

Install eXP Interior Extreme in accordance to GA-216 *"Application and Finishing of Gypsum Panel Products"* and ASTM C 840 *"Standard Specification for Application and Finishing of Gypsum Board for Non-Fire rated Construction."* In addition, the following recommendations should be followed:

- Installation of fire-rated assemblies shall be in accordance with the details found in the UL Fire Resistance Directory or Gypsum Association GA-600 Fire Design Manual.
- Fasteners shall be driven just below the surface, avoiding damage to the core and/or facer.
- Unlike paper faced gypsum board, eXP Interior Extreme can be installed in pre-rock applications, yet water sensitive materials should not be installed adjacent to eXP Interior Extreme until the building is dried in.
- For optimal results when transitioning from eXP Interior Extreme to paper faced gypsum board, panels should be butted at corners or above drop ceilings.

Finishing

The finishing of eXP Interior Extreme panels should be specified and performed in accordance with Gypsum Association Publication GA-214 "Recommended Levels of Gypsum Board Finish". Joints between eXP Interior Extreme panels may be finished with either paper tape and ready mix joint compound or fiberglass mesh tape and setting compound such as ProForm BRAND Interior Finishing Products. In most areas to receive final decoration, skim coating of the entire surface is recommended.

In critical lighting conditions or when using gloss, semi-gloss or enamel paints, finish panels to a Level 5 finish as outlined in GA-214.

Decoration

For best painting results all surfaces, including joint compound, should be clean and dust free. To improve fastener and joint concealment, a coat of a quality drywall primer is recommended to equalize the porosities between surface facer and joint compound.

The level of finish selection and paint required to provide the specified or desired finished characteristics is the responsibility of the architect or contractor.

A gypsum panel that is to have a wallcovering applied should be prepared and primed as described for painting.

Safety

The following standard work practices are recommended: Installers should wear long pants and a long-sleeved loose fitting shirt. Protective gloves and special eye protection (goggles or safety glasses with side shields) should be used. A dust mask should be worn when sanding and additional breathing protection may be needed in extremely dusty conditions. Do not use a power saw to cut this product.

Caution: Because this product contains fiberglass, dust and glass fibers may be released during normal handling, which could result in eye or skin irritation or cause difficulty in breathing. Whenever possible, avoid contact with the skin and eyes and avoid breathing dust or fibers that may be released during installation. Consult the MSDS for this product, available at ***purplechoice.info*** before use.

Fire Resistance Ratings

The 5/8" Fire-Shield eXP Interior Extreme Gypsum Panel is tested in accordance with ASTM Standard E 119 and is classified as Type X for use in specific UL listings. The UL core designation for 5/8" Fire-Shield® eXP is FSW-6.

Technical Data

PHYSICAL PROPERTIES

	1/2" eXP Interior Extreme Regular	5/8" eXP Interior Extreme Fire-Shield – Type X
Nominal Thickness	1/2"	5/8"
Standard Width	4'	4'
Standard Lengths	8'–12'	8'–12'
Nominal Weight, (lbs/sf)	2.0	2.5
Permeance, (perms)	>10	>10
Linear Expansion	6.25 x 10⁻⁶	6.25 x 10⁻⁶
Coefficient of Thermal Expansion	9.26 x 10⁻⁶	9.26 x 10⁻⁶
Flexural Strength, parallel, lbf	≥90	≥106
Flexural Strength, perpendicular, lbf	≥100	≥140
"R" Value (C 518)	0.45	0.50
Noncombustible per ASTM E 136	Yes	Yes
Nail Pull Resistance minimum, lbf	80	90
Hardness core, edges and ends	≥15	≥15
Water Absorption (% of weight) (ASTM C 473)	≤5	≤5
Surface Water Absorption (grams)	≤1.6	≤1.6
Surface Burning Characteristics Flame Spread/Smoke Developed (E 84)	0/0	0/0
Humidified Deflection	2/8"	1/8"
Bending Radius	6'	8'
Resists Growth of Mold	Yes	Yes
Edges	Tapered	Tapered

APPLICABLE STANDARDS AND REFERENCES

- ASTM C 1658 – Standard Specification for Glass Mat Gypsum Panels
- Appropriate sections of ASTM C 1396 – Standard Specification for Gypsum Board
- ASTM C 473 – Standard Test Methods for Physical Testing of Gypsum Panel Products
- ASTM D 3273 – Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
- ASTM D 6329 – Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers (12-week test)
- ASTM C 840** – Standard Specification for Application and Finishing of Gypsum Board
- ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials
- ASTM E 136 – Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C
- ASTM C 518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
- Gypsum Association GA-216** – Application and Finishing of Gypsum Panel Products
- Gypsum Association GA-214 – Recommended Levels of Gypsum Board Finish
- Gypsum Association GA-238 – Guideline for Prevention of Mold Growth on Gypsum Board
- Gypsum Association GA-600 – Fire Resistance Design Manual
- National Gypsum, Gypsum Construction Guide

** Good building practices should always be followed to minimize adverse moisture exposure. When conditions require installation of board before the building is fully enclosed, the use of eXP Interior Extreme is the best possible solution.

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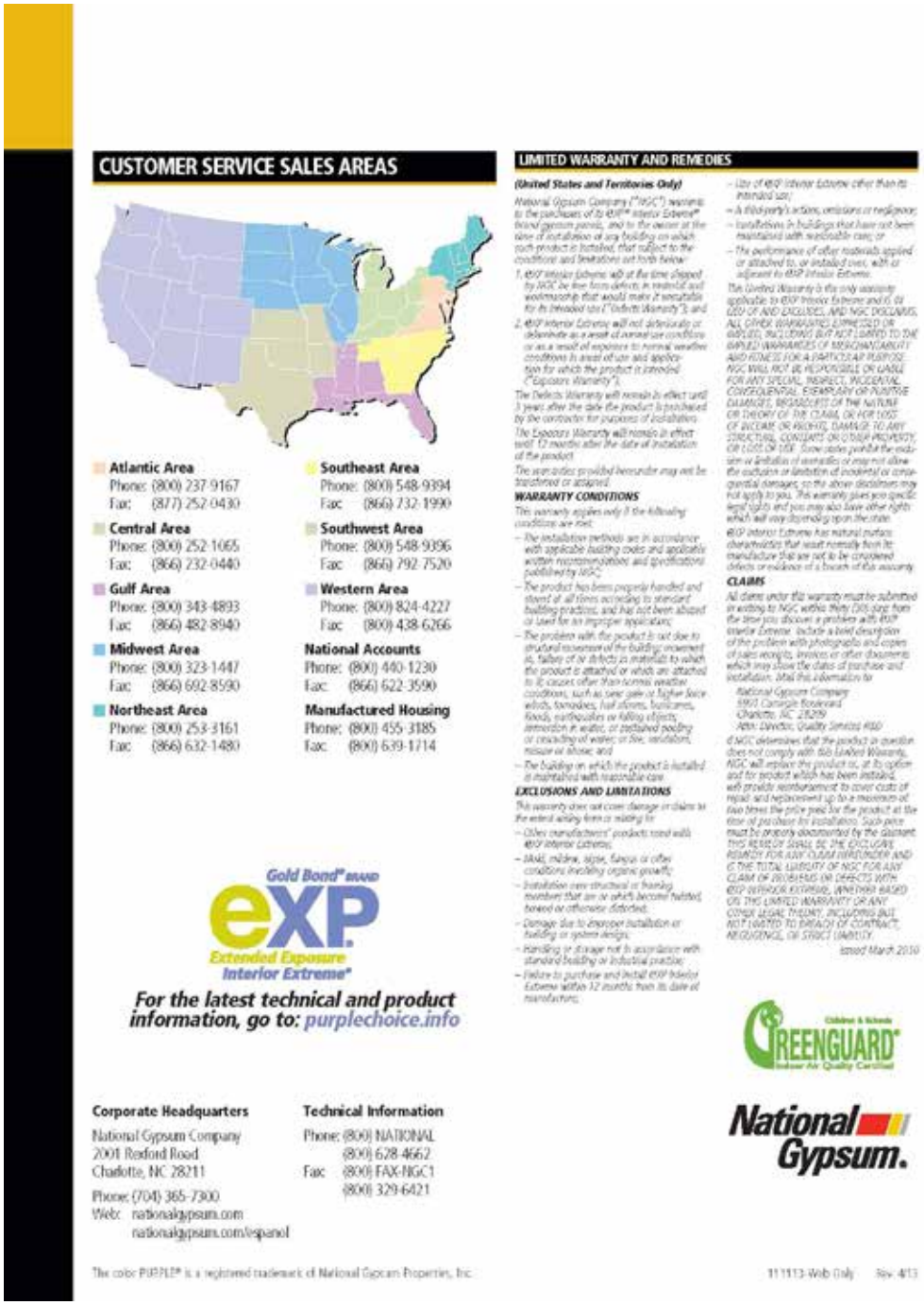

CUSTOMER SERVICE SALES AREAS

Atlantic Area
Phone: (800) 237-9167
Fax: (877) 252-0430

Central Area
Phone: (800) 252-1065
Fax: (866) 232-0440

Gulf Area
Phone: (800) 343-4893
Fax: (866) 482-8940

Midwest Area
Phone: (800) 323-1447
Fax: (866) 692-8590

Northeast Area
Phone: (800) 253-3161
Fax: (866) 632-1480

Southeast Area
Phone: (800) 548-9394
Fax: (866) 732-1990

Southwest Area
Phone: (800) 548-9396
Fax: (866) 792-7520

Western Area
Phone: (800) 824-4227
Fax: (800) 438-6266

National Accounts
Phone: (800) 440-1230
Fax: (866) 622-3590

Manufactured Housing
Phone: (800) 455-3185
Fax: (800) 639-1714

Gold Bond® brand eXP Extended Exposure Interior Extreme®

For the latest technical and product information, go to: purplechoice.info

Corporate Headquarters
National Gypsum Company
2001 Rexford Road
Charlotte, NC 28211
Phone: (704) 365-7300
Web: nationalgypsum.com
nationalgypsum.com/espanol

Technical Information
Phone: (800) NATIONAL
(800) 628-4662
Fax: (800) FAX-NGC1
(800) 329-6421

The color PURPLE® is a registered trademark of National Gypsum Properties, Inc.

111113-Web Only Rev. 4/13

LIMITED WARRANTY AND REMEDIES

(United States and Territories Only)

National Gypsum Company ("NGC") warrants to the purchaser of its 6IXP® Interior Extreme® brand gypsum panels, and to the owner of the site of installation of any building on which such product is installed, that subject to the conditions and limitations set forth below:

1. 6IXP Interior Extreme will at the time shipped by NGC be free from defects in material and workmanship that would make it unsuitable for its intended use ("Defects Warranty"); and

2. 6IXP Interior Extreme will not deteriorate or delaminate as a result of normal use conditions or as a result of exposure to normal weather conditions in areas of use and application for which the product is intended ("Exposure Warranty").

The Defects Warranty will remain in effect until 5 years after the date the product is purchased by the contractor for purposes of installation.

The Exposure Warranty will remain in effect until 12 months after the date of installation of the product.

The warranties provided hereunder may not be transferred or assigned.

WARRANTY CONDITIONS

This warranty applies only if the following conditions are met:

- *The installation methods are in accordance with applicable building codes and applicable written recommendations and specifications published by NGC;*
- *The product has been properly handled and stored at all times according to standard building practices, and has not been abused or used for an improper application;*
- *The problem with the product is not due to structural movement of the building, movement in, failure of or defects in materials to which the product is attached or which are attached to it, causes other than normal weather conditions, such as sonic gale or higher force winds, tornadoes, hail storms, hurricanes, floods, earthquakes or falling objects, immersion in water, or installed pooling or cascading of water; or fire, vandalism, misuse or abuse; and*
- *The building on which the product is installed is maintained with reasonable care.*

EXCLUSIONS AND LIMITATIONS

This warranty does not cover damage or claims to the extent arising from or relating to:

- *Other manufacturers' products used with 6IXP Interior Exterior;*
- *Mold, mildew, algae, fungus or other conditions involving organic growth;*
- *Installation over structural or framing members that are or which become twisted, bowed or otherwise distorted;*
- *Damage due to improper installation or building or system design;*
- *Handling or storage not in accordance with standard building or industrial practice;*
- *Failure to purchase and install 6IXP Interior Extreme within 12 months from its date of manufacture;*
- *Use of 6IXP Interior Exterior other than its intended use;*
- *A third-party's actions, omissions or negligence;*
- *Installations in buildings that have not been maintained with reasonable care; or*
- *The performance of other materials applied or attached to, or installed over, with or adjacent to 6IXP Interior Extreme.*

This Limited Warranty is the only warranty applicable to 6IXP Interior Extreme and IS, IN LIEU OF AND EXCLUDES, AND NGC DISCLAIMS, ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. NGC WILL NOT BE RESPONSIBLE OR LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL, EXEMPLARY OR PUNITIVE DAMAGES, REGARDLESS OF THE NATURE OR THEORY OF THE CLAIM, OR FOR LOSS OF INCOME OR PROFITS, DAMAGE TO ANY STRUCTURE, CONTENTS OR OTHER PROPERTY, OR LOSS OF USE. Some states prohibit the exclusion or limitation of incidental or consequential damages, so the above disclaimers may not apply to you. This warranty gives you specific legal rights and you may also have other rights which will vary depending upon the state.

6IXP Interior Extreme has natural surface characteristics that result normally from its manufacture that are not to be considered defects or evidence of a breach of this warranty.

CLAIMS

All claims under this warranty must be submitted in writing to NGC within thirty (30) days from the time you discover a problem with 6IXP Interior Extreme. Include a brief description of the problem with photographs and copies of sales receipts, invoices or other documents which may show the date of purchase and installation. Mail this information to:

National Gypsum Company
6901 Carnegie Boulevard
Charlotte, NC 28209
Attn: Director, Quality Services 4310

If NGC determines that the product in question does not comply with this Limited Warranty, NGC will replace the product or, at its option and for product which has been installed, will provide reimbursement to cover costs of repair and replacement up to a maximum of two times the price paid for the product at the time of purchase for installation. Such price must be properly documented by the claimant. THIS REMEDY SHALL BE THE EXCLUSIVE REMEDY FOR ANY CLAIM WHATSOEVER AND IS THE TOTAL LIABILITY OF NGC FOR ANY CLAIM OF PROBLEMS OR DEFECTS WITH 6IXP INTERIOR EXTERIOR, WHETHER BASED ON THIS LIMITED WARRANTY OR ANY OTHER LEGAL THEORY, INCLUDING BUT NOT LIMITED TO BREACH OF CONTRACT, NEGLIGENCE, OR STRICT LIABILITY.

Issued March 2010

GREENGUARD Children & Schools Indoor Air Quality Certified

National Gypsum.

CSI #: 09 20 00

National Gypsum COMPANY

Material Safety Data Sheet

MSDS No: GB-1008

Date: March 6, 2013
July 26, 2011

Gold Bond® BRAND eXP Interior Extreme Products

1. PRODUCT AND COMPANY INFORMATION

Manufacturer Information:
National Gypsum Company
2001 Rexford Road
Charlotte, NC 28211

For Emergency Product Information Call:
Director Quality Services
(704) 551-5820 - 24 Hour Emergency Response
Website: www.nationalgypsum.com

Product Name:	**eXP Interior Extreme** **eXP Interior Extreme AR (Abuse Resistant)** **eXP Interior Extreme IR (Impact Resistant)**
Use:	Interior building walls where moisture is a concern
Generic Descriptions:	Article composite. **eXP Interior Extreme** gypsum panels consist of a fire resistant, moisture resistant gypsum core encased in a moisture resistant, coated fiberglass mat.

2. HAZARDS IDENTIFICATION

Appearance and Odor: A gypsum core wrapped with an off white coated fiberglass mat. Composite material provides mildew protection. No odor.

Contains no asbestos. HMIS Hazard Class No. 1, 0, 0.

Emergency Overview

eXP Interior Extreme panels do not present an inhalation, ingestion, or contact health hazard unless subjected to operations such as sawing, sanding or machining which results in the generation of airborne particulate. This product contains quartz (crystalline silica) as a naturally occurring contaminant. It is recommended that a NIOSH approved particulate respirator be worn whenever working with this product results in airborne dust exposure exceeding the prescribed limits.
(See Section 11 - Toxicological Information)

OSHA Regulatory Status

While this material is not considered hazardous by the OSHA Hazard Communication Standard (29CFR 1910.1200), this MSDS contains valuable information critical to the safe handling and proper use of the product. This MSDS should be retained and available for employees and other users of this product.

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2. HAZARDS IDENTIFICATION (CONTINUED)

Potential Health Effects

Primary Routes of Entry: Inhalation, Dermal contact

Target Organs: Respiratory system, skin, eyes.

Inhalation: Acute exposure to airborne dust concentrations in excess of the PEL/TLV may result in coughing, dyspnea, wheezing, general irritation of the nose, throat, and upper respiratory tract, and impaired pulmonary function. Chronic exposures may result in lung disease (silicosis and/or lung cancer). (See Section 11 - Toxicological Information)

Exposures to respirable crystalline silica have not been documented during normal use of this product. However, good housekeeping practices and industrial hygiene monitoring is recommended when the potential for significant exposure exists.

Skin Contact: Continued and prolonged contact may result in dry skin. Contact with dust or glass fibers may produce itching, rash and/or redness. Repeated or prolonged exposure may result in dermatitis.

Eye Contact: Direct contact may cause mechanical irritation.

Ingestion: No known adverse effects. May result in obstruction or temporary irritation of the digestive tract.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-Number	Weight Percent
Calcium Sulfate Dihydrate (Gypsum)	10101-41-4	>91
Crystalline Silica (Quartz)	14808-60-7	varies
Vermiculite	1318-00-9	<2
Fiberglass, synthetic, vitreous, continuous	65997-17-3	<1%
Proprietary Additives*	NA	<5

* Note: No single proprietary ingredient is in excess of 1% (0.1% for carcinogens) of the mixture.

4. FIRST AID MEASURES

- **Inhalation:** Remove exposed individual to fresh air immediately. If breathing difficulty persists, seek medical attention.
- **Skin:** Flush and wash skin with soap and water. Utilize lotions to alleviate dryness if present. Seek medical attention if irritation persists.
- **Eye:** Immediately flush eyes with water for 15 minutes. Remove contact lenses (if applicable). Seek medical attention if irritation persists.
- **Ingestion:** Gypsum is non-hazardous and no harmful effects are expected upon ingestion of small amounts. Larger amounts may cause abdominal discomfort or possible obstruction of the digestive tract. Seek medical attention if problems persist.

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5. FIRE FIGHTING MEASURES

Flammable Properties
- Not flammable or combustible
- NFPA Hazard Class No: 1/0/0

Extinguishing media
- Dry chemical, foam, water, fog or spray

Protection of firefighters
- Standard protective equipment and precautions

Fire and Explosion Hazards
- None

Hazardous Combustion Products
- None
- Above 1450°C, material can decompose and release sulfur dioxide (SO_2) and oxides of carbon.

6. ACCIDENTAL RELEASE MEASURES

Not applicable, as product is an article composite.

General recommendations:

- Wear appropriate Personal Protective Equipment. (See Section 8)
- Maintain proper ventilation.
- Pick-up larger pieces to avoid a tripping hazard. Return large pieces of damaged/scraped material for recycling. Sweep or vacuum remaining material into a waste container for disposal. Use a light water spray to minimize dust generation.
- Waste material is not a hazardous waste. Dispose of in accordance with applicable federal, state, and local regulations.

7. HANDLING AND STORAGE

- Avoid contact with eyes, skin and clothing.
- Wear recommended personal protective equipment when handling. (See Section 8)
- Avoid breathing dust.
- Minimize generation of dust.
- Utilize proper lifting techniques when moving product and employ mechanical/ergonomic assistance when possible (i.e. move with forklifts, hold in place with lifts) to minimize the risk of back injury.
- Store material in a cool, dry, ventilated area.
- Store panels flat to minimize damage and warping.
- Do not stack panels too high when storing to minimize the risk of falling.

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8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines

Component	Exposure Limits OSHA PEL (mg/m3)	ACGIH TLV (mg/m3)
Calcium Sulfate Dihydrate (Gypsum)	15 (T) 5 (R)	10 (T)
Crystalline Silica (Quartz)	0.1 (R)	0.025 (R)
Fiberglass, synthetic, vitreous, continuous	15 (T) 5 (R)	1 f/cc (R)
Proprietary Additives	NA	NA

T- Total Dust
R- Respirable Dust

Engineering Controls

- Work/Hygiene Practices: The score and snap method of cutting is recommended. Sawing, drilling or machining will produce dust.
- Ventilation: Provide local and general exhaust ventilation to maintain a dust level below the PEL/TLV.
- Utilize wet methods, when appropriate, to reduce generation of dust.

Personal Protective Equipment

- Respiratory Protection: A NIOSH approved particulate respirator is recommended in poorly ventilated areas or if the PEL/TLV is exceeded. OSHA's 29 CFR 1910.134 (Respiratory Protection Standard) must be followed whenever work conditions require respirator use.
- Eye Protection: Safety glasses or goggles.
- Skin: Gloves, protective clothing and/or barrier creams may be utilized if conditions warrant.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Coated gypsum boards with white/gray core
Odor: None
Physical State: Solid
Ph: ~7
Solubility (H2O): 2.1 g/L @ 20°C
Boiling, Freezing, Melting Point: Not Applicable
Decomposition Temperature: 1450°C
Vapor pressure: Not Applicable
Vapor density: Not Applicable
Volatile organic compounds (VOC) content: None

Flammability: Not Applicable
Flash Point: Not Applicable
Upper/Lower explosive limits: Not applicable
Auto-ignition temperature: Not Applicable
Partition coefficient: n-octanol/water: Not applicable
Evaporation rate: Not Applicable
Molecular weight: 172.2 grams
Molecular formula: $CaSO_4.2H_2O$
Specific Gravity: 2.31 g/cc
Bulk Density: ~55 lb/ft3

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10. STABILITY AND REACTIVITY

Chemical stability: Stable in dry environments.
Conditions to avoid: Contact with strong acids may result in generation of carbon dioxide.
Incompatibility: None
Hazardous decomposition: Above 1450°C gypsum will decompose to calcium oxide (CaO), with releases of sulfur dioxide (SO_2) and various oxides of carbon.
Hazardous polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Data presented is for the major component of this product: Gypsum (calcium sulfate dihydrate)

Human Data
There is no information on toxicokinetics, metabolism and distribution.

There have been reports of irritation to mucus membranes of the eyes and respiratory tract upon acute exposure to dusts in excess of the recommended limits.

Chronic exposure to crystalline silica (a naturally occurring contaminant in gypsum) in the respirable size has been shown to cause silicosis, a debilitating lung disease. In addition, the International Agency for Research on Cancer (IARC) classifies crystalline silica inhaled in the form of quartz or cristobalite from occupational sources as carcinogenic to humans, Group 1. The National Toxicology Program (NTP) classifies respirable crystalline silica as a substance which may be reasonably anticipated to be a carcinogen. OSHA does not regulate crystalline silica as a human carcinogen. Industrial hygiene monitoring to date has not identified any detectable respirable crystalline silica in dust sampling conducted during gypsum panel installation utilizing recommended procedures.

Animal Data
The acute oral toxicity study [OECD TG 420, Fixed dose procedure] of calcium sulfate dihydrate showed that this chemical did not cause any changes even at 2,000 mg/kg b.w. Therefore, the oral LD_{50} value was more than 2,000-mg/kg b.w. for female rats (Sprague-Dawley).

Calcium sulfate, dihydrate was not irritating to the skin of rabbits at 1, 24, 48 and 72 hours after removal of test patches [OECD TG 404]. There is no indication of skin sensitization in guinea pigs [OECD TG 406].

Invivo and *Invitro* studies for mutagenicity were negative.

Reproduction/Developmental Toxicity Screening Tests were negative.

12. ECOLOGICAL INFORMATION

This product does not present an ecological hazard to the environment.

Ecotoxicological Information
Toxicity studies performed with fish, aquatic invertebrates and aquatic plants showed no toxic effect.

Environmental Fate
Gypsum is a naturally occurring mineral. Biodegradation and/or bioaccumulation potential is not applicable.

13. DISPOSAL CONSIDERATIONS

- Dispose of according to Local, State, Federal, and Provincial Environmental Regulations.
- Recycle if possible.

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14. TRANSPORT INFORMATION

- This product is not a DOT hazardous material
- Shipping Name: Same as product name
- ICAO/IATA/IMO: Not applicable

15. REGULATORY INFORMATION

All ingredients are included on the TSCA inventory.

Federal Regulations

SARA Title III: Not listed under Sections 302, 304, and 313
CERCLA: Not listed
RCRA: Not listed
OSHA: Dust and potential respirable crystalline silica generated during product use may be hazardous.

State Regulations
California Prop 65: Respirable crystalline silica is known to the state of California to cause cancer. Industrial hygiene monitoring during recommended use of this product failed to identify any respirable crystalline silica.

Canada WHMIS
All components of this product are included in the Canadian Domestic Substances List (DSL).
Crystalline silica: WHMIS Classification D2A

16. OTHER INFORMATION

MSDS Revision Summary

Effective Date Change: 03/06/13 Supersedes: 07/26/11
Format Changes: SDS was reviewed and 2 taken out of product name.

Key/Legend

ACGIH	American Conference of Governmental Industrial Hygienists
CAS	Chemical Abstract Services Number
CFR	Code of Federal Regulations
DOT	Department of Transportation
EPA	Environmental Protection Agency
HEPA	High Efficiency Particulate Air
HMIS	Hazardous Material Identification System
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IMO	International Maritime Organization
NIOSH	National Institute for Occupational Safety and Health
NFPA	National Fire Protection Association
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PPE	Personal Protective Equipment
TLV	Threshold Limit Value
TSCA	Toxic Substance Control Act
TWA	Time Weighted Average
WHMIS	Workplace Hazardous Materials Information System

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16. OTHER INFORMATION (CONTINUED)

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind expressed or implied is made with respect to the information contained herein. This material safety data sheet was prepared to comply with the OSHA Hazard Communication Standard (29 CFR 1910.1200) and with the Workplace Hazardous Materials Information System (WHMIS).

Disclaimer of Liability:
As the conditions or methods of use are beyond our control, we do not assume any responsibility and expressly disclaim any liability for any use of the material. Information contained herein is believed to be true and accurate, but all statements or suggestions are made without any warranty, express or implied, regarding accuracy of the information, the hazards connected with the use of the material, or the results to be obtained for the use thereof.

CSI #: 09 28 00

PRODUCT OVERVIEW

Model # 220022 | Internet # 100183556 | Store SKU # 180869

HardieBacker 1/4 in. cement board for floors and countertops is America's best selling 1/4 in. backer board. Produced with James Hardie's proprietary cement formulation, this no-mesh board cuts easily, even in tight, awkward spaces. HardieBacker cement board is available in a 3 ft. x 5 ft. and 4 ft. x 8 ft. size; the 3 ft. x 5 ft. sheet features the exclusive EZ Grid recessed fastener pattern to make installation even easier. HardieBacker cement board provides superior protection against moisture damage and mold growth and is backed by a limited lifetime product warranty.
California residents: see Proposition 65 information

- HardieBacker Cement Board with Moldblock Technology
- Easy Score and Snap cutting
- HardieBacker cement board is recognized for use in non-combustible construction in NER-405
- 90% Portland cement and ground sand. HardieBacker board contains no asbestos, glass mesh, formaldehyde, or gypsum
- EZ Grid recessed fastener pattern for easy installation
- Easy to score and snap
- Cuts easily, even in tight, awkward spaces
- Lightweight and non-combustible

SPECIFICATIONS

DIMENSIONS

Product Length (in.)	60	Product Width (in.)	36
Product Thickness	1/4 in.		

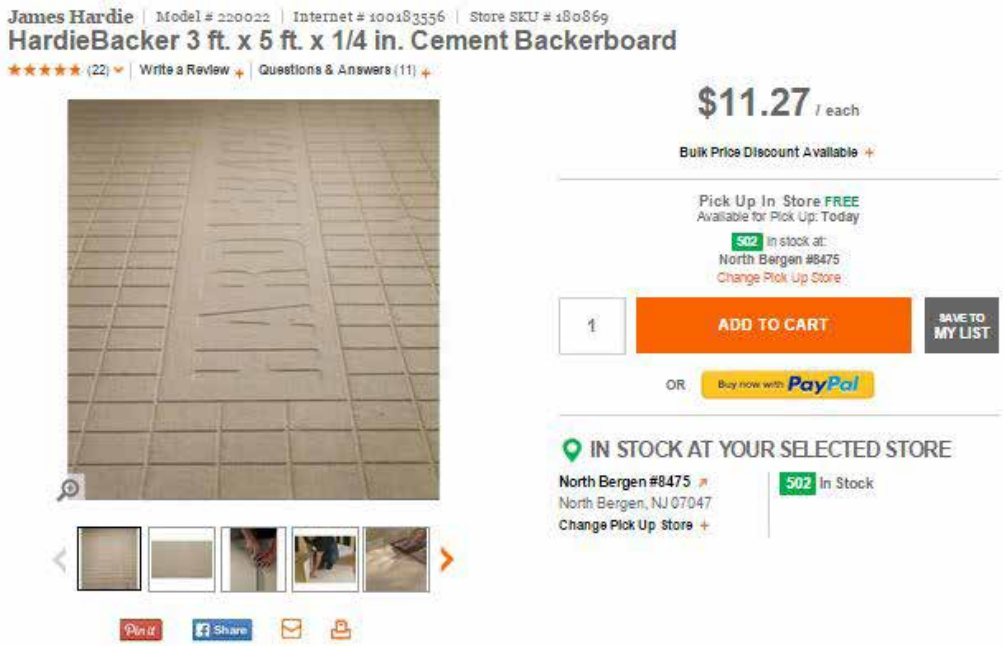
DETAILS

Commercial / Residential	Residential	Form	Fiber cement
Flooring Product Type	Backer Board	Moisture Resistant	Yes
Flooring Product Type	Backer Board	Product Weight (lb.)	29.54 lb

WARRANTY / CERTIFICATIONS

ASTM D 3273 test results	10	Manufacturer Warranty	Limited Lifetime

CSI #: 09 28 00


James Hardie | Model # 220022 | Internet # 100183556 | Store SKU # 180869
HardieBacker 3 ft. x 5 ft. x 1/4 in. Cement Backerboard
(22) | Write a Review | Questions & Answers (11)
$11.27 / each
Bulk Price Discount Available
Pick Up In Store FREE
Available for Pick Up: Today
502 In stock at:
North Bergen #8475
Change Pick Up Store
1
ADD TO CART
SAVE TO MY LIST
OR
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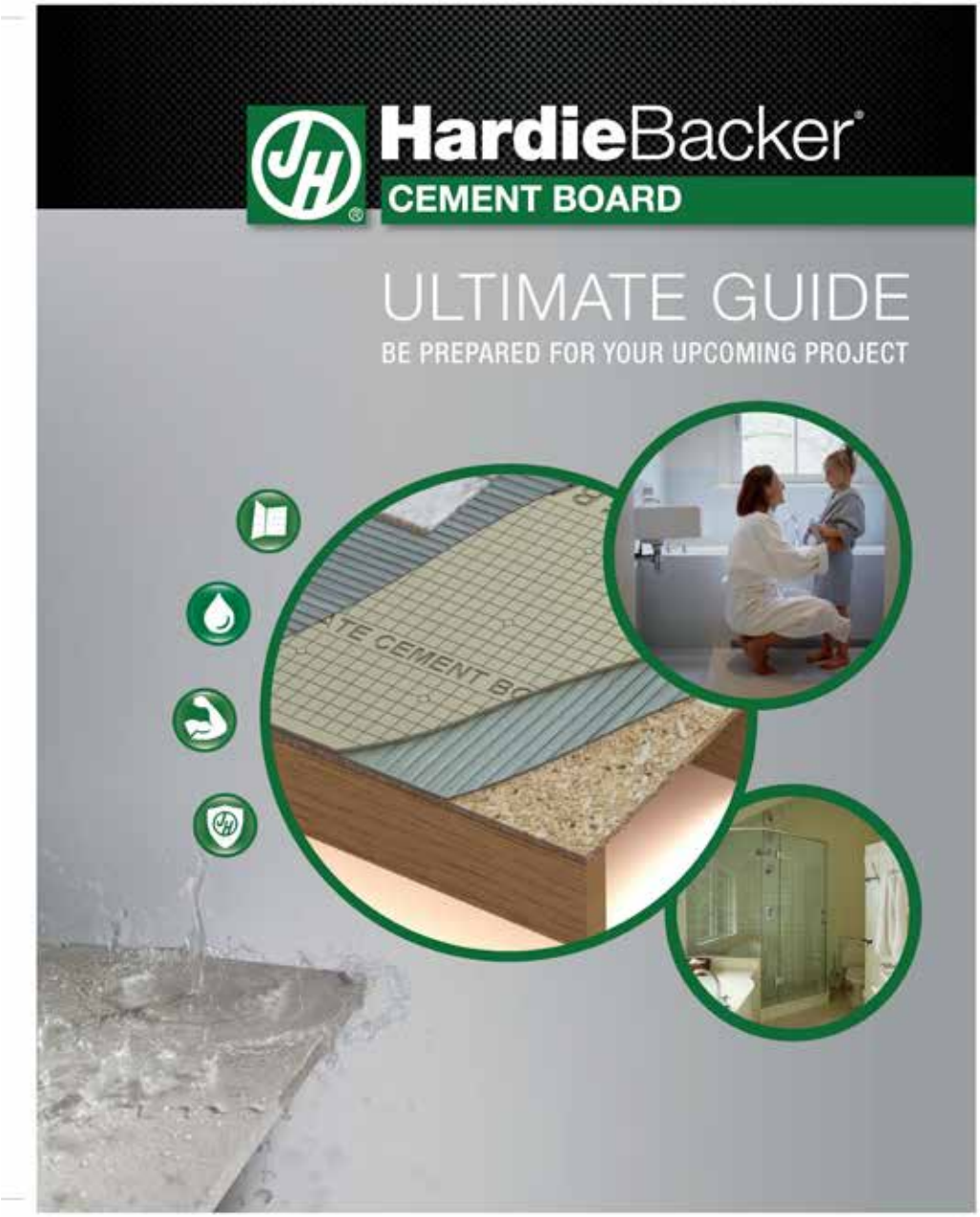
CSI #: 09 28 00


HardieBacker
CEMENT BOARD
ULTIMATE GUIDE
BE PREPARED FOR YOUR UPCOMING PROJECT

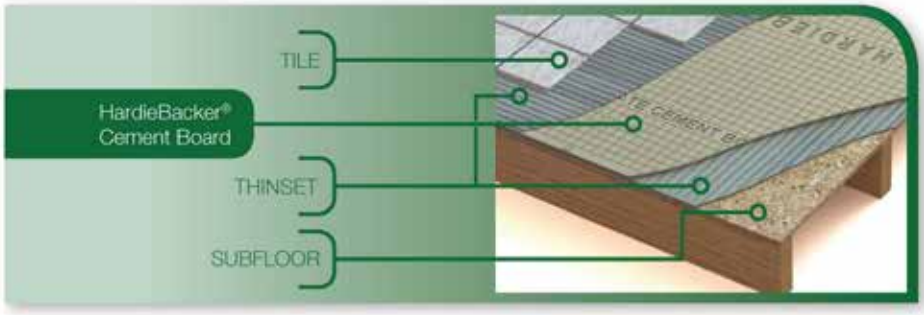
CSI #: 09 28 00

What are Backer Boards and Underlayments?

Backer boards and underlayments are used on interior walls, floors and countertops to provide a uniform surface for adhering tile, stone, paint, wallpaper or resilient surface materials. Even though backer board and underlayment are not visible once tiled or finished, they are a critical component of your interior system.

When you're building or remodeling and have an interior space that would come in contact with water, you should be installing backer board.

* Most local building codes REQUIRE the use of a backerboard or underlayment under tile in wet areas such as bathtub or shower surrounds.



Projects Where Backer Board or Underlayment Should Be Used

- Renovating bathroom
- Updating kitchen
- Replacing basement walls
- Installing fireplaces, furnaces, and steam rooms

CSI #: 09 28 00

Know Your Backer Board Substrate Options

Not all substrates are equal! To make sure your new or existing home has the greatest mold and moisture protection built in, you should be familiar with all the various substrates.

Gypsum

Gypsum is a lightweight, soft mineral compound used in some backer boards.

The Risk:

- Many building codes no longer allow some types of water resistant gypsum boards in wet areas
- Greenboard gypsum core—susceptible to water damage
- Paper facing serves as food source for mold
- Tile size and weight limitations
- Lower compressive and flexural strength than cement backer boards
- Can't be used in steam rooms or where temperature is greater than 125° F

Glass Mesh Cement Boards

Glass mesh is a hard and durable substrate common in interior construction that has some moisture prevention characteristics.

The Risk:

- Heavy with abrasive filler
- Typically contains fillers like fiberglass, which can reduce strength and quality
- Within the mesh can be messy and require significant cleanup
- Heavier than cement backer boards
- Typically require multiple cuts due to the toughness of the mesh
- Aggregate can scratch and damage porcelain and enamel surfaces

Fiber Cement Backer Boards

Experts agree that fiber cement backer boards are the best choice for wet area walls and floors because they provide the best combination of durability and installation benefits.

The Reward:

- Flexibility of surface finish, can be tiled, painted or wallpapered.
- Greater flexural strength compared to gypsum, reinforced gypsum and glass mesh cement boards
- Greatest resistance to moisture and mold.
- Resistance to flame spread.
- Contains no added formaldehyde, gypsum, or paper facing abrasive aggregate.
- Approved by International Residential Code and International Building Code.

CSI #: 09 28 00

Backer Board Comparison

	HARDIBACKER® CEMENT BOARD	USG DUROCK® BOARD AND DUROCK® NEXT GEN	CUSTOM BUILDING PRODS WONDERBOARD®	CUSTOM BUILDING PRODS WONDERBOARD® LITE	NATIONAL GYPSUM PERMABASE®	GEORGIA PACIFIC DENSSHIELD® BOARD	CERTAINTEED DIAMONDBACK® GLASROC®	USG FIBEROCK® AQUA-TOUGH™ UNDERLAYMENT	GREENBOARD
Product Composition	Portland cement, ground sand	Portland cement, aggregate, glass-fiber mesh	Portland cement, aggregate, glass-fiber mesh	Portland cement, EPS beads, aggregates and admixtures	Portland cement, aggregate, glass-fiber mesh	Gypsum, fiberglass mat w/acrylic coating	Gypsum, fiberglass mat w/ coating	Engineered gypsum fiber core	Gypsum with paper facing
WORKABILITY									
Cuts clean	✓	✗	✗	✗	✗	✓	Not indicated	✓	✓
Cuts easily	✓	✗	✗	✗	✗	✓	✓	✓	✓
EZ-Grid® technology	✓	✗	✗	✗	✗	✗	✗	✗	✗
Non-abrasive	✓	✗	✗	✗	✗	✓	Not indicated	✓	✓
UL Greenguard Gold Certified	✓	✗	✗	✗	✓	✗	✓	✗	✓
DURABILITY									
Gypsum free	✓	✓	✓	✓	✓	✗	✗	✗	✗
Glass fibers - free	✓	✗	✗	✗	✗	✗	✗	✓	✓
Passes ASTM G21 and ASTM D3273 standards for mold resistance	✓	✗	✓	✓	✗	✓	✓	✗	✓
MoldBlock® technology	✓	✗	✗	✗	✗	✗	✗	✗	✗
ASTM E136 Non-combustible	✓	✓	✓	✗	✗	✗	✓	✗	✓
STRENGTH									
Flexural Strength (psi)	1700 (0.42") 2100 (1/4")	750	900	900	750	Not indicated	Not indicated	45 -55	Not indicated
Compressive Strength (psi)	5500 (0.42") 7000 (1/4")	1250	2500	1200	2250	450-460	Not indicated	500-1250	Not indicated
TRUSTED									
Warranty	Lifetime limited, transferable (material and labor)	10-year limited, transferable	Lifetime limited, non-transferable	10-year limited, transferable	10-year limited, non-transferable	Lifetime limited, non-transferable	Lifetime limited for residential; 20-year for light commercial	20-year limited, transferable	Warranty by manufacturer, non-transferable
Lifetime limited, transferable (material and labor)	✓	✗	✗	✗	✗	✗	Not indicated	✗	✗
MAPEI Green	✓	✗	✗	✗	✗	✗	✗	✗	✓

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The Best Backer Board Choice: HardieBacker® Cement Board

HardieBacker® cement board is the strongest, easiest to use, and is the most durable lightweight cement backer board on the market today.

HardieBacker cement board is a portable fiber cement backer board that is composed of 90% Portland cement and sand, 10% cellulose fibers and proprietary additives to enhance performance.

HardieBacker
NO ADDED
FORMALDEHYDE,
GYPSUM,
PAPER FACING,
ABRASIVE AGGREGATE

HARDIEBACKER CEMENT BOARD IS USED AS A MOISTURE AND MOLD RESISTANT SUBSTRATE THAT PROTECTS THE INTEGRITY OF TILE INSTALLATION IN FLOORS, WALLS, COUNTERS AND WET AREAS

BENEFITS OF HARDIEBACKER CEMENT BOARD

DURABLE:
- Protects walls, floors, counters and wet areas from water damage.
- Non-combustible and approved for fire rated construction.

WORKABLE:
- No special tools required for cutting, just score and snap upwards.
- Fasten with screws or nails.

STRONG:
- Highest compressive strength.
- Strong enough to adhere to all sizes and types of tile.

TRUSTED:
- The only cement board with MoldBlock® Technology.
- The only backerboard to obtain a perfect score on both ASTM G21 and D3273 testst for mold resistance.

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HardieBacker® Cement Boards Products

HardieBacker® 500 Backer Board (0.42 in)

Sheet sizes: 3 ft. x 5ft. and 4 ft. x 8 ft. **Weight:** 2.6 lbs/sq.ft.

APPLICATIONS	FEATURES	BENEFITS
FLOORS WALLS WET AREAS	Nominal thickness (0.42 in.)	Transitions perfectly to tapered edge drywall
	Pre-printed fastener pattern	Less guesswork, measurement
	Can be painted, textured or wallpapered	Cut finishing time down
	No paper facing	Higher resistance against mold and delamination from water exposure

HardieBacker® ¼ in. Underlayment

Sheet sizes: 3 ft. x 5 ft. and 4 ft. x 8 ft. **Weight:** 1.9 lbs/sq.ft.

APPLICATIONS	FEATURES	BENEFITS
FLOORS COUNTER TOPS WET AREAS	EZ Grid® recessed pattern	Scoring guidance
	EZ Grid® 1 in. x 1in.	Facilitates layout
	Recessed fastener indications	Easier fastening and installation

HardieBacker

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Schluter Systems

PROFILE OF INNOVATION

Schluter®-KERDI-FIX

INNOVATIVE SOLUTIONS FOR CERAMIC AND STONE TILE

SEALING AND BONDING COMPOUND

Application and Function

0.3 Schluter®-KERDI-FIX is a single-component, waterproof sealing and bonding compound with a silane-modified polymer base. KERDI-FIX can be used to waterproof pipe and valve protrusions in the Schluter®-Shower System in conjunction with the Schluter®-KERDI membrane and Schluter®-KERDI-BOARD. KERDI-FIX is required to bond the KERDI membrane to the stainless steel Schluter®-KERDI-DRAIN bonding flange and can be used to bond KERDI to building elements such as bathtubs, window elements, and door frames. KERDI-BOARD can be adhered with KERDI-FIX in various applications, such as countertops, partitions, and other building elements.

Material Properties and Areas of Application

KERDI-FIX is odorless, weather- and UV-resistant. The product is elastomeric, free of solvents, and provides a strong bond to most materials, including wood, stone, concrete, metal, glass, and many synthetic materials. KERDI-FIX can be painted over with most alkyd resins or dispersion paint types. The suitability of the material must be verified based on the anticipated chemical, mechanical, and/or other stresses. KERDI-FIX is not recommended in or around swimming pool applications.

KERDI-FIX has been independently tested to determine VOC emissions per California Specification 01350 "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers", found to emit zero VOCs, and can contribute towards achieving the following green building credits:

- LEED, IEQ Credit 4.3: Low-Emitting Materials - Flooring Systems
- ICC 700-2008, 901.6: Pollutant Source Control - Hard-Surface Flooring
- CHPS, EQ 2.2: Low-Emitting Materials

Installation

Bonding KERDI membrane

1. The surface where KERDI-FIX is to be applied must be clean and free of grease or other contaminants prior to KERDI-FIX application.
2. Apply KERDI-FIX to the substrate and spread evenly with an appropriate notched trowel.
3. Embed the KERDI in the KERDI-FIX and work the membrane onto the substrate to ensure full coverage and remove air pockets.
4. Remove fresh KERDI-FIX with a cleaning agent (e.g., mineral spirits); after any excess KERDI-FIX has set, it can only be removed with mechanical methods.

Maintenance

Unopened packages of KERDI-FIX can be stored in a cool location that is above freezing temperatures for up to 18 months. Once the cartridge has been opened, the material has a limited shelf life.

0.3 Schluter®-KERDI-FIX

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Schluter®-KERDI-FIX

Schluter®-KERDI-FIX Technical Data	
Color	Gray or bright white
Basic raw material	Silyl-modified polymer (SMP)
Specific weight	approx. 93.6 lb/ft³ (1.5 g/m)
Solvent content	0%
Isocyanate content	0%
Dry materials content	approx. 100%
VOC emissions	0.0 mg/m²
Shear strength beech wood/beech wood	approx. 435 psi (3 N/mm²)
Shear strength aluminum/aluminum	approx. 290 psi (2 N/mm²)
Elongation at failure	approx. 200%
Skinning	about 10 minutes
Curing	1/8" (3 mm) per 24 hours
Permissible total movement	about 20%
Processing temperatures	don't install at temperatures below 40 °F (5 °C)
Temperature stability	-40 °F (-40 °C) to 212 °F (100 °C), temporarily 356 °F (180 °C) (max. 30 minutes)
Moisture resistance	very good
Frost stability	not sensitive to frost
Cartridge volume	9.81 oz (290 ml)
Estimated coverage	
5" (12.7 cm) connection to fixed building elements	12' 10" (3.9 m) per cartridge
1/4" (6 mm) bead	30' 1" (9.2 m) per cartridge

Product Item Numbers

6.3 Schluter®-KERDI-FIX	Adhesive/sealant
Item No.	Cartridge Volume
KERDI-FIX / color*	9.81 oz - 290 ml

Color Codes

BW bright white
G Grey

To complete the item number, add the color code (e.g., KERDI-FIX / BW).

2

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Schluter Systems

PROFILE OF INNOVATION

UNCOUPLING MEMBRANES

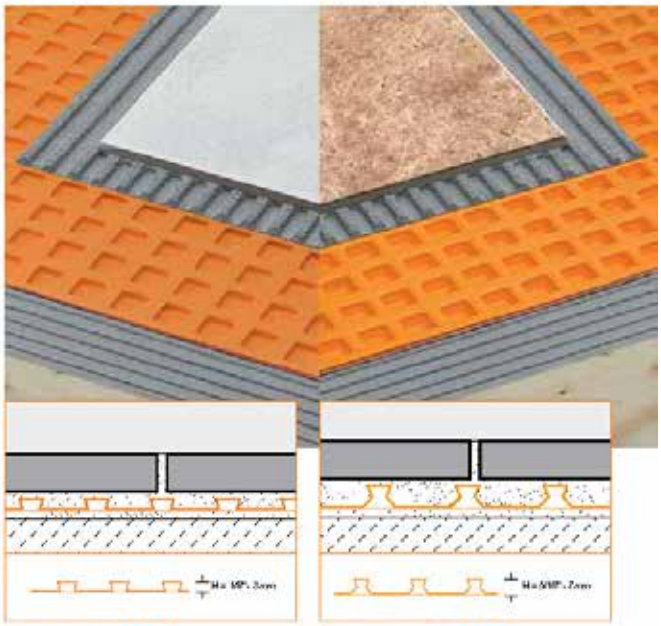
INNOVATIVE SOLUTIONS FOR CERAMIC AND STONE TILE

UNCOUPLING, WATERPROOFING, VAPOR MANAGEMENT, AND SUPPORT/LOAD DISTRIBUTION

Ceramic and stone tiles are durable, easy to maintain, and hygienic, representing the ideal surface coverings. However, today's lightweight construction methods can make the installation of hard surface coverings particularly challenging. In order to protect the integrity of the tile assembly, an underlayment that performs multiple functions is required.

Application and Function

6.1 Schluter®-DITRA and **6.1 Schluter®-DITRA-XL** are polyethylene membranes with a grid structure of square cavities, each cut back in a dovetail configuration, and an anchoring fleece laminated to the underside. The anchoring fleece is embedded in thin-set mortar to provide a mechanical bond to the substrate. Tile is installed over DITRA or DITRA-XL using the thin-bed method in such a way that the mortar becomes mechanically anchored in the square, cutback cavities of the matting. Designed specifically for ceramic tile and dimension stone installations, DITRA and DITRA-XL serve as an uncoupling layer, waterproofing membrane, and vapor management layer that accommodates moisture from beneath the tile covering. Further, DITRA and DITRA-XL perform all these functions while still providing adequate support/load distribution for the tile covering. The combination of these four essential functions allows for the successful installation of tile over a wide range of substrates, including plywood/OSB, concrete, gypsum, heated floors, etc. DITRA is 1/8" *(3 mm)* thick, which minimizes tile assembly thickness and reduces transitions to lower surface coverings (e.g., carpet, engineered wood, and vinyl). DITRA allows for ceramic tile application over single-layer plywood or OSB subfloors on joists spaced up to 19.2" *(488 mm)* o.c. DITRA-XL is 5/16" *(7 mm)* thick, which permits even transitions between tile and 3/4"-thick hardwood flooring. DITRA-XL allows for ceramic tile application over single-layer plywood or OSB subfloors on joists spaced up to 24" *(610 mm)* o.c.



6.1 Schluter®-DITRA

6.1 Schluter®-DITRA-XL

Uncoupling

Tile has been successfully installed for thousands of years by incorporating an uncoupling layer, or forgiving shear interface, within the tile assembly.

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DITRA and DITRA-XL provide uncoupling through its open rib structure, which allows for in-plane movement that effectively neutralizes the differential movement stresses between the substrate and the tile, thus eliminating the major cause of cracking and delaminating of the tiled surface.

Waterproofing

DITRA and DITRA-XL provide reliable waterproofing in interior and exterior applications. Its polyethylene composition protects the substrate from moisture penetration, which is particularly important in today's building environment where most substrates are moisture-sensitive.

Vapor management

The distinguishing feature of DITRA and DITRA-XL is the existence of free space created by the configured channels on the underside of the matting. The free space provides a route for excess moisture and vapor to escape from the substrate that could otherwise cause damage to the tile layer above. Thus, DITRA and DITRA-XL effectively manages moisture beneath the tile covering.

Support/load distribution

When placed on a solid foundation, columns or pillars can support tremendous loads. The same physical principle applies to DITRA and DITRA-XL installations. Column-like mortar structures are formed in the cutback cavities of the matting. Loads are transferred from the tile covering through these column-like mortar structures to the substrate. Since the matting is virtually incompressible within the tile assembly, the advantages of uncoupling are achieved without sacrificing point load distribution capabilities. The ability of DITRA and DITRA-XL installations to support and distribute heavy loads while preserving the integrity of the tiled surface has been verified through extensive laboratory and field testing, including applications exposed to vehicular traffic.

Material Properties and Areas of Application

DITRA and DITRA-XL are manufactured using high-density polyethylene (HDPE), which does not rot and is inert, non-toxic, and physiologically safe. The material is highly resistant to solutions containing salts, acids, and alkalis, as well as many organic solvents, alcohols, and oils. Resistance to specific stresses can be provided if concentration, temperature, and exposure time are known. DITRA and DITRA-XL are waterproof and minimize the transmission of vapor (water vapor permeance of DITRA is 0.006 perms per ASTM E96).

DITRA and DITRA-XL meet the American National Standard for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installations (ANSI A118.10), are listed by cUPC, and are evaluated by ICC-ES (see Report Nos. ESR-2467 and PMG-1204).

For copies of the above listing or report, please contact Schluter®-Systems at 800-472-4588 (USA) or 800-667-8746 (Canada) or by e-mail at info@schluter.com. Links to the listing and report can also be accessed at www.schluter.com.

DITRA and DITRA-XL have been independently tested and found to emit zero VOCs per California Specification 01350: "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers". Thus, DITRA and DITRA-XL can contribute towards achieving the following green building credits:

- LEED, IEQ Credit 4.3: Low-Emitting Materials - Flooring Systems
- ICC 700-2008, 901.6: Pollutant Source Control - Hard-Surface Flooring
- CHPS, EQ2.2: Low-Emitting Materials

Suitable Substrates

For complete installation guidelines and warranty criteria, please contact Schluter®-Systems at 800-472-4588 (USA) or 800-667-8746 (Canada) or by e-mail at info@schluter.com to receive a copy of the Schluter®-DITRA Installation Handbook and a step-by-step installation video. To download a PDF version of the Handbook or to view the installation video online, please visit www.schluter.com. All substrates must be clean, even, and load bearing. Bond-inhibiting surfaces must be removed prior to the application of DITRA and DITRA-XL.

Note: Type, thickness, and format of the tile or stone surface covering must be suitable for the intended application. Minimum tile format is 2" x 2" (5 x 5 cm).

Wood

All wood materials, including OSB, plywood, and framing members, are subject to expansion, contraction, bending, and deflection as a result of changes in moisture content and loading. Further, these deformations fluctuate over the life of the building structure. DITRA and DITRA-XL's uncoupling function protects the ceramic or stone tile covering from the aforementioned deformations by neutralizing the differential movement stresses between the wood structure and the tile, thus eliminating the major cause of cracking and delaminating of the tiled surface. Therefore, DITRA and DITRA-XL can replace a second layer of plywood in most applications. Since the uncoupling function of the matting is based on its geometric configuration, the increased thickness of DITRA-XL results in increased uncoupling capacity. Thus, DITRA-XL is optimized for tile installation over bending and deflecting substrates such as plywood and OSB, including applications over single-layer plywood/OSB subfloors on joists spaced at 24" (610 mm) o.c.

Wood continually absorbs and releases moisture. The free space beneath DITRA and DITRA-XL allows the wood to breathe and provides a route for any residual moisture in the wood substrate to escape.

Since DITRA and DITRA-XL is virtually incompressible within the tile assembly, the advantages of uncoupling are achieved without sacrificing point load distribution capabilities.

Industry standard guidelines referencing uncoupling membranes over wood substrates include methods F147 and F148 in the TCNA Handbook for Ceramic, Glass and Stone Tile Installation and method

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313F (Detail D) in the Terrazzo, Tile and Marble Association of Canada (TTMAC) Specification Guide 09 30 00 Tile Installation Manual.

Note: DITRA and DITRA-XL may be installed over existing vinyl floors (no cushioned or perimeter bonded vinyl). However, various steps must be taken to ensure a successful installation. Please refer to the Schluter®-DITRA Installation Handbook for details.

Concrete

There are various challenges associated with the installation of hard surface coverings on concrete substrates. To begin, the coefficient of thermal expansion of concrete is close to twice that of ceramic tile. Additionally, tile contractors are often expected to install tile over young concrete (concrete cured less than 28 days). However, rigid surface coverings installed over young concrete are susceptible to damage as a result of shrinkage during curing. Pre-stressed/post-tensioned concrete slabs are also commonplace in today's construction environment. Although pre-stressing is used to help control deflections in concrete structures, these slabs are still subject to deformations caused by changes in moisture, temperature, and loading. Many concrete slabs on or below grade are subject to moisture migration, which can be problematic. Furthermore, these structures experience the same deformations as stated above.

DITRA and DITRA-XL's uncoupling function protects the ceramic or stone tile covering by neutralizing the differential movement stresses between the concrete substrate and the tile, thus eliminating the major cause of cracking and delaminating of the tiled surface.

DITRA and DITRA-XL's waterproofing ability not only protects the substrate from moisture and harmful substances, it also slows the drying of fresh concrete, thus reducing the chances of cracking and curling.

The free space beneath the DITRA and DITRA-XL matting provides a route for any residual moisture in the concrete slab to escape. This allows the installation of DITRA and DITRA-XL and the tile covering as soon as the slab can be walked upon. Vapor management is also essential for slabs subject to moisture migration.

Since DITRA and DITRA-XL is virtually incompressible within the tile assembly, the advantages of uncoupling are achieved without sacrificing point load distribution capabilities. This allows DITRA and DITRA-XL to be installed in commercial and industrial applications exposed to heavy vehicular traffic, provided the type, format, and thickness of the tile are appropriate for the application.

Industry standard guidelines referencing uncoupling membranes over concrete substrates include method F128 in the TCNA Handbook for Ceramic, Glass and Stone Tile Installation and method 311F (Details A, C and D) in the Terrazzo, Tile and Marble Association of Canada (TTMAC) Specification Guide 09 30 00 Tile Installation Manual.

Gypsum

Bonding ceramic or stone tiles directly to gypsum concrete substrates is generally considered questionable or not recommended. The challenges associated with gypsum-based underlayments include the requirement of an extended drying period before installing tile and continued sensitivity to the reintroduction of moisture throughout the life of the installation. In addition, since the coefficient of thermal expansion of gypsum concrete is substantially greater than that of ceramic tile, shear stresses caused by temperature fluctuations can result in delamination or cracking of the tile covering. This is particularly important when gypsum concrete is used as a thermal mass for radiant heated floors. With the increasing popularity of radiant heated floors, which typically utilize gypsum concrete, tile installers need a reliable installation system to address these issues.

DITRA and DITRA-XL's uncoupling function protects the ceramic or stone tile covering by neutralizing the differential movement stresses between the gypsum concrete substrate and the tile, thus eliminating the major cause of cracking and delaminating of the tiled surface.

DITRA and DITRA-XL's waterproofing function prevents the reintroduction of moisture to gypsum concrete underlayments, which, if not prevented, could significantly compromise performance of the underlayment and lead to damage of the tiled surface. The residual moisture in gypsum concrete is allowed to escape through the air channels on the underside of the matting. This is particularly important since gypsum concrete must dry in order to gain strength.

Since DITRA and DITRA-XL is virtually incompressible within the tile assembly, the advantages of uncoupling are achieved without sacrificing point load distribution capabilities.

Industry standard guidelines referencing uncoupling membranes over gypsum substrates include methods F180 and F200 in the TCNA Handbook for Ceramic, Glass and Stone Tile Installation and method 314F (Details B and F) in the Terrazzo, Tile and Marble Association of Canada (TTMAC) Specification Guide 09 30 00 Tile Installation Manual.

Heated Floors

Radiant heating is one of the fastest growing market segments in the construction industry. Unlike other surface coverings, the low thermal resistivity of ceramic and stone tiles allows them to be used in radiant heat applications without sacrificing the energy efficiency of the system. However, there are inherent challenges in combining rigid surface coverings with radiant panel heating systems. A viable installation system must address the magnified fluctuations in temperature that contribute to increased shear stresses between the heated assembly and the tile covering. The system must also limit thermal striping by promoting even heat distribution and protect the assembly from moisture, which is particularly important when gypsum concrete is used as the thermal mass. Differential movement stresses are magnified in radiant-heated floor applications because of significant temperature gradients.

DITRA and DITRA-XL's uncoupling function protects the ceramic or stone tile covering by neutralizing the differential movement stresses between the heated assembly and the tile, thus eliminating the major cause of cracking and delaminating of the tiled surface.

DITRA and DITRA-XL's waterproofing function provides simple, effective, and

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DITRA or DITRA-XL and the ceramic or stone tile covering is required to reduce deflection and curvature of the sheathing between the joists. Please refer to the Schluter®-DITRA Installation Handbook for plywood/OSB underlayment installation guidelines.

Exterior Installations

It is recommended that DITRA and DITRA-XL be allowed to adapt to ambient air temperature before installing. Further, if low temperatures are expected during installation, proper care to ensure sufficient strength gain of the thin-set mortar must be taken.

Connection to Floor Drains

Schluter®-KERDI-DRAIN or Schluter®-KERDI-LINE may be used to provide drainage in DITRA or DITRA-XL applications. DITRA or DITRA-XL are sealed to the fleece-laminated KERDI-DRAIN bonding flange with a section of KERDI membrane using unmodified thin-set mortar. KERDI-RX is used to seal the section of KERDI to the stainless steel KERDI-DRAIN bonding flange.
The KERDI waterproofing collar on KERDI-LINE is sealed to DITRA or DITRA-XL using unmodified thin-set mortar.
Industry standard guidelines referencing floor drains with integrated bonding flanges include method B422 in the TCNA Handbook for Ceramic, Glass and Stone Tile Installation, and method 326DR in the Terrazzo, Tile and Marble Association of Canada (TTMAC) Specification Guide 09 30 00 Tile Installation Manual.

Notes:

1) When KERDI-DRAIN or KERDI-LINE are used in shower applications, walls must be waterproofed up to the height of the showerhead. Please refer to the Schluter®-Shower System Installation Handbook for complete details.
2) Various configurations of KERDI-DRAIN and KERDI-LINE are listed by IOC-ES (Report No. PMG-1204), IAPMO (IGC 196), CSA (B79), and NSF (as a special engineered product meeting applicable requirements of ASME A112.6.3).
3) DITRA, DITRA-XL and KERDI meet the American National Standard for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installations (ANSI A118.10), are listed by cIAPMO, and are evaluated by ICC-ES (see Report Nos. ESR-2467 and PMG-1204).

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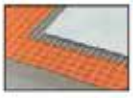
Product Item Numbers



6.1 Schluter®-DITRA — Uncoupling and waterproofing membrane

Item No.	Width	Length	Area	Thickness
DITRA 5M	3'3" - 1 m	16' 5" - 5 m	54 ft² - 5 m²	1/8" - 3 mm
DITRA 15O	3'3" - 1 m	45' 9" - 14 m	150 ft² - 14 m²	1/8" - 3 mm
DITRA 30M	3'3" - 1 m	98' 5" - 30 m	323 ft² - 30 m²	1/8" - 3 mm

6.1 Schluter®-DITRA-XL — Uncoupling and waterproofing membrane

Item No.	Width	Length	Area	Thickness
DITRA-XL/175	3'3" - 1 m	53' 3" - 16.25 m	175 ft² - 16.25 m²	5/16" - 7 mm

8.1 Schluter®-KERDI-BAND — Waterproofing strip

Item No.	Width	Length	Thickness
KEBA 100/125/5M	5" – 12.5 cm	16' 5" - 5 m	4 mil
KEBA 100/125/10M	5" – 12.5 cm	33' - 10 m	4 mil
KEBA 100/185/5M	7-1/4" – 18.5 cm	16' 5" - 5 m	4 mil
KEBA 100/250/5M	10" – 25 cm	16' 5" - 5 m	4 mil
KEBA 100/125	5" – 12.5 cm	98' 5" - 30 m	4 mil
KEBA 100/185	7-1/4" – 18.5 cm	98' 5" - 30 m	4 mil
KEBA 100/250	10" – 25 cm	98' 5" - 30 m	4 mil

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UNCOUPLING MEMBRANES

8.1 Schluter®-KERDI-FLEX — Waterproofing strip for use above movement joints

Item No.	Width	Length	Thickness
FLEX 125/5M	5" – 12.5 cm	16' 5" - 5 m	12 mil
FLEX 250/5M	10" – 25 cm	16' 5" - 5 m	12 mil
FLEX 125/30	5" – 12.5 cm	98' 5" - 30 m	12 mil
FLEX 250/30	10" – 25 cm	98' 5" - 30 m	12 mil

8.1 Schluter®-KERDI-KERECK-F — Preformed corner

Item No.	Thickness	Packaging
KERECK / R 2	4 mil	2 Inside corners
KERECK / R 10	4 mil	10 Inside corners
KERECK / RA 2	4 mil	2 Outside corners
KERECK / RA 10	4 mil	10 Outside corners

8.1 Schluter®-KERDI-KM — Pipe seal

Item No.	Dimensions	Thickness	Packaging
KM 5117/22	7" x 7" – 17 x 17 cm	4 mil	5 units

Hole diameter, ø = 7/8" - 22 mm

8.3 Schluter®-KERDI-FIX — Adhesive/sealant

Item No.	Cartridge Volume
KERDIFIX / color*	9.81 oz – 290 ml

Color Codes

BW

G

To complete the item number, add the color code (e.g., KERDIFIX / BW).

Schluter®-DITRA-TROWEL — Trowel

Item No.	Notch Size	Packaging
TRL-DIT6	11/64" x 11/64" – 4.5 x 4.5 mm	6 units

Schluter®-KERDI-TROWEL — Trowel

Item No.	Notch Size	Packaging
TRL-KER6	1/8" x 1/8" – 3 x 3 mm	6 units

Schluter®-DITRA-ROLLER

Item No.	Width
DIRO	14-1/4" – 37 cm

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Schluter Systems

PROFILE OF INNOVATION

SCHLUTER®-KERDI-BOARD

SUBSTRATE, BUILDING PANEL, BONDED WATERPROOFING

Application and Function

12.1 Schluter®-KERDI-BOARD

12.1 Schluter®-KERDI-BOARD is a multifunctional tile substrate and building panel, which can also be used for creating bonded waterproofing assemblies with tile coverings.

It consists of an extruded polystyrene foam panel, with a special reinforcement material on both sides and fleece webbing for effective anchoring in thin-set mortar.

With the available panel thicknesses of 3/16", 3/8", 1/2", 5/8", 3/4", 1", 1-1/2", and 2" *(5, 9, 12.5, 15, 19, 25, 38, and 50 mm)*, KERDI-BOARD covers a broad range of application areas for creating flat, level, plumb, square, and dimensionally stable substrates for the installation of ceramic and natural stone tiles. With suitable preparation of the abutting seams and joint areas, the panel may be used for bonded waterproofing assemblies.

KERDI-BOARD is suitable for: creating tile substrates on masonry walls, wood or metal framing, and other finished wall surfaces; creating straight or curved partition walls; creating straight or curved bathtub and shower surrounds; concealing pipes and columns; as well as creating bathtub platforms, vanities, storage shelves, countertops, and various other bathroom structures.

The boards are simply cut to size with a utility knife. The gridlines, which are printed

on the surface, are helpful for neat and quick cuts and installation.

KERDI-BOARD can be fully adhered in wall areas or spot-bonded with thin-set mortar. If necessary, the material may be secured with additional wall anchors. In the case of stud framing, KERDI-BOARD is attached with screws and washers from the matching hardware system.

Tiles can be installed directly over KERDI-BOARD using the thin-set method.

L-shaped and U-shaped KERDI-BOARD panels are available for creating pipe and column coverings, and grooved panels are available for creating curved elements. Schluter-Systems also offers profiles and attachment hardware for wall connections and finishing edges, as well as matching wall anchors and screws.

Schluter®-KERDI-BOARD-SN is a prefabricated shower niche made of KERDI-BOARD that can be installed in both Schluter®-KERDI and KERDI-BOARD wall assemblies. The shower niche features a 1/2" *(12.5 mm)* -thick by 2" *(50 mm)* -wide integrated bonding flange and is available in 12" x 6" *(30 cm x 15 cm)*, 12" x 12" *(30 cm x 30 cm)*, 12" x 20" *(30 cm x 51 cm)*, and 12" x 28" *(30 cm or 71 cm)* sizes.

Material Properties and Areas of Application

KERDI-BOARD is made from extruded polystyrene foam, with a cement-free reinforcement layer laminated to both sides and an anchoring fleece webbing. The surface of the board has gridlines consisting of 3/8" x 3/8" *(10 mm x 10 mm)* squares printed on one side.

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Curved wall areas made of KERDI-BOARD

1. The Schluter®-KERDI-BOARD-V panels feature grooves to allow for quick and easy creation of curved elements.
2. First, cut the panels to the required size. If a larger expanse of panels is required, several panels can be connected along the edges with thin-set mortar, Schluter®-KERDI-FIX adhesive, or the KERDI-BOARD-ZDK double-sided adhesive tape.
3. If the grooved surface points toward the inside, it is recommended that the grooves be filled with thin-set mortar prior to panel installation.
4. Outward-facing grooves should be filled with thin-set mortar prior to or during the tile installation.
5. The tiles can be installed using unmodified thin-set mortar once the bonding materials used to construct the element have cured sufficiently to stabilize the assembly. Choose a notched trowel to match the tile format, and back-butter the tiles, if necessary, to attain full coverage.

Note: See section "Waterproofing" on the use of KERDI-BOARD in bonded waterproofing assemblies.

KERDI-BOARD-SN shower niche

1. Determine desired location and trace around the outside of the Schluter®-KERDI-BOARD-SN flange, making sure the lines are level and plumb. Cut and remove the wallboard such that the niche will be supported on both sides by the studs or other wall framing.
2. Insert the niche and fasten to the studs. When installing adjacent to KERDI-BOARD, use wood or metal screws and KERDI-BOARD-ZT washers, placing the fasteners along the seam between the KERDI-BOARD and the niche. When installing adjacent to gypsum board or other tile backers (e.g., CBU), use wood or metal screws only (i.e., no washers), placing fasteners approximately 1/4" *(6 mm)* from the edges of the niche. Fasten all corners and limit fastener spacing to 12" *(305 mm)* o.c.
3. Connections between the niche and walls are made using KERDI-BAND or KERDI. When installed adjacent to KERDI-BOARD, seams are most easily constructed using KERDI-BAND. When installed adjacent to gypsum board or other tile backers (e.g., CBU), seams are most easily constructed by continuous application of the KERDI membrane. The membrane is applied up to the niche opening. Once the niche is sealed to the wall assembly, tile can be installed immediately using unmodified thin-set mortar.
4. When using the prefabricated shelf, determine the desired height of the shelf and mark with a level line. Set tile using unmodified thin-set mortar up to that line on the back and sides of the niche. Butter the sides and back of the shelf with unmodified thin-set mortar and solidly embed it in the niche, resting on the previously installed tile. The shelf may be raised at the back to create a slope, or the tile may be set on a slope during installation, to prevent water from pooling in the finished application. Continue setting tile using unmodified thin-set mortar.

Waterproofing with KERDI-BOARD

Where waterproofing is desired, the joints and corners of KERDI-BOARD in the area must be sealed with KERDI-BAND using unmodified thin-set mortar. The KERDI-BAND must overlap panel joints by at least 2" *(50 mm)*.

KERDI-BAND is also suitable for sealing connections to fixed building elements such as door and window frames. Where these surfaces will not accept a bond to unmodified thin-set mortar, use KERDI-FIX to bond KERDI-BAND.

Separate KERDI-BOARD above the existing movement joints and structural joints and cover the joints with Schluter®-KERDI-FLEX using unmodified thin-set mortar, ensuring a minimum 2" *(50 mm)* overlap.

Fastener penetrations may be sealed with KERDI-BAND using unmodified thin-set mortar.
Please refer to the Schluter®-Shower System Installation Handbook for guidelines on waterproofing showers, steam showers, and tub surrounds.

Note: Certain glass tiles may not be compatible with bonded waterproofing applications 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 or may require special setting materials. Consult stone supplier and Schluter-Systems for more information.

If installing bathroom fixtures such as grab bars in showers, wall-mounted toilets, or other heavy objects, the fixtures must be anchored in the structure or solid blocking behind KERDI-BOARD.

Note: Reinforcement may be required behind the entire footprint of the object. For example, place solid blocking behind the base of a wall-mounted toilet installed over KERDI-BOARD on stud framing.

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SUBSTRATE, BUILDING PANEL, BONDED WATERPROOFING

Product Item Numbers

Schluter®-KERDI-BOARD

Item No.	Width	Length	Thickness
Panel dimensions: 48" x 32" – 122 cm x 81 cm			
KB 12 1220 81 2	48" – 122 cm	32" – 81 cm	5/8" – 15 mm
Panel dimensions: 48" x 64" – 122 cm x 162.5 cm			
KB 5 1220 1625	48" – 122 cm	64" – 162.5 cm	3/16" – 5 mm
KB 9 1220 1625	48" – 122 cm	64" – 162.5 cm	3/8" – 9 mm
KB 12 1220 1625	48" – 122 cm	64" – 162.5 cm	1/2" – 12.5 mm
Panel dimensions: 48" x 96" – 122 cm x 244 cm			
KB 5 1220 2440	48" – 122 cm	96" – 244 cm	3/16" – 5 mm
KB 9 1220 2440	48" – 122 cm	96" – 244 cm	3/8" – 9 mm
KB 12 1220 2440	48" – 122 cm	96" – 244 cm	1/2" – 12.5 mm
KB 15 1220 2440	48" – 122 cm	96" – 244 cm	5/8" – 15 mm
Panel dimensions: 24-1/2" x 96" – 62.5 cm x 244 cm			
KB 19 625 2440	24-1/2" – 62.5 cm	96" – 244 cm	3/4" – 19 mm
KB 25 625 2440	24-1/2" – 62.5 cm	96" – 244 cm	1" – 25 mm
KB 38 625 2440	24-1/2" – 62.5 cm	96" – 244 cm	1-1/2" – 38 mm
KB 50 625 2440	24-1/2" – 62.5 cm	96" – 244 cm	2" – 50 mm
Panel dimensions: 48" x 120" – 122 cm x 305 cm			
KB 15 1220 3050	48" – 122 cm	120" – 305 cm	5/8" – 15 mm

Schluter®-KERDI-BOARD-V

Item No.	Width	Length	Thickness
KB 19 625 2440 V	24-1/2" – 62.5 cm	96" – 244 cm	3/4" – 19 mm
KB 25 625 2440 V	24-1/2" – 62.5 cm	96" – 244 cm	1" – 25 mm
KB 38 625 2440 V	24-1/2" – 62.5 cm	96" – 244 cm	1-1/2" – 38 mm
KB 50 625 2440 V	24-1/2" – 62.5 cm	96" – 244 cm	2" – 50 mm

Schluter®-KERDI-BOARD-E

Item No.	Width	Length	Thickness
KB 12 625 2440 E	24-1/2" – 62.5 cm	96" – 244 cm	1/2" – 12.5 mm
KB 19 625 2440 E	24-1/2" – 62.5 cm	96" – 244 cm	3/4" – 19 mm
KB 25 625 2440 E	24-1/2" – 62.5 cm	96" – 244 cm	1" – 25 mm

Schluter®-KERDI-BOARD-U

Item No.	Width	Length	Thickness
KB 19 625 2440 U30	8-1/4" x 7-7/8" x 8-1/4" = 24-1/2" – 21 x 20 x 21 cm = 62 cm	96" – 244 cm	3/4" – 19 mm
KB 19 625 2440 U80	6-5/16" x 11-13/16" x 6-5/16" = 24-1/2" – 16 x 30 x 16 cm = 62 cm	96" – 244 cm	3/4" – 19 mm

Schluter®-KERDI-BOARD-SN

Item No.	Size	Depth	Shelf
KB 12 SN 305 152 A	12" x 6" – 305 mm x 152 mm	3-1/2" – 89 mm	-
KB 12 SN 305 305 A	12" x 12" – 305 mm x 305 mm	3-1/2" – 89 mm	-
KB 12 SN 305 609 A1	12" x 24" – 305 mm x 609 mm	3-1/2" – 89 mm	1
KB 12 SN 305 711 A1	12" x 28" – 305 mm x 711 mm	3-1/2" – 89 mm	1

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Schluter®-KERDI-BOARD-ZW

Item No.	Description
Length supplied: 6" – *15 cm*	
KB ZW 30 E/15	Stainless steel angle profile
Length supplied: 9' 2-1/2" – *2.50 m*	
KB ZW 30 E	Stainless steel angle profile

Schluter®-KERDI-BOARD-ZC

Item No.	Description	Size
Length supplied: 9' 2-1/2" – *2.50 m*		
KB ZC 39 EB	U-shaped brushed stainless steel profile with 1 perforated anchoring leg	1-1/2" – *38 mm*
KB ZC 50 EB	U-shaped brushed stainless steel profile with 1 perforated anchoring leg	2" – *50 mm*

Schluter®-KERDI-BOARD-ZC/E

Item No.	Description	Size
E/KB ZC 39 EB	Brushed stainless steel outside corner piece for ZC	1-1/2" – *38 mm*
E/KB ZC 50 EB	Brushed stainless steel outside corner piece for ZC	2" – *50 mm*

Schluter®-KERDI-BOARD-ZA

Item No.	Description	Size
Length supplied: 9' 2-1/2" – *2.50 m*		
KB ZA 19 EB	U-shaped brushed stainless steel profile with 2 perforated anchoring legs	3/8" – *19 mm*
KB ZA 25 EB	U-shaped brushed stainless steel profile with 2 perforated anchoring legs	1" – *25 mm*
KB ZA 39 EB	U-shaped brushed stainless steel profile with 2 perforated anchoring legs	1-1/2" – *38 mm*
KB ZA 50 EB	U-shaped brushed stainless steel profile with 2 perforated anchoring legs	2" – *50 mm*

Schluter®-KERDI-BOARD-ZA/E

Item No.	Description	Size
E/KB ZA 38 EB	Brushed stainless steel outside corner piece for ZA	1-1/2" – *38 mm*
E/KB ZA 50 EB	Brushed stainless steel outside corner piece for ZA	2" – *50 mm*

Schluter®-KERDI-BOARD-ZV

Item No.	Description	Size
Length supplied: 9' 2-1/2" – *2.50 m*		
V/KB Z 19 EB	Brushed stainless steel connector for ZC and ZA	3/4" – *19 mm*
V/KB Z 25 EB	Brushed stainless steel connector for ZC and ZA	1" – *25 mm*
V/KB Z 38 EB	Brushed stainless steel connector for ZC and ZA	1-1/2" – *38 mm*
V/KB Z 50 EB	Brushed stainless steel connector for ZC and ZA	2" – *50 mm*

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SUBSTRATE, BUILDING PANEL, BONDED WATERPROOFING

Schluter®-KERDI-BOARD-ZI/V

Item No.	Description	Size
VKB ZI 19 E	Stainless steel internal connector for ZO and ZA	3/4" – 19 mm
VKB ZI 25 E	Stainless steel internal connector for ZO and ZA	1" – 25 mm
VKB ZI 38 E	Stainless steel internal connector for ZO and ZA	1-1/2" – 38 mm
VKB ZI 50 E	Stainless steel internal connector for ZO and ZA	2" – 50 mm

Schluter®-KERDI-BOARD-ZB

Item No.	Description	Size
Length supplied: 9' 2-1/2" – 2.50 m		
KB ZB 19 E	U-shaped stainless steel profile with S perforated anchoring legs	3/4" – 19 mm
KB ZB 25 E	U-shaped stainless steel profile with S perforated anchoring legs	1" – 25 mm
KB ZB 38 E	U-shaped stainless steel profile with S perforated anchoring legs	1-1/2" – 38 mm
KB ZB 50 E	U-shaped stainless steel profile with S perforated anchoring legs	2" – 50 mm

Schluter®-KERDI-BOARD-ZSD

Item No.	Description	Length	Packaging
KB ZSD 90 E	Stainless steel anchor	3-1/2" – 9 cm	25 anchors/box
KB ZSD 110 E	Stainless steel anchor	4-5/16" – 11 cm	25 anchors/box
KB ZSD 90 Z	Galvanized steel anchor	3-1/2" – 9 cm	25 anchors/box
KB ZSD 110 Z	Galvanized steel anchor	4-5/16" – 11 cm	25 anchors/box

Schluter®-KERDI-BOARD-ZT

Item No.	Description	Size	Packaging
KB ZT 32 Z	Galvanized steel attachment washers	1-1/4" – 32 mm	100 washers/box

Schluter®-KERDI-BOARD-ZDK

Item No.	Description	Size
KB ZDK 12/10M	Double-sided tape	1/2" x 33' – 12.5 mm x 10 m
KB ZDK 19/10M	Double-sided tape	3/4" x 33' – 19 mm x 10 m
KB ZDK 30/10M	Double-sided tape	1-3/16" x 33' – 30 mm x 10 m

Schluter®-KERDI-BOARD-ZSA

Item No.	Description	Size
KB ZSA 100/45M	Joint reinforcement tape	4" x 148' – 100 mm x 45 m

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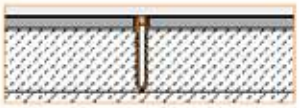
Movement joints are an integral part of any tile assembly. The various components of a tile assembly (tile, mortar, substrate, etc.) expand and contract according to each component's intrinsic physical properties with changes in moisture, temperature, and loading, resulting in internal stresses. Furthermore, structures that restrain overall expansion of the tile field (walls, columns, etc.) cause stress buildup within the system. If the aforementioned movements are not accommodated through the use of movement joints in the tile field and at restraining structures, the resulting stresses can cause cracking of the grout and tile and delamination of the tile from the substrate. Thus, movement joints are an essential component of any durable tile assembly. Schluter®-Systems' prefabricated movement joint profiles accommodate movement and protect tile edges, resulting in a permanent, maintenance-free installation. The family of Schluter®-DILEX prefabricated movement profiles includes a variety of shapes, sizes, and materials to suit different applications.

Application and Function

Mortar Bed Joint Profiles

DILEX screed joint profiles (DILEX-MDP and DILEX-MPV-MPV) are designed to provide movement joints in tile installations that are set in a mortar bed (e.g., ceramic tile, natural stone, pavers, and agglomerate tile). These profile systems are placed to produce individual fields in the assembly and feature flexible central zones to accommodate movement. DILEX mortar bed joint profiles may also be inserted in saw-cut joints or wider joints, for example, in the case of renovations. The remaining joint between the tile and the profile must be filled completely with grout or epoxy. The side sections of the profiles, made of rigid PVC, protect the edges of the adjacent covering against mechanical stresses caused by industrial traffic. However, where heavy mechanical stresses are anticipated, limitations of the PVC as edge protection must be considered.



4.4 Schluter®-DILEX-MDP is available in three different heights and features stable serrated sidewalls made of rigid PVC and a central movement zone made of soft PVC. The side sections are made with environmentally friendly recycled PVC and may vary slightly in color. Since the side sections are partially exposed at the surface, DILEX-MDP is intended mainly for industrial use.

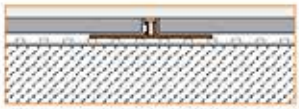
4.3 Schluter®-DILEX-MP adjusts to the thickness of the mortar bed and tile surface by attaching the DILEX-MPV extensions. The profile features a central movement zone made of soft chlorinated polyethylene (CPE), which overlaps the recycled rigid PVC side sections by approximately 1/32" (1 mm), thus providing a more aesthetically pleasing exposed surface when compared to DILEX-MDP.

Surface Joint Profiles

Surface joints must be placed within the tiled surface regardless of substrate conditions. They provide stress relief from movements in the tile field due to thermal and moisture expansion/contraction and loading. Schluter®-Systems offers a wide variety of prefabricated, maintenance-free surface movement joint profiles, suitable for applications ranging from residential to heavy commercial.

Residential to Medium-duty Commercial Applications

4.1 Schluter®-DILEX-EZ 6 + 9 feature rigid PVC side walls, which are connected on top and bottom by soft PVC movement zones that form the visible surfaces. These profiles separate individual fields in the tile covering and accommodate movement through the soft PVC movement zones. Each profile features two usable surfaces in different colors for increased design options. One surface of the profile features the PVC movement zone in a solid color, while the other surface features a brass or chrome inlay embedded in the PVC movement zone. DILEX-EZ 6 and 9 are flexible and can be used to form curves. The height, "H", of DILEX-EZ 6 is 1/4" (6 mm); the height, "H", of DILEX-EZ 9 is 11/32" (9 mm).



4.7 Schluter®-DILEX-BWS features trapezoid-perforated anchoring legs, made of recycled rigid PVC, which are secured in the mortar bond coat and provide edge protection for adjacent tiles. The profile separates individual fields in the tile covering and accommodates movement via the soft chlorinated polyethylene (CPE) movement zone, which also forms the visible surface. The movement zone is only 3/16" (5 mm) wide, matching common grout joint widths. The profile absorbs relatively limited movements, given the width of the movement zone. This should be taken into account when evaluating the requirements for a specific application. If larger movements within the covering are anticipated, the DILEX-BWS may be installed with greater frequency to create smaller fields, or the DILEX-BWB (3/8", 10 mm movement zone) may be used. DILEX-BWS is suitable for both residential and medium-duty commercial applications subject to light mechanical loads (e.g., offices and stores). The profile is also suited for exterior use.

4.6 Schluter®-DILEX-BWB features trapezoid-perforated anchoring legs, made of recycled rigid PVC, which are secured in the mortar bond coat and provide edge protection for adjacent tiles. The profile separates individual fields in the tile covering and accommodates movement via the soft chlorinated polyethylene (CPE) movement zone, which also forms the visible surface. The movement zone is 3/8" (10 mm) wide, matching common movement joint widths, and is thus capable of accommodating relatively large movements. DILEX-BWB is suitable for both residential use and medium-duty commercial applications subject to light mechanical loads (e.g., offices or stores). The profile is also suited for exterior use.

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3. For the next row of tiles, apply thin-set mortar to the side wall of the DILEX-EZ profile already in place, then press the tiles against the profile so that they are flush with the profile surface.
4. DILEX-EZ may be installed with or without a small joint to the adjacent tile.

BWS, BWD, EDP, KSN, and AKWS

1. Select profile according to tile thickness.
2. Using a notched trowel, apply thin-set mortar over the area where the profile is to be placed. The profile must align directly with movement joints in the substrate below.
3. Press the perforated anchoring legs of the profile into the mortar and align.
4. Trowel additional thin-set mortar over the perforated anchoring legs to ensure full coverage and support of the tile edges.
5. Solidly embed the tiles so that the tiled surface is flush with the top of the profile; the profile should not be higher than the tiled surface, but rather up to approx. 1/32" *(1 mm)* lower.
6. A joint of approximately 1/16" - 1/8" *(1.5 - 3 mm)* should be left between the tile and the profile.
7. Fill the joint completely with grout or setting material.

Expansion Joint Profiles

BT

1. Select profile according to tile thickness.
2. Using a notched trowel, apply thin-set mortar over the area where the profile is to be placed. The profile must align directly with movement joints in the substrate below.
3. Press the perforated anchoring legs of the profile into the mortar and align.
4. Trowel additional thin-set mortar over the perforated anchoring legs to ensure full coverage and support of the tile edges.
5. Solidly embed the tiles so that the tiled surface is flush with the top of the profile; the profile should not be higher than the tiled surface, but rather up to approx. 1/32" *(1 mm)* lower.
6. For DILEX-BT, the tile is set to the integrated joint spacer, which ensures a uniform joint of 1/16" - 1/8" *(1.5 - 3 mm)*.
7. Fill the joint completely with grout or setting material; remove the protective foil from DILEX-BT.
8. The installation of the profile on wall and ceiling surfaces is essentially equivalent to floor applications.
9. DILEX-BTS can be inserted into existing joint spaces. The joints must be at least 1-3/4" *(44 mm)* wide and 3/8" *(10 mm)* deep. The lateral anchoring legs are adhered to the existing covering with a suitable adhesive (e.g., epoxy resin) or mechanically fastened to the covering with the appropriate screws.

Perimeter Joint Profiles

AS

1. Thoroughly clean the contact area on adjoining fixtures where DILEX-AS will be positioned.
2. Using a notched trowel, apply the thin-set mortar over the area where the trapezoid-perforated anchoring leg will be placed.
3. Remove the paper from the self-adhesive tape. Apply Schluter®-KERDI-FIX or silicone sealant parallel and adjacent to self-adhesive tape. Press the profile with self-adhesive tape against the fixture in such a way that the perforated anchoring leg can also be pressed into the applied thin-set mortar.
4. Install inside corners and end caps with KERDI-FIX or silicone prior to setting tiles.
5. Trowel additional thin-set mortar over the perforated anchoring leg to ensure full coverage.
6. A joint of approx. 1/16" - 1/8" *(1.5 - 3 mm)* should be left between the tile and the profile.
7. Fill the joint completely with grout or setting material.

BWA and KSA

1. Select profile according to tile thickness.
2. Using a notched trowel, apply thin-set mortar over the area where the profile is to be placed.
3. If necessary, fill the dovetailed channel of DILEX-BWA with KERDI-FIX, epoxy resin, silicone, or similar to adhere the profile to the existing structure. Remove film from self-adhesive backing strip on DILEX-KSA.
4. Press the perforated anchoring leg of the profile into the mortar and adjust it securely against the existing building elements.
5. Trowel additional thin-set mortar over the perforated anchoring leg to ensure full coverage and support of the tile edges.
6. Solidly embed the tiles and align flush with the top of the profile.
7. A joint of approx. 1/16" - 1/8" (1.5 - 3 mm) should be left between the tile and the profile.
8. Fill the joint completely with grout or setting material.

Cove-shaped Profiles

EKE, HKW, HK, HKU, PHK, AHK, AHKA, EHK, and HKS

1. Select profile according to tile thickness.
   Note: For DILEX-HK and DILEX-EKE, profile height, "U", must allow insertion of the tile into the tile pocket; for example, select "U 12" for a tile thickness between approx. 3/8" *(10 mm)* and 7/16" *(11 mm)*. DILEX-HKU with 3/8" *(10 mm)* radius may be used with 1/4" *(6 mm)* and thicker tiles. DILEX-HKU with 1-13/32" *(36 mm)* radius may be used with 5/16" *(8 mm)* and thicker tiles.
2. Using a notched trowel, apply thin-set mortar over the area where the trapezoid-perforated anchoring legs will be placed.
   Note: If necessary, fill the dovetailed channel of DILEX-AHKA with KERDI-FIX, epoxy resin, silicone, thin-set mortar or similar to adhere the profile to the existing floor surface.
   Note: When using thicker tiles with DILEX-HKU, apply additional mortar behind the anchoring leg.
3. Press the perforated anchoring leg(s) of the profile into the mortar.
   Note: Install inside and outside corners, connectors, and end caps prior to setting tile. The use of thin-set mortar or similar may be required to achieve a proper fit. DILEX-EHK/-HKS/-HKU accessories are applied using a permanently elastic, waterproof adhesive (e.g., KERDI-FIX or silicone). Prior to application, any contact-inhibiting substances (e.g., grease, etc.) must be removed. The connectors should overlap the profiles by at least 3/8" *(10 mm)*.
4. Trowel additional thin-set mortar where the tiles are to be installed.
5. Solidly embed the tiles, ensuring full coverage and support of the tile edges, and align flush with the top of the profile, leaving a joint of approximately 1/16" – 1/8" *(1.5 - 3 mm)* between the tile and the profile.
   Note: For DILEX- HK and DILEX- EKE, insert floor tile into the tile pocket. For DILEX- AHK, set tile to the integrated joint spacer, which ensures a uniform joint of 1/16" – 1/8" *(1.5 – 3 mm)*.
6. Fill the joints completely with grout or setting material.

Maintenance

DILEX profiles require no special maintenance or care and are resistant to mold and fungi. Clean profile using common household cleaning agents.
Stainless steel surfaces exposed to the environment or aggressive substances should be cleaned periodically using a

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PORCELAIN/CERAMIC TEST RESULTS

EVALUATING THE STATIC COEFFICIENT OF FRICTION (COF) OF CERAMIC TILE, ASTM C1028-06

COF* defines the relative slip resistance of floor surfaces. The tile industry uses ASTM C1028-06 to measure the COF published in Dal-Tile's product literature. The procedure involves the use of a calibrated dynamometer, a specified neolite heel assembly, a standard reference tile surface, and a 50 pound weight. This procedure measures the maximum force required to initiate motion in the testing assembly in four perpendicular directions. The values are recorded and an averaging calculation is performed that determines the static COF.

WATER ABSORPTION, ASTM C373-88

Water absorption is measured using ASTM C373-88. Individual tiles are weighed, saturated with water, then weighed again. The percent difference between the two conditions is referred to as the water absorption value. Tiles are classified according to water absorption percentages as follows:

Impervious	Tiles exhibiting 0.5% or less.
Vitreous	Tiles exhibiting more than 0.5% but not more than 3.0%.
Semi-Vitreous	Tiles exhibiting more than 3.0% but not more than 7.0%.
Non-Vitreous	Tiles exhibiting more than 7.0%.

SCRATCH HARDNESS (MOH'S SCALE RATINGS)

The relative hardness of glazed tile is an important issue that should be addressed when selecting a tile. The test is performed by scratching the surface of the tile with different minerals and subjectively assigning a "MOH's Scale Hardness" number to the glaze, the softest mineral used is talc ("1" rating), the hardest is a diamond ("10" rating). Other minerals of varying hardness provide Moh's Scale Hardness values of 5 to 7 are suitable for most residential floor applications. A value of 7 or greater is normally recommended for commercial applications.

BREAKING STRENGTH CERAMIC TILE, ASTM C648-04

Ceramic tiles used on floors and walls must be able to withstand the expected load bearing capacity of various installations. The tile industry uses ASTM C648-04 to determine the strength and durability of the tile. A force is applied to an unsupported portion of the tile specimen until breakage occurs. The ultimate breaking strength is then recorded in pounds. Final selection of the tile should be based upon the breaking strength and the appropriate installation method. Tile integrity is critically dependent upon proper installation. Dal-Tile recommends strict adherence to industry installation guidelines set forth in ANSI A108, A118 and A136.

CHEMICAL RESISTANCE, ASTM C650-04

Chemical resistance is measured using ASTM C650-04. A tile sample is placed in continuous contact with a variety of chemicals for 24 hours, rinsing the surface and then examining the surface for visible variation.

SHADE VARIATIONS

Tiles range from complete consistency to a more random appearance. Here's an overview of color and shading of individual tile selections:

- Monochromatic (V0) - Very uniform, monochromatic color
- Low (V1) - Consistent color within each tile and from tile to tile
- Medium (V2) - Color variation within each tile
- High (V3) - Some variation from tile to tile, and within each tile
- Random (V4) - Considerable variation from tile to tile

ABRASION RESISTANCE, ASTM C1027-99

The durability of glazed tile is measured, subjectively, by observing the visible surface abrasion of the tile when subjected to the ASTM C 1027-99 testing procedure. Dal-Tile evaluates glazed tile recommended for floor applications using this test method which includes the following classification system:

Class Zero	Not recommended for use on floors.
Class One (Light Residential) [1]	Light Traffic - Residential floor coverings in areas subject to soft-soled footwear or normal footwear traffic, without scratching dirt (ie, domestic bathrooms and bedrooms without exterior access).
Class Two (Residential) [2]	Medium to Light Traffic - Residential floor coverings in areas subject to soft-soled footwear or normal footwear traffic with small amounts of scratching dirt (ie rooms in the living areas of homes except kitchens, entrances and other areas that may be subjected to high usage).
Class Three (Heavy Residential or Light Commercial) [3]	Medium to Heavy Traffic - Residential or light commercial may withstand normal footwear and regular traffic, with some dirt and/or other abrasives present in limited quantities. Tile in this class may be used in light commercial installations with limited foot traffic and with no direct access to the outside. Examples may include residential kitchens and hallways with limited traffic from the outside.
Class Four (Commercial) [4]	Heavy Traffic - Residential and commercial floor coverings subjected to considerable traffic and scratching dirt (ie entrances, workrooms, inns, exhibition halls, and sales rooms, as well as other rooms in public and private buildings). Floors should be adequately protected against scratching dirt at the entrances to buildings by either floor mats or some other footwear cleaning device.
Class Five (Heavy Commercial) [5]	Heavy Traffic - Heavy commercial floor coverings subject to heavy traffic with very abrasive soil.

INDUSTRY STANDARDS

The American Society for Testing and Materials (ASTM) and the American National Standards Institute (ANSI) are nationally recognized organizations, which identify and develop industry test methods and technical standards.

*Neither ASTM nor ANSI establish an industry standard identifying a minimum COF value whereby ceramic tile may be labeled "slip resistant."

All Standard Grade ceramic tile products manufactured by or for Dal-Tile meet or exceed the requirements of ANSI A137.1. See product pages for series-specific technical data.

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CARE AND MAINTENANCE

CERAMIC TILE

CERAMIC TILE - ROUTINE CARE
Contaminants and spills on a glazed ceramic tile are, generally, easier to clean then other surfaces. Glazed tile products should be cleaned routinely with an all-purpose, low VOC household or commercial cleaner. The product chosen should also be grout joint cleaning compatible. The type of product may vary depending on the tile application and use. A multipurpose spray cleaner, which removes soap scum, hard water deposits, and mildew designed for every day use, can be used on wall tile areas in residential baths and showers.

The entire area should be cleaned and scrubbed with cleaner solution through the use of a cotton mop, cloth, sponge, or non-metallic brush. The entire area should be rinsed with clean water to remove any cleaning solution residue. Remember that you should sweep or vacuum floor areas prior to cleaning to remove any dust or debris. Routine cleaners should never contain hazardous or polluting products including, but not limited to acids or ammonia. Acids can damage the grout and the glazed surface of the tile, and ammonia can discolor the grout.

Unglazed tile should be cleaned routinely with concentrated tile cleaners that have a neutral pH for safe regular use. These cleaners are better suited at removing grease, oils and normal spills from unglazed products. Again these products will vary depending on the application, amount of traffic and the use. The product chosen should also be compatible with cleaning the grout joints at the same time.

Removal of Sealers/Waxes/Floor Finishes:
If you need to remove a topical sealer or floor wax from a ceramic tile you should use a Tile Sealer & Adhesive remover. Always test a small area first. Apply a liberal amount of undiluted sealer & adhesive remover to a manageable area. Allow setting without drying until coating or residue softens. Reapply if necessary until sealer softens and can be removed. If necessary, agitate with white nylon scrub pad. Wipe up the residue with a cotton towel or sponge. Rinse thoroughly with clean water. Do not use on natural stone products.

Glass Tiles:
For routine cleaning, use any non-abrasive cleaning compound recommended for either glass or tile.

Metal Signatures/Metal Ages/Urban Metals:
- To clean, use a liquid non-abrasive household cleaner.
- DO NOT use scouring pads, steel wool, sandpaper or other abrasive products.
- Avoid cleaners containing ammonia, bleach, abrasives, or other hazardous/polluting compounds.

- Always test in small inconspicuous area while using a new cleaner to ensure compatibility.

CERAMIC TILE - GROUT CARE
Grout is the material used to fill the spaces between the individual tiles. Grout comes in many colors. While color is important to the final finished look of the tile installation, it has little effect on the functionality of the grout. The purpose of grout is simply to fill the joint between the tiles and becomes a permanent, integral component of the finished installation.

Penetrating/Impregnating Sealer:
Most tile installations use cementitious grouts. This type of grout should be sealed after installation to prevent the color from staining. The grout should be sealed with a penetrating/impregnating sealer (often called grout sealers) which does not contain silicone, as silicone can shorten the useful life of the sealer. Epoxy grouts, conversely, are chemically cured and acid resistant and, as a result, do not require a sealer. The application of a good quality penetrating/impregnating sealer into the grout joints of a cementitious grout will not change the natural color of the grout, but will prevent the penetration of moisture, simplify maintenance, and help prevent staining or discoloration. Only the grout needs to be sealed, not glazed floor or wall tiles. Grout can be sealed seventy-two hours after installation.

There are different grades of penetrating/impregnating sealers, therefore the useful life and price will differ between a low quality and high quality sealer. You may need to reapply the sealer on an annual basis depending on the sealer quality, traffic patterns, and maintenance routine. Some sealers have multiple year warranties for useful life. Refer to the manufacturer warranty, technical & product information for specific details on product installation, useful life, and product applications (including any warnings) before use.

Grout Maintenance:
Neither sealing the grout nor using a 100% Epoxy Grout will guarantee against surface build-up or discoloration of the grout. Grout needs to be cleaned on a periodic basis to remove any surface build-up. Routine grout cleaning can be done with a daily concentrated household or commercial cleaner depending on the application. When heavy duty grout cleaning is required, you will need to use a professional strength Tile & Grout Cleaner that is capable of removing grease, soap scum, body oil, mildew stains, algae, and synthetic or acrylic waxes from the grout joints. However, such a product should contain non-polluting chemicals and low VOC levels. This type of product can be purchased from

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most Home Centers, or through your local professional Floor Covering Dealer.

Grout Color Restoration:
When grout has been stained to the point that it cannot be maintained or returned to its natural color, you can return the grout back to its original color or any other color through the use of a "grout stain". Grout Stains are epoxy-based products that are specifically designed to penetrate into the grout and seal the surface with a permanent color. Once the grout has been stained there is no need to seal it any further with a penetrating/ impregnating sealer. Prior to staining, the grout joint should be cleaned thoroughly to remove any dirt, oils, grease or sealers with a professional strength Tile & Grout Cleaner. This can be purchased from most Home Centers or through your local Professional Floor Covering Dealer.

CERAMIC TILE - NEW INSTALLATIONS
Immediately after tile has been properly installed and grouted, the new installation should be covered with brown paper to protect it from debris during the remaining construction process. The grout joints should be dampened daily with clear water using a clean sponge or mop during the first 7 days. This procedure facilitates the grout cure and color lock. The paper will allow for two important things: (1) to protect the newly installed tile grout and (2) to allow moisture to escape from the grout as it cures further protecting the look and utility of the floor. This is an important step in achieving color consistency. Never use plastic or non-absorbent materials to protect freshly installed tile. These types of non-absorbent products will trap moisture causing the grout to discolor during the curing period. The protective brown paper should remain until construction is complete and the floor is opened for intended (post-construction) use.

Post-Grout Clean-Up:
Grout haze is a film that has been left behind on the surface of the tile as part of the final grouting process. Usually this is buffed off the surface after the grout has achieved its initial 12 to 24 hour cure. The removal of the haze is often difficult when buffing with a clean rag or floor machine. Cementitious grout haze can be successfully removed with "Sulfamic" acid, which is a mild acid that attacks and breaks down cement smears. There are several products on the market called grout haze removers, which usually contain Sulfamic acid. Sulfamic acid can also be purchased in powder form and mixed with water to different strengths by qualified professionals. Similarly, 100% Solids Epoxy Grout haze can be removed with an Epoxy Haze Remover. These removers are formulated to safely and quickly remove cured epoxy haze from new tile installations. Their unique formulation will soften most epoxy hazes for easy removal without damaging the grout or tile, usually in one application. Sulfamic acid or grout removers should never be used on Natural Stone products.

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NATURAL STONE

NATURAL STONE - ROUTINE CARE
To ensure your natural stone products will provide you with a lifetime of aesthetics and utility, a proper maintenance program is crucial. Natural Stone products are porous by nature and require a different maintenance program than traditional ceramic tile.

Natural stone requires a different maintenance routine than traditional, man-made ceramic tile. Many of the cleaners acceptable for use on ceramic tile can stain, damage or dull stone. Dirt and dust will scratch the surface of stone. Therefore, stone floors should be vacuumed or dust mopped frequently to remove abrasive agents from the stone surface. Natural stone should be cleaned with neutral cleaners. Stone cleaners should never contain acid or bleach. Acids, even a light solution of vinegar and water, will etch and eventually damage natural stone.

Stone Cleaners:
Only use cleaners specifically designed for cleaning stone. These cleaners contain no acids and are concentrated neutral pH cleaners that will not affect existing sealers or wax-type coatings. The surface of the stone should be dampened with clear water. This will keep the cleaning solution on the surface so it can be effective. A solution of the cleaner and water mixed to manufacturer instructions should be applied to the stone surface with a sponge or mop. On walls, kitchen counters or vanity tops, a spray bottle can be used to apply the cleaning solution. Allow sitting for manufacturers specified amount of time (usually 3 to 5 minutes). Agitate with a sponge, synthetic mop, soft bristle brush or through the use of a floor-scrubbing machine. Mop up dirty solution and buff dry.

Once the stone has been cleaned, you can periodically apply a Spray-Buff wax-type floor finish to enhance the beauty and luster of polished stone (including countertops). Apply the finish with a spray applicator and buff immediately with a white nylon pad. Reapply as often as needed, depending on volume of surface traffic and consistency of routine maintenance program. This product is not designed to restore the original shine, but is intended to maintain and protect the original shine. This can be purchased from most Home Centers or through your local Professional Floor Covering Dealer.

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CERAMIC TILE - NEW INSTALLATIONS
Immediately after tile has been properly installed and grouted, the new installation should be covered with brown paper to protect it from debris during the remaining construction process. The grout joints should be dampened daily with clear water using a clean sponge or mop during the first 7 days. This procedure facilitates the grout cure and color lock. The paper will allow for two important things: (1) to protect the newly installed tile grout and (2) to allow moisture to escape from the grout as it cures further protecting the look and utility of the floor. This is an important step in achieving color consistency. Never use plastic or non-absorbent materials to protect freshly installed tile. These types of non-absorbent products will trap moisture causing the grout to discolor during the curing period. The protective brown paper should remain until construction is complete and the floor is opened for intended (post-construction) use.

Post-Grout Clean-Up:
Grout haze is a film that has been left behind on the surface of the tile as part of the final grouting process. Usually this is buffed off the surface after the grout has achieved its initial 12 to 24 hour cure. The removal of the haze is often difficult when buffing with a clean rag or floor machine. Cementitious grout haze can be successfully removed with "Sulfamic" acid, which is a mild acid that attacks and breaks down cement smears. There are several products on the market called grout haze removers, which usually contain Sulfamic acid. Sulfamic acid can also be purchased in powder form and mixed with water to different strengths by qualified professionals. Similarly, 100% Solids Epoxy Grout haze can be removed with an Epoxy Haze Remover. These removers are formulated to safely and quickly remove cured epoxy haze from new tile installations. Their unique formulation will soften most epoxy hazes for easy removal without damaging the grout or tile, usually in one application. Sulfamic acid or grout removers should never be used on Natural Stone products.

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NATURAL STONE

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Natural stone requires a different maintenance routine than traditional, man-made ceramic tile. Many of the cleaners acceptable for use on ceramic tile can stain, damage or dull stone. Dirt and dust will scratch the surface of stone. Therefore, stone floors should be vacuumed or dust mopped frequently to remove abrasive agents from the stone surface. Natural stone should be cleaned with neutral cleaners. Stone cleaners should never contain acid or bleach. Acids, even a light solution of vinegar and water, will etch and eventually damage natural stone.

Stone Cleaners:
Only use cleaners specifically designed for cleaning stone. These cleaners contain no acids and are concentrated neutral pH cleaners that will not affect existing sealers or wax-type coatings. The surface of the stone should be dampened with clear water. This will keep the cleaning solution on the surface so it can be effective. A solution of the cleaner and water mixed to manufacturer instructions should be applied to the stone surface with a sponge or mop. On walls, kitchen counters or vanity tops, a spray bottle can be used to apply the cleaning solution. Allow sitting for manufacturers specified amount of time (usually 3 to 5 minutes). Agitate with a sponge, synthetic mop, soft bristle brush or through the use of a floor-scrubbing machine. Mop up dirty solution and buff dry.

Once the stone has been cleaned, you can periodically apply a Spray-Buff wax-type floor finish to enhance the beauty and luster of polished stone (including countertops). Apply the finish with a spray applicator and buff immediately with a white nylon pad. Reapply as often as needed, depending on volume of surface traffic and consistency of routine maintenance program. This product is not designed to restore the original shine, but is intended to maintain and protect the original shine. This can be purchased from most Home Centers or through your local Professional Floor Covering Dealer.

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Heavy-Duty Stone Cleaning:
When some areas have been neglected, you will need to use a heavy-duty non-hazardous and non-polluting stone cleaner and degreaser to effectively remove dirt, grease, grime, waxes and floor finishes. An optimal heavy-duty cleaner should contain low percentages of volatile organic compounds. These cleaning products are concentrated and designed to deep clean the stone without damaging it. Apply the solution of the cleaner and water mixed to manufacturer instructions to the stone surface with a sponge or mop. Allow setting for manufacturer-specified amount of time. Agitate with a sponge, synthetic mop, and soft bristle brush or through the use of a floor-scrubbing machine. Mop up dirty solution and buff dry. Be sure to change out the cleaning solution every 100 square feet to avoid reintroducing dirty water during the cleaning process. Rinse thoroughly with clean water when finished. After cleaning you may apply the Spray-Buff wax-type floor finish to enhance the natural shine.

Stain Removal:
Stone poultice will remove stains and grout haze from stone. Poultice is a fine, nonacidic, absorptive clay cleaning powder that removes deep-set oil stains, grease and light cementitious grout haze from polished and unpolished natural stone.

CAUTION: *Poultice may dull the shine of the polished stone. If this occurs you will need to use a marble polish to restore the natural shine.*

Restoration:
If a marble finish has become dull, scratched or etched, you can restore the natural shine through the use of a marble polish. Some marble polishes are available in kits. The process can be enhanced with the use of floor buffing machines. The process is generally a re-crystallization process to remove fine scratches and restore the original shine and polish to the stone. This is not an application of a topical sealer or wax to cover-up damaged or worn surfaces.

NATURAL STONE - NEW INSTALLATIONS
Sealing is strongly recommended for newly installed marble and other natural stone to provide maximum below surface stain protection. Consult your Professional Floor Covering Dealer or Home Center Store to ensure that you select a high quality sealer to protect your natural stone. Immediately after natural stone has been installed and grouted, the new installation should be covered with brown paper to protect it from debris during the remaining construction process. The protective brown paper should remain in place until construction is completed and the area is opened to intended (post-construction) use.

