

U.S. DEPARTMENT
OF ENERGY
SOLAR DECATHLON 2015

PROJECT MANUAL TEAM NYCCT



**NEW YORK CITY
COLLEGE OF
TECHNOLOGY**



PROJECT MANUAL

Version 3 As-Builts

DURAhome

Solar Decathlon 2015

New York City College of Technology

Brooklyn, New York

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SUMMARY OF CHANGES





SUMMARY OF CHANGES

PLAN/INTERIOR

Hempcrete removed from scope.

Bedroom closet moved to north wall, integrated with furniture piece.

Stove moved to west wall of kitchen.

EXTERIOR

Large glass door is a trifold door.

MECHANICAL

Trombe wall removed from scope.

Water tank moved to kitchen, northeast corner.



RULES COMPLIANCE CHECKLIST



RULES COMPLIANCE CHECKLIST

| RULES | 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-120 O-121 |
| Rule 4-2 | Construction Equipment | Specifications for heavy machinery | PM 01 54 00 |
| Rule 4-3 | Ground Penetration | Drawing(s) showing the locations and depths of all ground penetrations on the competition site | S-501 |
| Rule 4-4 | Impact within the Solar Envelope | Drawing(s) showing the location, contact area, and bearing pressure of every component resting directly within the Solar Envelope | G-111 |
| Rule 4-5 | Generators | Specifications for generators (including sound rating) | 01 54 00 |
| Rule 4-6 | Spill Containment | Drawing(s) showing the locations of all equipment, containers and pipes that will contain liquids at any point during the event | P-101 P-105 P-106 |
| Rule 4-6 | Spill Containment | Specifications for all equipment, containers, and pipes that will contain fluids at any point during the event | 22 00 00 23 56 13.19 23 81 46.13 23 83 16 21 10 00 |
| Rule 4-7 | Lot Conditions | Calculations showing that the structural design remains compliant even if 18in. (45.7 cm) of vertical elevation change exists | G-110 |
| Rule 4-7 | Lot Conditions | Drawing(s) showing shimming methods and materials to be used if 18 in. (45.7 cm) of vertical elevation change exists on the lot | N/A |



RULES COMPLIANCE CHECKLIST

| RULES | RULE DESCRIPTION | LOCATION DESCRIPTION | LOCATION |
|----------|-------------------------------|---|---|
| Rule 5-2 | Solar Envelope Dimensions | Drawing(s) showing the location of all house and site components relative to the Solar Envelope | G-111 |
| Rule 5-2 | Solar Envelope Dimensions | List of Solar Envelope exemption requests, accompanied by justifications and drawing references | N/A |
| Rule 6-1 | Structural Design Approval | A 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 | PM page 10, Structural Calculations, S-100.1 S-100.2 S-101.1 S-101.2 S-103 |
| Rule 6-2 | Finished Square Footage | Drawing(s) showing all information needed by the rules officials to measure the finished square footage electronically | G-120 |
| Rule 6-2 | Finished Square Footage | Drawing(s) showing all movable components that may increase the finished square footage of operated during contest week | N/A |
| Rule 6-3 | Entrance and Exit Routes | Drawing(s) showing the accessible public tour route | G-124 |
| Rule 7-1 | Placement | Drawings showing the location of all vegetation, and if applicable, the movement of vegetation designed as part of an integrated mobile system | L-102 |



RULES COMPLIANCE CHECKLIST

| RULES | RULE DESCRIPTION | LOCATION DESCRIPTION | LOCATION |
|----------|---------------------------|---|--------------------|
| Rule 7-2 | Watering Restrictions | Drawing(s) showing the layout and operation of greywater irrigation systems | P-107 P-108 |
| Rule 8-1 | PV Technology Limitations | Specifications for photovoltaic components | 23 56 13.13 |
| Rule 8-3 | Batteries | Drawings showing the location(s) and quantity of all primary and secondary batteries and stand-alone, PV-power devices | PM page 10, 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 | 23 00 00 |
| Rule 8-5 | Village Grid | Completed interconnection application form. | PM 23 |
| 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 PV-106.2 |
| Rule 8-5 | Village Grid | Specifications for the photovoltaics, inverter(s), terminal box , meter housing, service equipment, and grounding means | 23 86 13 |
| Rule 8-5 | Village Grid | One-line electrical diagram | E-120 |
| Rule 8-5 | Village Grid | Calculation of service/feeder net computed load per NEC 220 | N/A |
| Rule 8-5 | Village Grid | Site plan showing the house, decks, ramps, tour paths, and terminal box | G-122 |