Pre-grout Sealing:
A non-sanded grout is strongly recommended for natural stone installations due to the narrow grout joints customarily preferred. This type of grout has very fine particles of cement, polymers and color pigments that can penetrate the microscopic pores of the stone surface where they become trapped and appear as a stain in the stone. Therefore, all travertine, slate, tumbled stone and honed/flamed/unpolished granite should be sealed prior to the grouting process to protect them from staining. The application of a good quality sealer should be used as a grout sealer and applied again as the final sealing process once the installation is finished.

Sealing:
A premium natural look penetrating/impregnating sealer is the normal choice on polished or honed marble, limestone, granite, or where the natural color of a slate is desired. A stone enhancer sealer is often used on tumbled, antique stones or on slate where a darker, enriched or highlighted character is desired. When choosing either one of these types of sealers, make sure the brand you have chosen is formulated to provide maximum stain protection for stone products. Stone products should be tested periodically per manufacturer's instructions to insure that the sealer is working effectively.

Penetrating/impregnating stone sealers are a no-sheen, natural look sealer that can be water-based or solvent-based, good for interior and exterior applications. Most quality sealers of this type are rated to protect the stone for several years.

Stone enhancer sealers are also a no-sheen, penetrating/impregnating sealer that is formulated to darken, enrich and highlight the natural color and beauty of stone products. They will rejuvenate and improve the appearance of worn and weathered stone. Always test loose pieces of stone to ensure desired effect with enhancing sealers. However, they will also darken the color of grout joints. They are, generally, suitable for interior and exterior use, and rated to protect the stone for several years.

Always reference manufacturer's literature for specific information on the duration of the sealer's protection and make sure that the sealer is applied in strict accordance with the manufacturer's instructions.

Finishing:
A stone floor finish should be applied to a polished natural stone floor only. This type of product will help enhance the shine and provide a protective coating for "soft" or polished marbles. Verify the finish is a wax-type finish designed to add luster and enhance the beauty of sealed and polished natural stone only. A topical

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finish may change the appearance and performance of your stone, so always test a small area first. ***Application of topical sealer or wax should never be done as an attempt to add a shine to a honed, scratched or non-polished stone product. This will only create maintenance and/or slip resistance problem.***

SALTILLO

SALTILLO TILE - ROUTINE CARE
Soft clay tiles are categorized as specialty use products, and as such they are generally not governed by the same requirements as glazed or unglazed ceramic tile. These products will require some type of topical sealer protection. These sealers are designed to provide stain resistance and a durable finish to protect clay tile against wear. Pre-sealing the tile prior to grouting will act as a pre-grout sealer, provided it is applied over a clean tile surface. An additional final coat over the grouted floor will complete the sealing process along with providing the final grout stain protection.

There are two common types of sealers used today for sealing specialty tiles. The first is a water-based blend of acrylic polymers. This product allows for moisture vapor transmission, and it can be reapplied over itself, without stripping or removing the old sealer when the original application has become worn. The second type is a solvent-based sealer. Solvent-based sealers are not as forgiving after they have become worn, they must be stripped and removed prior to reapplication. Both types should be UV stable, which means the ultra violet rays from the sun should not break them down. You should always follow the manufacturer's instructions for use, maintenance and precautions.

The expected wear of the topical sealer will vary depending on the hardness, surface texture, type or area, usage, and type of maintenance products used. However, the average expected use life of the sealer, when properly prepared, is a maximum of 3 years. Harsh cleaning methods, high-alkaline or solvent-based cleaners can significantly lower the expected life of the sealer. Concentrated tile cleaners are recommended for routine cleaning.

Maintenance Cleaning:
Highly alkaline, acidic, ammoniated, abrasive cleaners and/or bleach may break down the sealer, adversely affecting repellency and may not be good for the tile or grout. Use neutral cleaners specially formulated for tile and grout that are low VOC, non-hazardous and non-polluting.

For routine cleaning:
We recommend DuPont™ StoneTech® Professional Stone & Tile Cleaner.

- Mix 2 ounces of Stone & Tile Cleaner concentrate in 1 gallon of warm or hot water. (Note: One gallon of concentrate makes 64 gallons of cleaning solution.
- Apply mixed solution with a damp mop, sponge or appropriate professional cleaning equipment.
- Clean entire area with mop, changing mop water often to ensure that soil is not re-deposited. Wipe or rinse cleaned area.
- Let area dry completely before using.

You may also use DuPont™ StoneTech® Professional Stone & Tile Cleaner in the ready-to-use spray bottle or wipes.

Re-Sealing and Protecting:
For interior surfaces, resealing should be performed every 3-5 years. For exterior surfaces, resealing should be performed every 1-3 years. Terrazzo surfaces must be sealed to prevent or minimize staining. Leaving terrazzo untreated may greatly hinder the complete removal of stains in the future. We recommend the use of a heavy-duty sealant that is low in VOC content and does not contain any hazardous materials.

ONE QUARTZ SURFACES

ONE QUARTZ SURFACES - ROUTINE CARE
- One Quartz Surfaces are virtually maintenance free and can be cleaned with extreme ease.
- Common household spills – such as tea, coffee, lemon juice, soda, fruit, vegetable juice, olive oil or grease spills – are easily removed and the surface restored to its original appearance.
- Some One Quartz Surface colors and finishes (lied honed, matt, etc., are more sensitive to grease or finger-prints and may require extra care during routine cleaning.
- Quartz is one of the hardest materials in nature, which is your assurance that your One Quartz Surfaces will not easily scratch or chip. The use of a cutting board is nevertheless recommended.
- To maintain the natural beauty of One Quartz Surfaces, do not place hot skillets or roasting pans directly onto the surface but use a trivet instead.

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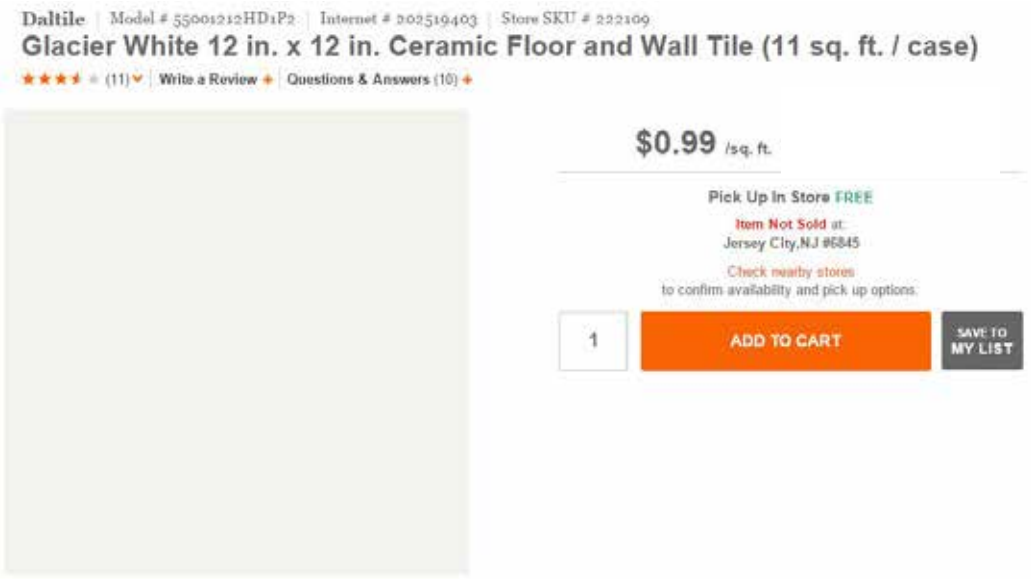
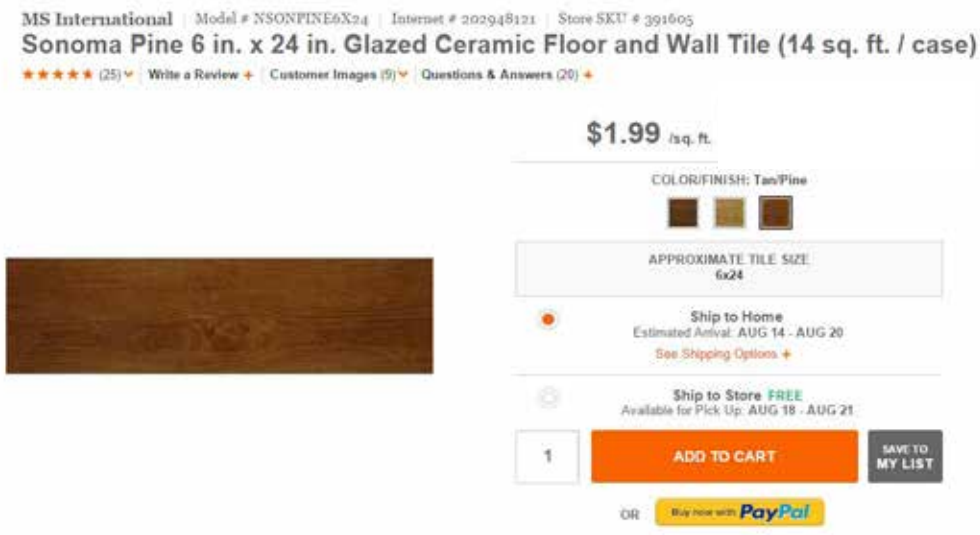

Daltile | Model # 55001212HD1P2 | Internet # 202519403 | Store SKU # 222109
Glacier White 12 in. x 12 in. Ceramic Floor and Wall Tile (11 sq. ft. / case)
(11) Write a Review + Questions & Answers (10) +
$0.99 /sq. ft.
Pick Up In Store FREE
Item Not Sold at:
Jersey City,NJ #6845
Check nearby stores
to confirm availability and pick up options
1
ADD TO CART
SAVE TO MY LIST


MS International | Model # NSONPINE6X24 | Internet # 202948121 | Store SKU # 391605
Sonoma Pine 6 in. x 24 in. Glazed Ceramic Floor and Wall Tile (14 sq. ft. / case)
(25) Write a Review + Customer Images (9) Questions & Answers (20) +
$1.99 /sq. ft.
COLOR/FINISH: Tan/Pine
APPROXIMATE TILE SIZE
6x24
Ship to Home
Estimated Arrival: AUG 14 - AUG 20
See Shipping Options +
Ship to Store FREE
Available for Pick Up: AUG 18 - AUG 21
1
ADD TO CART
SAVE TO MY LIST
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BellaWOOD
NOW WITH A CERTIFIED 100 YEAR TRANSFERABLE WARRANTY
More Durable. Now Transferable.
Now 100 Years.
CERTIFIED
100
YEAR
TRANSFERABLE
WARRANTY

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Benjamin Moore®

SUPER SPEC®
INTERIOR LATEX PEARL FINISH 277

Features

- Excellent hiding
- Washable finish
- Spatter resistant
- Decorative and functional pearl finish
- Quick dry
- Low odor
- Easy to apply
- Soap and water cleanup

General Description

An acrylic blended latex pearl finish designed for application to a wide variety of interior surfaces.

Recommended For

- For commercial and residential applications
- For use on primed or previously painted drywall, plaster, wood, metal and wallpapered surfaces.

Limitations

- Do not apply when air and surface temperatures are below 50°F (10°C)

Product Information

Colors — Standard:
White (01)
(May be tinted with up to 2.0 fl. oz. of Benjamin Moore® Color Preview® colorants per gallon.)

— Tint Bases:
Benjamin Moore® Color Preview® Bases 1B, 2B, 3B, & 4B

— Special Colors:
Contact your Benjamin Moore representative

Certification:

VOC Compliant in all regulated areas except the South Coast and areas of California that follow the 2007 Suggested Control Measures.

Class A (0-25) over non-combustible surfaces when tested in accordance with ASTM E-84

Qualifies for LEED® Credit (INTERIOR NON-FLAT)

Technical Assistance
Available through your local authorized independent Benjamin Moore® retailer. For the location of the retailer nearest you, call 1-800-826-2623, see www.benjaminmoore.com, or consult your local Yellow Pages.

Technical Data◊		Pastel Base
Vehicle Type		Acrylic Blended Latex
Pigment Type		Titanium Dioxide
Volume Solids		33%
Coverage per Gallon at Recommended Film Thickness		400 – 450 Sq. Ft.
Recommended Film Thickness	– Wet	3.8 mils
	– Dry	1.2 mils
Depending on surface texture and porosity. Be sure to estimate the right amount of paint for the job. This will ensure color uniformity and minimize the disposal of excess paint.		
Dry Time @ 77°F (25°C) @ 50% RH	– To Touch	2 Hours
	– To Recoat	4 Hours
Painted surfaces can be washed after two weeks. High humidity and cool temperatures will result in longer dry, recoat and service times.		
Dries By		Evaporation, Coalescence
Viscosity		92 ± 1 KU
Flash Point		None
Gloss / Sheen		Pearl (15-20 @ 60°)
Surface Temperature at Application	– Min.	50°F
	– Max.	90°F
Thin With		Clean Water
Clean Up Thinner		Clean Water
Weight Per Gallon		10.2 lbs
Storage Temperature	– Min.	40°F
	– Max.	90°F

Volatile Organic Compounds (VOC)

145 Grams/Liter 1.2 Lbs./Gallon

◊Reported values are for Pastel Base. Contact Benjamin Moore for values of other bases or colors.

Benjamin Moore & Co., 101 Paragon Drive, Montvale, NJ 07645 Tel: (201) 573-9600 Fax: (201) 573-9046 www.benjaminmoore.com M72 277 US 022614

CSI #: 09 91 23

Super Spec® Interior Latex Pearl Finish 277

Surface Preparation

Surfaces to be painted must be clean, dry, and free of dirt, dust, grease, oil, soap, wax, scaling paint, water soluble materials, and mildew. Remove any peeling or scaling paint and sand these areas to feather edges smooth with adjacent surfaces. Glossy areas should be dulled. Drywall surfaces must be free of sanding dust.

New plaster or masonry surfaces must be allowed to cure (30 days) before applying base coat. Cured plaster should be hard, have a slight sheen and maximum pH of 10; soft, porous or powdery plaster indicates improper cure. Never sand a plaster surface; knife off any protrusions and prime plaster before and after applying patching compound. Poured or pre-cast concrete with a very smooth surface should be etched or abraded to promote adhesion, after removing all form release agents and curing compounds. Remove any powder or loose particles before priming.

Difficult Substrates: Benjamin Moore offers a number of specialty primers for use over difficult substrates such as bleeding woods, grease stains, crayon markings, hard glossy surfaces, galvanized metal, or other substrates where paint adhesion or stain suppression is a particular problem. Your Benjamin Moore® retailer can recommend the right problem-solving primer for your special needs.

WARNING! If you scrape, sand or remove old paint, you may release lead dust. **LEAD IS TOXIC. EXPOSURE TO LEAD DUST CAN CAUSE SERIOUS ILLNESS, SUCH AS BRAIN DAMAGE, ESPECIALLY IN CHILDREN. PREGNANT WOMEN SHOULD ALSO AVOID EXPOSURE.** Wear a NIOSH approved respirator to control lead exposure. Carefully clean up with a HEPA vacuum and a wet mop. Before you start, find out how to protect yourself and your family by contacting the National Lead Information Hotline at 1-800-424-LEAD or log on to www.epa.gov/lead

Primer/Finish Systems

New surfaces should be fully primed, and previously painted surfaces may be primed or spot primed as necessary. For best hiding results, tint the primer to the approximate shade of the finish coat, especially when a significant color change is desired. **Special Note:** Certain custom colors require a Deep Color Base Primer tinted to a special prescription formula to achieve the desired color. Consult your retailer.

Wood, and engineered wood products:
Primer: Super Spec® Latex Enamel Undercoater & Primer Sealer (253) or Super Spec® Alkyd Enamel Undercoater & Primer Sealer (C245)
Finish: 1 or 2 coats Super Spec® Latex Pearl Finish (277)

Drywall:
Primer: Super Spec® Latex Enamel Undercoater & Primer Sealer (253)
Finish: 1 or 2 coats Super Spec® Latex Pearl Finish (277)

Plaster:
Primer: Fresh Start® Multi-Purpose Latex Primer (N023) or Fresh Start® High-Hiding All Purpose Primer (046)
Finish: 1 or 2 coats Super Spec® Latex Pearl Finish (277)

Rough or Pitted Masonry:
Primer: Super Spec® Masonry Interior/Exterior Hi-Build Block Filler (208)
Finish: 1 or 2 coats Super Spec® Latex Pearl Finish (277)

Smooth Poured or Precast Concrete:
Primer: Super Spec® Masonry Interior/Exterior 100% Acrylic Masonry Sealer (N066) or Fresh Start® Multi-Purpose Latex Primer (N023) or Fresh Start® High-Hiding All Purpose Primer (046)
Finish: 1 or 2 coats Super Spec® Latex Pearl Finish (277)

Ferrous Metal (Steel and Iron):
Primer: Super Spec HP® Acrylic Metal Primer (P04) or Super Spec HP® Alkyd Metal Primer (P06)
Finish: 1 or 2 coats Super Spec® Latex Pearl Finish (277)

Non-Ferrous Metal (Galvanized & Aluminum): All new metal surfaces must be thoroughly cleaned with Super Spec HP® Oil & Grease Emulsifier (P83) to remove contaminants. New shiny non-ferrous metal surfaces that will be subject to abrasion should be dulled with very fine sandpaper or a synthetic steel wool pad to promote adhesion
Primer: Super Spec HP® Acrylic Metal Primer (P04)
Finish: 1 or 2 coats Super Spec® Latex Pearl Finish (277)

Repaint, All Substrates: Prime bare areas with the primer recommended for the substrate above.

Application

Stir thoroughly before use. Apply one or two coats. For best results, use a Benjamin Moore® Professional custom-blended nylon/polyester brush, Benjamin Moore® Professional roller, or a similar product. This product can also be sprayed.

Two coats provide maximum hiding and film durability.

Spray, Airless: Fluid Pressure —1,500 to 2,500 PSI;
Tip — .011-.015 Orifice.

Thinning/Cleanup

Thinning is unnecessary, but if required to obtain desired application properties, a small amount of clean water may be added. Never add other paints or solvents.

Cleanup: Clean brushes, rollers and other painting tools in warm soapy water after use. Spray equipment should be given a final rinse with mineral spirits to prevent rusting.

USE COMPLETELY OR DISPOSE OF PROPERLY. Dry empty containers may be recycled in a can recycling program. **Local disposal requirements vary; consult your sanitation department or state-designated environmental agency on disposal options.**

Environmental, Health & Safety Information

Use only with adequate ventilation. Do not breathe spray mist or sanding dust. Ensure fresh air entry during application and drying. Avoid contact with eyes and prolonged or repeated contact with skin. Wear an appropriate, properly fitted respirator (NIOSH approved) during application, sanding, and clean-up. Follow respirator manufacturer's directions for respirator use. Close container after each use. Wash thoroughly after handling.

FIRST AID: In case of eye contact, flush immediately with plenty of water for at least 15 minutes; for skin, wash thoroughly with soap and water. If symptoms persist, seek medical attention. If you experience difficulty breathing, leave the area to obtain fresh air. If continued difficulty is experienced, get medical attention immediately.
WARNING: This product contains a chemical known to the state of California to cause cancer and birth defects, or other reproductive harm.

IN CASE OF SPILL – Absorb with inert material and dispose of as specified under "Cleanup".

KEEP OUT OF REACH OF CHILDREN
PROTECT FROM FREEZING

Refer to Material Safety Data Sheet for additional health and safety information.

Benjamin Moore & Co., 101 Paragon Drive, Montvale, NJ 07645 Tel: (201) 573-9600 Fax: (201) 573-9046 www.benjaminmoore.com M72 277 US 022614

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CSI #: 09 91 23

Benjamin Moore®

AURA®
WATERBORNE INTERIOR PAINT
SATIN FINISH 526

Features

- Extreme hide for fewer coats
- Color Lock® Technology, no color rub-off
- Provides a mildew resistant coating
- Zero VOC, low odor
- Easy application
- Self priming
- Stains wash off easily
- Excellent touch up
- Easy clean up

General Description

Aura® Satin Finish is part of an innovative paint and colorant system integrating the best technologies to deliver superior durability for any color along with the promise of long lasting beauty. In addition to using 100% acrylic latex, proprietary resins have been incorporated to give the product its extraordinary performance properties.

Recommended For

New or previously painted wallboard, plaster, masonry and wood; primed or previously painted metal; new or coated acoustic ceilings. It is ideal for surfaces where maximum durability is required and lasting color is desired

Limitations

- Do not apply when air and surface temperatures are below 50° F (10° C)
- Only Gennex® Waterborne Colorants can be added to Aura® Paint

Product Information

Colors:—Standard:
No ready-mixed colors are available.

—Tint Bases:
1X, 2X, 3X, & 4X Tint Bases only with Gennex® Waterborne Colorant.

—Special Colors:
Contact your Benjamin Moore representative.

Certification:

VOC compliant in all regulated areas

Zero VOC according to EPA Method 24

Master Painters Institute MPI #43, 43 X-Green, 140, 140 X-Green

Class A (0-25) over non-combustible surfaces in accordance with ASTM E-84

Anti-microbial - This product contains agents which inhibit the growth of microbes on the surface of this paint film. This product contains antimicrobial additives that inhibit the growth of mold and mildew on the surface of the paint film.

green promise®

The Green Promise® designation means that this product has been tested by independent third parties and meets or exceeds each standard shown in the first row of the following chart.

LEED®	CHPS (Collaborative for High Performance Schools)	MPI Green Performance™	VOC (in any color)
YES	YES	YES	0 g/L

Products that have the Green Promise® designation also meet or exceed the published chemical restriction and performance criteria included in the standards shown below, based on independent, third-party testing, but have not been certified under any of these standards.

Green Seal™ GS-11 2010
YES

Technical Assistance:
Available through your local authorized independent Benjamin Moore retailer. For the location of the retailer nearest you, call 1-800-826-2623, see www.benjaminmoore.com, or consult your local Yellow Pages.

Technical Data◊		Pastel Base
Vehicle Type		Acrylic & Proprietary Resins
Pigment Type		Titanium Dioxide
Volume Solids		42%
Coverage per Gallon at Recommended Film Thickness		350 – 400 Sq. Ft.
Recommended Film Thickness	– Wet – Dry	4.3 mils 1.8 mils
Depending on surface texture and porosity. Be sure to estimate the right amount of paint for the job. This will ensure color uniformity and minimize the disposal of excess paint.		
Dry Time @ 77° F (25° C) @ 50% RH	– To Touch – To Recoat	1 Hour 1 Hour
Painted surfaces can be washed after two weeks. High humidity and cool temperatures will result in longer dry, recoat and service times.		
Dries By		Evaporation, Coalescence
Viscosity		100 ± 3 KU
Flash Point		None
Gloss / Sheen		Satin (28-38 @ 60°)
Surface Temperature at Application	– Min. – Max.	50° F 90° F
Thin With		See Chart
Clean Up Thinner		Clean Water
Weight Per Gallon		11.3 lbs
Storage Temperature	– Min. – Max.	40° F 90° F

Volatile Organic Compounds (VOC)

0g/L

Zero VOC post tint (any base and any color)

◊Reported values are for Pastel Base. Contact Benjamin Moore for values of other bases or colors.

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CSI #: 09 91 23

Aura® Waterborne Interior Paint Satin Finish 526

Surface Preparation

Surfaces to be painted must be clean, dry, and free of dirt, dust, grease, oil, soap, wax, scaling paint, water soluble materials and mildew. Remove any peeling or scaling paint, and sand these areas to feather edges smooth with adjacent surfaces. Glossy areas should be dulled. Drywall surfaces must be free of sanding dust. Spot prime with Aura® Satin Finish Paint before and after filling nail holes, cracks, and other surface imperfections.

New plaster or masonry surfaces must be allowed to cure (30 days) before applying base coat. Cured plaster should be hard, have a slight sheen and maximum pH of 10; soft, porous or powdery plaster indicates improper cure. Never sand a plaster surface; knife off any protrusions and prime plaster before and after applying patching compound. Poured or pre-cast concrete with a very smooth surface should be etched or abraded to promote adhesion, after removing all form release agents and curing compounds. Remove any powder or loose particles.

Difficult Substrates: Benjamin Moore offers a variety of specialty primers for use over difficult substrates such as plaster, bleeding woods, grease stains, crayon markings, hard glossy surfaces, galvanized metal or other substrates where paint adhesion or stain suppression is a particular problem. Your Benjamin Moore® retailer can recommend the right problem-solving primer for your special needs.

WARNING! If you scrape, sand, or remove old paint, you may release lead dust. **LEAD IS TOXIC. EXPOSURE TO LEAD DUST CAN CAUSE SERIOUS ILLNESS, SUCH AS BRAIN DAMAGE, ESPECIALLY IN CHILDREN. PREGNANT WOMEN SHOULD ALSO AVOID EXPOSURE.** Wear a NIOSH approved respirator to control lead exposure. Clean up carefully with a HEPA vacuum and a wet mop. Carefully clean up with a HEPA vacuum and a wet mop. Before you start, find out how to protect yourself and your family by contacting the National Lead Information Hotline at 1-800-424-LEAD or log on to www.epa.gov/lead.

Primer/Finish Systems

Aura® Satin Finish is self priming on most surfaces. Aura® will act as its own primer, providing the optimal foundation for the subsequent finish coat. On bare substrates two coats are required; previously painted surfaces can be finished with 1 or 2 coats. **Special Note:** For certain deep colors, Aura® Color Foundation must be used to achieve maximum hide and the desired topcoat color. Consult your retailer.

Wood and Engineered Wood Products:
Primer: For non-bleeding woods, use Fresh Start® Multi-Purpose Latex Primer (023) or Fresh Start® High-Hiding All Purpose Primer (046). For bleeding woods such as cedar and redwood, use Fresh Start® Multi-Purpose Oil Based Primer (024)
Finish: 1 or 2 coats Aura® Satin Finish.

Plaster/Wallboard:
Primer/Finish: 1 or 2 coats of Aura® Satin Finish.

Rough or Pitted Masonry:
Primer: Super Spec® Masonry Interior/Exterior Hi-Build Block Filler (206)
Finish: 1 or 2 coats of Aura® Satin Finish.

Smooth Poured or Precast Concrete:
Primer/Finish: 1 or 2 coats of Aura® Satin Finish.

Ferrous Metal (Steel & Iron):
Primer: Super Spec HP® Acrylic Metal Primer (P04) or Super Spec HP® Alkyd Metal Primer (P06).
Finish: 1 or 2 coats of Aura® Satin Finish.

All new metal surfaces must be thoroughly cleaned with Oil & Grease Emulsifier Corotech® V600 to remove contaminants. New shiny non-ferrous metal surfaces that will be subject to abrasion should be dulled with very fine sandpaper or a synthetic steel wool pad to promote adhesion.
Primer: Not required on properly prepared surfaces
Finish: 1 or 2 coats of Aura® Satin Finish.

Repaint, All Substrates: Prime bare areas with the primer / finish recommended for the substrate above.

Application

Mixing of Paint: Stir thoroughly before and during use.

Use the same brushing techniques as you would for any low-VOC interior coating. Benjamin Moore recommends an extra firm nylon polyester brush for best results.

Aura® offers excellent flow and leveling. Do not over brush in the attempt to smooth out brush marks.

We recommend the Benjamin Moore® Aura® shed-resistant, 3/8" nap roller cover for best results. Aura® dries faster than other acrylic paints, so avoid lap marks by maintaining a wet edge. Roll out vertical sections in 3' to 4' widths.

If your edge begins to dry or you see that you missed a spot and the paint is already setting up, allow it to dry completely before touching up that area.

This product can also be sprayed; refer to the chart below for spray recommendations.

Thinning/Clean Up

Conditioning with Benjamin Moore® 518 Extender may be necessary under certain conditions to adjust open time or spray characteristics.
The chart below is for general guidance.

	Mild conditions	Severe conditions
	Humid (RH> 50%) with no direct sunlight & with little to no wind	Dry (RH<50%), in direct sunlight, or windy conditions
Brush: Nylon / Polyester	No thinning necessary	Add **518 Extender or water:** Max of 8 fl. oz. to a gallon of paint **Never add other paints or solvents.**
Roller: 3/8" AURA Roller Cover		
Spray: Airless Pressure: 1500-2500 psi Tip: 0.011-0.015		
.012 -.014 Fine Finish tips produce excellent spray results in the 500-1000 psi range.		

Clean up: Wash painting tools in warm soapy water immediately after use. Spray equipment should be given a final rinse with mineral spirits to prevent rusting.

USE COMPLETELY OR DISPOSE OF PROPERLY. Dry, empty containers may be recycled in a can recycling program. **Local disposal requirements vary; consult your sanitation department or state-designated environmental agency on disposal options.**

Environmental Health & Safety Information

Use only with adequate ventilation. Do not breathe spray mist or sanding dust. Ensure fresh air entry during application and drying. Avoid contact with eyes and prolonged or repeated contact with skin. May cause allergic skin reaction. Avoid exposure to dust and spray mist by wearing a NIOSH approved respirator during application, sanding and clean up. Follow respirator manufacturer's directions for respirator use. Close container after each use. Wash thoroughly after handling.

WARNING: This product contains a chemical known to the state of California to cause cancer and birth defects, or other reproductive harm.

FIRST AID: In case of eye contact, flush immediately with plenty of water for at least 15 minutes; for skin, wash thoroughly with soap and water. If symptoms persist, seek medical attention. If you experience difficulty breathing, leave the area to obtain fresh air. If continued difficulty is experienced, get medical attention immediately.

IN CASE OF SPILL – Absorb with inert material and dispose of as specified under **Thinning/Clean up.**

KEEP OUT OF REACH OF CHILDREN
PROTECT FROM FREEZING
Refer to Safety Data Sheet for additional health and safety information.

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CSI #: 09 93 23

TECHNICAL DATA **PKS-04**

PRO FINISHER

WATER-BASE POLYURETHANE FOR FLOORS

DESCRIPTION AND USES

Pro Finisher Water-Base Polyurethane is a durable clear finish designed for coating and protecting hardwood floors and other interior wood surfaces. It is fast drying and flows & levels exceptionally well on any wood surface. Pro Finisher Water-Base Polyurethane dries clear and is non-yellowing to ensure the true natural color of wood. For increased coating performance an optional catalyst (Pro Finisher Catalyst, product number 137194) may be added before application.

PRODUCTS

1-Gallon	Description
258688	Gloss
258691	Semi-Gloss
258690	Satin

SURFACE PREPARATION

Surfaces must be clean, dry, and free of wax, grease, oil, shellac, lacquer, mildew, and polishes.

SANDING SURFACE:

Sand area smooth, progressing in sandpaper grit from rough to medium to fine. For hardwood floors, use NOFMA and NHFA accepted methods or see Pro Finisher Professional Finishing Techniques for sanding details. After sanding vacuum surface and wipe with a cloth to remove all dust.

WARNING! If you scrape, sand or remove old paint, you may release lead dust. LEAD IS TOXIC. EXPOSURE TO LEAD DUST CAN CAUSE SERIOUS ILLNESS SUCH AS BRAIN DAMAGE, ESPECIALLY IN CHILDREN. PREGNANT WOMEN SHOULD ALSO AVOID EXPOSURE. Wear a NIOSH-approved respirator 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 National Lead Information Hotline at 1-800-424-LEAD or log on to www.epa.gov/lead.

STAINING SURFACE:

Oil or water based stains can be used on bare wood surface prior to sealer or finish application. Allow oil based stains a minimum of 72 hours dry time before sealer or finish application. If using water based stains follow stain manufacturers dry time directions.

SEALING SURFACE:

A sanding sealer may be used to initially coat bare wood surface. Pro Finisher Water Base Sealer or Pro Finisher Universal Sealer is recommended. Pro Finisher Water Based Sanding Sealer will produce a colorless finish. Pro Finisher Universal Sealer will add a rich tone to the wood (similar to traditional oil based finish). Sealer must be dry and lightly abraded prior to applying a finish.

Note: Water based sealer will darken white oak. To maintain clear color apply Pro Finisher Water Based Polyurethane directly over bare wood.

PRODUCT APPLICATION

APPLICATION

Pro Finisher Water Base Polyurethane appears milky when wet but dries to a crystal clear finish. Do not apply in direct sunlight. Use with adequate ventilation at all times. Apply only when air (ambient) temperature is between 60-80°F (16-27°C) and relative humidity is below 85%. Use full strength. Do not thin. Stir thoroughly before and during use. To prevent bubbles in the finish, **DO NOT SHAKE,** do not over-brush.

Apply Pro Finisher Water Base Polyurethane using a Pro Finisher Universal Applicator, Lambswool applicator pad, polyester brush, or a weighted T-bar. Apply in direction of wood grain in a pulling motion with smooth, level strokes. Apply thin, even coats at a rate of 600-700 square feet per gallon.

Allow product to dry a minimum of 1-2 hours between coats. Sanding between coats is not required for adhesion as long as the time between coats is less than 6 hours. However, screening or sanding between coats usually produces a smoother better looking finish. A minimum of 3 coats of finish are recommended. Do not apply more than two coats the same day.

Sand between coats with 120-150 grit sandpaper or maroon abrasive pad. After sanding vacuum surface and wipe clean with a lightly water dampened lint free cloth to remove all dust before applying the next coat.

When using the Pro Finisher Catalyst, mix products in a separate container. Add entire (4 oz.) catalyst to 1 gallon of Water-Base Polyurethane. Stir thoroughly to ensure complete dispersion. Stir frequently during use. Do not shake container. Use entire catalyzed mixed finish within 24 hours.

DRY TIME

Dry times are based on 70°F and 50% relative humidity. Pro Finisher Water Base Polyurethane dries to the touch in 1-2 hours and is suitable for foot traffic in 24 hours.

CLEAN-UP

Clean application tools and equipment with soap and water.

CSI #: 09 93 23

PRO FINISHER

TECHNICAL DATA

WATER BASE POLYURETHANE

PHYSICAL PROPERTIES

		PRO FINISHER WATER BASE POLYURETHANE
Resin Type		Acrylic/Polyurethane
Pigments		NA
Weight	Per Gallon	8.38-8.48 lbs.
	Per Liter	1.0 kg
Solids	By Weight	28%
	By Volume	26.7%
Volatile Organic Compounds		<275 g/l (<2.3 lbs./gal.)
Recommended Dry Film Thickness (DFT) per Coat		1.0 mils (25µ)
Wet Film to Achieve DFT (unthinned material)		3.0 mils (75µ)
Practical Coverage at Recommended DFT		600-700 sq.ft./gal. Varies with surface porosity
Dry Times at 70-80°F (21-27°C) and 50% Relative Humidity	Touch	1-2 hours
	Foot Traffic	24 Hours
Cure Time	24 Hours	75%
	48 Hours	90%
	7 days	95%
Shelf Life		3 years
Flash Point		>220°F
Safety Information		For additional information, see SDS

The technical data and suggestions for use contained herein are correct to the best of our knowledge, and offered in good faith. The statements of this literature do not constitute a warranty, express, or implied, as to the performance of these products. As conditions and use of our materials are beyond our control, we can guarantee these products only to conform to our standards of quality, and our liability, if any, will be limited to replacement of defective materials. All technical information is subject to change without notice.

RUST-OLEUM BRANDS
Rust-Oleum Corporation
11 Hawthorn Parkway
Vernon Hills, Illinois 60061
An RPM Company
Phone: 877-385-8155
www.rustoleum.com

Form: GDH-890
Rev.: 072015

Division 10
Specialties

CSI #: 10 28 13

KOHLER.

2"x6" In-Wall Tank and Carrier System
K-6284

Features
- Robust steel tube frame when installed per Kohler's installation instructions can support up to 880 lbs without damage.
- Insulated tank to prevent sweating.
- Large flush actuator plate opening can be removed for easy access to the inner tank.
- Adjustable height allowing the bowl to be set anywhere from 15-3/8 inches to 28-1/2 inches from floor.
- Dual flush actuator offers a choice of 0.8 or 1.6 gallons per flush (gpf).
- Supply line not included.
- Combines with the K-6299 bowl to create a complete K-6303 Veil toilet or with a K-6300 bowl to create a complete K-6304 Veil toilet.

Technology
- Dual-flush technology allows you to choose between a full- or partial-flush.

Installation
- Durable steel frame carrier is installed on 2"x6" studs behind the wall. See installation guide and installation video for more detailed information.

Water Conservation & Rebates
- WaterSense® toilets meet strict EPA flushing guidelines, including using at least 20 percent less water than 1.6-gallon toilets.
- Eligible for consumer rebates in some municipalities.
-

Components
Product includes:
K-6298 Flush Actuator Plate

ADA

Codes/Standards
ASME A112.19.14
ASME A112.6.2
DOE - Energy Policy Act 1992
EPA WaterSense®
ADA
ICC/ANSI A117.1

KOHLER® One-Year Limited Warranty
See website for detailed warranty information.

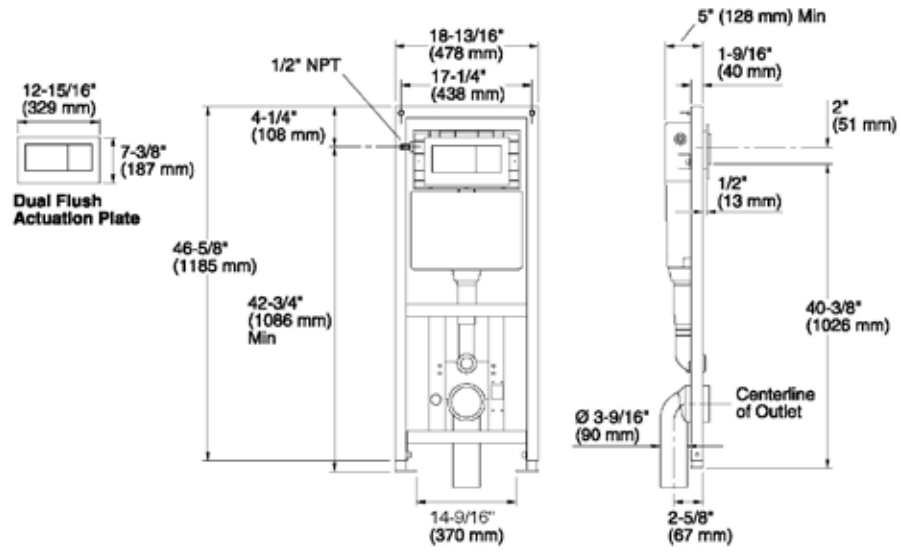
USA/Canada: 1-800-4KOHLER (1-800-456-4537)
Kohler Co. reserves the right to make revisions without notice to product specifications.
For the most current Specification Sheet, go to www.kohler.com.
7-21-2015 03:26

THE BOLD LOOK OF KOHLER.

CSI #: 10 28 13

KOHLER.

2"x6" In-Wall Tank and Carrier System
K-6284



Technical Information
All product dimensions are nominal.
Rough-in: Wall-hung

Fixture Supply Requirements
Max static pressure: 80 psi (551.6 kPa)

Notes
Install this product according to the installation guide.

Installation requires 2x6 framing.

Install the in-wall tank and carrier system in a wall opening 5-1/2" (140 mm) x 19" (483 mm) x 50" (1270 mm) minimum.

ADA compliant when installed to the specific requirements of these regulations.

The Model Plumbing Codes require the installation of elongated open-front toilet seats on public bathrooms.

USA/Canada: 1-800-4KOHLER (1-800-456-4537)
Kohler Co. reserves the right to make revisions without notice to product specifications.
For the most current Specification Sheet, go to www.kohler.com.
7-21-2015 03:26

THE BOLD LOOK OF KOHLER.

CSI #: 10 28 16

GRUNDTAL
Towel holder with 4 bars, stainless steel
$14.99
Article Number: 600.478.96

Swivels fully to the left or right. Read more
1 Buy online Save to list

Check stock at your local store
Choose Ok
Store selection may vary and prices may differ from those online. We apologize we do not offer in-store pick up. Items purchased online will be delivered directly to your home from one of our distribution centers.

*Want to hear about special offers, gift ideas, inspirational tips, and more? **Click here to join our email list today!** Your email will only be used as described in our **privacy policy.***

*WARNING - Serious or fatal crushing injuries can occur from furniture tip-over. To prevent this furniture must be permanently fixed to the wall. **Secure it! Learn how to prevent furniture tip-over accidents.***

View the tip-over restraint assembly instructions for chest of drawers

GRUNDTAL
Toilet roll holder, stainless steel
$5.99
Article Number: 200.478.98

Read more
1 Buy online Save to list

Check stock at your local store
Choose Ok
Store selection may vary and prices may differ from those online. We apologize we do not offer in-store pick up. Items purchased online will be delivered directly to your home from one of our distribution centers.

*Want to hear about special offers, gift ideas, inspirational tips, and more? **Click here to join our email list today!** Your email will only be used as described in our **privacy policy.***

*WARNING - Serious or fatal crushing injuries can occur from furniture tip-over. To prevent this furniture must be permanently fixed to the wall. **Secure it! Learn how to prevent furniture tip-over accidents.***

View the tip-over restraint assembly instructions for chest of drawers

CSI #: 10 28 16

GRUNDTAL
Hanger, stainless steel

$3.99 / 2 pack

Article Number: 300.612.47

Concealed suspension hardware. Read more

1 Buy online Save to list

Check stock at your local store
Choose Ok

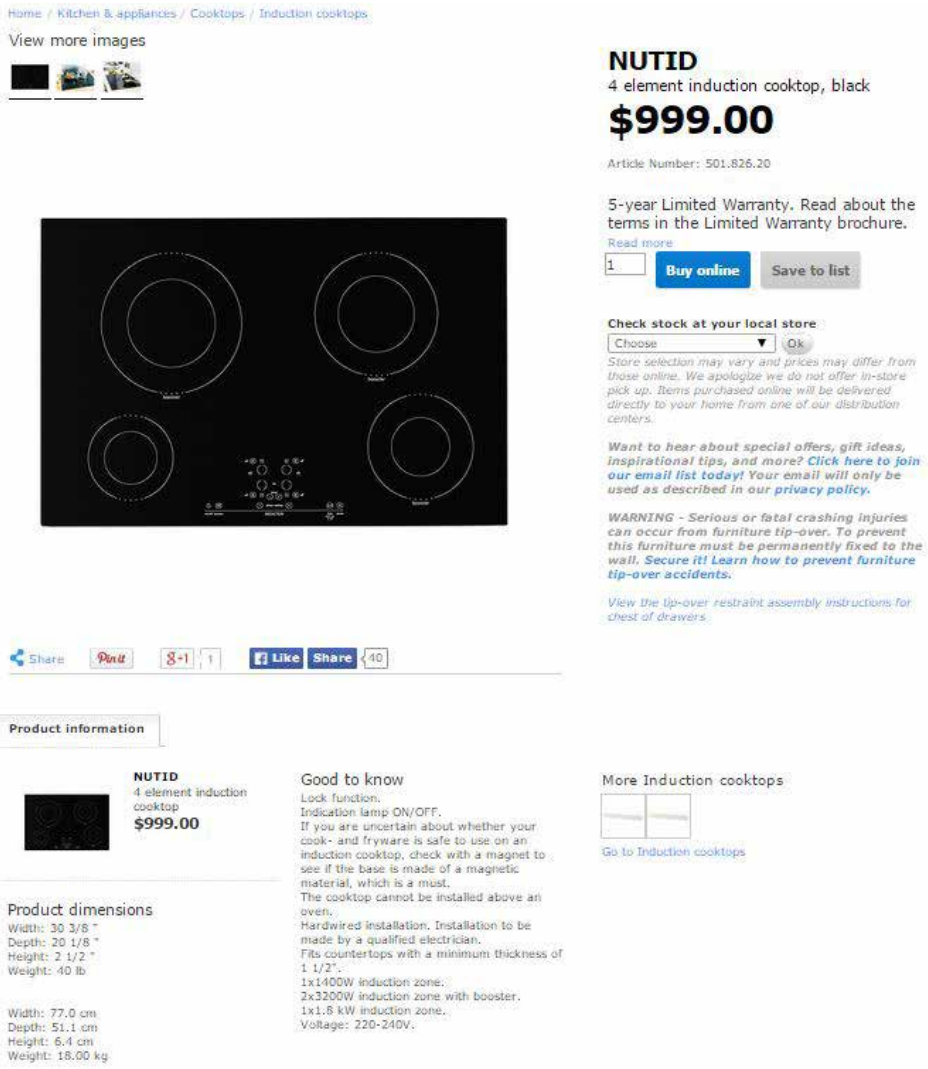
Store selection may vary and prices may differ from those online. We apologize we do not offer in-store pick up. Items purchased online will be delivered directly to your home from one of our distribution centers.

Want to hear about special offers, gift ideas, inspirational tips, and more? Click here to join our email list today! Your email will only be used as described in our privacy policy.

WARNING - Serious or fatal crushing injuries can occur from furniture tip-over. To prevent this furniture must be permanently fixed to the wall. Secure it! Learn how to prevent furniture tip-over accidents.

View the tip-over restraint assembly instructions for chest of drawers

CSI #: 10 35 23



Home / Kitchen & appliances / Cooktops / Induction cooktops

View more images

NUTID
4 element induction cooktop, black
$999.00

Article Number: 501.826.20

5-year Limited Warranty. Read about the terms in the Limited Warranty brochure.
Read more

1 Buy online Save to list

Check stock at your local store
Choose Ok

Store selection may vary and prices may differ from those online. We apologize we do not offer in-store pick up. Items purchased online will be delivered directly to your home from one of our distribution centers.

Want to hear about special offers, gift ideas, inspirational tips, and more? Click here to join our email list today! Your email will only be used as described in our privacy policy.

WARNING - Serious or fatal crashing injuries can occur from furniture tip-over. To prevent this furniture must be permanently fixed to the wall. Secure it! Learn how to prevent furniture tip-over accidents.

View the tip-over restraint assembly instructions for chest of drawers

Share Pin it 8+1 1 Like Share 40

Product information

NUTID
4 element induction cooktop
$999.00

Product dimensions
Width: 30 3/8 "
Depth: 20 1/8 "
Height: 2 1/2 "
Weight: 40 lb

Width: 77.0 cm
Depth: 51.1 cm
Height: 6.4 cm
Weight: 18.00 kg

Good to know
Lock function.
Indication lamp ON/OFF.
If you are uncertain about whether your cook- and fryware is safe to use on an induction cooktop, check with a magnet to see if the base is made of a magnetic material, which is a must.
The cooktop cannot be installed above an oven.
Hardwired installation. Installation to be made by a qualified electrician.
Fits countertops with a minimum thickness of 1 1/2".
1x1400W induction zone.
2x3200W induction zone with booster.
1x1.8 kW induction zone.
Voltage: 220-240V.

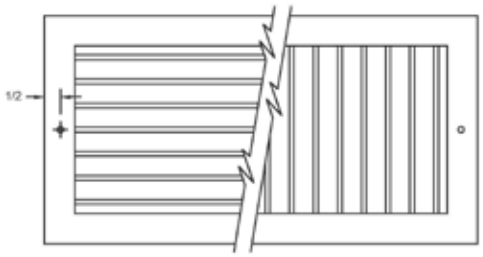
More Induction cooktops
Go to Induction cooktops

CSI #: 10 82 23

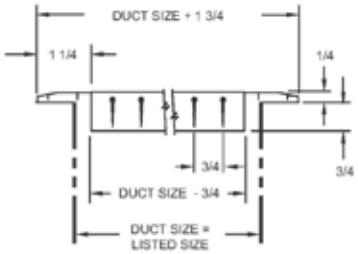
PRODUCT DIMENSIONS

A70, A70D, A80, A80D

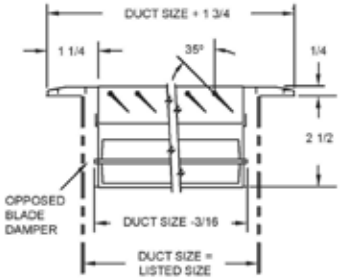
A70 **A80**



A70
Side View Detail



A70D w/A7 Damper
Side View/Damper Detail



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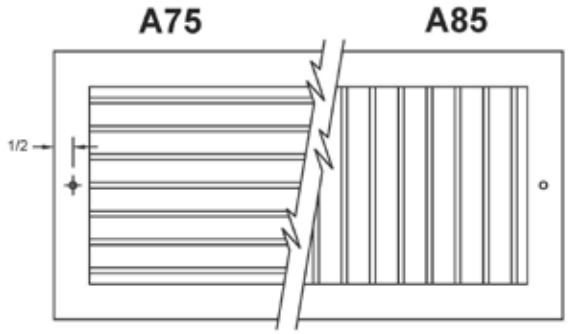
DIMENSIONS IN INCHES

12/09 75

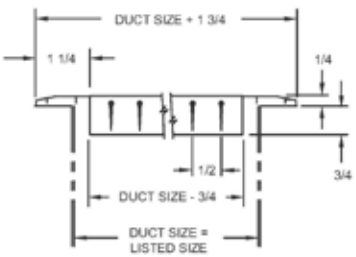
CSI #: 10 82 23

PRODUCT DIMENSIONS

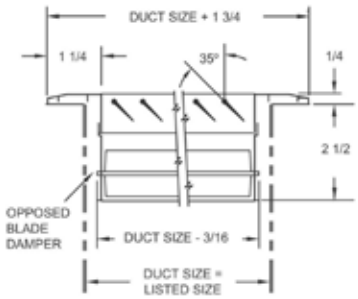
A75, A75D, A85, A85D



A75
Side View Detail



A75D w/A7 Damper
Side View/Damper Detail



DIMENSIONS IN INCHES

76 12/08

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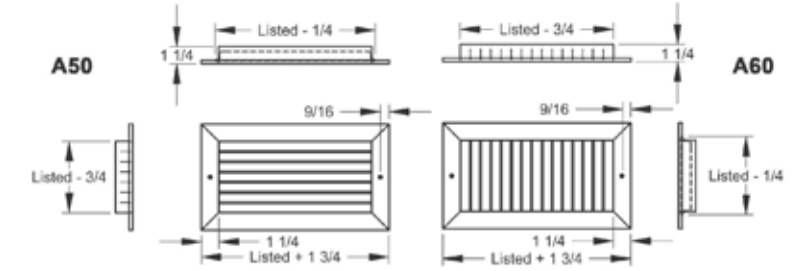
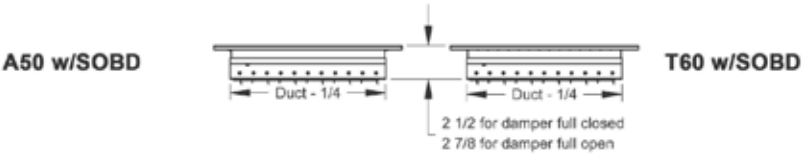
CSI #: 10 82 23

PRODUCT DIMENSIONS

A50, A60



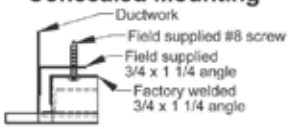


LT Margin Style

Module	* Max Neck
12x12	9x9
24x12	21x9
24x24	21x21
48x24	45x21

* - When using a module for Lay-In T-Bar ceiling, this is the maximum neck size for specified module

Concealed Mounting



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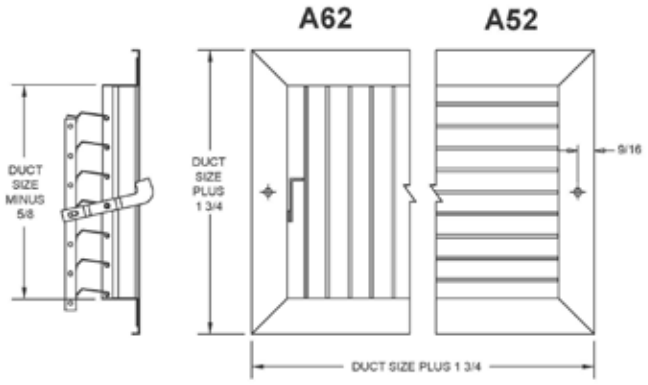
DIMENSIONS IN INCHES

12/09 33

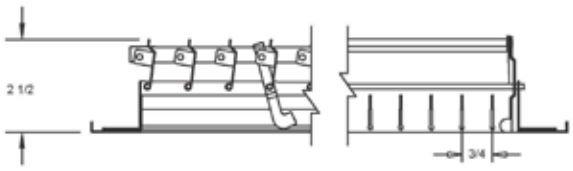
CSI #: 10 82 23

PRODUCT DIMENSIONS

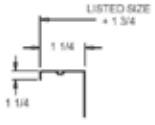
A52, A62



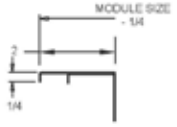
Damper Detail



SF Margin Style



LT Margin Style



DIMENSIONS IN INCHES

34 12/08

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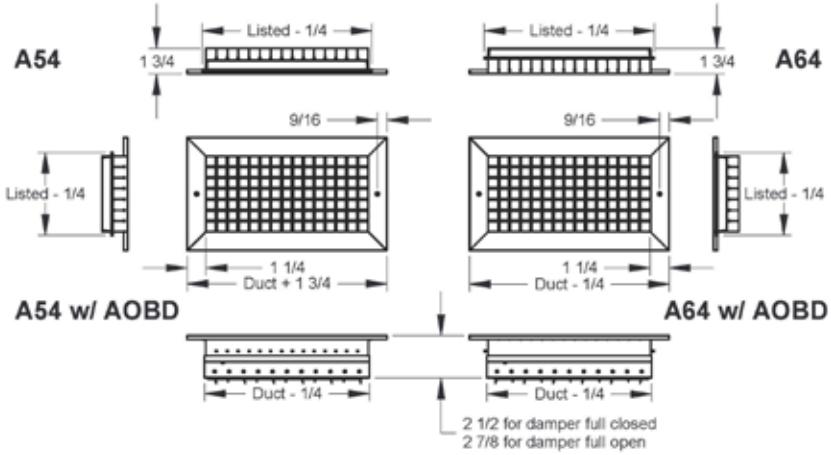
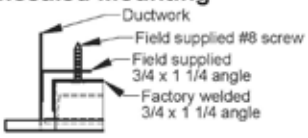
CSI #: 10 82 23

PRODUCT DIMENSIONS

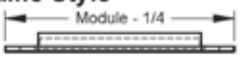
A54, A64



Concealed Mounting



LT Frame Style



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DIMENSIONS IN INCHES

12/09 35

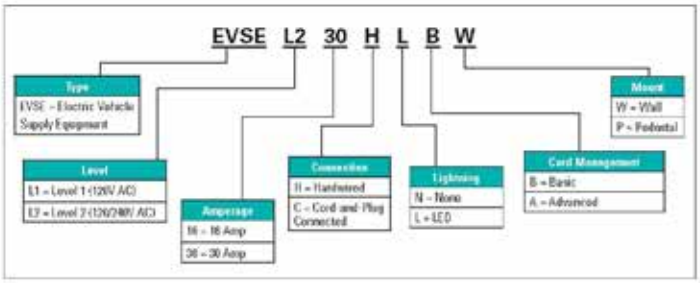
Division 11
Equipment

CSI #: 11 10 00

Electric Vehicle Supply Equipment

120 - 240VAC EV Charging Stations Level 1 & Level 2

240VAC EV Charging Station Level 2



Electric Vehicle Charging Stations

Product Description

Plug-in electric vehicles are becoming popular due to rising fuel costs and environmental concerns. Eaton's EV Charging Station provides a safe and reliable means to quickly power up Electric Vehicles.

Benefits Include:

- Auto-reset feature
- Indoor / outdoor rated
- Rugged stainless steel construction
- SAE J1772™ compliant connector
- ETL listed to UL® 2594/2231/1998

Product Selection

120-240VAC EV Charging Stations Level 1 & 2

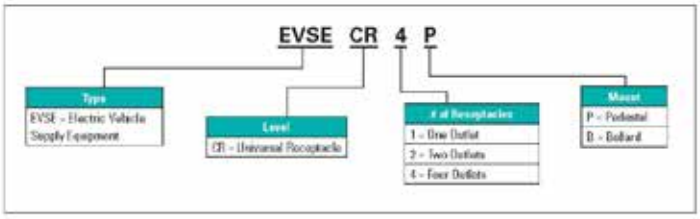
Catalog Number	Description
EVSEL216HNBW	EVSE 16A Hardwire Basic Cord Mgt Wall Mount
EVSEL216HLBW	EVSE 16A Hardwire Basic Cord Mgt Wall Mount Light
EVSEL216HNAW	EVSE 16A Hardwire Advanced Cord Mgt Wall Mount
EVSEL216HLAW	EVSE 16A Hardwire Advanced Cord Mgt Wall Mount Light
EVSEL230HNBW	EVSE 30A Hardwire Basic Cord Mgt Wall Mount
EVSEL230HLBW	EVSE 30A Hardwire Basic Cord Mgt Wall Mount Light
EVSEL230HNAW	EVSE 30A Hardwire Advanced Cord Mgt Wall Mount
EVSEL230HLAW	EVSE 30A Hardwire Advanced Cord Mgt Wall Mount Light
EVSEL116HNBW	EVSE 16A Hardwire Basic Cord Mgt Wall Mount (120V)
EVSEL116HLBW	EVSE 16A Hardwire Basic Cord Mgt Wall Mount Light (120V)
EVSEL116HNAW	EVSE 16A Hardwire Advanced Cord Mgt Wall Mount (120V)
EVSEL116HLAW	EVSE 16A Hardwire Advanced Cord Mgt Wall Mount Light (120V)
EVSEL130HNBW	EVSE 30A Hardwire Basic Cord Mgt Wall Mount (120V)
EVSEL130HLBW	EVSE 30A Hardwire Basic Cord Mgt Wall Mount Light (120V)
EVSEL130HNAW	EVSE 30A Hardwire Advanced Cord Mgt Wall Mount (120V)
EVSEL130HLAW	EVSE 30A Hardwire Advanced Cord Mgt Wall Mount Light (120V)

CSI #: 11 10 00

Electric Vehicle Supply Equipment

120VAC Universal Receptacle EV Charging Stations

120VAC Universal Receptacle EV Charging Station



Electric Vehicle Charging Stations

Product Description

Plug-in electric vehicles are becoming popular due to rising fuel costs and environmental concerns. Eaton's EV Charging Station provides a safe and reliable means to quickly power up Electric Vehicles.

Benefits Include:

- Charge up to four vehicles
- Indoor / outdoor rated
- Rugged stainless steel construction
- NEMA 5-20 T-slot receptacles
- NEC® 625 compliant
- UL® Listed to UL 2594 for EV use
- cUL Listed

Product Selection

120VAC Universal Receptacle EV Charging Stations

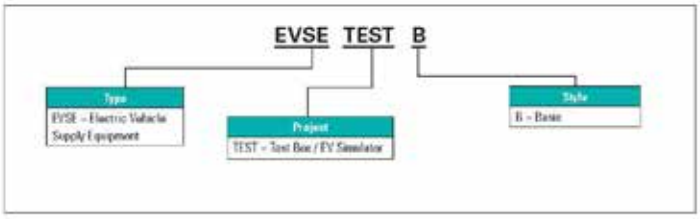
Catalog Number	Description
EVSEOR1P	EVSE Universal Receptacle Single Plug Pedestal
EVSEOR2P	EVSE Universal Receptacle Double Plug Pedestal
EVSEOR4P	EVSE Universal Receptacle Quad Plug Pedestal
EVSEOR2B	EVSE Universal Receptacle Double Plug Bollard
EVSEOR4B	EVSE Universal Receptacle Quad Plug Bollard

CSI #: 11 10 00

Electric Vehicle Supply Equipment

Electric Vehicle Simulator

Electric Vehicle Simulator



Electric Vehicle Chargers

Product Description

The unit acts as a basic electric vehicle, allowing the installer to immediately test all functionality of the EVSE on-site directly after installation.

Benefits Include:

- Confirm proper operation of any J1772™ compliant EVSE without the need of an actual EV
- Rugged case is perfect for service personnel
- Ready to charge verification switch
- Ground fault simulation
- Charging indicator
- Pilot signal test points for oscilloscopes
- Suitable for most other manufacturer's EVSE

Product Selection

Electric Vehicle Simulator

Catalog Number	Description
EVSETESTB	Electric Vehicle Simulator / EVSE Tester

CSI #: 11 30 13.13

Fully Integrated

HC 1070, HC 1000B, HC 1001B, HF 861/HRB 1120 - SBS 7014

24" Model: HC 1000B, HC 1001B

Integrated units are the most stylish option available - they're totally out of sight, fully concealed behind a cabinet door. Installed in a tall kitchen cupboard, the refrigerator door simply opens in unison with the cupboard door.

HC 1000B

Energy Star:	qualified
Energy consumption p. a.:	395 kWh
Energy Supply:	115V/60Hz
Total capacity:	9,42 cu ft (267 L)
Refrigerator:	7,02 cu ft (199 L)
Freezer:	2,4 cu ft (68 L)
Climate Rating:	SN-T
Door hinges:	right / reversable

- Automatic refrigerator and freezer compartment defrosting
- HC 1000B with Sliding system and LED-lighting
- Height-adjustable feet at front and levelling rails

HC 1001B

Energy Star:	qualified
Energy consumption p. a.:	395 kWh
Energy Supply:	115V/60Hz
Total capacity:	9,42 cu ft (267 L)
Refrigerator:	7,02 cu ft (199 L)
Freezer:	2,4 cu ft (68 L)
Climate Rating:	SN-T
Door hinges:	left / reversable

- Automatic refrigerator and freezer compartment defrosting
- HC 1001B with Sliding system and LED-lighting
- Height-adjustable feet at front and levelling rails

CSI #: 11 30 13.13

UCVM36FS
36-INCH DOWNDRAFT VENTILATION
MASTERPIECE® SERIES

Thermador.
REAL INNOVATIONS FOR REAL COOKS®

FEATURES & BENEFITS
- Suitable for wall or island applications
- Downdraft rises over 13" to capture steam from the tallest pots
- Downdraft recirculation possible with module RECIRC36DF
- Three fan speeds
- Dishwasher safe full-face filters also act as a splatter shield

ACCESSORIES (OPTIONAL)
25 ft. Blower Connector Cable

EXTNCB25 - For use with the following Inline and Remote Blowers: VTR630D, VTR1030D, VTR1330E, VTI1610D, VTI1010D

Recirculation Kit

RECIRC36DF -Includes 2 charcoal filters, 2 venting grids, and ducting to transition to Integrated Blower (blower sold separately)

Roofplates

RFPLT600 - For use with Remote Blower VTR630D

RFPLT1000 - For use with 1000 CFM Remote Blower VTR1030D and 1300 CFM Blower VTR1330E

Replacement Charcoal Filters

Service Item #291168

GENERAL PROPERTIES	
Operating Mode	Convertible: Ducted / Recirculating
Maximum CFM	Blower Sold Separately
Number of Speed Settings	3-Stage
Motor Location	External
Damper Included	No
Grease Filter Material	Washable Synthetic
Grease Filter Type	Multilayer Cassette
TECHNICAL DETAILS	
Current (A)	10 A
Volts (V)	120 V
Frequency (Hz)	60Hz
Plug Type	120V 3 prong
Power Cord Length (in)	57"
DIMENSIONS & WEIGHT	
Overall Appliance Dimensions (Width of Canopy Included) (HxWxD) (in)	34 1/2" x 36 7/8" x 3 3/4"
Height of the Rise (in.)	13"
Diameter of Air Duct (in.) Back	10"
Net Weight (lbs)	42 lbs
ACCESSORIES (REQUIRED)	
Blower (Sold Separately)	
BLOWERS AND TRANSITIONS	
Remote Blowers	
VTR630D - 600 CFM (Requires Transition CV2T6)	
VTR1030D - 1000 CFM (Requires Transition CV2T10)	
Inline Blowers	
VTI610D - 600 CFM (Requires Transition CV2T6)	
VTI1010D - 1000 CFM (Requires Transition CV2T10)	
Integrated Blower	
VTN600CV2C - 600 CFM	
Remote and Inline Blower Downdraft Transitions	
CV2T6 - Required for installation of 600 CFM Inline and Remote Blowers with 6" duct connections	
CV2T10 - Required for installation of 1000 CFM Inline and Remote Blowers with 10" duct connections	
WARRANTY	
Limited Warranty Parts and Labor	2 Year

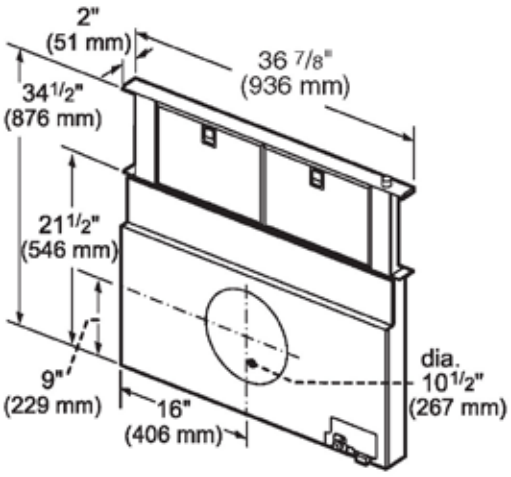
Page 1 of 9

CSI #: 11 30 13.13

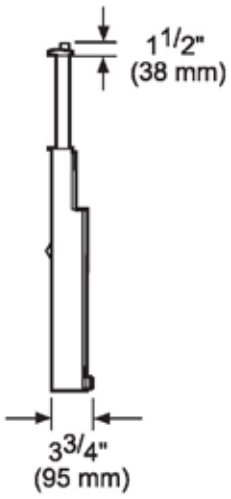
UCVM36FS
36-INCH DOWNDRAFT VENTILATION
MASTERPIECE® SERIES

Thermador.
REAL INNOVATIONS FOR REAL COOKS®

HOOD DIMENSIONS



measurements in inches and mm



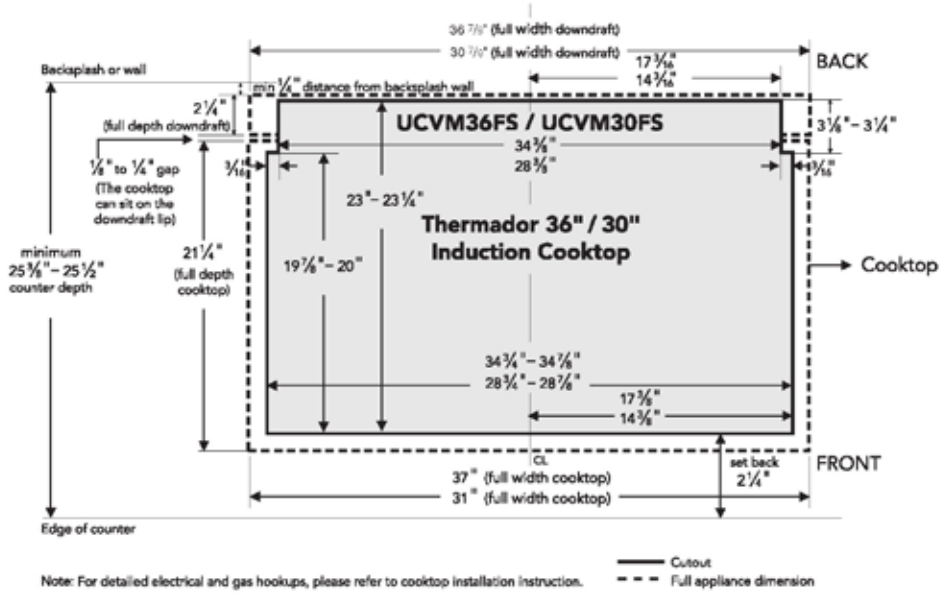
measurements in inches and mm

CSI #: 11 30 13.13

UCVM36FS
36-INCH DOWNDRAFT VENTILATION
MASTERPIECE® SERIES

Thermador.
REAL INNOVATIONS FOR REAL COOKS®

CUTOUT DIMENSIONS (TOP VIEW)



Note: For detailed electrical and gas hookups, please refer to cooktop installation instruction.

Page 4 of 9

CSI #: 11 30 13.13

JT5000DF

GE® 30" Built-In Single Convection Wall Oven

Dimensions and Installation Information (in inches)

Most 30" Wall Cabinets can be used with this unit.

Note: These ovens are not approved for stackable installations. Cabinets installed adjacent to wall ovens must have an adhesion spec of at least a 194°F temperature rating.

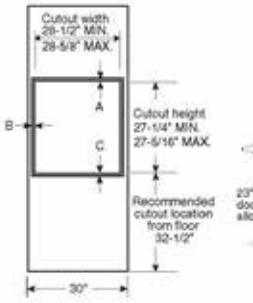
Door handle protrudes 3" from door face. Cabinets and drawers on adjacent 45° and 90° walls should be placed to avoid interference with the handle.

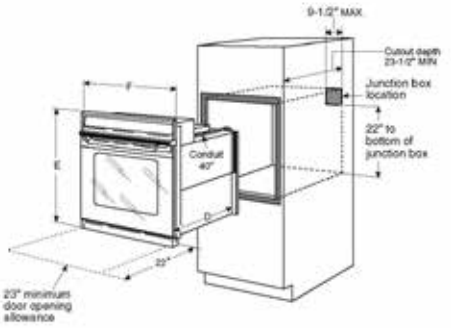
Electric wall ovens are not approved for installation with a plug and receptacle. They must be hard wired in accordance with installation instructions.

Installation Information: Before installing, consult installation instructions packed with product for current dimensional data.

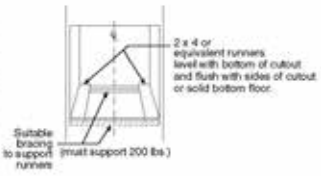
Side-by-side installations rerquire at least 2" between cutouts.

KW Rating	
240V	4.2
208V	3.3
Breaker Size	
240V	20 Amps
208V	20 Amps





	JT5000
Cabinet	**30"**
A – Overlap of oven at top of cutout	1"
B – Overlap of oven over side of edges of cutout	3/4"
C – Overlap of oven at bottom of cutout	1-1/4"
Oven	
D – Overall depth with handle	27-3/16"
E – Overall height with trim	28-3/8"
F – Overall width	29-3/4"



imagination at work

For answers to your Monogram® or GE appliance questions, visit our website at geappliances.com or call GE Answer Center® service, 800.626.2000.

Specification Created 2/13

CSI #: 11 30 13.13

JT5000DF

GE® 30" Built-In Single Convection Wall Oven

Optional Undercounter Dimensions and Installation Information

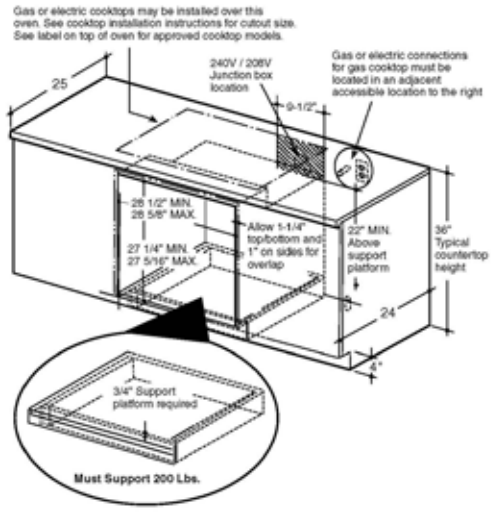
Dimension and installation information are shown in inches.

Note: 36" ribbon cooktop are approved for use over GE 30" single wall ovens and warming drawers. 30" ribbon cooktops are approved for use over 30" and GE 27" single wall ovens and warming drawers. Refer to cooktop and wall oven installation information packed with products for current dimensional data.

Note: 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 products for current dimensional data and for alternate installation options.

Electric wall ovens are not approved for installation with a plug and receptacle. They must be hard wired in accordance with installation instructions.



imagination at work

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Specification Created 2/13

320235

CSI #: 11 30 13.13

JT5000DF
GE® 30" Built-In Single Convection Wall Oven

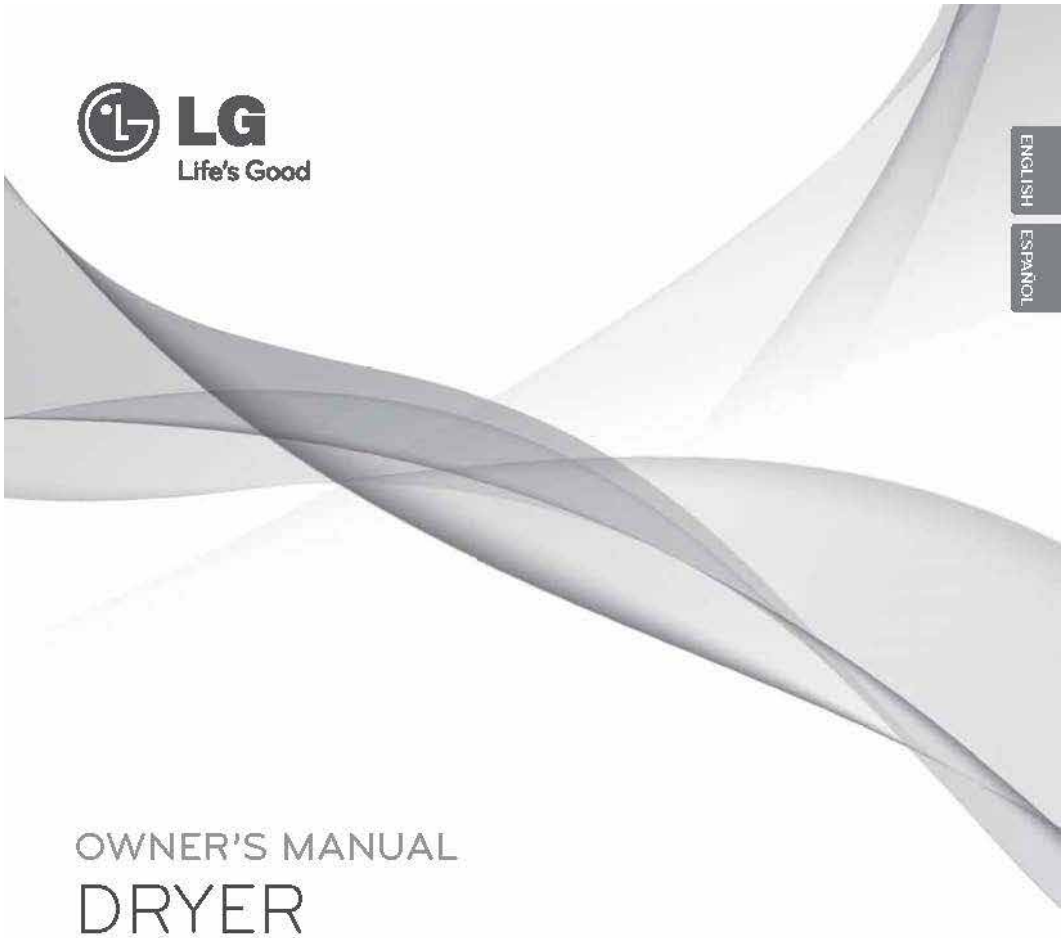
Features and Benefits

- True European Convection - Achieve delicious results from a third heating element and fan combination
- Self-Clean with Steam Clean Option - Clean your oven the way you want
- Self-Clean Heavy-Duty Oven Racks - Conveniently clean your oven and racks together
- Glass Touch Controls - Set temperatures quickly and clean with little effort
- Halogen Interior Oven Lighting - Easily see how your food is baking
- Ten-Pass Bake Element - Even baking is assured with heat that covers more surface area
- Eight-Pass Broil Element - Get full broil coverage and even browning from edge to edge
- 5.0 cu. ft. Oven Capacity - Cook more dishes at once
- Black Gloss Oven Interior - Enjoy a clean and sleek appearance
- Hidden Bake - Make cleanup easy by eliminating hard-to-reach areas
- Model JT5000DFBB – Black on black
- Model JT5000DFWW – White on white

imagination at work

Specification Created 2/13
320235

CSI #: 11 30 13.23



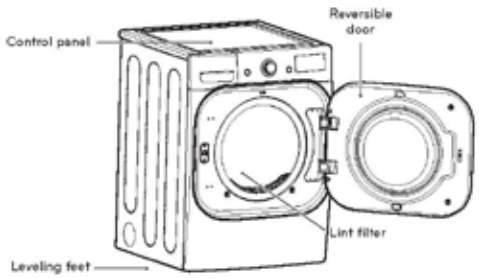
CSI #: 11 30 13.23

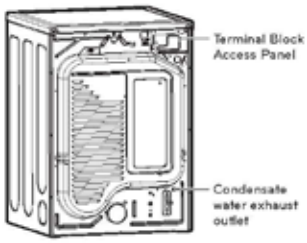
INTRODUCING YOUR DRYER

ENGLISH

PART AND ACCESSORIES

Parts





*For information on installing the drain hose, see page 20

Accessories

Included accessories

Drying rack

Drain hose

Hose extension Connector

Drain hose fitting

Tie strap (for securing hose)

Elbow bracket (for securing hose)

Optional accessories

Pedestal (sold separately)

Stacking kit (sold separately)

This dryer can only be vented to the rear.
There is no side vent kit available

NOTE

- Contact LG Customer Service at 1-800-243-0000 (1-888-542-2623 in Canada) if any accessories are missing.
- For your safety and for extended product life, use only authorized components. The manufacturer is not responsible for product malfunction or accidents caused by the use of separately purchased unauthorized components or parts.
- The images in this manual may be different from the actual components and accessories, and are subject to change by the manufacturer without prior notice for product improvement purposes.

CSI #: 11 30 13.23

WHAT IS A HYBRID DRYER?

What is hybrid dryer technology?

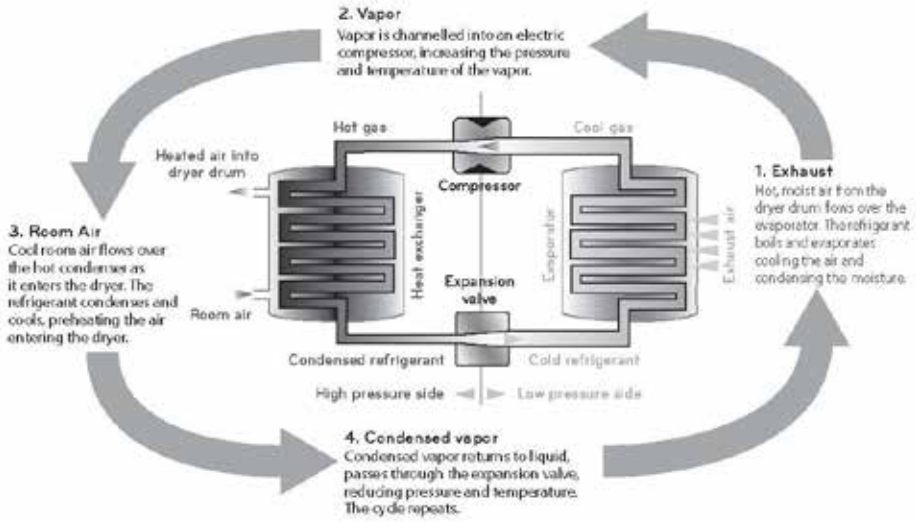
LG hybrid dryers use a combination of conventional heating elements and a heat pump system to dry your clothes. The heat pump recovers heat from the hot, moist air that is normally exhausted to the outside and lost.

Using a heat pump to preheat the air coming into the dryer recovers this heat and saves electricity, because it takes less electricity to move the heat than to create it with a conventional heater. This LG hybrid dryer has been designed to save you money.

How does it work?

Heat naturally moves from warmer areas toward cooler areas. Heat pumps control this movement by trapping hot air. Rather than using a lot of energy to create heat, heat pumps use a little energy to transfer heat from one place to another using a heat exchanger.

The heat pump in the dryer is similar to those used in air conditioners or dehumidifiers. The cold part of the system is used to condense water and cool the exhaust air, while the hot part of the system is used to heat the air coming into the drum to dry the clothes.



How does the LG hybrid dryer use less energy than a conventional dryer?

- Because heat pumps transfer heat instead of creating it from scratch, they use less energy to produce heat than regular heaters, in most cases.
- In conventional dryers, all the energy that is used to evaporate the moisture in the clothes is vented outside and lost. The hybrid dryer technology is able to recover some of this wasted energy and use it to evaporate more moisture, saving energy.

How much energy can it save?

The amount of energy saved will depend on cycle selection, load size, options, vent condition, and many other factors.

The cycles and options that save the most energy will take longer to dry, but the energy saved in heating more than offsets the energy used to tumble the clothes, which is relatively small.

CSI #: 11 30 13.23

ENGLISH

Installation location requirements

⚠WARNING

Read all installation instructions completely before installing and operating your dryer! It is important that you review this entire manual before installing and using your dryer. Detailed instructions concerning electrical connections, gas connections, and exhaust requirements are provided on the following pages.

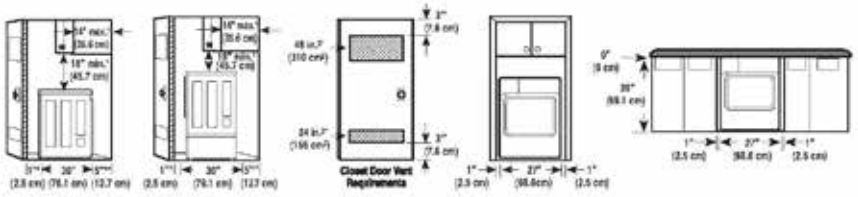
- A location that allows for proper exhaust installation. A gas dryer must be exhausted to the outdoors. See **Venting the dryer**.
- A grounded electrical outlet located within 2 ft. (61 cm) of either side of the dryer. See **Connecting electric dryers**.
- A sturdy floor to support the total dryer weight of 200 lbs (90.7 kg). The combined weight of a companion appliance should also be considered.
- No other fuel-burning appliance can be installed in the same closet as a dryer.

Do not operate your dryer at temperature below 45°F(7°C) and temperature over 95°F(35°C). At lower temperatures, the dryer might not shut off at the end of an automatic cycle. This can result in longer drying times. The dryer must not be installed or stored in an area where it will be exposed to water and/or weather. Check code requirements. Some codes limit, or do not permit, installation of the dryer in garages, closets, mobile homes or sleeping quarters. Contact your local building inspector.

NOTE

- The floor must be level, with a maximum slope of 1 inch (2.5 cm) under entire dryer. If slope is greater than 1 inch (2.5 cm), install the Extended Dryer Feet Kit. Clothes may not tumble properly, and automatic sensor cycles may not operate correctly if dryer is not level.
- For a garage installation, you will need to place the dryer at least 18 inches (46 cm) above the fl oor. The standard pedestal is 15 inches. You will need 18 inches (46 cm) from the garage fl oor to the bottom of the dryer.

Clearances



INSTALLATION SPACING FOR RECESSED AREA OR CLOSET INSTALLATION

The following spacing dimensions are recommended for this dryer. This dryer has been tested for spacing of 1 inches(2.5cm) clearance on the sides and rear. Recommended spacing should be considered for the following reasons:

- Additional spacing should be considered for ease of installation and servicing.
- Additional clearances might be required for wall, door and floor moldings.
- Additional spacing should be considered on all sides of the dryer to reduce noise transfer.

  For closet installation, with a door, minimum ventilation openings in the top and bottom of the door are required. Louvered doors with equivalent ventilation openings are acceptable.
- Companion appliance spacing should also be considered.

NOTE

There should be at least a little space around the dryer (or any other appliance) to eliminate the transfer of vibration from one to the other. Too much vibration, it could cause them to make noise or touch each other causing paint damage and making even more noise.

CSI #: 11 30 13.23

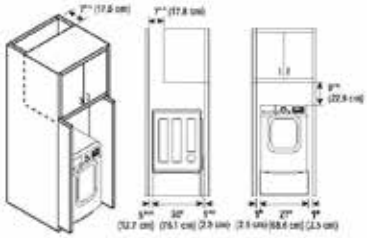
Installation with optional pedestal base or stacking kit

RECOMMENDED INSTALLATION SPACING FOR CABINET INSTALLATION

- For cabinet installation with a door, minimum ventilation openings in the top of the cabinet are required.

*Required spacing

**For side or bottom venting, 2 inches (5.1 cm) spacing is allowed.



CLOSET VENTILATION REQUIREMENTS

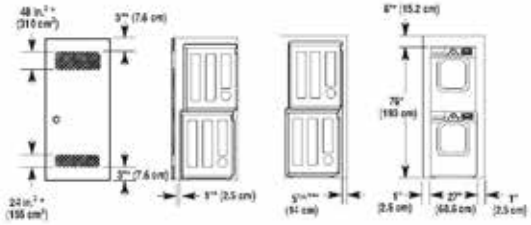
Closets with doors must have both an upper and lower vent to prevent heat and moisture buildup in the closet. One upper vent opening with a minimum opening of 48 sq. in. (310 cm^2) must be installed no lower than 6 feet above the floor. One lower vent opening with a minimum opening of 24 sq. in. (155 cm^2) must be installed no more than one foot above the floor. One example shown uses vent grilles in the door.

RECOMMENDED INSTALLATION SPACING FOR RECESSED OR CLOSET INSTALLATION, WITH STACKED WASHER AND DRYER

- The dimensions shown are for the recommended spacing.

*Required spacing

**For side or bottom venting, 2 inches (5.1 cm) spacing is allowed.



CSI #: 11 30 13.23

Ultra Large Capacity TurboWash™ Washer

WM4070H_A

LG
Life's Good

TURBOWASH™ IS FAST, QUIET AND PURE WOW

Is it possible for a washer to put a smile on your face and keep it there? We humbly say: "Believe it!" Believe in LG's incredible TurboWash™ technology that saves you up to 20 minutes per load (even the biggies) with outstanding cleaning performance. Feel glad all over with the wrinkle-reducing magic of Steam Technology, the real savings of ColdWash™ and the revolutionary clean of 6Motion™ technology. And revel in the bliss of incredibly quiet performance. It's easy to smile when you've got it all.

SPECIFICATIONS
- 4.3 cu. ft. Ultra Large Capacity with NeveRust™ Stainless Steel Drum
- Direct Drive Motor with 10-Year Limited Warranty
- 1,300 RPM
- 14 Washing Programs
- 5 Temperature Settings (All Cold Rinses)

STYLISH DESIGN
- Upfront Electronic Control Panel with Dual LED Display and Dial-A-Cycle™
- Chrome Square Rimmed Glass Door with Dark Blue Tinted Cover
- Extra Wide Door Opening
- Stackable with Matching Dryer (Stacking Kit Sold Separately)
- Optional Matching Drawer Pedestal

INNOVATIONS
- TurboWash™ Technology
- Steam Technology
- AAFA Certified Allergiene™ Cycle
- NSF Certified Sanitary Cycle
- ColdWash™ Option
- 6Motion™ Technology
- SmartDiagnosis™
- TrueBalance™ Anti-Vibration System
- Magnet Ventilation
- ENERGY STAR Most Efficient 2012
- LoDecibel™ Quiet Operation
- SenseClean™
- Delay Wash (Up to 19 Hours)
- 10" TriTub™

NSF CERTIFIED · DD MOTOR 10 YEAR · Inverter DirectDrive · CEE TIER 3 · Most Efficient 2012 · SMART DIAGNOSIS™ · 6MOTION DD™ · COLDWASH™ · TrueBalance™ ANTI-VIBRATION SYSTEM · TurboWash™

TurboWash™ Technology

Tired of spending hours on end finishing your family's laundry? Now, those days are gone. LG's revolutionary **TurboWash™ Technology** allows you to save 20 minutes on larger loads*, with outstanding cleaning performance! It's like pressing the fast forward button on your laundry.

Ultra Large Capacity

Towers of towels, piles of sweatshirts, and a mountain of jeans? Go for it. The **ultra large capacity (4.3 cu.ft.)** tub lets you do more laundry in fewer loads. That's time saved and sore backs avoided.

Steam Technology

There's no clean like a steam clean. Our **Steam Technology** gently but powerfully penetrates fabrics to virtually eliminate dirt, odors and wrinkles.

* Based on AHAM HLW-1-2010 test protocol. Cotton/Normal or comparable cycle at default settings, 8 kg loads, front load washers only. Excludes other LG manufactured products. Excludes quick wash or comparable cycles intended for small, lightly soiled loads only.

CSI #: 11 30 13.23

Ultra Large Capacity TurboWash™ Washer

WM4070H_A

LG
Life's Good

CAPACITY

Capacity	4.3 cu. ft.

APPEARANCE

Design Look	Front Control
Intelligent Electronic Controls with Dual LED Display	•
Dial-A-Cycle™	•

ENERGY

Energy Star	•
2012 ENERGY STAR MOST EFFICIENT	•

WASH PROGRAMS

No. of Programs	14
Wash Programs	Cotton/Normal, Bulky/Large, Perm. Press, Delicates, Hand Wash/Wool, Speed Wash, Tub Clean, Sanitary, Allergiene™, Heavy Duty, Bright Whites™, Towels, Rinse+Spin, Small Load
No. of Options	11
Options	Prewash, Rinse+Spin, Delay Wash, Custom Program, Extra Rinse, Child Lock, ColdWash™, Signal On/Off, Steam, FreshCare+™, TurboWash™, Drum Light
No. of Wash/Rinse Temps	Extra Hot, Hot, Warm, Cold, Tap Cold (All Cold Rinses)
Spin Speeds	Extra High (1,300 max.), High, Medium, Low, No Spin
No. of Water Levels	Automatically adjusts to the size of load
No. of Soil Levels	3

FABRIC CARE FEATURES

TurboWash™	•
Steam	•
ColdWash™ Option	•
Allergiene™ Cycle	•
SenseClean™ System	•

CONVENIENCE FEATURES

4 Tray Dispenser	Prewash, Main Wash (with liquid detergent cup), Bleach, Fabric Softener
TrueBalance™ Anti-Vibration System	•
SmartDiagnosis™	•
LoadSense	•
Status Indicator Lid	•
End of Cycle Signal	•
Child Lock	•
Auto Soak Removal	•
Forced Drain System	•
Internal Water Heater	•
LoDecibel™ Quiet Operation	•
Leveling Legs	4 Adjustable Legs
Easy Loading TrueTub™	•

MOTOR AND AGITATOR

Motor Type	Direct Drive Motor
Motor Speed	Variable
Max RPM	1,300
Axis	Horizontal

MATERIALS AND FINISHES

Nevaflux™ Stainless Steel Drum	•
Cabinet	PCM
Control Panel	Plastic
Top Plate	Painted
Transparent Glass Door	•
Door Rim	Large Square Chrome Rimmed Glass Door with Dark Blue Tinted Cover
Available Colors	White (W), Graphite Steel (V)

POWER SOURCE

Ratings	UL Listed
Electrical Requirements	120V, 10 Amps
Type	Electric

OPTIONS

Pedestal	WDP4W, WDP4V
Pedestal (W x H x D)	27" x 13 3/8" x 28 3/8"
Stacking Kit	KSTK1

DIMENSIONS

Product (W x H x D)	27" x 38 11/16" x 29 3/4" (31" D with door open)
Carton (W x H x D)	29 1/2" x 42 1/4" x 31 1/4"
Weight (Product/Carton)	265.8 lbs/275.4 lbs

LIMITED WARRANTY

	1 Year Parts and Labor, 10 Years Motor, Lifetime on Drum

UPC CODES

WM4070HWA Washer (Graphite Steel)	048231 012836
WM4070HWA Washer (White)	048231 012805
DLEX4070V Electric Dryer (Graphite Steel)	048231 012843
DLGX4071V Gas Dryer (Graphite Steel)	048231 012850
DLEX4070W Electric Dryer (White)	048231 012812
DLGX4071W Gas Dryer (Gas)	048231 012829
WDP4V Pedestal (Graphite Steel)	048231 011198
WDP4W Pedestal (White)	048231 011211
KSTK1 Stacking Kit (Chrome)	048231 012034

Optional dryer & pedestals sold separately

LG Electronics U.S.A., Inc.
1000 Sylvan Avenue Englewood Cliffs, NJ 07632
Customer Service and Technical Support: (800) 243-0000
LG.com

Design, features and specifications are subject to change without notice. Non-metric weights and measurements are approximate.

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CSI #: 11 30 13

LG TV

LG
Life's Good

LF6100 Series

1080p Smart LED TV

50" 55" 60"

* Class size. See below for details.

KEY FEATURES

- 1080p Full HD (1920 x 1080)
- TruMotion 120Hz
- Premium VOD Service
- ENERGY STAR® Qualified

PRODUCT HIGHLIGHTS

Full HD 1080p Resolution

This leap forward in picture quality is the reason you wanted HDTV in the first place. Full HD 1080p meets the highest standards for high definition, displaying 1,080 lines of resolution on screen for a clearer, more detailed image that is simply breathtaking.

Triple XD Engine

LG's exceptional picture quality is further enhanced by the Triple XD Engine, which processes images with even greater precision. The latest Triple XD Engine enables more natural color expression, deeper contrast and more refined motion so that viewers can enjoy a more lifelike picture.

Virtual Surround Plus

Put yourself in the middle of the action with our enhanced audio mode that expands the TV's sound field to creative immersive, surround-like sound while also assuring exceptional voice clarity.

PRODUCT FEATURES

PICTURE QUALITY	
1080p Full HD (1920 x 1080)	•
Refresh Rate	TruMotion 120Hz
Triple XD Engine	•
Just Scan (1:1 Pixel Matching)	•
Real Cinema 24p	•
SMART TV	
Premium VOD Service	•
Processor	Dual
Magic Remote	- Not included (Accessory, also requires AN-WF500 Bluetooth dongle)
LG Content Store (App Store)	•
Web Browser	•
SMART SHARE	
Screen Share	•
Content Share	•
AUDIO	
Speaker System	2 Channel
Output Power	20W
Sound System	Virtual Surround Plus
Mono/Stereo/Dual (MTS/SAP)	•
Dolby Digital Decoder	•
DTS Decoder	•
Clear Voice II	•
Wireless Sound Sync	• (Ready, also requires AN-WF500 Bluetooth dongle)
CONNECTIVITY	
Wi-Fi® Built In	•
Wi-Fi Direct	•
SIMPLINK™ (HDMI CEC)	•

USB	
-Video	Dual HD
-Photo	JPEG, JPS, MPO
-Audio	AC3 (Dolby Digital), EAC3, HE-AAC, AAC, MP2, MP3, PCM, DTS, RA, WMA
INPUTS	
RF In (Antenna/Cable)	1 (Rear)
Component Video In	1 (Rear)
Composite In (AV)	1 (Shared with Component)
Optical	1 (Rear)
HDMI®	3 (Side)
USB3.0/2.0	0 / 3 (Side)
Lan	1 (Rear)
RS232	1 (Rear, Phone Jack)
POWER	
ENERGY STAR® Qualified	• (50LF6100)
Power Supply (Voltage, Hertz)	100-240Vac 50~60Hz
Power Consumption	50LF6100 83 (kWh/year) 55LF6100 87 (kWh/year) 60LF6100 97 (kWh/year)
Standby Mode	0.3W
WALL MOUNT	
VESA	400x400
50LF6100 (49.5" diagonal) DIMENSIONS / WEIGHTS / UPC	
W/O Stand (WxHxD)	44.4" x 25.7" x 2.2"
W Stand (WxHxD)	44.4" x 27.9" x 10"
Shipping (WxHxD)	47.1" x 29.8" x 8"
W/O Stand Weight	30.4 lbs
W Stand Weight	31.3 lbs
Shipping Weight	33.0 lbs
UPC	719192597044

55LF6100 (54.6" diagonal) DIMENSIONS / WEIGHTS / UPC	
W/O Stand (WxHxD)	48.9" x 28.3" x 2.2"
W Stand (WxHxD)	48.9" x 30.4" x 10"
Shipping (WxHxD)	52.4" x 31.8" x 8.8"
W/O Stand Weight	39.6 lbs
W Stand Weight	40.5 lbs
Shipping Weight	50.2 lbs
UPC	719192597037
60LF6100 (59.5" diagonal) DIMENSIONS / WEIGHTS / UPC	
W/O Stand (WxHxD)	54.1" x 31.3" x 2.3"
W Stand (WxHxD)	54.1" x 33.6" x 11"
Shipping (WxHxD)	57.5" x 34.5" x 13"
W/O Stand Weight	50.7 lbs
W Stand Weight	51.8 lbs
Shipping Weight	64.3 lbs
UPC	719192597020
WARRANTY	
Limited Warranty	1 Year Parts & Labor

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HOME ENTERTAINMENT

CSI #: 11 48 00

Blomberg 24" Overlay Built-In Dishwasher from Blomberg

Blomberg 24" Overlay Built-In Dishwasher

Brand : Blomberg

Category : Major Appliances

Color : other

Buy Now | See All Offers

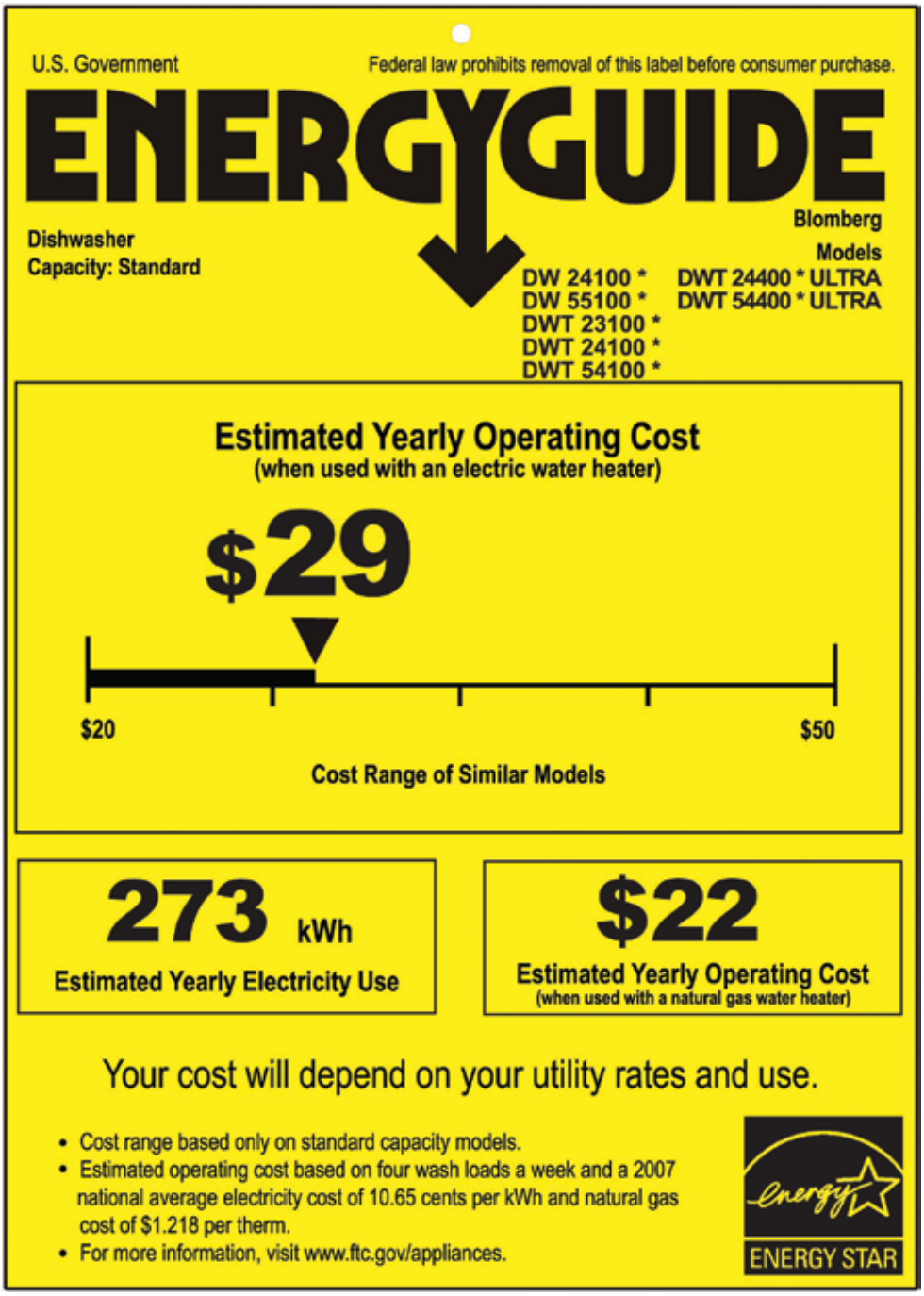
Features Blomberg 24" Overlay Built-In Dishwasher

Fully Integrated Dishwasher
12-Place Settings
5 Wash Programs
3 Wash Temperatures
4 Multi-Position Mug Shelves

Description Blomberg 24" Overlay Built-In Dishwasher

Blomberg tall tub built-in dishwasher can hold up to 12 place settings The dishwasher features 5 wash cycles 3 temperature settings and automatic water softener The aquAvoid plus is an anti-leak system featured in Blomberg dishwashers to protect your...

CSI #: 11 48 00


U.S. Government
Federal law prohibits removal of this label before consumer purchase.
ENERGYGUIDE
Dishwasher
Capacity: Standard
Blomberg
Models
DW 24100 *
DW 55100 *
DWT 23100 *
DWT 24100 *
DWT 54100 *
DWT 24400 * ULTRA
DWT 54400 * ULTRA
Estimated Yearly Operating Cost
(when used with an electric water heater)
$29
$20
$50
Cost Range of Similar Models
273 kWh
Estimated Yearly Electricity Use
$22
Estimated Yearly Operating Cost
(when used with a natural gas water heater)
Your cost will depend on your utility rates and use.
• Cost range based only on standard capacity models.
• Estimated operating cost based on four wash loads a week and a 2007 national average electricity cost of 10.65 cents per kWh and natural gas cost of $1.218 per therm.
• For more information, visit www.ftc.gov/appliances.
energy
ENERGY STAR

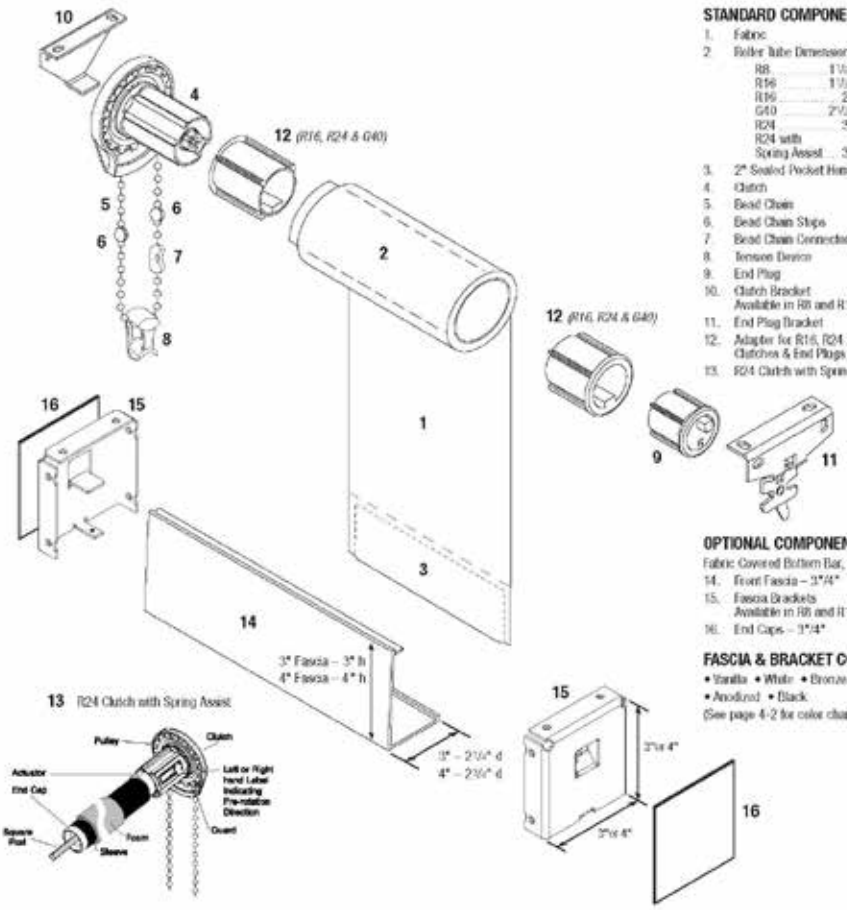
Division 12
Furnishings

CSI #: 12 24 13

CSI #: 12 24 13

MANUAL ROLLER SHADES

— MANUAL ROLLER SHADE —



STANDARD COMPONENTS:

1. Fabric
2. Roller Tube Dimensions
   - R8 ... 1 1/16" Diameter
   - R16 ... 1 1/2" Diameter
   - R16 ... 2" Diameter
   - G40 ... 2 1/2" Diameter
   - R24 ... 3" Diameter
   - R24 with Spring Assist ... 3" Diameter
3. 2" Sealed Pocket Hem Bar
4. Clutch
5. Bead Chain
6. Bead Chain Stops
7. Bead Chain Connector
8. Tension Device
9. End Plug
10. Clutch Bracket
    Available in R8 and R16 sizes
11. End Plug Bracket
12. Adapter for R16, R24 and G40 Clutches & End Plugs
13. R24 Clutch with Spring Assist

OPTIONAL COMPONENTS:

Fabric Covered Bottom Bar, Flat or Oval

14. Front Fascia – 3"/4"
15. Fascia Brackets
    Available in R8 and R16 sizes
16. End Caps – 3"/4"

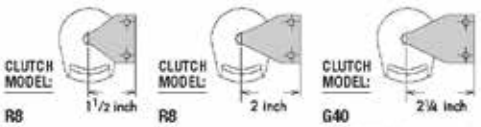
FASCIA & BRACKET COLORS:

• Vanilla • White • Bronze
• Anodized • Black
(See page 4-2 for color chart.)

SHADE SIZES & WEIGHTS:

CLUTCH MODEL	SHADE WIDTH	SHADE DROP	MAXIMUM WEIGHT
R8	12" – 72"	12" – 144"	8 lbs.
R16	72 1/8" – 120"	12" – 144"	16 lbs.
G40	120 1/8" – 156"	12" – 144"	40 lbs.
R24/R24 with Spring Assist	156 1/8" – 192"	12" – 144"	40 lbs.

BRACKET PROJECTIONS:

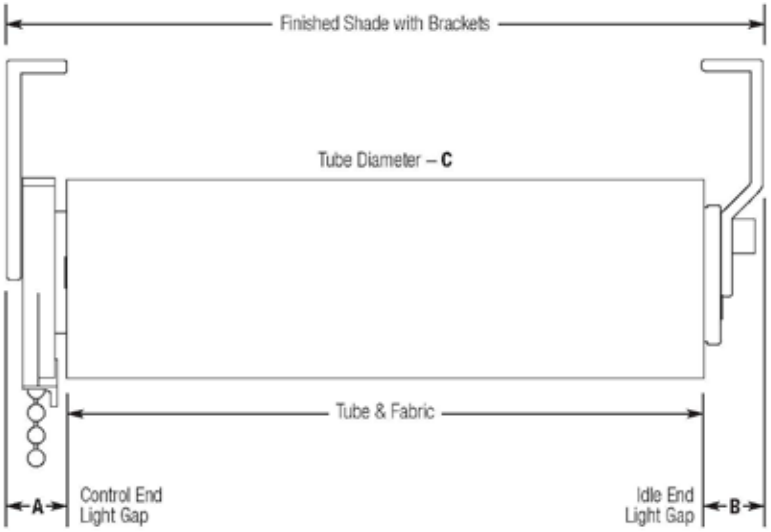


CSI #: 12 24 13

MANUAL ROLLER SHADES

— SINGLE SHADE MOUNTING —

(Deductions will be taken by manufacturer. Please order desired width.)