RULES COMPLIANCE CHECKLIST

| RULES | RULE DESCRIPTION | LOCATION DESCRIPTION | LOCATION |
|----------|-----------------------|---|----------------|
| Rule 8-5 | Village Grid | Elevation(s) showing the meter housing, main utility disconnect, and other service equipment | M-102 |
| Rule 9-1 | Container Locations | Drawing(s) showing the location of all liquid containers relative to the finished square footage | G-122 |
| Rule 9-1 | Container Locations | Drawing(s) demonstrating that the primary supply water tank(s) is fully shaded from direct solar radiation between 9am and 5pm PDT, or between 8am and 4pm solar time on October 1. | P-101 |
| Rule 9-3 | Team-Provided Liquids | Quantity, specifications, and delivery date(s) of all team-provided liquid 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 | P-107 P-108 |
| Rule 9-6 | Thermal Mass | Drawing(s) showing the locations of liquid-based thermal mass systems | P-101 |



RULES COMPLIANCE CHECKLIST

| RULES | RULE DESCRIPTION | LOCATION DESCRIPTION | LOCATION |
|-----------|-------------------------|--|----------------------|
| 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 | P-104 |
| Rule 9-8 | Water Delivery | Specifications for the containers to which water will be delivered | PM 13 30 00 |
| Rule 9-9 | Water Removal | Drawing(s) showing the complete sequence of water consolidation and removal events | P-105 |
| Rule 9-9 | Water Removal | Specifications for the containers from which water will be removed | P-103 PM 13 30 00 |
| Rule 11-4 | Public Exhibit | Interior and exterior plans showing entire accessible tour route | G-121 G-122 |



STRUCTURAL CALCULATIONS



STRUCTURAL CALCULATIONS

The structural design was certified by Arup Engineering. Stamped structural drawings and calculations submitted separately.

ARUP ENGINEERING

77 Water Street

New York

NY 10005

USA

T+1 212 896 3000

Enewyork@arup.com

STRUCTURAL DESIGN

DURAhome is modular, quick to construct, with a durable lightweight wood construction of engineered and dimensional lumber, assembled according to a simple bolt connection system. Composed of modules which fit on standard sized trucks, the home is quick to deploy and construct when needed. The modular structural system is robust enough to be stacked; the structure of one unit can hold the weight of three others atop it.

The team chose wood for the structural system for many reasons, including ease of buildability, minimized thermal bridging, and low carbon footprint. DURAhome showcases wood's value in modular construction and presents a typology of net-zero modular construction that is truly healthy, sustainable, renewable and responsible.

Please refer to the structural drawings in the drawing set beginning with S-100.

LOAD CALCULATIONS

$P_g = 20 \text{ psf}$

GROUND SNOW LOADS

(Based on BCNYS Figure 1608.2)

$PF = 0.7 \cdot C_e \cdot C_t \cdot I \cdot P_g$

FLAT ROOF SNOW LOAD

$C_e = 1.0, c_l = 1.0, I = 1.0$

$P_f = 20 \text{ psf}$

ROOF LIVE LOAD FOR FLAT ROOFS

$LR = 20 \text{ psf}$ (based on ASCE 7-10 Table 4.1) Roof Dead Load with light-weight tile $LD = 21 \text{ psf}$

WIND LOAD

(Based on BCNYC 1609 6.21(2))

$LW = 10 \text{ psf}$ (For wind gust of 120 mph.)