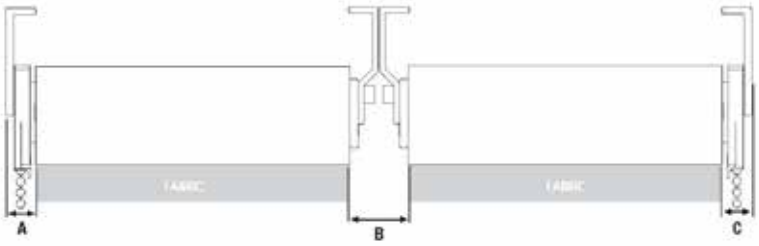
SINGLE SHADE MOUNTING DIMENSIONS:

CLUTCH MODEL	CONTROL END LIGHT GAP A	IDLE END LIGHT GAP B	TUBE DIAMETER C
R8	.510"	.573"	1⅛"
R16	.635"	.573"	1½" / 2"
G40	⅞"	⅝"	2½"
R24/R24 with Spring Assist	⅞"	⅝"	3"

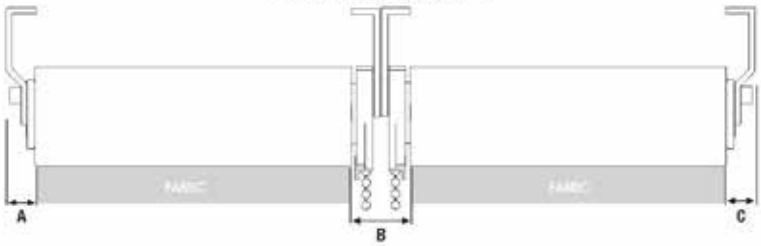
CSI #: 12 24 13

— SIDE-BY-SIDE MOUNTING —

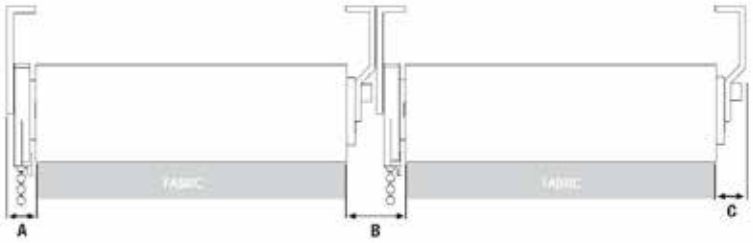
LEFT AND RIGHT CLUTCHES



RIGHT AND LEFT CLUTCHES



LEFT CLUTCHES



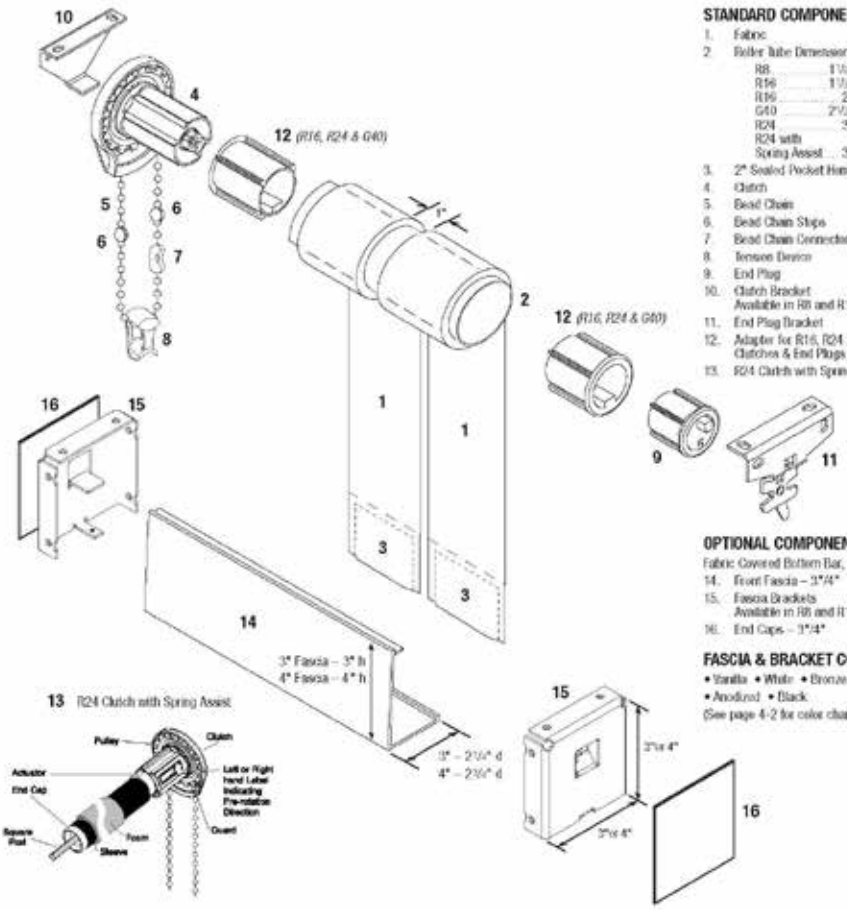
SIDE-BY-SIDE GAP DIMENSIONS:

CLUTCH MODEL	LEFT & RIGHT CLUTCHES A	B	C	RIGHT & LEFT CLUTCHES A	B	C	LEFT CLUTCHES A	B	C
R8	½"	1 ⅛"	½"	9/16"	1"	9/16"	½"	1 1/16"	9/16"
R16	5/8"	1 ⅛"	5/8"	9/16"	1 ¼"	9/16"	5/8"	1 3/16"	9/16"
G40	⅞"	1 ¼"	⅞"	5/8"	1 3/4"	5/8"	5/8"	1 ½"	5/8"
R24/R24 with Spring Assist	⅞"	1 ¼"	⅞"	5/8"	1 3/4"	5/8"	5/8"	1 ½"	5/8"

CSI #: 12 24 13

MANUAL ROLLER SHADES

— MANUAL BANDED ROLLER SHADE —



STANDARD COMPONENTS:

1. Fabric
2. Roller Tube Dimensions
   - R8 ... 1 1/16" Diameter
   - R16 ... 1 1/2" Diameter
   - R16 ... 2" Diameter
   - G40 ... 2 1/2" Diameter
   - R24 ... 3" Diameter
   - R24 with Spring Assist ... 3" Diameter
3. 2" Sealed Pocket Hem Bar
4. Clutch
5. Bead Chain
6. Bead Chain Stops
7. Bead Chain Connector
8. Tension Device
9. End Plug
10. Clutch Bracket
    Available in R8 and R16 sizes
11. End Plug Bracket
12. Adapter for R16, R24 and G40 Clutches & End Plugs
13. R24 Clutch with Spring Assist

OPTIONAL COMPONENTS:

Fabric Covered Bottom Bar, Flat or Oval

14. Front Fascia – 3"/4"
15. Fascia Brackets
    Available in R8 and R16 sizes
16. End Caps – 3"/4"

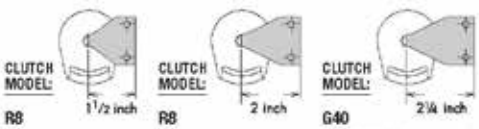
FASCIA & BRACKET COLORS:

• Vanilla • White • Bronze
• Anodized • Black
(See page 4-2 for color chart.)

SHADE SIZES & WEIGHTS:

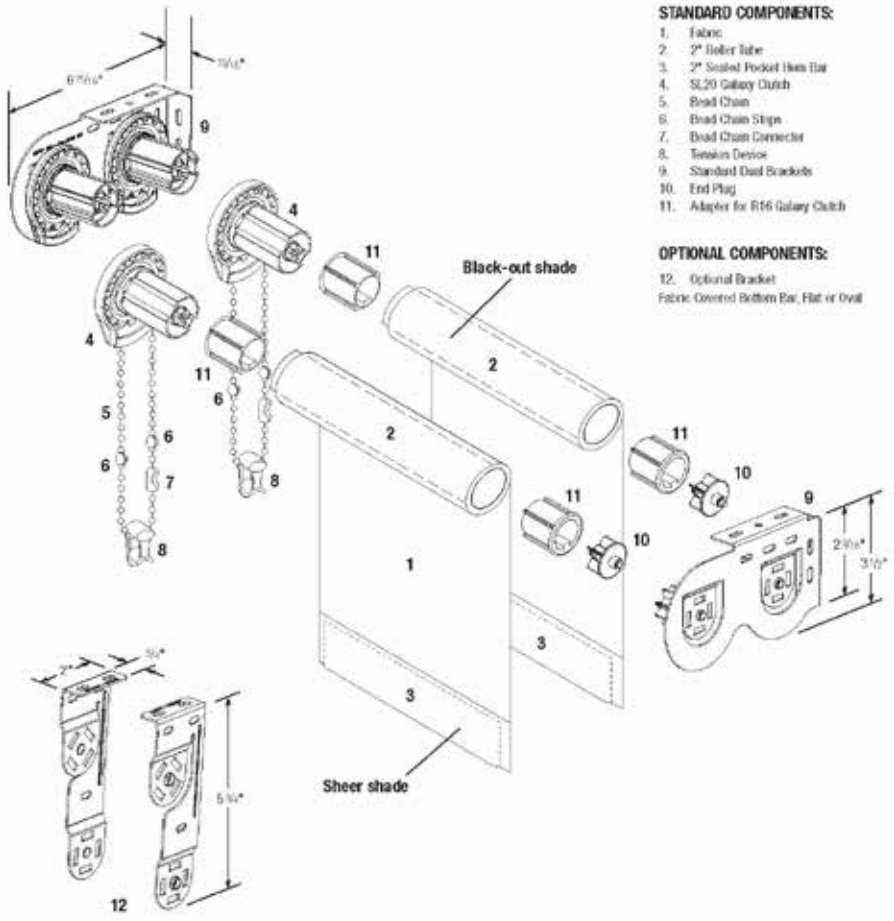
CLUTCH MODEL	SHADE WIDTH	SHADE DROP	MAXIMUM WEIGHT
R8	12" – 72"	12" – 144"	8 lbs.
R16	72 1/8" – 120"	12" – 144"	16 lbs.
G40	120 1/8" – 156"	12" – 144"	40 lbs.
R24/R24 with Spring Assist	156 1/8" – 192"	12" – 144"	40 lbs.

BRACKET PROJECTIONS:



CSI #: 12 24 13

— DUAL MANUAL ROLLER SHADES —



STANDARD COMPONENTS:

1. Fabric
2. 2" Roller Tube
3. 2" Sealed Pocket Hem Bar
4. SL20 Galaxy Clutch
5. Bead Chain
6. Bead Chain Stops
7. Bead Chain Connector
8. Tension Device
9. Standard Dual Brackets
10. End Plug
11. Adapter for R16 Galaxy Clutch

OPTIONAL COMPONENTS:

12. Optional Bracket
Fabric Covered Bottom Bar, Flat or Oval

SHADE SIZES & WEIGHTS:

CLUTCH MODEL	SHADE WIDTH	SHADE DROP	MAXIMUM WEIGHT	TUBE SIZE	MAXIMUM ROLL-UP DIAMETER*
SL20 Galaxy	18" – 120"	12" – 120"	16 lbs.	2"	3.4"

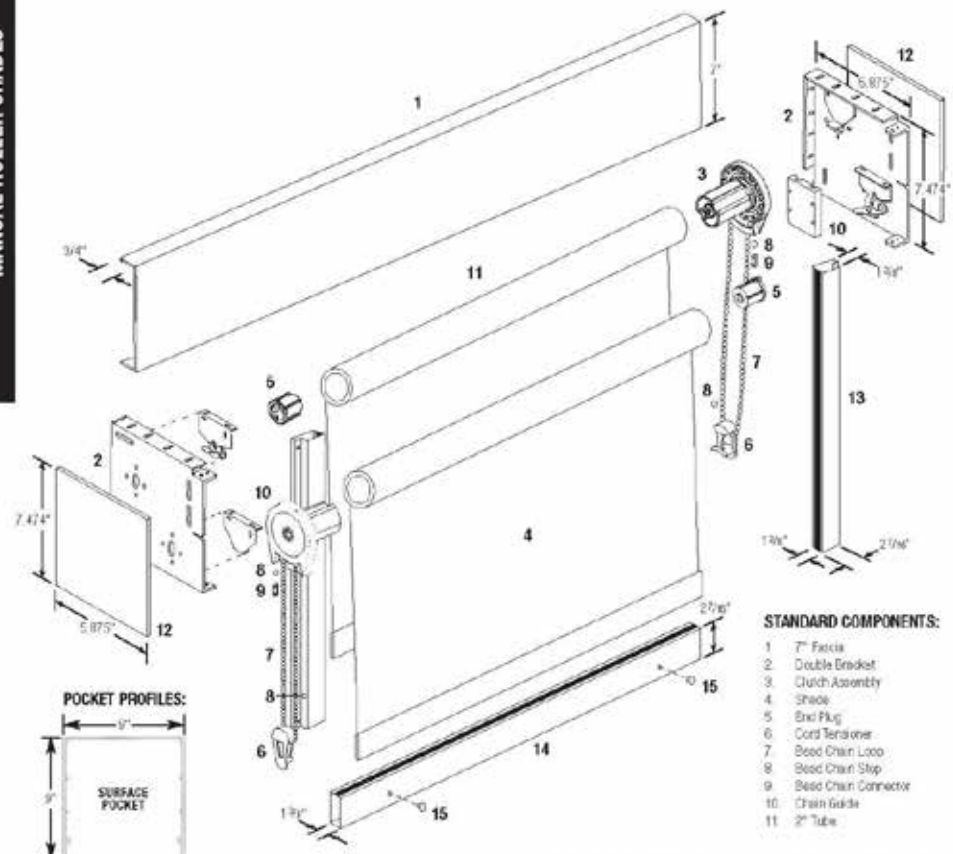
* Roll-up diameter varies with the thickness of the fabric. Contact Hunter Douglas Contract if specific roll-up diameter information is required.

NOTE: Recommended for inside mount applications only.

CSI #: 12 24 13

MANUAL ROLLER SHADES

— DUAL MANUAL SHADES WITH FASCIA —



STANDARD COMPONENTS:

1. 7" Fascia
2. Double Bracket
3. Clutch Assembly
4. Shade
5. End Plug
6. Cord Tensioner
7. Bead Chain Loop
8. Bead Chain Stop
9. Bead Chain Connector
10. Chain Guide
11. 2" Tube

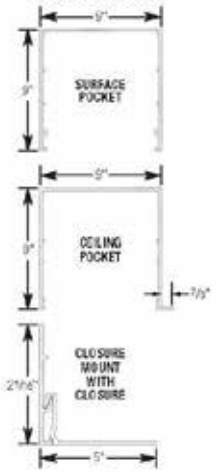
FASCIA & BRACKET COLORS:

• Vanilla • White • Bronze
• Anodized • Black
(See page 4-2 for color chart.)

OPTIONAL COMPONENTS:

12. Fascia End Plate
13. Blackout Side Channel
14. Blackout Bottom Channel
15. Mounting Hole Plugs
Fabric Covered Bottom Bar, Flat or Oval

POCKET PROFILES:



SHADE SIZES & WEIGHTS:

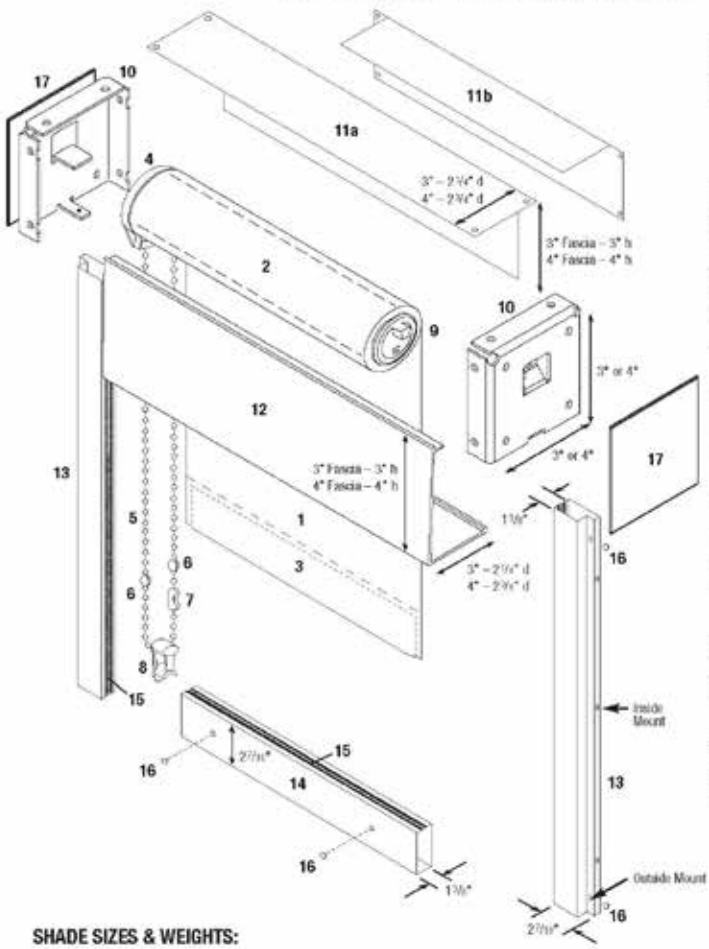
CLUTCH MODEL	SHADE WIDTH	SHADE DROP	MAXIMUM WEIGHT	TUBE SIZE	MAXIMUM ROLL-UP DIAMETER*
R16	18" – 120"	12" – 120"	16 lbs	2"	3.5"
G24 Fabric < 10 oz/sq. yd	120 1/8" – 156"	12" – 120"	24 lbs	2.5"	3.5"

* Roll-up diameter varies with the thickness of the fabric. Contact Hunter Douglas Contract if specific roll-up diameter information is required.

CSI #: 12 24 13

MANUAL ROLLER SHADES

— MANUAL SHADE WITH BLOCKOUT SYSTEM —



STANDARD COMPONENTS:

1. Fabric
2. Roller Tube Dimensions
   - R8 ..... 1⅛" Diameter
   - R16 ..... 1½" Diameter
   - R16 ..... 2" Diameter
   - G40 ..... 2½" Diameter
   - R24 ..... 3" Diameter
3. 2" Sealed Pocket Hem Bar
4. Clutch
5. Bead Chain
6. Bead Chain Stops
7. Bead Chain Connector
8. Tension Device
9. End Plug
10. 3" / 4" Fascia Brackets
    - R8 ..... 1⅛" Diameter
    - R16 ..... 1½" Diameter
11a. Top/Back Fascia (OM)
    - 3" Dimensions: 3" h x 2¼" d
    - 4" Dimensions: 4" h x 2¼" d
11b. Top/Back Fascia (IM)
    - 3" Dimensions: 2¼" h x 3" d
    - 4" Dimensions: 2¼" h x 4" d
12. Front Fascia
    - 3" Dimensions: 3" h x 2¼" d
    - 4" Dimensions: 4" h x 2¾" d
13. Side Channels
    - Dimensions: 2⅞" w x 1⅛" d
14. Bottom Channel
    - Dimensions: 2⅞" h x 1⅛" d
15. Wool Pile
16. Mounting Hole Plugs (outside mount only)

OPTIONAL COMPONENTS:

17. End Caps – 3"/4"

Fabric Covered Bottom Bar, Flat

FASCIA & BRACKET COLORS:

• Vanilla • White • Bronze
• Anodized • Black
(See page 4-2 for color chart.)

SHADE SIZES & WEIGHTS:

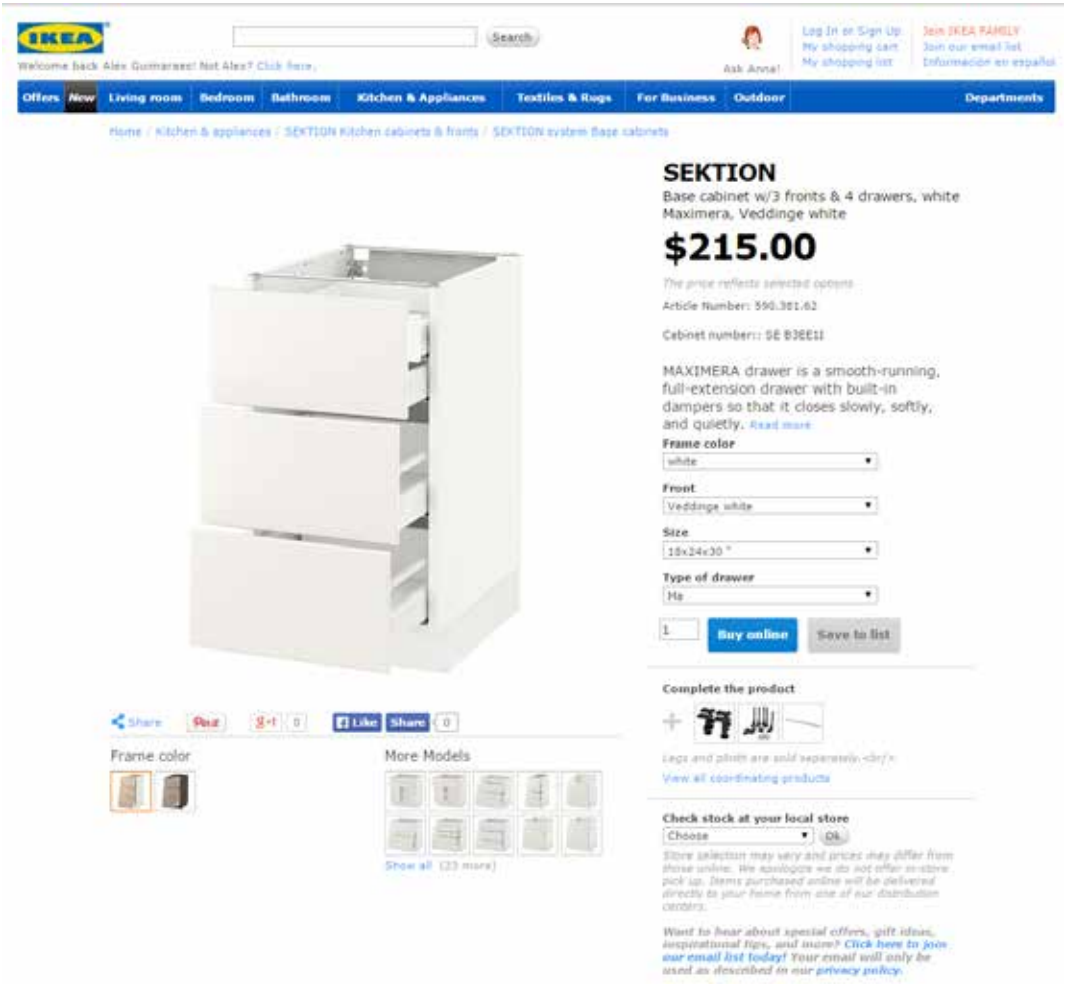
CLUTCH MODEL	SHADE WIDTH	SHADE DROP	MAXIMUM WEIGHT	TUBE SIZE 3" FASCIA	TUBE SIZE 4" FASCIA	MAXIMUM ROLL-UP DIAMETER* 3" FASCIA	MAXIMUM ROLL-UP DIAMETER* 4" FASCIA
R8	12" – 72"	12" – 144"	8 lbs.	1⅛"	—	2⅞"	—
R16	72⅛" – 90"	12" – 144"	16 lbs.	1½"	1½"	2⅞"	3⅞"
R16	90⅛" – 120"	12" – 144"	16 lbs.	—	2"	—	3⅞"
G40	120⅛" – 156"	12" – 144"	40 lbs.	—	2½"	—	3⅞"
R24	156⅛" – 192"	12" – 144"	24 lbs.	—	3"	—	3⅞"
R24 with Spring Assist	156⅛" – 192"	12" – 144"	40 lbs.	—	3"	—	3⅞"

* Roll-up diameter varies with the thickness of the fabric and tube diameter. Contact Hunter Douglas Contract if specific roll-up diameter information is required.

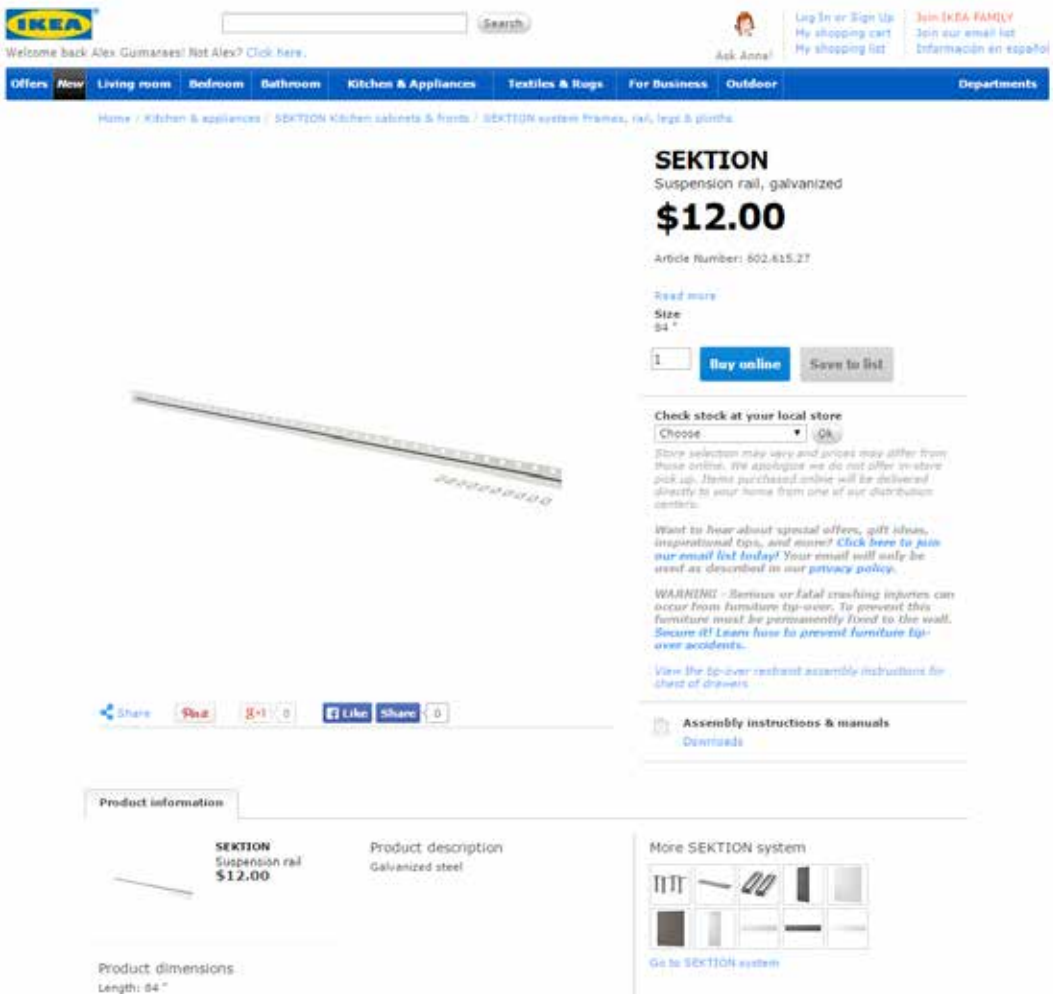
800.727.8953 www.hunterdouglascontract.com/windowcoverings | 1-9

with Spring Assist

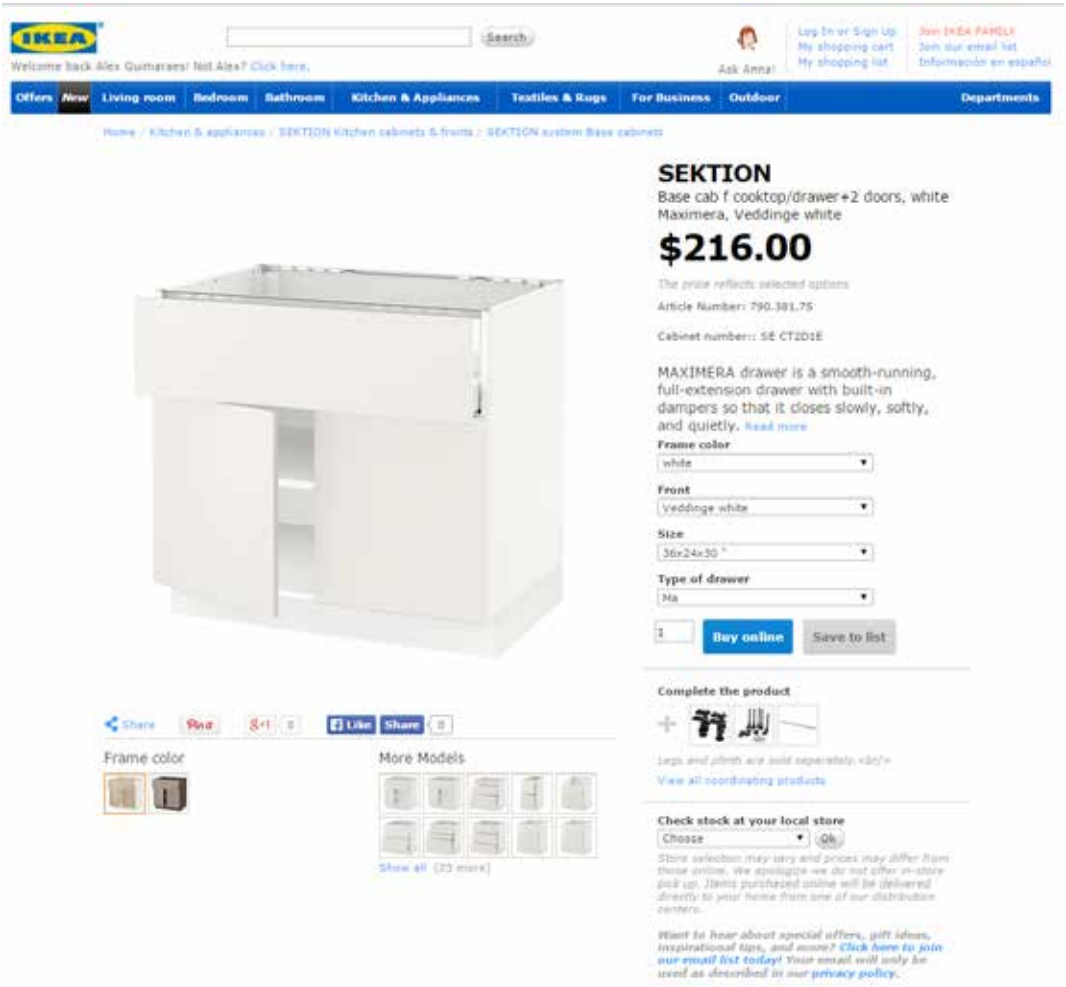
CSI #: 12 34 00


IKEA
Search
Offers
New
Living room
Bedroom
Bathroom
Kitchen & Appliances
Textiles & Rugs
For Business
Outdoor
Departments
SEKTION
Base cabinet w/3 fronts & 4 drawers, white
Maximera, Veddinge white
$215.00
Article Number: 590.301.62
MAXIMERA drawer is a smooth-running, full-extension drawer with built-in dampers so that it closes slowly, softly, and quietly.
Frame color
Front
Veddinge white
Size
Type of drawer
Buy online
Save to list
Complete the product
Frame color
More Models

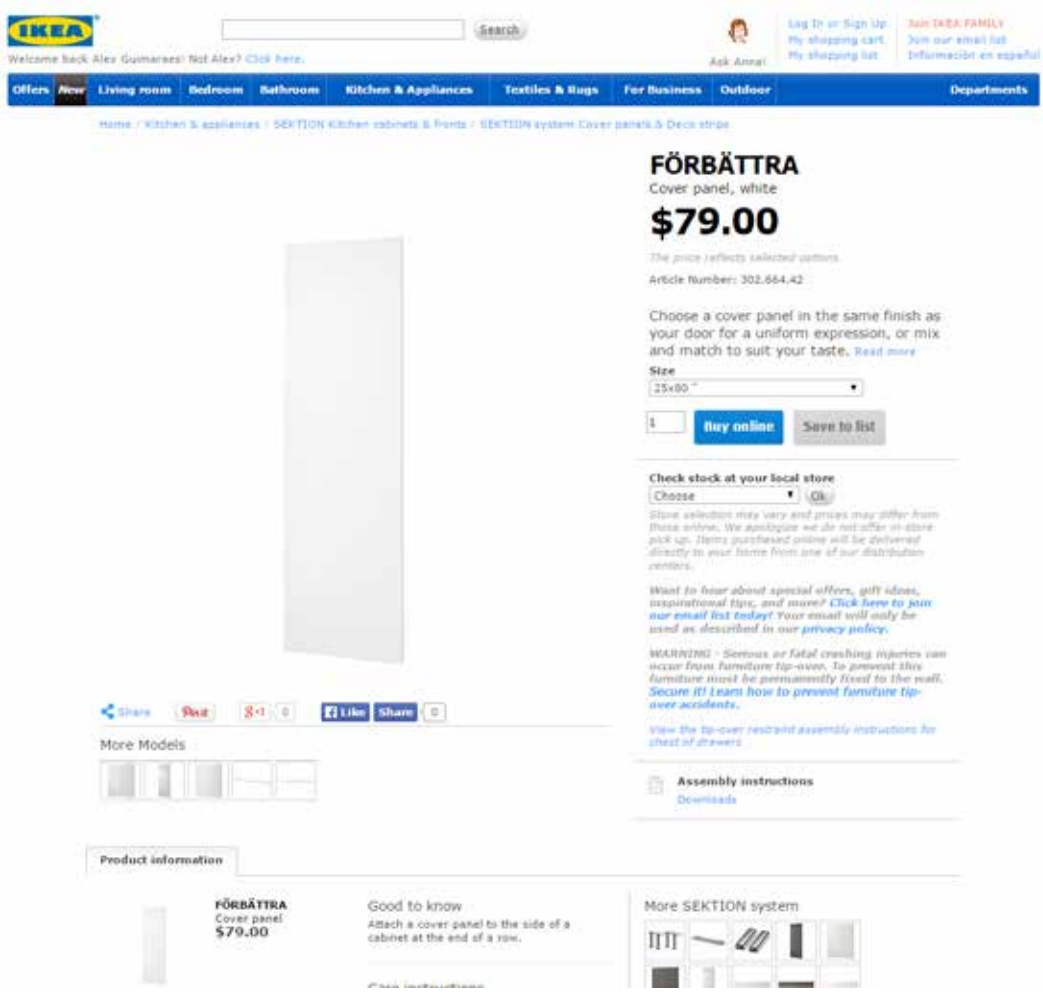
CSI #: 12 34 00


IKEA
Search
Offers
New
Living room
Bedroom
Bathroom
Kitchen & Appliances
Textiles & Rugs
For Business
Outdoor
Departments
SEKTION
Suspension rail, galvanized
$12.00
Article Number: 602.615.27
Size
84 "
Buy online
Save to list
Check stock at your local store
Choose
Assembly instructions & manuals
Product information
SEKTION
Suspension rail
$12.00
Product description
Galvanized steel
More SEKTION system
Product dimensions
Length: 84 "

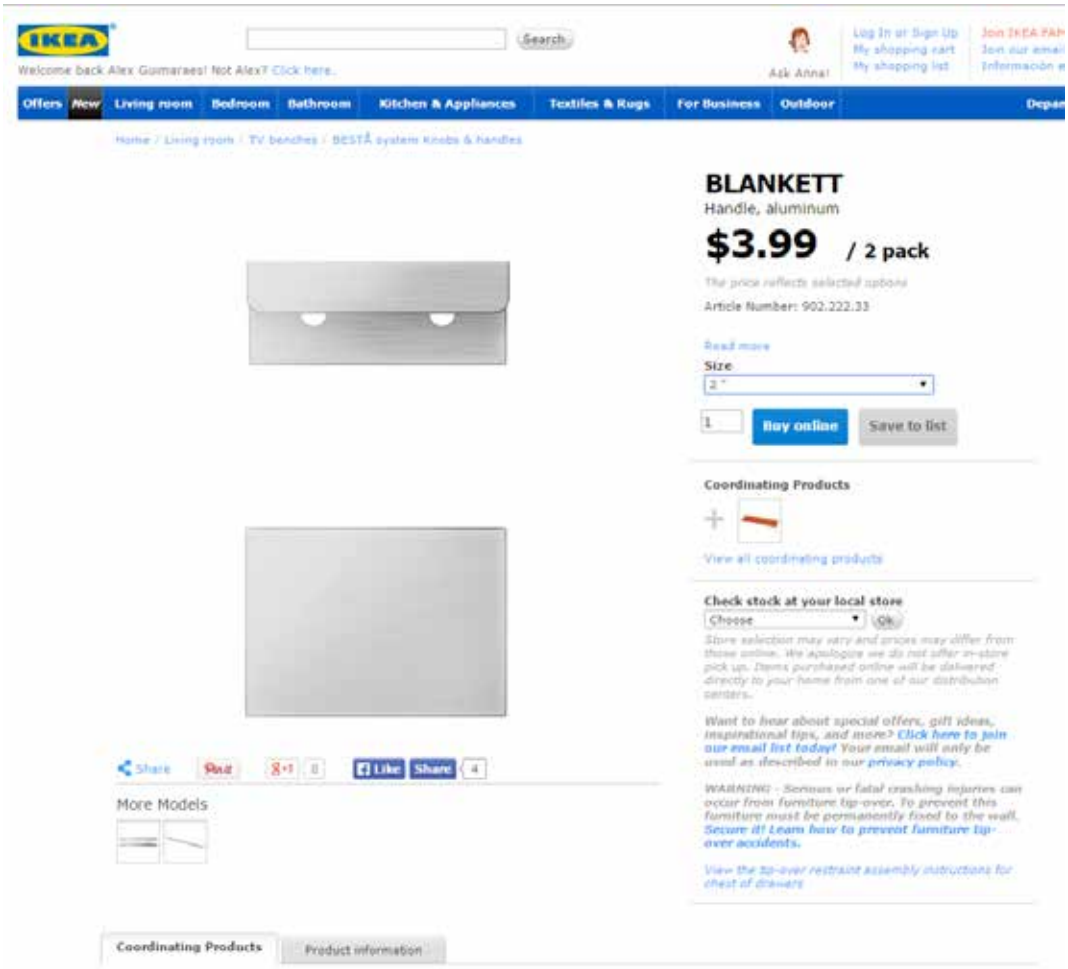
CSI #: 12 34 00


IKEA
Search
Offers
New
Living room
Bedroom
Bathroom
Kitchen & Appliances
Textiles & Rugs
For Business
Outdoor
Departments
SEKTION
Base cab f cooktop/drawer+2 doors, white
Maximera, Veddinge white
$216.00
Article Number: 790.381.75
MAXIMERA drawer is a smooth-running, full-extension drawer with built-in dampers so that it closes slowly, softly, and quietly.
Frame color
white
Front
Veddinge white
Size
Type of drawer
Buy online
Save to list
Complete the product
Frame color
More Models

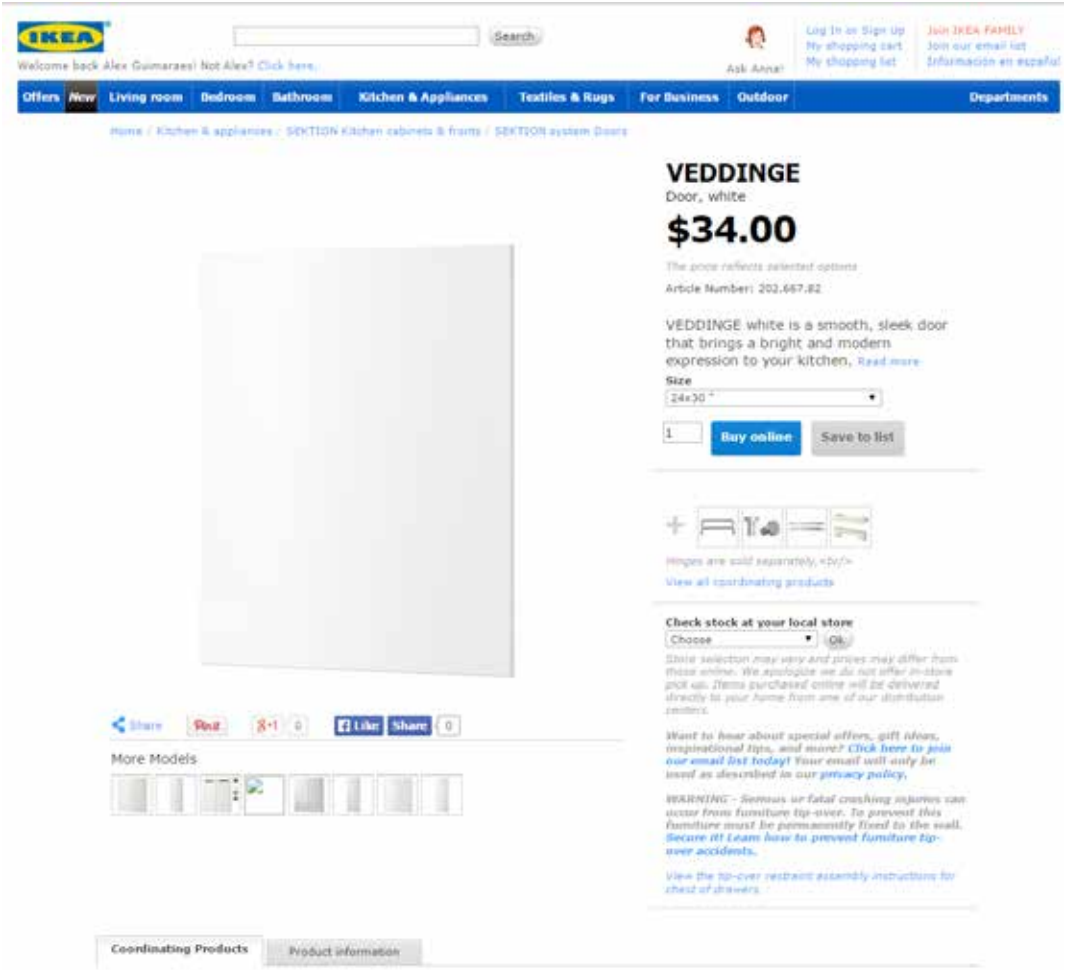
CSI #: 12 34 00


IKEA
Search
Offers
New
Living room
Bedroom
Bathroom
Kitchen & Appliances
Textiles & Rugs
For Business
Outdoor
Departments
FÖRBÄTTRA
Cover panel, white
$79.00
Article Number: 302.664.42
Choose a cover panel in the same finish as your door for a uniform expression, or mix and match to suit your taste.
Size
Buy online
Save to list
Check stock at your local store
Choose
Assembly instructions
More Models
Product information
FÖRBÄTTRA
Cover panel
$79.00
Good to know
Attach a cover panel to the side of a cabinet at the end of a row.
More SEKTION system

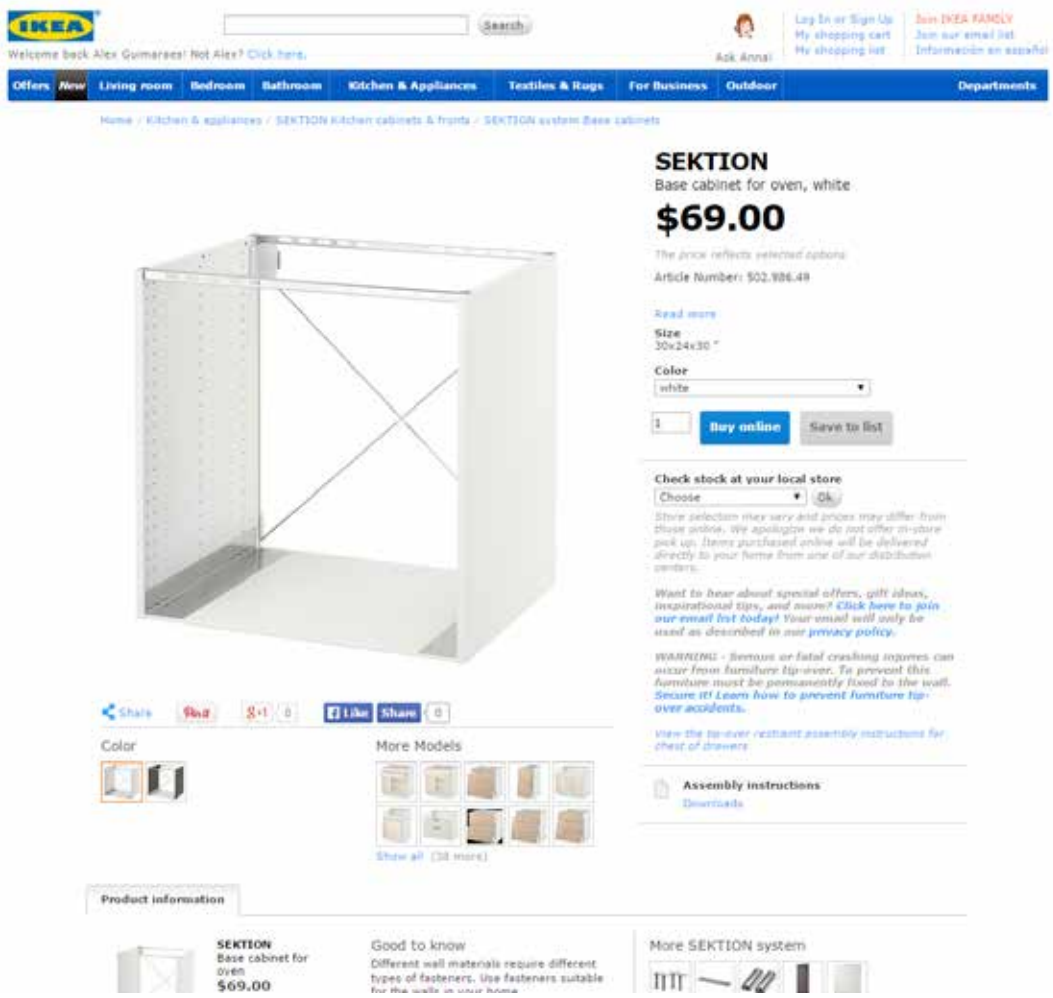
CSI #: 12 34 00


IKEA
Search
Offers
New
Living room
Bedroom
Bathroom
Kitchen & Appliances
Textiles & Rugs
For Business
Outdoor
BLANKETT
Handle, aluminum
$3.99 / 2 pack
Article Number: 902.222.33
Size
Buy online
Save to list
Coordinating Products
Check stock at your local store
More Models
Coordinating Products
Product information

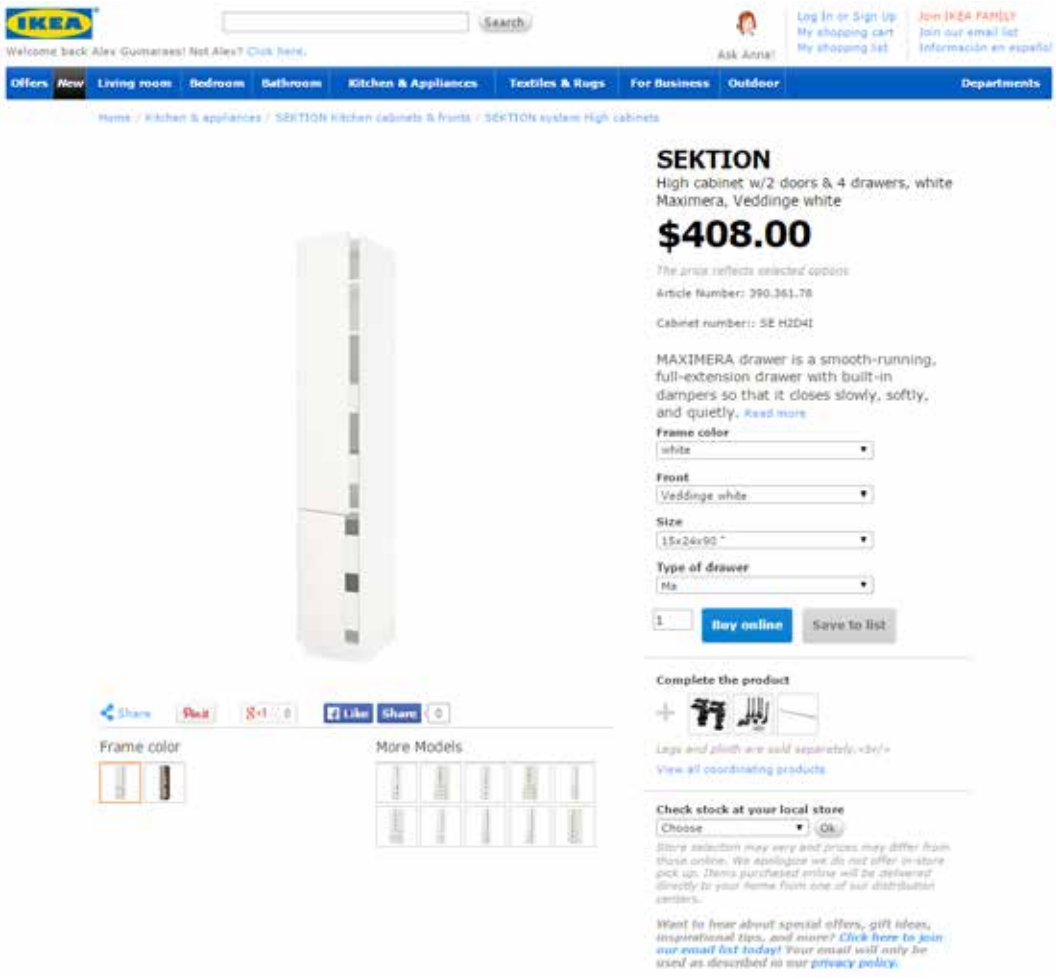
CSI #: 12 34 00


IKEA
Search
Offers
New
Living room
Bedroom
Bathroom
Kitchen & Appliances
Textiles & Rugs
For Business
Outdoor
Departments
VEDDINGE
Door, white
$34.00
Article Number: 202.667.82
VEDDINGE white is a smooth, sleek door that brings a bright and modern expression to your kitchen.
Size
Buy online
Save to list
Check stock at your local store
More Models
Coordinating Products
Product information

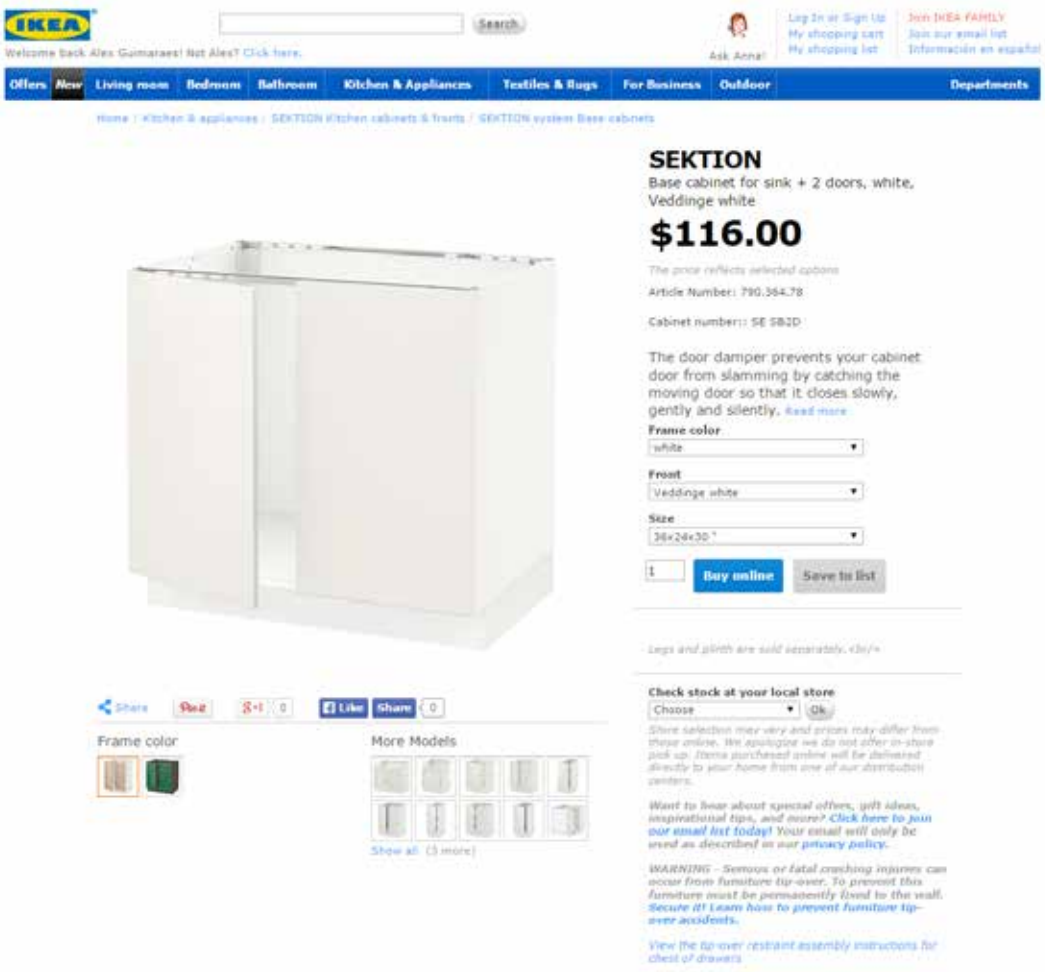
CSI #: 12 34 00


IKEA
Search
Offers
New
Living room
Bedroom
Bathroom
Kitchen & Appliances
Textiles & Rugs
For Business
Outdoor
Departments
SEKTION
Base cabinet for oven, white
$69.00
Article Number: 502.986.48
Size
30x24x30 "
Color
white
Buy online
Save to list
Check stock at your local store
Choose
Color
More Models
Assembly instructions
Product information
SEKTION
Base cabinet for oven
$69.00
Good to know
More SEKTION system

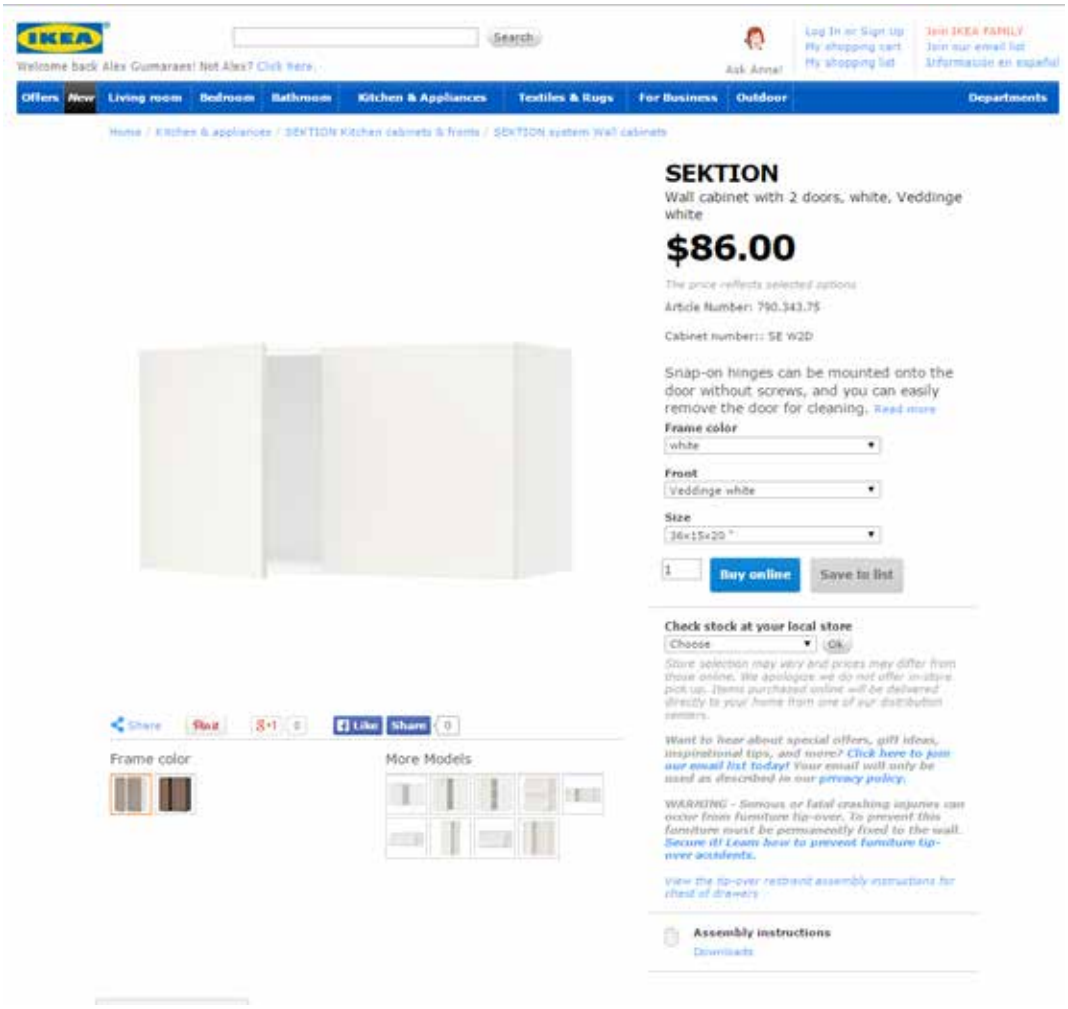
CSI #: 12 34 00


IKEA
Search
Offers
New
Living room
Bedroom
Bathroom
Kitchen & Appliances
Textiles & Rugs
For Business
Outdoor
Departments
SEKTION
High cabinet w/2 doors & 4 drawers, white
Maximera, Veddinge white
$408.00
Article Number: 390.361.78
MAXIMERA drawer is a smooth-running, full-extension drawer with built-in dampers so that it closes slowly, softly, and quietly.
Frame color
white
Front
Veddinge white
Size
Type of drawer
Buy online
Save to list
Complete the product
Frame color
More Models
Check stock at your local store
Choose
Ok

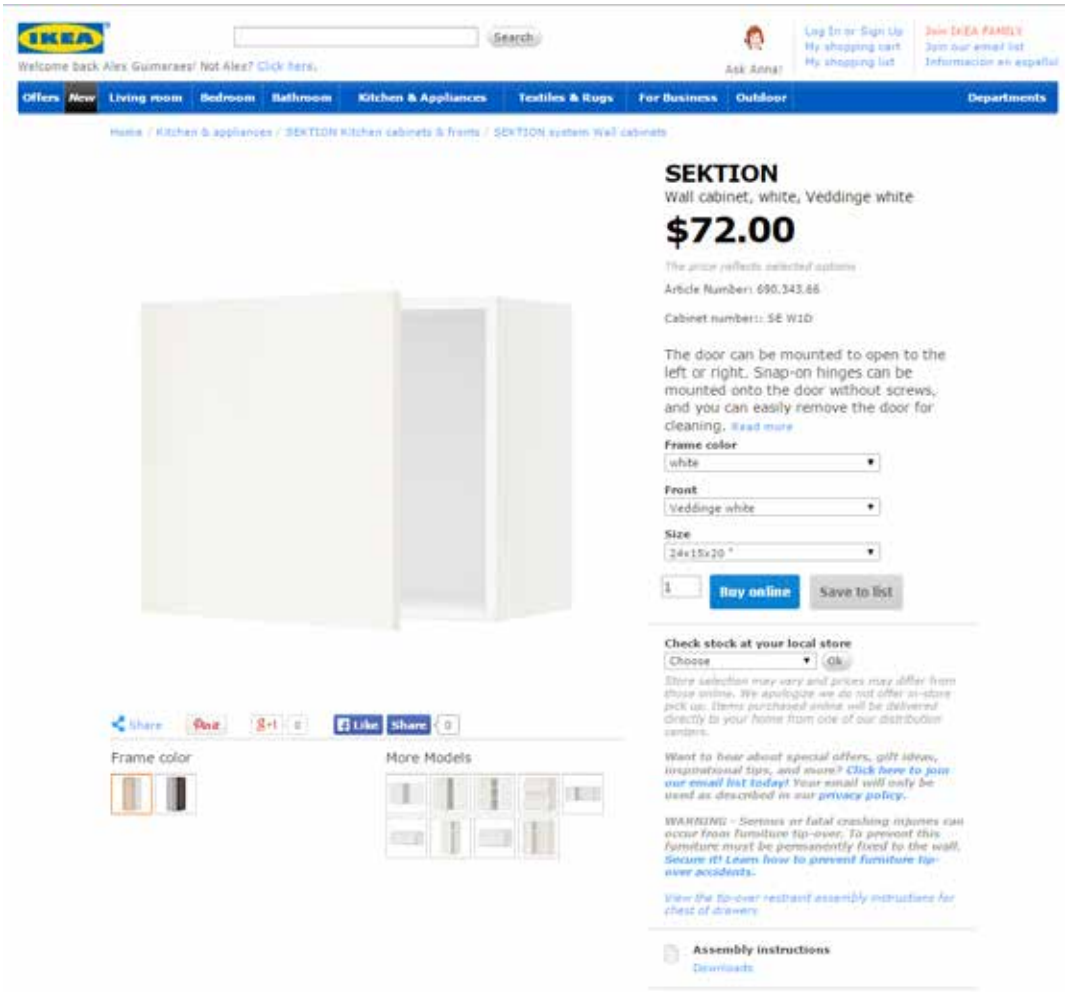
CSI #: 12 34 00


IKEA
Search
Offers
New
Living room
Bedroom
Bathroom
Kitchen & Appliances
Textiles & Rugs
For Business
Outdoor
Departments
SEKTION
Base cabinet for sink + 2 doors, white, Veddinge white
$116.00
Article Number: 790.364.78
Cabinet number:: SE SB2D
The door damper prevents your cabinet door from slamming by catching the moving door so that it closes slowly, gently and silently.
Frame color
white
Front
Veddinge white
Size
36x24x30 "
Buy online
Save to list
Frame color
More Models

CSI #: 12 34 00


IKEA
Search
Offers
New
Living room
Bedroom
Bathroom
Kitchen & Appliances
Textiles & Rugs
For Business
Outdoor
Departments
SEKTION
Wall cabinet with 2 doors, white, Veddinge white
$86.00
Article Number: 790.343.75
Cabinet number:: SE W2D
Snap-on hinges can be mounted onto the door without screws, and you can easily remove the door for cleaning.
Frame color
white
Front
Veddinge white
Size
36x15x20 "
Buy online
Save to list
Check stock at your local store
Choose
Frame color
More Models
Assembly instructions

CSI #: 12 34 00


IKEA
Search
Offers
New
Living room
Bedroom
Bathroom
Kitchen & Appliances
Textiles & Rugs
For Business
Outdoor
Departments
SEKTION
Wall cabinet, white, Veddinge white
$72.00
Article Number: 690.343.66
Cabinet number:: SE W1D
The door can be mounted to open to the left or right. Snap-on hinges can be mounted onto the door without screws, and you can easily remove the door for cleaning.
Frame color
white
Front
Veddinge white
Size
24x15x20 "
Buy online
Save to list
Check stock at your local store
Choose
Frame color
More Models
Assembly instructions

CSI #: 12 36 61

TECHNICAL FACTSHEET

HI-MACS® PERFORMANCE PROPERTIES

The technical information and specification provided will help you comprehend the material's characteristics and plan the details of your upcoming project. For further clarification or questions, inform us on our Contact Us page.

PROPERTY	TYPICAL RESULT	TEST
Tensile Strength	6000 psi	ASTM D 638
Tensile Modulus	1.35 x 10^6 / sq inch (850 kg / sq mm)	ASTM D 638 Nominal
Tensile Elongation	0.5% min	ASTM D 638
Flexural Strength	11,424 psi	ASTM D 790
Flexural Modulus	1.34 x 10^6 / sq inch	ASTM D 790
Hardness	Barcol Impressor: 57	ASTM D 2583
Thermal Expansion	0.000018 inch / inch / °F	ASTM D 696
Deflection Temperature (under load)	90 °C (194 °F)	ASTM D 648
Approximate Weight	4.20 lbs per sq ft (20.5 kg / sq m)	
Light Resistance	No Effect	NEMA LD 3-3.03
Wear and Cleanability	Pass	ANSI Z-124.3 ISSFA SST 3.1-00
Stain Resistance	No Effect	ANSI Z-124.3 Modified; 3.4 & 11
Fungus and Bacterial Resistance	Pass / No Effect Approved for use in all food zones	ASTM G 21 / ASTM G 22 ANSI / NSF Standard 51
Boiling Water Resistance	No Effect	NEMA LD 3-3.05 ISSFA SST 8.1-00
High Temperature Resistance	No Effect	NEMA LD 3-3.06 ISSFA SST 9.1-00
Radiant Heat Resistance	No Effect	NEMA LD 3-3.10
Izod Impact	0.3 foot lbs per inch (0.016 joules / mm)	ASTM D 256, Method A
Ball Impact Resistance	0.5 lbs (0.23 kg) ball 1/4" slab - 36" drop 1/2" slab - 144" drop	NEMA LD 3-3.08
Weatherability	Pass (1000 hr test)	ASTM D 2565 / ASTM D-1499
Specific Gravity	1.60 grams per cubic centimeter 0.06 lb / inch³)	ASTM D792 (Density)
Water Absorption	1/4" slab - 0.07% 1/2" slab - 0.4%	ISO 4586-2 / ASTM D570
Toxicity	66.9 grams (2.36 oz)	Pittsburgh Protocol
Flammability		ASTM E84: Class I or A
Flame Spread Index	<25	
Smoke Development Index	<25	

CSI #: 12 40 00

BLANKETT
Handle, aluminum
$3.99 / 2 pack
The price reflects selected options
Article Number 902.222.33

Read more
Size
2 "
1
Buy online
Save to list

Coordinating Products

View all coordinating products

Check stock at your local store
Choose
Ok
Store selection may vary and prices may differ from those online. We apologize we do not offer in-store pick up. Items purchased online will be delivered directly to your home from one of our distribution centers.

Want to hear about special offers, gift ideas, inspirational tips, and more? Click here to join our email list today! Your email will only be used as described in our privacy policy.

WARNING - Serious or fatal crushing injuries can occur from furniture tip-over. To prevent this

Division 21
Fire Suppression

CSI #: 21 13 00

Viking Plastics

BlazeMaster® CPVC Pipe

Features

- **Sizes Available (Nominal):** 3/4" (DN20) through 3" (DN80) pipe diameters, with a Standard Dimension Ratio (SDR) of 13.5 as specified in ASTM F442.
- **Environmental Specifications:** Indoor use only. Maximum Ambient Temperature: 150°F (65°C)
- **Hazen-Williams C Value:** 150
- **Pressure Data: Working Pressure:** 175 PSI (12.1 bar) at 150°F (65°C)
- **Specifications:**
  - Meets NFPA 13R and 13D standards for residential occupancies as well as NFPA 13 standards for light hazard occupancies.
  - Pipe meets or exceeds ASTM F442.
  - Certified by NSF International for potable water services.
  - CPVC pipe from Viking Plastics use compound cell class 23547 (demonstrated highest structural properties).
  - cULus Listed, FM Approved, New York City (MEA) Approved, LPCB Approved.

CPVC PIPE PHYSICAL DATA

Nominal Pipe Size		Actual Outside Diameter		Average Inside Diameter		*Weight per 15' (4,6 m) length		Length		Approvals	Part Number
Inch	DN	Inch	mm	Inch	mm	Lb.	Kg.	Feet	M		
3/4"	DN20	1.050	26,670	0.874	22,199	2.52	1,14	15	4.6	cULus, FM, NSF	34PIPE
1"	DN25	1.315	33,401	1.101	27,965	3.93	1,78	15	4.6		1PIPE
1 1/4"	DN32	1.660	42,164	1.394	35,408	6.27	2,84	15	4.6		114PIPE
1 1/2"	DN40	1.900	48,260	1.598	40,589	8.22	3,73	15	4.6		112PIPE
2"	DN50	2.375	60,325	2.003	50,876	12.89	5,85	15	4.6		2PIPE
2 1/2"	DN65	2.875	73,000	2.423	61,500	18.86	8,55	15	4.6		212PIPE
3"	DN80	3.500	88,900	2.950	74,900	28.01	12,71	15	4.6		3PIPE
Nominal Pipe Size		Actual Outside Diameter		Average Inside Diameter		*Weight per 10' (3,05 m) length		Length		Approvals	Part Number
Inch	DN	Inch	mm	Inch	mm	Lb.	Kg.	Feet	M		
3/4"	DN20	1.050	26,670	0.874	22,199	1.68	0,76	10	3,05	cULus, FM, NSF	34PIPE10
1"	DN25	1.315	33,401	1.101	27,965	2.62	1,19	10	3,05		1PIPE10
1 1/4"	DN32	1.660	42,164	1.394	35,408	4.18	1,90	10	3,05		114PIPE10
1 1/2"	DN40	1.900	48,260	1.598	40,589	5.48	2,49	10	3,05		112PIPE10
2"	DN50	2.375	60,325	2.003	50,876	8.59	3,90	10	3,05		2PIPE10
2 1/2"	DN65	2.875	73,000	2.423	61,500	12.57	5,70	10	3,05		212PIPE10
3"	DN80	3.500	88,900	2.950	74,900	18.67	8,47	10	3,05		3PIPE10

NOTE: CPVC Pipe is produced in SDR 13.5 Dimensions in accordance with ASTM F442. Standard Dimension Ratio is the ratio of the outside pipe diameter to the wall thickness of the pipe.

BlazeMaster® is a registered trademark of Lubrizol.

Specifications subject to change without notice

*Empty pipe weights

IMPORTANT: Installers should receive thorough hands-on training in the proper methods of assembly and installation of CPVC products.

Trusted above all™

VIKING

CSI #: 21 13 00

Viking Plastics

BlazeMaster® CPVC Pipe

CPVC Pipe Product Specifications

Corrosion resistant CPVC fire sprinkler pipe, when installed in strict accordance with the manufacturer's design and installation instructions, is UL and c-UL Listed by Underwriters Laboratories for use in the following:

- Meets NFPA 13R and 13D standards for residential occupancies as well as NFPA 13 standards for light hazard occupancies
- Residential occupancies up to and including four stories in height as defined by NFPA 13R
- Residential occupancies as defined in the Standard for Sprinkler Systems in One and Two Family Dwellings, NFPA 13D
- Installation of private fire service mains and their appurtenances, NFPA 24

CPVC fire sprinkler pipe from Viking Plastics shall be employed in wet pipe systems only and are not listed for outdoor use. CPVC pipe must never be used in a system using compressed air or other gases.

CPVC pipe from Viking Plastics also carries the following enhanced listings and approvals:

- According to UL Listing
  - Can be flush at return air plenums
  - Exposed system risers NFPA 13D, 13R
  - Exposed basement NFPA 13D (solid wood joist)
  - Extended coverage (exposed)
    - 20' spacing on pendent in lieu of 15'
    - 18' spacing on sidewall in lieu of 14'
  - Use with combustible concealed sprinklers
  - Tyco attic sprinkler head (to protect the floor below)
  - Tyco attic sprinkler head with wet system piping (feed main and ridge installation)
  - Exposed sidewall sprinkler listing for exposed pipe & fittings
    - 24' extended coverage sidewall sprinkler, 12" drop, 155°F sprinkler head
    - 18' extended coverage sidewall sprinkler, 12" drop, 165°F sprinkler head
    - 16' extended coverage sidewall sprinkler, 12" drop, 175°F sprinkler head
    - 14' standard coverage sidewall sprinkler, 12" drop, 200°F sprinkler head
- Factory Mutual Approved*
  - Factory Mutual Approval exposed
  - Factory Mutual Approval above drop-in ceilings
  - Factory Mutual Approval exposed w/Saffi-Steel soffiting covering system

New and enhanced listings and approvals are being pursued. Always check with the appropriate Listing and Approval agency for details on current listing parameters.

CPVC pipe meets all applicable standards for pressure rated application as required in ANSI-NSF Standard 14 and complies with ANSI-NSF Standard 61 for health effects and are marked with the NSF-pw end use marking.

All CPVC fire sprinkler pipe shall be Listed by Underwriters Laboratories for wet pipe systems, and shall carry a rated working pressure of 175 psi @ 150°F (12 bar @ 65.5°C). *The FM Approval is limited to use in wet pipe fire protection sprinkler systems for light hazard occupancies in both concealed and exposed applications with certain restrictions.

Piping must always be installed in strict accordance to the manufacturer's DESIGN AND INSTALLATION GUIDE, including product storage and handling, joining methods, supporting and bracing, expansion and contraction allowance and testing, etc. National Fire Protection Association (NFPA) Standards 13, 13D, and 13R must be referenced for design and installation requirements in conjunction with the installation instructions.

All CPVC fire sprinkler pipe from Viking Plastics is manufactured in the USA. All CPVC pipe shall be packaged immediately after its manufacture to prevent damage and shall be stored indoors after production, at the manufacturing site, until shipped from the factory. The pipe shall bear the logo of the listing agencies, and shall carry the National Sanitation Foundation (NSF) seal of approval for potable water applications.

CPVC products are intended for use in areas where the maximum ambient temperature does not exceed 150°F (65.5°C). If the ambient temperature is expected to exceed this limitation, refer to the manufacturer's DESIGN AND INSTALLATION GUIDE for additional information on methods to reduce the pipe exposure temperatures. CPVC pipe is not intended to be installed in outdoor applications. CPVC pipe is intended to be used in wet pipe systems only and have not been investigated for use in dry pipe systems. Special installation and design criteria relative to pipe hanger spacings, piping and sprinkler restraint, sprinkler temperature rating, piping locations, testing procedures and friction loss characteristics are specified in the manufacturer's installation instructions provided with the pipe. The manufacturer's installation instructions should be reviewed and the Authority Having Jurisdiction consulted before installation.

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VIKING®

CSI #: 21 13 00

ES-A-2000B

Series 2000B

Double Check Valve Assemblies

AMES
FIRE & WATERWORKS

Sizes: ½" – 2" (15 – 50mm)

2" 2000B HC
(50mm)

¾" 2000B
(20mm)

Features

- Ease of maintenance with only one cover
- Top entry
- Replaceable seats and seat discs
- Modular construction
- Compact design
- ½" – 2" (15 – 50mm) Cast bronze body construction
- Top mounted ball valve test cocks
- Low pressure drop
- No special tools required
- ½" – 1" (15 – 25 mm) have tee handles

Available Models

Suffix:

B - Quarter turn ball valves
LBV - less ball valves
SH - stainless steel ball valve handles
HC - 2½" inlet/outlet fire hydrant fitting (2" valve)

Pressure — Temperature

Temperature Range: 33°F – 140°F (0.5°C – 60°C)

Maximum Working Pressure: 175psi (12.1 bar)

Standards

AWWA Std. C510, IAPMO PS31

⚠ WARNING

It is illegal to use this product in any plumbing system providing water for human consumption, such as drinking or dishwashing, in the United States. Before installing standard material product, consult your local water authority, building and plumbing codes.

Series 2000B Double Check Valve Assemblies are designed to protect drinking water supplies for dangerous cross-connections in accordance with national plumbing codes and water authority requirements for non-health-hazard non-potable service applications such as irrigation, fire line, or industrial processing.

These valves meet the requirements of ASSE Std. 1015 and AWWA Std. C510 and are approved by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California.

Specifications

A Double Check Valve Assembly shall be installed at each noted location. The assembly shall consist of two positive seating check modules with captured springs and rubber seat discs. The check module seats and seat discs shall be replaceable. Service of all internal components shall be through a single access cover secured with stainless steel bolts. The assembly shall also include two resilient seated isolation valves and four top mounted, resilient seated test cocks. The assembly shall meet the requirements of ASSE Std. 1015 and AWWA Std. C510. Approved by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California. Assembly shall be an Ames Company Series 2000B.

Approvals

1015 B64.5 ¾" - 2" (LBV Models Only)

Approved by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California.

LBV models not listed.

Horizontal and vertical "flow up" approval on all sizes.

Job Name _____ Contractor _____

Job Location _____ Approval _____

Engineer _____ Contractor's P.O. No. _____

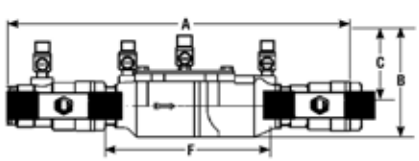
Approval _____ Representative _____

Ames product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Ames Technical Service. Ames reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Ames products previously or subsequently sold.

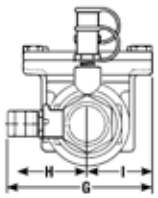
amesfirewater.com

CSI #: 21 13 00

Dimensions – Weights



Suffix HC — Fire Hydrant Fittings dimension "A" = 23½" (594mm)

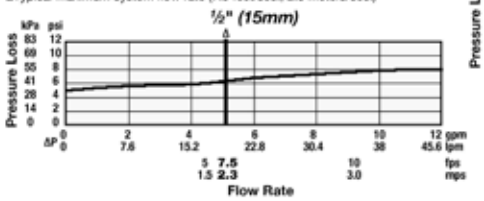


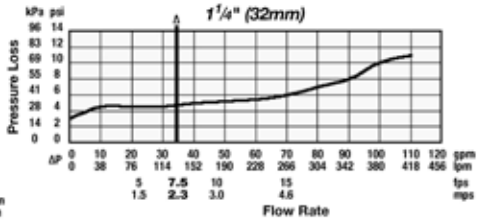
SIZE (DN)		DIMENSIONS												WEIGHT	
		A		B		C		F		G		H		I			
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kgs.
½	15	10	254	4⅝	117	2⅜	62	5	127	3⅜	85	2⅜	59	2⅛	52	4.5	2
¾	20	11⅛	282	4	102	3¼	79	6⅛	157	3⅜	87	2⅛	54	1⅜	33	5	2.3
1	25	13⅛	337	5⅛	130	4	102	7½	191	3⅜	85	1¹¹⁄₁₆	43	1¹¹⁄₁₆	43	12	5.4
1¼	32	16⅜	416	5	127	3⅝	84	9½	241	5	127	3	76	2	50	15	6.8
1½	40	16½	425	4⅞	124	3½	89	9¾	248	5⅞	148	3⅛	79	2⅛	68	15.86	7.2
2	50	19½	495	6¼	159	4	102	13⅜	340	6⅛	156	3⅜	87	2⅛	68	25.75	11.7

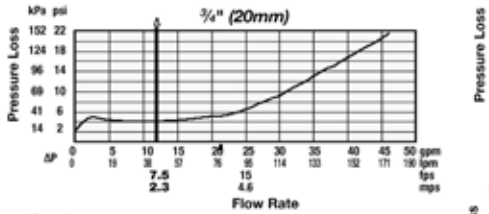
Strainer sold separately

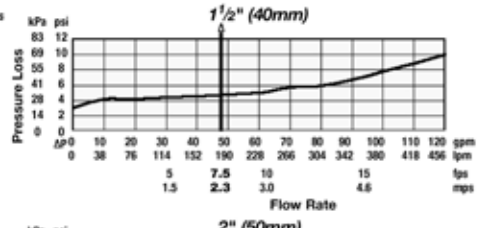
Capacities

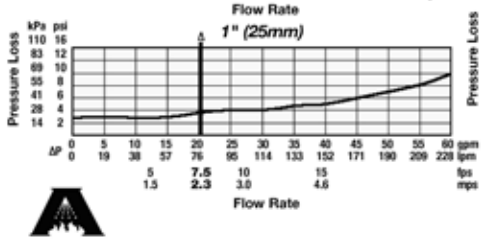
As compiled from documented Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California lab tests.
ΔTypical maximum system flow rate (7.5 feet/sec., 2.3 meters/sec.)

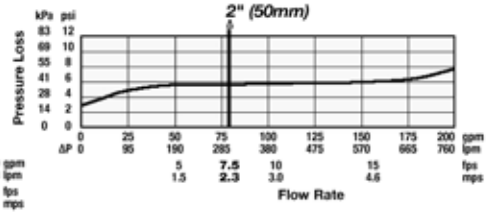












AMES
FIRE & WATERWORKS

A Watts Water Technologies Company

USA: Backflow Tel: (978) 689-6066 • Fax: (978) 975-8350 • AmesFireWater.com
USA: Control Valves Tel: (713) 943-0688 • Fax: (713) 944-9445 • AmesFireWater.com
Canada: Tel: (905) 332-4090 • Fax: (905) 332-7068 • AmesFireWater.ca
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ES-A-2000B 1410

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CSI #: 21 13 00

SAMMYS™

VERTICAL MOUNT

Wood

Approvals	Rod Size	Part #	Item #	Model	Screw Descriptions	Box Qty.	Weight (per 125)	Case Qty
	1/4"	8001957	20	GST .750	1/4 x 3/4	25	5.93	125
	1/4"	8002957	21	GST 100	1/4 x 1	25	6.25	125
	1/4"	8003957	22	GST 200	1/4 x 2	25	8.13	125
	1/4"	8004957	23	GST 300	1/4 x 3	25	9.38	125
	1/4"	8005925	24	GST 600	1/4 x 6	25	11.25	125
	3/8"	8006957	10	GST .75	1/4 x 3/4	25	5.63	125
	3/8"	8007957	11	GST 10	1/4 x 1	25	5.93	125
	3/8"	8008957	12	GST 20	1/4 x 2	25	7.50	125
	3/8"	8009925	27	GST 25-380	3/8 x 2-1/2	25	11.56	125
	3/8"	8010957	30	GST 30	1/4 x 3	25	8.75	125
	3/8"	8011925	403	GST 40	1/4 x 4	25	10.00	125
	3/8"	8012925	14	GST 60	1/4 x 6	25	11.25	125
	1/2"	8013925	8	GST 2	1/4 X 2	25	8.75	125
	1/2"	8014925	6	GST 2.5-380	3/8 X 2-1/2	25	12.50	125
	1/2"	8015925	15	GST 3	1/4 X 3	25	13.13	125
	1/2"	8016925	16	GST 4	1/4 X 4	25	13.25	125
	1/2"	8017925	17	GST 6	1/4 X 6	25	13.69	125

Steel

Approvals	Rod Size	Part #	Item #	Model	Screw Descriptions	Box Qty.	Weight (per 125)	Case Qty
	1/4"	8024957	50	DSTR 100	1/4-20 X 1	25	7.81	125
	1/4"	8025957	51	DST 100	1/4-14 X 1	25	6.56	125
	1/4"	8026957	52	DST 150	1/4-14 X 1-1/2	25	6.88	125
	1/4"	8027957	53	DST 200	1/4-14 X 2	25	7.50	125
	1/4"	8028957	54	DST 250	1/4-12 X 2-1/2	25	8.44	125
	1/4"	8029957	55	DST 300	1/4-14 X 3	25	9.06	125
	1/4"	8030957	56	TEK 500	12-24 X 1-1/2	25	6.88	125
	3/8"	8037957	29	DSTR 1-1/2"	12-24 X 1-1/2	25	7.75	125
	3/8"	8038957	30	DSTR 1"	1/4-20 X 1	25	7.19	125
	3/8"	8039957	31	DSTR 516	5/16-18 X 1-1/4	25	7.06	125
	3/8"	8040957	32	DST 10	1/4-14 X 1	25	5.94	125
	3/8"	8041957	33	DST 15	1/4-14 X 1-1/2	25	6.56	125
	3/8"	8042957	34	DST 20	1/4-14 X 2	25	6.88	125
	3/8"	8043957	35	DST 25	1/4-14 X 2-1/2	25	7.81	125
	3/8"	8044957	36	DST 30	1/4-14 X 3	25	8.44	125
	3/8"	8045957	37	DST 516	5/16-18 X 1-1/4	25	7.50	125
	3/8"	8046957	38	TEK 50	12-24 X 1-1/2	25	6.88	125
	1/2"	8031925	601	DST 2.0	1/4-14 X 2	25	8.44	125
	1/2"	8032925	1113	DST 2.5	1/4-14 X 2-1/2	25	9.06	125
	1/2"	8033925	422	DSTR 1.0	1/4-20 X 1	25	8.25	125
	1/2"	8034925	28	DSTR 5.16	5/16-18 X 1-1/4	25	10.00	125
	1/2"	8035925	443	DST 5.16	5/16-18 X 1-1/4	25	8.44	125
	1/2"	8036925	5	TEK 5.0	12-24 X 1-1/2	25	7.50	125

Nut Driver

Use #14 Nut Driver for Sammys and Swivel Head.

Part # 8113910
Item # 100

Concrete

Approvals	Rod Size	Part #	Item #	Model	Screw Descriptions	Box Qty.	Weight (per 125)	Case Qty
	1/4"	8058957	64	CST 200	5/16 x 1-1/2	25	8.44	125
	3/8"	8059957	61	CST 20	5/16 X 1-1/2	25	7.81	125
	1/2"	8060925	66	CST 2	5/16 X 1-1/2	25	8.75	125

CSI #: 21 13 00

VIKING® TECHNICAL DATA

EASYPAC RESIDENTIAL RISER MANIFOLD ASSEMBLIES
1" - 2" (DN25 - DN50)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

1. DESCRIPTION

Viking EasyPac Residential Riser Manifold Assemblies are available in sizes 1", 1-1/4", 1-1/2", and 2" for NFPA 13D and NFPA13R residential fire sprinkler systems. The configuration eliminates the need to drain the system before installing the relief valve, while a built in test port allows hydrostatic testing without draining the system. The EasyPac Residential Assemblies include pressure gauges, Potter flow switches, 3-way gauge control valve and 1" drain valve (or 1-1/4" for 2" Manifold). The EasyPac assemblies are made with steel bodies and are available in threaded or grooved connections.

2. LISTINGS AND APPROVALS

Pressure Gauges: UL Listed, FM Approved
Waterflow Alarm Switch: UL Listed - Category USQT, cUL Listed, FM Approved - Waterflow Detectors, Vane Type, CSFM Listed
Ball Valve: UL Listed, FM Approved
AGF TestanDrain Model 1000: UL Listed - Category VEHZ, FM Approved - Sprinkler System Alarm Testers
AGF TestanDrain Model 1011 with Pressure Relief Valve: UL Listed - Category VEHZ, FM Approved - Sprinkler System Alarm Testers

3. TECHNICAL DATA

Viking Technical Data may be found on The Viking Corporation's Web site at http://www.vikinggroupinc.com. The Web site may include a more recent edition of this Technical Data Page.

Specifications and Material Standards:
Available since 2007.

- Pressure Rating: 250 PSI (17.2 bar) maximum water working pressure.
- Fabricated steel pipe.
- Available in male NPT threaded inlet and outlet connections using Schedule 40 steel pipe.
- Available in grooved inlet and outlet connections using Schedule 10 steel pipe.
- Available with male NPT threaded inlet x grooved outlet using Schedule 40 steel pipe.
- Riser bodies coated with black Ecoat.
- Flow Switch: Two single-pole double-throw switches with Form C contacts rated at 15 Amps 125/250 V. AC, 2.5 Amp 0-30 V. DC. Each switch can be wired for open or closed circuit operation. See Figure 1.

Ordering Information:
(Also refer to the current Viking price list.)
There are three different options available for the Residential line:
Basic Residential EasyPac Assemblies with Ball Valve Drain (See Figure 2)
Residential EasyPac Assemblies with TESTanDRAIN Valve (See Figure 3)
Residential EasyPac Assemblies with TESTanDRAIN and Pressure Relief Valve (PRV) (See Figure 4)
See Table 1 for Part Numbers.

4. INSTALLATION

Refer to appropriate NFPA Installation Standards.
Note: The EasyPac Residential Riser Manifold Assembly can be installed horizontally with flow switch on top, or vertically with flow upward.

Viking EasyPac Riser Assemblies use Potter VSR flow switches. The literature that accompanies the VSR states that the switch should not be installed within 6" of a change of direction of pipe or within 24" of a valve. This is merely a recommendation to reduce the possibility of the switch not operating while minimal waterflow is occurring. This is a recommendation only, not a requirement.

5. TESTANDRAIN VALVE OPERATING INSTRUCTIONS

1. To Test: Turn valve handle counterclockwise from "Off" to "Test". The handle will stop automatically. After test is completed, return handle to "Off".
2. To Drain: Turn handle counterclockwise from "Off" to "Test". The handle will stop automatically. Depress "Push" button and turn handle to "Drain". When system is empty, return handle clockwise to "Off" position.

6. INSPECTIONS, TESTS AND MAINTENANCE

Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY

The Viking EasyPac Riser Assemblies are available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE

For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

Form No. F_102407

Replaces page 31a-f dated July 31, 2009. (Removed note regarding the flow switch for Canada orders-now use the same flow switch.)

CSI #: 21 13 00

31b

September 18, 2009

VIKING® **TECHNICAL DATA**

EASYPAC RESIDENTIAL RISER MANIFOLD ASSEMBLIES
1" - 2" (DN25 - DN50)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

Table 1 - Commercial EasyPac Assemblies

Pipe Size	Inlet / Outlet Connections	Option	Pipe Size	Viking Part Number
1"	Thread / Thread	Ball Valve	Schedule 40	15226
		TESTanDRAIN		15227
		TESTanDRAIN and PRV		15228
	Groove / Groove	Ball Valve	Schedule 10	15243
		TESTanDRAIN		15244
		TESTanDRAIN and PRV		15245
1-1/4"	Thread / Thread	Ball Valve	Schedule 40	14840
		TESTanDRAIN		15229
		TESTanDRAIN and PRV		15230
	Groove / Groove	Ball Valve	Schedule 10	14841
		TESTanDRAIN		15231
		TESTanDRAIN and PRV		15232
	Thread / Groove	Ball Valve	Schedule 40	14905
		TESTanDRAIN		15233
		TESTanDRAIN and PRV		15234
1-1/2"	Thread / Thread	Ball Valve	Schedule 40	14842
		TESTanDRAIN		15235
		TESTanDRAIN and PRV		15236
	Groove / Groove	Ball Valve	Schedule 10	14843
		TESTanDRAIN		15237
		TESTanDRAIN and PRV		15238
	Thread / Groove	Ball Valve	Schedule 40	14849
		TESTanDRAIN		15239
		TESTanDRAIN and PRV		15240
2"	Thread / Thread	Ball Valve	Schedule 40	14844
		TESTanDRAIN		15241
		TESTanDRAIN and PRV		14901
	Groove / Groove	Ball Valve	Schedule 10	14845
		TESTanDRAIN		15242
		TESTanDRAIN and PRV		14900
	Thread / Groove	Ball Valve	Schedule 40	14846
		TESTanDRAIN		15246
		TESTanDRAIN and PRV		15247

TESTanDRAIN Option:
Includes a test orifice with size specified from 3/8" (K2.8) to 25K ESFR*, depending on the smallest sprinkler installed on the system. Must add suffix to the part number for the desired orifice size.
Orifice Suffix:
A = 3/8" (K 2.8)
B = 7/16" (K 4.2)
C = 1/2" (K 5.6)
D = 17/32" (K 8.0)

TESTanDRAIN with PRV Option:
Includes test orifice and pressure relief valve. The test orifice must be specified based on the smallest sprinkler installed on the system for 3/8" (K2.8) to K25 ESFR*. The pressure relief valve is not factory assembled to the TestanDrain. Must add suffix to the part number for the desired orifice size and pressure setting of the pressure relief valve.
Orifice Suffix:
A = 3/8" (K 2.8)
B = 7/16" (K 4.2)
C = 1/2" (K 5.6)
D = 17/32" (K 8.0)
PRV Suffix:
175
185
195
205
225
250
NOTE: It is important to note that the pressure rating of the relief valve indicates an operating range of pressure for both opening and closing of the valve. Standard relief valves are required to OPEN in a range of pressure between 90% and 105% of their rating. The valves are required to CLOSE at a pressure above 80% of that rating.

Table 2 - Pipe Diameters

	1"	1-1/4"	1-1/2"	2"
Pipe OD	1.315" (33.4 mm)	1.660" (42 mm)	1.900" (48 mm)	2.375" (60 mm)
Schedule 10 Pipe ID	1.097" (27.9 mm)	1.45" (36.6 mm)	1.69" (42.7 mm)	2.16" (54.8 mm)
Schedule 40 Pipe ID	1.049" (26.6 mm)	1.38" (35.1 mm)	1.61" (40.9 mm)	2.07" (52.5 mm)

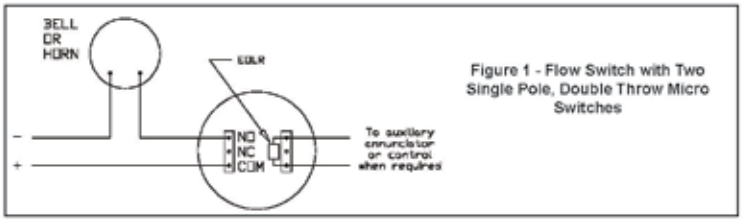

Figure 1 - Flow Switch with Two Single Pole, Double Throw Micro Switches

CSI #: 21 13 00

September 18, 2009 31c

VIKING® TECHNICAL DATA

EASYPAC RESIDENTIAL RISER MANIFOLD ASSEMBLIES
1" - 2" (DN25 - DN50)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

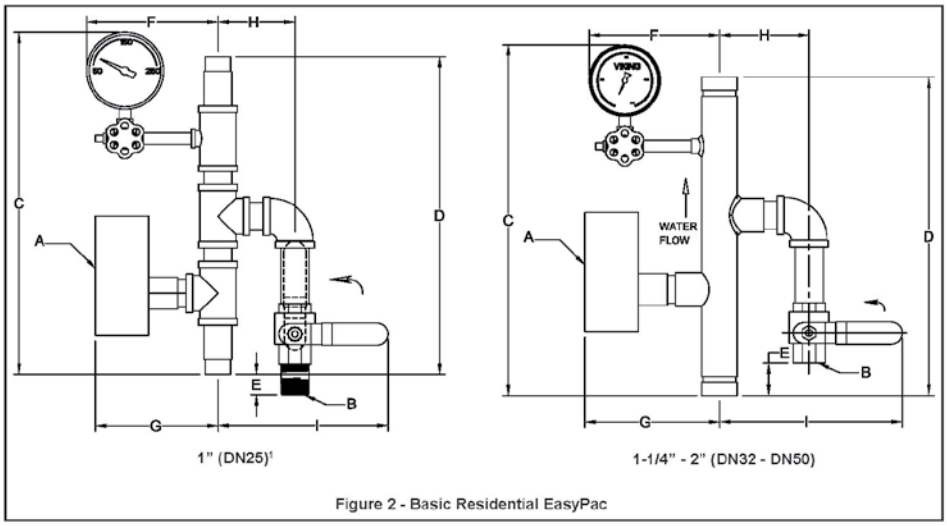

Figure 2 - Basic Residential EasyPac

Size	A	B	C	D	E	F	G	H	I
1" (DN25)[1]	VSR-S Flow Switch[3]	1" Hose	16-3/32" (409)	14-15/16" (379)	1" (25)	6-3/16" (157)	5-3/4" (146)	3-1/2" (89)	8" (203)
1-1/4" (DN32)	VSR-S Flow Switch[3]	1" NPT	16-1/2" (419)	15" (381)	1-1/2" (38)	6-3/32" (155)	6-11/32" (161)	4-3/16" (107)	8-9/16" (218)
1-1/2" (DN40)	VSR-S Flow Switch[3]	1" NPT	16-1/2" (419)	15" (381)	1-1/2" (38)	6-7/32" (158)	6-15/16" (164)	4-5/16" (110)	9-11/16" (246)
2" (DN50)	VSR Flow Switch[4]	1-1/4" NPT	14-1/2" (369)	13" (330)	-1/2" (-12)[2]	6-7/16" (164)	5-51/64" (148)	5" (127)	9-23/64" (238)

[1] The body of the 1" manifold is comprised of four 1" nipples and three tee's.
[2] Dimension E is negative because the ball valve extends below the end of the manifold body.
[3] Mounted with included nipple (As shown above)
[4] Mounted with included U bolt (Not Shown)

Note: Dimensions may vary by ± 1/4" (6.3 mm)

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BlazeMaster® Fire Protection Fittings – STANDARD

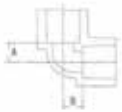
ELBOWS

5006

45° Elbow

UNIV. FIG. NO.	NOM. SIZE	APPROX. NET WT./LBS.	DIM. J INCHES	JOINT
5006	3/4"	0.08	0.32	SXS
5006	1"	0.12	0.39	SXS
5006	1-1/4"	0.18	0.48	SXS
5006	1-1/2"	0.30	0.47	SXS
5006	2"	0.54	0.58	SXS
5006	2-1/2"	1.00	0.65	SXS
5006	3"	1.29	0.76	SXS

5007
5007-R



90° Elbow

UNIV. FIG. NO.	NOM. SIZE	APPROX. NET WT./LBS.	DIM. A INCHES	DIM. B INCHES	JOINT
5007	3/4"	0.08	0.59	0.59	SXS
5007	1"	0.14	0.69	0.69	SXS
5007	1-1/4"	0.22	0.91	0.91	SXS
5007	1-1/2"	0.41	1.06	1.06	SXS
5007	2"	0.80	1.24	1.24	SXS
5007	2-1/2"	1.16	1.50	1.50	SXS
5007	3"	1.96	1.81	1.81	SXS
5007-R	1"x3/4"	0.12	0.61	0.75	SXS

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BlazeMaster® Fire Protection Fittings – STANDARD

TEES

5011
5011-R

Tees

UNIV. FIG. NO.	NOM. NOM. SIZE	APPROX. NET WT./LBS.	DIM. A INCHES	DIM. B INCHES	DIM. C INCHES	JOINT
5011	3/4"	0.10	0.57	0.57	0.57	SXSXS
5011	1"	0.17	0.69	0.69	0.69	SXSXS
5011	1-1/4"	0.28	0.83	0.83	0.83	SXSXS
5011	1-1/2"	0.38	1.05	1.05	1.05	SXSXS
5011	2"	0.62	1.25	1.25	1.25	SXSXS
5011	2-1/2"	1.08	1.53	1.53	1.53	SXSXS
5011	3"	2.14	1.84	1.84	1.84	SXSXS
5011-R	3/4"x3/4"x1"	0.14	0.70	0.70	0.73	SXSXS
5011-R	1"x1"x3/4"	0.16	0.81	0.81	0.94	SXSXS
5011-R	1"x3/4"x1"	0.20	0.76	0.90	0.70	SXSXS
5011-R	1"x3/4"x3/4"	0.15	0.80	0.87	0.77	SXSXS
5011-R	1-1/4"x1-1/4"x1"	0.24	0.73	0.73	0.85	SXSXS
5011-R	1-1/4"x1-1/4"x3/4"	0.20	0.80	0.80	0.89	SXSXS
5011-R	1-1/4"x1"x1-1/4"	0.29	0.88	1.03	0.87	SXSXS
5011-R	1-1/4"x1"x1"	0.24	0.71	0.90	0.89	SXSXS
5011-R	1-1/4"x1"x3/4"	0.20	0.81	0.76	0.99	SXSXS
5011-R	1-1/4"x1-1/4"x1-1/2"	0.44	1.01	1.01	0.88	SXSXS
5011-R	1-1/2"x1-1/2"x1-1/4"	0.48	0.89	0.89	1.04	SXSXS
5011-R	1-1/2"x1-1/2"x1"	0.54	0.77	0.77	0.98	SXSXS
5011-R	1-1/2"x1-1/2"x3/4"	0.50	0.67	0.67	1.04	SXSXS
5011-R	1-1/2"x1-1/4"x1"	0.40	0.72	0.59	1.01	SXSXS
5011-R	1-1/2"x1-1/4"x3/4"	0.36	0.69	0.78	1.02	SXSXS
5011-R	1-1/2"x1-1/2"x2"	0.88	1.30	1.30	1.14	SXSXS
5011-R	2"x2"x1-1/2"	0.86	1.06	1.00	1.30	SXSXS
5011-R	2"x2"x1-1/4"	0.87	1.00	1.00	1.29	SXSXS
5011-R	2"x2"x1"	0.72	0.80	0.80	1.35	SXSXS
5011-R	2"x2"x3/4"	0.68	0.70	0.70	1.25	SXSXS
5011-R	2-1/2"x2-1/2"x2"	1.83	1.53	1.53	1.53	SXSXS
5011-R	2-1/2"x2-1/2"x1-1/2"	1.94	1.53	1.53	2.08	SXSXS
5011-R	2-1/2"x2-1/2"x1-1/4"	1.95	1.53	1.53	2.47	SXSXS
5011-R	2-1/2"x2-1/2"x1"	1.94	1.53	1.53	2.58	SXSXS
5011-R	3"x3"x2-1/2"	2.61	1.84	1.84	2.45	SXSXS
5011-R	3"x3"x2"	1.86	1.36	1.36	1.92	SXSXS
5011-R	3"x3"x1-1/2"	2.57	1.84	1.84	2.55	SXSXS

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BlazeMaster® Fire Protection Fittings – STANDARD

ADAPTERS

5001-G

Grooved Coupling Adapters (G x S)

UNIV. FIG. NO.	NOM. SIZE	APPROX. NET WT./LBS.	DIM. A INCHES	DIM. B INCHES	DIM. C INCHES	JOINT
5001-G	1-1/4"	0.17	0.83	1.04	2.99	GXS
5001-G	1-1/2"	0.20	0.95	1.17	3.15	GXS
5001-G	2"	0.30	1.16	1.43	3.37	GXS
5001-G	2-1/2"	0.52	1.43	1.74	3.68	GXS
5001-G	3"	0.72	3.50	—	—	GXS

BUSHINGS

5018

Bushing

UNIV. FIG. NO.	NOM. SIZE	APPROX. NET WT./LBS.	DIM. L INCHES	DIM. N INCHES	JOINT
5018	1"x3/4"	0.04	1.28	0.29	SPGXS
5018	1-1/4"x1"	0.08	1.41	0.29	SPGXS
5018	1-1/4"x3/4"	0.10	1.41	0.41	SPGXS
5018	1-1/2"x1-1/4"	0.07	1.54	0.27	SPGXS
5018	1-1/2"x1"	0.12	1.54	0.39	SPGXS
5018	1-1/2"x3/4"	0.16	1.54	0.53	SPGXS
5018	2"x1-1/2"	0.16	1.66	0.27	SPGXS
5018	2"x1-1/4"	0.20	1.66	0.40	SPGXS
5018	2"x1"	0.22	1.66	0.52	SPGXS
5018	2"x3/4"	0.22	1.66	0.64	SPGXS
5018	2-1/2"x2"	0.24	1.94	0.44	SPGXS
5018	2-1/2"x1-1/2"	0.36	1.94	0.57	SPGXS
5018	2-1/2"x1-1/4"	0.37	1.94	0.69	SPGXS
5018	3"x2-1/2"	0.47	2.42	0.60	SPGXS
5018	3"x2"	0.60	2.42	0.93	SPGXS

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Form No. F_021214 Rev 14.1 1 of 1

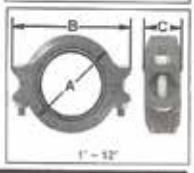
VIKING® | **TECHNICAL DATA** | **V-7705 STANDARD FLEXIBLE COUPLING**

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

DESCRIPTION

The VGS Model V-7705 flexible coupling is designed for use in a variety of piping applications of moderate or high pressure services. Working pressure is usually dictated by the wall thickness and rating of the pipe being used. The Model V-7705 coupling features flexibility that can deal with misalignment, distortion, thermal stress, vibration, noise, and also resist seismic tremors.

Sizes available: 1" ~ 12" / 25.4 mm ~ 304.8 mm
Gap seal gaskets available as V-7705F (1 1/4" - 8")
Galvanized couplings available as V-7705G and V-7705FG (Gap seal)
Working Pressure: Up to 300 psi / 20.7 bar



LISTINGS AND APPROVALS

c UL us FM APPROVED

Viking Technical Data may be found on The Viking Corporation's Web site at http://www.vikinggroupinc.com. The Web site may include a more recent edition of this Technical Data Page.

Table 1: V-7705

Nominal Size mm/in	Pip O.D. mm/in	Max. Working Pressure Bar/PSI	Max. End Load kN/Lbs	Axial Displacement	Dimensions A mm/in	B mm/in	C mm/in	Bolt Size No.	Bolt Size In	Weight Kgs/Lbs
25 1	33.4 1.315	20.7 300	1.75 406	1.6 0.0625	56 2.20	100 3.94	45 1.77	2	3/8 x 1-3/4	0.6 1.3
32 1.25	42.2 1.660	20.7 300	2.79 649	1.6 0.0625	66 2.59	104 4.09	47 1.85	2	3/8 x 2-1/8	0.6 1.4
40 1.5	48.3 1.900	20.7 300	3.66 850	3.2 0.125	72 2.83	108 4.25	46 1.81	2	3/8 x 2-1/8	0.7 1.6
50 2	60.3 2.375	20.7 300	5.71 1330	3.2 0.125	86 3.39	129 5.08	48 1.89	2	3/8 x 2-1/8	0.9 1.9
65 2.5	73.0 2.875	20.7 300	8.37 1950	1.6 0.0625	97 3.82	142 5.59	48 1.89	2	3/8 x 2-1/8	1.9 2.0
80 3	88.9 3.500	20.7 300	12.41 2885	3.2 0.125	114 4.49	163 6.42	48 1.89	2	1/2 x 3	1.4 3.1
100 4	114.3 4.500	20.7 300	24.77 4771	3.2 0.125	148 5.83	197 7.76	52 2.05	2	1/2 x 3	2.0 4.6
125 5	141.3 5.563	20.7 300	32.45 7290	3.2 0.125	172 6.77	234 9.21	52 2.05	2	5/8 x 3-1/2	2.9 6.3
150 6	168.3 6.625	20.7 300	46.02 10340	3.2 0.125	200 7.87	268 10.55	54 2.13	2	5/8 x 3-1/2	3.3 7.3
200 8	219.1 8.625	20.7 300	78.00 17525	6.4 0.250	263 10.35	337 13.27	62 2.44	2	5/8 x 3-1/2	5.5 12.1
250 10	243.0 10.750	20.7 300	121.19 27226	3.2 0.125	324 12.76	394 15.51	67 2.64	2	3/4 x 4-3/4	8.9 19.7
300 12	329.9 12.750	20.7 300	170.47 38302	4.80 0.189	372 14.65	450 17.72	67 2.64	2	7/8 x 6-1/2	10.9 25.1

Table 2: Approved Pipe and End Types

V-7705
Schedule 40, Cut Goove - Schedule 40, Roll Groove - Schedule 30, Cut Goove - Schedule 30, Roll Groove - Allied Tube & Conduit, "XL" - Allied Tube & Conduit, "BLT" - Allied Tube & Conduit, "Dyna-Thread" - Wheatland Tube, "Mega-Thread" - **Schedule 10, Roll Groove** - Allied Tube & Conduit, "Dyna-Flow" - Bullmoose Tube, "EDDY-Flow" - Bullmoose Tube, "EDDYlite" - Wheatland Tube, "Mega-Flow"

(New Page)

CSI #: 21 13 00

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Revision 12/15/2008

Fig. 98 - Rod Stiffener
Fig. 98B - Rod Stiffener w/Break-off Bolt Head

Size Range – Secures 3/8" thru 7/8" hanger rod
Material – Carbon Steel
Function – Secures channel to hanger rod for vertical seismic bracing.
Approvals – Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development (**OSHPD**). For additional load, spacing and placement information relating to OSHPD projects, please refer to the TOLCO Seismic Restraint Systems Guidelines
Finish – Electro Galvanized
Note – Available in HDG finish or Stainless Steel materials.
Order By – Figure number

Component of State of California OSHPD Approved Seismic Restraints System

FIG. 98

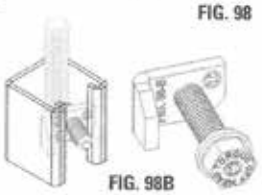


FIG. 98B

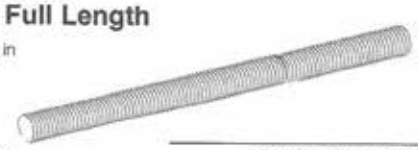
Fig. 99 - All Thread Rod Cut to Length

Size Range – Secures 3/8" thru 7/8" rod in 1" increments
Material – Carbon Steel
Maximum Temperature – 750°F
Finish – Plain
Note – Available in Electro-Galvanized and HDG finish or Stainless Steel materials.
Order By – Figure number, rod diameter, rod length and finish

Dimensions	
Rod Size	Max. Rec. Load Lbs. For Service Temp 650°F
3/8	730
1/2	1350
5/8	2160
3/4	3230
7/8	4480

Fig. 100 - All Thread Rod Full Length

Size Range – Secures 3/8" thru 1½" rod in 10' lengths
Material – Carbon Steel
Maximum Temperature – 750°F
Finish – Plain
Note – Available in Electro-Galvanized and HDG finish or Stainless Steel materials.
Order By – Figure number, rod diameter and finish



Dimensions • Weights		
Rod Size	Max Rec. Load Lbs. For Service Temps 650°F	Approx. Wt./100
1/4	240	12
3/8	730	29
1/2	1350	53
5/8	2160	84
3/4	3230	123
7/8	4480	169
1	5900	222
1¼	9500	360
1½	13800	510

72

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sediment in the diaphragm sensor
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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
- 1∅ / 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.

CSI #: 21 13 00

CADDY

Features

- Eliminates wood "blocking" materials and labor
- No spacer or backup blocks required
- Fastest offset CPVC support
- Positions CPVC pipe 1-1/2" off the surface
- Available for 3/4" - 2" CPVC pipe

c UL us

CADDY

Stand-Off 2-Hole Strap Hanger

For CPVC Fire Protection Piping

Installation

1. Snap strap over CPVC pipe.

2. Squeeze strap back around pipe. (NOTE: Pipe must be allowed to move freely)

3. Fasten the strap to the wood surface using the two screws provided. (#10 x 1 hex washer head unslotted, self-tapping.)

The 50 series hanger for CPVC pipe was tested on a 3/8" thick OSB web, composite wood joist without the use of a traditional wood block and passed the UL 203 test criteria.

No Backup Blocks Are Required!

COMPLIES WITH STATIC LOAD REQUIREMENTS OF NFPA13

ERICO

CSI #: 21 13 00

VIKING®

TECHNICAL DATA

FREEDOM® RESIDENTIAL UPRIGHT LEAD FREE SPRINKLER VK4670 (K4.9)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

1. DESCRIPTION

Viking Freedom® Residential Upright Lead Free* Sprinkler VK4670 is a small, thermosensitive, glass-bulb residential sprinkler available in several different finishes and temperature ratings to meet varying design requirements. The orifice design, with a K-Factor of 4.9 (70.6 metric†), allows efficient use of available water supplies for the hydraulically designed fire-protection system. The glass bulb operating element and special deflector characteristics meet the challenges of residential sprinkler standards.

* Lead content complies with the definition of 'Lead Free' established in the Reduction of Lead in Drinking Water Act (S.3874) endorsed by AWWA's Water Utility Council, and California Assembly Bill #1953.

2. LISTINGS AND APPROVALS

UL Listed (C-UL-US-EU): Category VKKW

UL Classified to: NSF/ANSI Standard 61, Drinking Water System Components and NSF 372 (MH48034). Refer to the Approval Chart Design Criteria for C-UL-US-EU Listing requirements that must be followed.

3. TECHNICAL DATA

Specifications:
Minimum Operating Pressure: Refer to the Approval Chart.
Maximum Working Pressure: 175 psi (12 bar). Factory tested hydrostatically to 500 psi (34.5 bar).
Thread size: 1/2" (15 mm) NPT
Nominal K-Factor: 4.9 U.S. (70.6 metric†)
†Metric K-factor measurement shown is in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.
Glass-bulb fluid temperature rated to -65 °F (-55 °C)
Overall Length: 2-1/4" (58 mm)

Material Standards:
Frame Casting: Brass UNS-C89833
Deflector: Brass UNS-C23000 or Bronze UNS-C22000
Bulb: Glass, nominal 3 mm diameter
Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with Polytetrafluoroethylene (PTFE) Tape
Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400
Compression Screw: Brass UNS-C36000

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Ordering Information: (Also refer to the current Viking price list.)
Sprinkler: Base Part No. 19442
Order Lead Freed Sprinkler VK4670 by first adding the appropriate suffix for the sprinkler finish and then the appropriate suffix for the temperature rating to the sprinkler base part number.
Finish Suffix: Brass = A, Chrome = F, White Polyester = M-/W, and Black Polyester = M-/B
Temperature Suffix: 155 °F (68 °C) = B, 175 °F (79 °C) = D
For example, sprinkler VK4670 with a Brass finish and a 155 °F (68 °C) temperature rating = Part No. 19442AB.
Available Finishes And Temperature Ratings:
Refer to Table 1.
Accessories: (Also refer to the "Sprinkler Accessories" section of the Viking data book.)
Sprinkler Wrenches:
A. Standard Wrench: Part No. 10896W/B (available since 2000)
Sprinkler Cabinets:
A. Six-head capacity: Part No. 01724A (available since 1971)
B. Twelve-head capacity: Part No. 01725A (available since 1971)

CSI #: 21 13 00

VIKING®

TECHNICAL DATA

FREEDOM® RESIDENTIAL UPRIGHT LEAD FREE SPRINKLER VK4670 (K4.9)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

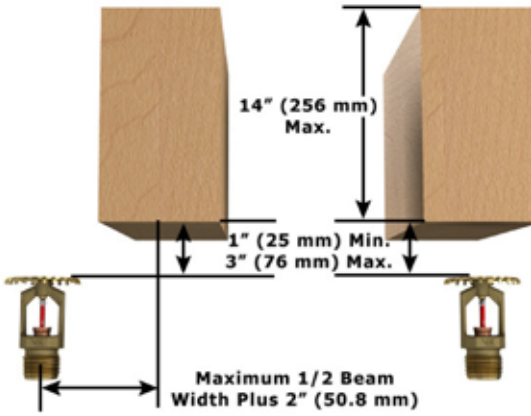


Figure 2: Sprinkler Positioning Under Primary Beams

Figure 3: Sprinkler Positioning Under Primary Beams

Form No. F_061314 Rev 14.1

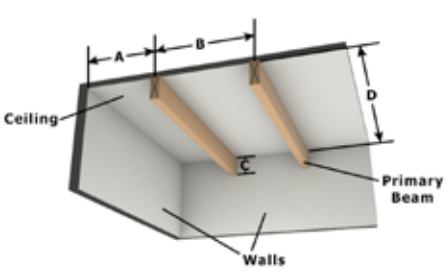
CSI #: 21 13 00

VIKING®

TECHNICAL DATA

FREEDOM® RESIDENTIAL UPRIGHT LEAD FREE SPRINKLER VK4670 (K4.9)

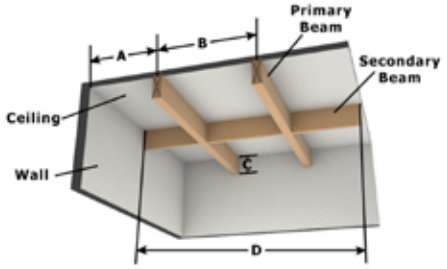
The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com



All dimensions are measured to wall faces and to centerlines of beams.

A = Distance from wall to nearest primary beam:
Minimum: 3 ft 4 in (1.0 m).
Maximum: No more than 1/2 listed sprinkler spacing.
B = Spacing between primary beams: 16 ft (4.9 m) maximum
C = Beam depth: 14" (356 mm) maximum
D = Beam span: 20 ft (6.1 m) maximum

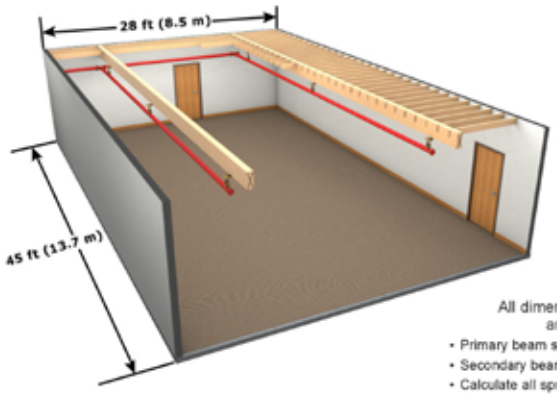
Figure 4A: Primary Beam Spans up to 20 ft (6.1 m)



All dimensions are measured to wall faces and to centerlines of beams.

A = Distance from wall to nearest primary beam:
Minimum: 3 ft 4 in (1.0 m).
Maximum: No more than 1/2 listed sprinkler spacing.
B = Spacing between primary beams: 16 ft (4.9 m) maximum
C = Beam depth: 14" (356 mm) maximum
D = 20 ft (6.1 m) maximum for secondary beams that are to be equal in depth for primary beams and that are required so that primary beam pockets do not exceed 20 ft (6.1 m).

Figure 4B: Primary Beam Spans over 20 ft (6.1 m)



EXAMPLE

All dimensions are measured to wall faces and to centerlines of beams.

- Primary beam spans exceeding 20 ft (6.1 m)
- Secondary beams or baffles not required
- Calculate all sprinklers in compartment

(Above example 6 sprinklers)

Figure 5: Alternate Entire Compartment Protection Scheme Example

Form No. F_061314 Rev 14.1

(New Page)

CSI #: 21 13 00

Bulletin 006 Rev. I

Reliable®

Model RFC30 (SIN RA0611)
Model RFC43 (SIN RA0612)
Model RFC49 (SIN RA0616)
Residential Flat Concealed Sprinklers

Bulletin 006 Rev. I

A Residential Flat Concealed Sprinkler engineered for a minimum design density of 0.05 gpm/ft² with low GPM requirements.

Features

1. Very low water flow requirements.
2. Cover plate attachment (Plain or Perforated) with ½" (13mm) Total adjustment.
3. Thread-On/Thread-Off or Push-On/Thread Off cover attachment option.
4. Smooth aesthetic ceiling profile.
5. Available in brass, chrome and black plated or painted finishes.

Listings & Approval

1. Listed by Underwriters Laboratories, and certified by UL for Canada (cULus)

UL Listing Categories

Residential Automatic Sprinklers

UL Guide Number

VKKW

Plain Cover Plate

Perforated Cover Plate

Product Description

Model RFC30, RFC43 and RFC49 Concealed Residential Sprinklers are fast response residential fusible solder link automatic sprinklers. Residential sprinklers differ from standard sprinklers primarily in their response time and water distribution patterns.

Model RFC30, RFC43 and RFC49 sprinklers discharge water in a hemispherical pattern below the sprinkler deflector. Residential distribution patterns are higher and generally contain a finer droplet size than standard sprinkler patterns.

The combination of speed of operation and high discharge pattern required for residential sprinklers has demonstrated, in fire testing, an ability for controlling residential fires, and thereby providing significant evacuation time for occupants.

The RFC30, RFC43 and RFC49 Sprinklers provide the best form of fire protection by combining an attractive appearance and ½" (13mm) of cover adjustment for ease of installation. The small diameter cover plate is easily and positively attached and blends into the ceiling, concealing the most dependable fire protection available, an automatic sprinkler system.

The RFC30, RFC43 and RFC49 are UL Listed Residential Sprinklers to be installed in the residential portions of any occupancy in accordance with NFPA 13, 13R, & 13D.

The RFC30, RFC43 and RFC49 can reduce the need for precise cutting of drop nipples. The threaded cover plate assembly can be adjusted without tools to fit accurately against the ceiling. The fire protection system need not be shut down to adjust or remove the cover plate assembly.

Reliable Automatic Sprinkler Co., Inc., 103 Fairview Park Drive, Elmsford, New York 10523

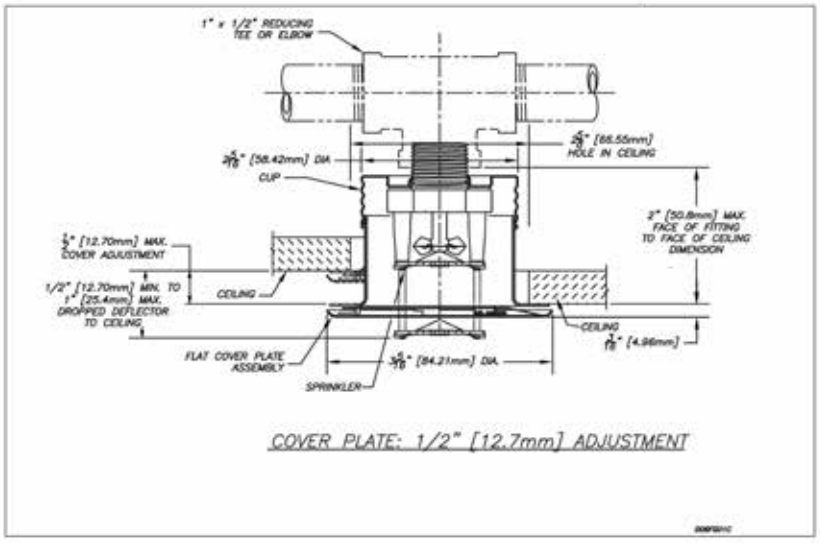
CSI #: 21 13 00

Ordering Information
Specify:
1. Sprinkler Model
2. Cover Plate Finish
3. Thread-On or Push-On Feature

Cover Plate Finishes[1]

Standard Finishes
Chrome
White Paint
Special Application Finishes[2]
Bright Brass
Finished Bronze
Black Plating
Black Paint
Off White
Satin Chrome

[1] Other finishes and colors are available on special order. Consult factory for details. Coverplate custom paint is semi-gloss, unless specified otherwise.
[2] For the perforated style coverplate, consult factory for availability on these and other custom finishes.



COVER PLATE: 1/2" [12.7mm] ADJUSTMENT

The equipment presented in this bulletin is to be installed in accordance with the latest published 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 90 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
Reliable®

Reliable Automatic Sprinkler Co., Inc.
(800) 431-1588 Sales Offices
(800) 848-6051 Sales Fax
(914) 829-2042 Corporate Offices
www.reliablesprinkler.com Internet Address

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Revision lines indicate updated or new data.
EG Printed in U.S.A. 11/14 P/N 9999970261

CSI #: 21 13 00

Bulletin 135 Rev. M

Reliable®

Model F1 Residential Sprinklers for Design Density of .05 gpm/ft²

Bulletin 135 Rev. M

Model F1 Res Sprinklers engineered for the lowest flows to meet the minimum design density of .05 gpm/ft²

Types:

1. F1 Res 30 Pendent
2. F1 Res 30 Recessed Pendent/F2
3. F1 Res 30 Recessed Pendent/FP
4. F1 Res 49 Pendent
5. F1 Res 49 Recessed Pendent/F1
6. F1 Res 49 Recessed Pendent/FP
7. F1 Res 58 Pendent
8. F1 Res 58 Recessed Pendent/F1
9. F1 Res 58 Recessed Pendent/FP
10. F1 Res 76 Pendent
11. F1 Res 76 Recessed Pendent/F1
12. F1 Res 76 Recessed Pendent/FP
13. F1 Res 30 CCP Pendent
14. F1 Res 49 CCP Pendent
15. F1 Res 58 CCP Pendent
16. F1 Res 76 CCP Pendent
17. F1 Res 44 HSW
18. F1 Res 44 Recessed HSW/F2
19. F1 Res 58 HSW
20. F1 Res 58 HSWX
21. KRes58 HSWX
22. F1 Res 58 HSW Recessed HSW/F2
23. F1 Res 44 SWC

F1 Res 30, 49, 58 & 76 Recessed Pendent /F1

F1 Res 30, 49, 58 & 76 Recessed Pendent /FP

F1 Res 58 HSWX

F1 Res 30, 49, 58 & 76 CCP Pendent

F1 Res 44 & 58 Recessed HSW/F2

F1 Res 44 SWC

Listings & Approvals

1. Listed by Underwriters Laboratories Inc. and UL Certified for Canada. (cULus)

Sprinklers for .10 Density: Refer to Bulletin 176

UL Listing Category

Residential Automatic Sprinkler

UL Guide Number

VK/KW

Patents

US Patent No. 6,516,893 applies to the Model F1 Res 49 & 58 Pendent Sprinklers
US Patent No. 7,353,882 applies to Model F1 Res 44 & 58 HSW Sprinklers
US Patent No. 7,784,555 applies to Model F1 Res 44 SWC Sprinklers

Product Description

Model F1 Res Pendent sprinklers (Figs. 1, 2, 3, & 4) are fast response sprinklers combining excellent durability, high sensitivity glass-bulb and low profile decorative design. The F1 Res Horizontal Sidewall sprinklers (Figs. 5, 6 & 7) are equally attractive when above ceiling piping cannot be used.

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 element, glass bulb or link to actuate, releasing the waterway for water flow onto the deflector, evenly distributing the discharged water to control a fire.

Technical Data:

- Thermal Sensor: Soldered Element (Link) or Nominal 3mm glass-bulb
- Sprinkler Frame: Brass Casting
- Sprinklers' Pressure Rating: 175 psi
  Factory Hydrostatically Tested to 500 psi
- Thread Size: ½" NPT (R½)
- K Factor: 3.0 (43.2) (Actual) - F1 Res 30 Pendent Sprinkler
  4.9 (70.6) (Actual) - F1 Res 49 Pendent Sprinkler
  5.8 (83.5) (Actual) - F1 Res 58 Pendent & HSW Sprinkler
  7.6 (109) (Actual) - F1 Res 76 Pendent Sprinkler
  4.4 (63) (Actual) - F1 Res 44 HSW Sprinkler
- Density: Minimum 0.05 gpm/ft²

Reliable Automatic Sprinkler Co., Inc., 103 Fairview Park Drive, Elmsford, New York 10523

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Application

Model F1 Res Sprinklers are used for Residential Fire Protection according to UL 1626 Standard*. For ceiling types: Smooth Flat Horizontal, or beamed, or sloped, in accordance with NFPA 13D, 13R, or 13 2013 editions. 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.

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 & SWC 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. Install F1 Res 44 with a ceiling to deflector distance of 4" - 12". Flow arrow on deflector must point away from near wall and "Top" marking must face ceiling.

Escutcheon*, F1 or F2, Data:

Type	Adjustment Inch (mm)	"A" Inch (mm)	Face of fitting to ceiling Inch (mm)	"B" Deflector Distance below bottom of beam Inch (mm)
F1	¾ (19.0)	Min. Recessed = 1⅝ (41.3) Max. Recessed = ⅞ (22.2)	⅜ (9.5) 1⅛ (28.6)	1¾ (44.4) 1 (25.4)
F2	½ (12.7)	Min. Recessed = 1⅝ (41.3) Max. Recessed = 1⅛ (28.6)	⅜ (9.5) ⅞ (22.2)	1¾ (44.4) 1¼ (31.7)

* **Note:** Escutcheons F1 or F2 may be used with Model F1 Res 49, 58 & 76 Recessed Pendent Sprinkler

- Model F1 Res 30, 49, 58 & 76 Pendent

- Model F1 Res 30 Recessed Pendent / F2
- Model F1 Res 49, 58 & 76 Recessed Pendent / F1

F1 escutcheon, ¾" (19mm) adjustment

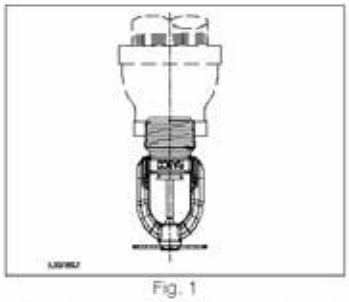


Fig. 1

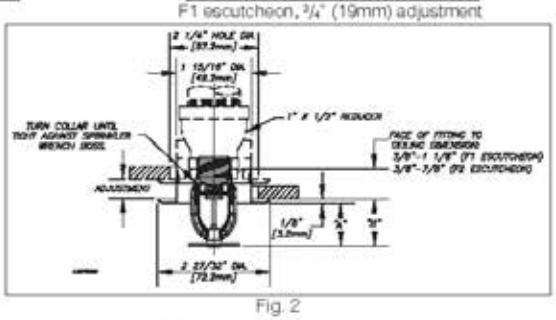


Fig. 2

Technical Data: F1Res 30 Pendent and Recessed Pendent (SIN R3511)

Thread Size	Nominal Orifice Inch (mm)	Max. Pressure psi (bar)	Sprinkler Temp. Rating °F	°C	Max. Ambient Temp. °F	°C	Actual K Factor	Sprinkler Length Inch (mm)
½" NPT (R½)	17/64" (6.2)	175 (12)	155 175	68 79	100	38	3.0 (43.2)	2.25 (57)

Max. Coverage area Ft x Ft (m x m)	Max. Spacing Ft (m)	Ordinary Temp. Rating (155°F/68°C) Flow GPM (L/min)	Pressure PSI (bar)	Intermediate Temp. Rating (175°F/79°C) Flow GPM (L/min)	Pressure PSI (bar)	Top of Deflector to Ceiling Inch (mm)	Minimum Spacing Ft (m)
12 x 12 (3,6 x 3,6)	12 (3,6)	8 (30,3)	7.0 (0,48)	8 (30,3)	7.0 (0,48)	Smooth Ceilings 1¼ to 4 (31.7 to 102) using F2 escutcheon Beamed Ceilings per NFPA 13D, 13R or 13 installed in beams 1¼ to 1¾ (31.7 to 44.4) using F2 escutcheon	8 (2,4)
14 x 14 (4,3 x 4,3)	14 (4,3)	10 (37,8)	11 (0,76)	10 (37,8)	11 (0,76)		
16 x 16 (4,9 x 4,9)	16 (4,9)	13 (49)	18.8 (1,3)	13 (49)	18.8 (1,3)		

For Ceiling types refer to NFPA 13, 13R or 13D

2.

CSI #: 21 13 00

Technical Data: F1 Res 76 Pendent and Recessed Pendent (SIN R7618)

Thread Size	Nominal Orifice Inch (mm)	Max. Pressure psi (bar)	Sprinkler Temp. Rating °F	°C	Max. Ambient Temp. °F	°C	K Factor	Sprinkler Length Inch (mm)
¾" NPT (R¾)	17/32" (13.5)	175 (12)	155 175	68 79	100 150	38 66	7.6 (109)	2.25 (57)

Max. Coverage area Ft x Ft (m x m)	Max. Spacing Ft (m)	Ordinary Temp. Rating (155°F/68°C) Flow GPM (L/min)	Pressure PSI (bar)	Intermediate Temp. Rating (175°F/79°C) Flow GPM (L/min)	Pressure PSI (bar)	Top of Deflector to Ceiling Inch (mm)	Minimum Spacing Ft (m)
12 x 12 (3,6 x 3,6)	12 (3,6)	21 (79,5)	7.6 (0,53)	21 (79,5)	7.6 (0,53)	Smooth Ceilings 4¼ to 8 (108 to 203) using F2 escutcheon. 4 to 8 (100 to 203) using F1 escutcheon. Beamed Ceilings per NFPA 13D, 13R or 13 installed in beams 4¼ to 8 (108 to 203) using F2 escutcheon, 4 to 8 (100 to 203) using F1 escutcheon	8 (2,4)
14 x 14 (4,3 x 4,3)	14 (4,3)	21 (79,5)	7.6 (0,53)	21 (79,5)	7.6 (0,53)		
16 x 16 (4,9 x 4,9)	16 (4,9)	21 (79,5)	7.6 (0,53)	21 (79,5)	7.6 (0,53)		
18 x 18 (5,5 x 5,5)	18 (5,5)	21 (79,5)	7.6 (0,53)	21 (79,5)	7.6 (0,53)		
20 x 20 (6,1 x 6,1)	20 (6,1)	23 (87,1)	9.2 (0,63)	23 (87,1)	9.2 (0,63)		

For Ceiling types refer to NFPA 13, 13R or 13D

- Model F1 Res 30, 49, 58 & 76 CCP Pendent*

* Not listed for corrosion resistance

- Model F1 Res 30, 49, 58 & 76 Recessed Pendent / FP

FP push-on/thread-off escutcheon

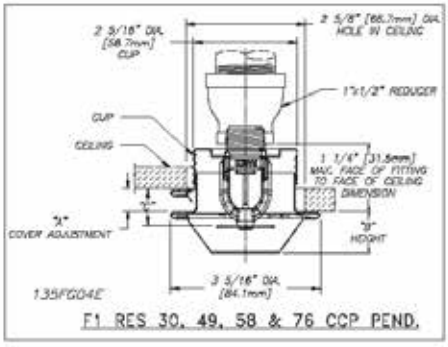


Fig. 3

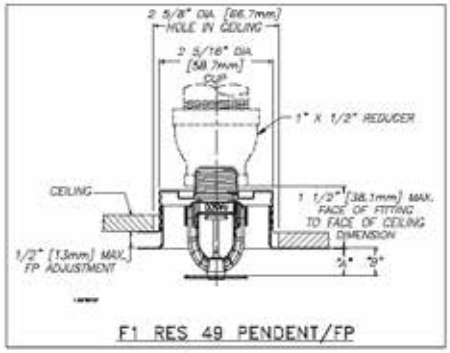


Fig. 4

Note: The F1 Res 76 will use a 1" x ½" reducer.

CCP Cover Plate Data:

"A" Cover Adjustment Inch (mm)	"B" CCP Height Inch (mm)	"C" Deflector Distance below bottom of beam Inch (mm)
½ (12.7)	15/16 (24)	½ (13) - 1 (25.4)
5/16 (7.9)	¾ (19)	½ (13) - 1 (25.4)

FP Escutcheon Data:

FP Position	"A" Inch (mm)	"B" Deflector Distance below bottom of beam Inch (mm)
Max. Recessed	7/16 (11)	½ (12.7)
Min. Recessed	15/16 (24)	1 (25.4)

Note: Sprinklers shown in Fig. 3 and Fig. 4 are not suitable for installation in ceilings which have positive pressure in the space above.

4.

CSI #: 21 13 00

Technical Data: F1 Res 76 Pendent and Recessed Pendent (SIN R7618)

Thread Size	Nominal Orifice Inch (mm)	Max. Pressure psi (bar)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	Max. Ambient Temp. °F	Max. Ambient Temp. °C	K Factor	Sprinkler Length Inch (mm)
¾" NPT (R¾)	17/32" (13.5)	175 (12)	155 175	68 79	100 150	38 66	7.6 (109)	2.25 (57)

Max. Coverage area Ft x Ft (m x m)	Max. Spacing Ft (m)	Ordinary Temp. Rating (155°F/68°C) Flow GPM (L/min)	Ordinary Temp. Rating (155°F/68°C) Pressure PSI (bar)	Intermediate Temp. Rating (175°F/79°C) Flow GPM (L/min)	Intermediate Temp. Rating (175°F/79°C) Pressure PSI (bar)	Top of Deflector to Ceiling Inch (mm)	Minimum Spacing Ft (m)
12 x 12 (3,6 x 3,6)	12 (3,6)	21 (79,5)	7.6 (0,53)	21 (79,5)	7.6 (0,53)	Smooth Ceilings 4¼ to 8 (108 to 203) using F2 escutcheon 4 to 8 (100 to 203) using F1 escutcheon Beamed Ceilings per NFPA 13D, 13R or 13 installed in beams 4¼ to 8 (108 to 203) using F2 escutcheon, 4 to 8 (100 to 203) using F1 escutcheon	8 (2,4)
14 x 14 (4,3 x 4,3)	14 (4,3)	21 (79,5)	7.6 (0,53)	21 (79,5)	7.6 (0,53)		
16 x 16 (4,9 x 4,9)	16 (4,9)	21 (79,5)	7.6 (0,53)	21 (79,5)	7.6 (0,53)		
18 x 18 (5,5 x 5,5)	18 (5,5)	21 (79,5)	7.6 (0,53)	21 (79,5)	7.6 (0,53)		
20 x 20 (6,1 x 6,1)	20 (6,1)	23 (87,1)	9.2 (0,63)	23 (87,1)	9.2 (0,63)		

For Ceiling types refer to NFPA 13, 13R or 13D

- Model F1 Res 30, 49, 58 & 76 CCP Pendent*

* Not listed for corrosion resistance

- Model F1 Res 30, 49, 58 & 76 Recessed Pendent / FP

FP push-on/thread-off escutcheon

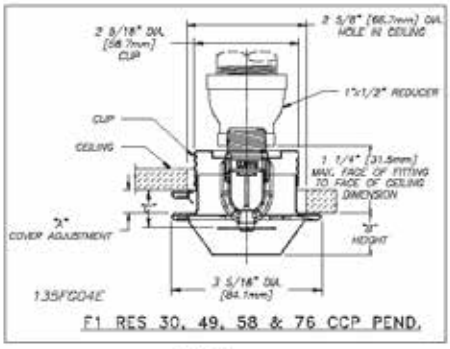


Fig. 3

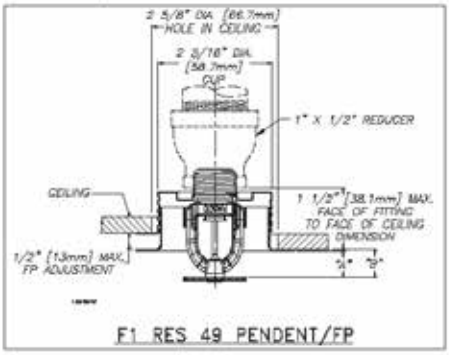


Fig. 4

Note: The F1 Res 76 will use a 1" x ¾" reducer.

CCP Cover Plate Data:

"A" Cover Adjustment Inch (mm)	"B" CCP Height Inch (mm)	"C" Deflector Distance below bottom of beam Inch (mm)
½ (12.7)	31/32 (24)	½ (13) - 1 (25.4)
5/16 (7.9)	¾ (19)	½ (13) - 1 (25.4)

FP Escutcheon Data:

FP Position	"A" Inch (mm)	"B" Deflector Distance below bottom of beam Inch (mm)
Max. Recessed	7/16 (11)	½ (12.7)
Min. Recessed	31/32 (24)	1 (25.4)

Note: Sprinklers shown in Fig. 3 and Fig. 4 are not suitable for installation in ceilings which have positive pressure in the space above.

4.

CSI #: 21 13 00

Technical Data: F1 Res 58 HSWX (SIN RA3533)

	Thread Size	Nominal Orifice Inch (mm)	Max. Pressure psi (bar)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	Max. Ambient Temp. °F	Max. Ambient Temp. °C	K Factor	Sprinkler Length Inch (mm)	Sprinkler Identification Number (SIN)
Bulb	½" NPT (R½)	½" (13)	175 (12)	155 175	68 79	100 150	38 66	5.8 (83.5)	2.45 (62)	RA3533

Max. Coverage area Ft x Ft (m x m)	Max. Spacing Ft (m)	Ordinary Temp. Rating (155°F/68°C) Flow GPM (L/min)	Ordinary Temp. Rating (155°F/68°C) Pressure PSI (bar)	Intermediate Temp. Rating (175°F/79°C) Flow GPM (L/min)	Intermediate Temp. Rating (175°F/79°C) Pressure PSI (bar)	Top of Deflector to Ceiling Inch (mm)	Minimum Spacing Ft (m)
18 x 20 (5,5 x 6,1)	18 (5,5)	30 (114)	26.8 (1,85)	30 (114)	26.8 (1,85)	4 to 6 (100 to 152); ½ (13) recessed using F2 escutcheon	8 (2,4)
20 x 20 (6,1 x 6,1)	20 (6,1)	30 (114)	26.8 (1,85)	30 (114)	26.8 (1,85)		
16 x 22 (4,9 x 7,3)	16 (4,9)	33 (125)	32.4 (2,23)	33 (125)	32.4 (2,23)		
16 x 24 (4,9 x 7,3)	16 (4,9)	38 (144)	42.9 (2,96)	38 (144)	42.9 (2,96)		
14 x 26 (4,3 x 7,9)	14 (4,3)	42 (160)	52.4 (3,75)	42 (160)	52.4 (3,75)		
18 x 20 (5,5 x 6,1)	18 (5,5)	35 (133)	36.4 (2,5)	35 (133)	36.4 (2,5)	6 to 12 (152 to 305); ½ (13) recessed using F2 escutcheon	
16 x 22 (4,9 x 6,7)	16 (4,9)	38 (144)	42.9 (2,96)	38 (144)	42.9 (2,96)		
16 x 24 (4,9 x 7,3)	16 (4,9)	42 (160)	52.4 (3,6)	42 (160)	52.4 (3,6)		
14 x 26 (4,3 x 7,9)	14 (4,3)	46 (174)	62.9 (4,34)	46 (174)	62.9 (4,34)		

For Ceiling types refer to NFPA 13, 13R or 13D

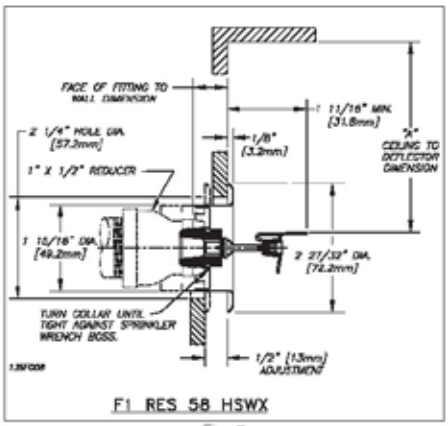
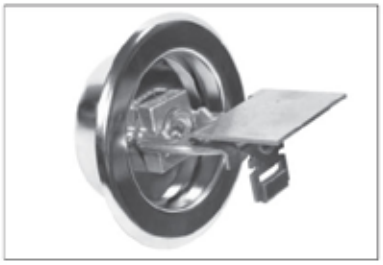


Fig. 7

- Model F1 Res 58 HSWX (Bulb)



- Model KRes58 HSWX (Link)

Division 22
Plumbing

CSI #: 22 11 13

TechData
PLUMBING
PRODUCT SPECIFICATION SHEET

viega

PureFlow® MANABLOC® Manifold Control Unit For ViegaPEX™, ViegaPEX™ Ultra and FostaPEX® SDR-9 Cross-linked Polyethylene (PEX)

Scope
This specification designates requirements for the PureFlow MANABLOC Manifold Plumbing Control Unit. The MANABLOC parallel water distribution system 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 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 and ANSI/NSF standards 14 and 61, CSA B137.5 Warnock Hersey, 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" - 1.66×10^{-3}
	1/2" - .21	1/2" - 9.997×10^{-4}
	(PSI=KxGPM²)	(BAR=KxLPM²)
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	56.98×10^{-6}
(36 Ports with "Y" Block)	(PSI=KxGPM²)	(BAR=KxLPM²)
WSFU Capacity (each side) (2006 IPC, table E103.3)	60	–

TD-PFMB 0509

viega

VIEGA
301 N. Main, 9th Floor
Wichita, KS 67202
Phone: 1-800-976-9819
Fax: 1-800-976-9817

service@viega.com
www.viega.com

CSI #: 22 11 13

PLUMBING

TechData
PRODUCT SPECIFICATION SHEET

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
NSF-pw - NSF International Performance and Health Effects (Standards 14 & 61)

- IAPMO Certified

- Intertek Testing Services (Warnock Hersey) - certification to CSA B137.5

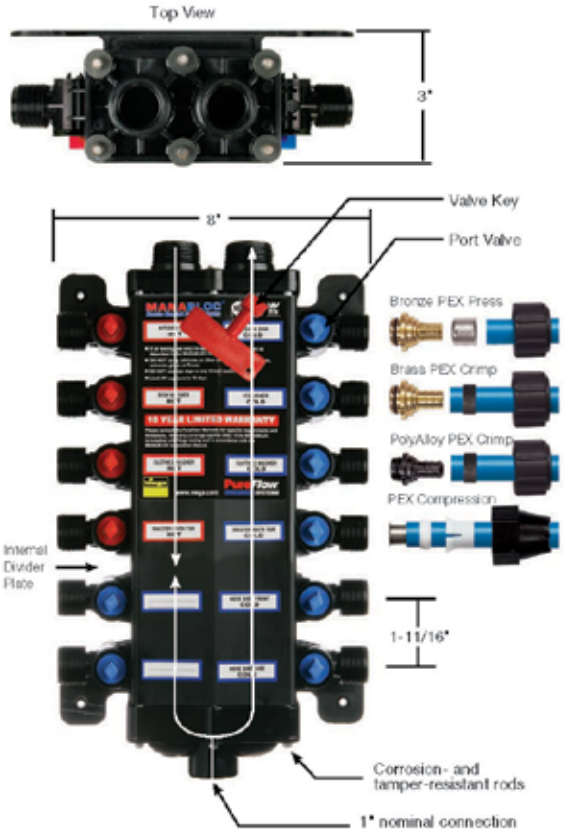
MANABLOC Dimensions

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



TD-PFMB 0509

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2 of 2

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CSI #: 22 11 23

BOOSTER SYSTEMS WITH TORRIUM®
Models: BT14-30, BT20-30, BT14-45 & BT20-40

DEPEND ON
DAVEY

WATER PRODUCTS

BT STAINLESS STEEL BOOSTER SYSTEMS

PRODUCT DESCRIPTION

Economical, compact, booster systems driven by quiet, efficient, stainless steel pumps.

The Torrium® control module replaces the conventional pressure switch and provides constant pressure without cycling. This feature also provides loss of prime protection and over-temperature cut out. The Torrium® includes an built-in accumulator.

APPLICATIONS

Ideal for boosting water pressure in :-

- Homes where the incoming municipal water supply pressure is inadequate
- From underground or surface water supplies
- Automatic water transfer
- Applications where pressure "cycling" must be avoided or where the pump may have interrupted water supply
- Domestic & light industrial irrigation

DESIGN FEATURES

PUMP
Single impeller or multistage centrifugal.

Closed vane impellers.

Unique floating impeller neckrings.

High grade stainless steel pump shaft, impeller/s, diffuser/s & casing.

Rotatable discharge through 360°.

Mechanical shaft seal.

Oring casing seals.

Torrium® control with adaptive cut-in pressure.

MOTOR
Davey designed.

2 pole, 3420rpm, 60Hz.

TEFC with IP55 enclosure.

Class F insulation.

Permanently split capacitor design.

Heavy duty cast aluminum lantern bracket and drive end endshield.

Protected against both high operating temperatures and high current by a built-in automatically resetting thermal overload.

BENEFITS

- Manufactured from highest quality corrosion resistant materials - meets ANSI/NSF61 and CSA-C/US.
- Torrium® offers even pressure without cycling
- Adaptive cut in pressure on Torrium® allows for installation on higher static head installations
- Pump protected from damage caused by dry running
- TEFC motor is corrosion resistant and excludes dust and dirt
- Motor and pump designed for frequent starts
- Discharge may be rotated through 360°, plus 12°, high quality, 304 stainless steel braided discharge hose included - reduces noise transmission through household plumbing and makes plumbing easier
- Quick and easy installation
- Low maintenance
- Easy to service if required
- Compact design
- Unique floating neckrings provide outstanding efficiency without compromising grit handling
- Low pressure loss through removable in-built check valve in Torrium®

OPERATING LIMITS

Capacities to	30 gpm
Max. total head to	76 psi
Cut-in pressure	Adapts to 80% of last shut-off head pressure
Min. setting	15 psi
Max. setting	80 psi
Cut-out flow rate	½ GPM
Max. liquid temperate	150° F
Max. ambient temperature	120° F
Max. suction lift	25'
Inlet size	1¼" F
Outlet size	1" F
Max. pump casing pressure	116 psi
Max. system pressure	100 psi

Quality Endorsed Company

CSI #: 22 11 23

TECHNICAL SPECIFICATIONS

MATERIALS OF CONSTRUCTION

PART		MATERIAL
Impellers		304 stainless steel
Lock nut		304 stainless steel
Pump casing		304 stainless steel
Pump backplate		304 stainless steel
Pump shaft		316 stainless steel
Neckrings		Teflon
Seal ring (stationary)		Ceramic
Seal ring (rotating)		Carbon (synthetic)
Seal spring		304 stainless steel
Orings		Nitrile rubber
Stage body		304 stainless steel
Torrium® check valve	Stem assembly	Nylon
	Spring	304 stainless steel
	Seal	Nitrile
Torrium® body		Glass filled nylon
Priming plug		304 stainless steel
Motor shell		Marine grade aluminum
Lantern / DE endshield		Marine grade aluminum
Shell & lantern bracket finish		Baked polyester

ELECTRICAL DATA

	BT14-30	BT20-30	BT14-45	BT20-40
Supply voltage/phase	120/1			240/1
Supply frequency	60Hz			
Input power (P_1)	0.92 kW	0.98 kW	0.86 kW	1.1 kW
Output power (P_2)	0.73 kW	0.78 kW	0.68 kW	0.92 kW
Full load current	7.8 A	8.2 A	7.3 A	4.7 A
Locked rotor current	38.0 A	38.0 A	38.0 A	23.0 A
Starting	PSC			
Insulation class	Class F			
IP rating	IP55			

INSTALLATION & PRIMING

- On installations with suction lifts a good quality foot valve should be fitted.
- The system is primed by filling the pump and suction line with water through the priming port, and replacing priming plug prior to switching on.
- The yellow push button on the Torrium® unit should be held in while the pump is establishing prime.

MODEL IDENTIFICATION

B = Booster series stainless steel pressure booster pump

T = Torrium® equipped

14-30 = Flow (gpm) at nominal pressure
14gpm @ 30psi
14-45 = 14gpm @ 45psi
20-30 = 20gpm @ 30psi
20-40 = 20gpm @ 40psi

MODEL	IMPELLERS
BT14-30	1
BT20-30	3
BT14-45	3
BT20-40	4

CSI #: 22 11 23

TORRIUM® CONTROL

THE TORRIUM® DELIVERS FLOW-ON BENEFITS

It's not easy living with water pressure problems. Poor or inconsistent water pressure can result in a broad range of problems like poor showers or slow filling dishwashers etc. That's why Davey invented the extremely clever, Torrium® Pressure System Controller. Five years in the making and thousands of hours of world wide, in-the-field testing have culminated in a Pressure System Controller that can actually think for itself.

The Torrium® can automatically adapt to changing conditions...because it has an in-built 'brain' that can out-smart every-day problems. It also means there's far less installation and maintenance issues. This unique ability to respond to changing circumstances ensures a steady, reliable flow of water is virtually guaranteed day after day, year after year.

CONSTANT FLOW

With a Torrium® system you'll hardly notice the pump start. Better still while you are using water, like in the shower, the pump doesn't cycle, overcoming those annoying temperature and pressure changes.

SIMPLIFIED FAULT FINDING

Torrium® is equipped with a status indicator to make system fault finding quicker and more accurate. Torrium® can tell you if you have a slow filling toilet cistern, a loss of prime, a slow leak, low supply voltage, water over-temperature, even if someone has tried to bypass the Torrium®!

ADAPTIVE PRESSURE SWITCH

Torrium® measures the system pressure and adapts the system cut-in pressure according to circumstances, thus providing a more reliable system with improved comfort and convenience.

LOW PRESSURE DROP

Torrium® has been designed to get the most from your pump, including pressure. The Torrium® has a very low water pressure loss through it, so that you can get the best performance at your outlets.

LOSS OF PRIME PROTECTION

If you run out of water, the last thing you need is a pump that continues to run without water. The Torrium® detects a loss of water supply (prime) and shuts the systems down. What's more it will Auto retry to re-establish prime if possible and Auto-restart on water flow return.

AUTO RETRY

Auto retry in Torrium® allows the system to reset itself after a loss of prime, thus helping reduce system downtime.

This literature is not a complete guide to product usage. Further information is available from your Davey dealer, Davey Customer Service Centre and from the relevant product Installation and Operating instructions. This data sheet must be read in conjunction with the relevant product Installation and Operating Instructions and all applicable statutory requirements. Product specifications may change without notice.
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DEPEND ON
DAVEY
WATER PRODUCTS

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Member of the CSR Group
ABN 18 066 327 517

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daveyusa.com

Offices also in Germany and New Zealand

CSI #: 22 12 00

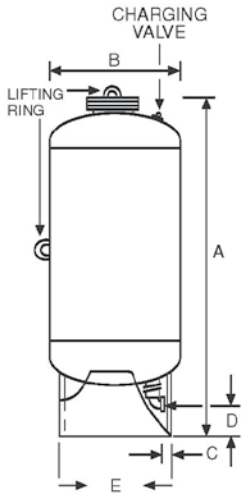
AMTROL INC

THERM-X-TROL®

Thermal Expansion Absorbers, ST-450 Series (Non-ASME)

150 PSIG Working Pressure

Model No.	Tank Vol. Lit.	Tank Vol. Gal.	0 PSIG Acc. Vol. Gal	Max. Recomm Accept. Vol. Lit.	Max. Recomm Accept. Vol. Gal	A Height mm	A Height ins.	B Diameter mm	B Diameter ins.	C mm	C ins.	D mm	D ins.	E mm	E ins.	Sys. Conn. NPTF	Ship Wt. kg	Ship Wt. lbs.
ST-451	600	158	158	386	.65	1880	74	762	30	89	3½	140	5½	608	24	2	230	508
ST-452	800	211	211	519	.65	2337	92	762	30	89	3½	140	5½	608	24	2	345	760
ST-453	1000	264	264	647	.65	2175	85⅝	914	36	114	4½	178	7	763	30	3	368	810
ST-454	1200	317	317	780	.65	2489	98	914	36	114	4½	178	7	763	30	3	415	914
ST-455	1400	370	370	908	.65	2804	110⅜	914	36	114	4½	178	7	763	30	3	462	1018
ST-456	1600	422	422	1037	.65	2080	81⅞	1220	48	191	7½	181	7⅛	1063	42	3	750	1655
ST-457	2000	528	528	1298	.65	2470	97¼	1220	48	191	7½	181	7⅛	1063	42	3	873	1925



Maximum Operating Conditions

Operating Temperature	240° F (115° C)
Working Pressure	150 PSIG (10.5 kg/cm²)

Specifications

Description	Standard Construction
Shell	Steel
System Connection	Brass
Bladder	Heavy Duty Butyl ANSI/NSF 61
Bladder Thickness	.100 Ins. Minimum
Coating	Red Oxide Primer
Factory Pre-set Pressure	55 PSIG (3.9 kg/cm²)

All dimensions and weights are approximate.

Job Name _____ Contractor _____

Location _____ Contractor P.O. No. _____

_____ Sales Representative _____

_____ Model No. Ordered _____

Engineer _____

1000DS (11/04) *Submittal data sheets can **ONLY** be ordered as a "Submittal Data Sheet Pack", using **MC# 4400**. They are not available to order on an individual basis, however each data sheet is available on the Amtrol Web Site and can be downloaded and printed for use as needed.*

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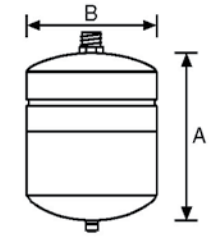
CSI #: 22 12 00

AMTROL INC

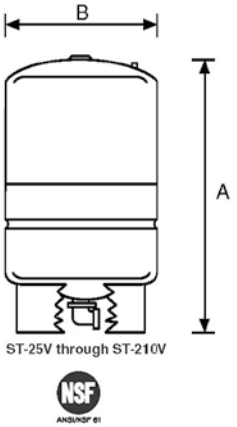
THERM-X-TROL®

Thermal Expansion Absorbers, ST-Series (Non-ASME)

150 PSIG Working Pressure



ST-5, ST-12



ST-25V through ST-210V

In-Line Models

Model No.	Tank Vol.		Max. Accept. Factor	A Height		B Diameter		Sys. Conn.	Ship Wt.	
	Lit.	Gal.		cm	ins.	cm	ins.	NPTM	kg	lbs.
ST-5	8	2.0	0.45	321	12⅝	203	8	¾	2.3	5
ST-12	17	4.4	0.73	381	15	279	11	¾	4.0	9

Stand Models

Model No.	Tank Vol.		Max. Accept. Factor	A Height		B Diameter		Sys. Conn.	Ship Wt.	
	Lit.	Gal.		cm	ins.	cm	ins.	NPTF	kg	lbs.
ST-25V	39	10.3	1.00	489	19¼	391	15⅜	1	10.5	23
ST-30V	53	14.0	0.81	605	23⅞	391	15⅜	1	11.4	25
ST-42V	76	20.0	0.57	802	31⅝	391	15⅜	1	15.0	33
ST-60V	129	34.0	1.00	913	29⅝	559	22	1¼	28.0	61
ST-80V	167	44.0	0.77	913	36	559	22	1¼	31.0	69
ST-180V	235	62.0	0.55	1186	46¾	559	22	1¼	41.0	92
ST-210V	326	86.0	0.54	1199	47¼	660	26	1¼	56.0	123

Maximum Operating Conditions

Operating Temperature	200°F (93°C)
Working Pressure	150 PSIG (10.5 kg/cm²)

Specifications

Description	Standard Construction
Standard Factory Pre-charge	40 PSIG (2.8 kg/cm²)
System Connection	Brass (ST5,12)
	Stainless Steel (Stand Models)
Diaphragm	Butyl/EPDM
Liner Material	Polypropylene

All dimensions and weights are approximate.

Job Name _____ Contractor _____

Location _____ Contractor P.O. No. _____

_____ Sales Representative _____

_____ Model No. Ordered _____

Engineer _____

(11/04)

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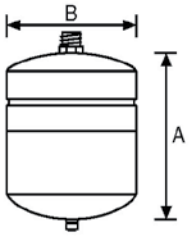
CSI #: 22 12 00

AMTROL INC

THERM-X-SPAN®

Thermal Expansion Absorbers, T-Series (Non-ASME)

150 PSIG Working Pressure



T-5, T-12

NSF

In-Line Models

Model No.	Tank Vol. Lit.	Tank Vol. Gal.	Max. Accept. Factor	A Height cm	A Height ins.	B Diameter cm	B Diameter ins.	Sys. Conn. NPTM	Ship Wt. kg	Ship Wt. lbs.
T-5	8	2.0	0.45	321	12⅝	203	8	¾	2.3	5
T-12	17	4.4	0.73	381	15	279	11	¾	4.0	9

Maximum Operating Conditions

Operating Temperature	200°F (93°C)
Working Pressure	150 PSIG (10.5 kg/cm²)

Specifications

Description	Standard Construction
Standard Factory Pre-charge	40 PSIG (2.8 kg/cm²)
System Connection	Brass
Diaphragm	Butyl/EPDM
Liner Material	Polypropylene

All dimensions and weights are approximate.

Job Name _____ Contractor _____

Location _____ Contractor P.O. No. _____

_____ Sales Representative _____

_____ Model No. Ordered _____

Engineer _____

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39

CSI #: 22 12 23.13

AMTROL

WELL-X-TROL

7 Year Warranty
- Installers asked for it - we delivered.
- A Well-X-Trol exclusive and the best warranty in the industry.

High Strength Steel
- Deep-drawn domes are double the strength of rolled steel.

Multi-Dome Construction
- Provides internal bracing for added strength.
- Prevents diaphragm over-extension.

Heavy Duty Butyl Diaphragm
- The industry's thickest diaphragm provides extra strength and flexibility.
- Seamless design conforms exactly to the shell without stretching, creasing or forming bubbles that could trap water or sediment.
- Meets stringent FDA requirements.

Positive Diaphragm Seal
- Unique hoop ring and groove design secures the diaphragm, liner and shell for added strength and reliability.
- Exclusive welding process eliminates rough spots and sharp edges that can damage the diaphragm and liner.

Stainless Steel System Connection
- High grade stainless steel withstands aggressive water conditions.

Optional Pro-Access® Connection
- Piped to stand for fast, easy installation.

4

CSI #: 22 12 23.13

Well Above The Rest®

150 psig Working Pressure
- 20% higher rating than competitive well tanks.
- Every tank is pressure tested for added safety.
- Precharged to 38 psig for the most common pump cut-in pressure.

Projection Welded Air Valve
- Eliminates leak paths found on threaded valves.
- Tamper-evident warning label for added safety.

Tuf-Kote™ HG Indoor/Outdoor Coating
- Stands up to the most severe conditions.
- Standard on all models; available in blue, tan and gray.

Antimicrobial Liner

Fresh Water Turbulator™

DuraBase® Composite Tank Stand
- Optional composite stand features patent pending design.
- UV resistant material is rugged and will never corrode.
- Available separately as a spacer for steel stand models.

Clean Water Technology™ in Every Tank
Antimicrobial Liner and Turbulator work together to keep tank surfaces clean.

ANTIMICROBIAL PROTECTION™

Antimicrobial Liner Protection
- Neutralizes over 99.9% of bacteria on contact.
- Safe. Silver-Ion technology only targets active microorganisms.
- Long lasting compound protects water reservoir lining for the life of the tank.

TURBULATOR

Fresh Water Turbulator™
- Patent-pending diffuser agitates incoming water stream.
- Water-jet scrubbing action prevents sediment buildup.
- Eliminates stagnant water in VFD applications.
- Helps extend the life of the tank.

5

CSI #: 22 12 23.13

AMTROL WELLXTROL

InLine Models

Model Number	Tank Volume (Gallons)	Max Acceptance Factor	Diameter (Inches)	Height (Inches)	System Connection (NPTM)	System Drawdown (gallons) 30/50	40/60	50/70	Shipping Weight (lbs.)
WX-101	2.0	.45	8	13	¾	0.6	0.6	0.5	5
WX-102	4.4	.55	11	15	¾	1.4	1.2	1.0	9
WX-103	7.6	.43	11	22	¾	2.4	2.0	1.8	15
WX-104	10.3	1.00	15	18	1	3.2	2.8	2.4	20
WX-200	14.0	.81	15	22	1	4.3	3.8	3.3	22

Tan and Gray: Available on all models. Use suffix T or G.

Stand Models

Model Number	Tank Volume (Gallons)	Max Acceptance Factor	Diameter (Inches)	Height (Inches)	System Connection (NPTF)	System Drawdown (gallons) 30/50	40/60	50/70	Shipping Weight (lbs.)
WX-201	14.0	.81	15	25	1	4.3	3.8	3.3	25
WX-202	20.0	.57	15	32	1	6.2	5.4	4.7	33
WX-202XL	26.0	.44	15	39	1	8.0	7.0	6.1	36
WX-203	32.0	.35	15	47	1	9.9	8.6	7.6	43
WX-205	34.0	1.00	22	30	1¼	10.5	9.1	8.0	61
WX-250	44.0	.77	22	36	1¼	13.6	11.8	10.4	69
WX-251	62.0	.55	22	47	1¼	19.2	16.6	14.6	92
WX-255	81.0	.41	22	57	1¼	25.0	21.7	19.1	103
WX-252	86.0	.39	22	62	1¼	26.6	23.0	20.3	114
WX-302	86.0	.54	26	47	1¼	26.6	23.0	20.3	123
WX-350	119.0	.39	26	62	1¼	36.8	31.9	28.1	166

DuraBase®: Available on all models except WX-252. Use suffix D.
Pre Access®: Available on all models except WX-201, WX-252 and DuraBase® models. Use suffix PA.
Tan and Gray: Available on all models except WX-252. Use suffix T or G.

Underground Models

Model Number	Tank Volume (Gallons)	Max Acceptance Factor	Diameter (Inches)	Height (Inches)	System Connection (NPTF)	System Drawdown (gallons) 30/50	40/60	50/70	Shipping Weight (lbs.)
WX-200UG	14.0	.81	15	22	1	4.3	3.8	3.3	22
WX-202UG	20.0	.57	15	30	1	6.2	5.4	4.7	30
WX-250UG	44.0	.77	22	33	1¼	13.6	11.8	10.4	60
WX-251UG	62.0	.55	22	44	1¼	19.2	16.6	14.6	83

Note: System Drawdown can be effected by various ambient and system conditions, including temperature and pressure.

6

CSI #: 22 12 23.13

Model Specifications & Sizing

Wall Hung Model for VFD Systems

Model Number	Tank Volume (Gallons)	Max. Acceptance Factor	Dimensions Length (Inches)	Width (Inches)	Height (Inches)	System Connection (NPTM)	System Drawdown (gallons) 30/50	40/60	50/70	Shipping Weight (lbs.)
WX-102VFD	4.4	55	15	11	12	¾	1.4	1.2	1.0	13

Includes Universal VFD Control Mounting Bracket

Pump Stand Models

Model Number	Tank Volume (Gallons)	Max. Acceptance Factor	Dimensions Length (Inches)	Width (Inches)	Height (Inches)	System Connection (NPTM)	System Drawdown (gallons) 30/50	40/60	50/70	Shipping Weight (lbs.)
WX-102PS	4.4	55	15	11	12	¾	1.4	1.2	1.0	13
WX-105PS	5.3	60	18	11	12	¾	1.6	1.4	1.3	15
WX-110PS	7.4	58	23	11	12	¾	2.3	2.0	1.8	18
WX-200PS	14.0	61	22	15	16	1	4.3	3.8	3.3	29
WX-202PS	20.0	57	30	15	16	1	6.2	5.4	4.7	35
WX-202H	20.0	57	30	15	16	1	6.2	5.4	4.7	33

All Well-X-Trol Well Tanks feature: Stainless Steel System Connection.
Maximum Working Pressure: 150 psig.
Maximum Operating Temperature: 200° F.
Factory Pre-charge: 38 psig.

ESP Sizing Table

Pump Discharge Rate (Approx GPM)	Pumps Up To 3/4 hp & 1 Minute Run Time 30/50 PSIG	40/60 PSIG	50/70 PSIG	Pumps Over 3/4 hp & 2 Minute Run Time 30/50 PSIG	40/60 PSIG	50/70 PSIG
5	WX-202	WX-202	WX-202	WX-205	WX-205	WX-250
7	WX-202X	WX-203	WX-203	WX-250	WX-251	WX-251
10	WX-205	WX-205	WX-250	WX-251	WX-255	WX-302
12	WX-250	WX-250	WX-251	WX-255	WX-255	WX-350
15	WX-250	WX-251	WX-251	WX-302	WX-350	WX-350
20	WX-251	WX-255	WX-302	WX-350	WX-255 (2)	WX-302 (2)
25	WX-255	WX-302	WX-350	WX-255 (2)	WX-302 (2)	WX-350 (2)
30	WX-302	WX-350	WX-350	WX-302 (2)	WX-350 (2)	WX-302 (3)
35	WX-350	WX-350	WX-255 (2)	WX-350 (2)	WX-350 (2)	WX-350 (3)
40	WX-350	WX-255 (2)	WX-302 (2)	WX-350 (2)	WX-302 (3)	WX-350 (3)

The Effective System Protection (ESP) sizing procedure covers modern residential water-use habits, heavy demands and the general increase in water use that has occurred in recent years. ESP sizing is designed to reduce system wear and lower energy consumption by keeping pump starts to a minimum.

Variable Frequency Drive (VFD) Sizing Table

Pump Discharge Rate (Approx. GPM)	Pump Motor Horsepower: Tank size at least 20% of pump GPM rounded to next size up. 1/2, 3/4 & 1 hp	Larger pumps = Move up additional tank size. 1 1/2 to 2 hp
7	WX-102VFD	WX-103
10	WX-102VFD	WX-103
12	WX-102VFD	WX-103
15	WX-103	WX-104
20	WX-103	WX-104
25	WX-104	WX-202
30	WX-104	WX-202

Sizing chart is to be used in the absence of the VFD manufacturer's tank size recommendation. Selections include additional buffer capacity to minimize pressure fluctuation. A larger tank is always a system enhancement. Tank pre-charge should be set according to drive manufacturer.

Larger Tank = Fewer Cycles = Longer Tank and Pump Life.

7

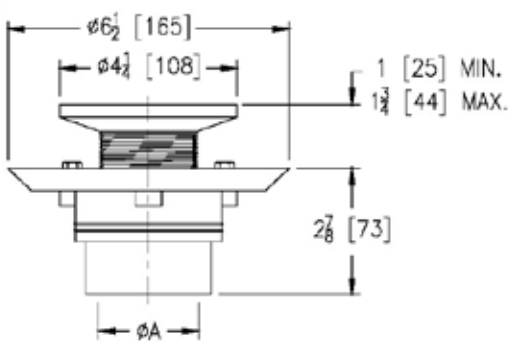
CSI #: 22 13 19.13

ZURN LIGHT COMMERCIAL LC®

FD2254 2 x 3 [51 x 76] Adjustable Shower Drain

TAG _____

Dimensional Data (inches and [mm]) are Subject to Manufacturing Tolerances and Change Without Notice

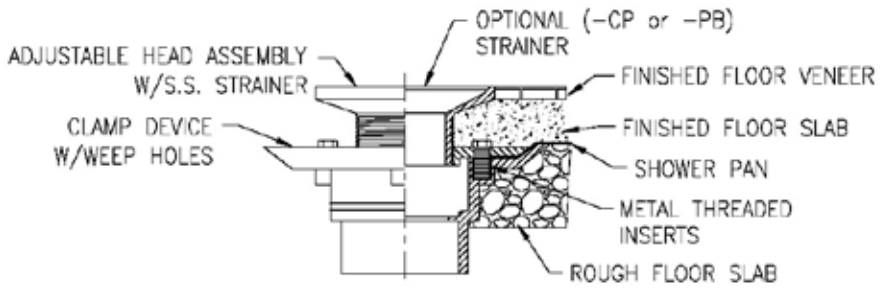


Product	'A' Connections	Grate Open Area Sq. In [cm²]
___ FD2254-PV2	2 x 3 [51 x 76] PVC	4 [26]
___ FD2254-AB2	2 x 3 [51 x 76] ABS	

FD2254 2 x 3 [51 x 76] Shower Drain
Recommended in showers where a membrane is generally used. The head is adjustable to meet finished floor elevations. The drain is furnished with a 6 1/2 [165] diameter PVC or ABS body, beveled clamp collar and head assembly. Complete with a brass threaded insert to accept square hole stainless steel, secured strainer. Fits over 2 [51] and inside 3 [76] sch. 40 DWV pipe.

Options:
___ **-CP** Chrome Plated
___ **-PB** Polished Brass

Typical Installation



ZURN LIGHT COMMERCIAL PLUMBING PRODUCTS • 2640 South Work Street • Falconer, NY 14733
Phone: 1-800/905-5060 • Fax: 716/665-3126 • World Wide Web: www.zurn.com

Rev. A Date: 12/6/07 C.N. No. 93512
Dwg. No. 63754 Product No. FD2254

CSI #: 22 14 29

Jackel

17” x 16” Sump Basin

The SF15 is the perfect basin for crawlspaces or where space is limited. It incorporates our heavy duty, non-corrosive nylon encapsulated inserts allowing the SF15 to be gas/radon tight and prohibits odor escape. The SF15 has a total capacity of 15 gallons. Constructed from ultra strong, heavy duty structural foam, the SF15 will provide decades of reliable service. It can be factory perforated with 40, 5/16” holes that allow for a quick reduction of standing water in crawl space areas, yards patios and driveways.

Specifications

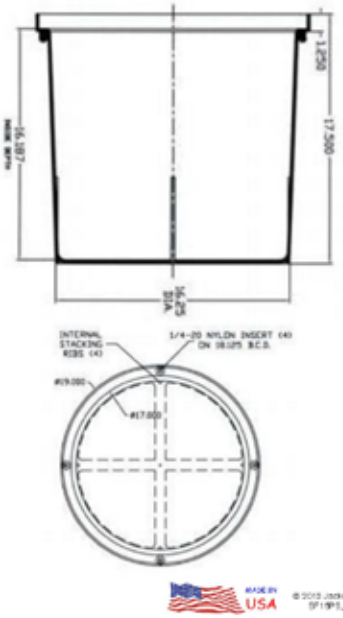
- **Material:** Injection molded high density structural foam
- **Holes:** 40, 5/16”
- **Inserts:** Nylon
- **Weight:** 7-1/2 lbs.
- **Total Capacity:** 15 gallons

Part Number: SF15

Features and Benefits

- 15 U.S. Gallon Usable Capacity
- Heavy duty structural foam injection molded construction
- Heavy duty, non-corrosive nylon encapsulated inserts
- Ultra strong, bottom will not flex
- Perfect for crawlspaces or limited space
- Can be perforated with 40 factory drilled, 5/16” holes (Model SF15DR)

Dimensions



Jackel, Inc · 15314 Harrison Road · Mishawka, IN 46544 · (574) 256-5635 · (574) 256-6966 fax · www.jackelinc.com

CSI #: 22 14 29

Duolift System

Unilift CC, KP, AP

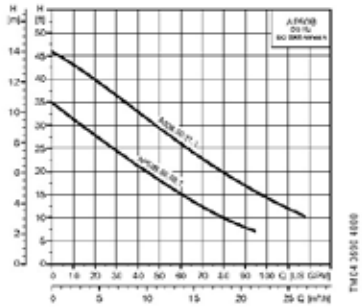
Product description

Fig. 31 Duolift System

Grundfos Duolift Systems are suitable for the collection and pumping of wastewater below sewer level from cellars/basements of private homes (shower, bath, washing machine, and toilets), hospitals, industries, hotels, restaurants, etc.)

Duolift Systems are supplied with two Grundfos AP 50B pumps. For further information about AP 50B pumps, see *Unilift AP50B* on page 40.

Pump performance



Technical data

Product number	Pump type	Hp	Ph	Voltage [V]	Run	Start	Cable	Cover
96966621	AP50B.50.08	1	1	115	—	—	25 ft	One piece
96966622	AP50B.50.08	1	1	230	8.4	29	25 ft	One piece
96966623	AP50B.50.11	1 1/2	1	230	8.4	35	25 ft	One piece

Basin

Dimensions [in]	Operating capacity [gal]	Inlet [in]	Discharge [in]	Vent [in]	Solids [in]	Panel type	Approx. shipping weight [lbs]
30 x 36	63	4	2	2	2	Duplex	120

Notes:

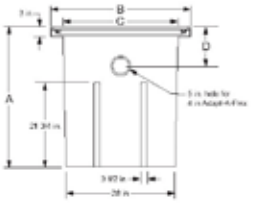
- Duolift systems are not designed for traffic loads.
- Contact Grundfos Partner Services for availability of 115V Duolift.

CSI #: 22 14 29

Duolift System

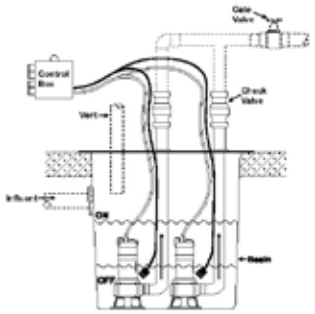
Unilift CC, KP, AP

Dimensions



A	B	C	D
[in]			
36.3	36	30	10

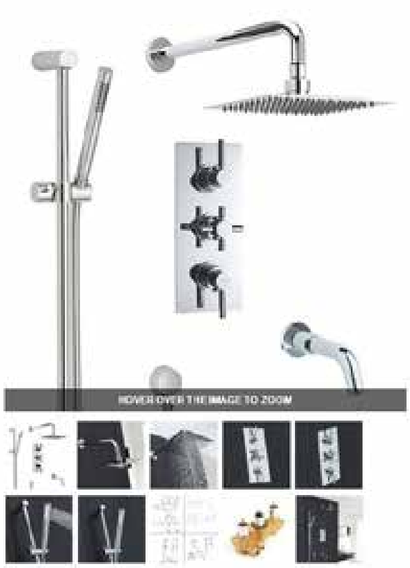
Components and materials



Description	Duo
Basin	Polyethylene
Lid	Fiberglass
Inlet hub	Neoprene
Elbow	PVC
Discharge pipe	PVC
Swing Check Valve	PVC Quantity 2
Control Panel SJE Rhombus	Model 122
Pumps	Grundfos AP50B Quantity 2

46 GRUNDFOS

CSI #: 22 41 00



Thermostatic Modern Shower System with Slide Rail Kit and Tub Spout

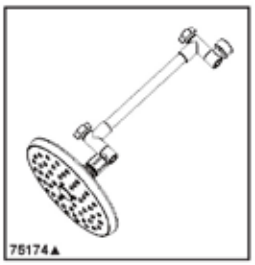
Product Code [illegible]

BE THE FIRST TO REVIEW THIS PRODUCT

In Brief...

The Hudson Reed Tec Thermostatic Triple Shower Valve (3 Outlet) features lever and cross head controls for fingertip control. Constructed from brass and with modern ceramic disc technology, this chrome finish minimalist shower valve supplies water to either the matching fixed shower head, handset or tub filler. Safety comes as standard with a pre-set maximum temperature and an anti-scald device. It is possible to use the shower head simultaneously with a handset or tub filler, but this may reduce the flow of water to both functions.

CSI #: 22 41 00



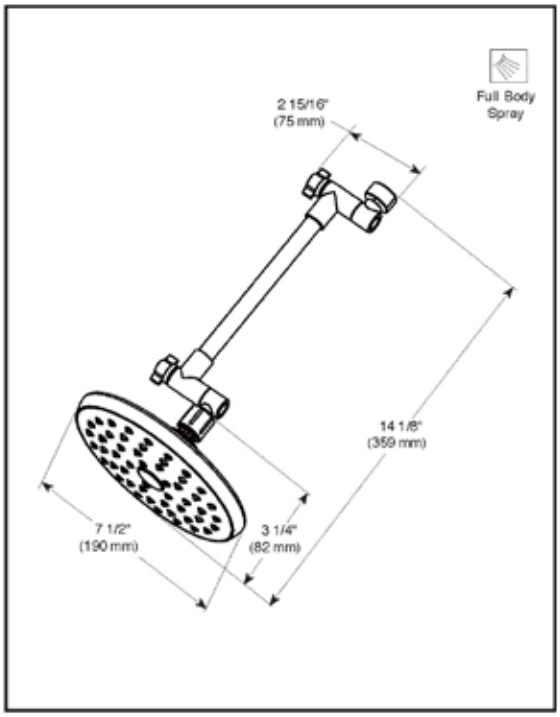
DELTA

SHOWERHEAD

- Full spray shower head
- 10" Adjustable shower arm
- Touch-Clean® Nozzles

Submitted Model No.: _____

Specific Features: _____



▲ Designate proper finish suffix

STANDARD SPECIFICATIONS:

- Maximum flow rate 2.0 gpm (7.6L/min) @ 60 PSI
- 10" (254mm) adjustable shower arm
- Standard 1/2" pipe fitting

WARRANTY

- Lifetime limited warranty on parts (other than electronic parts and batteries) and finishes; or, for commercial users, for 5 years from the date of purchase.
- 5 year limited warranty on electronic parts (other than batteries); or for commercial users, for 1 year from the date of purchase. No warranty is provided on batteries.

COMPLIES WITH

- ASME A112.18.1 / CSA B125.1

Delta reserves the right (1) to make changes in specifications and materials, and (2) to change or discontinue models, both without notice or obligation. Dimensions are for reference only. See current full-line price book or www.deltafaucet.com for finish options and product availability.

DSP-B-75174 Rev. B

DELTA FAUCET COMPANY

55 E. 111th Street, Indianapolis, Indiana 46280
350 South Edgeware Road, St. Thomas, Ontario Canada N5P 4L1

© 2015 Masco Corporation of Indiana

CSI #: 22 41 16

KOHLER.

Veil™
Wall-Hung Toilet
K-6303

Features
- One-piece wall-hung toilet.
- Compact elongated bowl with 3" glazed trapway offers added comfort while occupying the same space as a round-front bowl.
- Mounting hardware is completely concealed, giving Veil a sleek, seamless look that is easy to clean.
- Dual-flush actuator offers a choice of 0.8 or 1.6 gallons per flush (gpf).
- Includes Grip Tight Reveal Q3 seat, wall-hung bowl, flush actuator, and in-wall carrier.
- Supply line not included.
- Large flush actuator plate can be removed for easy access to inner tank.

Technology
- Dual-flush technology allows you to choose between a full- or partial-flush.

Installation
- Fully insulated in-wall tank and carrier system with rigid solid steel tube frame for 2" x 6" installation.
- Adjustable durable steel frame carrier allows the bowl to be set anywhere from 15-3/8 inches to 28-1/2 inches from floor.

Water Conservation & Rebates
- WaterSense® toilets meet strict EPA flushing guidelines, including using at least 20 percent less water than 1.6-gallon toilets.
- Eligible for consumer rebates in some municipalities.

Optional Accessories
K-6298 Flush Actuator Plate
K-6291 Wall-Hung Toilet Cast Iron Waste Pipe
K-4670-C Commercial Toilet Seat
K-4670-CA Commercial Toilet Seat
K-4670-SA Commercial Toilet Seat
K-4670-SC Commercial Toilet Seat

Components
Product includes:
K-6284 In-Wall Tank and Carrier System
K-6299 Wall-Hung Elongated Toilet Bowl
K-6298 Flush Actuator Plate
Additional included component/s: Toilet Seat.

ADA | CSA B651 | OBC

Codes/Standards
ASME A112.19.2/CSA B45.1
ASME A112.19.14
ASME A112.6.2
DOE - Energy Policy Act 1992
EPA WaterSense®
ADA
ICC/ANSI A117.1
CSA B651
OBC

KOHLER® One-Year Limited Warranty
See website for detailed warranty information.

Available Color/Finishes
Color tiles intended for reference only.

Color	Code	Description
	0	White
	96	Biscuit
	47	Almond
	NY	Dune
	7	Black Black™

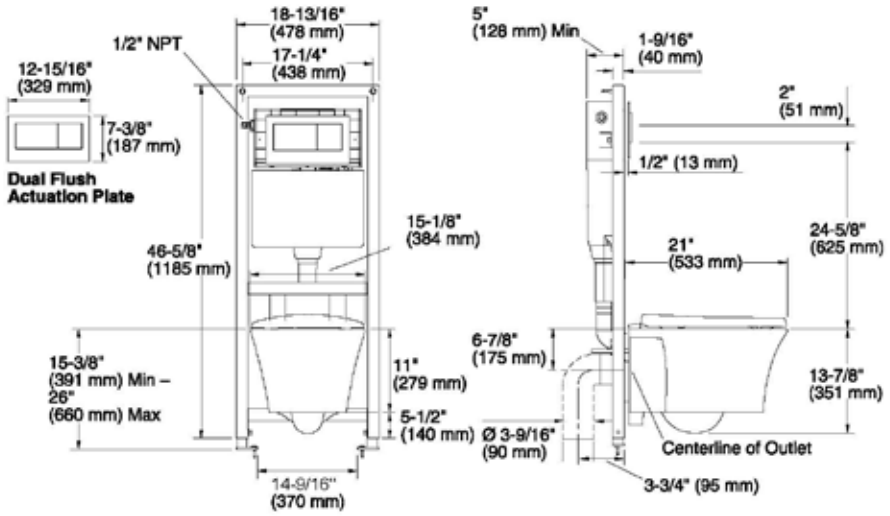
USA/Canada: 1-800-4KOHLER (1-800-456-4537)
www.kohler.com
12-18-2014 03:21

THE BOLD LOOK OF KOHLER.

CSI #: 22 41 16

KOHLER.

Veil™
Wall-Hung Toilet
K-6303



Technical Information
All product dimensions are nominal.

Toilet type:	In-wall
Bowl shape:	Elongated front
Trap passageway:	3" (76 mm)
Water Consumption	
Full:	1.6 gpf (6 lpf)
Reduced:	0.8 gpf (3 lpf)
Water surface size:	4-1/2" x 5-1/2" (114 mm x 140 mm)
Seat-mounting holes:	5-1/2" (140 mm)

Notes
Install this product according to the installation guide.

Installation requires 2x6 framing.

Refer to manufacturer and local codes for flush valve requirements.

Install the in-wall tank and carrier system in a wall opening 5-1/2" (140 mm) x 19" (483 mm) x 50" (1270 mm) minimum.

K-4670 is the recommended toilet seat for public use accessible installations.

The Model Plumbing Codes require the installation of elongated open-front toilet seats in public bathrooms.

ADA, OBC, CSA B651 compliant when installed to the specific requirements of these regulations.

The Model Plumbing Codes require the installation of elongated open-front toilet seats on public bathrooms.

USA/Canada: 1-800-4KOHLER (1-800-456-4537)
www.kohler.com
12-18-2014 03:21

THE BOLD LOOK OF KOHLER.

CSI #: 22 41 16.16

SINK SPECIFICATIONS
SILGRANIT®II
BLANCO DIAMOND™ EQUAL DOUBLE Bowl Dual Mount
Model 440220

BLANCO

FEATURED MODEL
440220 Equal Double, 9-1/2" bowl depths, ANTHRACITE

ADDITIONAL MODELS
440218 Equal Double, 9-1/2" bowl depths, CAFE BROWN
440219 Equal Double, 9-1/2" bowl depths, METALLIC GRAY
440221 Equal Double, 9-1/2" bowl depths, WHITE
440222 Equal Double, 9-1/2" bowl depths, BISCUIT
441217 Equal Double, 9-1/2" bowl depths, BISCOTTI
441285 Equal Double, 9-1/2" bowl depths, TRUFFLE
441466 Equal Double, 9-1/2" bowl depths, CINDER

Versatile dual deck design can be installed as a drop-in or undermount.

FEATURES
- Required outside cabinet: 33" (drop-in), 36" (undermount)
- 80% solid granite
- Heat resistant up to 536°F
- Unsurpassed cleanability backed by industry leading 7 patents!
- Resistant to scratches, stains and all household acids and alkali solutions
- Template provided
- Undermount clips NOT included
- 1/2" deck thickness
- Limited lifetime warranty

OPTIONAL ACCESSORIES

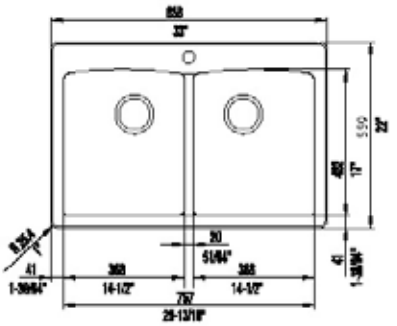
Cutting Board:	440229 (drop-in only)
Colander:	440492
Sink Grids:	221008 (left), 221009 (right)

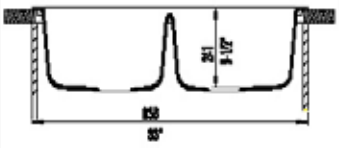
CODE/STANDARDS COMPLIANCE
ANSI Z124.6-97
IAPMO/UPC listed

NOMINAL DIMENSIONS Model 440220 shown

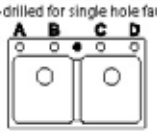
OVERALL	CUT OUT SIZE	BOWL DEPTHS LEFT	BOWL DEPTHS RIGHT	DRAIN
33" x 22"	32-1/4" x 21-1/4"	9-1/2"	9-1/2"	3-1/2"

DXF cutout templates (undermount and drop-in) available on our website.





KNOCKOUT HOLE LOCATIONS
Pre-drilled for single hole faucet.



Distance between A & B - 10"
Distance between B and hole - 4"
Distance between hole and C - 4"
Distance between C & D - 10"

WARRANTY
BLANCO'S SILGRANIT II Series sinks feature a LIMITED LIFETIME WARRANTY to be free of all manufacturing defects under normal use. See our complete warranty for details.

While BLANCO endeavors to provide accurate information, all dimension save nominal, cannot be guaranteed, and are subject to change or cancellation. BLANCO assumes no responsibility for use of superseded or voided specifications.

JOB INFORMATION

Job Name: _____

Contact: _____

Date Specified: _____

Specifier: _____

Contractor: _____

BLANCO AMERICA
800.451.5782
www.blancoamerica.com

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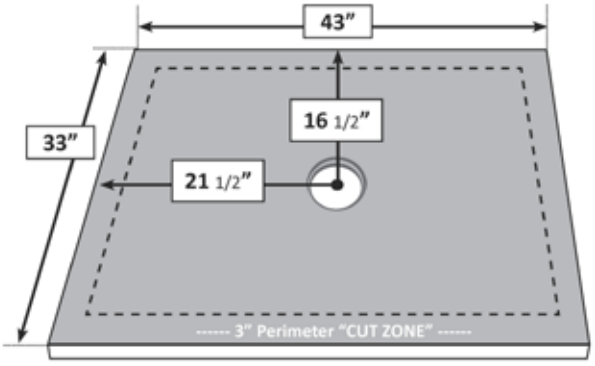
6/13 SPEC-003

CSI #: 22 41 23

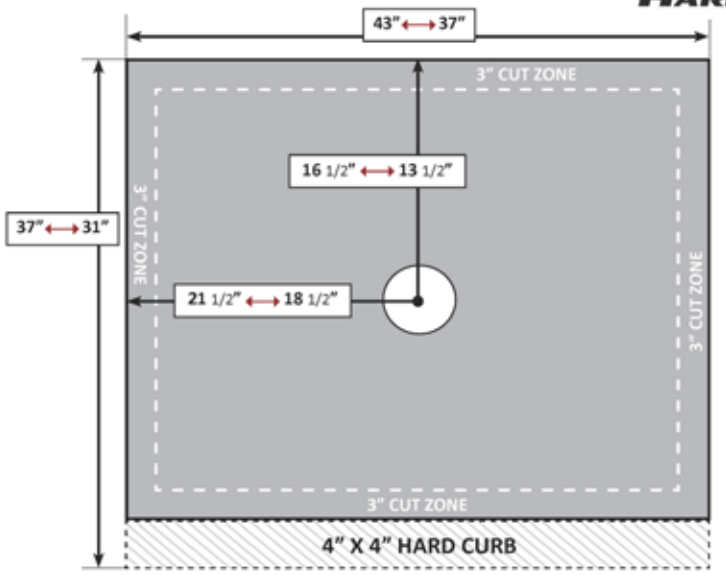
KBRS HARD CORE. ShowerSlope™

SS-3343-C
(Specifications)



33" X 43" Center Drain ShowerSlope™ Cut-To-Fit Dimension Ranges With HardCurb™

KBRS HARD CORE.



CSI #: 22 41 39

BLANCO

FAUCET SPECIFICATIONS
BLANCO LINUS[1st] Pull-Out Stream Only
Model 441196

FEATURED MODEL
441196 Pull-Out Stream Only, CHROME

ADDITIONAL MODELS
441197 Pull-Out Stream Only, SATIN NICKEL
441198 Pull-Out Stream Only, CAFE BROWN
441199 Pull-Out Stream Only, ANTHRACITE
441335 Pull-Out Stream Only, TRUFFLE

FEATURES
- Ceramic disk cartridge
- 2.2 GPM flow rate
- Pull-out single function spray
- Installation in a 1-3/8" hole
- 140 degree spout swivel
- 2" backsplash clearance off center
- 1-3/4" maximum deck thickness

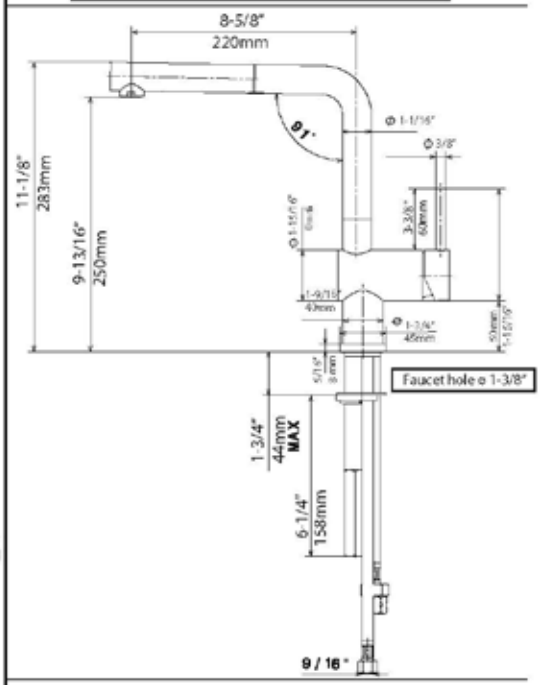
OPTIONAL ACCESSORIES

Deluxe Soap Dispenser:	440006 (Chrome)
Meridian Soap Dispenser:	440059 (Chrome)
Alta Soap Dispenser:	440046 (Chrome)
Milano Soap Dispenser:	440050 (Chrome)
Harvest Soap Dispenser:	440054 (Chrome)

CODE/STANDARDS COMPLIANCE
ASME A112.18.1-2011
NSF 61 certified
NSF 61 ANEX G low lead requirements
AB1953 Lead Free

NOMINAL DIMENSIONS Model 441196 shown

REACH	SPOUT HEIGHT	FAUCET HEIGHT
8-1/2"	9-3/4"	11"



WARRANTY
BLANCO'S kitchen and bar faucets feature a LIMITED LIFETIME WARRANTY to be free of all manufacturing defects under normal use. See our complete warranty for details.

While BLANCO endeavors to provide accurate information, all dimensions are nominal, cannot be guaranteed, and are subject to change or cancellation. BLANCO assumes no responsibility for use of superseded or voided specifications.

JOB INFORMATION

Job Name: _____

Contact: _____

Date Specified: _____

Specifier: _____

Contractor: _____

See next page for exploded parts drawing and parts list.

BLANCO AMERICA
800.451.5782
www.blancoamerica.com

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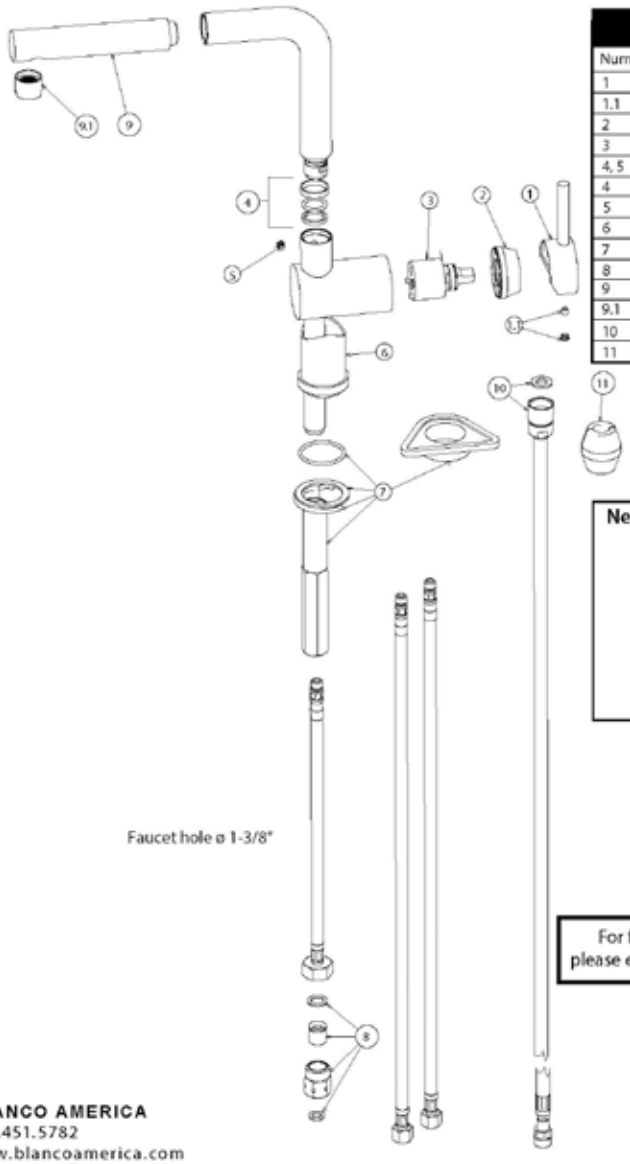
7/13 SPEC-003

CSI #: 22 41 39

BLANCO

FAUCET SPECIFICATIONS
BLANCO LINUS™ Pull-Out Stream Only
Model 441196



REPAIR PART GUIDE

Num.	Description	Part #
1	Handle - Chrome	
1.1	Handle - Screw and Cap	440889
2	Cartridge Lock Nut	
3	Cartridge	440877
4, 5	Spout - Ring set and screw	
4	Spout - Ring set	
5	Spout - Holding screw	
6	Base - Chrome	
7	Mounting assembly	
8	Check valve assembly 2.2 GPM	
9	Handspray - Chrome	441243
9.1	Aerator	
10	Spray hose	441066
11	Weight	

Need to Change a Faucet Cartridge?

Scan this QR code
to see our how-to video

For faucet technical support or questions,
please e-mail us at **faucets@blancoamerica.com**

BLANCO AMERICA
800.451.5782
www.blancoamerica.com

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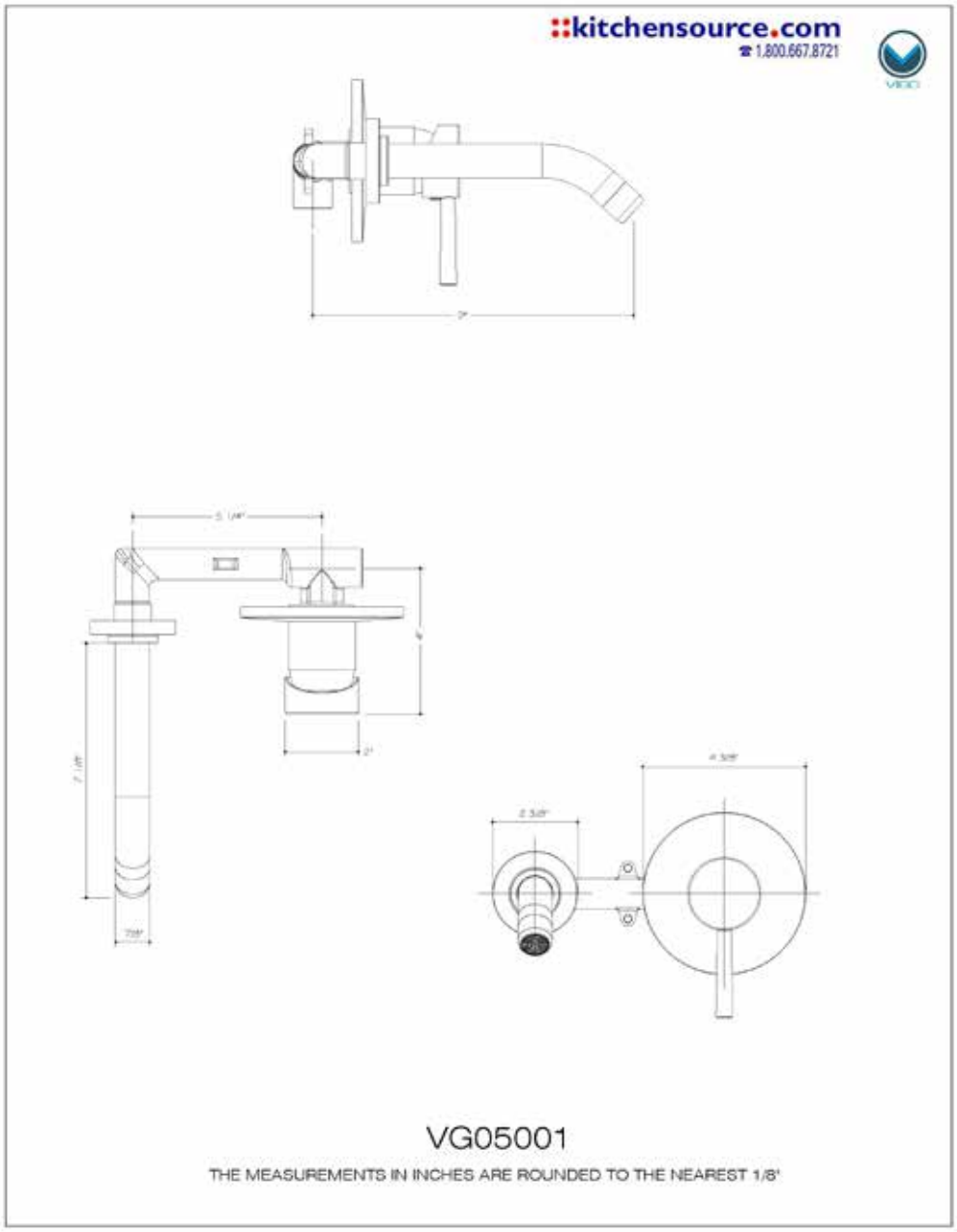
8/13 SPEC-003

CSI #: 22 41 39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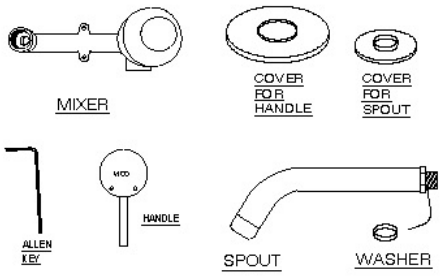
VG05001
THE MEASUREMENTS IN INCHES ARE ROUNDED TO THE NEAREST 1/8"

CSI #: 22 41 39

PACKAGE CONTENT



MAINTENANCE

Your new faucet is designed for years of trouble-free performance.
Keep it looking new by cleaning it periodically with a soft cloth. Avoid abrasive cleaners, steel wool and harsh chemicals as these will scratch, dull, and/or damage the finish and/or product void your warranty.

TOOLS NEEDED

Adjustable wrench
Groove joint pliers
Plumber's putty
Pipe tape
Phillips and flat screwdrivers

SAFETY TIPS

If you use soldering for the installation of the faucet, the seats, cartridges and washers will have to be removed before using flame. Otherwise, warranty will be void on these parts
Protect your eyes with safety glasses when cutting or soldering water supply lines
Cover your drain to avoid losing parts.

IMPORTANT POINTS

Prior to beginning installation, turn off the cold and hot water lines and open the hot and cold knobs on the old faucet to release build-up pressure.
When installing your new faucet, turn the connector nuts finger-tight, then use one wrench to anchor the fitting and a second wrench to tighten the nut one additional turn. Connections that are too tight will reduce the integrity of the system.
Wrap all threaded connections with Teflon tape available at your local hardware or plumbing supply store. Always wrap in a clockwise direction.
All installations can vary depending on how your previous faucet was installed. Not all necessary supplies to install your faucet are included, however, they are available wherever plumbing supplies are sold.

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ASSEMBLY

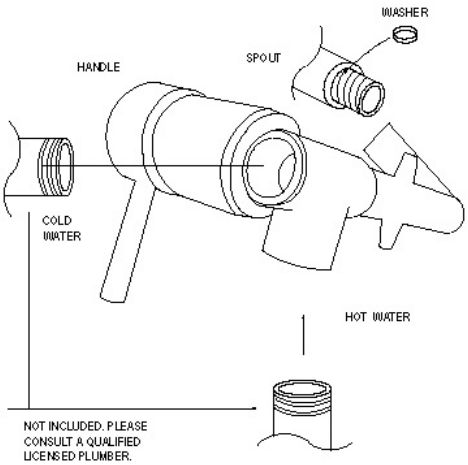
NOTE: INSTALLATION MUST BE DONE BY A QUALIFIED, LICENSED PLUMBER.

1. CONNECT PIPES WITH COLD AND HOT WATER TO THE MIXER USING TEFLON TAPE.

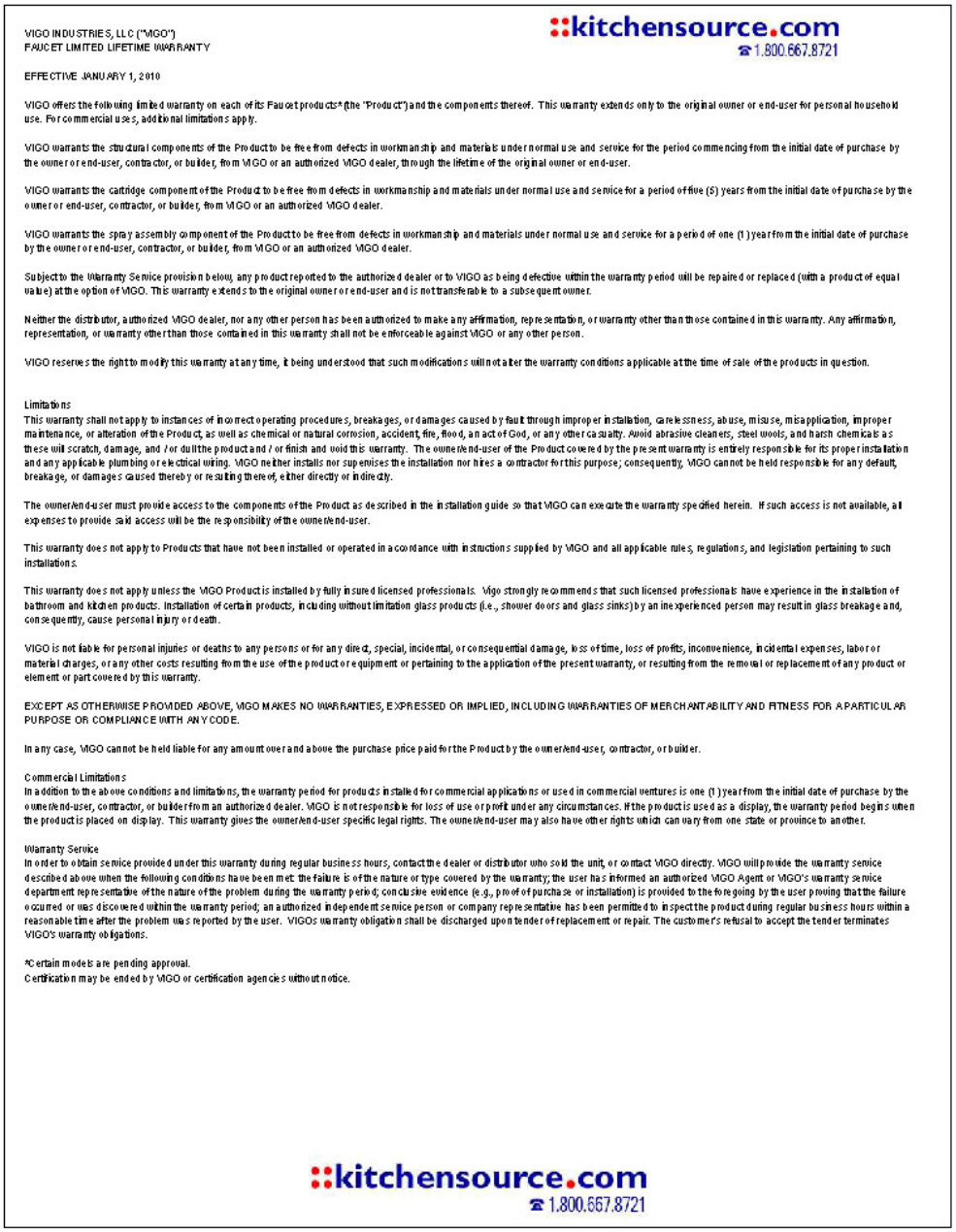
2. SECURE MIXER TO THE WALL

3. CONNECT SPOUT TO THE MIXER USING THE SUPPLIED WASHER. SECURE WASHER BEHIND THE THREADED PORTION OF THE SPOUT FOR SPACING. THREAD THE SPOUT SO THE TIP FACES DOWN MAKING SURE NOT TO OVER TIGHTEN THE SPOUT TO THE MIXER.

4. ATTACH HANDLE.



CSI #: 22 41 39



VIGO INDUSTRIES, LLC ("VIGO")
FAUCET LIMITED LIFETIME WARRANTY

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EFFECTIVE JANUARY 1, 2010

VIGO offers the following limited warranty on each of its Faucet products* (the "Product") and the components thereof. This warranty extends only to the original owner or end-user for personal household use. For commercial uses, additional limitations apply.

VIGO warrants the structural components of the Product to be free from defects in workmanship and materials under normal use and service for the period commencing from the initial date of purchase by the owner or end-user, contractor, or builder, from VIGO or an authorized VIGO dealer, through the lifetime of the original owner or end-user.

VIGO warrants the cartridge component of the Product to be free from defects in workmanship and materials under normal use and service for a period of five (5) years from the initial date of purchase by the owner or end-user, contractor, or builder, from VIGO or an authorized VIGO dealer.

VIGO warrants the spray assembly component of the Product to be free from defects in workmanship and materials under normal use and service for a period of one (1) year from the initial date of purchase by the owner or end-user, contractor, or builder, from VIGO or an authorized VIGO dealer.

Subject to the Warranty Service provision below, any product reported to the authorized dealer or to VIGO as being defective within the warranty period will be repaired or replaced (with a product of equal value) at the option of VIGO. This warranty extends to the original owner or end-user and is not transferable to a subsequent owner.

Neither the distributor, authorized VIGO dealer, nor any other person has been authorized to make any affirmation, representation, or warranty other than those contained in this warranty. Any affirmation, representation, or warranty other than those contained in this warranty shall not be enforceable against VIGO or any other person.

VIGO reserves the right to modify this warranty at any time, it being understood that such modifications will not alter the warranty conditions applicable at the time of sale of the products in question.

Limitations
This warranty shall not apply to instances of incorrect operating procedures, breakages, or damages caused by fault through improper installation, carelessness, abuse, misuse, misapplication, improper maintenance, or alteration of the Product, as well as chemical or natural corrosion, accident, fire, flood, an act of God, or any other casualty. Avoid abrasive cleaners, steel wools, and harsh chemicals as these will scratch, damage, and /or dull the product and / or finish and void this warranty. The owner/end-user of the Product covered by the present warranty is entirely responsible for its proper installation and any applicable plumbing or electrical wiring. VIGO neither installs nor supervises the installation nor hires a contractor for this purpose; consequently, VIGO cannot be held responsible for any default, breakage, or damages caused thereby or resulting thereof, either directly or indirectly.

The owner/end-user must provide access to the components of the Product as described in the installation guide so that VIGO can execute the warranty specified herein. If such access is not available, all expenses to provide said access will be the responsibility of the owner/end-user.

This warranty does not apply to Products that have not been installed or operated in accordance with instructions supplied by VIGO and all applicable rules, regulations, and legislation pertaining to such installations.

This warranty does not apply unless the VIGO Product is installed by fully insured licensed professionals. Vigo strongly recommends that such licensed professionals have experience in the installation of bathroom and kitchen products. Installation of certain products, including without limitation glass products (i.e., shower doors and glass sinks) by an inexperienced person may result in glass breakage and, consequently, cause personal injury or death.

VIGO is not liable for personal injuries or deaths to any persons or for any direct, special, incidental, or consequential damage, loss of time, loss of profits, inconvenience, incidental expenses, labor or material charges, or any other costs resulting from the use of the product or equipment or pertaining to the application of the present warranty, or resulting from the removal or replacement of any product or element or part covered by this warranty.

EXCEPT AS OTHERWISE PROVIDED ABOVE, VIGO MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE OR COMPLIANCE WITH ANY CODE.

In any case, VIGO cannot be held liable for any amount over and above the purchase price paid for the Product by the owner/end-user, contractor, or builder.

Commercial Limitations
In addition to the above conditions and limitations, the warranty period for products installed for commercial applications or used in commercial ventures is one (1) year from the initial date of purchase by the owner/end-user, contractor, or builder from an authorized dealer. VIGO is not responsible for loss of use or profit under any circumstances. If the product is used as a display, the warranty period begins when the product is placed on display. This warranty gives the owner/end-user specific legal rights. The owner/end-user may also have other rights which can vary from one state or province to another.

Warranty Service
In order to obtain service provided under this warranty during regular business hours, contact the dealer or distributor who sold the unit, or contact VIGO directly. VIGO will provide the warranty service described above when the following conditions have been met: the failure is of the nature or type covered by the warranty; the user has informed an authorized VIGO Agent or VIGO's warranty service department representative of the nature of the problem during the warranty period; conclusive evidence (e.g., proof of purchase or installation) is provided to the foregoing by the user proving that the failure occurred or was discovered within the warranty period; an authorized independent service person or company representative has been permitted to inspect the product during regular business hours within a reasonable time after the problem was reported by the user. VIGOs warranty obligation shall be discharged upon tender of replacement or repair. The customer's refusal to accept the tender terminates VIGO's warranty obligations.

*Certain models are pending approval.
Certification may be ended by VIGO or certification agencies without notice.

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Division 23

Heating,Ventilating, and Air-Conditioning

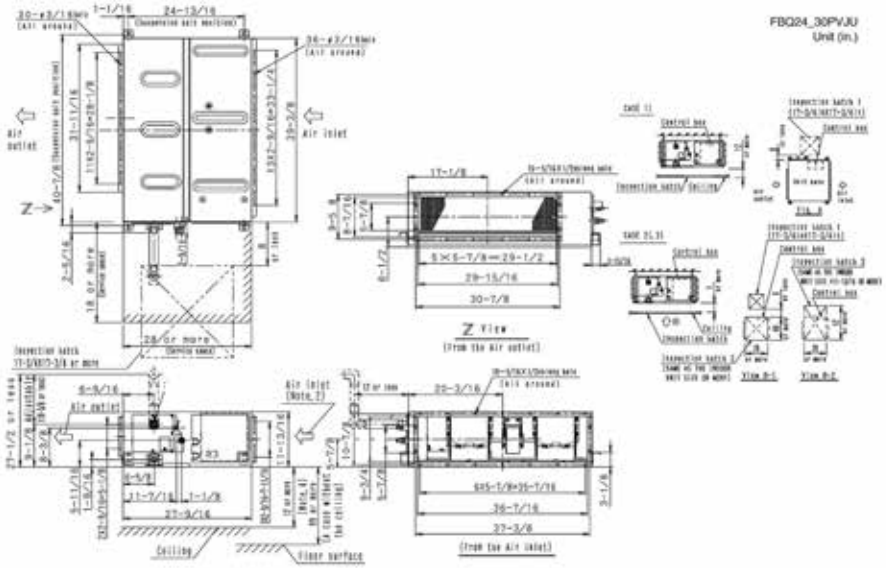
CSI #: 23 74 00

DAIKIN AC
absolute comfort

Submittal Data Sheet

Project Name:	
Location:	Approval:
Engineer:	Date:
Submitted to:	Construction:
Submitted by:	Unit #:
Reference:	Drawing #:

Dimensional Drawing - Indoor Unit FBQ24PVJU



(Daikin's products are subject to continuous improvements. Daikin reserves the right to modify product design, specifications and information in this data sheet without notice and without incurring any obligations)

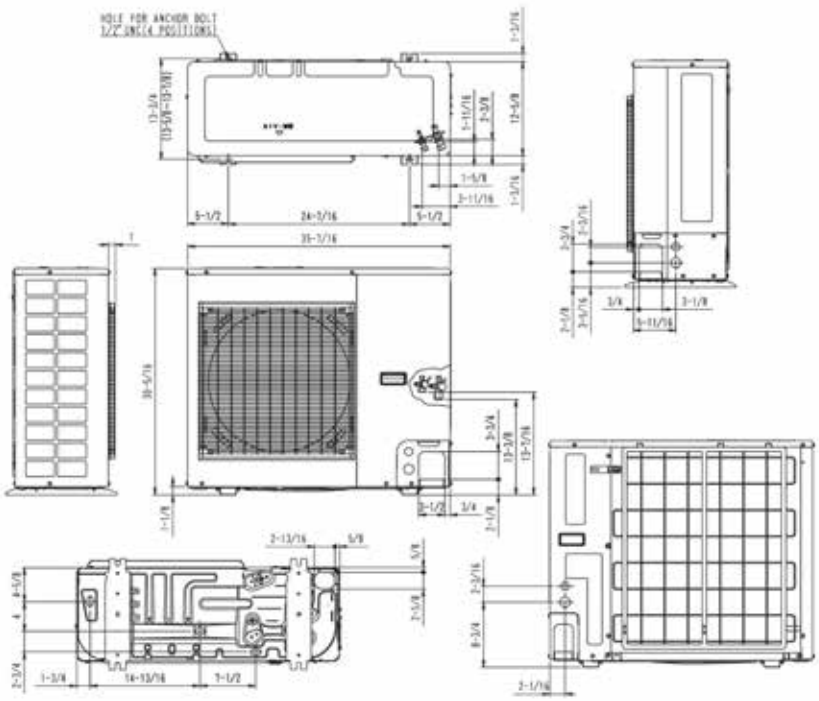
CSI #: 23 74 00

DAIKIN AC
absolute comfort

Submittal Data Sheet

Project Name:	
Location:	Approval:
Engineer:	Date:
Submitted to:	Construction:
Submitted by:	Unit #:
Reference:	Drawing #:

Dimensional Drawing - Condensing Unit RZQ24PVJU9



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CSI #: 23 74 00

DAIKIN AC
absolute comfort

Submittal Data Sheet

Project Name:	
Location:	
Engineer:	
Submitted to:	
Submitted by:	
Reference:	

Approval:	
Date:	
Construction:	
Unit #:	
Drawing #:	

Performance

Indoor Unit Model No:	FBQ24PVJU
Outdoor Unit Model No:	RZQ24PVJU9
Rated Cooling Capacity (Btu/hr):	24000
Sensible Capacity (Btu/hr):	18700
Max/Min Cooling Capacity (Btu/hr / kW):	tabook/databook
Cooling Input Power (kW):	2.12
SEER:	16.5
Rated Heating Capacity (Btu/hr):	27000
Max/Min Heating Capacity (Btu/hr / kW):	tabook/databook
Heating Input Power (kW):	2.12
Heating COP (Btu/hr / Btu/hr):	N/A
HSPF:	10.5

Indoor Unit Type:	DC Duct Mounted
Condensing Unit Type:	SkyAir Heat Pump
Rated Cooling Conditions	Indoor: 80°F DB/67°F WB Outdoor: 95°F DB/75°F WB
Rated Heating Conditions	Indoor: 70°F DB/60°F WB Outdoor: 47°F DB/43°F WB
Rated Piping Length(ft)	25
Rated Height Separation(ft)	0

Indoor Unit Details

Power Supply (V/Hz/Ph:)	208-230/60/1ph
Power Supply Connections:	L1, L2, Ground
Min Circuit Amps MCA (A):	1.8
Max Overcurrent Amps MFA (A):	15
Dimensions (HxWxD):	11-13/16x39-3/8x27-9/16
Panel (HxWxD):	N/AxN/AxN/A
Net Weight (lbs):	80
Weight with Panel (lbs):	N/A

Airflow Rate (CFM wet coil)	688/618/565
Moisture Removal (pt/h):	
Gas Pipe Connection (inch):	5/8
Liquid Pipe Connection (inch):	3/8
Condensate Connection (inch):	1
Sound Pressure Level (dBA):	42
Sound Power Level (dBA):	38
Static Pressure Rated/Max (inWg)	0.4 / 0.8/0.8

Condensing Unit Details

Power Supply (V/Hz/Ph):	208-230/60/1ph
Power Supply Connections:	L1, L2, Ground
Min. Circuit Amps MCA (A):	16.5
Max. Overcurrent Amps MFA (A):	20
Max. Starting Current MSC(A):	
Rated Load Amps RLA (A):	10.3
Dimensions (HxWxD):	30-5/16x35-7/16x12-5/8
Net Weight (lbs):	150

Compressor Type:	Inverter
Capacity Control Range (%):	30 - 100
Airflow Rate (CFM):	1835
Gas Pipe Connection (inch):	5/8
Liquid Pipe Connection (inch):	3/8
Sound Pressure Level (dBA):	49
Sound Power Level (dBA):	

System Details

Refrigerant Type:	R-410A
Holding Refrigerant Charge (lbs):	5.1
Additional Charge (oz/ft):	0.036lbs/ft
Pre-charge Piping (Length ft):	-
Max. Pipe Length (Total ft):	164 ft

Max. Pipe Length (Vertical ft):	98 ft
Cooling Operation Range (°F):	23 - 115
Cooling Range w/Baffle (°F):	0 - 115
Heating Operation Range (°F):	0 - 77
Heating Range w/Baffle (°F):	0 - 77

(Daikin's products are subject to continuous improvements. Daikin reserves the right to modify product design, specifications and information in this data sheet without notice and without incurring any obligations)

CSI #: 23 74 00

DAIKIN AC
absolute comfort

Submittal Data Sheet

Project Name:	
Location:	Approval:
Engineer:	Date:
Submitted to:	Construction:
Submitted by:	Unit #:
Reference:	Drawing #:

FBQ24PVJU

RZQ24PVJU9

FBQ24PVJU

Std U.S. Warranty: 7yrs Compressor, 5yrs Parts

RZQ24PVJU9

Std U.S. Warranty: 7yrs Compressor, 5yrs Parts

(Daikin's products are subject to continuous improvements. Daikin reserves the right to modify product design, specifications and information in this data sheet without notice and without incurring any obligations)

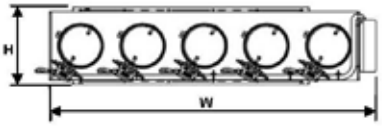
CSI #: 23 82 19

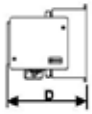
DZK
DAIKIN ZONING KIT

Submittal Data Sheet
DZK030E5 – Zoning Box rev.1.00

Project Name:	
Location:	Approval:
Engineer:	Date:
Submitted to:	Construction:
Submitted by:	Unit #:
Reference:	Drawing #:

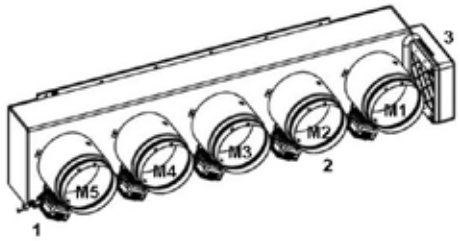
Model	DZK030E5
Description	Zoning Box
Compatible Indoor Units	FBQ18PVJU; FBQ24PVJU; FBQ30PVJU FXMQ18PVJU; FXMQ24PVJU; FXMQ30PVJU
Damper Control	Flow Control System by Airzone
Damper Size	6"
Number of Dampers	5
Insulation Value	R4
Weight (Mass)	20.24lb (9.2 kg)
Size	W: 43.58" (1107 mm) H: 10.43" (265 mm) D: 10.43" (265 mm)





Features / Benefits:

- Allows multiple individually controlled zones with one Daikin Indoor Unit fan coil.
- Individual design for each Daikin unit model.
- Reduced size and weight.
- Fast and simple assembly.
- Manual setting of maximum and minimum flow rate for each damper.