DETAILED WATER BUDGET



DETAILED WATER BUDGET

Detailed Water Budget

| FUNCTION | WATER USE (GALLONS) | CALCULATIONS | | NOTES |
|--------------------------|---------------------|--------------|--------|---|
| | | GAL | EVENTS | |
| Hot Water Draws | 240 | 15 | 16 | |
| Water Vaporization | 4 | 1 | 4 | |
| Dishwasher | 25 | 5 | 5 | 5 - 15 gallons per load |
| Clothes Washer | 200 | 25 | 8 | 20 - 25 gallons per load (8.0 - 9.5 gals/cubic foot) |
| Vegetation | 14 | 2 | 7 | A combination of greywater system would be use for vegetation |
| Fire Protection | 280 | 40 | 1 | 40 gallons for 7 minutes for 1 event |
| Thermal Storage Tanks | 0 | | 1 | |
| Testing | 40 | 5 | 8 | |
| Initial Systems Fill | 0 | | 1 | |
| Solar Thermal Collectors | 4 | 4 | 1 | Maximum operating pressure: 6 psi |
| Aesthetic Purpose | | | | |
| Radiant Flooring | 0 | | 1 | |
| Safety Factor | 110.7 | | | |
| WATER REQUIRED | 1217.7 | gallons | | |



SUMMARY OF UNLISTED ELECTRICAL COMPONENTS



SUMMARY OF UNLISTED ELECTRICAL COMPONENTS

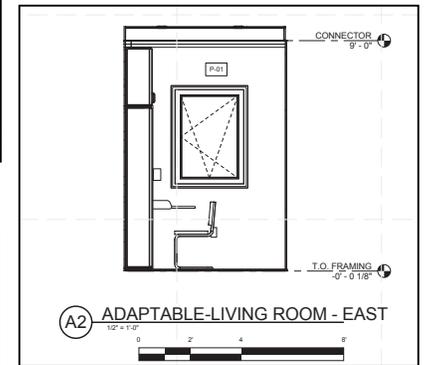
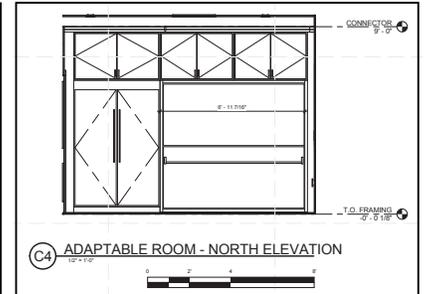
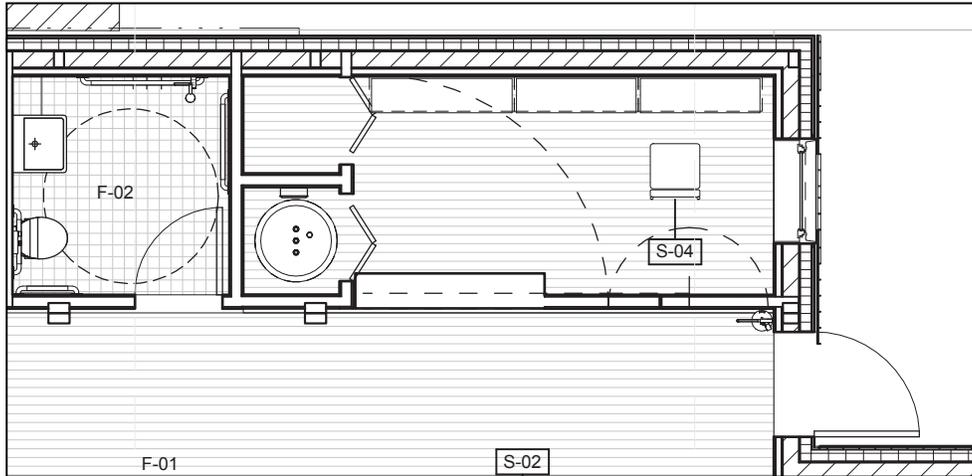
All electrical components can carry an approved testing agency's listing, per Section 6.7 of the SD 2015 Building Code.