Ref	Function
1	Actuator
2	Damper
3	Main Control Board
M1 ... M5	Dampers number from 1 to 5

Note: Dampers are numbered starting with number 1 next to the Zoning box Control Board.

Phone: 972 245 1510
E-mail: info@daikinac.com
http://www.daikinac.com.

1 / 2

CSI #: 23 82 19

DZK
DAIKIN ZONING KIT

Submittal Data Sheet

DZK030E5 – Zoning Box rev.1.00

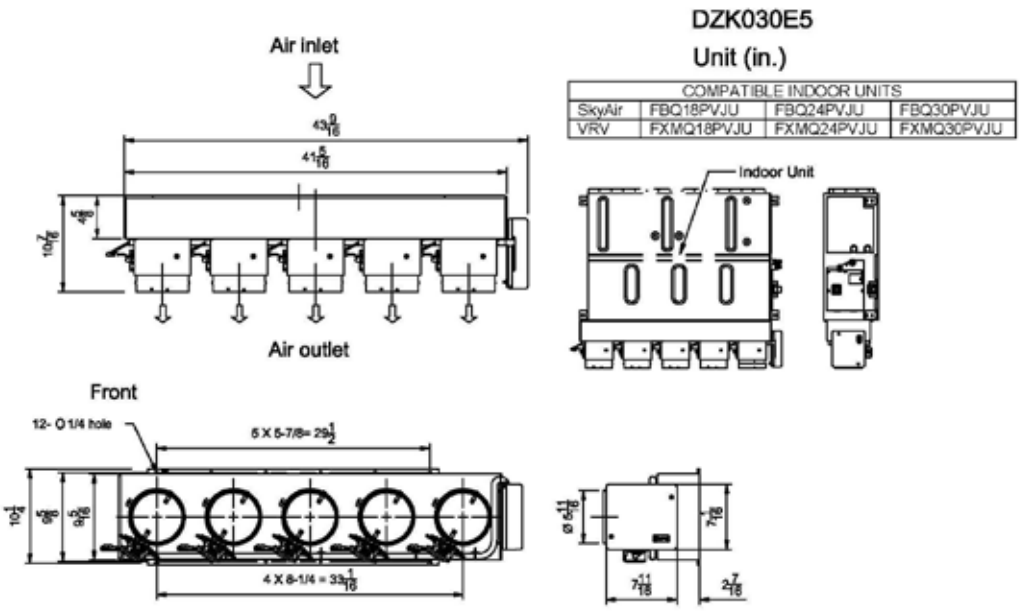
Project Name:	
Location:	Approval:
Engineer:	Date:
Submitted to:	Construction:
Submitted by:	Unit #:
Reference:	Drawing #:

Dimensional Drawing: (Units inch)

DZK030E5

Unit (in.)

COMPATIBLE INDOOR UNITS			
SkyAir	FBQ18PVJU	FBQ24PVJU	FBQ30PVJU
VRV	FXMQ18PVJU	FXMQ24PVJU	FXMQ30PVJU



Phone: 972 245 1510
E-mail: info@daikinac.com
http://www.daikinac.com

Intertek
4008882

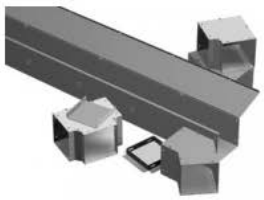
Division 26
Electrical

CSI #: 26 00 00

HAMMOND MANUFACTURING

Quality Products. Service Excellence.

Type 1 Lay-In Wireway *CW Series*



Application

- Construction designed to ensure electrical continuity and to permit fast and easy indoor installation of multiple wireway runs.

Standards

- UL-50 Type 1
- cUL Type 1
- Complies with
  - IEC 60529, IP20

Construction - Screw Cover

- Formed from 16 or 14 gauge steel
- Flat covers have keyhole screw slots
- Straight sections do not have knockouts
- Unobstructed interior speeds up laying of cables
- Optional hanger brackets allow for vertical or horizontal mounting
- Joiners sold separately

Construction - Hinge Cover

- Formed from 16 or 14 gauge steel
- Hinge covers are hinged on 24" centers
- Straight sections are provided with adequate concentric knockouts (1/2", 3/4" conduit size)
- Knockouts are on 12" centers
- Joiner is included with each straight section
- Unobstructed interior speeds up laying of cables
- Optional hanger brackets allow for vertical or horizontal mounting

Finish

- Sections and components are finished in ANSI 61 gray. Couplings are unpainted galvanized

Accessories

- Type 1 Lay In Hinge Cover Wireway
- Type 1 Lay In Hinge Cover Wireway - w/o Knockouts
- Type 1 Lay In Screw Cover Wireway - w/o Knockouts
- Straight Section Barrier
- Reducer
- Corner Reducer
- Cross Fitting
- Tee Fitting
- 90 degree Elbow
- 45 degree Elbow
- 22.5 degree Elbow
- Bracket Hanger Ceiling Type
- Closing Plate
- Adapter (Box Connector)
- Bracket Hanger Wall Type
- Joiner

CSI #: 26 00 00

- Telecope Fitting

Screw Cover with Knockouts	2.5 x 2.5	4 x 4	6 x 6	8 x 8	10 x 10	12 x 12
Straight Section 12"	CWSC212	CWSC412	CWSC612	CWSC812	-	CWSC1212
Straight Section 18"	-	-	-	-	-	-
Straight Section 24"	CWSC224	CWSC424	CWSC624	CWSC824	-	CWSC1224
Straight Section 36"	CWSC236	CWSC436	CWSC636	CWSC836	-	CWSC1236
Straight Section 48"	CWSC248	CWSC448	CWSC648	CWSC848	-	CWSC1248
Straight Section 60"	CWSC260	CWSC460	CWSC660	CWSC860	-	CWSC1260
Straight Section 72"	-	CWSC472	CWSC672		-	-
Straight Section 96"	-	-	-	-	-	-
Straight Section 120"	CWSC2120	CWSC4120	CWSC6120	CWSC8120	-	-

Screw Cover w/o Knockouts	2.5 x 2.5	4 x 4	6 x 6	8 x 8	10 x 10	12 x 12
Straight Section 12"	CWSC212NK	CWSC412NK	CWSC612NK	CWSC812NK	CWSC1012NK	CWSC1212NK
Straight Section 18"	-	CWSC418NK	CWSC618NK	CWSC818NK	-	-
Straight Section 24"	CWSC224NK	CWSC424NK	CWSC624NK	CWSC824NK	CWSC1024NK	CWSC1224NK
Straight Section 36"	CWSC236NK	CWSC436NK	CWSC636NK	CWSC836NK	CWSC1036NK	CWSC1236NK
Straight Section 48"	CWSC248NK	CWSC448NK	CWSC648NK	CWSC848NK	CWSC1048NK	CWSC1248NK
Straight Section 60"	CWSC260NK	CWSC460NK	CWSC660NK	CWSC860NK	CWSC1060NK	CWSC1260NK
Straight Section 72"	-	CWSC472NK	CWSC672NK	CWSC872NK	CWSC1072NK	-
Straight Section 96"	-	-	-	-	CWSC1096NK	CWSC1296NK
Straight Section 120"	CWSC2120NK	CWSC4120NK	CWSC6120NK	CWSC8120NK	CWSC10120NK	CWSC12120NK

Hinged Cover with Knockouts	2.5 x 2.5	4 x 4	6 x 6	8 x 8	10 x 10	12 x 12
Straight Section 12"	CWST212	CWST412	CWST612	CWST812	-	-
Straight Section 18"	-	-	-	-	-	-
Straight Section 24"	CWST224	CWST424	CWST624	CWST824	-	-
Straight Section 36"	CWST236	CWST436	CWST636	CWST836	-	-
Straight Section 48"	CWST248	CWST448	CWST648	CWST848	-	-
Straight Section 60"	CWST260	CWST460	CWST660	CWST860	-	-
Straight Section 72"	CWST272	CWST472	CWST672	CWST872	-	-
Straight Section 96"	CWST296	CWST496	CWST696	CWST896	-	-
Straight Section 120"	CWST2120	CWST4120	CWST6120	CWST8120	-	-

Hinged Cover w/o Knockouts	2.5 x 2.5	4 x 4	6 x 6	8 x 8	10 x 10	12 x 12
Straight Section 12"	CWST212NK	CWST412NK	CWST612NK	CWST812NK	CWST1012NK	CWST1212NK
Straight Section 18"	-	CWST418NK	CWST618NK	CWST818NK	-	-
Straight Section 24"	CWST224NK	CWST424NK	CWST624NK	CWST824NK	CWST1024NK	CWST1224NK
Straight Section 36"	CWST236NK	CWST436NK	CWST636NK	CWST836NK	CWST1036NK	CWST1236NK
Straight Section 48"	CWST248NK	CWST448NK	CWST648NK	CWST848NK	CWST1048NK	CWST1248NK
Straight Section 60"	CWST260NK	CWST460NK	CWST660NK	CWST860NK	CWST1060NK	CWST1260NK
Straight Section 72"	-	CWST472NK	CWST672NK	CWST872NK	CWST1072NK	CWST1272NK
Straight Section 96"	-	CWST496NK	CWST696NK	CWST896NK	CWST1096NK	CWST1296NK
Straight Section 120"	CWST2120NK	CWST4120NK	CWST6120NK	CWST8120NK	CWST10120NK	CWST12120NK

Accessories	2.5 x 2.5	4 x 4	6 x 6	8 x 8	10 x 10	12 x 12
Straight Section Barrier 60"	CWBA260	CWBA460	CWBA660	CWBA860	-	-
Elbow 90 degrees	CWEL290	CWEL490	CWEL690	CWEL890	CWEL1090	CWEL1290
Elbow 45 degrees	CWEL245	CWEL445	CWEL645	CWEL845	CWEL1045	CWEL1245
Elbow 22.5 degrees	CWEL222	CWEL422	CWEL622	CWEL822	-	-
Tee Fitting	CWTF2	CWTF4	CWTF6	CWTF8	CWTF10	CWTF12

CSI #: 26 00 00

Accessories	2.5 x 2.5	4 x 4	6 x 6	8 x 8	10 x 10	12 x 12
Cross Fitting	CWCF2	CWCF4	CWCF6	CWCF8	CWCF10	CWCF12
Reducer 4 x 4 to 2.5 x 2.5	-	CWRD42	-	-	-	-
Reducer 6 x 6 to 4 x 4	-		CWRD64	-	-	-
Reducer 8 x 8 to 6 x 6	-	-	-	CWRD86	-	-
Reducer 10 x 10 to 8 x 8	-	-	-	-	CWRD108	-
Reducer 12 x 12 to 8 x 8	-	-	-	-	-	CWRD128
Reducer 12 x 12 to 10 x 10	-	-	-	-	-	CWRD1210
Corner Reducer 4 x 4 to 2.5 x 2.5	-	CWCRD42	-	-	-	-
Corner Reducer 6 x 6 to 4 x 4	-	-	CWCRD64	-	-	-
Corner Reducer 8 x 8 to 6 x 6	-	-	-	CWCRD86	-	-
Bracket Hanger Ceiling Type	CWHD2	CWHD4	CWHD6	CWHD8	CWHD10	CWHD12
Bracket Hanger Wall Type	CWHW2	CWHW4	CWHW6	CWHW8	CWHW10	CWHW12
Closing Plate	CWCP2	CWCP4	CWCP6	CWCP8	CWCP10	CWCP12
Adapter (Box Connector)	CWAD2	CWAD4	CWAD6	CWAD8	CWAD10	CWAD12
Joiner	CWJO2	CWJO4	CWJO6	CWJO8	CWJO10	CWJO12
Telescope Fitting	CWTL2	CWTL4	CWTL6	CWTL8	CWTL10	CWTL12

Data subject to change without notice

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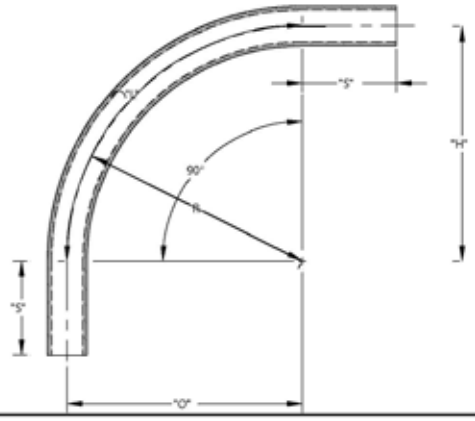
CSI #: 26 05 33.13

PART NUMBER	SIZE	"R"	"O"	"H"	"S" MIN	"B" MIN	"L"
5133823	½"	4"	4"	4"	1 ½"	N/A	6 ¼"
5133824	¾"	4 ½"	4 ½"	4 ½"	1 ½"	N/A	7 ¼"
5133825	1"	5 ¾"	5 ¾"	5 ¾"	1 ⅞"	N/A	9"
5133826	1 ¼"	7 ¼"	7 ¼"	7 ¼"	2"	N/A	11 ⅛"
5133827	1 ½"	8 ¼"	8 ¼"	8 ¼"	2"	N/A	13"
5133828	2"	9 ½"	9 ½"	9 ½"	2"	N/A	15"
5133829	2 ½"	10 ½"	10 ½"	10 ½"	3"	N/A	16 ½"
5133830	3"	13"	13"	13"	3 ⅜"	N/A	20 ⅛"
5133831	3 ½"	15"	15"	15"	3 ¾"	N/A	23 ½"
5133832	4"	16"	16"	16"	3 ⅜"	N/A	25 ⅛"
5133835	5"	24"	24"	24"	3 ⅜"	N/A	37 ⅛"
5133834	6"	30"	30"	30"	3 ¾"	N/A	47 ⅛"



ETL LISTED
CONFORMS TO UL651
ETL CONTROL #3107144
CONFORMS TO NEMA TC3
SEE NEC ARTICLE 352 FOR USE
MATERIAL IS RIGID PVC
BEND TOLERANCE IS ±2°

Intertek

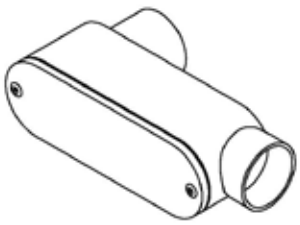
CANTEX INC.
Fort Worth, TEXAS

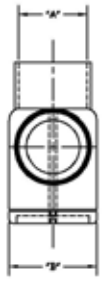
90° Elbows Plain End
Schedule 40 Standard Radius Elbows

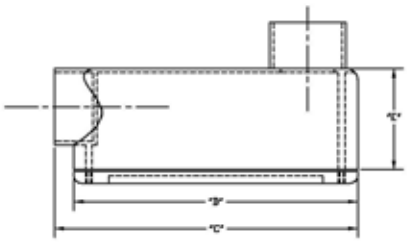
Drawn By: CD Branch | Date: 10/15/07 | Rel:

CSI #: 26 05 33.13

PART NUMBER	SIZE	"A"	"B"	"C"	"D"	"E"	Volume cu. in.	3-wire Fill
5133663	1/2	7/8"	1 5/16"	4 3/16"	4"	1 7/16"	4.3	#6 or smaller
5133664	3/4	1 1/16"	1 1/2"	4 15/16"	4 5/8"	1 5/8"	6.5	#6 or smaller
5133665	1	1 5/16"	1 3/4"	5 7/8"	5 3/8"	2"	11.8	#6 or smaller
5133666	1-1/4	1 13/16"	2 1/2"	7 5/16"	7 3/16"	2 3/8"	25	XHHW #1
5133667	1-1/2	1 7/8"	2 5/8"	8 5/16"	8"	2 3/4"	36.5	XHHW #2/0
5133668	2	2 3/8"	3 1/8"	9 13/16"	9 5/16"	3 3/8"	63.5	XHHW #4/0
5133669	2-1/2	2 7/8"	4 5/8"	1' 3"	1' 7/8"	4 5/16"	198	XHHW 500 MCM
5133670	3	3 3/4"	4 5/8"	1' 3 1/16"	1' 7/8"	4 5/16"	198	XHHW 500 MCM
5133671	3-1/2	4"	5 5/8"	1' 4 3/16"	1' 7/8"	5 1/2"	305	XHHW 500 MCM
5133672	4	N/A	N/A	N/A	N/A	N/A	305	XHHW 500 MCM







UL Listed
UL File # E98429
UL Category Code QCMZ
UL Control Number 39N9
See NEC Article 314 for use
Material is Rigid PVC
Screws are Zinc Plated Steel

CANTEX INC.
Fort Worth, TEXAS

Type LB
Conduit Bodies and Junction Boxes

Drawn By: CD Branch | Date:09/25/07 | Ref.

CSI #: 26 05 33.13

Rigid/Intermediate Grade Conduit Fittings

Grounding Bushings

INSULATED THROAT GROUNDING BUSHINGS - MALLEABLE IRON

Applications:

- For use on threaded rigid/IMC conduit to provide a means of grounding conduit through an insulated bushing

105°C Rated Plastic Throat Liner
Aluminum Lug – For Copper Or Aluminum Grounding Conductors – Threaded

UL File No. E-6225

Cat. #	Trade Size	Lug Size	Unit Qty.	Wt. Lbs. Per 100
GLL1	½"	#4 – #14	50	5
GLL2	¾"	#4 – #14	50	9
GLL3	1"	#4 – #14	50	12
GLL4	1¼"	#4 – #14	25	19
GLL4 10	1¼"	#1/0 – #8	25	23
GLL5	1½"	#4 – #14	10	24
GLL5 10	1½"	#1/0 – #8	10	28
GLL6	2"	#4 – #14	10	26
GLL6 10	2"	#1/0 – #8	10	32
GLL7	2½"	#1/0 – #8	10	53
GLL7 30	2½"	#3/0 – #6	10	60
GLL7 250	2½"	250MCM – #6	10	67
GLL8	3"	#1/0 – #8	5	70
GLL8 30	3"	#3/0 – #6	5	72
GLL8 250	3"	250MCM – #6	5	76
GLL9	3½"	#3/0 – #6	1	100
GLL9 250	3½"	250MCM – #6	1	100
GLL10	4"	#3/0 – #6	1	110
GLL10 250	4"	250MCM – #6	1	120
GLL11	5"	#3/0 – #6	1	140
GLL11 250	5"	250MCM – #6	1	143
GLL12	6"	#3/0 – #6	1	160
GLL12 250	6"	250MCM – #6	1	163

105°C Rated Plastic Throat Liner
Copper Lug – For Copper Grounding Conductors – Threaded

UL File No. E-6225

CP

Cat. #	Trade Size	Lug Size	Unit Qty.	Wt. Lbs. Per 100
GLL1C	½"	#4 – #14	50	8
GLL2C	¾"	#4 – #14	50	12
GLL3C	1"	#4 – #14	50	14
GLL4 10C	1¼"	#4 – #14	25	19
GLL4C	1¼"	#1/0 – #8	25	30
GLL5 10C	1½"	#4 – #14	10	21
GLL5C	1½"	#1/0 – #8	10	32
GLL6C	2"	#4 – #14	10	29
GLL6 10C	2"	#1/0 – #8	10	40
GLL7C	2½"	#1/0 – #8	10	65
GLL7 30C	2½"	#3/0 – #6	10	88
GLL7 250C	2½"	250MCM – #6	10	97
GLL8C	3"	#1/0 – #8	5	77
GLL8 30C	3"	#3/0 – #6	5	100
GLL8 250C	3"	250MCM – #6	5	109
GLL9C	3½"	#3/0 – #6	1	125
GLL9 250C	3½"	250MCM – #6	1	134
GLL10C	4"	#3/0 – #6	1	145
GLL10 250C	4"	250MCM – #6	1	154
GLL11C	5"	#3/0 – #6	1	165
GLL11 250C	5"	250MCM – #6	1	174
GLL12C	6"	#3/0 – #6	1	195
GLL12 250C	6"	250MCM – #6	1	204

CSI #: 26 05 33.13

Rigid/Intermediate Grade Conduit Fittings

Grounding Bushings

INSULATED THROAT GROUNDING BUSHINGS - MALLEABLE IRON

Applications:

- For use on threaded rigid/IMC conduit to provide a means of grounding conduit through an insulated bushing

CP

Aluminum Lug – For Copper Or Aluminum Grounding Conductors – Threadless – Set Screw Type 105°C Rated Plastic Throat Liner

UL File No. E-6225

Cat. #	Trade Size	Lug Size	Unit Qty.	Wt. Lbs. Per 100
GLS1	½"	#4 – #14	50	5
GLS2	¾"	#4 – #14	50	9
GLS3	1"	#4 – #14	50	12
GLS4	1¼"	#4 – #14	25	19
GLS4 10	1¼"	#1/0 – #8	25	23
GLS5	1½"	#4 – #14	10	24
GLS5 10	1½"	#1/0 – #8	10	28
GLS6	2"	#4 – #14	10	26
GLS6 10	2"	#1/0 – #8	10	32
GLS7	2½"	#1/0 – #8	10	53
GLS7 30	2½"	#3/0 – #6	10	60
GLS7 250	2½"	250MCM – #6	10	67
GLS8	3"	#1/0 – #8	5	70
GLS8 30	3"	#3/0 – #6	5	72
GLS8 250	3"	250MCM – #6	5	76
GLS9	3½"	#3/0 – #6	1	100
GLS9 250	3½"	250MCM – #6	1	100
GLS10	4"	#3/0 – #6	1	110
GLS10 250	4"	250MCM – #6	1	120
GLS11	5"	#3/0 – #6	1	140
GLS11 250	5"	250MCM – #6	1	143
GLS12	6"	#3/0 – #6	1	160
GLS12 250	6"	250MCM – #6	1	163

Copper Lug – For Copper Grounding Conductors – Threadless – Set Screw Type 105°C Rated Plastic Throat Liner

UL File No. E-6225

Cat. #	Trade Size	Lug Size	Unit Qty.	Wt. Lbs. Per 100
GLS1C	½"	#4 – #14	50	8
GLS2C	¾"	#4 – #14	50	12
GLS3C	1"	#4 – #14	50	14
GLS4C	1¼"	#4 – #14	25	19
GLS4 10C	1¼"	#1/0 – #8	25	30
GLS5C	1½"	#4 – #14	10	21
GLS5 10C	1½"	#1/0 – #8	10	32
GLS6C	2"	#4 – #14	10	29
GLS6 10C	2"	#1/0 – #8	10	40
GLS 7C	2½"	#1/0 – #8	10	65
GLS7 30C	2½"	#3/0 – #6	10	88
GLS7 250C	2½"	250MCM – #6	10	97
GLS8C	3"	#1/0 – #8	5	77
GLS8 30C	3"	#3/0 – #6	5	100
GLS8 250C	3"	250MCM – #6	5	109
GLS9C	3½"	#3/0 – #6	1	125
GLS9 250C	3½"	250MCM – #6	1	134
GLS10C	4"	#3/0 – #6	1	145
GLS10 250C	4"	250MCM – #6	1	154
GLS11C	5"	#3/0 – #6	1	165
GLS11 250C	5"	250MCM – #6	1	174
GLS12C	6"	#3/0 – #6	1	195
GLS12 250C	6"	250MCM – #6	1	204

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CSI #: 26 05 33.13

Rigid/Intermediate Grade Conduit Fittings

Grounding Bushings

INSULATED THROAT GROUNDING BUSHINGS - MALLEABLE IRON

Features:

- Resilient plastic liner, resists corrosion, chemicals and temperature extremes
- Insuliner – ULTEM1000 rated at 150°C
- 1 Set screw provided with each fitting locks bushing in any desired position
- External stainless steel hardware as standard

Standard Finishes:

- Zinc Plated

150°C Rated

Aluminum Lug – For Copper Or Aluminum Grounding Conductors – Threaded

UL File No. E-6225

Cat. #	Trade Size	Lug Size	Unit Qty.	Wt. Lbs. Per 100
HGLL 1	½"	#4 – #14	50	9
HGLL 2	¾"	#4 – #14	50	11
HGLL 3	1"	#4 – #14	50	14
HGLL 4	1¼"	#4 – #14	25	17
HGLL4 10	1¼"	#1/0 – #8	25	24
HGLL 5	1½"	#4 – #14	10	20
HGLL5 10	1½"	#1/0 – #8	10	24
HGLL 6	2"	#4 – #14	10	27
HGLL6 10	2"	#1/0 – #8	10	31
HGLL 7	2½"	#1/0 – #8	10	58
HGLL7 30	2½"	#3/0 – #6	10	67
HGLL7 250	2½"	250MCM – #6	10	70
HGLL 8	3"	#1/0 – #8	5	59
HGLL8 30	3"	#3/0 – #6	5	78
HGLL8 250	3"	250MCM – #6	5	81
HGLL 9	3½"	#3/0 – #6	1	101
HGLL9 250	3½"	250MCM – #6	1	104
HGLL 10	4"	#3/0 – #6	1	120
HGLL10 250	4"	250MCM – #6	1	123
HGLL 11	5"	#3/0 – #6	1	145
HGLL 11 250	5"	250MCM – #6	1	150
HGLL 12	6"	#3/0 – #6	1	185
HGLL 12 250	6"	250MCM – #6	1	186

150°C Rated

Copper Lug – For Copper Grounding Conductors – Threaded

UL File No. E-6225

Cat. #	Trade Size	Lug Size	Unit Qty.	Wt. Lbs. Per 100
HGLL1C	½"	#4 – #14	50	12
HGLL2C	¾"	#4 – #14	50	14
HGLL3C	1"	#4 – #14	50	17
HGLL4C	1¼"	#4 – #14	25	20
HGLL4 10C	1¼"	#1/0 – #8	25	32
HGLL5C	1½"	#4 – #14	10	23
HGLL5 10C	1½"	#1/0 – #8	10	35
HGLL 6C	2"	#4 – #14	10	30
HGLL6 10C	2"	#1/0 – #8	10	42
HGLL7C	2½"	#1/0 – #8	10	69
HGLL7 30C	2½"	#3/0 – #6	10	92
HGLL7 250C	2½"	250MCM – #6	10	101
HGLL8C	3"	#1/0 – #8	5	80
HGLL8 30C	3"	#3/0 – #6	5	103
HGLL8 250C	3"	250MCM – #6	5	112
HGLL9C	3½"	#3/0 – #6	1	126
HGLL9 250C	3½"	250MCM – #6	1	135
HGLL10C	4"	#3/0 – #6	1	145
HGLL10 250C	4"	250MCM – #6	1	155
HGLL 11C	5"	#3/0 – #6	1	171
HGLL11 250C	5"	250MCM – #6	1	180
HGLL 12C	6"	#3/0 – #6	1	210
HGLL 12 250C	6"	250MCM – #6	1	317

INSULATED THROAT GROUNDING BUSHINGS - ZINC DIE CAST

150°C Rated Plastic Throat Liner

Aluminum Lug – for Copper or Aluminum Grounding Conductors

UL File No. E-6225

Cat. #	Trade Size	Unit Qty.	Wt. Lbs. Per 100
GLL1 DC	½"	50	3
GLL2 DC	¾"	40	4
GLL3 DC	1"	25	5
GLL4 DC	1¼"	25	9
GLL5 DC	1½"	25	10
GLL6 DC	2"	10	14
GLL7 DC	2½"	5	25
GLL8 DC	3"	5	33
GLL9 DC	3½"	4	38
GLL10 DC	4"	4	44

CP

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Rigid/Intermediate Grade Conduit Fittings

Grounding Bushings

CP

INSULATED THROAT GROUNDING BUSHINGS - MALLEABLE IRON

150°C Rated

Set Screw Type – Aluminum Lug – For Copper Or Aluminum Grounding Conductors – Threadless

UL File No. E-6225

Cat. #	Trade Size	Lug Size	Unit Qty.	Wt. Lbs. Per 100
HGLS1	½"	#4 – #14	50	9
HGLS2	¾"	#4 – #14	50	10
HGLS3	1"	#4 – #14	50	13
HGLS4	1¼"	#4 – #14	25	16
HGLS4 10	1¼"	#1/0 – #8	25	20
HGLS5	1½"	#4 – #14	10	18
HGLS5 10	1½"	#1/0 – #8	10	22
HGLS6	2"	#4 – #14	10	24
HGLS6 10	2"	#1/0 – #8	10	28
HGLS7	2½"	#1/0 – #8	10	50
HGLS7 30	2½"	#3/0 – #6	10	58
HGLS7 250	2½"	250MCM – #6	10	60
HGLS8	3"	#1/0 – #8	5	58
HGLS8 30	3"	#3/0 – #6	5	67
HGLS8 250	3"	250MCM – #6	5	70
HGLS9	3½"	#3/0 – #6	1	80
HGLS9 250	3½"	250MCM – #6	1	85
HGLS10	4"	#3/0 – #6	1	90
HGLS10 250	4"	250MCM – #6	1	100
HGLS11	5"	#3/0 – #6	1	115
HGLS11 250	5"	250MCM – #6	1	120
HGLS12	6"	#3/0 – #6	1	145
HGLS12 250	6"	250MCM – #6	1	150

Features:

- Resilient plastic liner resists corrosion, chemicals and temperature extremes
- Insulinar – ULTEM1000 rated at 150°C
- 2 Set-screws provided with each fitting, locks bushings in any desired position

Standard Finishes:

- Body – Zinc Plated

150°C Rated

Set Screw Type – Copper Lug – For Copper Grounding Conductors – Threadless

UL File No. E-6225

Cat. #	Trade Size	Lug Size	Unit Qty.	Wt. Lbs. Per 100
HGLS1C	½"	#4 – #14	50	12
HGLS2C	¾"	#4 – #14	50	13
HGLS3C	1"	#4 – #14	50	16
HGLS4C	1¼"	#4 – #14	25	19
HGLS4 10C	1¼"	#1/0 – #8	25	31
HGLS5C	1½"	#4 – #14	10	21
HGLS5 10C	1½"	#1/0 – #8	10	33
HGLS6C	2"	#4 – #14	10	27
HGLS6 10C	2"	#1/0 – #8	10	39
HGLS7C	2½"	#1/0 – #8	10	60
HGLS7 30C	2½"	#3/0 – #6	10	83
HGLS7 250C	2½"	250MCM – #6	10	92
HGLS8C	3"	#1/0 – #8	5	70
HGLS8 30C	3"	#3/0 – #6	5	92
HGLS8 250C	3"	250MCM – #6	5	100
HGLS9C	3½"	#3/0 – #6	1	105
HGLS9 250C	3½"	250MCM – #6	1	115
HGLS10C	4"	#3/0 – #6	1	100
HGLS10 250C	4"	250MCM – #6	1	130
HGLS11C	5"	#3/0 – #6	1	140
HGLS11 250C	5"	250MCM – #6	1	150
HGLS12C	6"	#3/0 – #6	1	170
HGLS12 250C	6"	250MCM – #6	1	180

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Crouse-Hinds by EATON

CSI #: 26 05 33.13

Titan® - Type UL

(Liquidtight Flexible Metal Conduit)

**Liquidtight Flexible Metal Conduit. UL Listed.
CSA Listed. Oil-Resistant. Sunlight-Resistant.
Temperature Rated -30°C to 80°C.**

APPLICATIONS

Titan® Type UL Liquidtight Flexible Metal Conduit is suitable of the following installations:

- For the installation and protection of electrical conductors in circuits of 600 Volts nominal, or less
- Used in industrial and commercial applications for conveyors, blowers, cranes, air conditioners, machine tooling and lubrication equipment
- Where the conditions of installation, operation, or maintenance require flexibility or protection from liquids, vapors, solids, or weather
- Applications requiring movement, crossover connections, or tight bends
- Exposed or concealed locations
- For use as a grounding conductor per NEC® 250.118(7)
- For flexible connections to swimming pool, spa, and hot tub motors per 2011 NEC® 680.21(A)(3) & 680.42(A)(1)
- Electric signs and outline lighting supply and secondary-circuit per 2011 NEC® 600.31 (1000 Volts or less) & NEC® 600.32 (over 1000 Volts)
- For use in Hazardous locations - see Additional Applications Section on following page for more details

STANDARDS & REFERENCES

- NEC® Type designation - Type LFMC (Liquidtight Flexible Metal Conduit)
- ANSI / NFPA-70, NEC Article 350
- UL Listed to Underwriters Laboratories Standard ANSI / UL-360 for Liquidtight Flexible Steel Conduit
- CSA Listed to CSA 22.2 No.56 for use per the Canadian Electrical Code C22.1 Section 12-1300

CONSTRUCTION

Titan® Type UL is manufactured with a spiral wound strip of heavy gauge, corrosion-resistant, hot-dipped galvanized steel. For 3/8" through 1-1/4" trade sizes, the core is constructed with a square locked steel strip with an integral copper-bonding strip enclosed within the steel convolutions. For 1-1/2" through 4" trade sizes, the core is constructed with a fully interlocked steel strip. A rugged, flame retardant, flexible PVC jacket is extruded over the steel core. The grey jacket resists oils, mild acids and exposure to sunlight. Also available in other colors subject to minimum runs.

Southwire
One Southwire Drive
Carrollton, Ga. 30119 USA

MADE IN THE USA

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Tue Jan 24 10:38:59 EST 2012

CSI #: 26 05 33.13

Titan - Type UL

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 ReelLength (feet)
3/8	27	0.484 / 0.504	0.690 / 0.710	4	100	600
1/2	31	0.622 / 0.642	0.820 / 0.840	4	100	500/1000
3/4	40	0.820 / 0.840	1.030 / 1.050	5	100	500/1000
1	76	1.041 / 1.066	1.290 / 1.315	6	100	400
1-1/4	102	1.380 / 1.410	1.630 / 1.660	8	50	250
1-1/2	103	1.575 / 1.600	1.865 / 1.900	10	50	150
2	145	2.020 / 2.045	2.340 / 2.375	12	50	100
2-1/2	197	2.480 / 2.505	2.840 / 2.875	15	25	100
3	265	3.070 / 3.100	3.460 / 3.500	18	25	-
3-1/2	300	3.500 / 3.540	3.960 / 4.000	21	25	-
4	333	4.000 / 4.040	4.460 / 4.500	24	25	-

* Minimum bend radius based on NEC Chapter 9, Table 2 (other bends) per Article 350.

FEATURES

- A protective thermoplastic outer jacket which seals out water, liquids, abrasives, alcohol, coolants, corrosive fumes and gases, dirt, grease, mineral acids, nonconcentrated fixed alkalines, petroleum oils, salt air and spray, and weather
- Smooth metal interior for easy wiring pulling
- UV sunlight resistant jacket
- Rated for temperature range of -30°C to 80°C, 60°C Oil (-22°F to +176°F, 140°F Oil)
- Accepts standard metallic liquidtight fittings
- Rated for direct burial applications including concrete encasement

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) & 501.30(B)
  - Class II, Div. 1 - NEC® 502.10(A)(2) & 502.30(B)
  - Class II, Div. 2 - NEC® 502.10(B)(2)
  - Class III, Div. 1 - NEC® 503.10(A)(2) & 503.30(B)
  - Class III, Div. 2 - NEC® 503.10(A)(2)
- Permitted for equipment grounding in sizes 3/8" through 1-1/4" in lengths not exceeding 6 feet per NEC® 250.118(6)
- Floating building feeders and services per NEC® 553.7(B)
- Boatyards & Marinas in accordance with NEC® 555.13
- Cranes & Hoists in accordance with NEC® 610.11(C)

Southwire
One Southwire Drive
Carrollton, Ga. 30119 USA

MADE IN THE USA

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®Southwire is a registered trademark of Southwire Company.

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Titan - Type UL

- 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 data processing areas per NEC® 645.5(D) & 645.5(D)(2)
- Service entrance in lengths up to six feet per NEC® 230.43(15)

ONLINE CERTIFICATIONS AND TOOLS

- UL Online Certifications Directory (www.ul.com)
- CSA Online Certifications Directory (www.csa.ca)
- UL Guide Information - Flexible Metal Conduit, Liquidtight (DXHR)
- CSA Product Information - Conduit-Flexible Metal, Liquidtight Conduit (1812-03)

Southwire
One Southwire Drive
Carrollton, Ga. 30119 USA

MADE IN THE USA

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CSI #: 26 05 33.13

Part Number	Size	T Min.	OD	ID Min.	E	B	D Min.	L Min.
AS2AE12	½ *	0.109"	0.840"	0.578"	0.852"	0.836"	1.500"	120"
AS2AG12	3/4"	0.113"	1.050"	0.780"	1.064"	1.046"	1.750"	120"
AS2BA12	1"	0.133"	1.315"	1.004"	1.330"	1.310"	2.000"	120"
AS2BC12	1 1/4"	0.140"	1.660"	1.335"	1.677"	1.655"	2.250"	120"
AS2BE12	1 ½ *	0.145"	1.900"	1.564"	1.918"	1.894"	2.500"	120"
AS2CA12	2"	0.154"	2.375"	2.021"	2.393"	2.369"	3.000"	120"
AS2CE12	2 ½ *	0.203"	2.875"	2.414"	2.890"	2.868"	3.250"	120"
AS2DA12	3"	0.216"	3.500"	3.008"	3.515"	3.492"	3.750"	120"
AS2DE12	3 ½ *	0.226"	4.000"	3.486"	4.015"	3.992"	4.000"	120"
AS2EA12	4"	0.237"	4.500"	3.961"	4.515"	4.491"	4.500"	120"
AS2FA12	5"	0.258"	5.563"	4.975"	5.593"	5.553"	5.500"	120"
AS2GA12	6"	0.280"	6.625"	5.986"	6.658"	6.614"	6.125"	120"
AS2JA12 *	8"	0.322"	8.625"	7.853"	8.670"	8.610"	6.375"	120"

Dimensions are Nominal
* Not ETL Listed

ETL Listed
Conforms to UL-651
NEMA TC2 Compliant
See NEC Article 352 for use
Sunlight Resistant
Max 90° C Wire

Complies with Federal Specification WC-1094

CANTEX INC.

Schedule 40 Rigid PVC Conduit

Drawn By: D.S. Frank | Date: 7-13-2010

CSI #: 26 05 33.13

Electrical Metallic Tubing (EMT) and True Color™ EMT

allied TUBE & CONDUIT™
a brand of Atkore

E-Z Pull® EMT

- Hot galvanized steel using patented inline Flo-Coat® process for long lasting exterior protection
- E-Z Pull interior coating provides a smooth raceway for fast, easier wire-pulling
- Excellent mechanical protection for conductors
- Ductility for faster and easier bending
- Optimal EMI shielding characteristics
- Listed to Underwriters Laboratories Safety Standard UL 797
- Manufactured in accordance with ANSI C80.3
- Available in sizes 1/2 (16) - 4 (103)

Quality Electrical Metallic Tubing

True Color™ EMT

- All the benefits of E-Z Pull EMT
- Instant identification of multiple circuits
- Fire Alarm® Red EMT
- Healthcare Green EMT
- Data Com Blue EMT
- Available in 8 colors
- Available in sizes 1/2 (16) - 4 (103)

Identify Important Circuits Instantly!

True Color™ Applications

Black EMT
- Blends in dark colored areas

Fire Alarm® EMT
- Emergency circuits
- Fire alarm and Security systems

Orange EMT
- Construction/research areas
- Fiber optic systems
- Auto repair/maintenance

Yellow EMT
- High voltage wiring
- Caution areas
- Special equipment

Green EMT
- Hospital and healthcare areas
- Nurse call stations
- Critical circuits

Blue EMT
- Low voltage wiring
- Data com/video
- Network security

Purple EMT
- Specialty wiring systems
- Security systems

White EMT
- Blends in light colored areas

Silver EMT
- Standard Use
- Contemporary architecture

Project Information

Company Name: _____
Address: _____
City: _____
State & Zip: _____
Phone: _____
Project Name: _____
City: _____
State: _____

www.alliedeg.com

CSI #: 26 05 33

Electrical Metallic Tubing (EMT) and True Color™ EMT

allied TUBE & CONDUIT
a trade of atkore

FEATURES & SPECIFICATIONS

Manufactured for Long Life

Allied Tube & Conduit® EMT is precision manufactured from high grade mild strip steel for exceptional durability and long-lasting life. Allied EMT is hot galvanized using a patented inline Flo-Coat® process. This process combines zinc, a conversion coating, and a clear organic polymer topcoat to form a triple layer of protection against corrosion and abrasion.

E-Z Pull® EMT combines strength with ductility, providing easy bending, cutting and joining while resisting flattening, kinking and splitting. Available in sizes 1/2 (16) - 4 (103).

Coatings

Allied's EMT (Electrical Metallic Tubing) has a special low friction ID coating called E-Z Pull that greatly improves the slip properties between conduit and wire. With E-Z Pull EMT, wire pulls through the EMT smoothly and easily, making installation easier and faster.

EMI Shielding

Allied EMT is very effective in reducing electromagnetic field levels for encased power distribution circuits, shielding computers and other sensitive electronic equipment from the effects of electromagnetic interference.
For more information on EMT shielding, visit www.alliedeg.com to obtain the **GEMI** (**G**rounding and **E**lectro-**M**agnetic **I**nterference) software analysis program.

Codes & Standards Compliance

Allied EMT is listed to Underwriters Laboratories Safety Standard UL 797 and meets ANSI C80.3. These standards have been adopted as federal specifications in lieu of WWC 563. EMT is recognized as an equipment grounding conductor by NEC Section 250-118. Documentation for compliance with NEC Article 250 is also available in the **GEMI** (**G**rounding and **E**lectro-**M**agnetic **I**nterference) analysis software and related research studies found at the www.alliedeg.com website.

Installation of EMT shall be in accordance with the National Electrical Code and the UL listing information. Allied EMT is listed in category FJMX. Master bundles conform to NEMA Standard RN2.

Specification Data

To specify Allied EMT, include the following: Electrical Metallic Tubing shall be equal to that manufactured by Allied Tube & Conduit Corporation. EMT shall be hot galvanized steel O.D. with an organic corrosion resistant I.D. coating, and shall be listed to UL Safety Standard 797 and manufactured in accordance with ANSI C80.3.

Electrical Metallic Tubing (EMT) and True Color™ EMT

Listed to Underwriters Laboratories Safety Standard UL 797
Manufactured in accordance with ANSI C80.3

Trade Size	Metric Designator	Outside Diameter[1]		Nominal Wall Thickness[1]		Approximate Weight Per 100 Ft. (30.5M)		Red and Galvanized Master Bundle Quantity		True Color** Bundle Qty.	
		in	mm	in	mm	lb	kg	ft	m	ft	m
1/2	16	0.706	17.93	0.042	1.07	30	13.6	7000	2135	3500	1066.8
3/4	21	0.922	23.42	0.049	1.24	46	20.9	5000	1525	2500	762.0
1	27	1.163	29.54	0.057	1.45	67	30.4	3000	915	1500*	457.2
1-1/4	35	1.510	38.35	0.065	1.65	101	45.8	2000	610	2000	609.6
1-1/2	41	1.740	44.20	0.065	1.65	116	52.6	1500	457.5	1500	457.2
2	53	2.197	55.80	0.065	1.65	148	67.1	1200	366.0	1200	365.7
2-1/2	63	2.875	73.03	0.072	1.83	216	98.0	610	186.1	610	185.9
3	78	3.500	88.90	0.072	1.83	263	119.3	510	155.6	510	155.4
3-1/2	91	4.000	101.60	0.083	2.11	349	158.3	370	112.9	370	112.7
4	103	4.500	114.30	0.083	2.11	393	178.3	300	91.5	300	91.5

[1]Outside diameter tolerances: +/- .005 in. (.13mm) for trade sizes 1/2 (16mm) through 2 (53mm);
+/- .010 in. (.25mm) for trade sizes 2-1/2 (63mm);
+/- .015 in. (.38mm) for trade size 3 (78mm);
+/- .020 in. (.51mm) for trade sizes 3-1/2 (91mm) and 4 (103mm).

*Blue trade size 1 master bundle size: 3000 ft / 915 m
** Other Color Trade Sizes 2 - 4 are available thru special order
NOTE: Length = 10 ft. (3.05m) with a tolerance of +/- .25 in. (6.35 mm)

NOTE: Special orders are non-cancelable, non-returnable and non-refundable

16100 S. Lathrop Ave., Harvey, IL 60426
Phone / 708.339.1610 • Toll-Free / 800.882.5543

www.alliedeg.com

CSI #: 26 05 33.13

Electrical Metallic Tubing (EMT) Elbows

allied TUBE & CONDUIT

EMT 90° Elbows

Listed to Underwriters Laboratories Safety Standard UL 797
Manufactured in accordance with ANSI C80.3

Trade Size	Metric Designator	Radius (A)[1]		Offset (B)[2]		Straight (D)[1]		Approximate Weight Per 100 Pieces		Standard Package
		in	mm	in	mm	in	mm	lb	kg	
1/2	16	4	102	5 7/8	149	1 1/2	38	25	11.3	25
3/4	21	4 1/2	114	7	178	1 1/2	38	46	20.9	50
1	27	5 3/4	146	8 3/4	222	1 7/8	48	84	38.1	25
1 1/4	35	7 1/4	184	10 1/8	257	2	51	144	65.3	20
1 1/2	41	8 1/4	210	11 3/4	298	2	51	193	87.5	15
2	53	9 1/2	241	14	356	2	51	296	134.3	10
2 1/2	63	10 1/2	267	16 1/4	413	3	76	504	228.6	1
3	78	13	330	18 3/4	476	3 1/8	79	701	318.0	1
3 1/2	91	15	381	21 1/4	540	3 1/4	83	1047	474.9	1
4	103	16	406	23 3/8	594	3 3/8	86	1310	594.2	1

[1]Minimum requirement as per UL Standard
[2]Dimensions and weights are approximate
Sizes 2-1/2 (63) and larger shipped in palletized cartons or bulk.
Also available in the following Degrees (90°, 45°, 30°, 22-1/2°, 15° & 11-1/4°)

EMT 45° Elbows

Listed to Underwriters Laboratories Safety Standard UL 797
Manufactured in accordance with ANSI C80.3

Trade Size	Metric Designator	Radius (A)[1]		Offset (B)[2]		Offset (C)[2]		Straight (D)[1]		Approximate Weight Per 100 Pieces		Standard Package
		in	mm	in	mm	in	mm	in	mm	lb	kg	
1/2	16	4	102	6 1/8	156	2 1/2	64	1 1/2	38	18	8.2	25
3/4	21	4 1/2	114	7 3/8	187	3 1/8	79	1 1/2	38	33	15.0	50
1	27	5 3/4	146	8 3/4	222	3 5/8	92	1 7/8	48	56	25.4	25
1 1/4	35	7 1/4	184	10 1/8	257	4 1/8	105	2	51	97	44.0	20
1 1/2	41	8 1/4	210	13 1/8	333	5 3/8	137	2	51	145	65.8	15
2	53	9 1/2	241	13 1/8	333	5 1/2	140	2	51	185	83.9	10
2 1/2	63	10 1/2	267	17 1/2	445	7 1/4	184	3	76	360	163.3	1
3	78	13	330	17 1/2	445	7 1/4	184	3 1/8	79	438	198.7	1
3 1/2	91	15	381	26 1/8	664	10 7/8	276	3 1/4	83	873	396.0	1
4	103	16	406	26 1/4	667	10 7/8	276	3 3/8	86	983	445.9	1

[1]Minimum requirement as per UL Standard
[2]Dimensions and weights are approximate
Sizes 2-1/2 (63) and larger shipped in palletized cartons or bulk.
Also available in the following Degrees (90°, 45°, 30°, 22-1/2°, 15° & 11-1/4°)

NOTE: Special orders are non-cancelable, non-returnable and non-refundable

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CSI #: 26 05 33.13

Electrical Metallic Tubing (EMT) Elbows

allied TUBE & CONDUIT

EMT Large Radius 90° Elbows

Listed to Underwriters Laboratories Safety Standard UL 797
Manufactured in accordance with ANSI C80.3

Trade Size	Metric Designator	Radius (A)		Offset (B)*		Straight (D)*		Approximate Weight Per 100 Pieces	
		in	mm	in	mm	in	mm	lb	kg
1	27	12	305	20 5/8	524	8 5/8	219	201	91.2
1	27	15	381	24 1/4	616	9 1/4	235	235	106.6
1	27	18	457	27 7/8	708	9 7/8	251	268	121.6
1	27	24	610	34 5/8	879	10 5/8	270	329	149.2
1	27	30	762	41	1041	11	279	385	174.6
1	27	36	914	46 3/4	1187	10 3/4	273	436	197.8
1	27	42	1067	54	1372	12	305	503	228.2
1	27	48	1219	60 1/4	1530	12 1/4	311	558	253.1
1 1/4	35	12	305	20 5/8	524	8 5/8	219	303	137.4
1 1/4	35	15	381	24 1/4	616	9 1/4	235	354	160.6
1 1/4	35	18	457	27 7/8	708	9 7/8	251	404	183.3
1 1/4	35	24	610	34 5/8	879	10 5/8	270	497	225.4
1 1/4	35	30	762	41	1041	11	279	581	263.5
1 1/4	35	36	914	46 3/4	1187	10 3/4	273	657	298.0
1 1/4	35	42	1067	54	1372	12	305	758	343.8
1 1/4	35	48	1219	60 1/4	1530	12 1/4	311	842	381.9
1 1/2	41	15	381	24 1/4	616	9 1/4	235	406	184.2
1 1/2	41	18	457	27 7/8	708	9 7/8	251	464	210.5
1 1/2	41	24	610	34 5/8	879	10 5/8	270	570	258.6
1 1/2	41	30	762	41	1041	11	279	667	302.6
1 1/2	41	36	914	46 3/4	1187	10 3/4	273	754	342.0
1 1/2	41	42	1067	54	1372	12	305	870	394.6
1 1/2	41	48	1219	60 1/4	1530	12 1/4	311	967	438.8
2	53	15	381	24 1/4	616	9 1/4	235	518	235.0
2	53	18	457	27 7/8	708	9 7/8	251	592	268.5
2	53	24	610	34 5/8	879	10 5/8	270	728	330.2
2	53	30	762	41	1041	11	279	851	386.0
2	53	36	914	46 3/4	1187	10 3/4	273	962	436.4
2	53	42	1067	54	1372	12	305	1110	503.5
2	53	48	1219	60 1/4	1530	12 1/4	311	1233	559.3
2 1/2	63	18	457	27 7/8	708	9 7/8	251	864	391.9
2 1/2	63	24	610	34 5/8	879	10 5/8	270	1062	481.7
2 1/2	63	30	762	41	1041	11	279	1242	563.4
2 1/2	63	36	914	46 3/4	1187	10 3/4	273	1404	636.9
2 1/2	63	42	1067	54	1372	12	305	1620	734.8
2 1/2	63	48	1219	60 1/4	1530	12 1/4	311	1800	816.5

*For information only, not a requirement as per UL Standard
Sizes 2-1/2 (63) and larger shipped in pallet/cut cartons or bulk.
Also available in the following Degrees (60°, 45°, 30°, 22-1/2°, 15° & 11-1/4°)

Chart continued on the next page

16100 S. Lathrop Ave., Harvey, IL 60426
Phone / 708.339.1610 • Toll-Free / 800.882.5543

NOTE: Special orders are non-cancelable, non-returnable and non-refundable

www.alliedeg.com

CSI #: 26 05 33.13

Electrical Metallic Tubing (EMT) Elbows

allied TUBE & CONDUIT
a brand of atkore

EMT Large Radius 90° Elbows (continued)

Listed to Underwriters Laboratories Safety Standard UL 797
Manufactured in accordance with ANSI C80.3

Trade Size	Metric Designator	Radius (A)		Offset (B)[2]		Straight (D)[2]		Approximate Weight Per 100 Pieces	
		in	mm	in	mm	in	mm	lb	kg
3	78	15	381	24 1/4	616	9 1/4	235	921	417.8
3	78	18	457	27 7/8	708	9 7/8	251	1052	477.2
3	78	24	610	34 5/8	879	10 5/8	270	1293	586.5
3	78	30	762	41	1041	11	279	1512	685.8
3	78	36	914	46 3/4	1187	10 3/4	273	1710	775.7
3	78	42	1067	54	1372	12	305	1973	895.0
3	78	48	1219	60 1/4	1530	12 1/4	311	2192	994.3
3 1/2	91	18	457	27 7/8	708	9 7/8	251	1396	633.2
3 1/2	91	24	610	34 5/8	879	10 5/8	270	1716	778.4
3 1/2	91	30	762	41	1041	11	279	2007	910.4
3 1/2	91	36	914	46 3/4	1187	10 3/4	273	2269	1029.2
3 1/2	91	42	1067	54	1372	12	305	2618	1187.5
3 1/2	91	48	1219	60 1/4	1530	12 1/4	311	2908	1319.1
4	103	24	610	34 5/8	879	10 5/8	270	1932	876.4
4	103	30	762	41	1041	11	279	2260	1025.1
4	103	36	914	46 3/4	1187	10 3/4	273	2555	1158.9
4	103	42	1067	54	1372	12	305	2948	1337.2
4	103	48	1219	60 1/4	1530	12 1/4	311	3275	1485.5

[1]For information only, not a requirement as per UL Standard
Sizes 2 1/2 (63) and larger shipped in palletized cartons or bulk.
Also available in the following Degrees: 60°, 45°, 30°, 22-1/2°, 15° & 11-1/4°

16100 S. Lathrop Ave., Harvey, IL 60426
Phone / 708.339.1610 • Toll-Free / 800.882.5543

NOTE: Special orders are non-cancelable, non-returnable and non-refundable

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CSI #: 26 05 53

Solar Power Solutions
Identification Solutions

Pre-printed Installation Labels

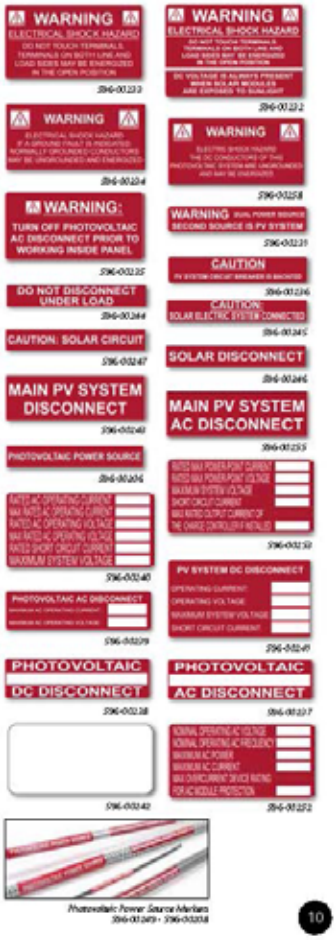
HellermannTyton offers a complete line of pre-printed, regulatory solar identification labels for use on small or large scale photovoltaic installations. Designed to meet the current National Electrical Code (NEC) and International Fire Code (IFC) requirements for durability, color, text height and visibility, HellermannTyton's solar installation labels are manufactured based on the parameters outlined in Section 690 of the NEC, for Solar Photovoltaic (PV) Systems, using ultraviolet (UV) resistant ink, permanent acrylic adhesive, and a base material intended to endure harsh environmental elements. An optional hand-applied acrylic laminate is available to provide additional long-term protection to variable printed text. The adhesives are expressly intended to offer performance on both enamel baked paints and powder coats found on most breaker boxes and panels.

The PHOTOVOLTAIC POWER SOURCE MARKERS are a pre-printed, non-adhesive, coiled marker can be opened and snapped over the cable for long term, reflective, permanent identification per NEC 2011, Article 690.31(E)(3) and IFC 2012, Article 605.11.1.4. Designed with UV stable vinyl, coiled markers come 25 per bag and will fit all standard PV cables or EMT conduit. Printed characters are the required 3/8" tall.

Product Selection

Article No.	Part No.	Type	Pkg. Qty	Description
Pre-printed Solar Labels				
596-00233	596-00233	WESHSELEC	50	WARNING - ELECTRICAL SHOCK HAZARD 3.75" X 2.0"
596-00232	596-00232	WESHELEC	50	WARNING - ELECTRICAL SHOCK HAZARD WIDC 3.75" X 2.5"
596-00234	596-00234	WGCML	50	WARNING - GROUNDED CONDUCTORS MAY BE UNGROUNDED 4.12" X 2"
596-00258	596-00258	WDCCU	50	WARNING - DC CONDUCTORS MAY BE UNGROUNDED 4.12" X 2"
596-00235	596-00235	WTOPVLEL	50	WARNING - TURN OFF PV AC PRIOR WORKING INSIDE PANEL 4.12" X 2"
596-00231	596-00231	WLPSLEL	50	WARNING - TURN OFF PV AC PRIOR WORKING INSIDE PANEL 4.12" X 2"
596-00236	596-00236	CBACKFED	50	CAUTION - PV SYSTEM CIRCUIT IS BACKFED 4.12" X .75"
Reflective Solar Labels				
596-00244	596-00244	DNDCUL	50	DO NOT DISCONNECT UNDER LOAD 6.5" X 1"
596-00245	596-00245	CSESC	50	CAUTION - SOLAR ELEC SYS CONNECTED 6.5" X 1"
596-00247	596-00247	CSCIRLEL	50	CAUTION - SOLAR CIRCUIT 6.5" X 1"
596-00246	596-00246	SOLARD	50	SOLAR DISCONNECT 6.5" X 1"
596-00243	596-00243	MPVSD	50	MAIN PV SYSTEM DISCONNECT 5.5" X 1.75"
596-00255	596-00255	MPVACDS	50	MAIN PV SYSTEM AC DISCONNECT 5.5" X 1.75"
596-00206	596-00206	PVPSE	50	PHOTOVOLTAIC POWER SOURCE 6.5" X 1"
Variable Imprint Solar Rating Labels				
596-00253	596-00253	DC2011	50	DC MODULE LABEL 4" X 2"
596-00240	596-00240	ACRATING	50	DC BACKUP SYSTEM LABEL 4" X 2"
596-00241	596-00241	DCRATING	50	DC RATING LABEL 3.75" X 2"
596-00239	596-00239	PVACDIS	50	PV AC DISCONNECT RATING 3.75" X 1"
596-00237	596-00237	ACDSCT	50	PHOTOVOLTAIC - AC DISCONNECT 3.75" X 1"
596-00238	596-00238	DCDSCT	50	PHOTOVOLTAIC - DC DISCONNECT 3.75" X 1"
596-00242	596-00242	LAM1	50	LAMINATE FOR AC/DC RATING LABEL 4.2" X 2.25"
596-00252	596-00252	AC2011	50	AC MODULE LABEL 4" X 2"
Photovoltaic Power Source Markers				
596-00249	596-00249	CSCSHAPAR	25	CAUTION - SOLAR CIRCUIT 4" X 2" Use on .25" OD PV cables
596-00251	596-00251	CSCSHAPT2R	25	CAUTION - SOLAR CIRCUIT 7.2" X 5" for EMT conduits up to 1" in OD
596-00207	596-00207	PVPSHAPAR	25	PHOTOVOLTAIC POWER SOURCE 4" X 2" Use on .25" OD PV cables
596-00208	596-00208	PVPSHAPT2R	25	PHOTOVOLTAIC POWER SOURCE 7.2" X 5" for EMT conduit up to 1" in OD

Use Part No. For ordering and Type for specification.



Photovoltaic Power Source Markers
596-00249 - 596-00258

CSI #: 26 05 53

KETRA
X1 TOUCHPAD

Project: _____
Comments: _____
Prepared By: _____

KETRA®
X1 TOUCHPAD

- Elegant touch interface control for Ketra lighting system
- On-board memory and astronomical time clock enables stand-alone operation
- Wireless connection to control network
- Fully customizable with multiple layout styles
- Contemporary design with back-lit display
- Integrated IR proximity sensor enables touchpad to wake upon user approach
- Field-swappable faceplate
- Field upgradeable firmware through Micro-B USB supported

Hardware Ordering Guide:

X1		AC	1	BK
Series	Display	Mounting Config	Region	Housing Color

Series	Code
X Series Touchpad	X1

Display	Code
5 Scenes w/ Dimmer	B01
5 Zones w/ Dimmer	B02
5 Scenes Fitting Room w/ Dimmer	B03
Special Event Space w/ Dimmer	B04
Entry w/ Dimmer	B05
Master Bedroom w/ Dimmer	B06
Kitchen w/ Dimmer	B07
Landscape w/ Dimmer	B08
5 Custom Presets w/ Dimmer	BXX

Mounting Configuration	Code
Single Gang Junction Box	AC
Table Top Console	TT
Not Applicable (Faceplate only)	NA

Region	Code
North America	1

Housing Color	Code
Black	BK

*Ketra's X1 Touchpads can be ordered with multiple layout styles and customizable text. Contact Ketra for more details.

770-0000007 01-13
Specifications are subject to change without notice

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CSI #: 26 09 23

KETRA
X1 TOUCHPAD

Project: _____
Comments: _____
Prepared By: _____

Performance Summary

Environmental

Ambient Operating Temperature	0° to 40°C
Storage Temperature	-20° to 60°C
Humidity	0-85% Non-condensing
Certification	UL, cUL, FCC Class B, RoHS
Location	UL Damp location, IP20

Mechanical

Weight	6.8 oz, 250 kg
Housing Material	Flame Retardant Polymer
Face Plate	Glass
Mounting	Mounts in non-metallic, single-gang wall box with minimum volume of 14 in³ Includes (2qty. 2) 6-32, 1", counter-sunk screws

Wireless[1]

Frequency	2405 - 2480 MHz
Output Power	+8 dBm

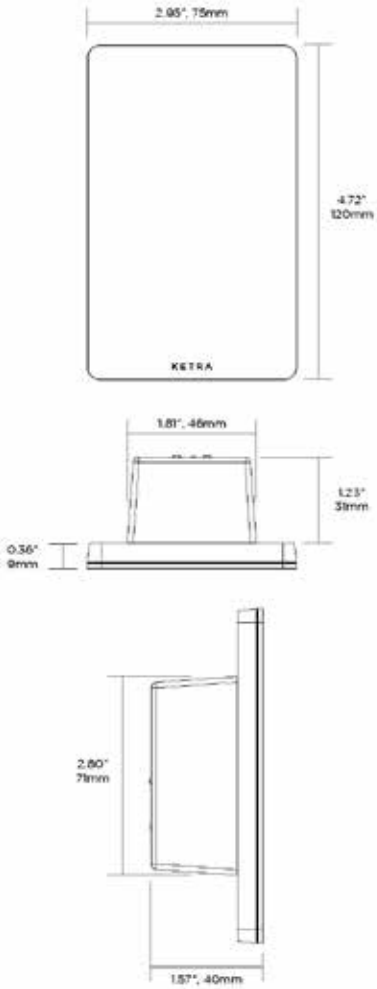
Electrical[2]

AC Model

Input Wiring	12-28 AWG (X2) Solid or Stranded
Voltage	120 VAC
Power Consumption	4 W
Frequency	50/60 Hz

[1]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.

[2]The Ketra X1 Touchpad is powered directly from a 120 VAC power source and connects wirelessly to the Ketra network.



770-000907-03 D
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CSI #: 26 09 23

KETRA
X1 TOUCHPAD

Project: _____
Comments: _____
Prepared By: _____

X1 Touchpad Configurations

Ketra's X1 Touchpad comes in a variety of customizable options. Apply your own unique lighting content to one of the X1's themes. See below.

Display B_ _ : 5 Preset Buttons

- Apply custom light content to a five button interface
- Buttons available in a variety of themes

Display Theme Options

B01 : Generic Scenes

Input	Readout	Lamp Group	Command
1	Scene 1	All	User Configurable
2	Scene 2	All	User Configurable
3	Scene 3	All	User Configurable
4	Scene 4	All	User Configurable
5	Power Icon	All	Lights On/Off

B02 : Generic Zones

Input	Readout	Lamp Group	Command
1	Zone 1	Group 1	Toggle On/Off
2	Zone 2	Group 2	Toggle On/Off
3	Zone 3	Group 3	Toggle On/Off
4	Zone 4	Group 4	Toggle On/Off
5	Power Icon	All	Lights On/Off

B03 : Fitting Room

Input	Readout	Lamp Group	Command
1	Home	All	3000K @ 25%
2	Office	All	4200K @ 100%
3	Dinner	All	2700K @ 50%
4	Daytime	All	5000K @ 100%
5	Sunset	All	2500K @ 50%

B04 : Special Event Space

Input	Readout	Lamp Group	Command
1	Scheduled	All	User Configurable
2	Special Event	All	User Configurable
3	Special Event	All	User Configurable
4	All On	All	User Configurable
5	Power Icon	All	User Configurable

B05 : Entry

Input	Readout	Lamp Group	Command
1	Home	All	User Configurable
2	Away	All	User Configurable
3	Entertain	All	User Configurable
4	Relax	All	User Configurable
5	All On/Off	All	User Configurable

B06 : Master Bedroom

Input	Readout	Lamp Group	Command
1	Room On/Off	All	User Configurable
2	Security	All	User Configurable
3	Media	All	User Configurable
4	Relax	All	User Configurable
5	Sleep	All	User Configurable

B07 : Kitchen

Input	Readout	Lamp Group	Command
1	Room On/Off	All	User Configurable
2	Cooking	All	User Configurable
3	Dining	All	User Configurable
4	Entertain	All	User Configurable
5	Relax	All	User Configurable

B08 : Landscape

Input	Readout	Lamp Group	Command
1	On/Off	All	User Configurable
2	Entertain	All	User Configurable
3	Cooking	All	User Configurable
4	Holiday	All	User Configurable
5	Event	All	User Configurable

770-000007-01-E
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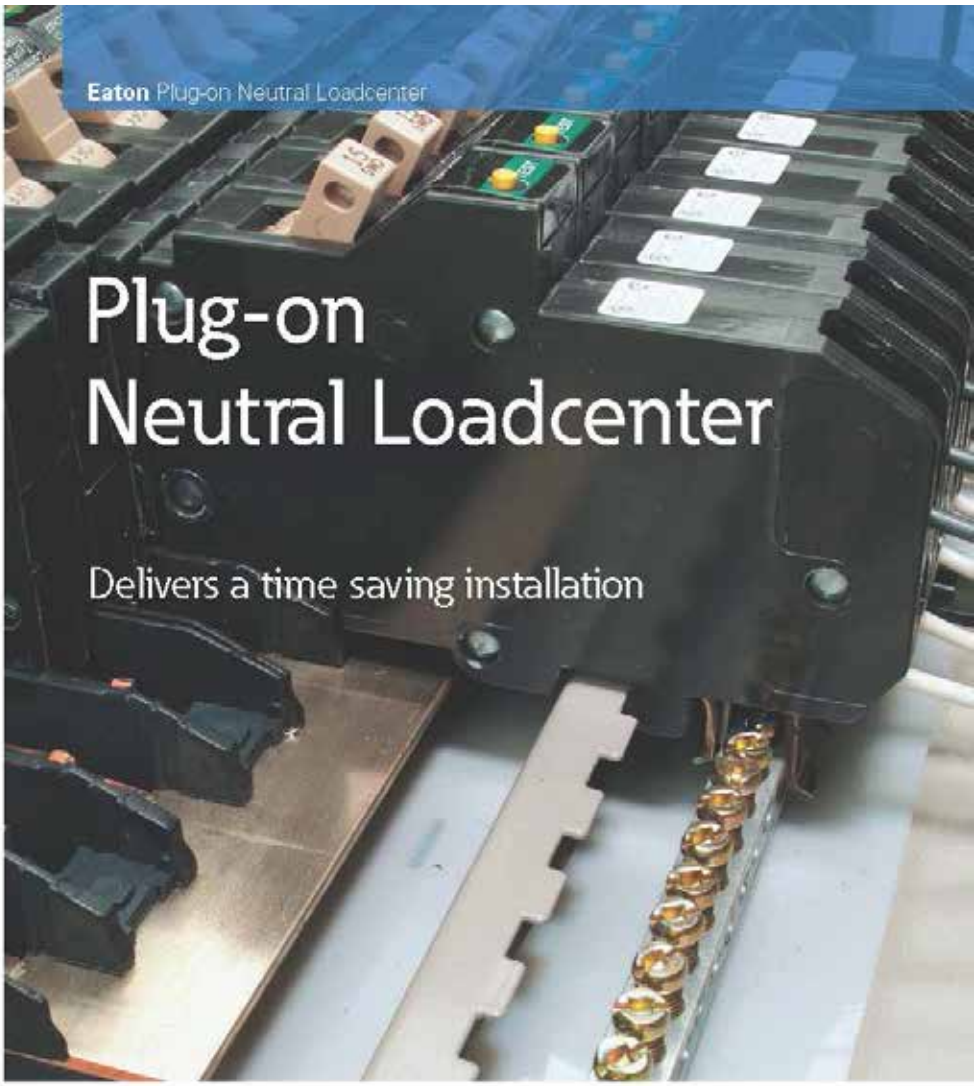
CSI #: 26 13 00



EATON
Powering Business Worldwide

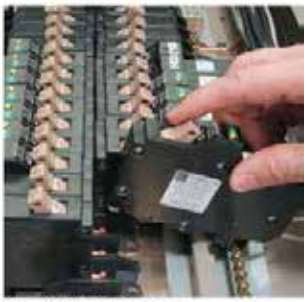
CSI #: 26 13 00

Plug into Savings

Code changes and higher safety standards are leading to more Arc Fault Circuit Interrupter (AFCI) installations. With the electrical contractor in mind, Eaton has revolutionized the way Combination AFCIs are installed with the Plug-on Neutral line of loadcenters and breakers. This unique product solution enables the contractor to connect the breaker directly to the neutral bar, eliminating the need for wiring a pigtail.

Benefits Include:

- Time savings up to 25% per AFCI installation.
- Eliminates nuisance tripping due to loose pigtail connections.
- Clean gutter space.
- Easier troubleshooting due to less wiring.
- Backed by a Lifetime Warranty.



Step 1: Connect breaker to the neutral bar.

Step 2: Snap breaker firmly to the bus bar.

End result: Tight fit and a clean installation.

■ **Combination Type Plug-on Neutral AFCI**

Plug-on Neutral clip
(Eliminates pigtail)

Product Selection

COMBINATION TYPE AFCI PLUG-ON NEUTRAL CIRCUIT BREAKERS

Catalog No.	Branch Breaker Type	Ampere Rating	Configuration
CH115CAFPN	Single-Pole 10 kAIC	15	Combination AFCI Plug-on Neutral, No Pigtail
CH120CAFPN	Single-Pole 10 kAIC	20	Combination AFCI Plug-on Neutral, No Pigtail

MAIN BREAKER PLUG-ON NEUTRAL LOADCENTERS

Catalog No.	Main Breaker Type	Main Ampere Rating	Max # 3/4" Poles	Enclosure Type	Wire Size Range for Main Breaker	Cover Catalog No. Combination	Surface
CH24BPN100E	CJH 35 kAIC	100	24	Indoor	#2-300 kcmil	CH8EF	CH8ES
CH32BPN200J	CSH 35 kAIC	200	32	Indoor	#2-300 kcmil	CH8JF	CH8JS
CH42BPN200K	CSH 35 kAIC	200	42	Indoor	#2-300 kcmil	CH8KF	CH8KS

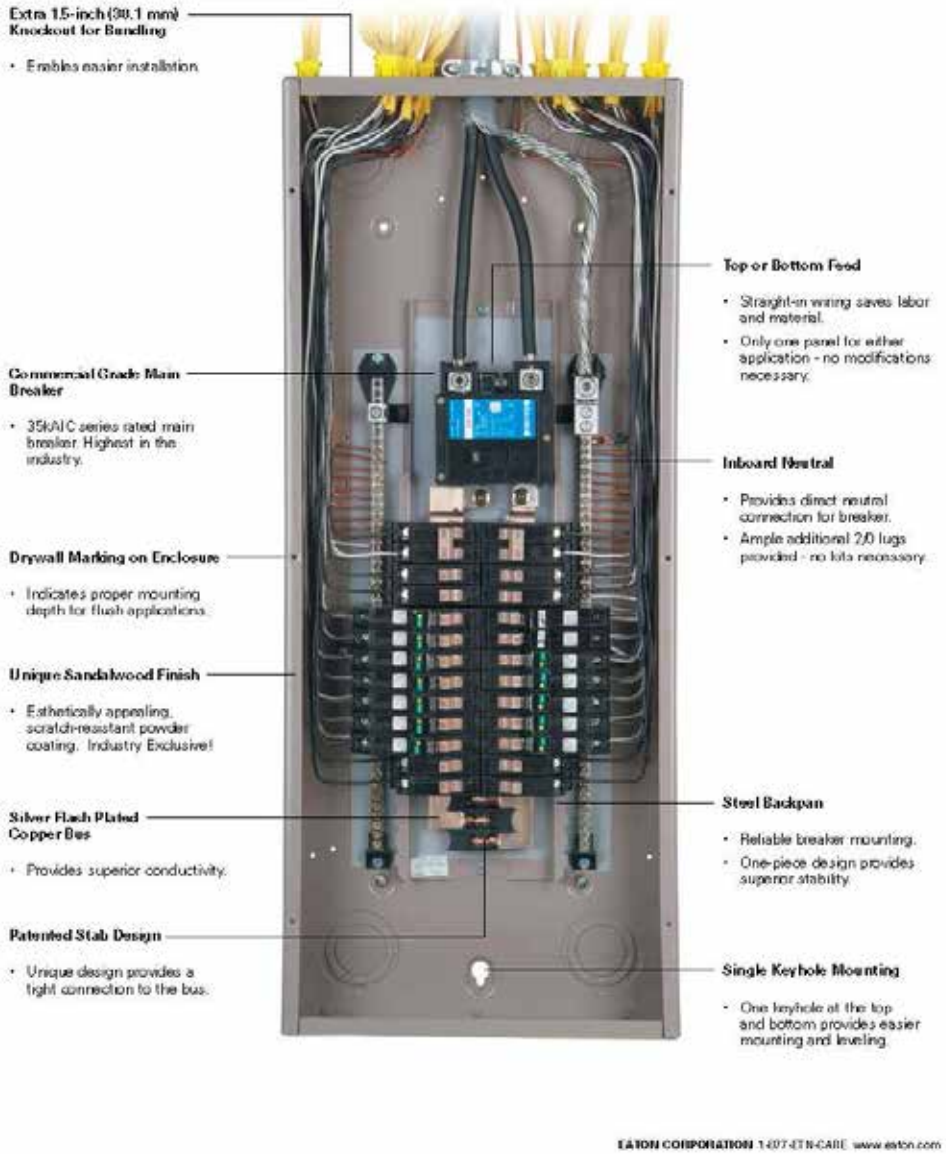
MAIN LUG ONLY/CONVERTIBLE PLUG-ON NEUTRAL LOADCENTERS (With Factory Installed Main Lugs)

Catalog No.	Main Breaker Kit	Max. Main Ampere Rating	Max # 3/4" Poles	Enclosure Type	Max Wire Size Range for Main Breaker/ Main Lug	Cover Catalog No. Combination	Surface
CH24NLPN125E	CSH2100N CSH2125N	125	24	Indoor	#2-300 kcmil/ #6-300 kcmil	CH4NLEF	CH8NLES
CH32NLPN225J	CSH2125N CSH2150N CSH2200N	225	32	Indoor	#2-300 kcmil/ #6-300 kcmil	CH8NLJF	CH8NLJS
CH42NLPN225K	CSH2125N CSH2150N CSH2200N	225	42	Indoor	#2-300 kcmil/ #6-300 kcmil	CH4NLKF	CH4NLKS

EATON CORPORATION 1-877-ETN-CARE www.eaton.com

CSI #: 26 13 00

Features, Benefits and Functions



EATON CORPORATION 1-877-ETN-CARE www.eaton.com

CSI #: 26 13 00

Enclosed Breakers

Contents

Description	Page
Product Selection	V1-T1-88

1

Product Overview

Eaton enclosed breakers offer all the advantages of circuit breakers packed in an enclosure for 240 Vac applications and include a wide range of accessories

Product Description

- 100–225A, 240 Vac maximum
- NEMA 1 general purpose—surface or flush mounting
- NEMA 3R raintight surface mounting

Standards and Certifications

- UL 489
- CSA 22.2
- NEMA 250

CSI #: 26 13 00

1.4 Loadcenters and Circuit Breakers

Enclosed Breakers

1 Product Selection

Single-Phase Circuit Breaker Enclosures—10/25/35 kAIC

Circuit Breaker Unit Enclosures

Type ECB Circuit Breaker Enclosure—Includes Lug Kit

Main Ampere Rating	Unit Enclosure Type	Mounting	Type of Circuit Breaker	Wire Size Range Cu/Al 60°C or 75°C	Catalog Number
Single-Phase Three-Wire—240 Vac Maximum					
150	Outdoor	—	CSR (included) ①	④	ECB1500B ④⑤⑦
200	Outdoor	—	CSR (included) ②	④	ECB2000B ④⑤⑦
225	Indoor	Flush	BW, CSR ③, CSH	④	ECB225I ③④⑥
	Indoor	Surface	CSR ③	④	ECB225S ③④⑥
	Outdoor	—	CSR ③	④	ECB225R ③④⑤⑥

CSR2200N

Circuit Breakers 120/240 Vac—25 kAIC For Use in Type ECB Enclosures

Ampere Rating	Wire Size Range Cu/Al 60°C or 75°C for Line Terminals	Two-Pole Breakers Catalog Number 10 kAIC	25 kAIC
100	#2–300 kcmil	—	CSR2100N
125	#2–300 kcmil	BW2125	CSR2125N
150	#2–300 kcmil	BW2150	CSR2150N
175	#2–300 kcmil	BW2175	CSR2175N
200	#2–300 kcmil	BW2200	CSR2200N
225	#2–300 kcmil	BW2225	CSR2225N

Shunt Trips

Type	Volts	Catalog Number Suffix Adder ⑧
CSR	12	ST12
CSR	24	ST24
CSR	120	ST01

Lug Kit for Replacement Purposes Only For Use in Type ECB Enclosures

Ampere Rating	Description	Wire Size Range Cu/Al 60°C or 75°C for Line Terminals	Catalog Number
225	For use on 125, 150, 175, 200 and 225A breakers	#2–300 kcmil	MCECB225

Wire Data

Wire/Application	Maximum Wire Size	Maximum Ampere Rating
Aluminum—standard	250 kcmil	200
Aluminum—service entrance	250 kcmil	225
Copper—standard and service entrance	250 kcmil	225

Shunt Trips, Auxiliary and Alarm Contacts

Description	Catalog Number Suffix Adder ⑧
Shunt Trip for Types BW/BWH	
12V	ST12
24V	ST24
120V	ST01
Auxiliary Contact for Types BW/BWH	
1NO and 1NC	A11
2NO and 2NC	A12
Alarm Contacts for Types BW/BWH	
Type: BW/BWH	CB1
Alarm Contacts for Type GFCB (Single-Pole)	
Alarm contact for GFCB (single-pole)	W1
1NO and 1NC	W2

Notes

① CSR2150N factory installed circuit breaker.
② CSR2200N factory installed circuit breaker.
③ Order circuit breaker separately.
④ Wire size is determined by the circuit breaker installed in enclosure. Maximum wire size and ampere rating is determined by Wire Data table above.
⑤ Rainproof panels are furnished with hub closures plates. For rainproof hubs, refer to Page V1-T1-23.
⑥ One ground lug accepting (1) #14–#2 is factory installed. Also, there are predrilled holes to accept a GBK5 ground bar.
⑦ Approved for service entrance.
⑧ Add suffix indicated to end of breaker catalog number.

Bar sizes Pages V1-T1-25 and V1-T1-26

CSI #: 26 27 00

"Stay Connected with Heyco" Liquid Tight Cordgrips

HEYCO

Heyco®-Tite Liquid Tight Cordgrips

Multi-Hole with Integral Sealing Ring
Sequenced by Conductor Size
The Ultimate in Liquid Tight Strain Relief Protection

NO O-RING REQUIRED!

CONDUCTORS Hole Size mm.	No.	® or VDE	NPT HUB* (specifications on page 3-1) Black Part No.	Desc.	PG HUB** (specifications on page 3-2) Black Part No.	Desc.	METRIC HUB** (specifications on page 3-3) Black Part No.	Desc.
Round, Open Holes - consult Heyco for Snap-in-2 Hub versions								
4.2	7		M3231GAB	LTOG 1/2	M3216GAB	LTOG 13	M4340GAB	LTOG M20
4.5	9	VDE	M8437GBF	LTOG 1	M3225GBF	LTOG 29	M4348GBF	LTOG M32
	13	VDE	M4524GBG	LTOG 1-1/4	M3284GBG	LTOG 36	M4352GBG	LTOG M40
4.6	3		M3234GBD	LTOG 3/4	M3222GBD	LTOG 21	M4344GBD	LTOG M25
	4		M3234GBE	LTOG 3/4	M3222GBE	LTOG 21	M4344GBE	LTOG M25
5.0	7		M3231GAC	LTOG 1/2	M3216GAC	LTOG 13	M4340GAC	LTOG M20
	4		M3234GAD	LTOG 3/4	M3222GAD	LTOG 21	M4344GAD	LTOG M25
5.2	2	®	M3231GAF†	LTOG 1/2	M3216GAE	LTOG 13	M4340GAE††	LTOG M20
	3	®	M3234GAF†	LTOG 3/4	M3222GAF	LTOG 21	M4344GAF	LTOG M25
	4	®	M3234GAG†	LTOG 3/4	M3222GAG	LTOG 21	M4344GAG	LTOG M25
5.6	3	®	M3208GAH†	LTOG LL 1/2	M3219GAH	LTOG 16	M3198GAH	LTOG LL M20
6.0	2		M3208GAJ	LTOG LL 1/2	M3219GAJ	LTOG 16	M3198GAJ	LTOG LL M20
	4		M3234GBC	LTOG 3/4	M3222GBC	LTOG 21	M4344GBC	LTOG M25
6.5	6		M8437GAL	LTOG 1	M3225GAL	LTOG 29	M4348GAL	LTOG M32
			M4524GAL	LTOG 1-1/4	M3284GAL	LTOG 36	M4352GAL	LTOG M40
7.0	3		M3234GAM	LTOG 3/4	M3222GAM	LTOG 21	M4344GAM	LTOG M25
7.4	7		M3234GAN	LTOG 3/4	M3222GAN	LTOG 21	M4344GAN	LTOG M25
8.0	2		M3234GAQ	LTOG 3/4	M3222GAQ	LTOG 21	M4344GAQ	LTOG M25
	6		M4524GAR	LTOG 1-1/4	M3284GAR	LTOG 36	M4352GAR	LTOG M40
9.0	4		M8437GAS	LTOG 1	M3225GAS	LTOG 29	M4348GAS	LTOG M32
	5		M4524GAT	LTOG 1-1/4	M3284GAT	LTOG 36	M4352GAT	LTOG M40
	7		M4524GAW	LTOG 1-1/4	M3284GAW	LTOG 36	M4352GAW	LTOG M40
9.5	4		M8437GAX	LTOG 1	M3225GAX	LTOG 29	M4348GAX	LTOG M32

Standard color black.
*Locknuts not included. For Locknut specifications or to order Locknuts separately, see pages 3-41 & 3-42.
**Unassembled Nylon Locknuts INCLUDED.
†Assembled Metal Locknut INCLUDED
†M4340GAE is UL approved under File E51579

- Heyco® **Multi-hole glands** provide the widest range of conductor through-hole size and number configurations, many of which are agency approved. See the tabular charts for specific approvals for specific parts. These approvals are not "global" or implied approvals; they are both real and part specific.
- Integral Sealing Ring ensures a superior seal at the clearance or threaded mounting hole location, every time.
- IP 68 rated.
- Cordgrips are made of nylon construction with TPE sealing glands that resist salt water, weak acids, gasoline, alcohol, oil, grease, and common solvents.
- For body part dimensions see page 3-1, 3-3, and 3-4.
- Multi-hole glands are only to be used with Heyco Liquid Tight Cordgrips and are not sold separately.
- Consult Heyco for Cordgrips molded in other colors.

Material		Nylon 6/6 with TPE Sealing Gland
Certifications	®	Listed under Underwriters' Laboratories File E51579
	VDE	Recognized under the Component Program of Underwriters' Laboratories File E51579 to both Canadian and U.S. requirements
Flammability Rating		94V-2 Standard
Temperature Range		Static -40°F (-40°C) to 239°F (115°C)
		Dynamic -4°F (-20°C) to 212°F (100°C)
IP Rating		IP 68

Quick Specs

1-800-526-4182 • 732-286-1800 (NJ) • FAX: 732-244-8843 • www.heyco.com

3-14

CSI #: 26 27 00

Product Bulletin for
Weather-Resistant GFCI Receptacles

LEVITON

When it comes to outdoor GFCI protection, it's smart to go with a pro. SmartlockPro Weather-Resistant (WR) GFCI Receptacles. The new GFCIs offer all the advantages of Leviton's popular brand, plus they are UL Listed weather resistant to comply with Section 406.8 of the 2008 NEC Code. Built with UV stabilized engineering thermoplastic for high cold impact resistance, the WR GFCI devices feature stainless steel straps and mounting screws, as well as conformally coated PC board to protect critical components from moisture. For an even higher level of safety, the GFCIs are available in tamper-resistant (TR) versions that help protect children from the danger of inserting foreign objects into receptacles. Rain or shine, Leviton offers products to meet all your outdoor needs, including a selection of raintight-while-in-use covers.

Important: Covers must be used with WR GFCI receptacles in damp or wet locations per Section 406.8 of the NEC Code.

Applications:

- Ideal in damp locations that are protected from the weather and wet locations that are subject to water saturation
- Code-compliant solution for patio, deck and pool areas
- Designed for residential and commercial applications

Section 406.8 of the 2008 NEC® Code mandates all non-locking 15A and 20A receptacles in damp or wet locations should be listed weather resistant.

CSI #: 26 27 00

LEVITON

Features and Benefits:

All Weather-Resistant GFCIs

- Professional grade lockout action, dead-face design and end-of-life indication offer superior ground fault protection
- Stainless steel strap and mounting screws
- Stainless steel terminal screws with nickel plated steel nut plates
- UV stabilized engineering thermoplastic with high cold impact resistance
- Conformally coated PC board to protect critical components from moisture
- Meets UL 498 requirements for weather-resistant receptacles

Tamper-Resistant Versions:

- TR symbol on residential receptacles assures they meet Section 406.11 of the NEC Code mandating that all 15A and 20A receptacles installed in dwelling units be listed as tamper resistant
- Shutter mechanism inside the receptacle blocks access to the contacts unless a two-prong plug is inserted, helping ensure foreign objects will be locked out

Agency Standards:

- UL Listed (File #E-48380)
- CSA Certified (File #LR-57811)
- Meets UL 498 requirements for weather-resistant receptacles

ORDERING INFORMATION:

Outdoor Grade SmartlockPro® Weather-Resistant (WR) and Tamper-Resistant (TR) GFCI Receptacles
Buttons Match Face Color - Wallplate Not Included
15A-125V @ Receptacle, 20A-125V Feed-Through — NEMA 5-15R

Cat. No.	Description	Tamper Resistant	Color	Standard Pack
R02-W7599-TKW	WR GFCI with LED Indicator Light	✔	White	1/Box, 8/Carton
R05-W7599-TKE	WR GFCI with LED Indicator Light	✔	Black	1/Box, 8/Carton
012-W7599-TRW	WR GFCI with LED Indicator Light	✔	White	1/Box, 10/Carton
014-W7599-TRE	WR GFCI with LED Indicator Light	✔	Black	1/Box, 10/Carton
002-W7599-00W	WR GFCI with LED Indicator Light	—	White	1/Box, 10/Carton
004-W7599-00E	WR GFCI with LED Indicator Light	—	Black	1/Box, 10/Carton

20A-125V @ Receptacle, 20A-125V Feed-Through — NEMA 5-20R

R54-W7899-TKE	WR GFCI with LED Indicator Light	✔	Black	1/Box, 8/Carton
012-W7899-TRW	WR GFCI with LED Indicator Light	✔	White	1/Box, 10/Carton
014-W7899-TRE	WR GFCI with LED Indicator Light	✔	Black	1/Box, 10/Carton
002-W7899-00W	WR GFCI with LED Indicator Light	—	White	1/Box, 10/Carton
004-W7899-00E	WR GFCI with LED Indicator Light	—	Black	1/Box, 10/Carton

This product is covered by U.S. Patents Nos. 6,040,967, 6,246,559, 6,282,070, 6,381,112, 6,437,953, 6,864,766, as well as other U.S. and Foreign patents pending.

NEC® is a registered trademark of the National Fire Protection Association, Inc.

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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: 1-800-563-1853

Leviton S. de R.L. de C.V.
Lago Tana 43, Mexico DF, Mexico CP 11290
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www.leviton.com.mx

Visit our Website at: www.leviton.com

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ISO 9001 REGISTERED

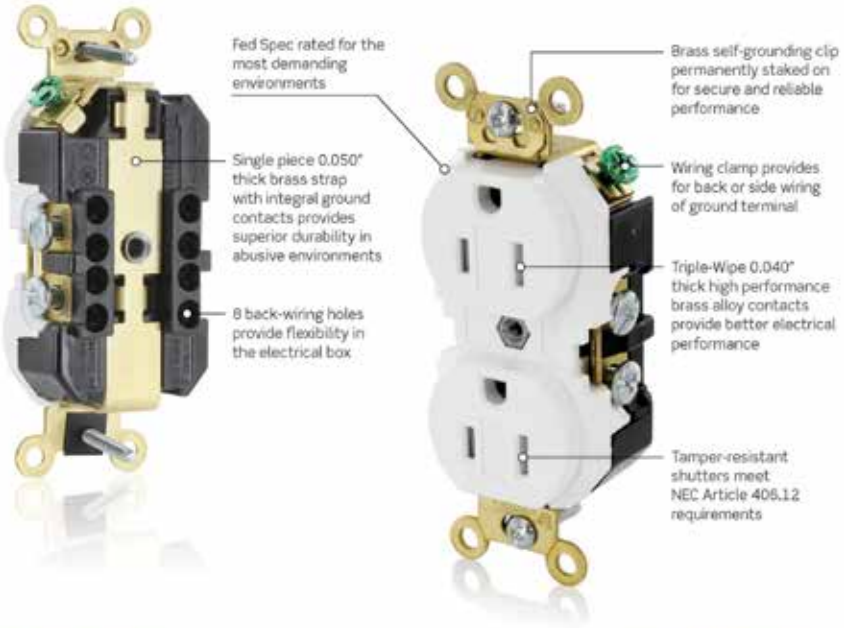
CSI #: 26 27 00

Product Bulletin

LEVITON

Industrial Grade
Tamper-Resistant Duplex Receptacle
15 Amp & 20 Amp, 125 Volt

New TR Offering!



Ordering Information

	Description	15A	20A
COLOR	Brown	5262-SG	5362-SG
	Ivory	5262-SGI	5362-SGI
	White	5262-SGW	5362-SGW
	Black	5262-SGE	5362-SGE
	Gray	5262-SGG	5362-SGG
	Red	5262-SGR	5362-SGR

Common Applications

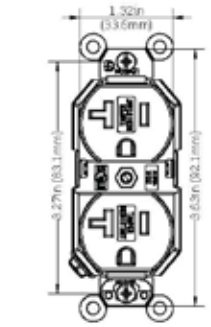
- Industrial Facilities
- Institutional Facilities
- Transportation Facilities
- Commercial Facilities

CSI #: 26 27 00

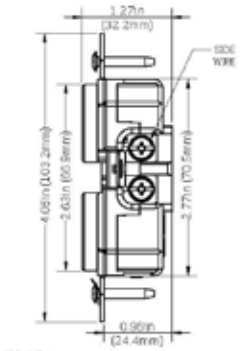
Specifications

Description	5262-SG	5362-SG
AC Horsepower Rating		
At Rated Voltage	½ Hp	1 Hp
Electrical Specifications		
Amperage	15A	20A
Voltage	125V	125V
NEMA	5-15R	5-20R
Grounding	Self Grounding	Self Grounding
Pole	2	2
Wire	3	3
Dielectric Voltage	Withstands 2000V per UL 498	Withstands 2000V per UL 498
Temperature Rise	Max 30 °C after 250 cycles OL at 200 percent rated current	Max 30 °C after 250 cycles OL at 200 percent rated current
Environmental Specifications		
Flammability	Rated V-2 per UL94	Rated V-2 per UL94
Operating Temperature	-40 °C to 75 °C	-40 °C to 75 °C
Material Specifications		
Face Material	Nylon	Nylon
Body Material	Nylon	Nylon
Line Contacts	Triple-Wipe 0.040" High Performance Brass Alloy	Triple-Wipe 0.040" High Performance Brass Alloy
Terminal Clamp	Zinc-Plated Steel	Zinc-Plated Steel
Terminal Screws	Brass 10-32	Brass 10-32
Grounding Screws	Brass 8-32	Brass 8-32
Strap Material	Brass 0.050"	Brass 0.050"
Ground Clip	Brass	Brass
Mechanical Specifications		
Terminal ID	Brass-Hot, Green-Ground, Silver-Neutral	Brass-Hot, Green-Ground, Silver-Neutral
Terminal Accom.	14-10 AWG	14-10 AWG
Wire Types	Solid or stranded	Solid or stranded
Product ID	Ratings are permanently marked on device	Ratings are permanently marked on device
Termination	Back & side wiring, 8 back-wiring holes	Back & side wiring, 8 back-wiring holes
Standards & Certifications		
NEMA	WD-1 and WD-6	WD-1 and WD-6
ANSI	C-73	C-73
Certification/Listing	UL, CSA, NOM-ANCE	UL, CSA, NOM-ANCE
Applicable Standards	UL 498, CSA C22.2 No. 42, FedSpec W-C-596	UL 498, CSA C22.2 No. 42, FedSpec W-C-596
Guarantees		
Product Warranty	10-Year Limited	10-Year Limited

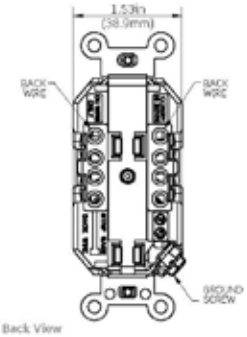
Dimensions



Front View



Side View



Back View

Visit our Website at:
www.leviton.com/industrial
email: industrial@leviton.com
Q-904

Leviton Manufacturing Co., Inc.
201 N Service Rd, 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

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ISO 9001

CSI #: 26 27 00

Product Bulletin for
USB Charger Devices

LEVITON.

USB Charger Devices. Smart, Fast, Convenient!

More Power to Keep You Connected!

The Leviton line of USB Charger Devices offers powerful charging capabilities to get your electronic devices up and running fast!

Our USB Charger Devices feature a smart chip that recognizes and optimizes the charging power of your device for fast and efficient charging. Strategically placed vertical USB Ports in all models provide generous room to insert and maneuver charging cords and add to the contemporary and aesthetically appealing design. Plus, adapter-free charging eliminates unsightly clutter contributing to a neat appearance on countertops, desktops or wherever you choose to charge.

Available with receptacle or without, Leviton USB Charger Devices are a powerful solution to help keep you connected to all your favorite mobile devices.

Cat. No. T5632
Shown with screwless wallplate
80301 sold separately

CSI #: 26 27 00

Perfect for Residential and Commercial Applications

- Kitchens
- Bedrooms
- Home Offices
- Airport Lounges
- Salons and Spas
- Hotels, Meeting Rooms
- Office Cubicles
- College Dormitories
- Cafes, Coffee Houses, Restaurants

Compatible with a wide range of electronic devices including, but not limited to, the following:

- iPad®
- iPhone®
- iPod®
- Tablets
- Mobile Phones
- Blackberry®, Android Phones
- Windows® Phone by HTC
- Samsung Devices
- Nintendo 3DS™
- PlayStation® Vita
- Bluetooth™ Headsets
- Digital Cameras
- Kindle®, Nook e-readers
- GPS

Features

- Smart chip recognizes and optimizes the charging requirements of individual devices
- USB ports are positioned vertically providing more space for maneuvering and reducing stress on USB cables
- Compatible with USB 2.0 devices
- Compact design fits in a standard wallbox
- Can be multi-ganged with other devices
- Compatible with Decora® wallplates and Decora Plus™ screwless wallplates

CSI #: 26 27 00

LEVITON

Cat. No. T5632 Cat. No. T5832

Cat. No. USB4P

USB Charger/15A or 20A Tamper-Resistant Duplex Receptacle

- Two vertical USB Ports
- 3.6A charging capacity
- Smart chip
- Two high-powered charging ports
- 15A or 20A Tamper-Resistant outlets for improved safety
- Back and side wired for easy installation
- cCSAus Listed

4-Port USB Charger

- Four vertical USB Ports
- 4.2A charging capacity
- Microprocessor and smart chip
- Charges up to 4 high-powered devices, including multiple tablets, simultaneously
- Wire leads provided for easy installation
- cCSAus Listed

Anywhere you want the convenience of fast, dependable adapter-free charging.

CSI #: 26 27 00

Hospital Grade Receptacles also available

Ordering Information

Cat. No.	Description	Charging Capability	Rating	Color*
T5632	15A USB Charger/Duplex Tamper-Resistant Receptacle	3.6 AMP	15 AMP, 125V	W, I, T, GY, E, B
T5832	20A USB Charger/Duplex Tamper-Resistant Receptacle	3.6 AMP	20 AMP, 125V	W, I, T, GY, E
T5632-HG	15A USB Charger/Duplex Tamper-Resistant Hospital Grade Receptacle	3.6 AMP	15 AMP, 125V	W, I, T, G, E, B, R
T5832-HG	20A USB Charger/Duplex Tamper-Resistant Hospital Grade Receptacle	3.6 AMP	20 AMP, 125V	W, I, T, G, E, B, R
USB4P	4-Port USB Charger	4.2 AMP 2.1A Max per output	0.4A, 25W, 125V	W, I, T, GY, E

*Colors: W - White, I - Ivory, T - Light Almond, GY - Gray, E - Black, B - Brown, R - Red.

Use of third party branded products in this material does not indicate endorsement. iPad, iPhone, iPod, Blackberry, Nintendo, Playstation, Bluetooth, Windows and Kindle are the trademarks of their respective owners.

Leviton Manufacturing Co., Inc. World Headquarters
201 North Service Road, Melville, NY 11747-3138
Telephone: 1-800-323-8920 FAX: 1-800-832-9538
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Visit our Website at: www.leviton.com/USB

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ISO 9001 REGISTERED

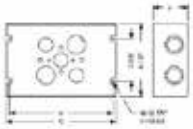
CSI #: 26 27 00

RACO TAYMAC BELL

www.hubbell.com

WELDED GANG BOXES WITH CONDUIT KO'S

Gang Boxes, 2-1/2 in. Deep - Welded with Conduit KO's A54



Catalog # [illegible]

APPLICATIONS

RACO® Gang boxes are used where a number of wiring devices are to be centrally located.

PRODUCT FEATURES

Gang boxes save time in installation, no need to gang boxes together
Have 3/4" and 1" concentric KO's for use with a wide variety of wiring methods
Bottom KO pattern, 3-1/2" and 2-3/4" at either end of box
Accepts two styles of covers, flat and 3/4" raised device cover
Use low voltage partitions #947 or #948

UL LISTED

File E155876

GENERAL PRODUCT INFORMATION

Wiring System	Conduit

CONFIGURATION

Top & Bottom Knockout(s)	(4) 3/4, (4) 3/4-1 in. Concentric
Back Knockout(s)	(2) 1/2 in. & (2) 3/4 in.
Gangs	2
Side Knockout(s)	(4) 3/4-1 in. Concentric

DRAWING DIMENSIONS

Dimension A	2-1/2 in.
Dimension B	6 3/8 in.
Dimension C	6-13/16 in.

PRODUCT MEASUREMENTS

Depth	2-1/2 in.
Cubic Inches (cm3)	10.0 (147.5)
Wt. Ea. (Lbs.)	1.825
Product Length (in.)	2.5
Product Width (in.)	4.5
Product Height (in.)	6.313

PACKAGING

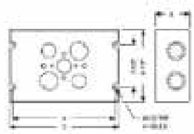
Minimum Pack Qty.	5
Std. Pkg.	5
Product UPC-A Labeled	Yes
Weight (Lbs. Per/C)	182.5
Ship Carton Length (in.)	1.25
Ship Carton Width (in.)	9.5
Ship Carton Height (in.)	7.75
Ctn Weight (Lbs.)	9.125
Pallet Qty.	810
UPC Number	[illegible]
12of5	[illegible]

CSI #: 26 27 00

HUBBELL **RACO** **TAYMAC** **BELL** www.hubbell.com

WELDED GANG BOXES WITH CONDUIT KO'S

Gang Boxes, 2-1/2 in. Deep - Welded with Conduit KO's **A54**



Catalog # 943

APPLICATIONS

RACO® Gang boxes are used where a number of wiring devices are to be centrally located

PRODUCT FEATURES

Gang boxes save time in installation, no need to gang boxes together
Have 3/4" and 1" concentric KO's for use with a wide variety of wiring methods
Bottom KO pattern, 3-1/2" and 2-3/4" at either end of box
Accepts two styles of covers, flat and 3/4" raised device cover
Use low-voltage partitions #947 or #948

UL LISTED

File E195978

GENERAL PRODUCT INFORMATION	
Wiring System:	Conduit
CONFIGURATION	
Top & Bottom Knockout(s):	(4) 3/4, (4) 3/4-1 in. Concentric
Back Knockout(s):	(5) 1/2 in. & (4) 3/4 in.
Gangs:	4
Side Knockout(s):	(4) 3/4-1 in. Concentric
DRAWING DIMENSIONS	
Dimension A:	2-1/2 in.
Dimension B:	10 in.
Dimension C:	10-7/16 in.
PRODUCT MEASUREMENTS	
Depth:	2-1/2 in.
Cubic Inches (cm3):	115.3 (1889.4)
Wt. Ea. (Lbs.):	2.312
Product Length (in.):	2.5
Product Width (in.):	4.5
Product Height (in.):	10.438
PACKAGING	
Minimum Pack Qty.:	5
Std. Pkg.:	5
Product UPC-A Labeled:	Yes
Weight (Lbs. Per/C):	231.2
Ship Carton Length (in.):	11.25
Ship Carton Width (in.):	9.5
Ship Carton Height (in.):	7.75
Ctn Weight (Lbs.):	11.560
Pallet Qty:	300
UPC Number:	050169009437
I2of5:	50050169009432

CSI #: 26 27 16

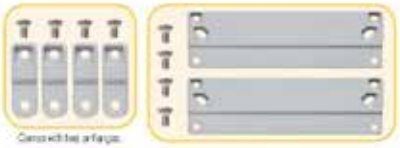
12X10X4 PREMIUM LINE

PREMIUM POLYCARBONATE ENCLOSURE

Features and Benefits

- 16 Standard configurations including hinged or non-hinged lids in 2-screw, 4-screw, or stainless steel metal latched lids.
- Standard color – light gray with a gloss finish.
- Best material – bases, opaque covers and clear covers are all made of high-impact, UV resistant polycarbonate.
- Easy ordering – one part number includes base, lid, mounting feet or flanges and all lid fastening hardware (mounting panels sold separately).
- Flexible interior mounting – features the unique and patented Integra adjustable depth "T-Rail" back panel mounting system (back panel and adjustable brackets sold separately).
- Features multiple bosses for easy installation of devices and DIN rails.
- UL-50 / c-UL Listed (files # E229365, # E207562)

Our Premium Line enclosures are the most durable, aesthetically pleasing, non-metallic Nema UL rated enclosures available. From the extremely versatile mounting options inside the enclosure to having the most off-the-shelf accessories, the Integra "Made In the USA" Premium Line enclosures provide great value to any application.



Comes with feet or flanges

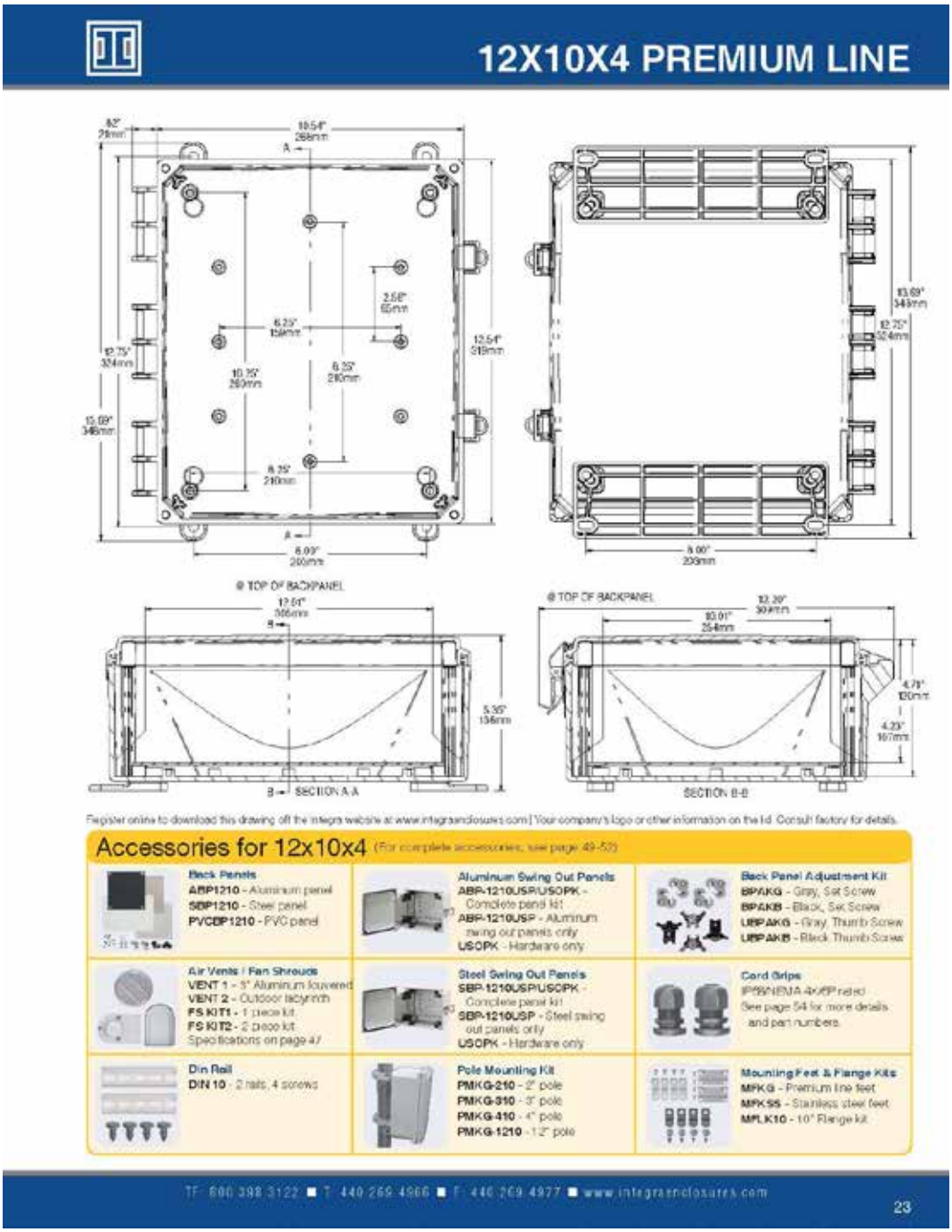
Mechanical and Thermal	Test Spec.	Unit	Premium Line
Instrumented Dart Impact @ 73° F		in/lb	565
Falling Ball Impact @ 73° F	UL-746	in/lb	900
Deflection Temperature @ 264 psi	ASTM D648	Deg. F	270
Modulus of Elasticity	ASTM D790	ksi	340
Temperature Range		Deg. F	-40 to 285
Flammable / UV Ratings	**Test Spec**	**Unit**	**Premium Line**
Flame Rating - UL	UL 94	-	5VA
Outdoor UV Exposure	UL	-	F1

Atex pending, contact factory for details

12104 P/N	4X IP66	6P IP68	Hinged Cover	Screw Cover	Opaque Cover	Clear Cover	Mounting Feet	Mounting Flange	Stainless Steel Locking Latch	T-Rail System
H12104S	✓	✓		✓	✓		✓			✓
H12104SC	✓	✓		✓		✓	✓			✓
H12104SF	✓	✓		✓	✓			✓		✓
H12104SCF	✓	✓		✓		✓		✓		✓
H12104H	✓		✓	✓	✓		✓			✓
H12104HC	✓		✓	✓		✓	✓			✓
H12104HF	✓		✓	✓	✓			✓		✓
H12104HCF	✓		✓	✓		✓		✓		✓
H12104HLL	✓		✓		✓		✓		✓	✓
H12104HCLL	✓		✓			✓	✓		✓	✓
H12104HFLL	✓		✓		✓			✓	✓	✓
H12104HCFLL	✓		✓			✓		✓	✓	✓
H12104H-6P	✓	✓	✓	✓	✓		✓			✓
H12104HC-6P	✓	✓	✓	✓		✓	✓			✓
H12104HF-6P	✓	✓	✓	✓	✓			✓		✓
H12104HCF-6P	✓	✓	✓	✓		✓		✓		✓

TORQUE SPECIFICATIONS - Mounting Brackets - 1/4"-20 x 0.25 SS, countersunk phillips drive screws (torque limit = 20 in. lbs.) **Covers / Doors** - Torque for corner screws is 10 in. lbs.

CSI #: 26 27 16


12X10X4 PREMIUM LINE
@ TOP OF BACKPANEL
SECTION A-A
@ TOP OF BACKPANEL
SECTION B-B
Register online to download this drawing off the Integra website at www.integraenclosures.com | Your company's logo or other information on the lid. Consult factory for details.
Accessories for 12x10x4 (For complete accessories, see page 49-53)
Back Panels
ABP1210 - Aluminum panel
SBP1210 - Steel panel
PVCBP1210 - PVC panel
Aluminum Swing Out Panels
ABP-1210USP/USCPK - Complete panel kit
ABP-1210USP - Aluminum swing out panels only
USCPK - Hardware only
Back Panel Adjustment Kit
BPAKG - Gray, Set Screw
BPAKB - Black, Set Screw
UBPAKG - Gray, Thumb Screw
UBPAKB - Black, Thumb Screw
Air Vents / Fan Shrouds
VENT 1 - 3" Aluminum louvered
VENT 2 - Outdoor labyrinth
FS KIT1 - 1 piece kit
FS KIT2 - 2 piece kit
Specifications on page 47
Steel Swing Out Panels
SBP-1210USP/USCPK - Complete panel kit
SBP-1210USP - Steel swing out panels only
USCPK - Hardware only
Cord Grips
IP66/NEMA 4X/IP rated
See page 54 for more details and part numbers.
Din Rail
DIN 10 - 2 rails, 4 screws
Pole Mounting Kit
PMKG-210 - 2" pole
PMKG-310 - 3" pole
PMKG-410 - 4" pole
PMKG-1210 - 12" pole
Mounting Feet & Flange Kits
MFKG - Premium line feet
MFKSS - Stainless steel feet
MFLK10 - 10" Flange kit
TF: 800 398 3122 ■ T: 440 269 4966 ■ F: 440 269 4977 ■ www.integraenclosures.com
23

CSI #: 26 27 16

9X8X2 IMPACT LINE

IMPACT

Features and Benefits

- Available in two configurations, either clear or opaque lids with Integra's standard EZ Hinge and Integra's patented Integra latch
- Standard Color – light gray with a high gloss finish.
- Best material – bases, opaque covers and clear covers are all made of high-impact, UV resistant polycarbonate
- Easy ordering – One part number equals one completely assembled enclosure
- Super easy use – mounting flanges integral, so no extra hardware needed
- Flexible interior Mounting – bosses on rear wall provide multiple mounting options for din rail, back panels, or other components
- Secure – Choose your level of protection: pad lockable or tamper tag capable
- Frequency Friendly – Available with absolutely no metals of any kind on the enclosure which is extremely favorable for sending and receiving signals
- UL-50 / c-UL Listed (file # E207562)

Our Impact Line enclosures are the most versatile, feature packed, aesthetically pleasing, Nema UL rated, non-metallic enclosures available. Features like extremely durable, UV resistant, wide temperature range, easy to machine, lighter than other non-metallic or metal materials, the "Made in USA" Impact Line enclosures provide great value to any application.

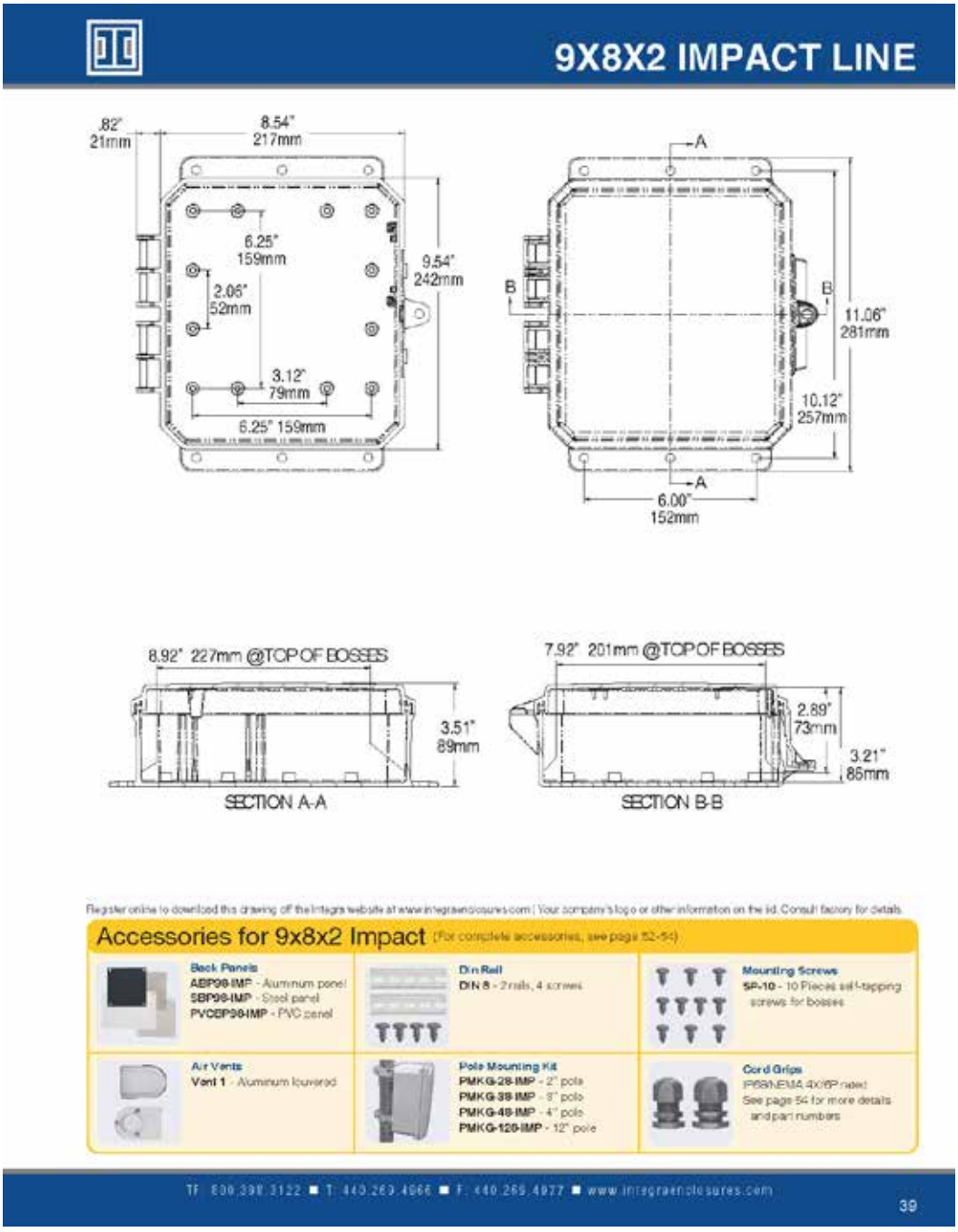
Mechanical and Thermal	Test Spec	Unit	Impact Line
Instrumented Dart Impact @ 73° F		in/lb.	565
Falling Ball Impact @ 73° F	UL-746	in/lb.	900
Deflection Temperature @ 264 psi	ASTM D648	Deg. F	270
Modulus of Elasticity	ASTM D790	ksi	340
Temperature Range		Deg. F	-40 to 265
Flammable / UV Ratings	**Test Spec**	**Unit**	**Impact Line**
Flame Rating - UL	UL 94	-	5VA
Outdoor UV Exposure	UL	-	F1

Atex pending, contact factory for details

P9082	4X IP65	6P IP68	Clear Cover	Opaque Cover	Integraged Mounting Flange	Standard Hinge	Low Profile Hinge	Integrated Locking Latch	Stainless Steel Locking Latch	PCB Mounting System	Face Plate Mtg System*
P9082	✓	✓		✓	✓	✓		✓		✓	✓
P9082C	✓	✓	✓		✓	✓		✓		✓	✓

** Sold separately*

CSI #: 26 27 16


9X8X2 IMPACT LINE
.82"
21mm
8.54"
217mm
6.25"
159mm
9.54"
242mm
2.06"
52mm
3.12"
79mm
6.25" 159mm
A
B
B
11.06"
281mm
10.12"
257mm
A
6.00"
152mm
8.92" 227mm @TOP OF BOSSES
3.51"
89mm
SECTION A-A
7.92" 201mm @TOP OF BOSSES
2.89"
73mm
3.21"
85mm
SECTION B-B
Register online to download this drawing off the Integra website at www.integraenclosures.com | Your company's logo or other information on the lid. Consult factory for details.
Accessories for 9x8x2 Impact (For complete accessories, see page 52-54)
Back Panels
ABP98-IMP - Aluminum panel
SBP98-IMP - Steel panel
PVCBP98-IMP - PVC panel
Din Rail
DIN 8 - 2 rails, 4 screws
Mounting Screws
SP-10 - 10 Pieces self-tapping screws for bosses
Air Vents
Vent 1 - Aluminum louvered
Pole Mounting Kit
PMKG-28-IMP - 2" pole
PMKG-38-IMP - 3" pole
PMKG-48-IMP - 4" pole
PMKG-128-IMP - 12" pole
Cord Grips
IP68/NEMA 4X/6P rated
See page 54 for more details and part numbers
TF 800.390.3122 ■ T 440.269.4066 ■ F 440.269.4077 ■ www.integraenclosures.com
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CSI #: 26 27 26

GB Gardner Bender

Wire Connectors

14

USA 800.624.4320 | fax 800.799.3779 | www.gardnerbender.com
CANADA 905.564.5749 | fax 905.564.0305

Copper Lugs

Heavy-duty lugs made from pure copper for maximum current flow.

- Tinned for corrosion resistance.
- Seamless barrel for maximum strength.
- Closed ends seal out moisture.

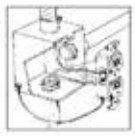
Part #	Pkg Qty	Wire Gauge	Stud Size
AML-200	2/clam	#6 AWG	¼"
AML-201	2/clam	#6 AWG	5/16"
AML-202	2/clam	#6 AWG	⅜"
AML-203	2/clam	#4 AWG	5/16"
AML-204	2/clam	#4 AWG	⅜"

Part #	Pkg Qty	Wire Gauge	Stud Size
AML-205	2/clam	#2 AWG	5/16"
AML-206	2/clam	#2 AWG	⅜"
AML-207	2/clam	#1/0 AWG	⅜"
AML-208	2/clam	#2/0 AWG	⅜"

Grounding Accessories

Convenient grounding accessories include products suitable for most job requirements.

- Zinc-plated grounding clips provide positive grounding to switch, outlet or junction boxes for #10, 12, 14 AWG copper grounding wire.
- Hex-head grounding screws secure ground wires to circuit box.
- Grounding clamps listed for connection of ground wire to ground rod.
- Fork terminals for 8–10 stud.



SEE PG 10 FOR MORE INFO ON Grounding Wire Connector

Part #	Pkg Qty	Description	Length	Ends
GGP-1261	25/bag	Grounding Pigtail; #12 AWG Solid	6½"	Captured screw/stripped
GGP-1273	25/bag	Grounding Pigtail; #12 AWG Str	7"	Stripped/bare fork terminal
GGP-1282	25/bag	Grounding Pigtail; #12 AWG Str	8"	Captured screw/bare fork terminal
GGP-1461	25/bag	Grounding Pigtail; #14 AWG Solid	6½"	Captured screw/stripped
GGP-1502	2/card	Grounding Pigtail; #12 AWG Str	8"	Captured screw/bare fork terminal
14-GRC	1/card	Grounding Clamp for ¾" - 1" pipe		
GGC-1508	8/card	Grounding Clip for Aluminum or Copper; Grounding wire; Zinc plated		
GGS-1032HC	100/clam	Hex-Head Ground Screw 10–32 x 1/2"		
GGS-1512R	12/card	Green Round Washer Head Screw for Switch and Outlet Boxes -10-32 x 3/8"		

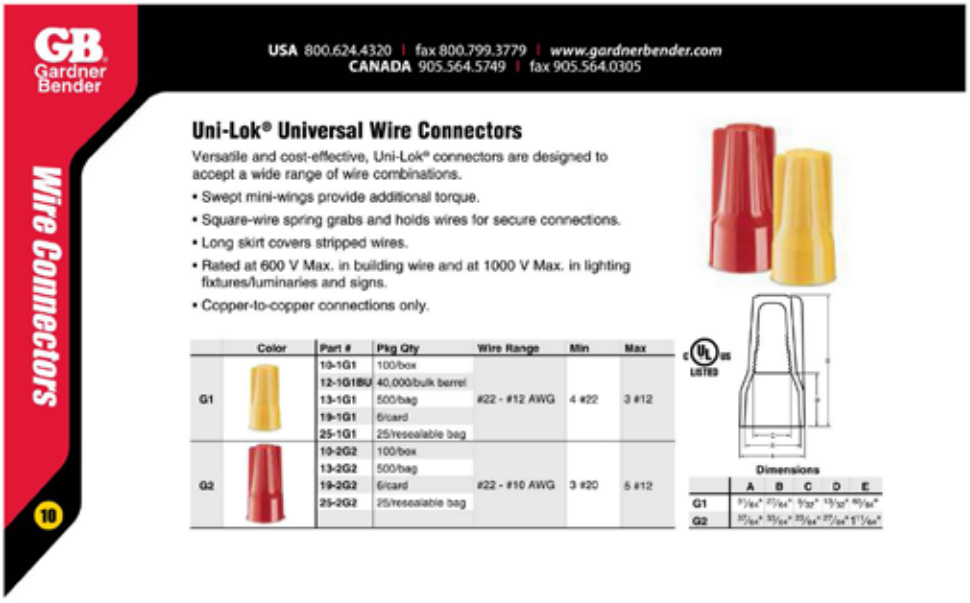
Ox-Gard™ Anti-Oxidant Compound

The perfect safeguard for aluminum-to-aluminum, aluminum-to-copper wire connections and aluminum conduit joints and copper-to-copper.

- Guards against oxidation.
- Improves conductivity; penetrates aluminum oxide to maintain inter-strand and inter-conductor current paths.
- Produces a cooler connection.

Part #	Pkg Qty	Description
OX-100B	1/tube	1 oz Squeeze Tube (blister pack)
OX-800	1/tube	8 oz Squeeze Tube

CSI #: 26 27 26



GB Gardner Bender

Wire Connectors

10

USA 800.624.4320 | fax 800.799.3779 | www.gardnerbender.com
CANADA 905.564.5749 | fax 905.564.0305

Uni-Lok® Universal Wire Connectors

Versatile and cost-effective, Uni-Lok® connectors are designed to accept a wide range of wire combinations.

- Swept mini-wings provide additional torque.
- Square-wire spring grabs and holds wires for secure connections.
- Long skirt covers stripped wires.
- Rated at 600 V Max. in building wire and at 1000 V Max. in lighting fixtures/luminaries and signs.
- Copper-to-copper connections only.

	Color	Part #	Pkg Qty	Wire Range	Min	Max
G1		10-1G1	100/box	#22 - #12 AWG	4 #22	3 #12
		12-1G1BU	40,000/bulk barrel			
		13-1G1	500/bag			
		19-1G1	6/card			
		25-1G1	25/resealable bag			
G2		10-2G2	100/box	#22 - #10 AWG	3 #20	5 #12
		13-2G2	500/bag			
		19-2G2	6/card			
		25-2G2	25/resealable bag			

c UL us LISTED

Dimensions

	A	B	C	D	E
G1	5/16"	27/64"	9/32"	13/32"	49/64"
G2	35/64"	35/64"	35/64"	27/64"	51/64"

GreenGard™ Grounding Wire Connectors

Specifically designed for making positive ground connections, GreenGard™ connectors feature the same live-action as GB® WingGard® connectors with the added plating protection for corrosion resistance in grounding applications.

- Easier to use — New design enables torque-up with improved grip.
- Contoured, offset wings enable firm ground connections.
- Flame retardant, thermoplastic shell resists punctures, cuts, abrasion and corrosion.
- Connectors have a hole in the tip for ground wire.
- Solid copper-to-copper connections only.

	Color	Part #	Pkg Qty	Wire Range	Min	Max
#95™		10-095	100/box	#14 - #10 AWG (connections rated at 600 V Max.)	2 #14	4 #12
		13-095	500/bag			
		16-095	125/jar			
		19-095	6/card			
		25-095	25/resealable bag			

c UL us LISTED

Dimensions

	A	B	C	D	E
#95™	1 1/4"	9/16"	9/32"	7/16"	29/32"

CSI #: 26 27 26

USA 800.624.4320 | fax 800.799.3779 | www.gardnerbender.com
CANADA 905.564.5749 | fax 905.564.0305

GB Gardner Bender

Wire Connectors

7

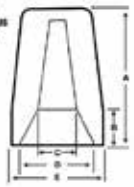
WireGard™ Color-Coded Screw-On Wire Connectors

The industry standard twist-on connector with top quality, performance and durability.

- Color-coded for easy size selection.
- Tight, square-wire spring makes quick, secure connections for positive continuity.
- Tough, thermoplastic shell shields against environmental extremes.
- Resists chemical action from hydrocarbons, diluted acid or alkaline solutions.
- Flame-retardant properties resist heat distortion up to 105 °C (221 °F).
- High-dielectric shell features deep skirt design to prevent exposure of bare wire.
- Copper-to-copper connections only.
- All wire nuts are made with Polypropylene.

	Color	Part #	Pkg Qty	Wire Range	Min	Max
GB-1 (71B)		10-001	100/box	#22 - #16 AWG (connections rated at 300 V Max.)	1 #20 w/1 #22	2 #16
		12-001	25,000/bulk keg			
		12-001BU	150,000/bulk barrel			
		15-001	150/jar			
		19-001	14/card			
		25-001	25/resealable bag			
GB-2 (72B)		10-002	100/box	#22 - #16 AWG (connections rated at 300 V Max.)	3 #22	3 #16
		12-002	10,000/bulk keg			
		12-002BU	96,000/bulk barrel			
		15-002	150/jar			
		19-002	14/card			
		25-002	25/resealable bag			
GB-3 (73B)		10-003	100/box	#22 - #14 AWG (connections rated at 300 V Max. and 600 V Max.)*	3 #20	4 #16 w/1 #20
		12-003BU	53,000/bulk barrel			
		13-003	500/bag			
		15-003	100/jar			
		15-003M	300/jar			
		17-003	50/bag			
		19-003	12/card			
		25-003	25/resealable bag			
GB-4 (74B)		10-004	100/box	#18 - #10 AWG (connections rated at 300 V Max. and 600 V Max.)*	1 #14 w/1 #18	3 #12
		12-004BU	32,400/bulk barrel			
		13-004	500/bag			
		15-004	200/jar			
		17-004	50/bag			
		19-004	9/card			
		25-004	25/resealable bag			
GB-6 (76B)		10-006	100/box	#18 - #10 AWG (connections rated at 300 V Max. and 600 V Max.)*	2 #14	2 #10 w/2 #12
		12-006BU	21,000/bulk barrel			
		13-006	250/bag			
		15-006	125/jar			
		17-006	50/bag			
		19-006	6/card			
		25-006	25/resealable bag			

c UL us LISTED



Dimensions

	A	B	C	D	E
GB-1					
GB-2					
GB-3					
GB-4					
GB-6					

* Note: Connectors rated at 600 V Max. for building wiring and rated at 1000 V Max. in lighting fixtures/luminaires and signs. See carton for detailed wire combination ratings or www.gardnerbender.com.

Assortments

Part #	Pkg Qty	Description
19-AWC	9/card	2 gray, 2 orange, 3 yellow, 3 red
25-AWC	25/resealable bag	3 gray, 4 blue, 9 orange, 6 yellow, 6 red

CSI #: 26 27 26

LEVITON

Extra Duty While-In-Use Covers

The new Leviton Extra Duty While-in-Use Covers are ruggedly constructed to protect from moisture, debris and insects, while providing easy access to receptacles. These non-metallic covers are available in both vertical and horizontal configurations for a secure fit and neat appearance when mounted. The UV resistant polycarbonate cover and base protect wiring devices from the elements without breaking, cracking or discoloration. Stainless steel hinge pins offer added strength and resistance to the rigors of daily use.

The Extra Duty While-in-Use Covers are available in solid Gray or Clear with a gray base. They are ideal for use with lawn equipment, pools, hot tubs, holiday and landscape lighting, outdoor entertainment systems, barbeques, fountains, vending machines and other outdoor electrical applications.

Our Extra Duty While-in-Use Covers are built to withstand the elements and feature:

- Compliance with NEC® 2014 Section 406.9(B)(1) for "Extra Duty" applications hoods*
- Standard opening accommodates Decora® GFCI devices and additional adapter plates are included for duplex and single receptacle openings
- Pre-mounted heavy-duty gasket provides a weather-resistant seal which protects from moisture and adds to ease of installation
- Includes two inserts to cover the circular cord openings to prevent insects and debris from entering the cover while not in use
- Safety lock feature
- cULus listed

CSI #: 26 27 26

PRODUCT SPECIFICATIONS

LEVITON

decora®

Rocker Slide Universal Dimmers and Fan Speed Control

APPLICATION

Leviton Decora Rocker Slide Universal Dimmers provide smooth, slide-action, full-range dimming for incandescent, dimmable LEDs, dimmable CFLs, halogen and magnetic low voltage (MLV) loads. The Decora Fan Speed Control offers 1.5 amps of quiet fan speed control with user adjustable low, medium and high settings. Quiet fan speed controls are ideal for libraries, home offices, bedrooms and any area where ceiling fan noise could become distracting.

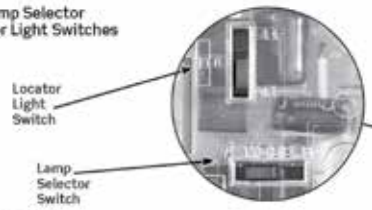
With a new, streamlined style, Decora dimmers and fan speed control complement any interior design and are compatible with other Decora devices.

DIMMER FEATURES AND BENEFITS

- New aesthetically pleasing design with rocker switch and slender dimmer control slide bar
- Integrated linear full-range slide control for easy, precise operation
- Future-proof to control a variety of dimmable LED and CFL lamps
- Compatible with incandescent and halogen lamps
- Single pole/3-way is standard; packaged with White, Ivory, and Light Almond color change kits
- Additional color change kits available in Black, Brown, Red and Gray
- Slim, compact housing fits easily into a standard wallbox and is suitable for multi-gang installations with other Decora products
- Features a separate ON/OFF switch that preserves the selected brightness setting
- Microprocessor control offers flexibility to program LEDs and CFLs for best performance (DSL06 and DSM10)
- User-friendly locator light option switch (DSL06 and DSM10)
- No fins for multi-gang installation
- DSL06 has screw terminals with back wire capability for easier installation
- Built-in radio/TV interference filter

DSL06

Dimmer Lamp Selector and Locator Light Switches



Lamp Selector Switch

DSL06 and DSM10 dimmers have a lamp selector switch that is pre-set at the factory to Mode A (LED/Incandescent). For CFL lamp applications the switch should be moved to Mode B (CFL).

- **MODE A - LED/Incandescent:** The selector switch is pre-set at the factory to this mode. Use this mode for dimmable LED lamps and incandescent/halogen lamps.
- **MODE B - CFL:** To be used for dimmable CFL lamps only. In this mode the dimmer provides a pre-set kick-start to aid the lamp in starting.
- The lamp selector switch also allows the user to adjust the minimum light level when dimming.

Locator Light Switch (LOC)

The LED Locator Light on the device will automatically illuminate when the load is OFF. To disable the Locator Light, move the Locator Light Switch to the OFF position.

Leviton Mfg. Co., Inc.

201 North Service Road, Melville, NY 11747 Tech Line: 1-800-824-3005 Fax: 1-800-832-9538 www.leviton.com

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Decora Universal Dimmers and Fan Speed Control

CSI #: 26 27 26

Decora Universal Dimmers and Fan Speed Control

SPECIFICATIONS

Electrical for DSL06
- Input 120VAC @ 60Hz
- 600W Incandescent
- 300W (2.5A) LED and CFL
- Single pole and 3-way
- Optional locator light

Electrical for DSM10
- Input 120VAC @ 60Hz
- 1000W Incandescent and MLV 1000VA
- 450W (3.75A) LED and CFL
- Single pole and 3-way
- Optional locator light

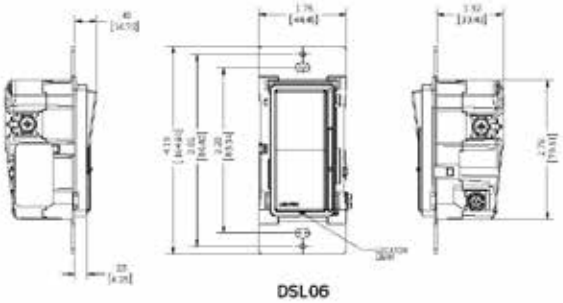
Electrical for DSF01
- Input 120VAC @ 60Hz
- 1.5A fan speed control
- High, medium and low settings
- Single pole and 3-way

TYPICAL SPECIFICATIONS
- Operating Temperature Range: 0°C to 55°C
- Storage Temperature Range: -10°C to 85°C
- Relative Humidity: 20% to 90% non-condensing

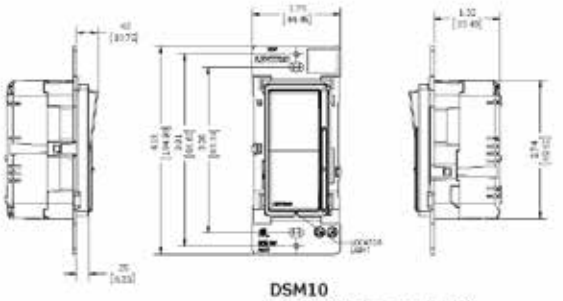
AGENCY STANDARDS AND COMPLIANCE
- cCSAus certified to standard 1941, complies with UL 1472
- NOM

WARRANTY INFORMATION
Five-Year Limited Warranty

DIMENSIONAL DRAWINGS



DSL06



DSM10
DSF01 (No locator light)

Color Change Kit

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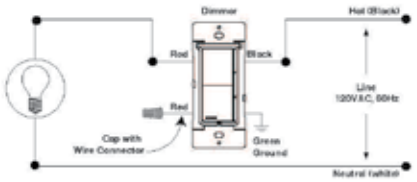
CSI #: 26 27 26

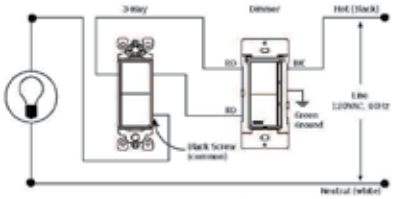
WIRING DIAGRAMS

Single Pole



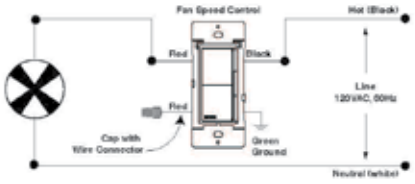
Cat. No. DSL06
Cat. No. DSM10

3-Way



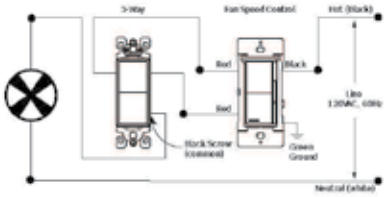
Cat. No. DSL06
Cat. No. DSM10

Single Pole



Cat. No. DSF01

3-Way



Cat. No. DSF01

ORDERING INFORMATION

CAT. NO.	DESCRIPTION	RATING	COLOR
DSL06	Incandescent, LED, CFL dimmer with optional locator light and screw terminals	600W Incandescent 300W LED/CFL	Z
DSM10	Incandescent, MLV, LED, CFL dimmer with optional locator light and leads	1000W Incandescent/ 1000VA MLV 450W LED/CFL	Z
DSF01	Quiet Fan Speed Control and leads	1.5A	Z

Z- Comes packaged with three colors: White, Ivory and Light Almond.

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Decora Universal Dimmers and Fan Speed Control

CSI #: 26 27 26

1-5 CU-NM-B

Romex ® SIMpull ® Type NM-B

**Nonmetallic-Sheathed Cable. 600 Volt.
Copper Conductors. Color-Coded Jacket.
Four Conductor Available With Two Neutrals.
SIM Jacket ® Designed for Easier Pulling.**

APPLICATIONS

Southwire's Romex SIMpull Type NM-B (nonmetallic-sheathed cable) may be used for both exposed and concealed work in normally dry locations at temperatures not to exceed 90°C (with ampacity limited to that for 60°C conductors) as specified in the 2011 National Electrical Code. NM-B cable is primarily used in residential wiring as branch circuits for outlets, switches, and other loads. NM-B cable may be run in air voids of masonry block or tile walls where such walls are not wet or damp locations. Voltage rating for NM-B cable is 600 volts.

SPECIFICATIONS

Southwire's Romex SIMpull Type NM-B cable complies with:

- ASTM B-3 and B-8
- UL Standard 83
- UL Standard 719
- Federal Specification A-A-59544
- National Electrical Code, NFPA 70. 2011 Edition
- RoHS/ REACH

CONSTRUCTION

Southwire's Romex SIMpull Type NM-B cable is manufactured as 2, 3, or 4 conductor cable, with a bare ground wire. Copper conductors are annealed (soft) copper. Stranded conductors are compressed stranded. Conductor insulation is 90°C-rated polyvinyl chloride (PVC), nylon jacketed. Southwire's Romex SIMpull Type NM-B is designed for Easier Pulling, Resulting in Easier installation. The cable jacket is color-coded for quick size identification; White - 14 AWG, Yellow - 12 AWG, Orange - 10 AWG, and Black - 8 AWG and 6 AWG.

Southwire
One Southwire Drive
Carrollton, Ga. 30119 USA

MADE IN THE USA

greenSpec
RoHS Compliant

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CSI #: 26 27 26

CU-NM-B

Conductor				Ground Wire		Approx. Cable Dimension (mils)	Approx. Net Weight per 1000' (lbs)	Allowable Ampacity+	Standard Package
Size (AWG)	Number of Conductors	Number of Strands	Insulation Thickness (mils)	Size (AWG)	Number of Strands				
TWO CONDUCTOR									
14	2	1	19	14	1	360X162	57	15	BEF
12	2	1	19	12	1	410X179	82	20	BEF
10	2	1	24	10	1	494X210	124	30	ABE
8	2	7	35	10	1	612X269	186	40	ABCD
6	2	7	35	10	1	683X304	225	55	BDF
THREE CONDUCTOR									
14	3	1	19	14	1	307	74	15	BDF
12	3	1	19	12	1	347	107	20	BE
10	3	1	24	10	1	422	164	30	BCE
8	3	7	35	10	1	565	253	40	ABCD
6	3	7	35	10	1	650	357	55	ABCD
4	3	7	46	8	1	814	560	70	BCD
2	3	7	46	8	1	952	816	95	BCD
FOUR CONDUCTOR									
14	2/2	1*	19	14	1	336	91	15	BE
14	4	1**	19	14	1	336	91	15	BE
12	2/2	1*	19	12	1	381	132	20	BE
12	4	1**	19	12	1	381	132	20	BE
10	4	1	24	10	1	465	201	30	BE

+ Ampacities per National Electrical Code section 310.15 and 334.80, 2011 Edition
NOTE: Jacket thickness for all NM-B cable is 30 mils
* Color code for 2/2 conductor cable is Black, White, Red and White with Red stripe.
** Color code for 4 conductor cable is Black, White, Red and Blue.

PACKAGE CODE:
A - 2500' Reel
B - 1000' Reel
C - 500' Spool
D - 125' Coil
E - 250' Coil
F - 500' Coil

RECOMMENDED SAMPLE SPECIFICATIONS:
Conductors shall be UL-listed Type NM-B, suitable for operation at 600 volts in all installations as specified in the National Electrical Code. SIMpull ® jacketed conductors shall be annealed copper as manufactured by Southwire Company or approved equal.

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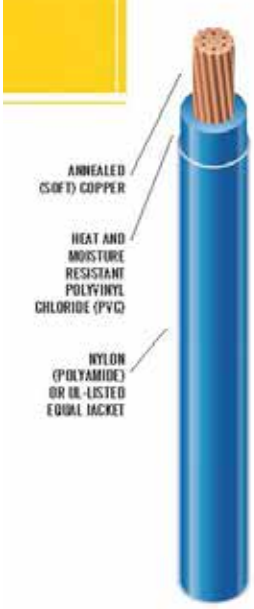
CSI #: 26 27 26

THHN/THWN/TWN75/T90



- 600 Volt
- Copper Conductor
- Thermoplastic Insulation/Nylon Sheath
- Heat, Moisture, Gasoline and Oil Resistant[1]
- Sizes 8 AWG and Larger Rated THWN-2
- All Stranded Sizes Rated MTW and THWN
- Sizes 14 through 6 AWG Rated AWM (105°C)
- Sizes 14 through 1 AWG Rated VW-1

APPLICATIONS Suitable for use as follows:

- Southwire Type 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 National Electrical Code®[2]
- When used as Type THHN, conductor is suitable for use in dry locations at temperatures not to exceed 90°C.
- When used as Type THWN-2*, 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 or coolant
- When used as Type MTW, conductor is suitable for use in wet locations or when exposed to oil or coolant 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. Voltage for all applications is 600 volts

STANDARDS & REFERENCES

Southwire Type THHN or THWN-2* or MTW (also AWM) meets or exceeds all applicable ASTM specifications, UL Standard 83, UL Standard 1063 (MTW), Federal Specification A-A-59544 and requirements of the National Electrical Code® RoHS Compliant.

CONSTRUCTION

- Southwire Type THHN or THWN-2* or MTW copper conductors are annealed (soft) copper, insulated with a tough heat and moisture resistant polyvinyl chloride (PVC), over which a nylon (polyamide) or UL-listed equal jacket is applied
- Available in black, white, red, blue, green, yellow, brown, orange and grey; some colors standard, some subject to economic order quantity

SPECIFICATIONS

- **MTW or THHN or THWN-2:**
  Conductors shall be UL-listed Type MTW or THHN or THWN-2* gasoline and oil resistant II, suitable for operations at 600 volts as specified in the National Electrical Code® Sizes 14 through 6 AWG shall be rated VW-1. Conductors shall be annealed copper, insulated with high-heat and moisture resistant PVC, jacketed with abrasion, moisture, gasoline and oil resistant nylon or listed equivalent, as manufactured by Southwire Company or approved equal.
- **AWM:**
  Conductors shall be UL-listed Type THHN or THWN-2* or MTW or AWM, suitable for operation at 600 volts at conductor temperatures not to exceed 105°C.

*rated -2 for 8 AWG and larger only
[1] Oil and gasoline resistant II as defined by Underwriters Laboratories
[2] 2005 Edition

Southwire® greenSpec® RoHS Compliant 2002/95/EC

CSI #: 26 27 26

THHN/THWN/TWN75/T90

WEIGHTS, MEASUREMENTS, AND PACKAGING

CONDUCTOR		INSULATION THICKNESS (mils)	JACKET THICKNESS (mils)	NOMINAL O.D. (mils)		APPROX. NET WEIGHT (lbs/1000 ft)		ALLOWABLE AMPACITIES*			STANDARD PACKAGE
SIZE (AWG or kcmil)	NUMBER OF STRANDS			SOL.	STR.	SOL.	STR.	60°C	75°C	90°C	
14	19	15	4	102	109	15	16	15	15	15	DNFP
12	19	15	4	119	128	23	24	20	20	20	DNFP
10	19	20	4	150	161	37	38	30	30	30	DQFP
8	19	30	5	-	213	-	62	40	50	55	FP
6	19	30	5	-	249	-	95	55	65	75	EP

Solid construction available in sizes 14 through 10 AWG as Types THHN or THWN or AWM only.
Sizes 14 through 6 AWG also suitable for 105°C appliance wiring material (AWM).
Sizes 14 and 12 AWG contain four 500 ft. spools per carton. Size 10 AWG contains two 500' spools per carton.
*Allowable ampacities shown are for general use as specified by the National Electrical Code® 2005 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 6 AWG conductors. MTW wet locations or when exposed to oil or coolant.
90°C - THHN dry locations. THWN-2 wet or dry locations. For ampacity derating purpose.

STANDARD PACKAGE CODES
B – 1000 ft. reel
C – 500 ft. reel
D – 2500 ft. spool
E – 1000 ft. spool
F – 500 ft. spool
N – 2000 ft. carton
Q – 350 ft. carton
P – Drum

CSI #: 26 27 26

1-3 CU-RHH/RHW/USE

RHH or RHW or 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

Southwire Type RHH or RHW-2 or USE-2 conductors are used with conduit as specified in the 2011 National Electrical Code. 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.

SPECIFICATIONS

Southwire Type RHH or RHW-2 or USE-2 comply with:

- ASTM - B3, B8 (7, 19, 37, 61 Strands), B787 (19 Wire Combination Unilay Strand)
- UL Standard 44 for RHH or RHW-2
- UL Standard 854 for USE-2
- Federal Specification A-A-59544
- National Electrical Code, NFPA 70 - 2011 Edition
- NEMA WC 70 Costruction Requirements
- RoHS/REACH Compliant

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).
An optional CT rated product is available upon request for sizes 1/0 and larger.

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One Southwire Drive
Carrollton, Ga. 30119 USA

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CSI #: 26 27 26

CU-RHH/RHW/USE

Conductor		Insulation Thickness	Nominal O.D. (mils)	Approx. Weight per 1000' (lbs)	Allowable Ampacities+			Standard Package
Size (AWG or kcmil)	Number of Strands				60°	75°	90°	
14	7	45	160	20	15	15	15	AC
12	7	45	177	29	20	20	20	AC
10	7	45	201	42	30	30	30	AC
8	7	60	256	68	40	50	55	AC
6	7	60	294	101	55	65	75	ABCD
4	7	60	341	154	70	85	95	ABCD
2	7	60	397	235	95	115	130	ABCD
1	19	80	484	309	110	130	145	B
1/0	19	80	520	379	125	150	170	ABC
2/0	19	80	557	472	145	175	195	ABC
3/0	19	80	614	583	165	200	225	ABC
4/0	19	80	673	729	195	230	260	BC
250	37	95	748	863	215	255	290	BC
300	37	95	804	1029	240	285	320	AB
350	37	95	854	1191	260	310	350	AB
400	37	95	899	1352	280	335	380	
500	37	95	983	1674	320	380	430	AB
600	61	110	1089	2012	350	420	475	A
700	61	110	1158	2332	385	460	520	
750	61	110	1191	2492	400	475	535	
800	61	110	1223	2642	410	490	555	
900	61	110	1283	2970	435	520	585	
1000	61	110	1340	3288	455	545	615	

+ Allowable ampacities shown are for general use as specified by the National Electrical Code, 2011 Edition, section 310.15 and 240.4(D)
Unless the equipment is marked for use at higher temperatures the conductor ampacities shall be limited to the following per NEC 110.14(C)
60° C- When terminated to equipment for circuits rated 100 amperes or less or marked for 14- 1 AWG conductors.
75° C- When terminated to equipment for circuits rated over 100 amperes or marked for 1/0 AWG or larger conductors.
90° C- Wet or dry locations for ampacity adjustment purposes using NEC section 310.15

Package Codes:
A- 2500 ft. Reel
B- 1000 ft. Reel
C- 500 ft. Reel
D- 5000 ft. Reel

Southwire
One Southwire Drive
Carrollton, Ga. 30119 USA

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RoHS Compliant

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PHOTOVOLTAIC WIRES

2kV Copper PV Wire

CONSTRUCTION AT A GLANCE

CONDUCTOR TYPE (1)
COPPER

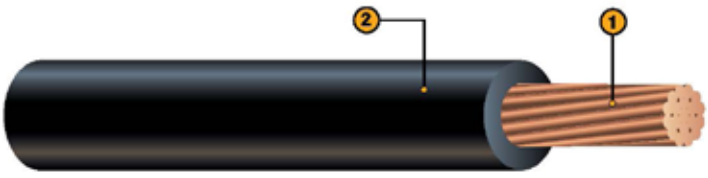
INSULATION TYPE (2)
XLPE

APPLICATIONS
- For use in solar power applications
- Rated 90°C for exposed or concealed wiring in wet or dry locations
- Rated for direct burial conduit

CONSTRUCTION DETAILS
- Stranded copper conductors with single layer XLPE insulation
- Bare or tinned conductors
- -40°C to +90°C
- Sunlight resistant
- RoHS compliant
- Direct burial
- Sample print: SOUTHWIRE E316464 (O) (UL) PV WIRE 10 AWG (5.26mm2) CU 2000V 90°C WET OR DRY -40°C SUN RES DIRECT BURIAL OR RHW-2 2000V – RoHS

SPECIFICATIONS
Southwire 2kV Copper Photovoltaic Wire meets the requirements of the following:
- UL Subject 4703
- UL 44
- UL 854 for TYPE USE-2

OPTIONS
- CT rated
- 600V configurations available upon request
- Cable tray use
- VW-1



Southwire

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CSI #: 26 27 26

Southwire

Section C

PHOTOVOLTAIC WIRES

AWG Size	Number of Strands	Insulation Thickness (in)	Nominal O.D. (in)	Net Weight (lbs)
14	7	0.075	0.222	32
12	7	0.075	0.237	41
10	7	0.075	0.261	57
8	7	0.075	0.312	86
14	19	0.075	0.222	32
12	19	0.075	0.237	41
10	19	0.075	0.261	57
8	19	0.085	0.312	86
6	19	0.085	0.349	121
4	19	0.085	0.396	176
2	19	0.085	0.456	261
1	19	0.105	0.531	338
1/0	19	0.105	0.570	413
2/0	19	0.105	0.614	506
3/0	19	0.105	0.664	623
4/0	19	0.105	0.720	769
250 MCM	37	0.120	0.801	880
300 MCM	37	0.120	0.854	1,042
350 MCM	37	0.120	0.904	1,205
400 MCM	37	0.120	0.949	1,375
500 MCM	37	0.120	1.033	1,700
600 MCM	61	0.135	1.139	2,032
750 MCM	61	0.135	1.241	2,515
1000 MCM	61	0.135	1.390	3,335

*Allowable Ampacities
Allowable ampacities shown are for general use as specified by the NEC, 2008 Edition, section 310.15.
60°C–When terminated to equipment for circuits rated 100 amperes or less or marked for 14 AWG 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–Wet or dry locations. For ampacity derating purposes.

2KV COPPER PV WIRE

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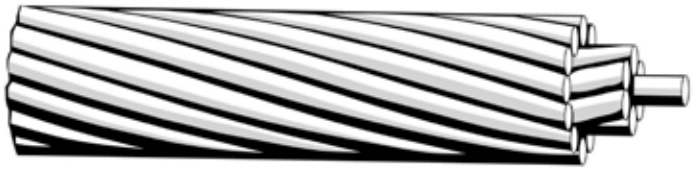
Bare Copper Wire and Cable

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-8 Concentric-Lay-Stranded Hard, Medium-Hard or Soft Copper Conductor.
- B-33 Tinned Conductors
- B-787 19 Wire Combination Unilay-Stranded Soft copper wire.

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.

Southwire
One Southwire Drive
Carrollton, Ga. 30119 USA

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CSI #: 26 27 26

Bare Copper

Size (AWG)	Weight (lbs/1000 ft)	Diameter (mils)	Circular Mil Area (mils)	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)	Stranding	Stranding Class	Weight (lbs/1000 ft)	Diameter (mils)		Hard Drawn		Medium-Hard Drawn		Soft-Drawn (Annealed)		Allowable Ampacity*
				Individual Wires	Complete Conductor	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	
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
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.

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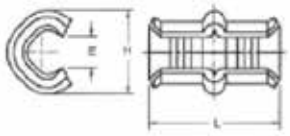
Thomas&Betts



C-Tap
T&B Catalog Number: 54730
UPC Number: 78621054730
Status: Active
Description:

Copper C-Tap for Wire Range Main: 4-2, Branch 4-12, Pink 42

Features

	Positive, all-around compression with low resistance and high pull-out values.
	Ideal for pigtailing, 2-way splicing or tapping to an unbroken continuous main.
	Heavy reinforcing ribs help locate compression dies and strengthen compressed joint.

General

Style	Standard
Material	Copper
Finish	Plain
Wire Size	4-2
Die Color	Pink
Die Code	42

Dimension Information

H (inches)	27/32
L (inches)	1 5/32

Specifications

Voltage Rating	600V

Accessories & Components

Shrink Tubing	HS430
Hand Cover	HTC40

Tooling

Connector & Tooling Chart	Available on Website

Packaging

Package in Units	100
T&B Sold in UOM	Each
T&B Weight Per UOM	4.1 lbs. per 100

Application Support

T&B Instruction Sheets	ts00628-tb2

Notes

	Each C-Tap contains a range of conductor sizes. See installation instructions for wire range combinations.
	UL approved for direct burial.
	Taps can be supplied tin-plated. Add suffix TP to any catalog number.

Certifications

RoHS Compliance	Yes

CSI #: 26 27 26

Shrink-Kon®

Splice Insulators & Insulating Covers

H-Tap Insulating Covers (Hard Covers)

- Interlocking insulating covers for H-type compression taps
- Easy installation: Place the H-Tap in the cover and snap the cover closed
- Consult factory for flame-retardant version
- Can also be used on C-Taps

Shrink-Kon

CAT. NO.	NOMINAL DIMENSIONS IN./MM. A (LENGTH)	B (THICKNESS)	C (WIDTH)	STD. PKG. QTY.
HTC2S	2	1.13	1.44	15
HTC2	3.5	1.13	1.44	15
HTC40	4.25	1.56	2	2
HTC40L2	5.75	1.56	2	2
HTCS00	6	1.75	2.75	6
HTC1000	7	2.38	3.88	2
HTC1000L	10	2.38	3.88	3

Order multiple of std. pkg.

Specifications

- HTC2 and HTC2S use insulation wrap instead of end cushions for inner seal.
- Connector Cat. Nos. 54755 through 54790 and 63140 through 63190 require hydraulic crimping tools. Refer to instruction sheets.
- Outer Hard Shell Covers: High-impact black thermoplastic (Noryl) Flammability Class, UL 94V-1
- Inner seal: Black neoprene sponge soft closed cell, oxygen index 26% UL 94 HBF
- Temperature Rating: 90° C Maximum
- Voltage Rating: 600V Maximum
- Uses insulation wrap instead of end cushions for inner seal

NOTE: Insulation covers are not reusable.

For H-Tap Applications

COVER CAT. NO.	AL/CU H-TAP NO.	CU H-TAP
HTC2	63105	—
HTC2S	—	CHT814-1 D
HTC40	63110	CHT214-5
	63115	CHT250214-5
	63125	CHT2514-7
	63140	CHT2502-6
HTCS00	63145	CHT50010-5/CHT50040-4
	63160	CHT75010-3/CHT750350-2
HTC1000L	63170	—
HTC1000	63180/63169	CHT750350-1F

For C-Tap Applications

COVER CAT. NO.	C-TAP NO.	COLOR CODE
HTC40	54720	Brown
	54725	Green
	54730	Pink
	54755	Blue
	54760	Brown
HTC40L2	54735	Black
	54740	Orange
	54745	Purple
	54750	Yellow
HTCS00	54765	Pink
	54770	Black
	54775	Yellow
	54780	White
	54785	—
HTC1000	54790	—

United States
Tel: 901.252.8000
800.816.7809
Fax: 901.252.1354

Technical Services
Tel: 888.862.3289

Thomas&Betts
www.tnb.com

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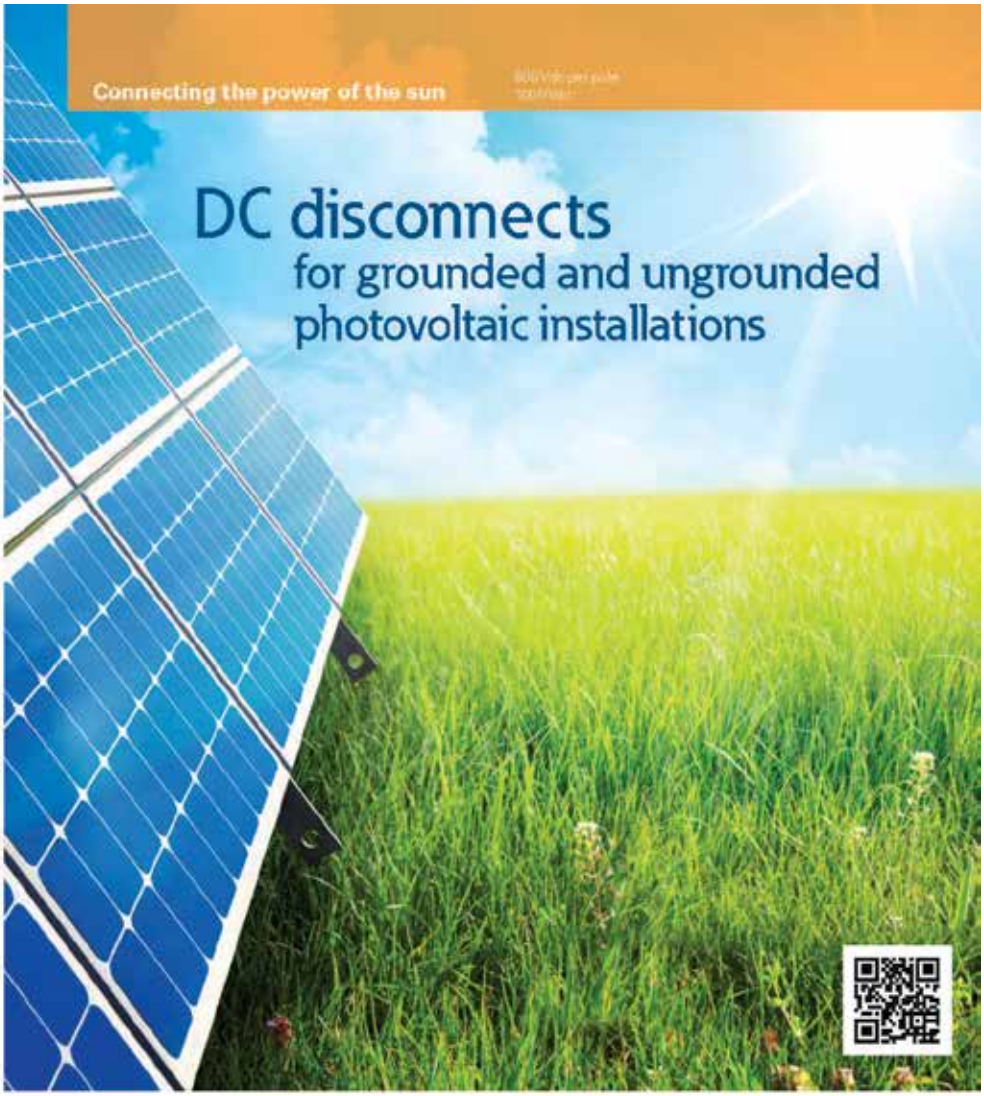


EATON
Powering Business Worldwide

CSI #: 26 28 16

Eaton is pleased to introduce the market's first UL® Listed 600 Vdc per pole, bi-directional disconnect. Listed to the UL 98B standard, this design has the capacity to switch multiple circuits of up to 600 Vdc each.

The use of renewable energy sources is on the rise. Photovoltaic (PV) systems are among the fastest growing of the new green technologies, and they are being installed on a variety of building types and landscapes throughout North America. This results in a growing need for products to meet the requirements of these systems. Eaton DC disconnects meet these requirements—enter Eaton's new lineup of 600 Vdc per pole and 1000 Vdc switches, tested and listed to the rigorous UL 98B standard, in line with NEC® 690 Code requirements for PV installations.

Switching devices primarily designed for DC service require design features to increase the total arcing voltage. This can be achieved by designing larger single air gaps and multiple gaps in series, or by using magnetic fields to force arc movement. In this new safety switch design, Eaton uses magnetic fields, created with the use of permanent magnets, to stretch the arc. These new products are not polarity sensitive, so they can be used on either negative or positive grounded systems, and they provide protection regardless of whether the current flow is in the "normal" direction or is reversed (possible due to miswiring or under a fault condition).

Grounded PV systems

A large number of PV systems in North America to date are grounded systems. These systems will be either positive grounded or negative grounded. In a positive grounded system, the disconnect will switch (break) the negative (–) conductor only. Conversely, in a negative grounded system, the disconnect will switch (break) the positive (+) conductor only. It is important that the disconnect applied within a grounded PV system be properly rated for that specific system. Eaton's new lineup of switches (600 Vdc and 1000 Vdc) are designed and UL Listed for use in both positive and negative grounded applications—one switch can be used on either system.

Ungrounded PV systems

Somewhat less common today are ungrounded (floating) PV systems. These use transformerless inverters and, relative to the disconnects within the system, both the positive (+) and the negative (–) conductors are switched. Eaton is proud to also offer a series of disconnects (600 Vdc and 1000 Vdc) for ungrounded systems.

Safety

Operators benefit from using Eaton's tried and true K-switch base and mechanism because of the visible means of disconnect when the switch handle is in the OFF position. Blade disengagement from the stationary contact can be seen when viewing the switch base (**Figure 1**).

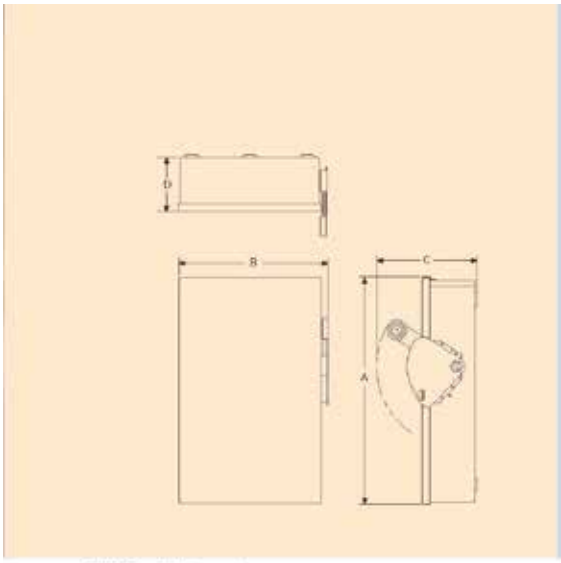
Figure 1

1000 Vdc SYSTEMS

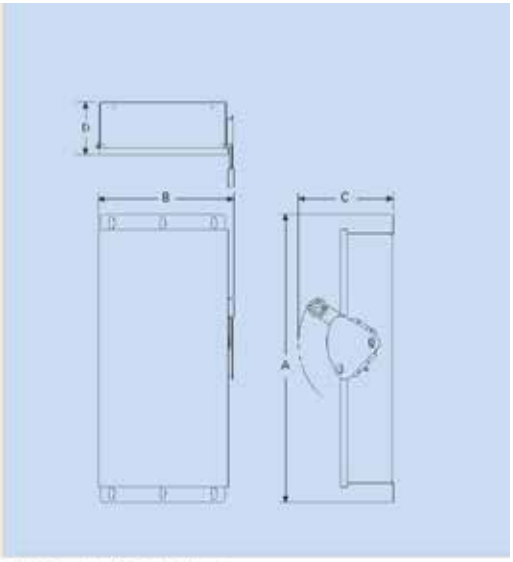
Eaton new 1000 Vdc disconnects are designed for use in large-scale projects where the higher voltage helps drive improved efficiencies.

EATON CORPORATION Connecting the power of the sun

CSI #: 26 28 16



NEMA Type 3R Dimensions



NEMA Type 4, 4X Stainless Dimensions

PV disconnect dimensions in inches

600 Vdc non-fusible and fusible

Ampere Rating	Number of Circuits	NEMA Type 3R ● A	B	C	D	NEMA Types 4, 4X Stainless ● A	B	C	D
Grounded									
30, 60	3	16.27	8.87	9.89	5.25	19.08	8.76	10.22	5.50
30, 60	6	19.08	12.88	10.22	5.50	19.08	12.88	10.22	5.50
100	3	21.99	11.84	9.89	5.25	24.96	11.79	10.22	5.50
100	6	24.95	16.13	10.22	5.50	24.95	16.13	10.22	5.50
200	2	35.38	18.54	11.63	6.44	35.38	18.54	11.63	6.44
200	3	35.38	18.54	11.63	6.44	35.38	18.54	11.63	6.44
200	4	35.38	24.46	11.63	6.44	35.38	24.46	11.63	6.44
200	6	39.18	30.19	11.63	6.44	39.18	30.19	11.63	6.44
400 ●	2	57.47	24.12	12.43	7.19	57.47	24.12	12.43	7.19
400 ●	3	57.47	24.12	12.43	7.19	57.47	24.12	12.43	7.19
400 ●	4	57.47	24.12	12.43	7.19	57.47	24.12	12.43	7.19
Ungrounded									
30, 60	1	16.27	8.87	9.89	5.25	19.08	8.76	10.22	5.50
30, 60	3	19.08	12.88	10.22	5.50	19.08	12.88	10.22	5.50
100	1	21.99	11.84	9.89	5.25	24.96	11.79	10.22	5.50
100	3	24.95	16.13	10.22	5.50	24.95	16.13	10.22	5.50
200	1	35.38	18.54	11.63	6.44	35.38	18.54	11.63	6.44
200	2	35.38	18.54	11.63	6.44	35.38	18.54	11.63	6.44
200	3	35.38	24.46	11.63	6.44	35.38	24.46	11.63	6.44
400 ●	1	57.47	24.12	12.43	7.19	57.47	24.12	12.43	7.19
400 ●	2	57.47	24.12	12.43	7.19	57.47	24.12	12.43	7.19

● NEMA Type 4 and 4X stainless steel enclosures are suitable for mounting in either vertical or horizontal positions. NEMA Type 3R enclosures must be mounted vertically.

● For sizes like NEMA 3R enclosures, consult factory.

1000 Vdc non-fusible (fusible available at 200A and 400A)

Ampere Rating	Number of Circuits	NEMA Type 3R ● A	B	C	D	NEMA Types 4, 4X Stainless ● A	B	C	D
Grounded									
30, 60	1	16.27	8.87	9.89	5.25	14.14	8.76	10.22	5.50
30, 60	2	19.08	12.88	10.22	5.50	19.08	12.88	10.22	5.50
100	1	21.99	11.84	9.89	5.25	24.95	11.79	10.22	5.50
100	2	24.95	16.13	10.22	5.50	24.95	16.13	10.22	5.50
200	1	35.38	18.95	11.63	6.44	35.38	19.95	11.80	6.44
200	2	35.38	24.57	11.63	6.44	35.38	24.57	11.80	6.44
200	3	35.38	24.57	11.63	6.44	35.38	24.57	11.80	6.44
400 ●	1	57.47	24.12	12.43	7.19	57.47	24.12	12.43	7.19
400 ●	2	57.47	24.12	12.43	7.19	57.47	24.12	12.43	7.19
Ungrounded									
30, 60	1	16.27	8.87	9.89	5.25	14.14	8.76	10.22	5.50
30, 60	2	19.08	12.88	10.22	5.50	19.08	12.88	10.22	5.50
100	1	21.99	11.84	9.89	5.25	24.95	11.79	10.22	5.50
100	2	24.95	16.13	10.22	5.50	24.95	16.13	10.22	5.50
200	1	35.38	18.54	11.63	6.44	35.38	18.54	11.80	6.44
200	2	35.38	18.54	11.63	6.44	35.38	18.54	11.80	6.44
200	3	35.38	24.26	11.63	6.44	35.38	24.26	11.80	6.44
400 ●	1	57.47	24.12	12.43	7.19	57.47	24.12	12.43	7.19
400 ●	2	57.47	24.12	12.43	7.19	57.47	24.12	12.43	7.19

● NEMA Type 4 and 4X stainless steel enclosures are suitable for mounting in either vertical or horizontal positions. NEMA Type 3R enclosures must be mounted vertically.

● For sizes like NEMA 3R enclosures, consult factory.

EATON CORPORATION Connecting the power of the sun.

CSI #: 26 28 16

Catalog numbering system

DCG 3 06 1 U R M

- Number of Circuits ●: 1 = 1 circuit; 2 = 2 circuits; 3 = 3 circuits; 4 = 4 circuits; 6 = 6 circuits
- Class and Type: DCG = DC disconnect/ grounded system; DCU = DC disconnect/ ungrounded system
- Maximum System Voltage: 06 = 600 Vdc; 10 = 1000 Vdc
- Ampacity: 1 = 30A; 2 = 60A; 3 = 100A; 4 = 200A; 5 = 400A
- Protection: F = Fusible; U = Non-fusible
- NEMA Enclosure Rating: R = NEMA 3R; P = NEMA 4; W = NEMA 4X, stainless 304; X = NEMA 4X, stainless 316
- Switch Series: M = DC photovoltaic applications
- Accessories/Options: Blank = No accessories; 2 = 1NO/1NC auxiliary contact; 3 = 2NO/2NC auxiliary contact; W = Viewing window; J = Factory-converted Class J fuse provisions

● Not all configurations for ampere rating and number of circuits are available. All circuit configurations can be found in the product dimension tables.

DC disconnect circuit configurations (non-fusible and fusible)

Maximum Vdc System Voltage	Disconnect Ampere Rating	Grounded Systems Number of Circuits 1	2	3	4	6	Ungrounded Systems Number of Circuits 1	2	3
600	30	●		●		◆	◆		◆
	60	●		●		◆	◆		◆
	100	●		●		◆	◆		◆
	200	●	●	●	●	●	◆	◆	◆
	400	●	●	●	◆		◆	◆	
	600	●							
1000	30	●	◆				◆	◆	
	60	●	◆				◆	◆	
	100	●	◆				◆	◆	
	200	●	●	●			◆	◆	◆
	400	●	■				◆	◆	

● Indicates grounded conductor terminal included with isolated lugs for each circuit.
◆ Indicates no grounded conductor terminal included.
■ Indicates only one fusible version includes grounded conductor terminal with isolated lug for each circuit.

DC disconnect lug capacities

Maximum Vdc System Voltage	Ampere Rating	Lug Capacity ●● Main Input	Main Output	Solid Return (for Grounded Conductor) Input	Solid Return (for Grounded Conductor) Output	Equipment Ground Input	Equipment Ground Output
600	30	#2–#14 AWG	#2–#14 AWG	1/0–#14 AWG	1/0–#14 AWG	#1–#14 AWG	#1–#14 AWG
	60	#2–#14 AWG	#2–#14 AWG	1/0–#14 AWG	1/0–#14 AWG	#1–#14 AWG	#1–#14 AWG
	100	1/0–#14 AWG	1/0–#14 AWG	1/0–#14 AWG	1/0–#14 AWG	#1–#14 AWG	#1–#14 AWG
	200	300 kcmil–#6	300 kcmil–#6	300 kcmil–#6	300 kcmil–#6	#1–#14 AWG	250 kcmil–#6
	400	(1) 750 kcmil–1/0 and (1) 600 kcmil–#2	(1) 750 kcmil–1/0 and (1) 600 kcmil–#2	(2) 750 kcmil–1/0	(2) 750 kcmil–1/0	1/0–#14	350 kcmil–#6
1000	30	#2–#14 AWG	#2–#14 AWG	#2–#14 AWG	#2–#14 AWG	#1–#14 AWG	#1–#14 AWG
	60	#2–#14 AWG	#2–#14 AWG	#2–#14 AWG	#2–#14 AWG	#1–#14 AWG	#1–#14 AWG
	100	1/0–#14 AWG	1/0–#14 AWG	1/0–#14 AWG	1/0–#14 AWG	#1–#14 AWG	#1–#14 AWG
	200	300 kcmil–#6	300 kcmil–#6	300 kcmil–#6	300 kcmil–#6	#1–#14 AWG	250 kcmil–#6
	400	(1) 750 kcmil–1/0 and (1) 600 kcmil–#2	(1) 750 kcmil–1/0 and (1) 600 kcmil–#2	(2) 750 kcmil–1/0	(2) 750 kcmil–1/0	1/0–#14	350 kcmil–#6

●● All lug capacities shown are for standard lugs. For options, including compression type, consult factory.
●● All lugs are CU/Al rated.

EATON CORPORATION Connecting the power of the sun

CSI #: 26 28 16

600 Vdc and 1000 Vdc features and benefits


DCG4065FPM


DCG3104URM


DCU2064UPM


DCG3063FRM

Standard features

- UL Listed to the UL 98B standard
- Marked as suitable for NEC 690 PV applications per UL 1741 requirements
- Suitable for use on positive and negative grounded systems
  - Not polarity sensitive
- Bi-directional functionality
  - Will break high-energy DC arc regardless of direction of current flow
- Ampacity range—30, 60, 100, 200 and 400A
- Clear polycarbonate deadfront shield
- Equipment ground
- NEMA® 3R, 4 and 4X stainless steel enclosures
- Flex Center modification available, such as viewing windows, pilot lights and more

600 Vdc specific features

- First UL Listed 600 Vdc per pole, bi-directional solution in the market
- 2-, 3-, 4- and 6-circuit configurations for grounded systems ●
- 1-, 2- and 3-circuit configurations for ungrounded systems ●
- Fusible and non-fusible
- Grounded configurations include isolated return terminals. Exceptions include 6-circuit 30, 60, 100A and 4-circuit 400A
- Suitable for use on a circuit capable of delivering up to 10,000A, 600 Vdc

1000 Vdc specific features

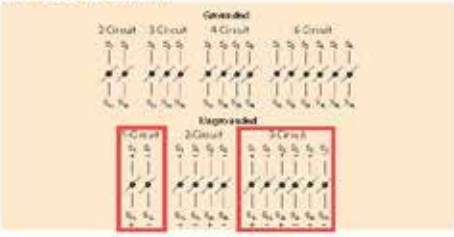
- 1-, 2- and 3-circuit configurations for both grounded and ungrounded systems ●
- Fusible and non-fusible ●
- Factory-installed jumpers
- Grounded configurations include isolated return terminals. Exceptions include 2-circuit 400A
- Suitable for use on a circuit capable of delivering up to 10,000A, 1000 Vdc

● See wiring diagrams below

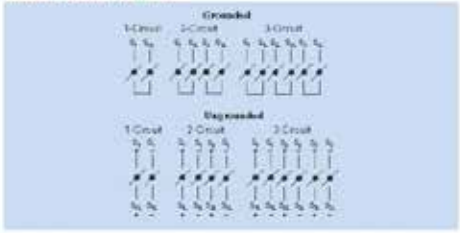
● Fusible configurations have provisions for Class J or R fuse types. Currently there are no applicable 1000 Vdc fuses available at 100A and below

Wiring diagrams

600 Vdc/pole (30–400A)



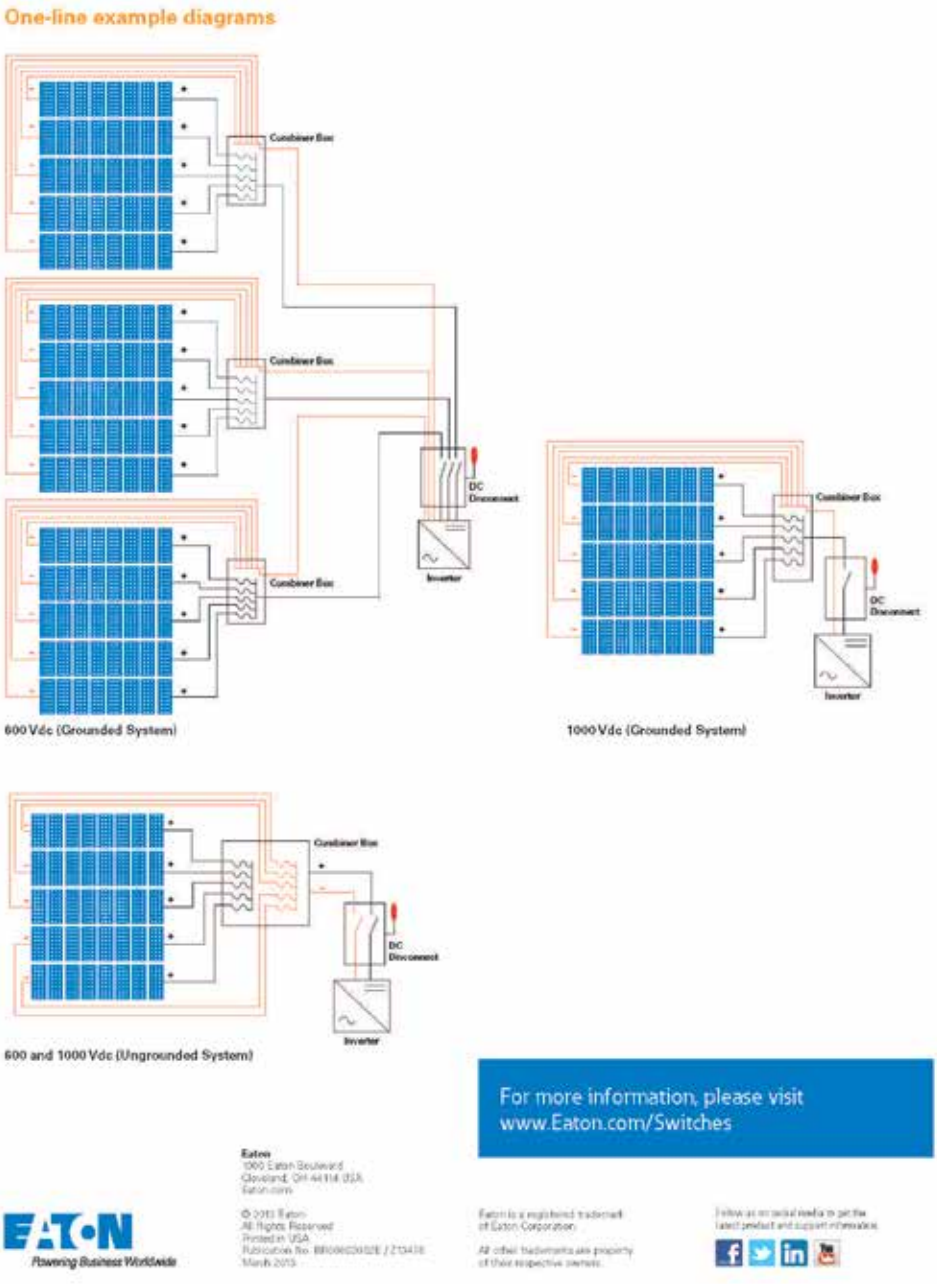
1000 Vdc/pole (30–400A)



Note: Majority of grounded configurations have isolated return terminals. For specific circuit configurations available, please see matrix in the middle of **page 4**

EATON CORPORATION Connecting the power of the sun

CSI #: 26 28 16


One-line example diagrams
Combiner Box
Combiner Box
Combiner Box
DC Disconnect
Inverter
600 Vdc (Grounded System)
Combiner Box
DC Disconnect
Inverter
1000 Vdc (Grounded System)
Combiner Box
DC Disconnect
Inverter
600 and 1000 Vdc (Ungrounded System)
For more information, please visit
www.Eaton.com/Switches
Eaton
1000 Eaton Boulevard
Cleveland, OH 44114 USA
Eaton.com
EATON
Powering Business Worldwide

CSI #: 26 29 00

String Inverter Solutions

SOLAR BOS

SolarBOS String Inverter Solutions provide a low-cost and space-saving solution for residential and commercial solar systems that are utilizing string inverters. All products are ETL listed to UL-1741 for 600 VDC and 1000 VDC photovoltaic systems and use compact NEMA-4X polycarbonate enclosures. They can be configured as combining or pass-through with or without integrated disconnects.

SolarBOS Pass-Through Disconnect Unit, Part Number F4SK32-1-4XP

Product Features

- 2 to 6 input circuits per MPPT
- Rated for 600 VDC or 1000 VDC and continuous duty
- Configurations for single or dual MPPT inverters
- Configurations for grounded or floating arrays
- Integrated load break disconnect(s) option
- Touch-safe fuse holders
- Ground block included
- NEMA-4X polycarbonate enclosures

Product Description	Junction Box	Standard Combiners			Pass-Through Disconnect Units				Disconnect Combiners	
Product Part Number	C6SK1-4XP	C6SK6-FF-4XP	F6SK6-FF-4XP	F2SK6-FF-4XP	C2SK32-1-4XP	C4SK32-1-4XP	F2SK32-1-4XP	F4SK32-1-4XP	F2S45-4-FF-4XP	F2SK32-3-FF-4XP
Topology	Grounded or Floating	Grounded	Floating	Floating	Grounded	Grounded	Floating	Floating	Floating	Floating
Maximum Voltage	1000 VDC	1000 VDC	1000 VDC	1000 VDC	1000 VDC	1000 VDC	1000 VDC	1000 VDC	600 VDC	1000 VDC
Integrated Load Break Disconnect					✓	✓	✓	✓	✓	✓
Number of Input Circuits	6	6	6	2 x 6	2	4	2	4	2 x 4	2 x 3
Number of Output Circuits	6	1	1	2	2	4	2	4	2	2
Input Conductor Size Range (AWG)	#20 - 6	#14 - 8	#14 - 8	#14 - 8	#14 - 8	#14 - 8	#14 - 8	#14 - 8	#14 - 8	#14 - 8
Output Conductor Size Range (AWG)	#20 - 6	#14 - 2	#14 - 2	#14 - 2	#14 - 8	#14 - 8	#14 - 8	#14 - 8	#12 - 2	#12 - 2
Max Rated Current (ADC cont. per output circuit)	10	75	75	2 x 75	32	32	32	32	2 x 45	2 x 32
Max Fuse Size (Amps)	N/A	30	30	30	N/A	N/A	N/A	N/A	30	30
Enclosure Size (Inches)	9x8x2	9x8x2	12x10x4	16x14x7	10x8x4	12x10x4	10x8x4	12x10x4	14x12x6	14x12x6
Approx. Weight (Pounds)	4	4	10	14	6	10	6	10	20	20
Enclosure NEMA Rating	4X	4X	4X	4X	4X	4X	4X	4X	4X	4X

25 Configure your BOS Solutions Online: www.solarbos.com

CSI #: 26 31 00

MonoX® LG280S1C-B3

Mechanical Properties

Cells	6 x 10
Cell vendor	LG
Cell type	Monocrystalline
Cell dimensions	156.5 x 156.5 mm / 6 x 6 in
# of busbar	3
Dimensions (L x W x H)	1640 x 1000 x 35 mm 64.57 x 39.37 x 1.38 in
Static snow load	5400 Pa / 113 psf
Static wind load	2400 Pa / 50 psf
Weight	18.0 ± 0.5 kg / 39.96 ± 1.1 lb
Connector type	MC4 connector IP 67
Junction box	IP 67 with 3 bypass diodes
Length of cables	1000 mm / 39.37 in
Glass	High transmission tempered glass
Frame	Anodized aluminum

Certifications and Warranty

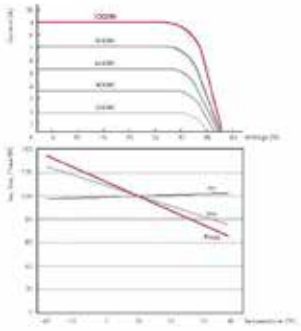
Certifications	IEC 61215, IEC 61730-1/-2, Salt Mist Corrosion Test (IEC 61701), DLG-Fokus Test, Ammonia Resistance, UL 1703, ISO 9001
Module fire performance (UL1703)	Type 2
Product warranty	10 years
Output warranty of Pmax (measurement tolerance ± 3%)	Limited Linear warranty*

* 1) 1st year 97%, 2) After 2nd year 0.7%p annual degradation, 3) 93.3% for 25 years

Temperature Coefficients

NOCT	45.0 ± 2 °C
Pmpp	-0.43 %/°C
Voc	-0.31 %/°C
Isc	0.04 %/°C

Characteristic Curves



Electrical Properties (STC *)

Maximum power at STC (Pmpp)	280
MPP voltage (Vmpp)	31.9
MPP current (Impp)	8.78
Open circuit voltage (Voc)	38.8
Short circuit current (Isc)	9.33
Module efficiency (%)	17.1
Operating temperature (°C)	-40 ~ +90
Maximum system voltage (V)	1000 (IEC), 600 (UL)
Maximum series fuse rating (A)	15
Power tolerance (W)	0 ~ +3

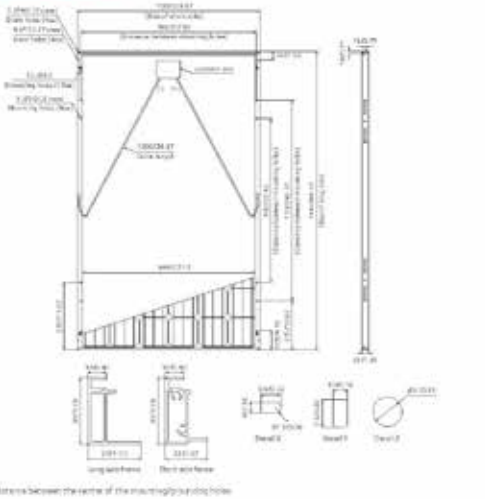
* STC (Standard Test Condition) Irradiance 1000 W/m², module temperature 25 °C, AM 1.5
* The nameplate power output is measured and determined by LG Electronics at its sole discretion.

Electrical Properties (NOCT*)

Maximum power at NOCT (Pmpp)	205
MPP voltage (Vmpp)	29.3
MPP current (Impp)	7.03
Open circuit voltage (Voc)	36.0
Short circuit current (Isc)	7.52
Efficiency reduction (from 1000 W/m² to 200 W/m²)	≤ 4.5%

* NOCT (Nominal Operating Cell Temperature) under an irradiance of 800 W/m², ambient temperature 20 °C and wind speed 1 m/s

Dimensions (mm/in)



* The distance between the center of the mounting/grounding holes

LG Life's Good

North America Solar Business Team
LG Electronics U.S.A. Inc.
1000 Sylvan Ave, Englewood Cliffs, NJ 07632

Contact: lg.solar@lge.com
www.lgsolarusa.com

Product specifications are subject to change without notice.
"LG Life's Good" is a registered trademark of LG Corp.
All other trademarks are the property of their respective owners.
DS-A3-EC-C-US-F-EN-20323

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09/17/2014

Innovation for a Better Life

CSI #: 26 31 00

60 cell

Mono X® series are LG Electronics' high-quality monocrystalline module brands. The quality is the result of our strong commitment in developing a module to improve benefits for customers. Features of Mono X® series include higher efficiency and durability than LG previous models, convenient installation, and aesthetic exterior.

Intertek

APPROVED PRODUCT

Light and Robust
With a weight of just 16.8 kg (36.96 lb), LG modules are proven to demonstrate outstanding durability against external pressure up to 5400 Pa.

Convenient Installation
LG modules are carefully designed to benefit installers by allowing quick and easy installations throughout the carrying, grounding, and connecting stages of modules.

100% EL Test Completed
All LG modules pass Electroluminescence inspection. The EL inspection detects cracks and other imperfections unseen by the naked eye.

Positive Power Tolerance
LG provides rigorous quality testing to solar modules to assure customers of the stated power outputs of all modules, with a positive nominal tolerance starting at 0%.

Reliable Warranties
LG stands by its products with the strength of a global corporation and sterling warranty policies. LG offers a 10 year product limited warranty and a 25 year limited linear output warranty.

The Extra 2% Power
To minimize losses due to mismatch, LG produces 3 groups of solar modules which are sorted by its current class. This enables Mono X® to maximize the system's output by around 2% based over the theoretical calculation.

About LG Electronics

LG Electronics, is a multinational corporation committed to expanding its capacity with solar energy business as its future growth engine. Our solar energy cluster research program was launched in 1985, backed by LG Group's rich experience in semi-conductors, LCD, chemistry and electronic materials industry. We successfully released the first MonoX® series to the market in 2010 which exported to 30 countries in 2 years. In 2011, MonoX® NeON won "Intersolar Award" which proved its leading innovation in the industry.

CSI #: 26 31 00

https://www.phoenixcontact.com/us/products/3044131

Feed-through terminal block - UT 6 - 3044131

Please be informed that the data shown in this PDF Document is generated from our Online Catalog. Please find the complete data in the user's documentation. Our General Terms of Use for Downloads are valid (http://phoenixcontact.com/download)

Feed-through terminal block, Connection method: Screw connection, Cross section: 0.2 mm² - 10 mm², AWG: 24 - 8, Width: 6.2 mm, Color: gray, Mounting type: NS 35/7,5, NS 35/15

Product Features

- The large wiring space enables the connection of solid and stranded conductors without ferrules, even above the nominal cross section
- As well as saving space, the compact design enables user-friendly wiring in a small amount of space
- Optimum screwdriver guidance through closed screw shafts
- The multi-conductor connection offers maximum flexibility and wiring density
- Tested for railway applications
- The cable entry funnel enables the use of conductors with ferrules and plastic collars within the nominal cross section

Key Commercial Data

Packing unit	1 pc
Minimum order quantity	50 pc
Weight per Piece (excluding packing)	14.8 g
Custom tariff number	85369010
Country of origin	Germany

Technical data

General

Number of levels	1
Number of connections	2
Nominal cross section	6 mm²
Color	gray
Insulating material	PA
Inflammability class according to UL 94	V0

08/04/2015 Page 1 / 7

CSI #: 26 31 00

https://www.phoenixcontact.com/us/products/3044131

Feed-through terminal block - UT 6 - 3044131

Technical data

General

Area of application	Railway industry
	Mechanical engineering
	Plant engineering
	Process industry
Maximum load current	57 A (with 10 mm² conductor cross section)
Rated surge voltage	8 kV
Pollution degree	3
Surge voltage category	III
Insulating material group	I
Connection in acc. with standard	IEC 60947-7-1
Maximum load current	57 A (with 10 mm² conductor cross section)
Nominal current I_N	41 A
Nominal voltage U_N	1000 V
Open side panel	ja
Shock protection test specification	DIN EN 50274 (VDE 0660-514):2002-11
Back of the hand protection	guaranteed
Finger protection	guaranteed
Surge voltage test setpoint	9.8 kV
Result of surge voltage test	Test passed
Power frequency withstand voltage setpoint	2.2 kV
Result of power-frequency withstand voltage test	Test passed
Checking the mechanical stability of terminal points (5 x conductor connection)	Test passed
Bending test rotation speed	10 rpm
Bending test turns	135
Bending test conductor cross section/weight	0.2 mm² / 0.2 kg
	6 mm² / 1.4 kg
	10 mm² / 2 kg
Result of bending test	Test passed
Conductor cross section tensile test	0.2 mm²
Tractive force setpoint	10 N
Conductor cross section tensile test	6 mm²
Tractive force setpoint	80 N
Conductor cross section tensile test	10 mm²
Tractive force setpoint	90 N
Tensile test result	Test passed
Tight fit on carrier	NS 35

CSI #: 26 31 00

https://www.phoenixcontact.com/us/products/3044131

Feed-through terminal block - UT 6 - 3044131

Technical data

General

Setpoint	5 N
Result of tight fit test	Test passed
Requirements, voltage drop	≤ 3.2 mV
Result of voltage drop test	Test passed
Temperature-rise test	Test passed
Conductor cross section short circuit testing	6 mm²
Short-time current	0.72 kA
Conductor cross section short circuit testing	10 mm²
Short-time current	1.2 kA
Short circuit stability result	Test passed
Proof of thermal characteristics (needle flame) effective duration	30 s
Result of thermal test	Test passed
Test specification, oscillation, broadband noise	DIN EN 50155 (VDE 0115-200):2008-03
Test spectrum	Service life test category 1, class B, body mounted
Test frequency	f_1 = 5 Hz to f_2 = 150 Hz
ASD level	1.857 $(m/s^2)^2$/Hz
Acceleration	0.8g
Test duration per axis	5 h
Test directions	X-, Y- and Z-axis
Oscillation, broadband noise test result	Test passed
Test specification, shock test	DIN EN 50155 (VDE 0115-200):2008-03
Shock form	Half-sine
Acceleration	5 g
Shock duration	30 ms
Number of shocks per direction	3
Test directions	X-, Y- and Z-axis (pos. and neg.)
Shock test result	Test passed
Temperature index, insulating material (DIN EN 60216-1 (VDE 0304-21))	130 °C
Static insulating material application in cold	-60 °C

Dimensions

Width	8.2 mm
End cover width	2.2 mm
Length	47.7 mm
Height NS 35/7,5	47.5 mm
Height NS 35/15	55 mm

Connection data

CSI #: 26 31 00

https://www.phoenixcontact.com/us/products/3044131

Feed-through terminal block - UT 6 - 3044131

Technical data

Connection data

Connection method	Screw connection
Connection in acc. with standard	IEC 60947-7-1
Note	Note: Product releases, connection cross sections and notes on connecting aluminum cables can be found in the download area.
Conductor cross section solid min.	0.2 mm²
Conductor cross section solid max.	10 mm²
Conductor cross section AWG min.	24
Conductor cross section AWG max.	8
Conductor cross section flexible min.	0.2 mm²
Conductor cross section flexible max.	10 mm²
Min. AWG conductor cross section, flexible	24
Max. AWG conductor cross section, flexible	8
Conductor cross section flexible, with ferrule without plastic sleeve min.	0.25 mm²
Conductor cross section flexible, with ferrule without plastic sleeve max.	6 mm²
Conductor cross section flexible, with ferrule with plastic sleeve min.	0.25 mm²
Conductor cross section flexible, with ferrule with plastic sleeve max.	6 mm²
2 conductors with same cross section, solid min.	0.2 mm²
2 conductors with same cross section, solid max.	2.5 mm²
2 conductors with same cross section, stranded min.	0.2 mm²
2 conductors with same cross section, stranded max.	2.5 mm²
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, min.	0.5 mm²
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, max.	4 mm²
2 conductors with same cross section, stranded, ferrules without plastic sleeve, min.	0.25 mm²
2 conductors with same cross section, stranded, ferrules without plastic sleeve, max.	1.5 mm²
Connection in acc. with standard	IEC/EN 60079-7
Conductor cross section solid min.	0.2 mm²
Conductor cross section solid max.	10 mm²
Conductor cross section AWG min.	24
Conductor cross section AWG max.	8
Conductor cross section flexible min.	0.2 mm²
Conductor cross section flexible max.	6 mm²
Stripping length	10 mm
Internal cylindrical gage	A5
Screw thread	M4
Tightening torque, min	1.5 Nm

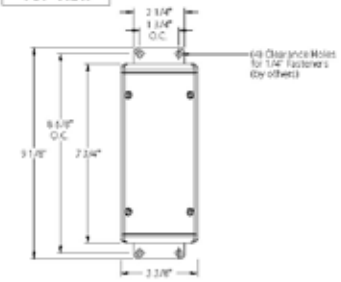
CSI #: 26 50 00

UPM
Low Voltage

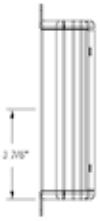
PM2RM SURFACE MOUNT

PROJECT:	SURE HOUSE
TYPE:	D3

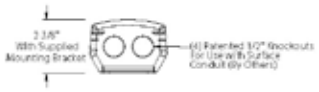
TOP VIEW



SIDE VIEW



END VIEW



All dimensions indicated on this submittal are nominal.
Contact Technical Sales if you require more stringent specifications.

SPECIFICATIONS

GreenSource Initiative™
Metal and packaging components are made from recycled materials. Manufactured using renewable solar energy, produced onsite. Returnable to manufacturer at end of life to ensure cradle-to-cradle handling. Packaging contains no chlorofluorocarbons (CFC's). Use of this product may qualify for GreenSource efficacy and recycling rebate(s). Consult www.bklighting.com/greensource for program requirements.

Installation
Universal design for remote low voltage fixtures. Specified separately. Water-tight installation in three distinct mounting conditions.

Surface Mount
For use with side entry, surface conduits. Stainless steel mounting brackets provide for direct anchor to architectural surfaces in any orientation.

Housing
Copper free, aluminum extrusion with die cast end caps. Surface mounted with flow through back channel to prevent water and debris collection. Machined aluminum cover with countersunk holes for flush hardware installation. Tamper-resistant, captive, black oxide stainless steel mounting screws. Front access for ease of installation and inspection. (2) 1/2" NPT female conduit entries per end cap for through wiring.

Installation Tether
Stainless steel cable with integral loop allows cover to temporarily suspend from housing during installation to simplify wire connection and component attachment.

Patented Knockouts
(4) 1/2" NPT, machined aluminum knockouts. High temperature, silicone 'O' Ring for water-tight seal. Patented design allows knockout to be reinserted without compromising seal integrity.

L75E Transformer
For use with halogen lamps. (1) 75VA electronic low voltage transformer. 120, 208, or 277VAC primary voltage. 120V in dimmable 40W minimum load using electronic low voltage dimmer. 10 watt minimum load (non-dimmed). 50/60Hz. 11.5VAC secondary voltage. >.99 Power Factor. <20% THD. Operating frequency >40kHz. Primary overload protection and RFI filtration. Soft start circuitry extends lamp life.

TRe20 Electronic Transformer
For use with ENSOL solid state Power of 'e' Systems. (1) 20VA electronic low voltage transformer. 105-330VAC primary voltage. 1 watt minimum load. 20 watt maximum load. 50/60Hz. Non-Dimming. 12VDC secondary voltage. >90% Power Factor. >80% Efficiency (under full load). Inrush current limited to <5A max. Thermal shutdown with automatic restart. Overload, short circuit, and open circuit protection.

Finish
StarGuard®, our exclusive RoHs compliant, 15 stage chromate-free process cleans and conversion coats aluminum components prior to application of Class 'A' TGIC polyester powder coating.

Warranty
5 year limited warranty.

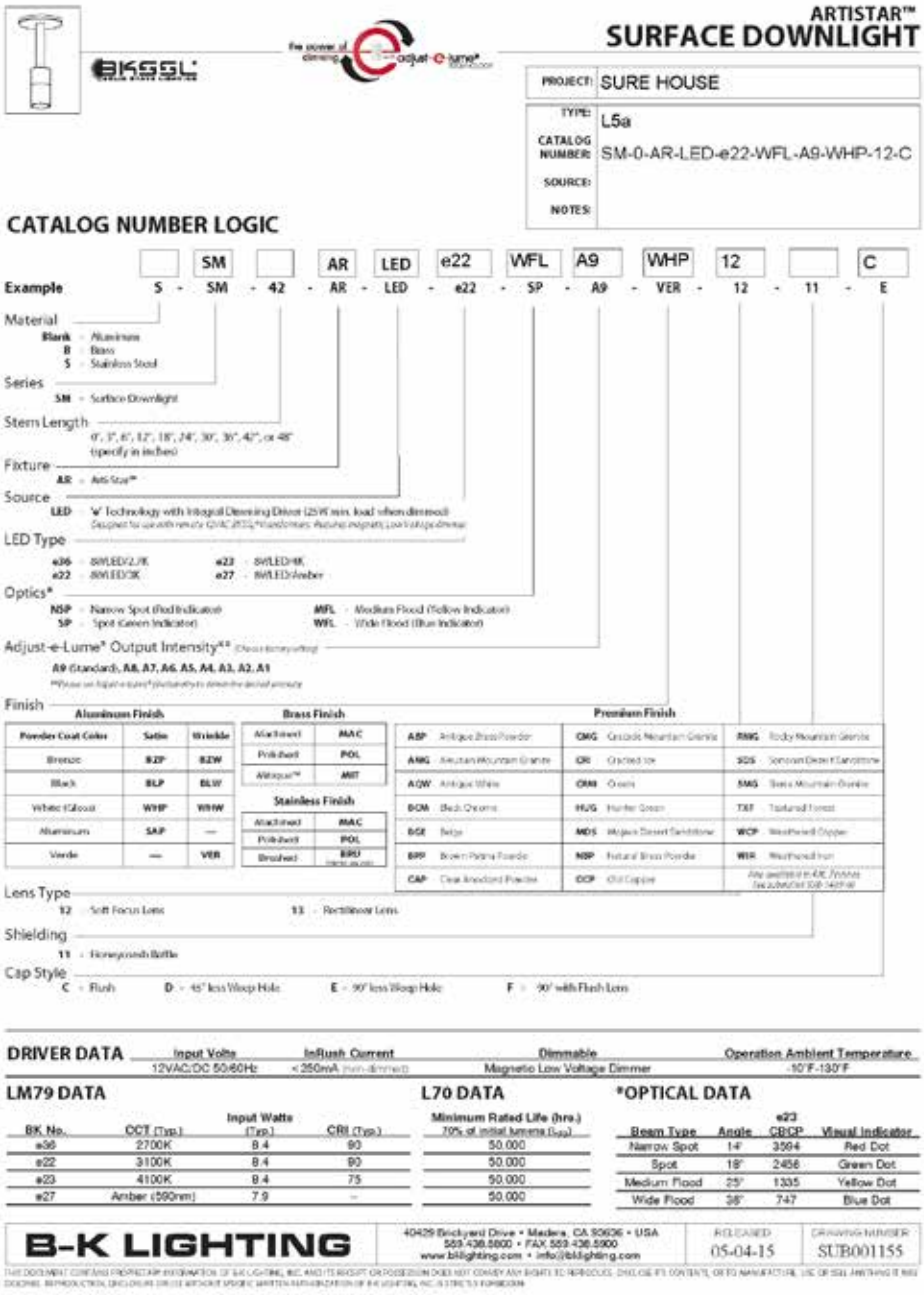
Listings
NEMA 4X / IP 66 Rated Enclosure. (1). Listed to ANSI/UL Standard 5085E and Certified to CAN/CSA Standard C22.2 No. 94.0/94.2. RoHS compliant. Made in USA.

RoHS

B-K LIGHTING	40429 Brickyard Drive • Madera, CA 93636 • USA 559-438-5800 • FAX 559-438-5900 www.bklighting.com • info@bklighting.com	SUBMITTAL DATE 6-10-14	DRAWING NUMBER SUB-1520-00

UPM's Patented knockouts are covered by U.S. Patent No. 6,940,012 B2

CSI #: 26 50 00



ARTISTAR™
SURFACE DOWNLIGHT

PROJECT: SURE HOUSE
TYPE: L5a
CATALOG NUMBER: SM-0-AR-LED-e22-WFL-A9-WHP-12-C
SOURCE:
NOTES:

CATALOG NUMBER LOGIC

Example	S	SM	42	AR	LED	e22	SP	A9	VER	12	11	E

Material: Blank - Aluminum; B - Brass; S - Stainless Steel
Series: SM - Surface Downlight
Stem Length: 0", 3", 6", 12", 18", 24", 30", 36", 42", or 48" (specify in inches)
Fixture: AR - Anti Star™
Source: LED - W Technology with Integral Dimming Driver (25 W min. load when dimmed)
LED Type: e36 - 8WLED/2.7K; e23 - 8WLED/4K; e22 - 8WLED/3K; e27 - 8WLED/Amber
Optics*: NSP - Narrow Spot (Red Indicator); SP - Spot (Green Indicator); MFL - Medium Flood (Yellow Indicator); WFL - Wide Flood (Blue Indicator)
Adjust-e-Lume® Output Intensity**: A9 (Standard), A8, A7, A6, A5, A4, A3, A2, A1
Finish

Aluminum Finish

Powder Coat Color	Satin	Wrinkle
Bronze	BZP	BZW
Black	BLP	BLW
White/Almond	WHP	WHW
Aluminum	SAP	—
Verde	—	VER

Brass Finish

Machined	MAC
Polished	POL
Antique™	ANT

Stainless Finish

Machined	MAC
Polished	POL
Brushed	BRU

Premium Finish

ABP	Antique Brass Powder	CMG	Cascade Mountain Granite	RMG	Rocky Mountain Granite
AMG	Aleutian Mountain Granite	CRI	Cracked Ice	SDS	Sonoran Desert Sandstone
AQW	Antique White	ONX	Onyx	SMG	Sierra Mountain Granite
BCM	Black Chrome	HUG	Hunter Green	TXF	Textured Forest
BGE	Beige	MDS	Mojave Desert Sandstone	WCP	Weathered Copper
BPP	Brown Patina Powder	NBP	Natural Brass Powder	WIR	Weathered Iron
CAP	Clear Anodized Powder	OCP	Old Copper		

Lens Type: 12 - Soft Focus Lens; 13 - Rectilinear Lens
Shielding: 11 - Honeycomb Baffle
Cap Style: C - Flush; D - 45° less Hoop Hole; E - 90° less Hoop Hole; F - 90° with Flush Lens

DRIVER DATA

Input Volts	InRush Current	Dimmable	Operation Ambient Temperature
12VAC/DC 50/60Hz	<250mA (non-dimmed)	Magnetic Low Voltage Dimmer	-10°F-130°F

LM79 DATA

BK No.	CCT (Typ.)	Input Watts (Typ.)	CRI (Typ.)
e36	2700K	8.4	90
e22	3100K	8.4	90
e23	4100K	8.4	75
e27	Amber (590nm)	7.9	–

L70 DATA

Minimum Rated Life (hrs.) 70% of initial lumens (typ.)
50,000
50,000
50,000
50,000

*OPTICAL DATA

Beam Type	Angle	e23 CBCP	Visual Indicator
Narrow Spot	14°	3594	Red Dot
Spot	18°	2456	Green Dot
Medium Flood	25°	1335	Yellow Dot
Wide Flood	38°	747	Blue Dot

B-K LIGHTING
40429 Brickyard Drive • Madera, CA 93636 • USA
559.438.5800 • FAX 559.438.5900
www.bklighting.com • info@bklighting.com
RELEASED 05-04-15
DRAWING NUMBER SUB001155

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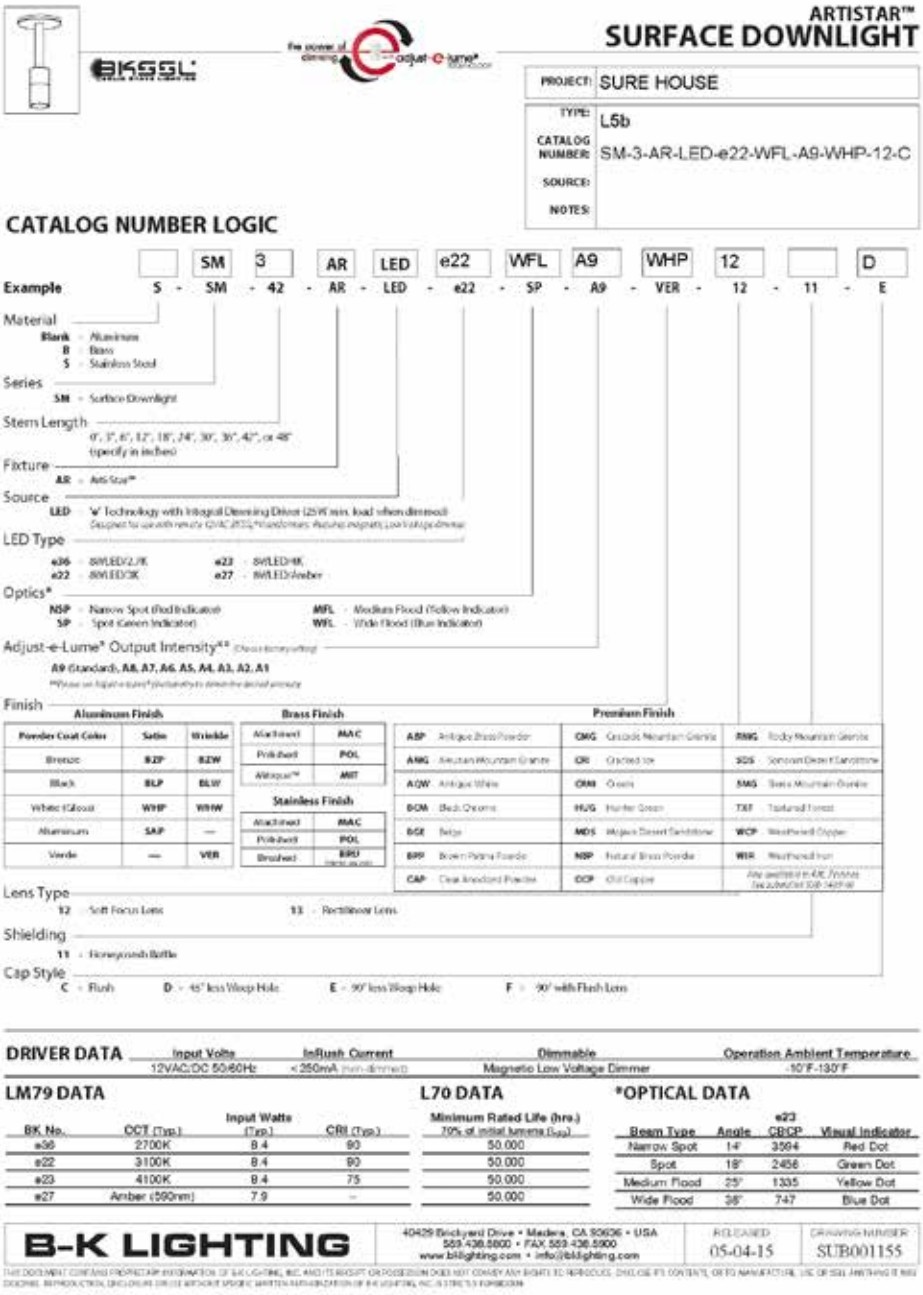

ARTISTAR™
SURFACE DOWNLIGHT

PROJECT: SURE HOUSE
TYPE: L5b
CATALOG NUMBER: SM-3-AR-LED-e22-WFL-A9-WHP-12-C
SOURCE:
NOTES:

CATALOG NUMBER LOGIC

		SM	3	AR	LED	e22	WFL	A9	WHP	12		D
Example	S	SM	42	AR	LED	e22	SP	A9	VER	12	11	E

Material
Blank - Aluminum
B - Brass
S - Stainless Steel

Series
SM - Surface Downlight

Stem Length
0", 3", 6", 12", 18", 24", 30", 36", 42", or 48" (specify in inches)

Fixture
AR - Anti-Star™

Source
LED - W Technology with Integral Dimming Driver (25 W min. load when dimmed)

LED Type
e36 - 86WLED/2.7K
e22 - 86WLED/3K
e23 - 86WLED/4K
e27 - 86WLED/Amber

Optics*
NSP - Narrow Spot (Red Indicator)
SP - Spot (Green Indicator)
MFL - Medium Flood (Yellow Indicator)
WFL - Wide Flood (Blue Indicator)

Adjust-e-Lume® Output Intensity**
A9 (Standard), A8, A7, A6, A5, A4, A3, A2, A1

Finish

Aluminum Finish

Powder Coat Color	Satin	Wrinkle
Bronze	BZP	BZW
Black	BLP	BLW
White/Almond	WHP	WHW
Aluminum	SAP	—
Verde	—	VER

Brass Finish

Machined	MAC
Polished	POL
Antiqued™	ANT

Stainless Finish

Machined	MAC
Polished	POL
Brushed	BRU

Premium Finish

ABP	Antique Brass Powder	CMG	Cascade Mountain Granite	RMG	Rocky Mountain Granite
AMG	Alaskan Mountain Granite	CRI	Cracked Ice	SDS	Sonoran Desert Sandstone
AQW	Antique White	ONX	Onyx	SMG	Sierra Mountain Granite
BCM	Black Chrome	HUG	Hunter Green	TXF	Textured Forest
BGE	Beige	MDS	Mojave Desert Sandstone	WCP	Weathered Copper
BPP	Brown Patina Powder	NBP	Natural Brass Powder	WIR	Weathered Iron
CAP	Clear Anodized Powder	OCP	Old Copper		

Lens Type
12 - Soft Focus Lens
13 - Rectilinear Lens

Shielding
11 - Honeycomb Baffle

Cap Style
C - Flush
D - 45° less Weep Hole
E - 90° less Weep Hole
F - 90° with Flush Lens

DRIVER DATA

Input Volts	InRush Current	Dimmable	Operation Ambient Temperature
12VAC/DC 50/60Hz	<250mA (non-dimmed)	Magnetic Low Voltage Dimmer	-10°F-130°F

LM79 DATA

BK No.	CCT (Typ.)	Input Watts (Typ.)	CRI (Typ.)
e36	2700K	8.4	90
e22	3100K	8.4	90
e23	4100K	8.4	75
e27	Amber (590nm)	7.9	–

L70 DATA

Minimum Rated Life (hrs.) 70% of initial lumens (typ.)
50,000
50,000
50,000
50,000

*OPTICAL DATA

Beam Type	Angle	e23 CBCP	Visual Indicator
Narrow Spot	14°	3594	Red Dot
Spot	18°	2456	Green Dot
Medium Flood	25°	1335	Yellow Dot
Wide Flood	38°	747	Blue Dot

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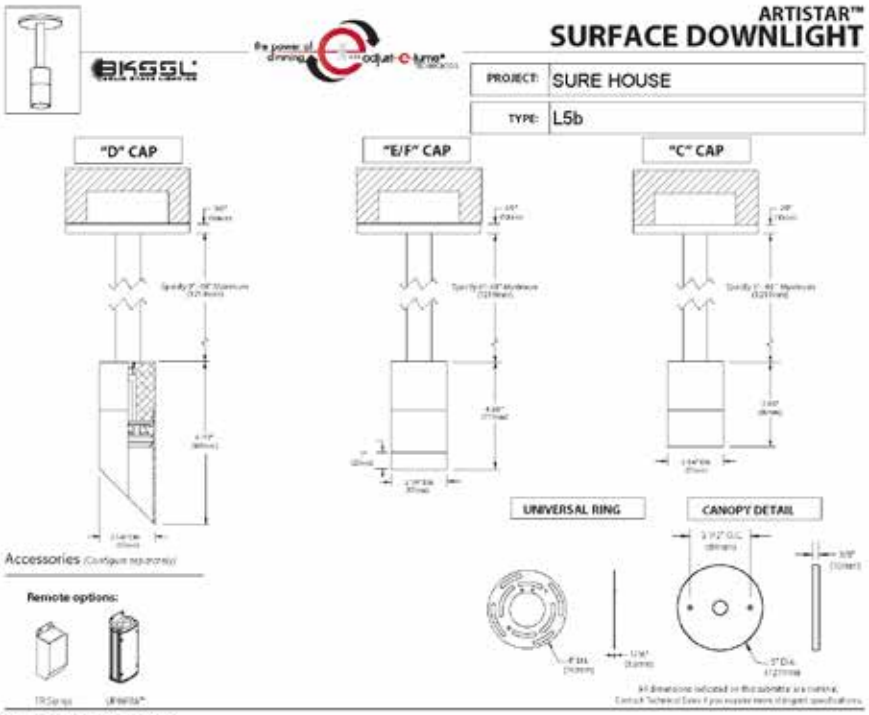

ARTISTAR™
SURFACE DOWNLIGHT

PROJECT: SURE HOUSE
TYPE: L5b

"D" CAP | "E/F" CAP | "C" CAP

UNIVERSAL RING | CANOPY DETAIL

Accessories

Remote options:

SPECIFICATIONS

GreenSource Initiative™
Metal and packaging components are made from recycled materials. Manufactured using renewable solar energy, produced on site. Returnable to manufacturer at end of life to ensure cradle-to-cradle handling. Packaging contains no chlorofluorocarbons (CFCs). Use of this product may qualify for GreenSource efficacy and recycling rebate(s). Consult www.bklighting.com/greensource for program requirements.

Materials
Furnished in Copper Free Aluminum (Type 6061-T6), Brass (Type 360) or Stainless Steel (Type 304).

Body
Fully machined from solid billet. Unibody design provides enclosed, water proof wireway and integral heat sink for maximum component life.

Cap
Fully machined. Accommodates (1) lens or louver media. Choose from flush lens (FC), 45° cutoff (CO), 11° deep bezel with 90° cutoff (IE) cap styles, or 11° deep cutoff with flush mounted lens (FF).

Lens
Shock resistant, tempered, glass lens is factory adhered to fixture cap and provides hermetically sealed optical compartment. Specify soft focus (#12) or rectilinear (#13) lens.

Stem
Fully machined, 1" dia. with internal threads for maximum visual appeal. Available in configurable lengths to 48" maximum overall.

BKSSL™
Integrated solid state system with W² technology is scalable for field upgrade. Modular design with electrical quick disconnects permit field maintenance. High power, forward throw source complies with ANSI C78.377 binning requirements. Exceeds ENERGY STAR® lumen maintenance requirements. LM-80-certified components.
Integral constant current driver. 120VAC/VDC input. 50/60Hz. Proprietary input control scheme achieves power factor correction and eliminates inrush current. Output, over-voltage, open-circuit, and short circuit protected. Inrush current limited to <250mA from dimmer. Conforms to Safety Std C22.2 No. 250.13-12.

Line dimmable. For use with low voltage dimmer with dedicated neutral conductor. Minimum 25 watt load required for dimming.

Optics
Interchangeable OPTIKIT™ modules permit field changes to optical distribution. Color coded for easy reference: Narrow Spot (NSP) = Red. Spot (SP) = Green. Medium Flood (MFL) = Yellow. Wide Flood (WFL) = Blue.

Adjust-e-Lume® (Pat. Pending)
Integral electronics allows dynamic lumen response at the individual fixture. Indexed (100% to 25% nom.) lumen output. Maintains output at desired level or may be changed as conditions require. Specify factory preset output intensity.

Installation
5" dia. machined canopy with stainless steel universal mounting ring permits mounting to 4" octagonal junction box (by others).

Remote Transformer
For use with 12VAC BKSSL remote transformer or magnetic transformers only. B-K Lighting cannot guarantee performance with third party manufacturers' transformers.

Wiring
PVC coated, 18AWG, 150V, 60°C rated and certified to UL 1838 standard.

Hardware
Tamper resistant, stainless steel hardware. Canopy mounting screws are additionally black oxide treated for additional corrosion resistance.

Finish
StarGuard®, our exclusive RoHS compliant, 15 stage chromate free process cleano and conversion coats aluminum components prior to application of Class 'A' TGIC polyester powder coating. Brass components are available in powder coat or handcrafted metal finish. Stainless steel components are available in handcrafted metal finish. (Brushed finish for interior use only).

Warranty
5 year limited warranty.

Certification and Listing
ETL tested to IESNA LM-79. Lighting Facts registration per USDOE (www.lightingfacts.com). ETL Listed to ANSI/UL Standard 1838 and UL Subject 8750 and Certified to CAN/CSA Standard C22.2 No. 9. RoHS compliant. Suitable for indoor or outdoor use. Suitable for use in wet locations. IP66 Rated. Made in USA.

RoHS lighting facts

*Energy Star® is a registered trademark of the United States Environmental Protection Agency.

B-K LIGHTING	40429 Brickyard Drive • Madera, CA 93636 • USA 559.438.5800 • FAX 559.438.5900 www.bklighting.com • info@bklighting.com	RELEASED 05-04-15	DRAWING NUMBER SUB001155

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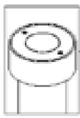

BKSSL

the power of adjust-e-lume

ARTISTAR™ RECESSED UPLIGHT

PROJECT:	SURE HOUSE
TYPE:	L8
CATALOG NUMBER:	S-UL-S-AR-LED-e22-SP-A9-MAC-13
SOURCE:	
NOTES:	

CATALOG NUMBER LOGIC

	S	UL	S	AR	LED	e22	SP	A9	MAC	13	
Example	S	UL	F	AR	LED	e22	NSP	A6	BLW	12	11

Material
- **Blank** - Aluminum
- **B** - Brass
- **S** - Stainless Steel

Series
- **UL** - Recessed Uplight

Installation
- **F** - Flush mount
- **S** - Surface mount

Fixture
- **AR** - ArtStar™

Source
- **LED** - 'e' Technology with Integral Dimming Driver (25W min. load when dimmed). Refer to dimmer for minimum load required.

LED Type
- **e36** - 8WLED/2.7K
- **e22** - 8WLED/3K
- **e23** - 8WLED/4K
- **e27** - 8WLED/Amber

Optics*
- **NSP** - Narrow Spot (Red Indicator)
- **SP** - Spot (Green Indicator)
- **MFL** - Medium Flood (Yellow Indicator)
- **WFL** - Wide Flood (Blue Indicator)

Adjust-e-Lume® Output Intensity**
- **A9** (Standard), **A8, A7, A6, A5, A4, A3, A2, A1**

Finish

Aluminum Finish

Powder Coat Color	Satin	Wrinkle
Bronze	BZP	BZW
Black	BLP	BLW
White (Gloss)	WHP	WHW
Aluminum	SAP	—
Verde	—	VER

Brass Finish

Machined	MAC
Polished	POL
Mitique™	MIT

Stainless Finish

Machined	MAC
Polished	POL
Brushed	BRU

Premium Finish

ABP	Antique Brass Powder	CMG	Cascade Mountain Granite	RMG	Rocky Mountain Granite
AMG	Aleutian Mountain Granite	CRI	Cracked Ice	SDS	Sonoran Desert Sandstone
AQW	Antique White	CRM	Cream	SMG	Sierra Mountain Granite
BCM	Black Chrome	HUG	Hunter Green	TXF	Textured Forest
BGE	Beige	MDS	Mojave Desert Sandstone	WCP	Weathered Copper
BPP	Brown Patina Powder	NBP	Natural Brass Powder	WIR	Weathered Iron
CAP	Clear Anodized Powder	OCP	Old Copper		

Lens
- **12** - Soft Focus Lens
- **13** - Rectilinear Lens

Sheilding
- **11** - Honeycomb Baffle

DRIVER DATA

Input Volts	InRush Current	Dimmable	Operation Ambient Temperature
12VAC/DC 50/60Hz	<250mA max (non-dimmed)	Magnetic Low Voltage Dimmer	-22°F-184°F (-30°C-90°C)

LM79 DATA

BK No.	CCT (Typ.)	Input Watts (Typ.)	CRI (Typ.)
e36	2700K	8.4	90
e22	3100K	8.4	90
e23	4100K	8.4	75
e27	Amber (590nm)	7.9	–

L70 DATA

Minimum Rated Life (hrs.) 70% of initial lumens (L_{70})
50,000
50,000
50,000
50,000

*OPTICAL DATA

Beam Type	Angle	Visual Indicator
Narrow Spot	14°	Red Dot
Spot	18°	Green Dot
Medium Flood	25°	Yellow Dot
Wide Flood	36°	Blue Dot

B-K LIGHTING

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RELEASED 07-10-15 | DRAWING NUMBER SUB-2322-00

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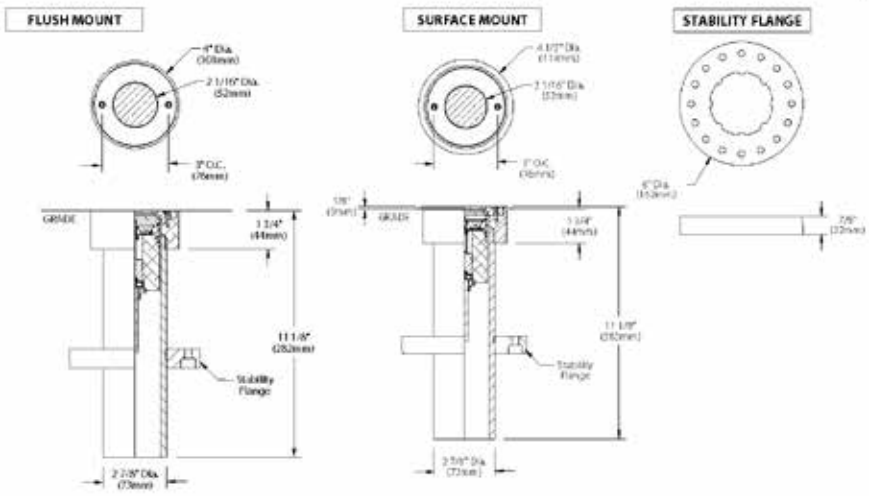
CSI #: 26 50 00

ARTISTAR™ RECESSED UPLIGHT

PROJECT: SURE HOUSE

TYPE: L8



SPECIFICATIONS

GreenSource Initiative™
Metal and packaging components are made from recycled materials. Manufactured using renewable solar energy produced on site. Returnable to manufacturer at end of life to ensure cradle-to-cradle handling. Packaging contains no chlorofluorocarbons (CFC's). Use of this product may qualify for GreenSource efficacy and recycling rebate(s). Consult www.bkligthing.com/greensource for program requirements.

Materials
Furnished in Copper Free Aluminum (Type 6061-T6), Brass (Type 360) or Stainless Steel (Type 304).

Body
Fully machined from solid billet. Unibody design provides enclosed, water-proof wireway and integral heat sink for maximum component life. Provided with hard coat (Type III) black anodize finish for maximum corrosion resistance. Weather tight cable connector with 5' 18Ga., 2 wire line voltage cable. High temperature, silicone 'O' Ring provides water-tight seal.

Housing
Fixture provided with 2-7/8" dia., Schedule 80 PVC housing for direct burial into soil or concrete. 6" dia., molded stability flange projects into substrate to simplify installation and reinforce housing stability.

Faceplate
Fully machined from solid billet. Countersunkholes provide for flush hardware mounting. Accommodates (1) lens or louver media.

Lens
Shock resistant, tempered, glass lens is factory adhered to fixture cap and provides hermetically sealed optical compartment. Specify soft focus (F12) or rectilinear (R13) lens.

BK|SSL®
Integrated solid state system with V² technology is scalable for field upgrade. Modular design with electrical quick disconnects permit field maintenance. High power, forward throw source complies with ANSI C78.377 binning requirements. Exceeds ENERGY STAR® lumen maintenance requirements. LM-80 certified components.

Integral, constant current driver. 12VAC/VDC input, 50/60Hz. Proprietary input control scheme achieves power factor correction and eliminates inrush current. Output, over voltage, open circuit, and short circuit protected. Inrush current limited to <250mA max (non-dimming). Conforms to Safety Std. C22.2 No. 250.13-12.

Adjust-a-Lume® (Pat. Pending)
Integral electronics allows dynamic lumen response at the individual fixture. Indexed (100% to 25% nom.) lumen output. Maintains output at desired level or may be changed as conditions require. Specify factory preset output intensity.

Optics
Interchangeable OPTIBIT™ modules permit field changes to optical distribution. Color-coded for easy reference: Narrow Spot (NSP) = Red, Spot (SP) = Green, Medium Flood (MFL) = Yellow, Wide Flood (WFL) = Blue.

Installation
Flush Mount features integral concrete pour collar. Top edge of collar to be installed flush with finished grade. Collar material and finish to match faceplate. (2) Threaded holes for faceplate installation. Faceplate is suitable for walk-over and drive-over applications to 35,000 lbs. GVW.

Surface Mount features fully machined, copper free aluminum installation collar. Collar material and finish to match faceplate. (2) Threaded holes for faceplate installation.

Remote transformer
For use with 12VAC BK|SSL remote transformer or magnetic transformers only. B-K Lighting cannot guarantee performance with third party manufacturers' transformers.

Wiring
PVC coated, 18AWG, 150V, 60°C rated and certified to UL 1838 standard. Anti-Siphon Valve (ASV™) prevents "wicking" through conductor insulation.

Hardware
Tamper-resistant, stainless steel hardware. Faceplate screws are additionally black oxide treated for additional corrosion resistance.

Finish
StarGuard®, our exclusive RoHS compliant, 15 stage chromate-free process cleans and conversion coats aluminum components prior to application of Class 'A' TGIC polyester powder coating. Brass components are available in powder coat or handcrafted metal finish. Stainless steel components are available in handcrafted metal finish (brushed finish for interior use only).

Warranty
5 year limited warranty.

Certification and Listing
ETL tested to IESNA LM-79. Lighting Facts Registration per USDOE (www.lightingfacts.com). ETL Listed to ANSI/UL Standard 1838 and UL Subject 8750 and Certified to CAN/CSA Standard C22.2 No. 92. RoHS compliant. Suitable for indoor or outdoor use. Suitable for use in wet locations. IP 66 Rated. Made in USA.

RoHS Lighting Facts

B-K LIGHTING	40429 Brickyard Drive • Madera, CA 93636 • USA 559.438.5800 • FAX 559.438.5900 www.bklighting.com • info@bklighting.com	RELEASED 07-10-15	DRAWING NUMBER SUB-2322-00

CSI #: 26 50 00

HALO LED NON-IC HOUSING for NEW CONSTRUCTION

The H750T is a dedicated LED new construction housing to be used with designated HALO LED modules. The H750T is designed for non-insulated ceilings. If insulation is present it must be kept three inches from all sides of the housing. The AIRTITE™ housing design prevents airflow between conditioned and unconditioned spaces, saving on both heating and air conditioning costs. The LED connector system provides high efficacy code compliance when used with designated HALO LED modules and trims.

HALO

Catalog #		Type
Project		
Comments		Date
Prepared by		

H750T

6" New Construction NON-IC AIR-TITE™ Housing For Halo LED Modules and Trims
- ML56 Series
- RL56 Series
- RA56 Series

High Efficacy LED Housing

FOR USE IN NON-INSULATED CEILINGS

CAN BE USED IN INSULATED CEILINGS BUT INSULATION MUST BE KEPT 3" FROM ALL SIDES OF THE HOUSING

Qualified and compliant with select trims. Refer to ENERGY STAR® Qualified Products List and DEC (T24) Appliance Database for listings.

ADV141508
6/17/2014

DESIGN FEATURES

Housing
Aluminum with white semi-gloss paint finish.

Plaster Frame
Galvanized steel frame. Housing adjusts in plaster frame to accommodate up to 1" ceiling thickness. Regressed locking screw for securing hanger bars. Cutouts included for easily crimping hanger bars in position.

Slide-N-Side™ Junction Box
- Positioned to accommodate straight conduit runs.
- Seven ½" trade size conduit knockouts with true pry-out slots.
- Slide-N-Side wire traps allow non metallic sheathed cable to be installed without tools and without removing knockouts.
- Allows wiring connections to be made outside the box.
- Simply insert the cable directly into the trap after connections are made.
- Accommodates the following standard non-metallic sheathed cable type:
  - U.S. #14/2, #14/3, #12/2, 12/3
  - Canada: #14/2, #14/3, #12/2

GOT-NAIL!™ Pass-N-Thru™ Bar Hangers
Bar Hanger features include
- Pre-installed nail easily installs in regular lumber, engineered lumber and laminated beams.
- Safety and Guidance system prevents snagging, ensures smooth, straight nail penetration and allows bar hangers to be easily removed if necessary
- Automatic leveling flange aligns the housing and allows holding the housing in place with one hand while driving nails.
- Housing can be positioned at any point within 24" joist spans
- Score lines allow tool-free shortening for 12" joists and bar hangers do not need to be removed for shortening.
- Bar hangers may be repositioned 90° on plaster frame
- Integral T-bar clip snaps onto T-bars – no additional clips are required.

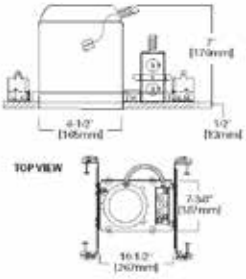
LED Module Connection
Halo LED modules simply install with a plug-in 120V-277V rated line voltage wiring connector (UL and CSA Listed Luminaire Disconnect).

This non-screw-base connection preserves the high efficacy rating and prevents use of low efficacy incandescent sources (see LED Module specifications).

Caution
Connection is rated for 120V and 277V input. Installer must verify LED module voltage is compatible with the applicable voltage input. If uncertain, consult a qualified electrician.

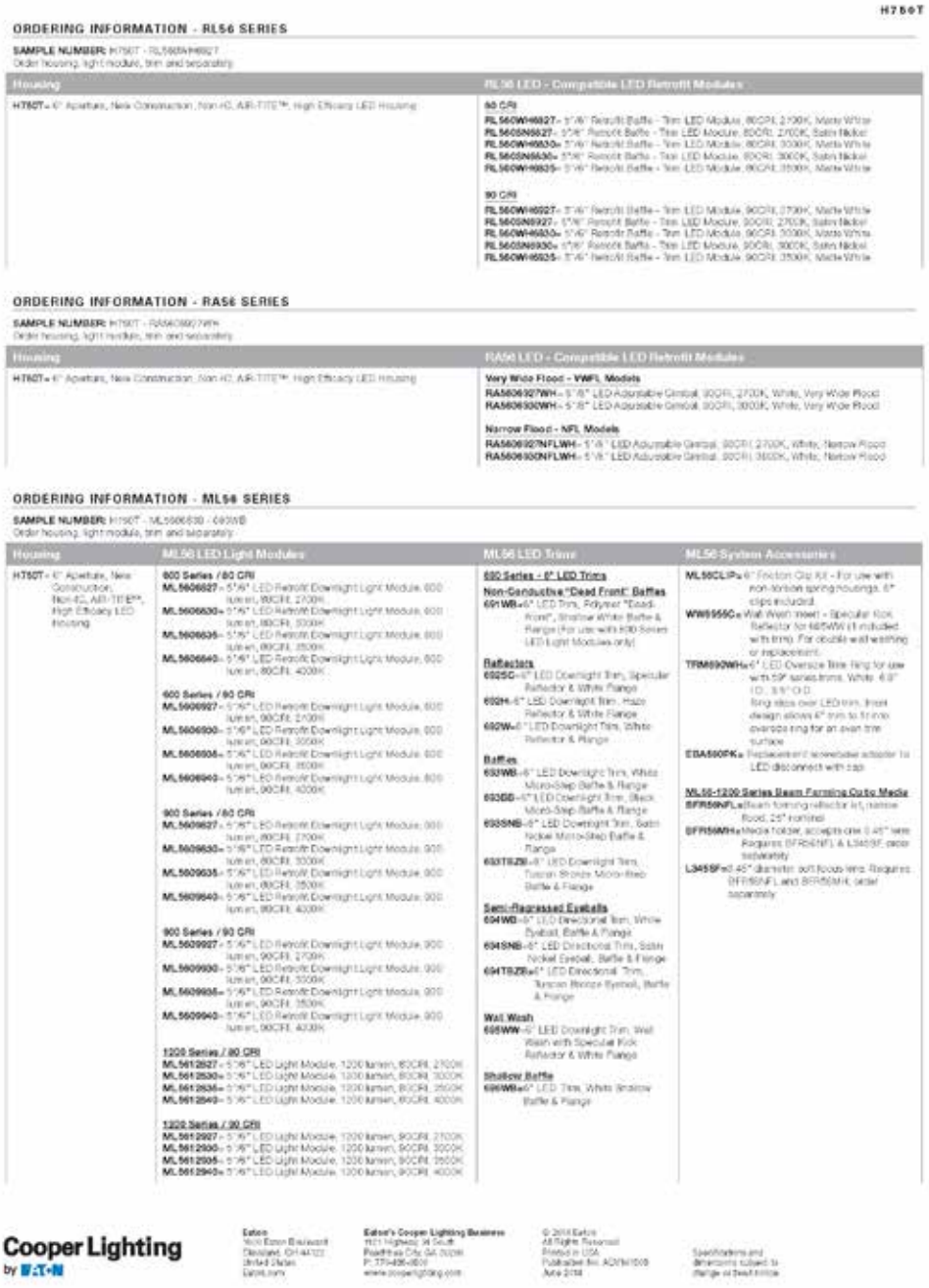
Labels
- UL/cUL Listed 1598 Luminaire
- CE Marking - "Conformité Européene" conformity with the Council of European Communities Directives, meeting internationally recognized compliance when used with ML56 Series LED modules
- Listed for Feed Through
- Listed for Damp Location
- Listed for Wet Location with select trims
- Rated for 20W maximum

Qualification
May be used with qualified Halo LED modules and designated trims for High Efficacy Luminaire Compliance:
- State of California Title 24
- International Energy Conservation Code (IECC)
- New York State Energy Conservation Construction Code - AIR-TITE™ Compliant
- Certified under ASTM-E283 standard for air-tight construction when used with ML56 series, RL56 series and ML7 series trims



Cooper Lighting
by EATON

CSI #: 26 50 00



H750T

ORDERING INFORMATION - RL56 SERIES

SAMPLE NUMBER: H750T - RL560WH6927
Order housing, light module, trim and separately

Housing	RL56 LED - Compatible LED Retrofit Modules
H750T= 6" Aperture, New Construction, Non-IC, AIR-TITE™, High Efficacy LED Housing	80 CRI RL560WH6927= 5"/6" Retrofit Baffle - Trim LED Module, 80CRI, 2700K, Matte White RL560SN6927= 5"/6" Retrofit Baffle - Trim LED Module, 80CRI, 2700K, Satin Nickel RL560WH6930= 5"/6" Retrofit Baffle - Trim LED Module, 80CRI, 3000K, Matte White RL560SN6930= 5"/6" Retrofit Baffle - Trim LED Module, 80CRI, 3000K, Satin Nickel RL560WH6935= 5"/6" Retrofit Baffle - Trim LED Module, 80CRI, 3500K, Matte White 90 CRI RL560WH6927= 5"/6" Retrofit Baffle - Trim LED Module, 90CRI, 2700K, Matte White RL560SN6927= 5"/6" Retrofit Baffle - Trim LED Module, 90CRI, 2700K, Satin Nickel RL560WH6930= 5"/6" Retrofit Baffle - Trim LED Module, 90CRI, 3000K, Matte White RL560SN6930= 5"/6" Retrofit Baffle - Trim LED Module, 90CRI, 3000K, Satin Nickel RL560WH6935= 5"/6" Retrofit Baffle - Trim LED Module, 90CRI, 3500K, Matte White

ORDERING INFORMATION - RA56 SERIES

SAMPLE NUMBER: H750T - RA5606927WH
Order housing, light module, trim and separately

Housing	RA56 LED - Compatible LED Retrofit Modules
H750T= 6" Aperture, New Construction, Non-IC, AIR-TITE™, High Efficacy LED Housing	Very Wide Flood - VWFL Models RA5606927WH= 5"/6" LED Adjustable Gimbal, 90CRI, 2700K, White, Very Wide Flood RA5606930WH= 5"/6" LED Adjustable Gimbal, 90CRI, 3000K, White, Very Wide Flood Narrow Flood - NFL Models RA5606927NFLWH= 5"/6" LED Adjustable Gimbal, 90CRI, 2700K, White, Narrow Flood RA5606930NFLWH= 5"/6" LED Adjustable Gimbal, 90CRI, 3000K, White, Narrow Flood

ORDERING INFORMATION - ML56 SERIES

SAMPLE NUMBER: H750T - ML5606930 - 6911WB
Order housing, light module, trim and separately

Housing	ML56 LED Light Modules	ML56 LED Trims	ML56 System Accessories
H750T= 6" Aperture, New Construction, Non-IC, AIR-TITE™, High Efficacy LED Housing	600 Series / 80 CRI ML5606927= 5"/6" LED Retrofit Downlight Light Module, 600 lumen, 80CRI, 2700K ML5606930= 5"/6" LED Retrofit Downlight Light Module, 600 lumen, 80CRI, 3000K ML5606935= 5"/6" LED Retrofit Downlight Light Module, 600 lumen, 80CRI, 3500K ML5606940= 5"/6" LED Retrofit Downlight Light Module, 600 lumen, 80CRI, 4000K 600 Series / 90 CRI ML5606927= 5"/6" LED Retrofit Downlight Light Module, 600 lumen, 90CRI, 2700K ML5606930= 5"/6" LED Retrofit Downlight Light Module, 600 lumen, 90CRI, 3000K ML5606935= 5"/6" LED Retrofit Downlight Light Module, 600 lumen, 90CRI, 3500K ML5606940= 5"/6" LED Retrofit Downlight Light Module, 600 lumen, 90CRI, 4000K 900 Series / 80 CRI ML5609027= 5"/6" LED Retrofit Downlight Light Module, 900 lumen, 80CRI, 2700K ML5609030= 5"/6" LED Retrofit Downlight Light Module, 900 lumen, 80CRI, 3000K ML5609035= 5"/6" LED Retrofit Downlight Light Module, 900 lumen, 80CRI, 3500K ML5609040= 5"/6" LED Retrofit Downlight Light Module, 900 lumen, 80CRI, 4000K 900 Series / 90 CRI ML5609027= 5"/6" LED Retrofit Downlight Light Module, 900 lumen, 90CRI, 2700K ML5609030= 5"/6" LED Retrofit Downlight Light Module, 900 lumen, 90CRI, 3000K ML5609035= 5"/6" LED Retrofit Downlight Light Module, 900 lumen, 90CRI, 3500K ML5609040= 5"/6" LED Retrofit Downlight Light Module, 900 lumen, 90CRI, 4000K 1200 Series / 80 CRI ML5612927= 5"/6" LED Light Module, 1200 lumen, 80CRI, 2700K ML5612930= 5"/6" LED Light Module, 1200 lumen, 80CRI, 3000K ML5612935= 5"/6" LED Light Module, 1200 lumen, 80CRI, 3500K ML5612940= 5"/6" LED Light Module, 1200 lumen, 80CRI, 4000K 1200 Series / 90 CRI ML5612927= 5"/6" LED Light Module, 1200 lumen, 90CRI, 2700K ML5612930= 5"/6" LED Light Module, 1200 lumen, 90CRI, 3000K ML5612935= 5"/6" LED Light Module, 1200 lumen, 90CRI, 3500K ML5612940= 5"/6" LED Light Module, 1200 lumen, 90CRI, 4000K	600 Series - 6" LED Trims Non-Conductive "Dead Front" Baffles 6911WB= 6" LED Trim, Polymer "Dead-Front", Shallow White Baffle & Flange (For use with 600 Series LED Light Modules only) Reflectors 6925C= 6" LED Downlight Trim, Specular Reflector & White Flange 6926H= 6" LED Downlight Trim, Haze Reflector & White Flange 6926W= 6" LED Downlight Trim, White Reflector & Flange Baffles 6931WB= 6" LED Downlight Trim, White Micro-Step Baffle & Flange 6935B= 6" LED Downlight Trim, Black Micro-Step Baffle & Flange 6935NB= 6" LED Downlight Trim, Satin Nickel Micro-Step Baffle & Flange 6937BZB= 6" LED Downlight Trim, Tuscan Bronze Micro-Step Baffle & Flange Semi-Recessed Eyeballs 6941WD= 6" LED Directional Trim, White Eyeball, Baffle & Flange 6943NB= 6" LED Directional Trim, Satin Nickel Eyeball, Baffle & Flange 6941TBZB= 6" LED Directional Trim, Tuscan Bronze Eyeball, Baffle & Flange Wall Wash 6959WW= 6" LED Downlight Trim, Wall Wash with Specular Kick Reflector & White Flange Shallow Baffle 6969WB= 6" LED Trim, White Shallow Baffle & Flange	ML56CLIPK= 6" Friction Clip Kit - For use with non-torsion spring housings. 6" clips included. WW6956C= Wall Wash Insert - Specular Kick Reflector for 6859WW (Included with trim). For double wall washing or replacement. TRM690WH= 6" LED Oversize Trim Ring for use with 69* series trims. White. 6.9" I.D., 9.5" O.D. Ring slips over LED trim. Inset design allows 6" trim to fit into oversize ring for an even trim surface. EBA560PK= Replacement screwdriver adapter to LED disconnect with cap. ML56-1200 Series Beam Forming Optic Media BFR56NFL= Beam forming reflector kit, narrow flood, 25° nominal BFR56WFL= Media holder, accepts one 0.45" lens. Requires BFR56NFL & L3455F, order separately. L3455F= 0.45" diameter soft focus lens. Requires BFR56NFL and BFR56WFL, order separately.

Cooper Lighting by EATON

CSI #: 26 50 00

HALO LED NON-IC HOUSING for NEW CONSTRUCTION

HALO®

The H750T is a dedicated LED new construction housing to be used with designated HALO LED modules. The H750T is designed for non-insulated ceilings. If insulation is present it must be kept three inches from all sides of the housing. The AIRTITE™ housing design prevents airflow between conditioned and unconditioned spaces, saving on both heating and air conditioning costs. The LED connector system provides high efficacy code compliance when used with designated HALO LED modules and trims.

Catalog #		Type
Project		
Comments		Date
Prepared by		

H750T

6" New Construction NON-IC AIR-TITE™ Housing For Halo LED Modules and Trims
- ML56 Series
- RL56 Series
- RA56 Series

High Efficacy LED Housing

FOR USE IN NON-INSULATED CEILINGS

CAN BE USED IN INSULATED CEILINGS BUT INSULATION MUST BE KEPT 3" FROM ALL SIDES OF THE HOUSING

Qualified and compliant with select trims. Refer to ENERGY STAR® Qualified Products List and CEC (T24) Appliance Database for listings.

ADV141508
6/17/2014

DESIGN FEATURES

Housing
Aluminum with white semi-gloss paint finish.

Plaster Frame
Galvanized steel frame. Housing adjusts in plaster frame to accommodate up to 1" ceiling thickness. Regressed locking screw for securing hanger bars. Cutouts included for easily crimping hanger bars in position.

Slide-N-Side™ Junction Box
- Positioned to accommodate straight conduit runs.
- Seven ½" trade size conduit knockouts with true pry-out slots.
- Slide-N-Side wire traps allow non metallic sheathed cable to be installed without tools and without removing knockouts.
- Allows wiring connections to be made outside the box.
- Simply insert the cable directly into the trap after connections are made.
- Accommodates the following standard non-metallic sheathed cable type:
  - U.S. #14/2, #14/3, #12/2, 12/3
  - Canada: #14/2, #14/3, #12/2

GOT-NAIL!™ Pass-N-Thru™ Bar Hangers
Bar Hanger features include
- Pre-installed nail easily installs in regular lumber, engineered lumber and laminated beams.
- Safety and Guidance system prevents snagging, ensures smooth, straight nail penetration and allows bar hangers to be easily removed if necessary
- Automatic leveling flange aligns the housing and allows holding the housing in place with one hand while driving nails.
- Housing can be positioned at any point within 24" joist spans
- Score lines allow tool-free shortening for 12" joists and bar hangers do not need to be removed for shortening.
- Bar hangers may be repositioned 90° on plaster frame
- Integral T-bar clip snaps onto T-bars – no additional clips are required.

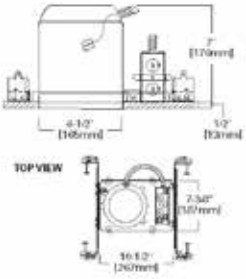
LED Module Connection
Halo LED modules simply install with a plug-in 120V-277V rated line voltage wiring connector (UL and CSA Listed Luminaire Disconnect).

This non-screw-base connection preserves the high efficacy rating and prevents use of low efficacy incandescent sources (see LED Module specifications).

Caution
Connection is rated for 120V and 277V input. Installer must verify LED module voltage is compatible with the applicable voltage input. If uncertain, consult a qualified electrician.

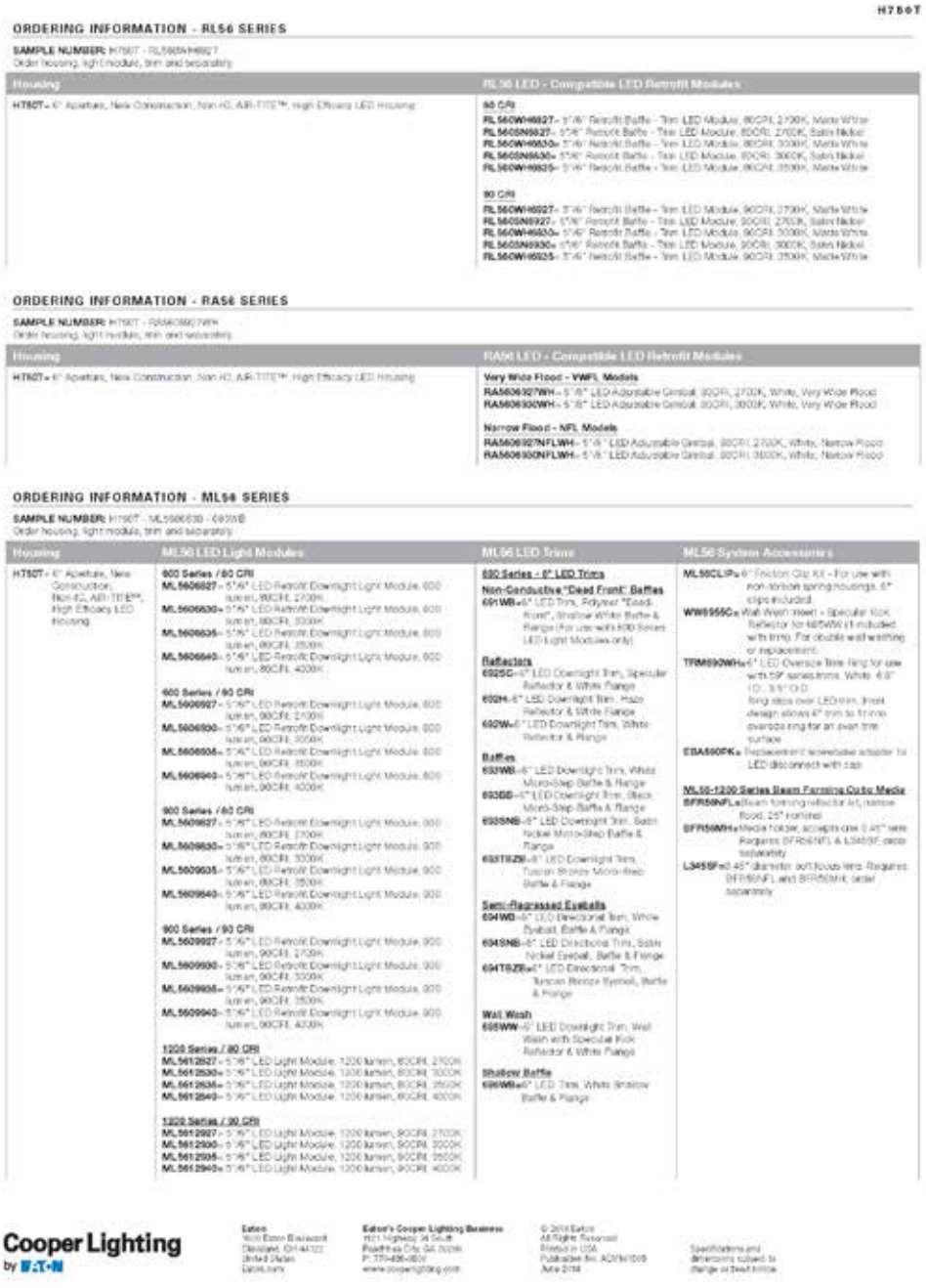
Labels
- UL/cUL Listed 1598 Luminaire
- CE Marking - "Conformité Européene" conformity with the Council of European Communities Directives, meeting internationally recognized compliance when used with ML56 Series LED modules
- Listed for Feed Through
- Listed for Damp Location
- Listed for Wet Location with select trims
- Rated for 20W maximum

Qualification
May be used with qualified Halo LED modules and designated trims for High Efficacy Luminaire Compliance:
- State of California Title 24
- International Energy Conservation Code (IECC)
- New York State Energy Conservation Construction Code - AIR-TITE™ Compliant
- Certified under ASTM-E283 standard for air-tight construction when used with ML56 series, RL56 series and ML7 series trims



Cooper Lighting
by EATON

CSI #: 26 50 00



H750T

ORDERING INFORMATION - RL56 SERIES

SAMPLE NUMBER: H750T - RL560WH6927
Order housing, light module, trim and separately

Housing	RL56 LED - Compatible LED Retrofit Modules
H750T= 6" Aperture, New Construction, Non-IC, AIR-TITE™, High Efficacy LED Housing	80 CRI RL560WH6927= 5"/6" Retrofit Baffle - Trim LED Module, 80CRI, 2700K, Matte White RL560SN6927= 5"/6" Retrofit Baffle - Trim LED Module, 80CRI, 2700K, Satin Nickel RL560WH6930= 5"/6" Retrofit Baffle - Trim LED Module, 80CRI, 3000K, Matte White RL560SN6930= 5"/6" Retrofit Baffle - Trim LED Module, 80CRI, 3000K, Satin Nickel RL560WH6935= 5"/6" Retrofit Baffle - Trim LED Module, 80CRI, 3500K, Matte White 90 CRI RL560WH6927= 5"/6" Retrofit Baffle - Trim LED Module, 90CRI, 2700K, Matte White RL560SN6927= 5"/6" Retrofit Baffle - Trim LED Module, 90CRI, 2700K, Satin Nickel RL560WH6930= 5"/6" Retrofit Baffle - Trim LED Module, 90CRI, 3000K, Matte White RL560SN6930= 5"/6" Retrofit Baffle - Trim LED Module, 90CRI, 3000K, Satin Nickel RL560WH6935= 5"/6" Retrofit Baffle - Trim LED Module, 90CRI, 3500K, Matte White

ORDERING INFORMATION - RA56 SERIES

SAMPLE NUMBER: H750T - RA5606927WH
Order housing, light module, trim and separately

Housing	RA56 LED - Compatible LED Retrofit Modules
H750T= 6" Aperture, New Construction, Non-IC, AIR-TITE™, High Efficacy LED Housing	Very Wide Flood - VWFL Models RA5606927WH= 5"/6" LED Adjustable Gimbal, 90CRI, 2700K, White, Very Wide Flood RA5606930WH= 5"/6" LED Adjustable Gimbal, 90CRI, 3000K, White, Very Wide Flood Narrow Flood - NFL Models RA5606927NFLWH= 5"/6" LED Adjustable Gimbal, 90CRI, 2700K, White, Narrow Flood RA5606930NFLWH= 5"/6" LED Adjustable Gimbal, 90CRI, 3000K, White, Narrow Flood

ORDERING INFORMATION - ML56 SERIES

SAMPLE NUMBER: H750T - ML5606930 - 6911WB
Order housing, light module, trim and separately

Housing	ML56 LED Light Modules	ML56 LED Trims	ML56 System Accessories
H750T= 6" Aperture, New Construction, Non-IC, AIR-TITE™, High Efficacy LED Housing	600 Series / 80 CRI ML5606927= 5"/6" LED Retrofit Downlight Light Module, 600 lumen, 80CRI, 2700K ML5606930= 5"/6" LED Retrofit Downlight Light Module, 600 lumen, 80CRI, 3000K ML5606935= 5"/6" LED Retrofit Downlight Light Module, 600 lumen, 80CRI, 3500K ML5606940= 5"/6" LED Retrofit Downlight Light Module, 600 lumen, 80CRI, 4000K 600 Series / 90 CRI ML5606927= 5"/6" LED Retrofit Downlight Light Module, 600 lumen, 90CRI, 2700K ML5606930= 5"/6" LED Retrofit Downlight Light Module, 600 lumen, 90CRI, 3000K ML5606935= 5"/6" LED Retrofit Downlight Light Module, 600 lumen, 90CRI, 3500K ML5606940= 5"/6" LED Retrofit Downlight Light Module, 600 lumen, 90CRI, 4000K 900 Series / 80 CRI ML5609027= 5"/6" LED Retrofit Downlight Light Module, 900 lumen, 80CRI, 2700K ML5609030= 5"/6" LED Retrofit Downlight Light Module, 900 lumen, 80CRI, 3000K ML5609035= 5"/6" LED Retrofit Downlight Light Module, 900 lumen, 80CRI, 3500K ML5609040= 5"/6" LED Retrofit Downlight Light Module, 900 lumen, 80CRI, 4000K 900 Series / 90 CRI ML5609027= 5"/6" LED Retrofit Downlight Light Module, 900 lumen, 90CRI, 2700K ML5609030= 5"/6" LED Retrofit Downlight Light Module, 900 lumen, 90CRI, 3000K ML5609035= 5"/6" LED Retrofit Downlight Light Module, 900 lumen, 90CRI, 3500K ML5609040= 5"/6" LED Retrofit Downlight Light Module, 900 lumen, 90CRI, 4000K 1200 Series / 80 CRI ML5612627= 5"/6" LED Light Module, 1200 lumen, 80CRI, 2700K ML5612630= 5"/6" LED Light Module, 1200 lumen, 80CRI, 3000K ML5612635= 5"/6" LED Light Module, 1200 lumen, 80CRI, 3500K ML5612640= 5"/6" LED Light Module, 1200 lumen, 80CRI, 4000K 1200 Series / 90 CRI ML5612927= 5"/6" LED Light Module, 1200 lumen, 90CRI, 2700K ML5612930= 5"/6" LED Light Module, 1200 lumen, 90CRI, 3000K ML5612935= 5"/6" LED Light Module, 1200 lumen, 90CRI, 3500K ML5612940= 5"/6" LED Light Module, 1200 lumen, 90CRI, 4000K	600 Series - 6" LED Trims Non-Conductive "Dead Front" Baffles 6911WB= 6" LED Trim, Polymer "Dead-Front", Shallow White Baffle & Flange (For use with 600 Series LED Light Modules only) Reflectors 6925C= 6" LED Downlight Trim, Specular Reflector & White Flange 6926H= 6" LED Downlight Trim, Haze Reflector & White Flange 6926W= 6" LED Downlight Trim, White Reflector & Flange Baffles 6931WB= 6" LED Downlight Trim, White Micro-Step Baffle & Flange 6936B= 6" LED Downlight Trim, Black Micro-Step Baffle & Flange 6936NB= 6" LED Downlight Trim, Satin Nickel Micro-Step Baffle & Flange 6937BZB= 6" LED Downlight Trim, Tuscan Bronze Micro-Step Baffle & Flange Semi-Regressed Eyeballs 6941WB= 6" LED Directional Trim, White Eyeball, Baffle & Flange 6943NB= 6" LED Directional Trim, Satin Nickel Eyeball, Baffle & Flange 6947BZB= 6" LED Directional Trim, Tuscan Bronze Eyeball, Baffle & Flange Wall Wash 6959WW= 6" LED Downlight Trim, Wall Wash with Specular Kick Reflector & White Flange Shallow Baffle 6969WB= 6" LED Trim, White Shallow Baffle & Flange	ML56CLIPs= 6" Friction Clip Kit - For use with non-torsion spring housings. 6" clips included. WW6956Cs= Wall Wash Insert - Specular Kick Reflector for 6859WW (Included with trims). For obsolete wall washing or replacement. TRM690WHs= 6" LED Oversize Trim Ring for use with 69* series trims. White. 6.9" I.D., 9.5" O.D. Ring slips over LED trim. Insert design allows 6" trim to fit into oversize ring for an even trim surface. EBA560PKs= Replacement screwdriver adapter to LED disconnect with cap. ML56-1200 Series Beam Forming Optic Media BFR56NFLs= Beam forming reflector kit, narrow flood, 25° nominal BFR56WHs= Media holder, accepts one 0.45" lens. Requires BFR56NFL & L3455F, order separately. L3455Fs= 0.45" diameter soft focus lens. Requires BFR56NFL and BFR56WH, order separately.

Cooper Lighting by EATON

CSI #: 26 50 00

Jewelers Collection BY LITELAB

Halogen

MR-16/Lamp-Ring/Stem

J19MR16

job name: fixture type:

Specify: J19MR16 - - - -

	FIXTURE MODEL	ADAPTER	VOLTAGE	FINISH	ACCESSORIES (optional)
example:	J19MR16	-9iD	-A	-NT	-OL5x55-a

Jewelers Collection Fixtures

- Fits standard 1.81" (46mm) and deep 2.38" (60mm) BusRun.
- Fixture rotates up to 360° and may be ordered with optional on/off switch.

Lamp

12-volt, Halogen MR-16 (by others)

Ratings

50 watts maximum

CE ETL

Features & Benefits

J19MR16-9iD shown

Materials
6000-series aluminum, precision machined to blemish free architectural finish

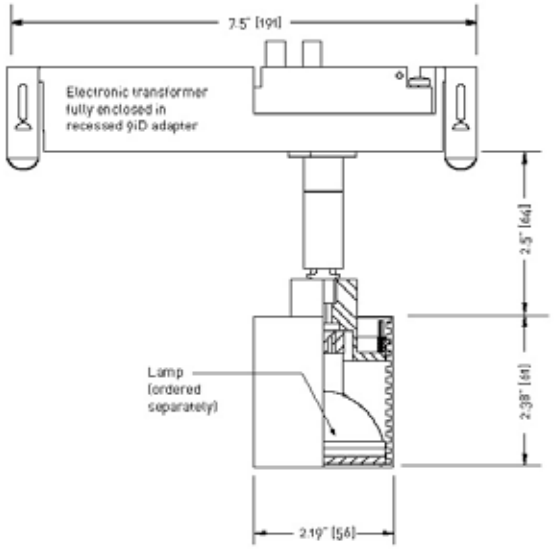
Lamp Ring
machined to .187" seamless wall thickness; internally threaded to accept retaining ring for lamp and up to two accessories held level behind 90° front.

Socket Cup
(where appropriate) machined to .062" seamless wall thickness, securely fastened to ceramic socket, with leads enclosed in basket-weave, stainless steel sleeve.

Accessory Size Code: a

Input
120/240 Volt

Temperature
40°C/104°F ambient maximum



**See fittings and accessories page for mounting options and accessories.

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Jewelers Collection BY LITELAB — Input Fittings & Accessories | MR-16

Adapters

BusRun

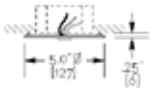
	adapter code	on-off switch optional	voltage
9iD* adapter in **DEEP Busway** 2.38" [60]	9iD	-SY	- A
	fused plug-in fitter with integral transformer for use with **Deep 120V BusRun** busway		
	9iD	-SY	- D
	fused plug-in fitter with integral transformer for use with **Deep 240V BusRun** busway		
9iS* adapter in **SHALLOW Busway** 1.81" [46]	9iS	-SY	- A
	fused plug-in fitter with integral transformer for use with **Shallow 120V BusRun** busway		
	9iS	-SY	- D
	fused plug-in fitter with integral transformer for use with **Shallow 240V BusRun** busway		

*U.S. Patent D499,688

12V BusRun

adapter shown in **DEEP Busway** 2.38" [60]	9BD	-SY	- B
	fused plug-in fitter for use with **12V BusRun** busway		
adapter shown in **SHALLOW Busway** 1.81" [46]	9BS	-SY	- B
	fused plug-in fitter for use with **12V BusRun** busway		

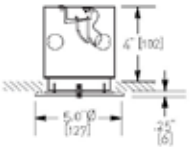
Canopy for Remote Transformer



-3

machined canopy and mounting bracket for 4" octagon box (by others) and remote transformer (order separately). 5.0" diameter x .25" height

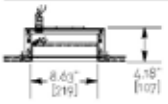
Canopy with Transformer (120V, 240V, 277V)



-3E

machined canopy, 5.0" diameter x .25" height and 4"x 4"x 4" junction box with electronic low-voltage power supply.

BusPoints



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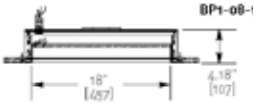

BP1-08-18

Fitter Detail

Accessories

Spread Lenses

Linear Spread*
OL-5°x30°-a
OL-5°x55°-a

Universal Spread*
OL-55°x75°-a

Beam Softener*
OL-SF-a

Clear Pyrex
OL-Flat-a (included)

UV Filter
OL-Flat-a-UV

* available with UV coating (add -UV to part number when specifying.)

Louvers & Screens

Hexcell Louver
LVH/a (black)

Light Block Screen
B-18/a

Photo-etched, 15% light-blocking screen. Accepts up to 5 for 30%, 45%, 60% or 75% (maximum)

Snoots

Tapered
SNOOT-T-a-13

Wallwash
SNOOT-TW-a-13

Finishes

Consult with Litelab for custom finishes.

NT	Brushed Aluminum
MB	Black
P	White
CP	Custom Paint

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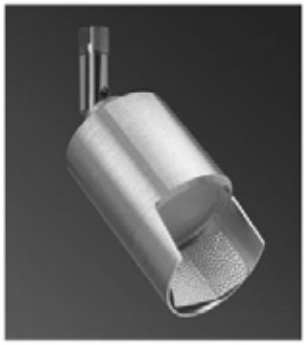
CSI #: 26 50 00

Jewelers Collection BY LITELAB

Halogen

MR-16/Wall-Wash/Stem



J21MR16

job name: fixture type:

Specify: J21MR16 - - - -

FIXTURE MODEL	ADAPTER	VOLTAGE	FINISH	ACCESSORIES (optional)
example: J21MR16	-9iD	-A	-NT	-0L5x55-a

Jewelers Collection Fixtures

- Fits standard 1.81" (46mm) and deep 2.38" (60mm) BusRun.
- Fixture rotates up to 360° and may be ordered with optional on/off switch.

Lamp

12-volt, Halogen MR-16 (by others)

Ratings

50 watts maximum

CE

Features & Benefits

J21MR16-9iD shown

Materials
6000-series aluminum, precision machined to blemish free architectural finish

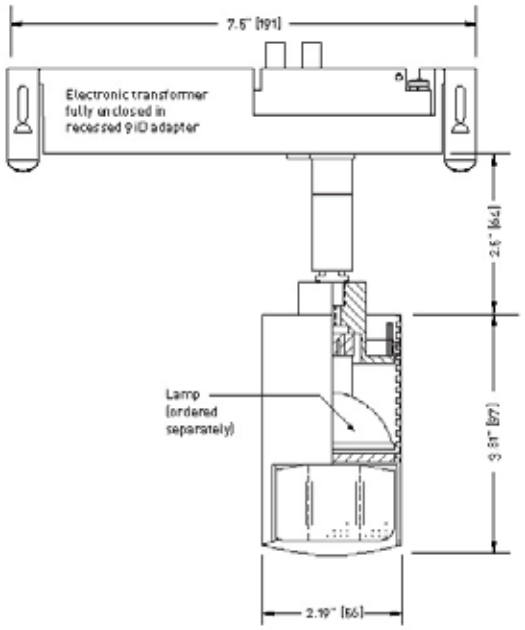
Lamp Ring
machined to .187" seamless wall thickness, internally threaded to accept retaining ring for lamp and up to two accessories held level behind 90° front

Socket Cup
(where appropriate) machined to .062" seamless wall thickness; securely fastened to ceramic socket, with leads enclosed in basket-weave, stainless steel sleeve

Accessory Size Code: a

Input
120/240 Volt

Temperature
40°C/104°F ambient maximum



→See fittings and accessories page for mounting options and accessories.

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CSI #: 26 50 00

Jewelers Collection BY LITELAB Input Fittings & Accessories | MR-16

Adapters

BusRun

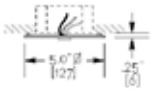
	adapter code	on-off switch optional	voltage
9iD* adapter in **DEEP Busway** 2.38" [60]	9iD	-SY	- A
	fused plug-in fitter with integral transformer for use with **Deep 120V BusRun** busway		
	9iD	-SY	- D
	fused plug-in fitter with integral transformer for use with **Deep 240V BusRun** busway		
9iS* adapter in **SHALLOW Busway** 1.81" [46]	9iS	-SY	- A
	fused plug-in fitter with integral transformer for use with **Shallow 120V BusRun** busway		
	9iS	-SY	- D
	fused plug-in fitter with integral transformer for use with **Shallow 240V BusRun** busway		

*U.S. Patent D499,688

12V BusRun

adapter shown in **DEEP Busway** 2.38" [60]	9BD	-SY	- B
	fused plug-in fitter for use with **12V BusRun** busway		
adapter shown in **SHALLOW Busway** 1.81" [46]	9BS	-SY	- B
	fused plug-in fitter for use with **12V BusRun** busway		

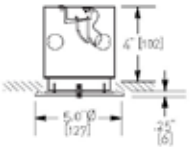
Canopy for Remote Transformer



-3

machined canopy and mounting bracket for 4" octagon box (by others) and remote transformer (order separately). 5.0" diameter x .25" height

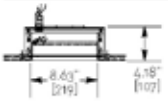
Canopy with Transformer (120V, 240V, 277V)



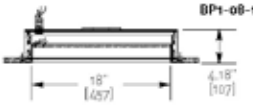
-3E

machined canopy, 5.0" diameter x .25" height and 4"x 4"x 4" junction box with electronic low-voltage power supply.

BusPoints



BP1-08-09



BP1-08-18

Fitter Detail

Accessories

Spread Lenses

Linear Spread*
OL-5°x30°-a
OL-5°x55°-a

Universal Spread*
OL-55°x75°-a

Beam Softener*
OL-SF-a

Clear Pyrex
OL-Flat-a (included)

UV Filter
OL-Flat-a-UV

* available with UV coating (add -UV to part number when specifying.)

Screens

Photo-etched, 15% light-blocking screen. Accepts up to 5 for 30%, 45%, 60% or 75% (maximum)

Finishes

Consult with Litelab for custom finishes.

NT	Brushed Aluminum
MB	Black
P	White
CP	Custom Paint

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CSI #: 26 50 00

KETRA
G2 HIGH OUTPUT LINEAR ACCENT

Project
Comments
Prepared By

KETRA®

G2 High Output Linear Accent

- High performance cove, graze and wash applications
- Tunable spectrum single point source produces wide range of white, pastels & saturated colors
- Closed-loop color point maintenance to <1 MacAdam ellipse over lifetime and temperature
- Programmable digital dimming to 0.1%
- Connects with Ketra's N3 Satellite for power, wireless control and connection to Ketra's library of light content
- Ketra's technology ensures consistent appearance and guaranteed compatibility over LED technology generations
- Integrated on-board power supply does not require remote transformer
- Infinitely adjustable, 180° rotation, constant torque hinge does not require locking but includes optional locking screw
- Excellent near-field color mixing

Hardware Ordering Guide:

G2	12		A	T		1	A	WH		
Series	Length	Lumens	Platform	Control	Beam Angle	Voltage	Interface	Housing Color	Custom Code (Optional)	Custom Field (Optional)

Series	Code
G Series 12" Linear Accent	G2

Length	Code
One Foot (12")	12

Lumens	Code
700	07
400	04

Platform (see page 4 color chart)	Code
Wide Gamut	A

Control	Code
Tunable	T

Beam Angle	Code
Narrow Flood (30 X 45°)	NFL
Flood (60 X 60°)	FL
Wide Flood (120 X 120°)	WFL
Graze (10 X 60° Shipping Q3 2015)	GR

Voltage	Code
120V AC 60Hz	1

Interface	Code
Leader Cable	A

Housing Color	Code
White	WH
Black	BK

Ketra luminaires can be ordered with a variety of custom light settings, including specific saturated, pastel and white color points.
Contact Ketra for more details.

720-000028-01-23
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CSI #: 26 50 00

KETRA
G2 HIGH OUTPUT LINEAR ACCENT

Project
Comments
Prepared By

Specifications[1]

Optical Performance

Lumen Output[2]	G2.07 700 lm/ft, G2.04 400 lm/ft
CRI	>90
Lumen Maintenance[3]	50K Hours to L70@25°C Ambient
Color Spatial Uniformity	<2 MacAdam ellipses across field angle
Color point maintained to <1 MacAdam ellipse over product lifetime	
Beam Angles	30x45°, 60x60°, 120x120°
Dimming Range	0.1-100% lm output

Environmental

Ambient Operating Temperature	-20 to 50°C
Storage Temperature	-20 to 80°C
Humidity	0 - 85%, Non-condensing
Certification	UL, cUL, RoHS
Location	UL Damp Location, IP20

Form Factor

Dimensions

Beam Angle	Dim A	Dim B	Dim C
Wide Flood	12", 305 mm	2.5", 63.5 mm	2.5", 63.5 mm
Flood			2.5", 63.5 mm
Narrow Flood			2.65", 67 mm
Graze			3.1", 78.7 mm

Rotation: Infinite adjustment through 180°

Mechanical

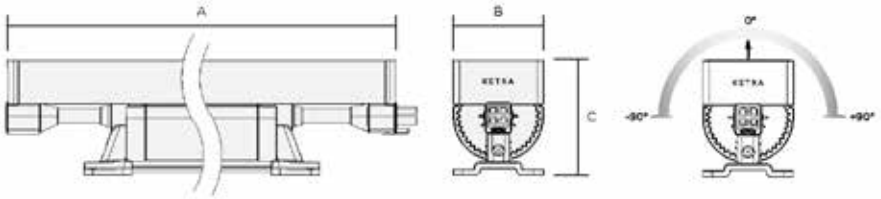
Weight (12")	1.35 lbs, 600 g
Housing Material	Powder Coated Aluminum, Polymer
Lens Material	Non-yellowing heat/ UV stabilized PMMA

Electrical

Power Consumption	G2.07 9W/ft TYP, G2.04 6W/ft TYP
Power Factor	>0.9
Current	G2.07 0.16 A, G2.04 0.09 A
Efficacy	37 lm/W
Max. Qty of Fixtures Per N3	40
Max Total Run Length, including cable, Per N3	100ft

Accessories

Leader 50', White (with Terminator)	G2L6001CWH
Leader 50', Black (with Terminator)	G2L6001CBK
Leader 10', White (with Terminator)	G2L1201CWH
Leader 10', Black (with Terminator)	G2L1201CBK
Jumper 1', White	G2J0121CWH
Jumper 1', Black	G2J0121CBK
Jumper 5', White	G2J0601CWH
Jumper 5', Black	G2J0601CBK
Terminator (Optional Replacement)	GTC
G2 Alignment Track	G2TRKZP48
N3 Satellite	N3INDRECTBK



[1] All performance measurements taken with fixture stabilized at 25°C ambient, 100% power input, unless otherwise stated, within CCT range of 2700 - 5000K.
[2] Lumen measurement complies with IES LM-79-08 testing procedures.
[3] Lumen maintenance values calculated in accordance to TM-21 procedures based on LM-80 compliant measurement sets.

770-000003-01-21

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CSI #: 26 50 00

KETRA
TRACK ADAPTER

Project: _____
Comments: _____
Prepared By: _____

KETRA®
Track Adapter

- Leverage the full feature set of Ketra's S38 LED Lamp
- Constant torque hinge provides 90° of tilt aiming at any increment, without the need for a mechanical lock
- 365° of rotation eliminates any aiming shadows
- Configurable with industry standard track systems and conduit mount option

Hardware Ordering Guide

TA						1	G24		WH		
Series	Form Factor	Lumens	Platform	Control	Beam Angle	Region	Base Type	Adapter Type	Housing Color	Custom Code (Optional)	Custom Field (Optional)

Series	Code
Track Adapter	TA

Form Factor	Code
Track Adapter Only	-
S38	S38

Lumens	Code
Track Adapter Only	-
900	09

Platform (see page 4 color chart)	Code
Track Adapter Only	-
Wide Gamut	A

Control	Code
Track Adapter Only	-
Tunable	T

Beam Angle	Code
Track Adapter Only	-
Spot (10°)	SP
Flood (25°)	FL
Wide Flood (40°)	WFL
Very Wide Flood (60°)	VFL

Region	Code
NA 120 V 60 Hz	1

Base Type	Code
GU24	G24

Adapter Type	Code
Global Trac Compatible	-
"H-Type" Compatible	H
"J-Type" Compatible	J
"L-Type" Compatible	L
1/2" NPT Canopy Mount	-

Housing Color	Code
White	WH
Black	BK

Accessory Order Codes
See Page 2 for Accessory options

Custom Order Codes
See Page 4 for custom order code options

FIX-D60096-01-2
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CSI #: 26 50 00

KETRA
TRACK ADAPTER

Project:
Comments:
Prepared By:

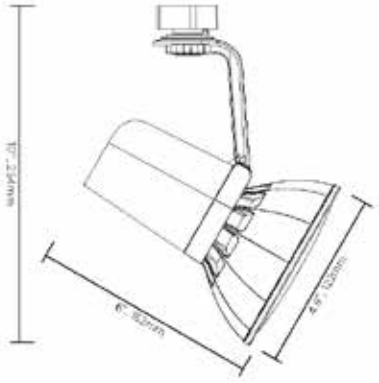
Specifications[1]

Optical Performance

Lumen Output	900 lm[2]
Color	Red: 330 lm, Green: 435 lm, Blue: 130 lm[3]
CRI (Ra)	>90 (R9 >80)
Lumen Maintenance	25,000 hours to L70 @ 25°C T_a[4]
Color Spatial Uniformity	<2 MacAdam ellipses across field angle
Color Point Maintenance	<1 MacAdam ellipse over product lifetime
Equivalent Traditional Lamp	75W halogen PAR38
Dimming Range	0.1 - 100%[5][6]

Environmental

Operating Temperature (T_a)	0 - 50°C[4]
Storage Temperature	-20 - 80°C
Humidity	0 - 95%, Non-condensing
Certification	UL, cUL, RoHS, FCC Class B
Location	UL Damp Location, IP20, S.38.08: suitable for use in fully enclosed luminaires



CAD files available upon request

Mechanical

Weight	13.8 oz, 390 g
Housing Material	Powder Coated Aluminum, Polymer
Lens Material	Non-yellowing PMMA
Base Type	E26 or GU24

Electrical

Power Consumption	17W
Power Factor	>0.9
Current	170 mA Max
Efficacy	>50 lm/W

Accessories

S.38 Accessory Snoot 30° cutoff, White	S38ASNT30WH	S.38 Accessory Louver 45° cutoff, White (Requires S.38ASNT55)	S38ALUM45WH
S.38 Accessory Snoot 30° cutoff, Black	S38ASNT30BK	S.38 Accessory Louver 45° cutoff, Black (Requires S.38ASNT55)	S38ALUM45BK
S.38 Accessory Snoot 55° cutoff, White	S38ASNT55WH	S.38 Accessory Baffle 10° cutoff, White (Requires S.38ASNT30)	S38ABFL10WH
S.38 Accessory Snoot 55° cutoff, Black	S38ASNT55BK	S.38 Accessory Baffle 10° cutoff, Black (Requires S.38ASNT30)	S38ABFL10BK

[1] All performance measurements taken at 3000K, 25°C ambient, 100% power input, unless otherwise stated.
[2] Lumen measurement complies with IES LM-79-08 testing procedures.
[3] See color gamut chart at the end of this document.
[4] Lumen maintenance values calculated in accordance to TM-21 procedures based on LM-80 compliant measurement data.
[5] Intensity and color point controlled via Ketra's wireless network.
[6] S.38.08: suitable for use in fully enclosed luminaires. S.38.09: not to be used in fully enclosed luminaires.

730-000080-01-2

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CSI #: 26 50 00

KETRA
TUNABLE S38 LED LAMP

Project:
Comments:
Prepared By:

KETRA®
S38 Tunable Lamp

- Fully tunable spectrum single point source produces wide range of 90+ CRI white, pastels and saturated colors
- Closed-loop color point maintenance to <1 MacAdam ellipse over lifetime and temperature
- Integrated temperature protection maintains product within safe operating conditions
- Wireless and TRIAC dimmable to 0.1%
- On-board wireless control enables individual addressability and control at a competitive system level price point
- Lamps may be ordered preprogramed from the factory to specific CCTs, x,y chromaticity coordinates, gel, Pantone, and traditional lamp dimming curves.

Hardware Ordering Guide

S	38		A	T		1		WH		
Series	Form Factor	Lumens	Platform	Control	Beam Angle	Region	Base Type	Housing Color	Custom Code (Optional)	Custom Field (Optional)

Series	Code
S Series Lamp	S

Form Factor	Code
PAR38	38

Lumens	Code
800 (Suitable for use in fully enclosed luminaires)	08
900	09

Platform	Code
Wide Gamut	A

Control	Code
Tunable	T

Beam Angle	Code
Spot (10°)	SP
Flood (25°)	FL
Wide Flood (40°)	WFL
Very Wide Flood (60°)	VFL

Region	Code
NA 120 V 60 Hz	1

Base Type	Code
E26	E26
GU24	G24

Housing Color	Code
White	WH
Black	BK
Silver	S

Accessory Order Codes

See Page 2 for Accessory options

Custom Order Codes

See Page 4 for custom order code options

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CSI #: 26 50 00

KETRA
TUNABLE S38 LED LAMP

Project:
Comments:
Prepared By:

Specifications[1]

Optical Performance

Lumen Output	900 lm[2]
Color	Red: 330 lm, Green: 435 lm, Blue: 130 lm[3]
CRI (Ra)	>90 (R9 >80)
Lumen Maintenance	25,000 hours to L70 @ 25°C T_a[4]
Color Spatial Uniformity	<2 MacAdam ellipses across field angle
Color Point Maintenance	<1 MacAdam ellipse over product lifetime
Equivalent Traditional Lamp	75W halogen PAR38
Dimming Range	0.1 - 100%[5][6]

Environmental

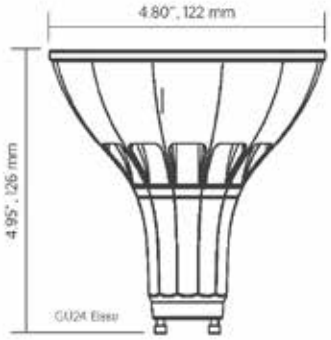
Operating Temperature (T_a)	0 - 50°C[6]
Storage Temperature	-20 - 80°C
Humidity	0 - 95%, Non-condensing
Certification	UL, cUL, RoHS, FCC Class B
Location	UL Damp Location, IP20, S38.08: suitable for use in fully enclosed luminaires

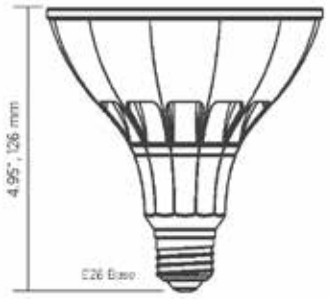
Mechanical

Weight	13.8 oz, 390 g
Housing Material	Powder Coated Aluminum, Polymer
Lens Material	Non-yellowing PMMA
Base Type	E26 or GU24

Electrical

Power Consumption	17W
Power Factor	>0.9
Current	170 mA Max
Efficacy	>50 lm/W





CAD files available upon request

Accessories

S38 Accessory Snoot 30° cutoff, White	S38ASNT30WH	S38 Accessory Louver 45° cutoff, White (Requires S38ASNT55)	S38ALUM45WH
S38 Accessory Snoot 30° cutoff, Black	S38ASNT30BK	S38 Accessory Louver 45° cutoff, Black (Requires S38ASNT55)	S38ALUM45BK
S38 Accessory Snoot 55° cutoff, White	S38ASNT55WH	S38 Accessory Baffle 10° cutoff, White (Requires S38ASNT30)	S38ABFL10WH
S38 Accessory Snoot 55° cutoff, Black	S38ASNT55BK	S38 Accessory Baffle 10° cutoff, Black (Requires S38ASNT30)	S38ABFL10BK

[1] All performance measurements taken at 3000K, 25°C ambient, 100% power input, unless otherwise stated.
[2] Lumen measurement complies with IES LM-79-08 testing procedures.
[3] See color gamut chart at the end of this document.
[4] Lumen maintenance values calculated in accordance to TM-21 procedures based on LM-80 compliant measurement data.
[5] Intensity and color point controlled via Ketra's wireless network.
[6] S38.08: suitable for use in fully enclosed luminaires. S38.09: not to be used in fully enclosed luminaires.

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CSI #: 26 50 00

KETRA
A20 TUNABLE LED LAMP

Project: _____
Comments: _____
Prepared By: _____

KETRA®
A20 Tunable Lamp

- Fully tunable spectrum single point source produces wide range of white, pastels and saturated colors
- Closed-loop color point maintenance to <1 MacAdam ellipse over lifetime and temperature
- Integrated temperature protection maintains product within safe operating conditions
- Wireless and TRIAC dimmable to 0.1%
- Integrated wireless control for seamless connection with Ketra's predefined light content
- Ketra's technology ensures consistent appearance and guaranteed compatibility as LED technology evolves

Hardware Ordering Guide

A	20		B	T	1		WH		
Series	Form Factor	Lumens	Platform	Control	Region	Base Type	Housing Color	Custom Code (Optional)	Custom Field (Optional)

Series	Code
A Series Lamp	A

Form Factor	Code
A20 Lamp	20

Lumens	Code
600	06
800	08

Platform (see page 4 color chart)	Code
Wide Gamut	B

Control	Code
Tunable	T

Region	Code
NA 120 V 60 Hz	1

Base Type	Code
E26	E26
GU24 (Available Q3 2015)	G24

Housing Color	Code
White	WH

Custom Order Codes
See Page 4 for custom order code options

770-00000x-0X-R
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CSI #: 26 50 00

KETRA
A20 TUNABLE LED LAMP

Project
Comments
Prepared By

Specifications[1]

Optical Performance

Lumen Output[2]	600 lm/ 800 lm
CRI (Ra)	>90
Lumen Maintenance[3]	25,000 hours to L70 @ 25°C Ambient
Color Spatial Uniformity	<2 MacAdam ellipses across field angle
Color Point Maintenance	<1 MacAdam ellipse over product lifetime
Equivalent Traditional Lamp	40W/ 60W Incandescent lamp
Dimming Range[4]	0.1 - 100% lm

Environmental

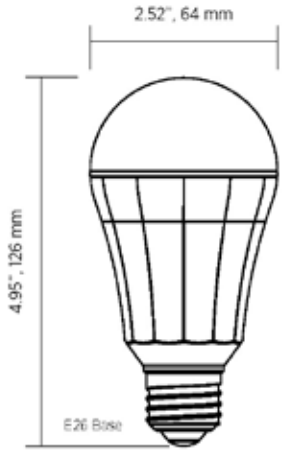
Ambient Operating Temperature[5]	0 - 50°C
Storage Temperature	-20 - 80°C
Humidity	0 - 85%, Non-condensing
Certification	UL, cUL, RoHS, FCC Class B
Location	UL Damp Location, IP50, Suitable for use in fully enclosed luminaires

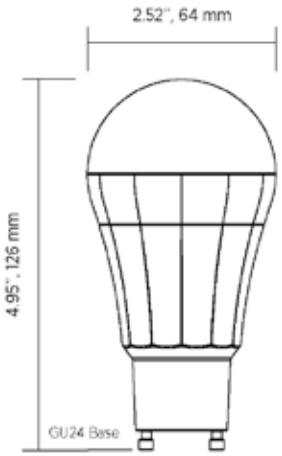
Mechanical

Weight	13.8 oz, 390 g
Housing Material	Powder Coated Aluminum, Polymer
Lens Material	Non-yellowing PMMA
Base Type	E26 GU24

Electrical

Power Consumption	A20.06 10W/ A20.08 11W
Power Factor	>0.9
Current	100 mA Max
Efficacy	≥60 lm/W





Available Q3 2015

CAD files available upon request

[1] All performance measurements taken at 3000K, 25°C ambient, 100% power input, unless otherwise stated.
[2] Lumen measurement complies with IES LM-79-08 testing procedures.
[3] Lumen maintenance values calculated in accordance to TM-21 procedures based on LM-80 compliant measurement data.
[4] Intensity and color point controlled via Ketra's wireless network.
[5] Suitable for use in fully enclosed luminaires.

770-00000X-0X-6
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CSI #: 26 50 00

KETRA
A20 TUNABLE LED LAMP

Project: _____
Comments: _____
Prepared By: _____

KETRA®
A20 Tunable Lamp

- Fully tunable spectrum single point source produces wide range of white, pastels and saturated colors
- Closed-loop color point maintenance to <1 MacAdam ellipse over lifetime and temperature
- Integrated temperature protection maintains product within safe operating conditions
- Wireless and TRIAC dimmable to 0.1%
- Integrated wireless control for seamless connection with Ketra's predefined light content
- Ketra's technology ensures consistent appearance and guaranteed compatibility as LED technology evolves

Hardware Ordering Guide

A	20		B	T	1		WH		
Series	Form Factor	Lumens	Platform	Control	Region	Base Type	Housing Color	Custom Code (Optional)	Custom Field (Optional)

Series	Code
A Series Lamp	A

Form Factor	Code
A20 Lamp	20

Lumens	Code
600	06
800	08

Platform (see page 4 color chart)	Code
Wide Gamut	B

Control	Code
Tunable	T

Region	Code
NA 120 V 60 Hz	1

Base Type	Code
E26	E26
GU24 (Available Q3 2015)	G24

Housing Color	Code
White	WH

Custom Order Codes
See Page 4 for custom order code options

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CSI #: 26 50 00

KETRA
A20 TUNABLE LED LAMP

Project:
Comments:
Prepared By:

Specifications[1]

Optical Performance

Lumen Output[2]	600 lm/ 900 lm
CRI (Ra)	>90
Lumen Maintenance[3]	25,000 hours to L70 @ 25°C Ambient
Color Spatial Uniformity	<2 MacAdam ellipses across field angle
Color Point Maintenance	<1 MacAdam ellipse over product lifetime
Equivalent Traditional Lamp	40W/ 60W Incandescent lamp
Dimming Range[4]	0.1 - 100% lm

Environmental

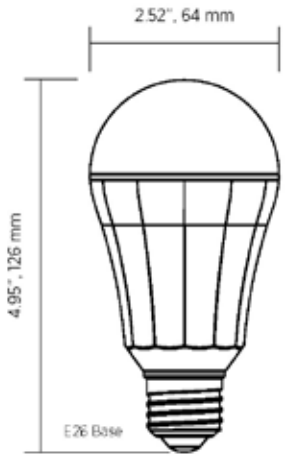
Ambient Operating Temperature[5]	0 - 50°C
Storage Temperature	-20 - 60°C
Humidity	0 - 95%, Non-condensing
Certification	UL, cUL, RoHS, FCC Class B
Location	UL Damp Location, IP50, Suitable for use in fully enclosed luminaires

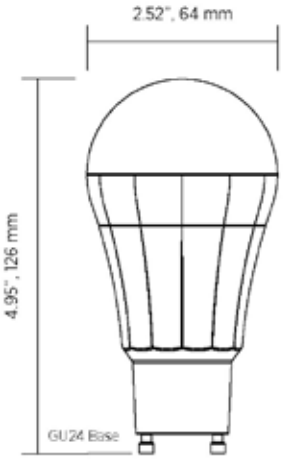
Mechanical

Weight	13.8 oz, 390 g
Housing Material	Powder Coated Aluminum, Polymer
Lens Material	Non-yellowing PMMA
Base Type	E26 GU24

Electrical

Power Consumption	A20.06 10W/ A20.08 11W
Power Factor	>0.9
Current	100 mA Max
Efficacy	≥60 lm/W





Available Q3 2015

CAD files available upon request

[1] All performance measurements taken at 3000K, 25°C ambient, 100% power input, unless otherwise stated.
[2] Lumen measurement complies with IES LM-79-08 testing procedures.
[3] Lumen maintenance values calculated in accordance to TM-21 procedures based on LM-80 compliant measurement data.
[4] Intensity and color point controlled via Ketra's wireless network.
[5] Suitable for use in fully enclosed luminaires.

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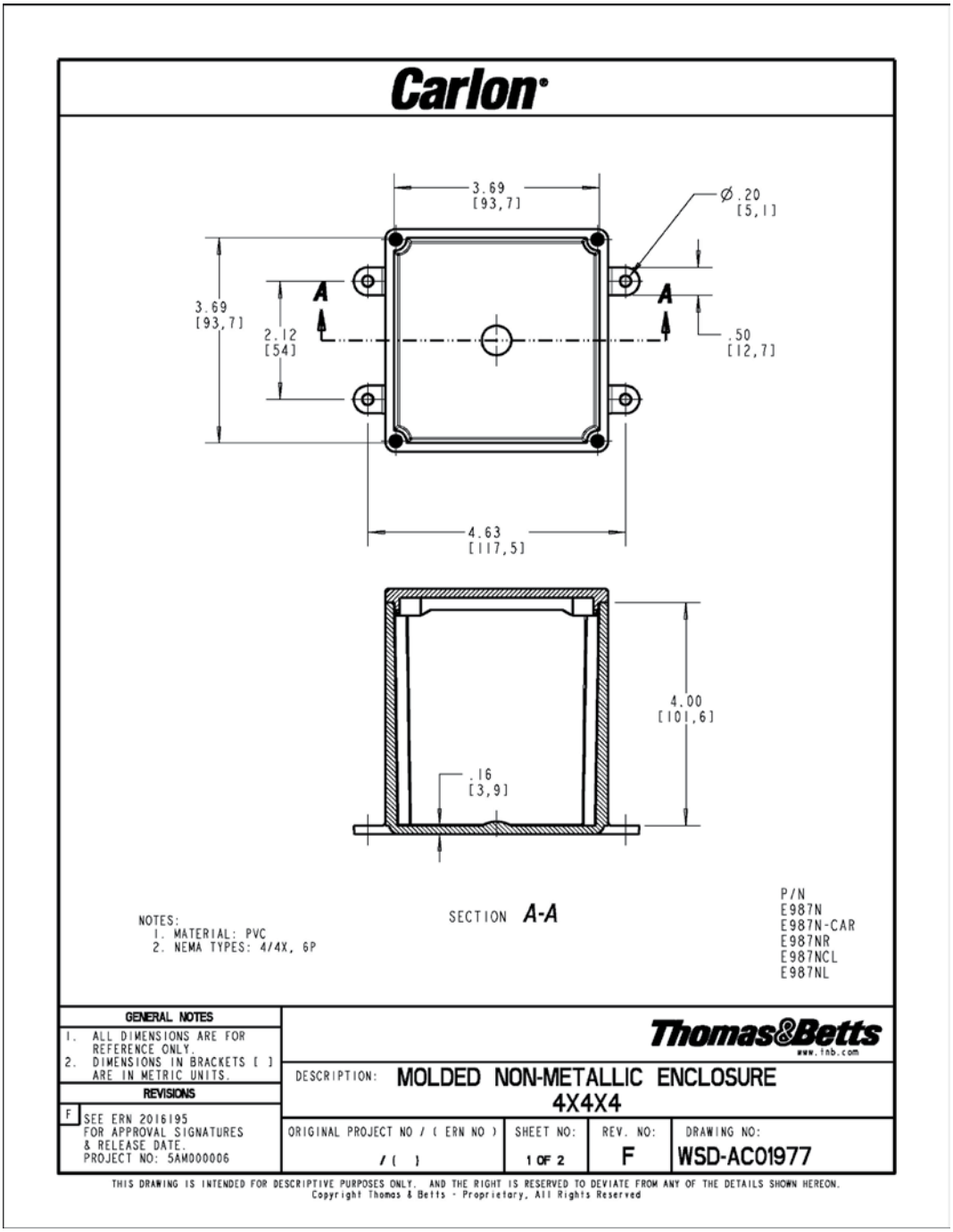
Carlon
3.69
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[54]
A
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.50
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4.63
[117,5]
4.00
[101,6]
.16
[3,9]
SECTION A-A
NOTES:
1. MATERIAL: PVC
2. NEMA TYPES: 4/4X, 6P
P/N
E987N
E987N-CAR
E987NR
E987NCL
E987NL
GENERAL NOTES
1. ALL DIMENSIONS ARE FOR REFERENCE ONLY.
2. DIMENSIONS IN BRACKETS [ ] ARE IN METRIC UNITS.
REVISIONS
F SEE ERN 2016195 FOR APPROVAL SIGNATURES & RELEASE DATE. PROJECT NO: 5AM000006
Thomas&Betts
www.tnb.com
DESCRIPTION: MOLDED NON-METALLIC ENCLOSURE 4X4X4
ORIGINAL PROJECT NO / (ERN NO)
/ ( )
SHEET NO: 1 OF 2
REV. NO: F
DRAWING NO: WSD-AC01977
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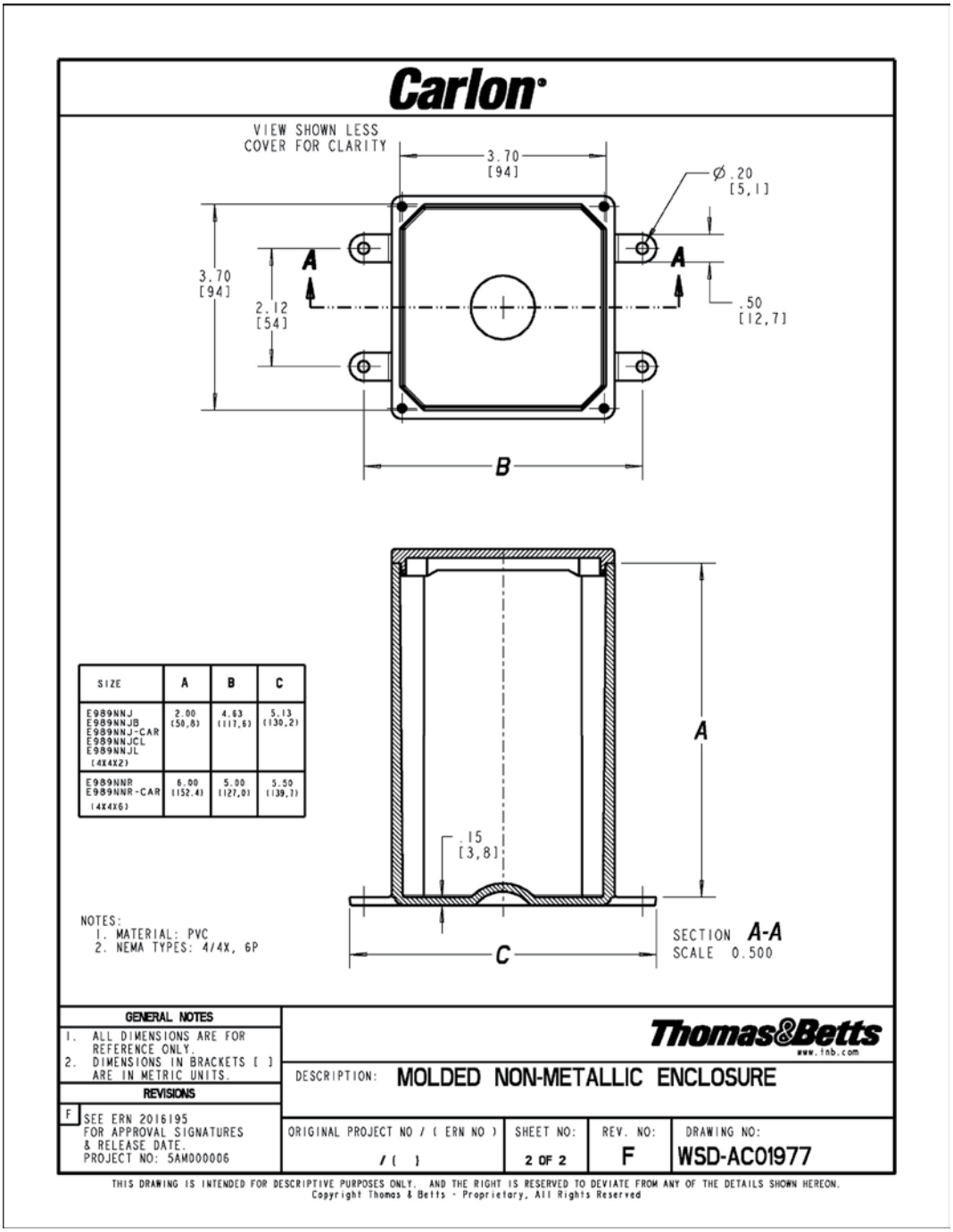
CSI #: 26 50 00



SIZE	A	B	C
E989NNJ E989NNJB E989NNJ-CAR E989NNJCL E989NNJL (4X4X2)	2.00 (50,8)	4.63 (117,6)	5.13 (130,2)
E989NNR E989NNR-CAR (4X4X6)	6.00 (152.4)	5.00 (127,0)	5.50 (139,7)

Division 28

Electronic Safety and Security

CSI #: 28 40 00

EDS-205/208 Series

5 and 8-port entry-level unmanaged Ethernet switches

- 10/100BaseT(X) (RJ45 connector), 100BaseFX (multi-mode, SC/ST connectors)
- IEEE802.3/802.3u/802.3x support
- Broadcast storm protection
- DIN-rail mounting ability
- -10 to 60°C operating temperature range

Introduction

The EDS-205/208 series of industrial Ethernet switches are entry-level industrial 5 and 8-port Ethernet switches that support IEEE 802.3/802.3u/802.3x with 10/100M, full/half-duplex, MDI/MDIX auto-sensing RJ45 ports. The EDS-205/208 switches are rated to operate at temperatures ranging from -10 to 60°C, and are rugged enough for any harsh industrial environment. The switches can be easily installed on a DIN-rail as well as in distribution boxes. The DIN-rail mounting capability, wide operating temperature, and the IP30 housing with LED indicators make the plug-and-play EDS-205/208 switches easy to use and reliable.

Specifications

Technology

Standards:
IEEE 802.3 for 10BaseT
IEEE 802.3u for 100BaseT(X) and 100BaseFX
IEEE 802.3x for Flow Control
Processing Type: Store and Forward
Flow Control: IEEE 802.3x flow control, back pressure flow control

Switch Properties

MAC Table Size: 1 K
Packet Buffer Size: 512 kbit

Interface

Fiber Ports: 100BaseFX ports (SC/ST connector, multi-mode)
RJ45 Ports: 10/100BaseT(X) auto negotiation speed, Full/Half duplex mode, and auto MDI/MDI-X connection
LED Indicators: Power, 10/100M (TP port), 100M (fiber port)

Optical Fiber

	100BaseFX	
	Multi-mode	Single-mode
Wavelength	1300 nm	1310 nm
Max. TX	-10 dBm	0 dBm
Min. TX	-20 dBm	-5 dBm
RX Sensitivity	-32 dBm	-34 dBm
Link Budget	12 dB	29 dB
Typical Distance	5 km [a] 4 km [b]	40 km [c]
Saturation	-6 dBm	-3 dBm

a. 50/125 μm, 800 MHz*km fiber optic cable
b. 62.5/125 μm, 500 MHz*km fiber optic cable
c. 9/125 μm single-mode fiber optic cable

Power Requirements

Input Voltage:
EDS-205: 24 VDC (12 to 48 VDC), 18 to 30 VAC (47 to 63 Hz), single input
EDS-208 Series: 24 VDC (12 to 45 VDC), 18 to 30 VAC (47 to 63 Hz), single input
Input Current:
EDS-205: 0.12 A @ 24 V
EDS-208: 0.14 A @ 24 V
EDS-208-M: 0.23 A @ 24 V
Overload Current Protection: 1.1 A
Connection: 1 removable 3-contact terminal block
Reverse Polarity Protection: Present

Physical Characteristics

Housing: Plastic, IP30 protection
Dimensions:
EDS-205: 24.9 x 100 x 86.5 mm (0.98 x 3.94 x 3.41 in)
EDS-208 Series: 40 x 100 x 86.5 mm (1.57 x 3.94 x 3.41 in)
Weight:
EDS-205: 135 g
EDS-208 Series: 170 g
Installation: DIN-rail mounting

Environmental Limits

Operating Temperature: -10 to 60°C (14 to 140°F)
Storage Temperature: -40 to 85°C (-40 to 185°F)
Ambient Relative Humidity: 5 to 95% (non-condensing)

CSI #: 28 40 00

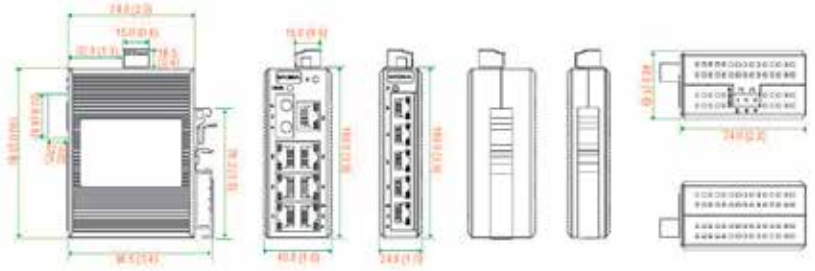
Standards and Certifications
Safety:
EDS-205: UL 508, EN 60950-1
EDS-208 Series: UL 508
EMI: FCC Part 15 Subpart B Class A, EN 55022 Class A
EMS:
EN 61000-4-2 (ESD) Level 2, EN 61000-4-3 (RS) Level 3,
EN 61000-4-4 (EFT) Level 3, EN 61000-4-5 (Surge) Level 3,
EN 61000-4-6 (CS) Level 3,
EN 61000-4-8, EN 61000-4-11
Shock: IEC 60068-2-27
Freefall: IEC 60068-2-32
Vibration: IEC 60068-2-6
Note: Please check Moxa's website for the most up-to-date certification status.

MTBF (mean time between failures)
Time:
EDS-205: 3,915,945 hrs
EDS-208 Series: 7,492,000 hrs
Database: Telcordia (Bellcore), GB

Warranty
Warranty Period: 5 years
Details: See www.moxa.com/warranty

Dimensions

Unit: mm (inch)



Side View | Front View | Rear View | Top & Bottom View

Ordering Information

Available Models	Port Interface			Housing Material	Power Range
Standard Temperature (-10 to 60°C)	10/100BaseT(X)	100BaseFX			
		Multi-mode, SC Connector	Multi-mode, ST Connector		
EDS-205	5	–	–	Plastic	12 to 48 VDC
EDS-208	8	–	–	Plastic	12 to 48 VDC
EDS-208-M-SC	7	1	–	Plastic	12 to 48 VDC
EDS-208-M-ST	7	–	1	Plastic	12 to 48 VDC

Optional Accessories (can be purchased separately)
DR-4524/75-24/120-24: 45/75/120 W DIN-rail 24 VDC power supplies
MDR-40-24/60-24: 40/60 W DIN-rail 24 VDC power supplies, -20 to 70°C operating temperature
RK-4U: 4U-high 19" rack mounting kit

Package Checklist
- EDS-205 or EDS-208 switch
- Hardware installation guide (printed)
- Warranty card

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CSI #: 28 40 00

eGauge
MEASURE EVERY MOMENT

eGauge 3 Series

Specifications

General

Warranty:	2 years, 5 years
Logging Values:	V, A, W, Wh, Hz, VA, VAr, THD, deg

Measurement Capacity

Voltage:	3 channels: 85-277Vrms (L1-N) 0-277Vrms (L2-N, L3-N)
Current:	12 channels, up to 4800A
Power:	Any voltage/current combination
Frequency:	50 or 60 Hz

Regulatory

Safety:	Conforms to UL/IEC STD 61010-1 Certified to CAN/CSA STD C22.2 No. 61010.1 Conforms as Listed Device Lead-free, RoHS compliant
FCC:	CISPR 11 Group 1 class B FCC 47CFR 15 class B

User Interface

Compatible web browsers:	Google Chrome Firefox 2+ Safari 3.1+ Internet Explorer 9+

Communication

HomePlug AV:	Compatible with HomePlug AV adapter within ~100ft. on same phase as L1 terminal
Ethernet:	IEEE 802.3 - LAN
Wi-Fi:	150 Mbps data rate Complies with 802.11b/g/n 64/128-bit WEP & WPA security WPA2 for high security

eGauge is a flexible, secure, web-based electric energy and power meter that can measure up to 12 circuits on up to 3-phases (120V–480V, 50–60Hz).

Product Capabilities

	EG3000	EG3010	EG3020
Ethernet Port	✓	✓	✓
PLC		✓	
Wi-Fi			✓
Revenue-Grade†	✓	✓	✓
120-277vac (θ-N)	✓	✓	✓
4w/3p	✓	✓	✓
3w/2p	✓	✓	✓
0-4800A	✓	✓	✓
12 CT Channels	✓	✓	✓
4800 Amps Max	✓	✓	✓
Renewable Gen.	✓	✓	✓
CSV Export	✓	✓	✓
16/64 Registers*	✓	✓	✓
UI Firmware	✓	✓	✓

*Database Storage Capacity

The EG30xx model has two database options: 16 and 64 register. They differ in how long and with what granularity data is stored. Both options have 10 minutes of data at one-second granularity in volatile memory.

	1 min average	15 min average	1 hr average
16 Register Database	1 year	29 years	—
64 Register Database	1 year	—	6 years

Made in USA

Sales@eGauge.net - 877.342.8431 ext1

CSI #: 28 40 00

Environmental Conditions

Operating Temp:	-30°C to 70°C (-22°F to 158°F)
Max Altitude:	4000m (13,000 ft)
Max Humidity:	80% up to 31°C
Meas. Category:	III (fixed installation)
Location:	Indoor or outdoor (in NEMA 4 Enclosure)
Pollution Degree:	2

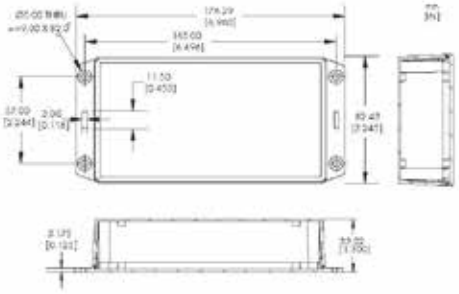
Revenue-Grade Accuracy

†Accuracy Options: (A000) ANSI C12.1 - 1%
(A010) ANSI C12.1 - 1% with Certificate
(A005) ANSI C12.20 - 0.5% with Certificate

Revenue-grade accuracy requires the use of model ACT-xxxx-xxx CTs
Contact eGauge sales for more information

Enclosure

Material:	Flame-retardant ABS (UL94-V0)
Size:	176x83x33mm (6.94x3.25x1.3IN)
Weight:	220g (8oz)



Current Transformers

CT TYPE	CURRENT (A)																					
	5	10	15	20	30	50	75	100	150	200	250	300	400	600	800	1000	1200	1500	2000	3000	4000	4800
MagneLab (ACT-xxxx-xxx)																						
0.4" inner diameter	✓	✓	✓	✓	✓	✓	✓															
0.75" inner diameter	✓	✓		✓	✓	✓		✓	✓	✓												
1.25" inner diameter						✓		✓	✓	✓	✓	✓	✓	✓								
2" inner diameter								✓		✓		✓	✓	✓	✓	✓	✓	✓				
CCS Accu-CT (ACT-xxxx-xxx)																						
0.78" inner diameter						✓		✓		✓	✓		✓	✓								
1.25" inner diameter											✓		✓	✓								
CR Magnetics DC CT																						
0.79" inner diameter		✓			✓	✓		✓	✓			✓										
Rogowski Coil																						
6" inner diameter	LINEAR ACCURACY FROM 50A TO 4800A																					

Wire Gauge Sizing**

AWG/kcmil	DIAMETER (IN)	AWG/kcmil	DIAMETER (IN)	AWG/kcmil	DIAMETER (IN)	AWG/kcmil	DIAMETER (IN)
12	0.127	4	0.317	0	0.474	250	0.678
10	0.160	3	0.344	00	0.518	300	0.730
8	0.212	2	0.375	000	0.568	350	0.777
6	0.248	1	0.435	0000	0.624	400	0.821

**Sizes based on approximate outer diameters of THHN cable. Should be used only as a guide.

Sales@eGauge.net - 877.342.8431 ext1

CSI #: 28 40 00

HAMMOND MANUFACTURING

Quality Products. Service Excellence.

Type 4 Mild Steel Wallmount Enclosure w/ Window *Eclipse Series*

Hinge Door with Quarter Turn

Panel Sold Separately

Application

- Designed to enclose electrical and/or electronic equipment in wallmount applications where viewing of component operation is necessary while maintaining protection ratings.
- Impressive styling features like hidden hinges, attractive latching systems make the Eclipse a suitable addition to any high-tech equipment installation.
- A wide range of sizes and practical accessories make this product line a complete package.

Standards

- UL 508 Type 3R, 4 and 12
- CSA Type 3R, 4 and 12
- Complies with
  - NEMA 3R, 4 and 12
  - IEC 60529, IP66

Construction

- Formed 14 or 16 gauge steel.
- Full view UV resistant polycarbonate window allow maximum viewing area of inner panel.
- Smooth, continuously welded seams ground smooth.
- Door stiffeners are provided where required for increased strength and rigidity - designed to also permit additional mounting options.
- Formed lip on enclosure to exclude flowing liquids and contaminants.
- Door latches feature the added safety of quarter turn slot requiring use of tool for opening.
- Doors may be easily removed for modifications and are interchangeable.
- Seamless poured-in place gasket.
- Collar studs provided for mounting inner panel.
- Includes hardware kit with panel mounting nuts and sealing washers for wall mounting holes.
- Bonding stud provided on door and grounding stud installed in enclosure.
- Hinges are constructed from 304 stainless steel.
- Hinge pins are stainless steel.
- Quarter turn latches are zinc diecast with black epoxy finish.

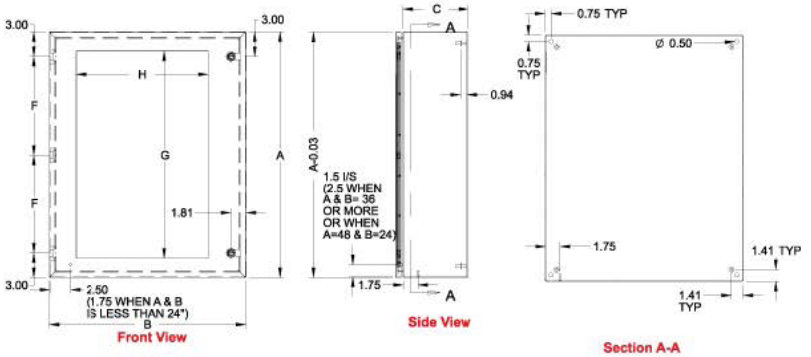
Finish

- Cover and enclosure are phosphatized and finished with a recoatable powder inside and out with choice of ANSI 61 smooth Gray (GY) or RAL703[illegible] textured light gray (LG).

Accessories

CSI #: 28 40 00

- Cooling Products
- Ventilation
- DIN Rail Mounting Kit
- Drip Shield Kit
- Gland Plates
- Handles
- Literature Pocket
- Mounting Foot Kit
- Swing Frame
- Rear Hole Plugs
- Quarter Turn Assemblies
- Type 4 Hardware Kits
- Padlock Adaptor
- Blowers and Fans
- DIN Rails
- Door Stop Kit
- Filtered Fans
- Heaters
- Inner Panels
- Quarter Turn Inserts and Keys
- Swing Panel
- Eclipse Rack Panel
- Replacement Hinge Pins
- Temperature Controls
- Touch-Up Spray Paint



Part No. (ANSI 61 Gray)	Part No. (RAL7035 Light Gray)	Overall Dimensions A	B	C	Door/Body Gauge	Latch[1] Qty	Hinge Qty	F	Viewing Area G	H	Optional Panel Part No.	Inner Panel Dimensions D	E	Ship Wt. (lbs)
EN4SD16126WGY	EN4SD16126WLG	16.00	12.00	6.00	16	1	2	10.00	11.33	6.71	EP1612	14.20	10.20	16
EN4SD20166WGY	EN4SD20166WLG	20.00	16.00	6.00	16	1	2	14.00	15.33	10.71	EP2016	18.20	14.20	22
EN4SD20206WGY	EN4SD20206WLG	20.00	20.00	6.00	16	1	2	14.00	15.33	14.71	EP2020	18.20	18.20	26
EN4SD24206WGY	EN4SD24206WLG	24.00	20.00	6.00	16	1	2	18.00	19.33	14.71	EP2420	22.20	18.20	30
EN4SD24246WGY	EN4SD24246WLG	24.00	24.00	6.00	14	2	2	18.00	19.33	16.15	EP2424	22.20	22.20	37
EN4SD16128WGY	EN4SD16128WLG	16.00	12.00	8.00	16	1	2	10.00	11.33	6.71	EP1612	14.20	10.20	16
EN4SD20168WGY	EN4SD20168WLG	20.00	16.00	8.00	16	1	2	14.00	15.33	10.71	EP2016	18.20	14.20	25
EN4SD20208WGY	EN4SD20208WLG	20.00	20.00	8.00	16	1	2	14.00	15.33	14.71	EP2020	18.20	18.20	28
EN4SD24208WGY	EN4SD24208WLG	24.00	20.00	8.00	16	1	2	18.00	19.33	14.71	EP2420	22.20	18.20	32
EN4SD24248WGY	EN4SD24248WLG	24.00	24.00	8.00	14	2	2	18.00	19.33	16.15	EP2424	22.20	22.20	40
EN4SD30248WGY	EN4SD30248WLG	30.00	24.00	8.00	14	2	3	12.00	25.33	16.15	EP3024	28.20	22.20	46
EN4SD202012WGY	EN4SD202012WLG	20.00	20.00	12.00	16	1	2	18.00	15.33	14.71	EP2020	18.20	18.20	34
EN4SD242012WGY	EN4SD242012WLG	24.00	20.00	12.00	16	1	2	18.00	19.33	14.71	EP2420	22.20	18.20	38
EN4SD242412WGY	EN4SD242412WLG	24.00	24.00	12.00	14	2	2	18.00	19.33	16.15	EP2424	22.20	22.20	47

CSI #: 28 40 00

Part No. (ANSI 61 Gray)	Part No. (RAL7035 Light Gray)	Overall Dimensions A	B	C	Door/Body Gauge	Latch[1] Qty	Hinge Qty	F	Viewing Area G	H	Optional Panel Part No.	Inner Panel Dimensions D	E	Ship Wt. (lbs)
EN4SD302412WGY	**EN4SD302412WLG**	30.00	24.00	12.00	14	2	3	12.00	25.33	16.15	**EP3024**	28.20	22.20	57
EN4SD242416WGY	**EN4SD242416WLG**	24.00	24.00	16.00	14	2	2	18.00	19.33	16.15	**EP2424**	22.20	22.20	66
EN4SD242420WGY	**EN4SD242420WLG**	24.00	24.00	20.00	14	2	2	18.00	19.33	16.15	**EP2424**	22.20	22.20	70
EN4SD302420WGY	**EN4SD302420WLG**	30.00	24.00	20.00	14	2	3	12.00	25.33	16.15	**EP3024**	28.20	22.20	82

[1] All Window Door latch types are quarter turns.

Data subject to change without notice

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CSI #: 28 40 00

UC-8100 Series

Communication-centric RISC computing platform

- ARMv7 Cortex-A8 300/600/1000 MHz processor
- Dual auto-sensing 10/100 Mbps Ethernet ports
- SD socket for storage expansion and OS installation
- Rich programmable LEDs and a programmable button for easy installation and maintenance
- Mini PCIe socket for cellular module
- Debian ARM 7 open platform
- Cybersecurity

Overview

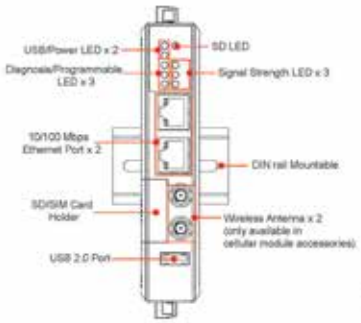
The UC-8100 computing platform is designed for embedded data acquisition applications. The computer comes with one or two RS-232/422/485 serial ports and dual 10/100 Mbps Ethernet LAN ports, as well as a Mini PCIe socket to support cellular modules. These versatile communication capabilities let users efficiently adapt the UC-8100 to a variety of complex communications solutions.

The UC-8100 is built around a Cortex-A8 RISC processor that has been optimized for use in energy monitoring systems, but is widely applicable to a variety of industrial solutions. With flexible interfacing options, this tiny embedded computer is a reliable and secure gateway for data acquisition and processing at field sites as well as a useful communication platform for many other large-scale deployments.

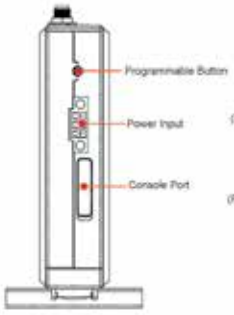
Wide temperature (T) models* are also available for extended temperature applications. All units are thoroughly tested in a testing chamber, guaranteeing that the computing platforms are suitable for wide temperature applications.

Appearance

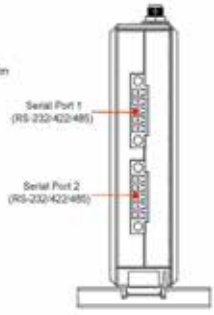
Front View



Top View



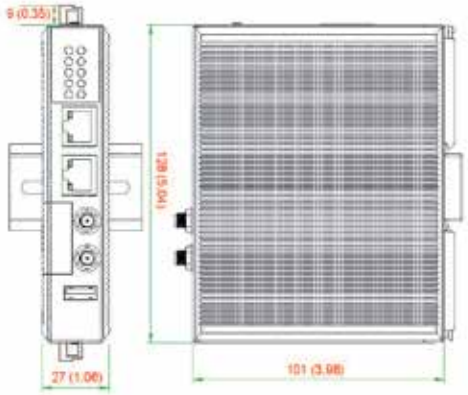
Bottom View



CSI #: 28 40 00

Dimensions

Unit: mm (inch)



Hardware Specifications

Computer
CPU: ARMv7 Cortex-A8 300/600/1000 MHz
USB: USB 2.0 host x 1 (type A connector)
DRAM: 256 MB DDR3 SDRAM
OS (pre-installed): Debian ARM 7 (Kernel 3.2)

Storage
Storage Expansion:
- SDHC/SDXC socket for storing OS and storage expansion
- 1 GB SD card with OS pre-installed
- MicroSD socket for storage expansion (UC-8112-LX only)
- 2 GB MicroSD cards with OS pre-installed (UC-8112-LX only)

Ethernet Interface
LAN: 2 auto-sensing 10/100 Mbps ports (RJ45)
Magnetic Isolation Protection: 1.5 kV built-in

Serial Interface
Serial Standards: 1 or 2 RS-232/422/485 ports, software-selectable (5-pin terminal block connector)
Console Port: RS-232 (TxD, RxD, GND), 4-pin pin header output (115200, n, 8, 1)

Serial Communication Parameters
Data Bits: 5, 6, 7, 8
Stop Bits: 1, 1.5, 2
Parity: None, Even, Odd, Space, Mark
Flow Control: XON/XOFF, ADDC® (automatic data direction control) for RS-485
Baudrate: Max. 921600 bps

Serial Signals
RS-232: TxD, RxD, RTS, CTS, GND
RS-422: TxD+, TxD-, RxD+, RxD-, GND
RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND
RS-485-2w: Data+, Data-, GND

LEDs
System: Power x 1, USB x 1, SD x 1, signal strength x 3 (UC-8112/8162/8132 with cellular module)
LAN: 10M/100M on connector
Programmable: Diagnosis x 3

Switches and Buttons
Push Button: Initially configured to return a diagnostic report, and to reset the device to factory defaults

Physical Characteristics
Housing: Polycarbonate plastic
Weight: 224 g
Dimensions: 101 x 27 x 128 mm (3.98 x 1.06 x 5.04 in)
Mounting: DIN rail, wall (with optional kit)

Environmental Limits
Operating Temperature:
Standard Models: -10 to 60°C (14 to 140°F)
Wide Temp. Models*: -40 to 75°C (-40 to 167°F)
Note: Available by request.
Storage Temperature: -40 to 80°C (-40 to 176°F)
Ambient Relative Humidity: 5 to 95% (non-condensing)
Anti-Vibration: 2 Grms @ IEC 60068-2-64, random wave, 5-500 Hz, 1 hr per axis (without any USB devices attached)
Anti-Shock: 20 g @ IEC 60068-2-27, half sine wave, 30 ms

Power Requirements
Input Voltage: 12 to 24 VDC (3-pin terminal block, V+, V-, SG)
Power Consumption: 5.4 W (without cellular module and external USB device attached)
- 450 mA @ 12 VDC
- 225 mA @ 24 VDC

Standards and Certifications
Safety: UL 60950-1, EN 60950-1, CCC (GB9254, GB17625.1)
EMC: EN55022 Class B, EN 55024-4-2, EN 55024-4-3, EN 55024-4-4, FCC Part 15 Subpart B Class A
Green Product: RoHS, CRoHS, WEEE

Reliability
Alert Tools: Built-in RTC (real-time clock)
Automatic Reboot Trigger: Built-in WDT (watchdog timer)

Warranty
Warranty Period: 5 years
Details: See www.moxa.com/warranty

CSI #: 28 40 00

Power Computers

Software Specifications

Linux
OS: Debian ARM 7
Web Server (Apache): Allows you to create and manage web sites; supports PHP and XML
Terminal Server (SSH): Provides secure encrypted communications between two un-trusted hosts over an insecure network
Kernel: GNU/Linux 3.2
System Shell: DASH (default), BASH
Text Editor: vim, nano
Internet Protocol Suite: TCP, UDP, IPv4, IPv6, SNMPv2, ICMP, ARP, HTTP, CHAP,PAP,DHCP, NTP,NFS, SSH, PPP, SFTP, RSYNC, SSL
Programming Language Support: PHP, Perl, Python
Internet Security Suite: OpenVPN, iptables
Cryptographic hardware accelerators: AES, SHA, OpenSSL
Self Diagnosis: Check status of system and hardware component via software method
Linux Board Support Packages (BSP):
• GCC C/C++ cross development tool chain
• Bootloader/ Kernel/ filesystem
Cellular Networking: (UC-8132-LX, UC-8162-LX, UC-8112-LX only)
• WVDIAL: Point-to-Point Protocol dialer that dials a modem and starts pppd to connect to the Internet.
• QMI (Qualcomm MSM Interface): Glib-based library for talking to WWAN modems and devices that speak the Qualcomm MSM Interface (QMI) protocol.
• MODBUS: Software library to send/receive data according to the Modbus protocol. This library is written in C and supports RTU (serial) and TCP (Ethernet) communications.
• Watchdog: Features a hardware function to trigger system reset in a user specified time interval (Linux standard API).
Cybersecurity:
• Secure Boot: A novel authentication algorithm proposed to secure platform integration. Only trusted Linux kernel and bootloader should be executed (Patent Pending).
• SUDO Mechanism: Sudo (sometimes considered short for Super-user Do) is a program designed to let system administrators allow some users to execute some commands as root (or another user). The basic philosophy is to give as few privileges as possible but still allow people to get their work done, and the Root account is disabled by default.
• Security Update of existing software packages: All packages in the UC-8100 could be updated for security purposes via Debian or Moxa's Advanced Packaging Tool (APT) server.
• USB Protection: Provides a mechanism for disabling USB function to avoid USB stick malware attacks.
• SD Write Protection: Provides a mechanism for disabling SD write permission both in the filesystem SD and extended storage SD. (Note: Extended storage SD is only supported by the UC-8112-LX).
• TPM (Trusted Platform Module, Version 1.2): Dedicated microprocessor designed to secure hardware by integrating cryptographic keys into devices (only supported by the UC-8112-LX).

Ordering Information

Model	CPU	Serial	Ethernet	Mini PCIe Socket for Cellular Module	TPM	Micro SD Socket
UC-8131-LX	300 MHz	1	2	–	–	–
UC-8132-LX	300 MHz	2	2	✓	–	–
UC-8162-LX	600 MHz	2	2	✓	–	–
UC-8112-LX	1 GHz	2	2	✓	✓	✓

Package Checklist (computer)
- UC-8100 embedded computer
- Power jack
- 3-pin terminal block for power
- 5-pin terminal block for UART x 2

3 MOXA www.moxa.com

CSI #: 28 40 00

Optional Accessories

Power Adapters & Cords, Console Cable		
Adapter	PWR-24250-DT-S1	Power adapter with input: 100-240 VAC, 50-60 Hz, 1.5 A Output: 24 VDC, 2.5 A, 60 W for test and system development in the office under ambient temperature
Power Cord	PWC-C7US-2B-183	Power cord with 2-pin connector, USA plug
Power Cord	PWC-C7EU-2B-183	Power cord with 2-pin connector, Euro plug
Power Cord	PWC-C7UK-2B-183	Power cord with 2-pin connector, British plug
Power Cord	PWC-C7AU-2B-183	Power cord with 2-pin connector, Australia plug
Power Cord	PWC-C7CN-2B-183	Power cord with 2-pin connector, China plug
Console Cable	CBL-F9DPF1x4-BK-100	Console cable with 4-pin connector
Wireless		
Cellular Package	CELLULAR-LTE-US	LTE module mounting package: • Cellular module x 1 • I-PEX MHF to SMA adapter with cable x 1 • Mini PCI-e mount screw sets x 2
Cellular Package	CELLULAR-LTE-EU	LTE module mounting package: • Cellular module x 1 • I-PEX MHF to SMA adapter with cable x 1 • Mini PCI-e mount screw sets x 2
Cellular Package	CELLULAR-3G-EVDO-HSPA+	3G module mounting package: • Cellular module x 1 • I-PEX MHF to SMA adapter with cable x 1 • Mini PCI-e mount screw sets x 2
WiFi Package	WiFi-BGN	WiFi module mounting package: • WiFi module x 1 • I-PEX MHF to RP-SMA adapter with cable x 1 • Mini PCI-e mount screw sets x 2
GPS Antenna	ANT-GPS-DSM-05-3M	GPS antenna package: • 26 dBi, 1572 MHz, L1 band antenna for GPS
3G Antenna	ANT-3G-SMA	SMA male antenna for cellular, support bands: 850/900/1800/1900/2100 MHz
WiFi Antenna	ANT-WDB-ARM-02	RP-SMA male antenna for WiFi, support bands: 2.4 Ghz
Cellular antenna cable	A-CRF-MHFSF	I-PEX MHF (male, on cellular module) to SMA (female, on top cover) adapter with cable. For when you need to install a GPS antenna or second cellular antenna.
WiFi antenna cable	CRF-MHF/SMA(M)-14.2	I-PEX MHF (male, on cellular module) to RP-SMA (female, on top cover) adapter with cable. For when you need to install a second WiFi antenna.

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CSI #: 28 40 00

Web Energy Logger (WEL) User Guide: Rev 4.0.3

Rev 4.3+ boards, Rev 4.09+ software. Revised: 6/3/2011

This manual describes WEL units that use the Rev 4.3 circuit board and Rev 4.09 WEL software. For earlier versions of the board or software, go to the "legacy" section of the WELSever.com support files page, and download the appropriate User Manual.

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Published on OurCoolHouse.com and WELserver.com.

Division 31
Earthwork

CSI #: 31 60 00

January 26, 2005

Central Piers, Inc.
284 N. Thorne Avenue
Fresno, California 93706

ATTN: Mr. Andy Naze

SUBJECT: **TEST REPORT**
C.P. Seismic Pier, Seismic Perimeter Pier and Foundation Pads

REFERENCE: California Code of Regulations, Title 25, Housing and Community Development, Division 1, Chapter 2, Section 1336.1, Effective July, 2004.

Dear Mr. Naze:

1. Introduction

The following report presents the results of the lateral and vertical load capacity testing program for the C.P. Seismic Pier, Seismic Perimeter Pier and Foundation Pads.

2. Purpose

The purpose of this testing program was to verify the design allowable lateral and vertical capacity for each pier.

3. Test Arrangements

The testing was conducted on the premises of BSK in Fresno, California during the month of December 2004. Complete test data sheets are included in Appendix A.

4. Test Procedure

a. Lateral Load Test - Table Assembly

i. The purpose of the lateral load test on the table assembly is to determine the lateral capacity of each pier. For the lateral load tests, the pier was bolted to a steel testing table.

ii. The piers were tested at various heights in order to cover a range of possible installations. The height of the stand, as tested, in listed on each data sheet.

iii. The loads were applied in the directions indicated by the force arrows (F1,F2,F3) as illustrated on each data sheet.

iv. The load was applied with a Central Pneumatic 20 ton hydraulic ram. The applied load was measured with a Load Cell, Model #1100386-50, Serial # 31477.

CSI #: 31 60 00

v. A zero reference point was established from which to measure displacements. The load was recorded at the Failure point. Failure was determined to be 3 inches of deflection or 2 inches of vertical uplift of the pier or pad.

b. Vertical Load

a. The purpose of the vertical load test was to determine the capacity of the C.P. Seismic Perimeter Piers to support a vertical load.

b. The testing apparatus consisted of a Boldwin Universal Compression Machine . The pier was centered in the apparatus. The Max Load (FN) Was recorded at failure. Tests were repeated for the 11 inch base thru the 19 inch base height.

c. The vertical capacity of the C.P. Seismic Pier and Foundation Pads was previously established. The previous test results are attached in Appendix B.

5. Test Results and Conclusions

5.1 December 2004 Test Results

The results of the testing performed by our firm (BSK Fresno Office) are summarized below. In accordance with Title 25, the allowable design capacity is determined by taking ⅔ of the final loads. Complete load test results are presented in Appendix A and are summarized as follows:

C.P. SEISMIC **STANDARD** PIER -TEST RESULTS							
Base Height (in)	Pier Height (in)	Direction of Load (F1, F2, Fn)	Test #1 (lbs)	Test #2 (lbs)	Test #3 (lbs)	Average Load (lbs)	Design Capacity (lbs)
7	9.75	F1 (Strong)	6000	6245	6145	6130	4087
		F2 (Weak)	6190	6200	6355	6248	4165
11	17.5	F1 (Strong)	4590	4505	4075	4390	2927
		F2 (Weak)	3005	2740	2875	2873	1916
18	22.75	F1 (Strong)	3305	3050	3255	3203	2136
		F2 (Weak)	2,205	2195	2420	2273	1516
19	33.75	F1 (Strong)	1500	1550	1610	1553	1036
		F2 (Weak)	1540	1440	1405	1462	974

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C.P. SEISMIC **PERIMETER** PIER - TEST RESULTS							
Base Height (in)	Pier Height (in)	Direction of Load (F1, F2, F3, Fn)	Test #1 (lbs)	Test #2 (lbs)	Test #3 (lbs)	Average Load (lbs)	Design Capacity (lbs)
11	17.5	F1 (Strong)	3450	3680	3785	3638	2426
		F2 (Strong)	4310	4380	4420	4370	2913
		F3 (Weak)	4660	5590	4110	4787	3191
		Fn (Vertical)	24221	24161	21837	23406	15604
18	22.75	F1 (Strong)	2580	2560	2765	2635	1756
		F2 (Strong)	2740	2300	2730	2590	1727
		F3 (Weak)	2555	3525	3310	3130	2087
		Fn (Vertical)	20,818	24,627	18,487	21,311	14,207
19	33.75	F1 (Strong)	1725	1800	1780	1768	1179
		F2 (Strong)	1705	1505	1635	1615	1077
		F3 (Weak)	2300	2265	2185	2250	1500
		Fn (Vertical)	19,489	18,679	18,761	18,976	12,651

5.2 Previous Test Result Summary

The vertical capacity of the C.P. Seismic Pier was previously tested by Certified Testing and Consulting Services (CTC). The test results are summarized below in order to provide a comprehensive test report. The test data sheets are attached in Appendix B.

C.P. SEISMIC PIER - VERTICAL LOAD TEST RESULTS					
Pad Type	Test #1 (lbs)	Test #2 (lbs)	Test #3 (lbs)	Average Load (lbs)	Design Capacity (lbs)
Concrete	16,000	16,000	16,000	16,000	10,667
Plywood	16,000	18,000	15,600	16,533	11,022

CSI #: 31 60 00

If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office.

Sincerely,

BSK ASSOCIATES,

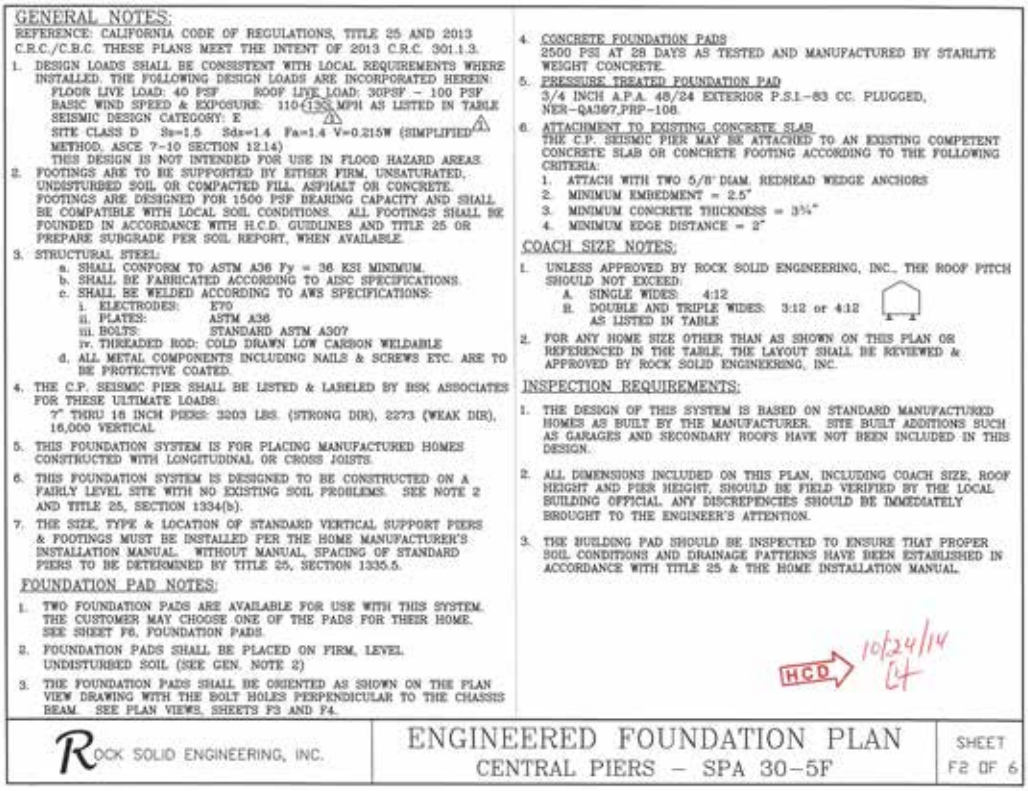
REGISTERED PROFESSIONAL ENGINEER
MICHAEL J. FEIST
No. 52261
Exp. 12-31-06
CIVIL
STATE OF CALIFORNIA

Michael J. Feist, P.E
Senior Civil Engineer

Michael Shwiyhat, E.I.T
Laboratory Manager

Attachments: Appendix A - December 2004 Test Data Sheets
Appendix B - March 2003 CTC Test Data Sheets

CSI #: 31 60 00



GENERAL NOTES:

REFERENCE: CALIFORNIA CODE OF REGULATIONS, TITLE 25 AND 2013 C.R.C./C.B.C. THESE PLANS MEET THE INTENT OF 2013 C.R.C. 301.1.3.

1. DESIGN LOADS SHALL BE CONSISTENT WITH LOCAL REQUIREMENTS WHERE INSTALLED. THE FOLLOWING DESIGN LOADS ARE INCORPORATED HEREIN:
   FLOOR LIVE LOAD: 40 PSF ROOF LIVE LOAD: 30PSF – 100 PSF
   BASIC WIND SPEED & EXPOSURE: 110-135 MPH AS LISTED IN TABLE
   SEISMIC DESIGN CATEGORY: E
   SITE CLASS D Ss=1.5 Sds=1.4 Fa=1.4 V=0.215W (SIMPLIFIED METHOD, ASCE 7-10 SECTION 12.14)
   THIS DESIGN IS NOT INTENDED FOR USE IN FLOOD HAZARD AREAS.
2. FOOTINGS ARE TO BE SUPPORTED BY EITHER FIRM, UNSATURATED, UNDISTURBED SOIL OR COMPACTED FILL, ASPHALT OR CONCRETE. FOOTINGS ARE DESIGNED FOR 1500 PSF BEARING CAPACITY AND SHALL BE COMPATIBLE WITH LOCAL SOIL CONDITIONS. ALL FOOTINGS SHALL BE FOUNDED IN ACCORDANCE WITH H.C.D. GUIDLINES AND TITLE 25 OR PREPARE SUBGRADE PER SOIL REPORT, WHEN AVAILABLE.
3. STRUCTURAL STEEL:
   a. SHALL CONFORM TO ASTM A36 Fy = 36 KSI MINIMUM.
   b. SHALL BE FABRICATED ACCORDING TO AISC SPECIFICATIONS.
   c. SHALL BE WELDED ACCORDING TO AWS SPECIFICATIONS:
      i. ELECTRODES: E70
      ii. PLATES: ASTM A36
      iii. BOLTS: STANDARD ASTM A307
      iv. THREADED ROD: COLD DRAWN LOW CARBON WELDABLE
   d. ALL METAL COMPONENTS INCLUDING NAILS & SCREWS ETC. ARE TO BE PROTECTIVE COATED.
4. THE C.P. SEISMIC PIER SHALL BE LISTED & LABELED BY BSK ASSOCIATES FOR THESE ULTIMATE LOADS:
   7" THRU 16 INCH PIERS: 3203 LBS. (STRONG DIR), 2273 (WEAK DIR), 16,000 VERTICAL
5. THIS FOUNDATION SYSTEM IS FOR PLACING MANUFACTURED HOMES CONSTRUCTED WITH LONGITUDINAL OR CROSS JOISTS.
6. THIS FOUNDATION SYSTEM IS DESIGNED TO BE CONSTRUCTED ON A FAIRLY LEVEL SITE WITH NO EXISTING SOIL PROBLEMS. SEE NOTE 2 AND TITLE 25, SECTION 1334(b).
7. THE SIZE, TYPE & LOCATION OF STANDARD VERTICAL SUPPORT PIERS & FOOTINGS MUST BE INSTALLED PER THE HOME MANUFACTURER'S INSTALLATION MANUAL. WITHOUT MANUAL, SPACING OF STANDARD PIERS TO BE DETERMINED BY TITLE 25, SECTION 1335.5.

FOUNDATION PAD NOTES:

1. TWO FOUNDATION PADS ARE AVAILABLE FOR USE WITH THIS SYSTEM. THE CUSTOMER MAY CHOOSE ONE OF THE PADS FOR THEIR HOME. SEE SHEET F6, FOUNDATION PADS.
2. FOUNDATION PADS SHALL BE PLACED ON FIRM, LEVEL, UNDISTURBED SOIL (SEE GEN. NOTE 2)
3. THE FOUNDATION PADS SHALL BE ORIENTED AS SHOWN ON THE PLAN VIEW DRAWING WITH THE BOLT HOLES PERPENDICULAR TO THE CHASSIS BEAM. SEE PLAN VIEWS, SHEETS F3 AND F4.
4. CONCRETE FOUNDATION PADS
   2500 PSI AT 28 DAYS AS TESTED AND MANUFACTURED BY STARLITE WEIGHT CONCRETE.
5. PRESSURE TREATED FOUNDATION PAD
   3/4 INCH A.P.A. 48/24 EXTERIOR P.S.1-83 CC. PLUGGED, NER-QA367,PRP-108.
6. ATTACHMENT TO EXISTING CONCRETE SLAB
   THE C.P. SEISMIC PIER MAY BE ATTACHED TO AN EXISTING COMPETENT CONCRETE SLAB OR CONCRETE FOOTING ACCORDING TO THE FOLLOWING CRITERIA:
   1. ATTACH WITH TWO 5/8" DIAM. REDHEAD WEDGE ANCHORS
   2. MINIMUM EMBEDMENT = 2.5"
   3. MINIMUM CONCRETE THICKNESS = 3¼"
   4. MINIMUM EDGE DISTANCE = 2"

COACH SIZE NOTES:

1. UNLESS APPROVED BY ROCK SOLID ENGINEERING, INC., THE ROOF PITCH SHOULD NOT EXCEED:
   A. SINGLE WIDES: 4:12
   B. DOUBLE AND TRIPLE WIDES: 3:12 or 4:12 AS LISTED IN TABLE
2. FOR ANY HOME SIZE OTHER THAN AS SHOWN ON THIS PLAN OR REFERENCED IN THE TABLE, THE LAYOUT SHALL BE REVIEWED & APPROVED BY ROCK SOLID ENGINEERING, INC.

INSPECTION REQUIREMENTS:

1. THE DESIGN OF THIS SYSTEM IS BASED ON STANDARD MANUFACTURED HOMES AS BUILT BY THE MANUFACTURER. SITE BUILT ADDITIONS SUCH AS GARAGES AND SECONDARY ROOFS HAVE NOT BEEN INCLUDED IN THIS DESIGN.
2. ALL DIMENSIONS INCLUDED ON THIS PLAN, INCLUDING COACH SIZE, ROOF HEIGHT AND PIER HEIGHT, SHOULD BE FIELD VERIFIED BY THE LOCAL BUILDING OFFICIAL. ANY DISCREPENCIES SHOULD BE IMMEDIATELY BROUGHT TO THE ENGINEER'S ATTENTION.
3. THE BUILDING PAD SHOULD BE INSPECTED TO ENSURE THAT PROPER SOIL CONDITIONS AND DRAINAGE PATTERNS HAVE BEEN ESTABLISHED IN ACCORDANCE WITH TITLE 25 & THE HOME INSTALLATION MANUAL.

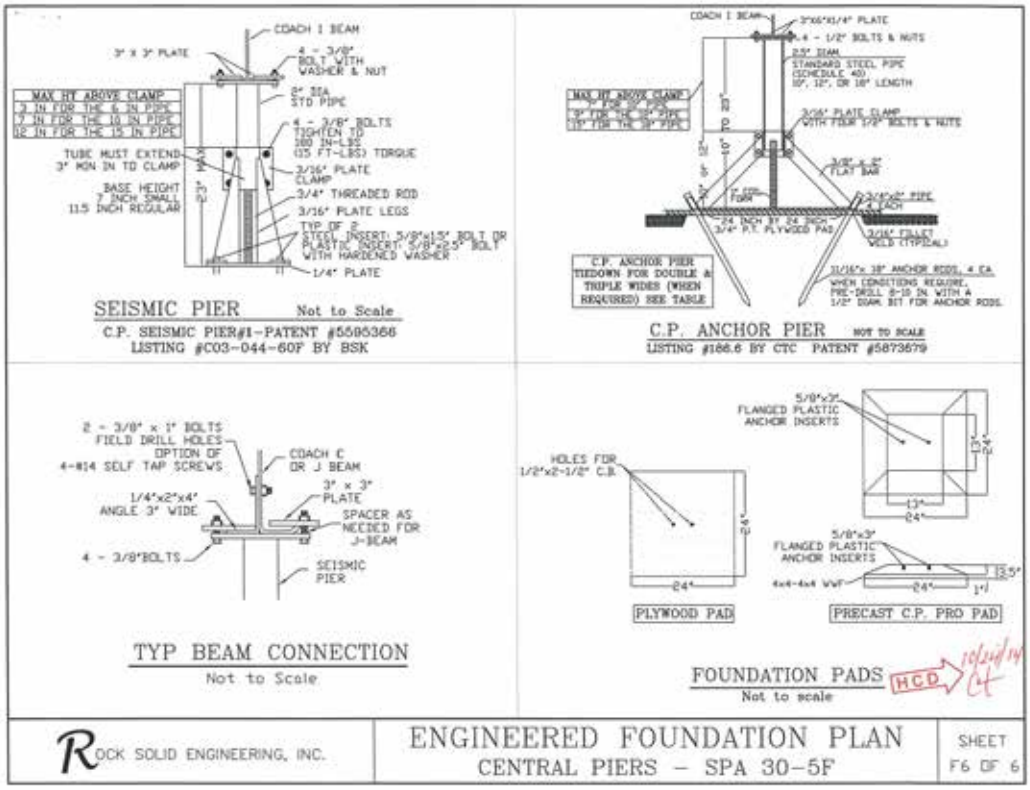
HCD 10/24/14 CT

ROCK SOLID ENGINEERING, INC.

ENGINEERED FOUNDATION PLAN
CENTRAL PIERS – SPA 30-5F

SHEET F2 OF 6

CSI #: 31 60 00


SEISMIC PIER Not to Scale
C.P. SEISMIC PIER#1-PATENT #5595366
LISTING #C03-044-60F BY BSK
C.P. ANCHOR PIER
LISTING #166.6 BY CTC PATENT #5873679
TYP BEAM CONNECTION
Not to Scale
PLYWOOD PAD
PRECAST C.P. PRO PAD
FOUNDATION PADS
Not to scale
ROCK SOLID ENGINEERING, INC.
ENGINEERED FOUNDATION PLAN
CENTRAL PIERS - SPA 30-5F
SHEET
F6 OF 6

Division 41

Material Processing and Handling Equipment

CSI #: 41 00 00

6042
TELEHANDLER

SKYTRAK

Performance

Rated Capacity	6,000 lb	2,722 kg
Maximum Lift Height	41 ft 11 in.	12.8 m
Load at Max Height	6,000 lb	2,722 kg
Maximum Forward Reach	27 ft 10 in.	8.51 m
Load at Max Reach	1,400 lb	636 kg
Frame leveling	10°	
Lift Speed (boom retracted)		
Up	14.3 sec	
Down	10.5 sec	
Boom Speed		
Extended	17 sec	
Retracted	17.2 sec	
Top Travel Speed (4 Speed)	19 mph	31 kph
Drawbar Pull (loaded)	22,000 lb	98 kN
Outside Turning Radius	16.8 in.	4.27 m
Operating Weight	25,100 lb	11,385 kg

Standard Specifications

Engine

Make and Model	Cummins QSF3.8L Tier 4 F	
No. of Cylinders	4	
Displacement	229 cu in.	3.8 L
Gross Power Rate	115 hp	69 kW
Maximum Torque @ 1400 rpm	340 lb ft	461 Nm
Fuel Tank Capacity	35 gal	132.5 L

Transmission

Powershift.
4-speed forward and 3-speed reverse.

Axles

Full-time planetary 4-wheel drive.
Oscillating rear axle with Stabil-Trak system.

Brakes

Hydraulically actuated inboard wet disc brakes.
Emergency brake with transmission declutch feature.

Tires

Standard	10.0/75-20
Optional	Foam Filled or Solid

Cab

Certified ROPS/FOPS structure	Rearview mirrors
Adjustable suspension seat with retractable seat belt	Single joystick control
	Integrated arm rest

Steering 4-Wheel

Power steering.
Operator selectable 4-wheel circle, 4-wheel crab, 2-wheel front.
Integrated arm rest.

Instruments

- DEF gauge
- Voltmeter
- Hourmeter
- Engine oil pressure gauge
- Temperature gauge
- Fuel gauge

Hydraulic System-Implement

Capacity	46.5 gal	172.2 L
Gear Pump		

Variable flow, load sensitive hydraulic system.
Load holding valves on frame level, stabilizer, attachment tilt, extend and lift cylinders.
Auxiliary hydraulics used for all attachments equipped with cylinders or other hydraulic components. Consists of valves, controls and hydraulic lines.

Accessories & Options

- Enclosed Cab
- Work Lights
- Road Lights
- Rotating Beacon
- Fenders
- Air Conditioning
- Reverse Sensing System

Attachments

Standard Carriage	50 in. 60 in. 72 in.	1.3 m 1.5 m 1.8 m
Side-Tilt Carriage	50 in. 60 in. 72 in.	1.3 m 1.5 m 1.8 m
Swing 90° Carriage	72 in.	1.8 m
Side-Shift Carriage	50 in.	1.3 m
Dual Fork Positioning Carriage	50 in.	1.3 m
Tower	8 ft (2.4 m), 50 in. (1.3 m) Standard Carriage	
Pallet Forks	2.36 in. x 4 in. x 48 in. 2.36 in. x 5 in. x 48 in. 2.00 in. x 6 in. x 72 in.	60 mm x 102 mm x 1.2 m 60 mm x 127 mm x 1.2 m 51 mm x 152 mm x 1.8 m
Lumber Forks	2.00 in. x 7 in. x 60 in. 2.36 in. x 6 in. x 60 in.	51 mm x 178 mm x 1.5 m 60 mm x 152 mm x 1.5 m
Cubing Forks	2 in. x 2 in. x 48 in.	51 mm x 51 mm x 1.2 m
Fork Extensions	90 in.	2.3 m
Material Bucket	72 in., 1.0 cu yd 96 in., 1.5 cu yd 102 in., 2.0 cu yd	1.8 m, 0.76 m³ 2.4 m, 1.15 m³ 2.6 m, 1.53 m³
Grapple Bucket	96 in., 1.75 cu yd	2.4 m, 1.34 m³
Truss Boom	10 ft, 2,000 lb 15 ft, 2,000 lb 12 ft with winch, 2,000 lb	3.7 m, 907 kg 4.6 m, 907 kg 3.7 m, 907 kg
Fork Mounted Work Platform	8 ft, 1,000 lb Capacity	2.4 m, 455 kg Capacity
Lifting Hook, Fork Mounted		
Material Handling Arms	4,000 lb Capacity	1,814 kg Capacity
Trash Hopper	72 in., 1.9 cu yd 2,000 lb Capacity	1.8 m, 1.5 m³ 907 kg Capacity

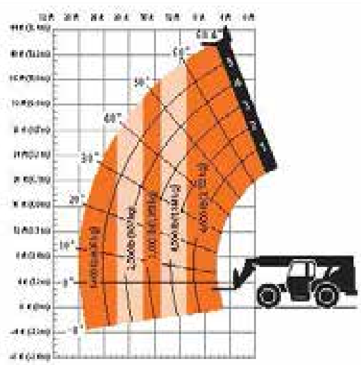
CSI #: 41 00 00

6042
TELEHANDLER

SKYTRAK

Dimensions
All dimensions are approximate.

Load Chart



The JLG "1 & 5" Warranty
JLG Industries, Inc. backs its products with its exclusive "1 & 5" Warranty. We provide coverage on all products for one (1) full year, and cover all specified major structural components for five (5) years. Due to continuous product improvements, we reserve the right to make specification and/or equipment changes without prior notification. This machine meets or exceeds applicable OSHA Regulations in 29 CFR 1910.67, 29 CFR 1926.453, ANSI A92.5-2006, and CSA Standard CAN3-B354.2-M82 as originally manufactured for intended applications.

Part No.: 3132402
R02808
Printed in USA

JLG

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Telephone 717-485-5161
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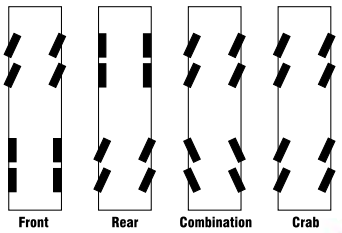
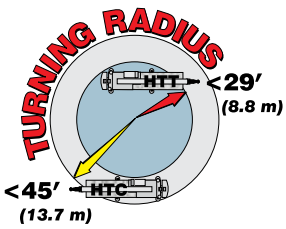
CSI #: 41 22 13

Steerable all wheel axles, in conjunction with super single tires, makes the HTT even harder to beat on the job-site. And NO changes to the on-outrigger capacity charts.

- Drive and steer capabilities for the rear axles
- Four steering modes:
  - Independent front
  - Independent rear
  - Combination
  - Crab
- Rear axles self-center and lock in the straight ahead position for high speed travel.
- Turning radius under 29 ft *(8.8 m)* at the edge of the tire
- 445/65R22.5 tires front and rear that are interchangeable
- Only one spare rim and tire combination is needed.
- Transverse (cross-axle) differential locks that greatly improve traction on unimproved job-site conditions.





CSI #: 41 22 13

Roomier and quieter operator's cab

- Extra large front window almost seamlessly merges into the roof window
- Sliding left side door, right and rear windows, and swing up top window provide excellent ventilation
- All gauges, switches, indicators, and controls are placed in the operators forward line of sight for excellent ergonomics
- All gauges and switches are backlit for excellent visibility when the cab working lights are switched to the on position
- Available — Integrated air conditioning utilizes the same ventilation outlets as the standard heating system

Integrated Microguard rated capacity limiter with color graphic display, for excellent contrast even in direct sunlight, aids the operator in safe and efficient operation by continuously monitoring a multitude of crane conditions. Optional external and internal light bars inform the operator and/or ground crew of the percentage of capacity.

Access to the engine compartments and the operator's cab is superb with strategically-located ladders and steps.

Multiple counterweight configurations give you capacities for any size job

- Standard – Total of 11,500 lbs *(5 216 kg)* of removable counterweights. Capacities for five different counterweight configurations.
- Optional – Up to 39,500 lbs *(17 917.2 kg)* of removable counterweights. Capacities for up to thirteen different counterweight configurations.
- All configurations can be raised and lowered by hydraulic cylinders from the comfort of the operator's cab for ease of installation and removal.

CSI #: 41 22 13

Your crane investment is always protected ... with your Link-Belt distributor.

When you invest in a Link-Belt crane, you invest in a legacy of outstanding customer support dating back to 1874. The ultimate value of a machine begins with state-of-the-art design and quality manufacturing, but it is the excellent Link-Belt distributor product support that determines its long term value. This philosophy has earned Link-Belt cranes the enviable position of traditionally commanding some of the highest resale prices in the industry.

... is the recognized as a leader in customer service & satisfaction. — The Link-Belt Vision

Link-Belt Preferred

As a member of Link-Belt Cranes user's group, you will have access to:

- Online access to a comprehensive library of all parts, service and operator manuals for YOUR crane
- Interactive, live groundbearing calculations for YOUR crane
- Plus a vast array of information on new products, services and special offerings

Link-Belt Parts Distribution Center

Link-Belt headquarters - Lexington, Kentucky

Master Technician TRAINING PROGRAM

Link-Belt's investment in the highly acclaimed Master Technician Training Program is further testimony to its commitment to highly trained, experienced service personnel.

Technical schools are specifically designed to establish proficiency in three phases: fundamentals, machine systems, and diagnostics/repair. To further support these highly trained distributor personnel, Link-Belt has dedicated, full time factory technical advisors available with comprehensive machine records, drawings and technical publications to quickly isolate and resolve service issues.

GENUINE Link-Belt Crane PARTS

No one knows your Link-Belt crane better than our trained technical specialists and coupled with the energy of our customer parts representatives, no one in the crane industry provides faster, more efficient customer service.

With state of the art computer information systems, distributors order Genuine Link-Belt Parts 24 hours a day, 7 days a week.

Our dedicated 72,000 sq. ft. *(6 689 m²)* Parts Distribution Center is an integral part of our product support commitment where we invest in an extensive and well planned parts inventory. And all parts in stock ship the same business day.

Link-Belt Construction Equipment Company is a leader in the design, manufacture and sales of telescopic and lattice boom cranes, with headquarters in Lexington, Kentucky.

In the recent decade, a dynamic and highly focused Link-Belt has emerged as a market leader in crane design and product quality standards by focusing on continuous improvement and employee empowerment.

Link-Belt's core production base and center for worldwide operations is its 500,000 sq. ft. *(46 451.5 m²)* manufacturing facility in Lexington, Kentucky.

With major expansions over the last ten years, along with continuous improvement philosophies, this facility has emerged as the most modern crane facility in North America.

Link-Belt CRANES

LINK-BELT CONSTRUCTION EQUIPMENT COMPANY

Lexington, Kentucky | www.linkbelt.com

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We are constantly improving our products and therefore reserve the right to change designs and specifications.

Litho in U.S.A. 11/07 #4344 (supersedes #4331)

CSI #: 41 22 13

5460 (supersedes 5424) – 0506 – N3

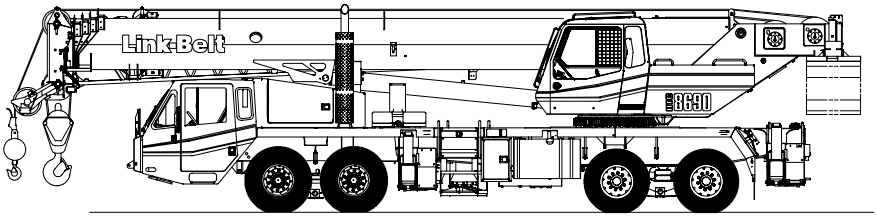
Technical Data

Specifications & Capacities

HTC 8690

Telescopic Boom Truck Crane

90 ton *(81.6 metric ton)*



CAUTION: This material is supplied for reference use only. Operator must refer to in – cab Crane Rating Manual and Operator's Manual to determine allowable crane lifting capacities and assembly and operating procedures.

Division 48

Electrical Power Generation

CSI #: 48 14 00

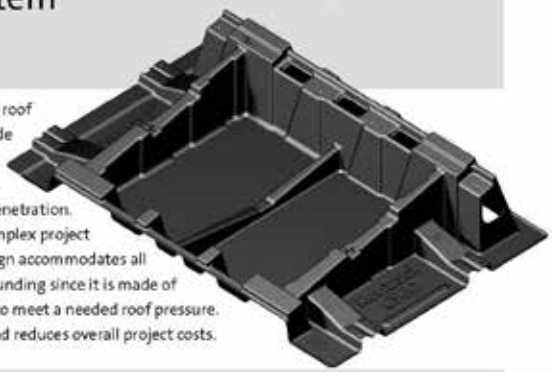
Renusol CS60

Ballasted Mounting System For Flat Roof Applications

A One Piece Mounting System

10° & 15° fixed tilt available

Call Us Today And Compare
+1 877 847 8919



The Renusol CS60 is a one piece PV mounting system for flat roof applications available in 10° and 15° tilts. The product is made from a 100% recycled high molecular weight polyethylene (HMWPE). This durable system transports easily and sets up quickly. Most projects require minimal ballast and no roof penetration. One PV module mounts directly to one Renusol CS60; no complex project design or complicated assembly required. The universal design accommodates all common PV modules. The mounting system requires no grounding since it is made of non-conductive material. Project design can be customized to meet a needed roof pressure. The simplicity of the Renusol CS60 saves installation time and reduces overall project costs.

The Renusol CS60 Benefits

Quick, Easy and Cost-Efficient Install
- Complete kit in 1 box
- Installs quickly with minimal parts
- 1 Renusol CS60 = 1PV Module
- PV panel mounts directly to Renusol CS60
- Durable, non-conductive material

Safety and Security
- Wire management channels
- No trip hazards between rows
- Enclosed ballast tray
- Evenly distributes weight across roof surface

Flexible
- Simple to design projects
- Fits common aluminum framed PV modules
- Stackable, easy to move and ship
- Design customizable to meet roof pressure limitations

Product and Project Support
- Project specific engineering documents
- Expert technical support

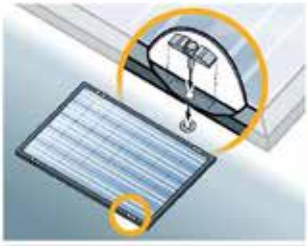
Made in America

Reliable and Environmentally Sound
- 100% recycled and recyclable
- Impact and UV resistant
- Most comprehensive wind tunnel testing to date (up to 150 mph)
- Integrated air foil minimizes ballast

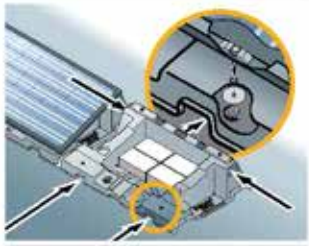
Additional Features 10° Tilt Product
- Built-in wire management channels with "Z" notch for easy fastening
- Adjustable East/West connection to accommodate either high density installation or larger module needs

Installation Steps

Fasten East-West, add ballast if needed



Install T-Washer on module frame



Fasten panel to Renusol CS60

Renusol
Solar Mounting Systems

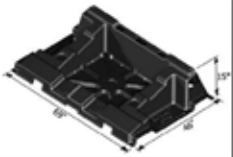
Renusol America
1292 Logan Circle NW, Atlanta, GA 30318
www.renusolamerica.com
+1 877 847 8919

CSI #: 48 14 00

Renusol CS60

Ballasted Mounting System For Flat Roof Applications

TECHNICAL SPECIFICATIONS

Product Name	Renusol CS60 10° Tilt Angle	Renusol CS60 15° Tilt Angle
Image & Dimensions		
System	Ballasted flat roof system compatible with optional roof anchoring	
Materials	100% Recycled HMWPE (High Molecular Weight Polyethylene)	
Roof pitch range	0° to 5°	
Product Weight	19 lbs	
Ballast Size	Optimized for 4" x 8" x 16" block but gravel, bricks or pavers can be used	
Ventilation	Slots on top, bottom and sides	
Module Type	For PV modules with aluminum frames	
Size Range	Up to 1020mm wide and up to 1685mm long	
Orientation	Landscape	
Wind testing	Wind tunnel tested in accordance with ASCE 7-05 & 7-10	
Warranty	25 years	
Training	On-site upon request	
Support	Telephone, email and on-site. Engineering provided.	

About Renusol

Renusol America is a leading innovator in flat-roof and pitch-roofed mounting systems for Solar PV modules in the US solar industry. Renusol America provides sales, service, and customer support from its headquarters in Atlanta, Georgia and operates full-scale ware-house and distribution facilities across the country. In 2011 Renusol America introduced the groundbreaking, American-made Renusol CS60 – the first one piece mounting system for PV panels - combining a heritage of German engineering with American innovation and production. The company is part of the CentroSolar Group, a publicly traded company on the German stock exchange, and is a wholly owned subsidiary of Renusol GmbH, a market leader in Europe with more than 600MW of solar power mounted on Renusol systems.

Renusol Solar Mounting Systems

Renusol America Inc.
1292 Logan Circle NW, Atlanta, GA 30318
www.renusolamerica.com
+1 877 847 8919

FAQs

Are roof protection mats required?
The Renusol CS60 has no sharp edges that contact the roof. Slip sheets may be required if it is needed to increase the friction coefficient.

Is grounding required?
The Renusol CS60 base is made of non-conductive material and requires no grounding.

Is anchoring required?
Projects in seismic areas or modules mounted in high wind zones may require roof anchoring. The Renusol CS60 is designed to easily attach to these anchors.

What material can be used as ballast?
It is recommended to use solid concrete block commonly found at local building supply companies.

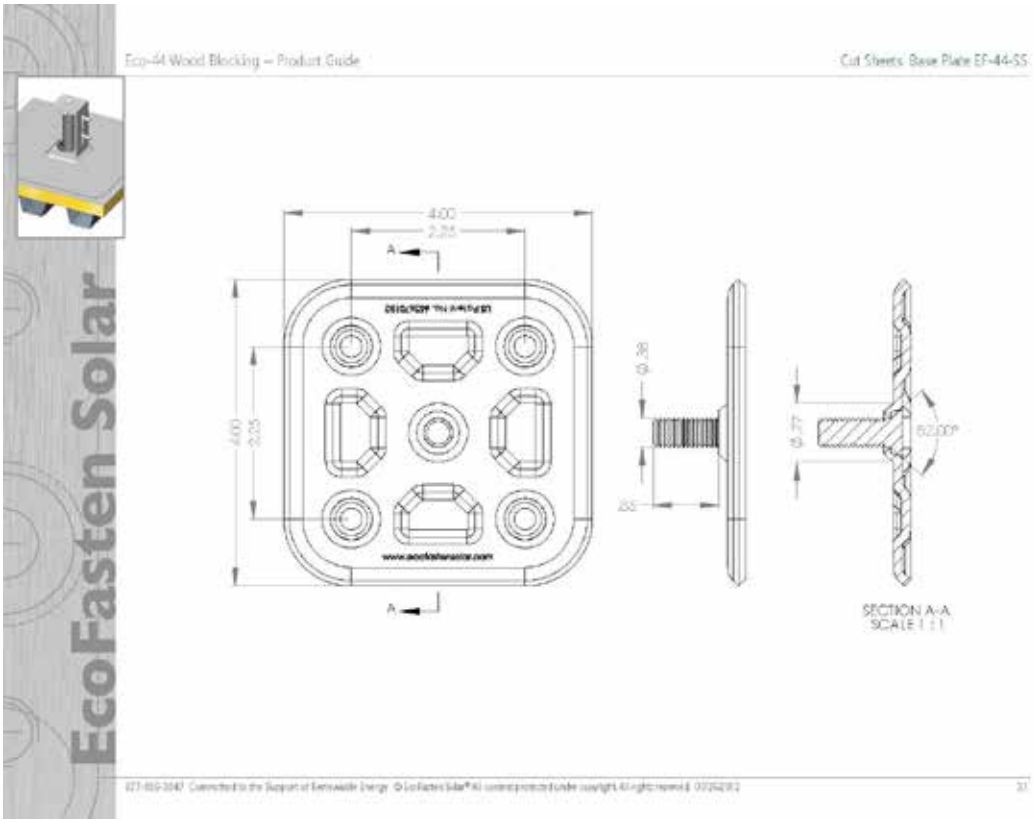
Was wind analysis done by computer simulation or physical testing?
Physical testing in a wind tunnel was performed in accordance with ASCE to ensure the Renusol CS60 performs well in the field.

Is the material UV resistant?
The Renusol CS60 base is made of recycled HMWPE (High Molecular Weight Polyethylene) with UV stabilizing agents that give it excellent UV resistant characteristics.

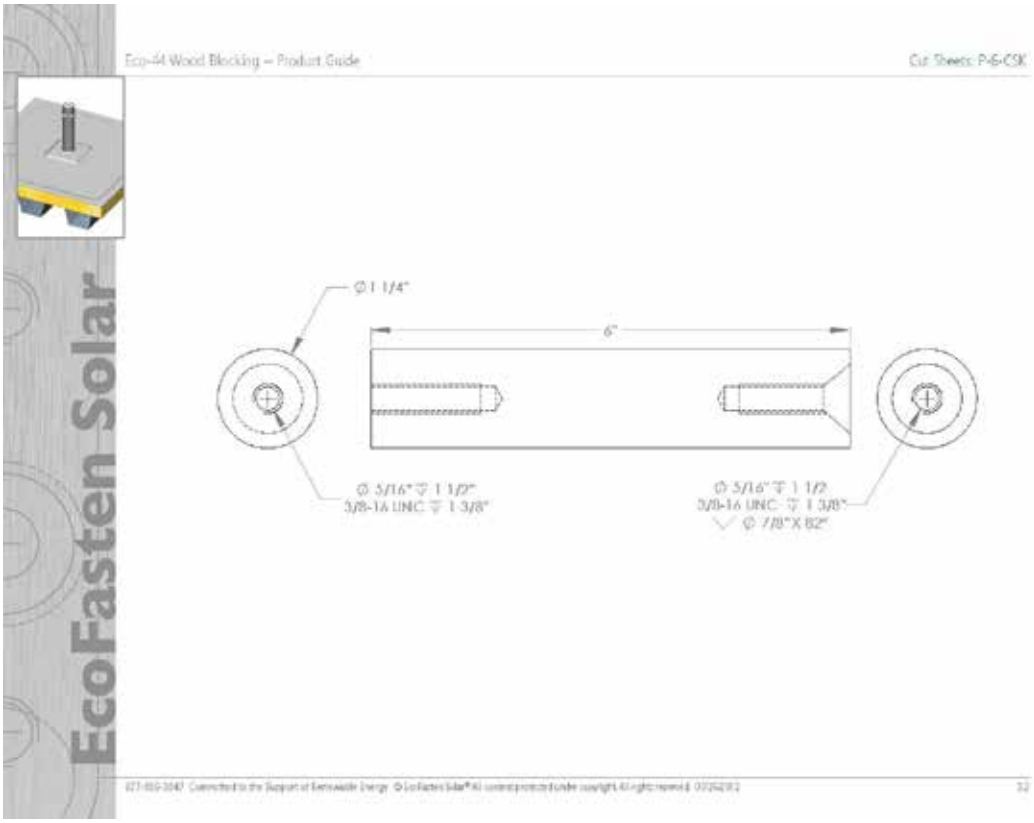
How long is the warranty?
The warranty period is 25 years. See "Renusol America 25-year Limited Product Warranty" for full details.

How many have been installed to date?
Over 1,000,000 modules have been installed with this type of product through our parent company in Europe. The first large scale installations began in 1996.

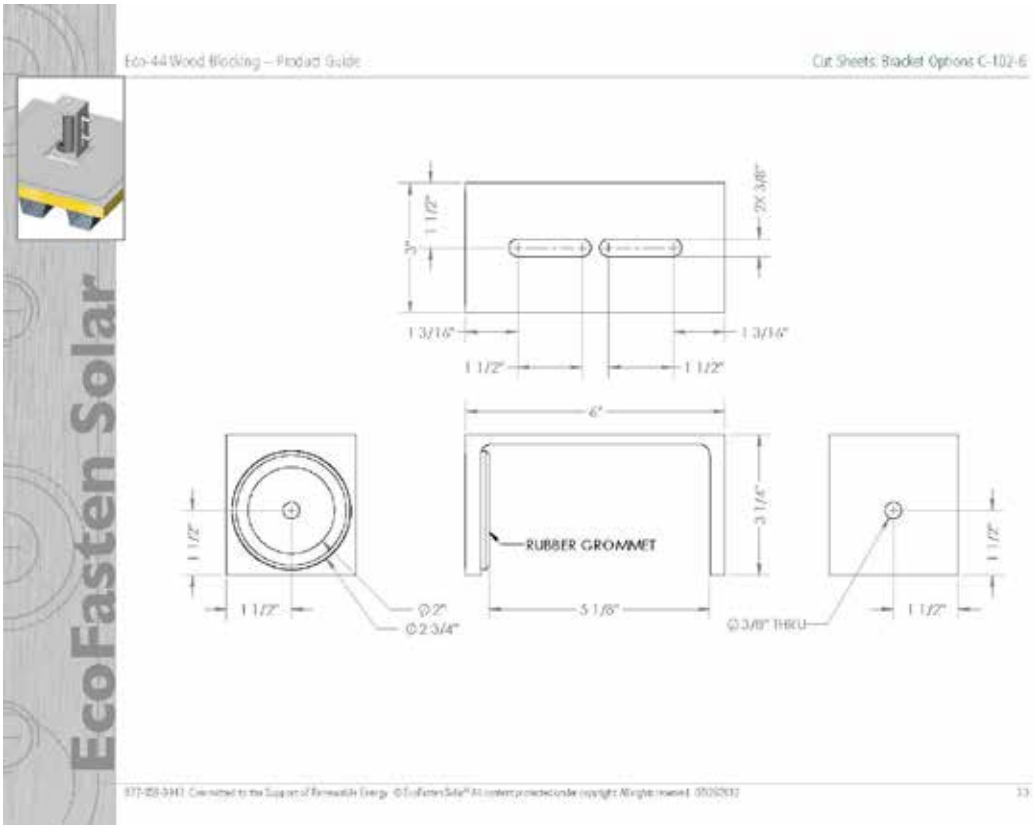
CSI #: 48 14 00


Eco-44 Wood Blocking – Product Guide
Cut Sheets: Base Plate EF-44-SS
EcoFasten Solar
SECTION A-A
SCALE 1 : 1

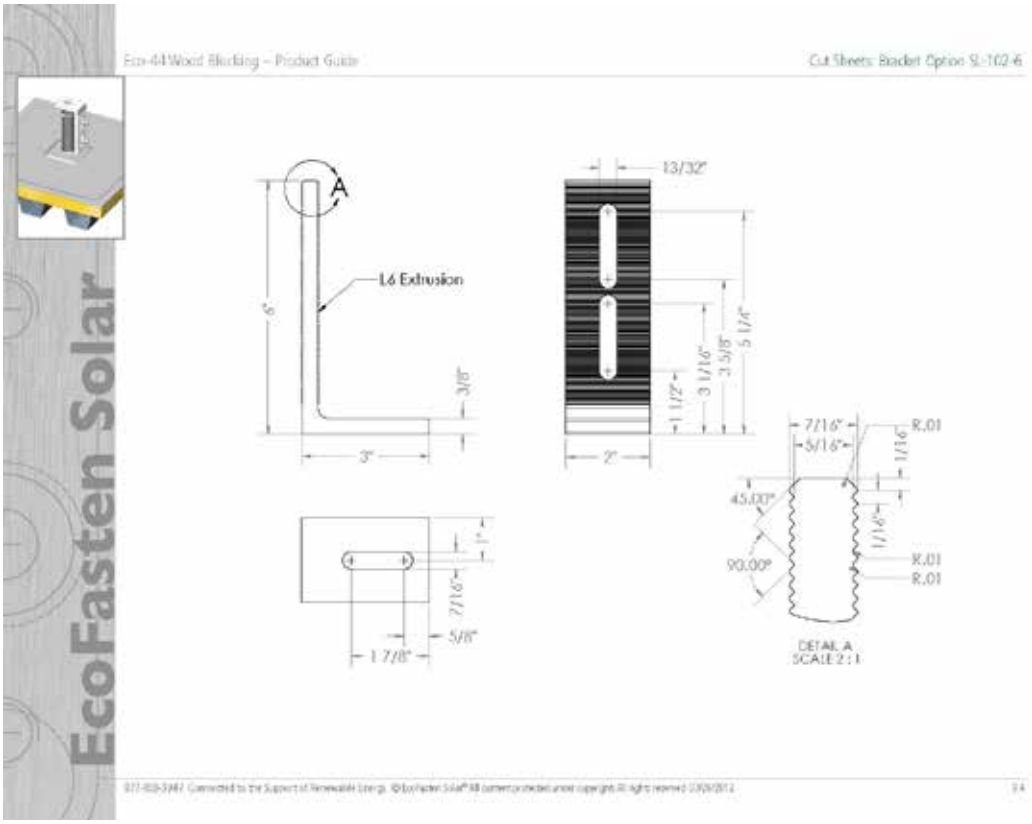
CSI #: 48 14 00


Eco-44 Wood Blocking – Product Guide
Cut Sheets: P-6-CSK
EcoFasten Solar
Ø 1 1/4"
6"
Ø 5/16" ∓ 1 1/2"
3/8-16 UNC ∓ 1 3/8"
Ø 5/16" ∓ 1 1/2"
3/8-16 UNC ∓ 1 3/8"
Ø 7/8" X 82°

CSI #: 48 14 00


Eco-44 Wood Blocking – Product Guide
Cut Sheets: Bracket Options C-102-6
EcoFasten Solar
RUBBER GROMMET
1 1/2"
3"
2X 3/8"
1 3/16"
1 1/2"
6"
3 1/4"
5 1/8"
Ø.7"
Ø2 3/4"
Ø.3/8" THRU

CSI #: 48 14 00


Eco-44 Wood Blocking – Product Guide
Cut Sheets: Blocker Option SL-102-6
EcoFasten Solar
A
L6 Extrusion
6"
3/8"
3"
13/32"
1 1/2"
3 1/16"
3 5/8"
5 1/4"
2"
7/16"
5/16"
R.01
1/16"
45.00°
1/16"
90.00°
R.01
R.01
1"
7/16"
5/8"
1 7/8"
DETAIL A
SCALE 2 : 1

CSI #: 48 14 13

pvilion
by SOLBIAN

SunPower™monocrystalline cells, laminated in high strength technopolymers.
The back-contact technology results in a superior aesthetic appearance and productivity.
These cells allow for flexible panels with the highest efficiency on the market.

	SP185	SP 137	SP 125	SP 112 L	SP 112 Q	SP 100	SP 50 L	SP 50 Q
Power	185 W	137 W	125 W	112 W	112 W	102 W	51 W	51 W
Height	1363	1490	1363	1236	855	1109	1109	601
Width	776	546	546	546	800	546	292	546
Thickness	2 mm	2 mm	2 mm	2 mm	2 mm	2 mm	2 mm	2 mm
Weight	23 Kg	2 Kg	1.8 Kg	1.7 Kg	1.7 Kg	1.5 Kg	0.8 Kg	0.8 Kg
Voc	40 V	29.1 V	26.9 V	24.3 V	24.3 V	21.8 V	10.9 V	10.9 V
Vpm	32.5 V	24 V	22 V	20 V	20 V	18 V	9 V	9 V
Isc	6.1 A	6 A	6 A	6 A	6 A	6 A	6 A	6 A
Ipm	5.7 A	5.7 A	5.7 A	5.7 A	5.7 A	5.7 A	5.7 A	5.7 A

SP series installations




CSI #: 48 14 13

EATON
Powering Business Worldwide

CSI #: 48 14 13

Eaton is pleased to introduce the market's first UL® Listed 600 Vdc per pole, bi-directional disconnect. Listed to the UL 98B standard, this design has the capacity to switch multiple circuits of up to 600 Vdc each.

The use of renewable energy sources is on the rise. Photovoltaic (PV) systems are among the fastest growing of the new green technologies, and they are being installed on a variety of building types and landscapes throughout North America. This results in a growing need for products to meet the requirements of these systems. Eaton DC disconnects meet these requirements—enter Eaton's new lineup of 600 Vdc per pole and 1000 Vdc switches, tested and listed to the rigorous UL 98B standard, in line with NEC® 690 Code requirements for PV installations.

Switching devices primarily designed for DC service require design features to increase the total arcing voltage. This can be achieved by designing larger single air gaps and multiple gaps in series, or by using magnetic fields to force arc movement. In this new safety switch design, Eaton uses magnetic fields, created with the use of permanent magnets, to stretch the arc. These new products are not polarity sensitive, so they can be used on either negative or positive grounded systems, and they provide protection regardless of whether the current flow is in the "normal" direction or is reversed (possible due to miswiring or under a fault condition).

Grounded PV systems

A large number of PV systems in North America to date are grounded systems. These systems will be either positive grounded or negative grounded. In a positive grounded system, the disconnect will switch (break) the negative (–) conductor only. Conversely, in a negative grounded system, the disconnect will switch (break) the positive (+) conductor only. It is important that the disconnect applied within a grounded PV system be properly rated for that specific system. Eaton's new lineup of switches (600 Vdc and 1000 Vdc) are designed and UL Listed for use in both positive and negative grounded applications—one switch can be used on either system.

Ungrounded PV systems

Somewhat less common today are ungrounded (floating) PV systems. These use transformerless inverters and, relative to the disconnects within the system, both the positive (+) and the negative (–) conductors are switched. Eaton is proud to also offer a series of disconnects (600 Vdc and 1000 Vdc) for ungrounded systems.

1000 Vdc SYSTEMS

Eaton new 1000 Vdc disconnects are designed for use in large-scale projects where the higher voltage helps drive improved efficiencies.

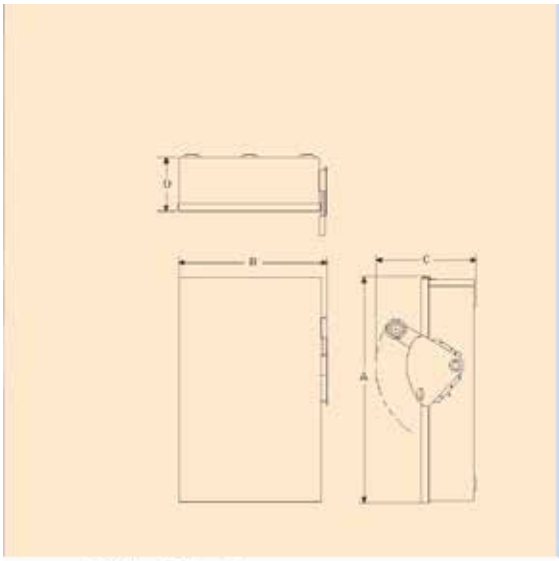
Safety

Operators benefit from using Eaton's tried-and-true K-switch base and mechanism because of the visible means of disconnect when the switch handle is in the OFF position. Blade disengagement from the stationary contact can be seen when viewing the switch base (**Figure 1**).

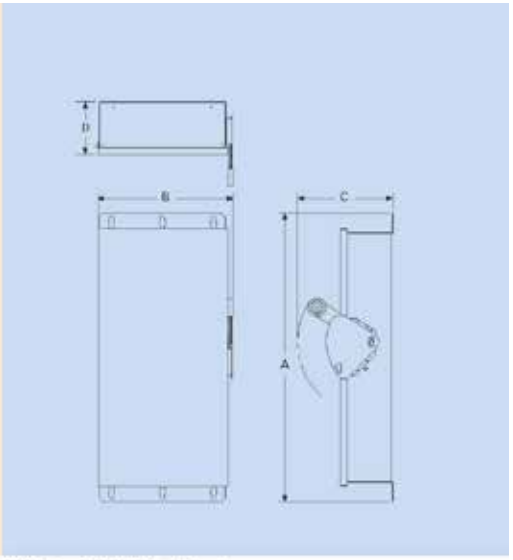
Figure 1

EATON CORPORATION Connecting the power of the sun

CSI #: 48 14 13



NEMA Type 3R Dimensions



NEMA Type 4, 4X Stainless Dimensions

PV disconnect dimensions in inches

600 Vdc non-fusible and fusible

Ampere Rating	Number of Circuits	NEMA Type 3R ● A	B	C	D	NEMA Types 4, 4X Stainless ● A	B	C	D
Grounded									
30, 60	3	16.27	8.87	9.89	5.25	19.08	8.76	10.22	5.50
30, 60	6	19.08	12.88	10.22	5.50	19.08	12.88	10.22	5.50
100	3	21.99	11.84	9.89	5.25	24.95	11.79	10.22	5.50
100	6	24.95	16.13	10.22	5.50	24.95	16.13	10.22	5.50
200	2	35.38	16.54	11.63	6.44	35.38	16.54	11.63	6.44
200	3	35.38	16.54	11.63	6.44	35.38	16.54	11.63	6.44
200	4	35.38	24.46	11.63	6.44	35.38	24.46	11.63	6.44
300	6	39.19	30.16	11.63	6.44	39.19	30.16	11.63	6.44
400 ●	2	57.47	24.12	12.43	7.19	57.47	24.12	12.43	7.19
400 ●	3	57.47	24.12	12.43	7.19	57.47	24.12	12.43	7.19
400 ●	4	57.47	24.12	12.43	7.19	57.47	24.12	12.43	7.19
Ungrounded									
30, 60	1	16.27	8.87	9.89	5.25	19.08	8.76	10.22	5.50
30, 60	3	19.08	12.88	10.22	5.50	19.08	12.88	10.22	5.50
100	1	21.99	11.84	9.89	5.25	24.95	11.79	10.22	5.50
100	3	24.95	16.13	10.22	5.50	24.95	16.13	10.22	5.50
200	1	35.38	16.54	11.63	6.44	35.38	16.54	11.63	6.44
200	2	35.38	16.54	11.63	6.44	35.38	16.54	11.63	6.44
300	3	35.38	24.46	11.63	6.44	35.38	24.46	11.63	6.44
400 ●	1	57.47	24.12	12.43	7.19	57.47	24.12	12.43	7.19
400 ●	2	57.47	24.12	12.43	7.19	57.47	24.12	12.43	7.19

● NEMA Type 4 and 4X stainless steel enclosures are suitable for mounting in either vertical or horizontal positions. NEMA Type 3R enclosures must be mounted vertically.

● For smaller NEMA 3R enclosure, consult factory.

1000 Vdc non-fusible (fusible available at 200A and 400A)

Ampere Rating	Number of Circuits	NEMA Type 3R ● A	B	C	D	NEMA Types 4, 4X Stainless ● A	B	C	D
Grounded									
30, 60	1	16.27	8.87	9.89	5.25	14.14	8.76	10.22	5.50
30, 60	2	19.08	12.88	10.22	5.50	19.08	12.88	10.22	5.50
100	1	21.99	11.84	9.89	5.25	24.95	11.79	10.22	5.50
100	2	24.95	16.13	10.22	5.50	24.95	16.13	10.22	5.50
200	1	35.38	16.54	11.63	6.44	35.38	16.54	11.63	6.44
200	2	35.38	24.57	11.63	6.44	35.38	24.57	11.63	6.44
200	3	35.38	24.57	11.63	6.44	35.38	24.57	11.63	6.44
400 ●	1	57.47	24.12	12.43	7.19	57.47	24.12	12.43	7.19
400 ●	2	57.47	24.12	12.43	7.19	57.47	24.12	12.43	7.19
Ungrounded									
30, 60	1	16.27	8.87	9.89	5.25	14.14	8.76	10.22	5.50
30, 60	2	19.08	12.88	10.22	5.50	19.08	12.88	10.22	5.50
100	1	21.99	11.84	9.89	5.25	24.95	11.79	10.22	5.50
100	2	24.95	16.13	10.22	5.50	24.95	16.13	10.22	5.50
200	1	35.38	16.54	11.63	6.44	35.38	16.54	11.63	6.44
200	2	35.38	16.54	11.63	6.44	35.38	16.54	11.63	6.44
200	3	35.38	24.26	11.63	6.44	35.38	24.26	11.63	6.44
400 ●	1	57.47	24.12	12.43	7.19	57.47	24.12	12.43	7.19
400 ●	2	57.47	24.12	12.43	7.19	57.47	24.12	12.43	7.19

● NEMA Type 4 and 4X stainless steel enclosures are suitable for mounting in either vertical or horizontal positions. NEMA Type 3R enclosures must be mounted vertically.

● For smaller NEMA 3R enclosure, consult factory.

EATON CORPORATION Connecting the power of the sun

CSI #: 48 14 13

Catalog numbering system

DCG 3 06 1 U R M –

- **Number of Circuits ●**
  - 1 = 1 circuit
  - 2 = 2 circuits
  - 3 = 3 circuits
  - 4 = 4 circuits
  - 6 = 6 circuits
- **Class and Type**
  - DCG = DC disconnect/ grounded system
  - DCU = DC disconnect/ ungrounded system
- **Maximum System Voltage**
  - 06 = 600 Vdc
  - 10 = 1000 Vdc
- **Ampacity**
  - 1 = 30A
  - 2 = 60A
  - 3 = 100A
  - 4 = 200A
  - 5 = 400A
- **Protection**
  - F = Fusible
  - U = Non-fusible
- **NEMA Enclosure Rating**
  - R = NEMA 3R
  - P = NEMA 4
  - W = NEMA 4X, stainless 304
  - X = NEMA 4X, stainless 316
- **Switch Series**
  - M = DC photovoltaic applications
- **Accessories/Options**
  - Blank = No accessories
  - 2 = 1NO/1NC auxiliary contact
  - 3 = 2NO/2NC auxiliary contact
  - W = Viewing window
  - J = Factory-converted Class J fuse provisions

● Not all configurations for ampere rating and number of circuits are available. All circuit configurations can be found in the product dimension tables.

DC disconnect circuit configurations (non-fusible and fusible)

Maximum Vdc System Voltage	Disconnect Ampere Rating	Grounded Systems Number of Circuits					Ungrounded Systems Number of Circuits		
		1	2	3	4	6	1	2	3
600	30	●		●		◆	◆		◆
	60	●		●		◆	◆		◆
	100	●		●		◆	◆		◆
	200	●	●	●	●	●	◆	◆	◆
	400	●	●	●	◆		◆	◆	
	800	●							
1000	30	●	◆				◆	◆	
	60	●	◆				◆	◆	
	100	●	◆				◆	◆	
	200	●	●	●			◆	◆	◆
	400	●	■				◆	◆	

● Indicates grounded conductor terminal included with isolated lugs for each circuit.
◆ Indicates no grounded conductor terminal included.
■ Indicates only non-fusible version includes grounded conductor terminal with isolated lug for each circuit.

DC disconnect lug capacities

Maximum Vdc System Voltage	Ampere Rating	Lug Capacity ●● Main Input	Main Output	Solid Neutral (for Grounded Conductor) Input	Solid Neutral (for Grounded Conductor) Output	Equipment Ground Input	Equipment Ground Output
600	30	#2–#14 AWG	#2–#14 AWG	1/0–#14 AWG	1/0–#14 AWG	#4–#14 AWG	#4–#14 AWG
	60	#2–#14 AWG	#2–#14 AWG	1/0–#14 AWG	1/0–#14 AWG	#4–#14 AWG	#4–#14 AWG
	100	1/0–#14 AWG	1/0–#14 AWG	1/0–#14 AWG	1/0–#14 AWG	#4–#14 AWG	#4–#14 AWG
	200	300 kcmil–#6	300 kcmil–#6	300 kcmil–#6	300 kcmil–#6	#4–#14 AWG	250 kcmil–#6
	400	(1) 750 kcmil–1/0 and (1) 600 kcmil–#2	(1) 750 kcmil–1/0 and (1) 600 kcmil–#2	(2) 750 kcmil–1/0	(2) 750 kcmil–1/0	1/0–#14	350 kcmil–#6
1000	30	#2–#14 AWG	#2–#14 AWG	#2–#14 AWG	#2–#14 AWG	#4–#14 AWG	#4–#14 AWG
	60	#2–#14 AWG	#2–#14 AWG	#2–#14 AWG	#2–#14 AWG	#4–#14 AWG	#4–#14 AWG
	100	1/0–#14 AWG	1/0–#14 AWG	1/0–#14 AWG	1/0–#14 AWG	#4–#14 AWG	#4–#14 AWG
	200	300 kcmil–#6	300 kcmil–#6	300 kcmil–#6	300 kcmil–#6	#4–#14 AWG	250 kcmil–#6
	400	(1) 750 kcmil–1/0 and (1) 600 kcmil–#2	(1) 750 kcmil–1/0 and (1) 600 kcmil–#2	(2) 750 kcmil–1/0	(2) 750 kcmil–1/0	1/0–#14	350 kcmil–#6

●● All lug capacities shown are for standard lugs. For options, including compression type, consult factory.
● All lugs are Cu/Al rated.

EATON CORPORATION Connecting the power of the sun

CSI #: 48 14 13

600 Vdc and 1000 Vdc features and benefits


DCG4066FRM


DCG3104URM


DCU2064URM


DCG3063FRM

Standard features

- UL Listed to the UL 98B standard
- Marked as suitable for NEC 690 PV applications per UL 1741 requirements
- Suitable for use on positive and negative grounded systems
  - Not polarity sensitive
- Bi-directional functionality
  - Will break high-energy DC arc regardless of direction of current flow
- Ampacity range—30, 60, 100, 200 and 400A
- Clear polycarbonate deadfront shield
- Equipment ground
- NEMA® 3R, 4 and 4X stainless steel enclosures
- Flex Center modification available, such as viewing windows, pilot lights and more

600 Vdc specific features

- First UL Listed 600 Vdc per pole, bi-directional solution in the market
- 2-, 3-, 4- and 6-circuit configurations for grounded systems ●
- 1-, 2- and 3-circuit configurations for ungrounded systems ●
- Fusible and non-fusible
- Grounded configurations include isolated return terminals. Exceptions include 6-circuit 30, 60, 100A and 4-circuit 400A
- Suitable for use on a circuit capable of delivering up to 10,000A, 600 Vdc

1000 Vdc specific features

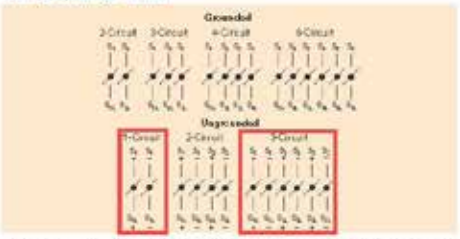
- 1-, 2- and 3-circuit configurations for both grounded and ungrounded systems ●
- Fusible and non-fusible ●
- Factory-installed jumpers
- Grounded configurations include isolated return terminals. Exceptions include 2-circuit 400A
- Suitable for use on a circuit capable of delivering up to 10,000A, 1000 Vdc

● See wiring diagrams below

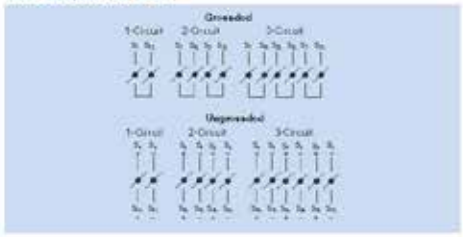
● Fusible configurations have provisions for Class J or R fuse types. Currently, there are no applicable 1000 Vdc fuses available at 100A and below

Wiring diagrams

600 Vdc/pole (30–400A)



1000 Vdc/pole (30–400A)

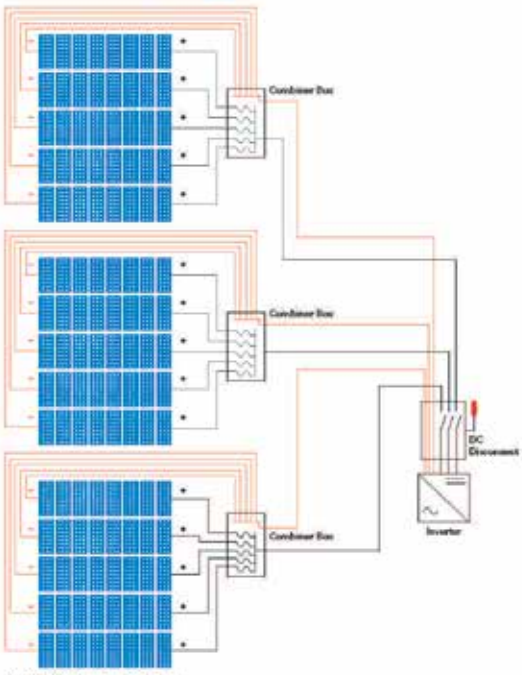


Note: Majority of grounded configurations have isolated return terminals. For specific circuit configurations available, please see matrix in the middle of **page 4**.

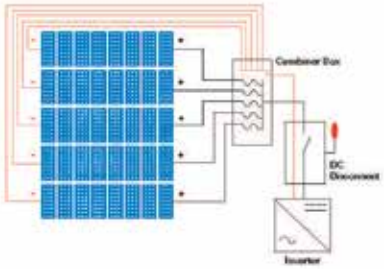
EATON CORPORATION Powering the power of the sun

CSI #: 48 14 13

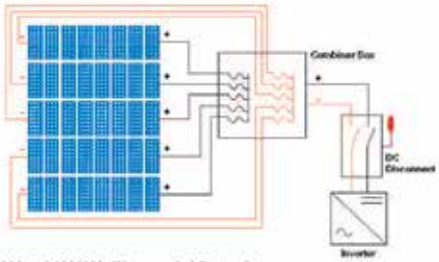
One-line example diagrams



600 Vdc (Grounded System)



1000 Vdc (Grounded System)



600 and 1000 Vdc (Ungrounded System)

For more information, please visit
www.Eaton.com/Switches

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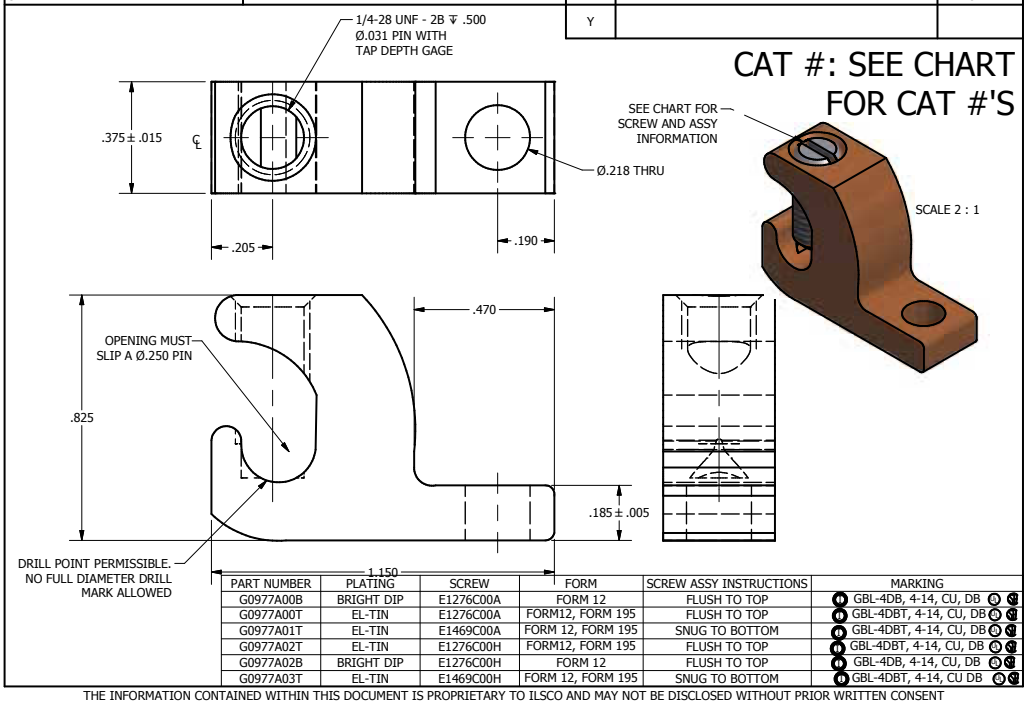
Powering Business Worldwide

CSI #: 48 19 00

SCREW: SEE CHART	MATERIAL: COPPER, X0C7309	TOLERANCES-UNLESS OTHERWISE SPECIFIED 2 PL. DEC. ±.015 TRUE C.L. ±.015 3 PL. DEC. ±.010 ANGLES ±1	ILSCO connections that matter
CAT. NO.:	PLATING: SEE CHART		
MASS: 0.054 lbmass	MARKING: SEE CHART	DRAWN BY: CLH SCALE: 3:1	DWG. NO. G0977
INFORMATION SHEET: SEE CHART		DATE: 7/27/2007 SIZE: A	SHEET 1 OF 1
CELL: ABM		REV. Y DESCRIPTION	APPROVED BY:



PART NUMBER	PLATING	SCREW	FORM	SCREW ASSY INSTRUCTIONS	MARKING
G0977A00B	BRIGHT DIP	E1276C00A	FORM 12	FLUSH TO TOP	GBL-4DB, 4-14, CU, DB
G0977A00T	EL-TIN	E1276C00A	FORM12, FORM 195	FLUSH TO TOP	GBL-4DBT, 4-14, CU, DB
G0977A01T	EL-TIN	E1469C00A	FORM 12, FORM 195	SNUG TO BOTTOM	GBL-4DBT, 4-14, CU, DB
G0977A02T	EL-TIN	E1276C00H	FORM12, FORM 195	FLUSH TO TOP	GBL-4DBT, 4-14, CU, DB
G0977A02B	BRIGHT DIP	E1276C00H	FORM 12	FLUSH TO TOP	GBL-4DB, 4-14, CU, DB
G0977A03T	EL-TIN	E1469C00H	FORM 12, FORM 195	SNUG TO BOTTOM	GBL-4DBT, 4-14, CU DB

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CSI #: 48 19 16

SUNNY BOY 3000TL-US / 3800TL-US / 4000TL-US /
5000TL-US / 6000TL-US / 7000TL-US / 7700TL-US

SMA

Certified
- UL 1741 and 1699B compliant
- Integrated AFCI meets the requirements of NEC 2011 690.11

Innovative
- Secure Power Supply provides daytime power during grid outages

Powerful
- 97.6% maximum efficiency
- Wide input voltage range
- Shade management with OptiTrac Global Peak MPP tracking

Flexible
- Two MPP trackers provide numerous design options
- Extended operating temperature range

SUNNY BOY 3000TL-US / 3800TL-US / 4000TL-US / 5000TL-US / 6000TL-US / 7000TL-US / 7700TL-US

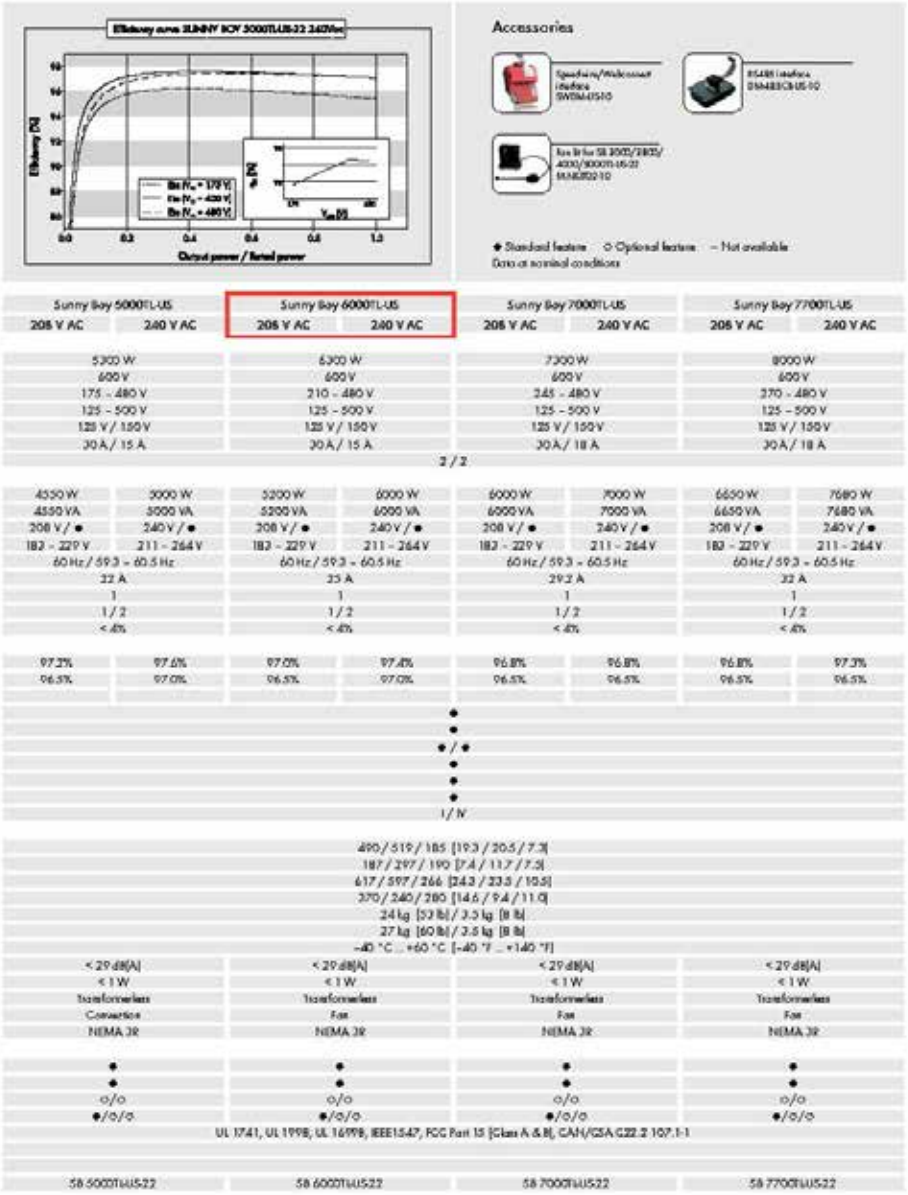
Setting new heights in residential inverter performance

The Sunny Boy 3000TL-US/3800TL-US/4000TL-US/5000TL-US/6000TL-US/7000TL-US/7700TL-US represents the next step in performance for UL certified inverters. Its transformerless design means high efficiency and reduced weight. Maximum power production is derived from wide input voltage and operating temperature ranges. Multiple MPP trackers and OptiTrac™ Global Peak mitigate the effect of shade and allow for installation at challenging sites. The unique Secure Power Supply feature provides daytime power in the event of a grid outage. High performance, flexible design and innovative features make the Sunny Boy TL-US series the first choice among solar professionals.

CSI #: 48 19 16

Technical data	Sunny Boy 3000TL-US		Sunny Boy 3800TL-US		Sunny Boy 4000TL-US	
	208 V AC	240 V AC	208 V AC	240 V AC	208 V AC	240 V AC
Input (DC)						
Max. usable DC power (@ cos φ = 1)	3200 W		4200 W		4200 W	
Max. DC voltage	600 V		600 V		600 V	
Rated MPP voltage range	175 - 480 V		175 - 480 V		175 - 480 V	
MPPT operating voltage range	125 - 500 V		125 - 500 V		125 - 500 V	
Min. DC voltage / start voltage	125 V / 150 V		125 V / 150 V		125 V / 150 V	
Max. operating input current / per MPP tracker	18 A / 15 A		24 A / 15 A		24 A / 15 A	
Number of MPP trackers / strings per MPP tracker	2 / 2					
Output (AC)						
AC nominal power	3000 W		3330 W	3840 W	4000 W	
Max. AC apparent power	3000 VA		3330 VA	3840 VA	4000 VA	
Nominal AC voltage / adjustable	208 V / ●	240 V / ●	208 V / ●	240 V / ●	208 V / ●	240 V / ●
AC voltage range	183 - 229 V	211 - 264 V	183 - 229 V	211 - 264 V	183 - 229 V	211 - 264 V
AC grid frequency; range	60 Hz / 59.3 - 60.5 Hz		60 Hz / 59.3 - 60.5 Hz		60 Hz / 59.3 - 60.5 Hz	
Max. output current	15 A		16 A		20 A	
Power factor (cos φ)	1		1		1	
Output phases / line connections	1 / 2		1 / 2		1 / 2	
Harmonics	< 4%		< 4%		< 4%	
Efficiency						
Max. efficiency	97.2%	97.6%	97.2%	97.5%	97.2%	97.5%
CEC efficiency	96.5%	96.5%	96.5%	97.0%	96.5%	97.0%
Protection devices						
DC disconnection device	●					
DC reverse-polarity protection	●					
Ground-fault monitoring / Grid monitoring	● / ●					
AC short-circuit protection	●					
All-pole sensitive residual-current monitoring unit	●					
Arc-fault circuit interruptor (AFCI); compliant to UL 1699B	●					
Protection class / overvoltage category	I / IV					
General data						
Dimensions (W / H / D) in mm (in)	490 / 519 / 185 (19.3 / 20.5 / 7.3)					
DC Disconnect dimensions (W / H / D) in mm (in)	187 / 397 / 190 (7.4 / 11.7 / 7.5)					
Packing dimensions (W / H / D) in mm (in)	617 / 597 / 266 (24.3 / 23.5 / 10.5)					
DC Disconnect packing dimensions (W / H / D) in mm (in)	370 / 240 / 280 (14.6 / 9.4 / 11.0)					
Weight / DC Disconnect weight	24 kg (53 lb) / 3.5 kg (8 lb)					
Packing weight / DC Disconnect packing weight	27 kg (60 lb) / 3.5 kg (8 lb)					
Operating temperature range	-40 °C ... +60 °C (-40 °F ... +140 °F)					
Noise emission (typical)	≤ 25 dB(A)		< 25 dB(A)		< 25 dB(A)	
Internal consumption at night	< 1 W		< 1 W		< 1 W	
Topology	Transformerless		Transformerless		Transformerless	
Cooling	Convection		Convection		Convection	
Electronics protection rating	NEMA 3R		NEMA 3R		NEMA 3R	
Features						
Secure Power Supply	●		●		●	
Display: graphic	●		●		●	
Interfaces: RS485 / Speedwire/Webconnect	o/o		o/o		o/o	
Warranty: 10 / 15 / 20 years	●/o/o		●/o/o		●/o/o	
Certificates and permits (more available on request)	UL 1741, UL 1998, UL 1699B, IEEE1547, FCC Part 15 (Class A & B), CAN/CSA-C22.2 107.1-1					
NOTE: US inverters ship with grey lids						
Type designation	SB 3000TL-US-22		SB 3800TL-US-22		SB 4000TL-US-22	

CSI #: 48 19 16



Accessories

Sunny Boy 5000TL-US		Sunny Boy 6000TL-US		Sunny Boy 7000TL-US		Sunny Boy 7700TL-US	
208 V AC	240 V AC	208 V AC	240 V AC	208 V AC	240 V AC	208 V AC	240 V AC
5300 W		6300 W		7300 W		8000 W	
600 V		600 V		600 V		600 V	
175 - 480 V		210 - 480 V		245 - 480 V		270 - 480 V	
125 - 500 V		125 - 500 V		125 - 500 V		125 - 500 V	
125 V / 150 V		125 V / 150 V		125 V / 150 V		125 V / 150 V	
30 A / 15 A		30 A / 15 A		30 A / 18 A		30 A / 18 A	
2 / 2							
4550 W	5000 W	5200 W	6000 W	6000 W	7000 W	6650 W	7680 W
4550 VA	5000 VA	5200 VA	6000 VA	6000 VA	7000 VA	6650 VA	7680 VA
208 V / ●	240 V / ●	208 V / ●	240 V / ●	208 V / ●	240 V / ●	208 V / ●	240 V / ●
183 - 229 V	211 - 264 V	183 - 229 V	211 - 264 V	183 - 229 V	211 - 264 V	183 - 229 V	211 - 264 V
60 Hz / 59.3 - 60.5 Hz		60 Hz / 59.3 - 60.5 Hz		60 Hz / 59.3 - 60.5 Hz		60 Hz / 59.3 - 60.5 Hz	
22 A		25 A		29.2 A		32 A	
1		1		1		1	
1 / 2		1 / 2		1 / 2		1 / 2	
< 4%		< 4%		< 4%		< 4%	
97.2%	97.0%	97.0%	97.4%	96.8%	96.8%	96.8%	97.3%
96.5%	97.0%	96.5%	97.0%	96.5%	96.5%	96.5%	96.5%
●							
●							
● / ●							
●							
●							
●							
I / IV							
490 / 519 / 185 [19.3 / 20.5 / 7.3]							
187 / 297 / 190 [7.4 / 11.7 / 7.5]							
617 / 597 / 266 [24.3 / 23.5 / 10.5]							
370 / 240 / 280 [14.6 / 9.4 / 11.0]							
24 kg [53 lb] / 3.5 kg [8 lb]							
27 kg [60 lb] / 3.5 kg [8 lb]							
-40 °C ... +60 °C [-40 °F ... +140 °F]							
< 29 dB(A)		< 29 dB(A)		< 29 dB(A)		< 29 dB(A)	
< 1 W		< 1 W		< 1 W		< 1 W	
Transformerless		Transformerless		Transformerless		Transformerless	
Convection		Fan		Fan		Fan	
NEMA 3R		NEMA 3R		NEMA 3R		NEMA 3R	
●		●		●		●	
●		●		●		●	
o/o		o/o		o/o		o/o	
●/o/o		●/o/o		●/o/o		●/o/o	
UL 1741, UL 1998, UL 16998, IEEE1547, FCC Part 15 [Class A & B], CAN/CSA C22.2 107.1-1							
SB 5000TLUS22		SB 6000TLUS22		SB 7000TLUS22		SB 7700TLUS22	

CSI #: 48 19 16

A NEW GENERATION OF INNOVATION

THE SUNNY BOY TL-US RESIDENTIAL SERIES HAS YET AGAIN REDEFINED THE CATEGORY.

Transformerless design

The Sunny Boy 3000TL-US / 3800TL-US / 4000TL-US / 5000TL-US / 6000TL-US / 7000TL-US / 7700TL-US are transformerless inverters, which means owners and installers benefit from high efficiency and lower weight. A wide input voltage range also means the inverters will produce high amounts of power under a number of conditions.

Additionally, transformerless inverters have been shown to be among the safest string inverters on the market. An industry first, the TL-US series has been tested to UL 1741 and UL 1699B and is in compliance with the arc fault requirements of NEC 2011.

Increased energy production

OptiTrac™ Global Peak, SMA's shade-tolerant MPP tracking algorithm, quickly adjusts to changes in solar irradiation, which mitigates the effects of shade and results in higher total power output. And, with two MPP trackers, the TL-US series can ably handle complex roofs with multiple orientations or string lengths.

An extended operating temperature range of -40 °F to +140 °F ensures power is produced in all types of climates and for longer periods of time than with most traditional string inverters.

Secure Power Supply

One of many unique features of the TL-US residential series is its innovative Secure Power Supply. With most gridtied inverters, when the grid goes down, so does the solar-powered home. SMA's solution provides daytime energy to a dedicated power outlet during prolonged grid outages, providing homeowners with access to power as long as the sun shines.

Simple installation

As a transformerless inverter, the TL-US residential series is lighter in weight than its transformer-based counterparts, making it easier to lift and transport. A new wall mounting plate features antitheft security and makes hanging the inverter quick and easy. A simplified DC wiring concept allows the DC disconnect to be used as a wire raceway, saving labor and materials.

The 3800TL-US and 7700TL-US models allow installers to maximize system size and energy production for customers with 100 A and 200 A service panels.

Leading monitoring and control solutions

The new TL-US residential line features more than high performance and a large graphic display. The monitoring and control options provide users with an outstanding degree of flexibility. Multiple communication options allow for a highly controllable inverter and one that can be monitored on Sunny Portal from anywhere on the planet via an Internet connection. Whether communicating through RS485, or SMA's new plug-and-play WebConnect, installers can find an optimal solution to their monitoring needs.

Wide power class range

Whether you're looking for a model to maximize a 100 A service panel or trying to meet the needs of a larger residential PV system, the Sunny Boy TL-US with Secure Power Supply has your covered. Its wide range of power classes—from 3 to 7.7 kW—offers customers the right size for virtually any residential application. The TL-US series is not only the smartest inverter on the planet, it's also the most flexible.

Toll Free +1 888 4 SMA USA
www.SMA-America.com

SMA America, LLC

CSI #: 48 19 19

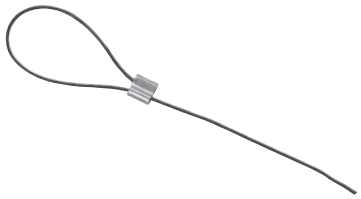
Solar Combiner Solutions

Solar Accessories

CP

Cable Tie and Cable Clip Applications:

Eaton's Crouse-Hinds Solar Cable Clips and Ties provide cable management options for bundling and harnessing PV solar wire anywhere between the panels to the inverter.



Cable Tie Features:

- Equipped with a UV protected vinyl jacket which prevents damage to installation cable insulation and ensures durability
- Tin plated with a copper crimp sleeve which allows for easy field installation
- Constructed from commercial aircraft grade stainless wire for long, dependable service

Standard Materials and Finishes:

- UV resistant vinyl jacketing, tin plated copper crimp sleeve, commercial aircraft grade stainless wire

Cable Tie Ordering Information:

		Part Specification			Part Dimensions			
		Min. Tensile Strength		Max. Bundle Dia.	Length	Cable Dia.		
Cat. #	Description	Lbs.	N	in.	in.	in.	Unit Qty	Wt. Lbs. Per 100
SCBLTIE8	Solar Cable Tie 8"	100	440	2.3	8	0.06	100	1
SCBLTIE10	Solar Cable Tie 10"			2.92	10		100	1
SCBLTIE12	Solar Cable Tie 12"			3.88	12		100	1
SCBLTIE14	Solar Cable Tie 14"			4.2	14		100	1

Cable Clip Features:

- Manufactured out of corrosion-resistant 304 stainless steel
- Double compression design which can accommodate (2) 12 gauge USE-2 wire or (2) 10 gauge PV-1000 wires
- Smooth clip edges which prevent damage to cable insulation
- Screwdriver designed slot which allows for easy removal or movement of the clip when necessary

Standard Materials:

- Corrosion-resistant 304 stainless steel

Cable Clip Ordering Information:

		Panel Thickness Clamping Range						
		Minimum	Maximum	Wire Dia. Range	Foot Print	Overall Height		
Cat. #	Description	in.	in.	Max. (2) Wires	in.	in.	Unit Qty	Wt. Lbs. Per 100
SCLP1	Solar PV Cable Clip	0.06	0.125	.20" (5.0 mm) - .30" (7.6 mm) each cable	1	0.39	100	1

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Crouse-Hinds by EATON

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Solar Pass Through Boxes

Applications:

Eaton's Crouse-Hinds Solar Pass Through Boxes (sometimes referred to as "transition boxes") are used in residential applications to provide a low profile, cost-effective way to group input wires/circuits from several arrays and/or solar panels and transition from solar (PV) cable to regular building wire. The Pass Through Box was designed for PV applications where overcurrent protection is not necessary due to the low power rating of the PV string.

Features:

- Rated 600 VDC continuous duty
- Constructed in accordance with UL1741 standards, providing spacious wiring room for quick, easy wire termination
- Factory installed multi-hole solar cord grip provides dependable, secure wire termination to enclosure and saves field installation – eliminating the need for enclosure drilling – saving time and labor
- Fiberglass enclosures with captive stainless steel screws and formed-in-place polyurethane seamless gasket provided as standard
- Available in N3R sheet steel enclosures – consult factory
- Lightweight design offers easy mounting capabilities; optional mounting feet are available for increased customer flexibility
- Rated for continuous operation at 60°C

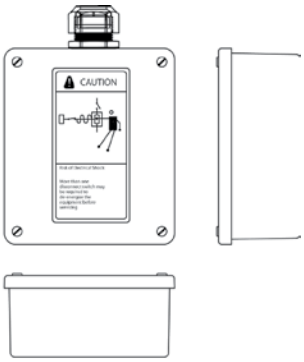
Certifications and Compliances:

- cETLus 1741 Listed
- cETLus 1741 Listed to CSA Standard C22.2 No. 31 & No. 107.1
- NEMA 4X

Standard Materials and Finishes:

- Hot compression molded fiberglass-reinforced thermoset polyester
- Non-conductive, impact-resistant, UV-resistant, flame retardant
- Poured polyurethane seamless gasket provides water-tight, dust-tight environmental seal
- Stainless steel used on all external hardware

CP



Ordering Information:

Cat. #	Description
CPBF03	3 Circuit Pass Through Box
CPBF04	4 Circuit Pass Through Box
CPBF05	5 Circuit Pass Through Box
CPBF06	6 Circuit Pass Through Box
CPBF07	7 Circuit Pass Through Box
CPBF08	8 Circuit Pass Through Box
CPBF09	9 Circuit Pass Through Box
CPBF10	10 Circuit Pass Through Box
CPBF11	11 Circuit Pass Through Box
CPBF12	12 Circuit Pass Through Box
CPBF13	13 Circuit Pass Through Box
CPBF14	14 Circuit Pass Through Box
CPBF15	15 Circuit Pass Through Box
CPBF16	16 Circuit Pass Through Box
CPBF17	17 Circuit Pass Through Box
CPBF18	18 Circuit Pass Through Box
CPBF19	19 Circuit Pass Through Box

Cat. #	Description
CPBF20	20 Circuit Pass Through Box
CPBF21	21 Circuit Pass Through Box
CPBF22	22 Circuit Pass Through Box
CPBF23	23 Circuit Pass Through Box
CPBF24	24 Circuit Pass Through Box
CPBF25	25 Circuit Pass Through Box
CPBF26	26 Circuit Pass Through Box
CPBF27	27 Circuit Pass Through Box
CPBF28	28 Circuit Pass Through Box
CPBF29	29 Circuit Pass Through Box
CPBF30	30 Circuit Pass Through Box
CPBF31	31 Circuit Pass Through Box
CPBF32	32 Circuit Pass Through Box
CPBF33	33 Circuit Pass Through Box
CPBF34	34 Circuit Pass Through Box
CPBF35	35 Circuit Pass Through Box
CPBF36	36 Circuit Pass Through Box

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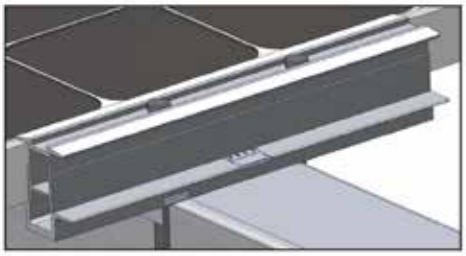
CSI #: 48 19 19

WEEB® Washer Electrical Equipment Bond

wiley

A revolution in the solar industry, WEEB® washers eliminate the need for older, more expensive grounding methods while also significantly reducing the amount of labor and materials used in installations.

Here's how it works: When the WEEB® is inserted between the module frame and mounting rail, the teeth of the WEEB® pierce the anodized coating. The result is excellent conductivity without oxidation—bonding the PV module frame with the metal racking structure. Essentially, the module and rail become one singular piece of metal, creating an electrical path to the ground.



- Corrosion-resistant 304 stainless-steel construction
- Reliability throughout the lifetime of the PV system
- ETL Listed to ANSI/UL 467
- UL Recognized to UL 2703
- CSA Certified to C22.2 No. 41
- Rated for outdoor use
- Multiuse

Customer Service Department
7 Aviation Park Drive
Londonderry NH 03053
1-800-346-4175
1-603-647-5299 (International)
www.burndy.com

Intertek
4004188

BURNDY Connecting Power to Your World™ HUBBELL

CSI #: 48 19 19

WEEB-DSK FAMILY

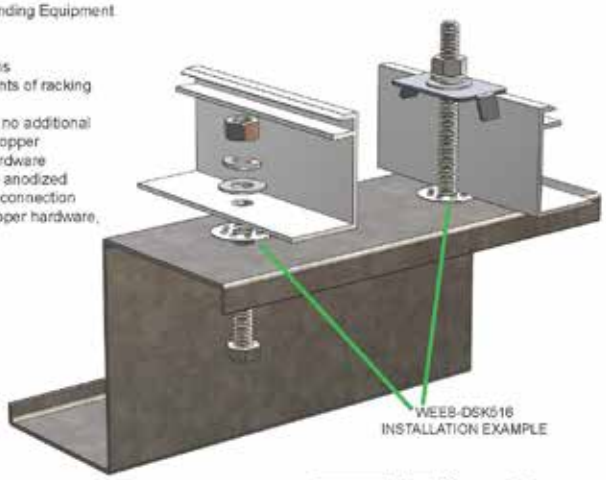
wiley

Introducing our new family of WEEB™ washers designated the WEEB-DSK line. The WEEB-DSK is an innovative design, which allows for a wide range of compatibilty across various racking systems. The WEEB-DSK family is primarily used for bottom-mount and top-clamp applications. There are several different designs to accommodate multiple hardware sizes. The overall functions of the WEEB-DSK are to bond PV modules to racking or other components of the racking system to each other.

Catalog	Item #	Hardware Size
WEEB-DSK12*	50017065	M12 or 1/2"
WEEB-DSK14*	50017068	M6 or 1/4"
WEEB-DSK38*	50017071	M10 or 3/8"
WEEB-DSK516	50020373	M8 or 5/16"

*Denotes a custom part. Please call for availability.

- Corrosion resistant 304 Stainless Steel
- ETL Listed to UL 467 as Grounding & Bonding Equipment
- UL Recognized to UL 2703
- CSA Certified to C22.2 No. 41
- Bottom-Mount and Top-Clamp Applications
- Bonds PV module to racking or components of racking system to each other
- Save time and money with faster installs, no additional installation steps, and the elimination of copper
- Can be used with either inch or metric hardware
- Specialized teeth on washer embeds into anodized aluminum to establish gas-tight electrical connection
- Detailed instruction manual specifying proper hardware, torque and mounting details
- Meets NEC guidelines and requirements
- Outdoor rated
- Multiuse



WEEB-DSK516
INSTALLATION EXAMPLE

Customer Service Department
7 Aviation Park Drive
Londonderry NH 03053
1-800-346-4175
1-603-647-5299 (International)
www.burndy.com

Intertek
4004188

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CSI #: 48 19 23

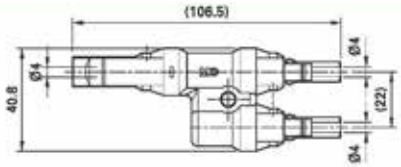
Advanced Contact Technology

Multi-Contact MC
STÄUBLI GROUP

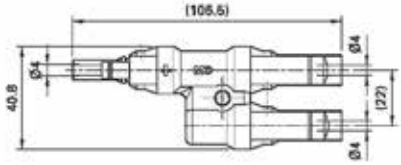
Abzweigbuchse, -stecker MC4

Branch socket, branch plug MC4

PV-AZB4



PV-AZS4



Typ Type	Bestell-Nr. Order No.	Beschreibung Description
PV-AZB4	32.0018	Abzweigbuchse/Branch socket
PV-AZS4	32.0019	Abzweigstecker/Branch plug

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Entriegelungsschlüssel Seite 57

Montageanleitung **MA250**
www.multi-contact.com

Safety locking clip page 49
Sealing caps page 51
Unlocking tool page 57

Assembly Instructions **MA250**
www.multi-contact.com

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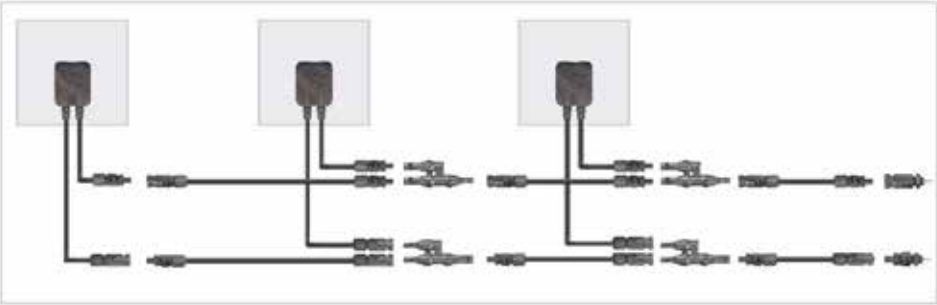
Advanced Contact Technology

Multi-Contact MC
STÄUBLI GROUP

- Für eine sichere und montagefreundliche parallel- oder parallel-seriell-Verkabelung von PV-Modulen.
- Steckbar mit einpoligen MC PV-Steckverbindern MC4. Nicht gesteckte Anschlüsse müssen mit einer Verschlusskappe geschützt werden.

- For a safe and simple parallel or serial-parallel connection of PV modules.
- Pluggable with single-pole MC PV-cable coupler MC4. Unmated connections must be protected by sealing caps.

Technische Daten	Technical data	
Steckverbindersystem	Connector system	**Ø 4 mm**
Bemessungsspannung	Rated voltage	**1000 V DC (MC)**
Bemessungsstrom	Rated current	**30 A**
Bemessungsstoßspannung	Rated impulse voltage	**12 kV**
Umgebungstemperaturbereich	Ambient temperature range	**-40 °C...+90 °C (MC)**
Obere Grenztemperatur	Upper limiting temperature	**105 °C (MC)**
Schutzart, gesteckt ungesteckt	Degree of protection, mated unmated	**IP67** **IP2X**
Überspannungskat. /Verschmutzungsgrad	Overvoltage category/Pollution degree	**CATIII/2**
Kontaktwiderstand der Steckverbinder	Contact resistance of plug connectors	**≤ 0,5 mΩ**
Schutzklasse	Safety class	**II**
Kontaktsystem	Contact system	**MULTILAM**
Kontaktmaterial	Contact material	**Kupfer, verzinnt** **Copper, tin plated**
Isolationsmaterial	Insulation material	**PC**
Verriegelungssystem (UL)	Locking system (UL)	**Locking type**
Flammklasse	Flame class	**UL94-V0**



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Multi-Contact MC STÄUBLI GROUP

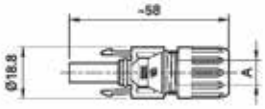
Kupplungsbuchse, -stecker MC4

Female and male cable coupler MC4

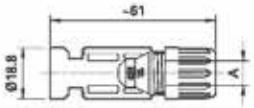
Kupplungsbuchsen und -stecker als Einzelteil
(inklusive Isolierteil)

Female and male cable coupler as individual part
(including insulating part)

PV-KBT4...



PV-KST4...



Typ Type	Bestell-Nr. Order No.	Kupplungsbuchse Female cable coupler	Kupplungsstecker Male cable coupler	Ø-Bereich Kabelverschraubung Ø range of cable gland	Leiterquerschnitt Conductor cross section			Zulassungen Approvals
				A (mm)	mm²	AWG	b (mm)	
PV-KBT4/2,5I-UR	32.0010P0001-UR	x		3 – 6	1,5; 2,5	14	3	
PV-KST4/2,5I-UR	32.0011P0001-UR		x	3 – 6	1,5; 2,5	14	3	
PV-KBT4/2,5II-UR	32.0012P0001-UR	x		5,5 – 9	1,5; 2,5	14	3	
PV-KST4/2,5II-UR	32.0013P0001-UR		x	5,5 – 9	1,5; 2,5	14	3	
PV-KBT4/6I-UR	32.0014P0001-UR	x		3 – 6	4; 6	12; 10	5	
PV-KST4/6I-UR	32.0015P0001-UR		x	3 – 6	4; 6	12; 10	5	
PV-KBT4/6II-UR	32.0016P0001-UR	x		5,5 – 9	4; 6	12; 10	5	
PV-KST4/6II-UR	32.0017P0001-UR		x	5,5 – 9	4; 6	12; 10	5	
PV-KBT4/10II	32.0034P0001	x		5,5 – 9	10	–	7,2	
PV-KST4/10II	32.0035P0001		x	5,5 – 9	10	–	7,2	

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MA Montageanleitung **MA231**
www.multi-contact.com

MA Assembly Instructions **MA231**
www.multi-contact.com

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Advanced Contact Technology

Multi-Contact MC STÄUBLI GROUP

- Snap-In Verriegelung
- Durch Einsatz der Sicherungshülse PV-SSH4 Verriegelung nach NEC 2011, nur mit Werkzeug entriegelbar
- Bewährte, langzeitstabile MULTILAM Technologie, dadurch konstant geringe Verlustleistung über die gesamte Lebensdauer der Steckverbinder
- Bewährter Steckverbinder, 12 Jahre Felderfahrung
- Auch für Querschnitte von 10 mm² konfektionierbar
- Auch erhältlich als konfektionierte Leitungen, siehe Seite 62
- Leitungen nach Kundenwunsch, siehe Seite 64

- Snap-in lock
- Locking by safety lock clip PV-SSH4 in accordance with NEC 2011, can be released only with tool
- Proven MULTILAM technology with high long-term stability, which ensures consistently low performance loss throughout the entire service life of the plug connector
- Tried and tested plug connectors, 12 years of experience in the field
- Available for assembly with cross-sections of 10 mm²
- Also available as ready made leads, see page 62
- Leads made to customer's specifications, see page 64

Technische Daten	Technical data	
Steckverbindersystem	Connector system	Ø 4 mm
Bemessungsspannung	Rated voltage	1000 V DC/1500 V DC (IEC)[1] 1000 V DC/600 V DC (UL)
Bemessungsstrom IEC (90 °C)	Rated current IEC (90 °C)	17 A (1,5 mm²) 22,5 A (2,5 mm²; 14 AWG) 30 A (4 mm², 6 mm²; 12 AWG, 10 AWG) 43 A (10 mm²)
Bemessungsstrom IEC (85 °C)	Rated current IEC (85 °C)	17 A (1,5 mm²) 22,5 A (2,5 mm²; 14 AWG) 39 A (4 mm²; 12 AWG) 45 A (6 mm²; 10 AWG)
Bemessungsstoßspannung	Rated impulse voltage	12 kV (1000 V DC (IEC)) 16 kV (1500 V DC (IEC))
Umgebungstemperaturbereich	Ambient temperature range	-40 °C...+90 °C (IEC) -40 °C...+75 °C (UL) -40 °C...+70 °C (UL: 14 AWG)
Obere Grenztemperatur	Upper limiting temperature	105 °C (IEC)
Schutzart, gesteckt ungesteckt	Degree of protection, mated unmated	IP65, IP68 (1 h/1 m) IP2X
Überspannungskat./Verschmutzungsgrad	Overvoltage category/ Pollution degree	CATIII/3
Kontaktwiderstand der Steckverbinder	Contact resistance of plug connectors	≤ 0,35 mΩ
Schutzklasse	Safety class	1000 V DC: II 1500 V DC: 0
Kontaktsystem	Contact system	MULTILAM
Anschlussart	Type of termination	Crimpen/Crimping
Kontaktmaterial	Contact material	Kupfer, verzinnt/Copper, tin plated
Isolationsmaterial	Insulation material	PC/PA
Verriegelungssystem (UL)	Locking system (UL)	Locking type
Flammklasse	Flame class	UL94-V0
Ammoniakbeständigkeit (gemäß DLG)	Ammonia resistance (acc. to DLG)	1500 h, 70 °C/70 % RH, 750 ppm
Salznebelsprühtest, Schärfegrad 6	Salt mist spray test, degree of severity 6	IEC 60068-2-52
TÜV-Rheinland zertifiziert nach EN 50521 TÜV-Rheinland zertifiziert nach 2PfG2330 UL anerkannte Komponente nach UL 6703 CSA zertifiziert nach UL 6703	TÜV-Rheinland certified, in accordance with EN 50521 TÜV-Rheinland certified, in accordance with 2PfG2330 UL recognized component, in accordance with UL 6703 CSA certified, in accordance with UL 6703	R60028286 R60087448 E343181 250725

[1] 2PfG2330: Nur für zugangsbeschränkte Standorte zugelassen

[1] 2PfG2330: only approved for locations with restricted access

SU+RE HOUSE
Project Manual
As-Built Documentation
August 2015

U.S. DEPARTMENT OF ENERGY
SOLAR DECATHLON