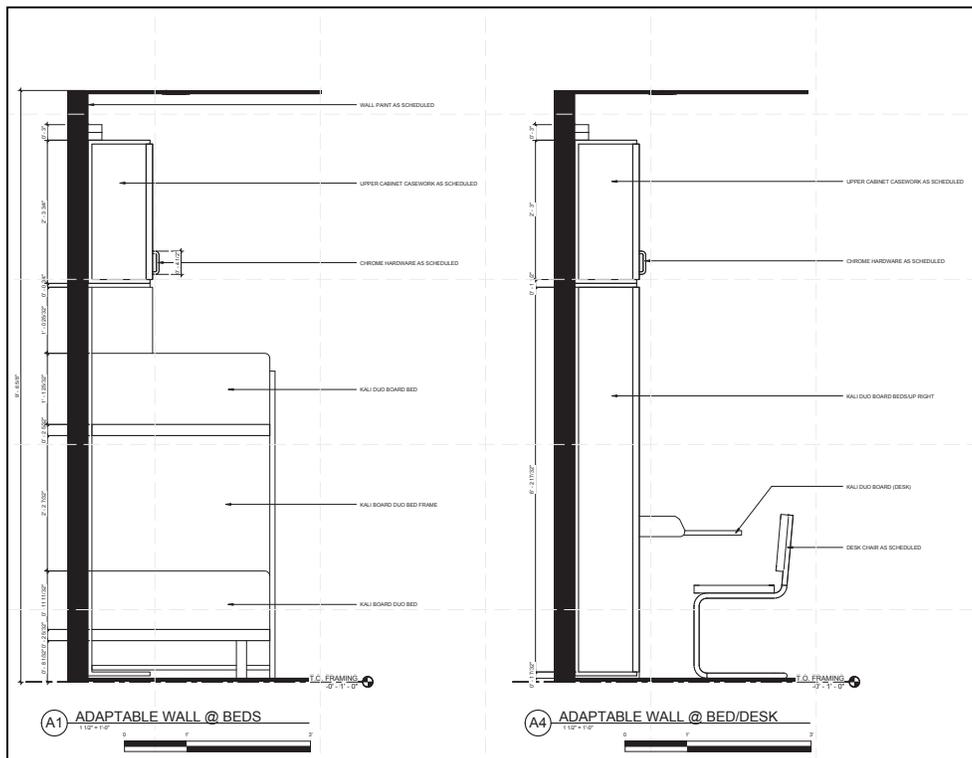
SUMMARY OF RECONFIGURABLE FEATURES

SUMMARY OF RECONFIGURABLE FEATURES



Adaptable room created by two moving walls. Adaptable furniture within the room converts from desk to bunk bed.

Please see pages A-101, A-456, A-506, A-507, A-541.





INTERCONNECTION APPLICATION FORM



INTERCONNECTION APPLICATION FORM

TEAM NYCCT: LOT #105

PV Systems

| Module Manufacturer | Short Description of Array | DC Rating of Array (sum of the DC ratings) |
|--------------------------|---|---|
| SunDrum SDM100 | Triples panel efficiency by cooling the PV panel for improved efficiency and collecting thermal energy. | N/A |
| SunPower 305 Solar Panel | Photovoltaic panels designed to absorb the sun's rays as a source of energy for generating electricity or heating. 19 x 305 Watt Panels | 5.8kW |

Total DC power of all arrays is 5.8 kW (in tenths)

INVERTERS

| Inverter Manufacturer | Model Number | Voltage | Rating (kVA or KW) | Quantity |
|-----------------------|-----------------------------|---------|--------------------|----------|
| ABB | MICRO-0.25/0.3/0.3HV-I-OUTD | 240V | 300W | 19 |

Total AC power of all inverters is 5.7 kW kVA or kW (in whole numbers)



ENERGY ANALYSIS RESULTS AND DISCUSSION



ENERGY ANALYSIS RESULTS AND DISCUSSION

1.0 - EXECUTIVE SUMMARY

1.1 - INTRODUCTION

TeamDURA's Energy Analysis report is an overview of the core concepts which informed the design of the house and the resultant systems which fulfill the climactic and energetic needs of the project. Each section details these environmental concerns informing the decisions, the various systems chosen, and the energy modeling employed. By so doing, this report highlights the relationships between the urban environment for which the house is designed, the climatic changes it is preparing for and the systems which best support those needs. It explains the ways in which house and its systems integrate with each other and the built environment. It offers an urban approach to resilient, energy-efficient housing that adapts to the needs of a diverse city and its people.

1.2 - URBANISM + RESILIENCE

DURAhome is suitable for construction at the heart of the urban environment. Heightened living densities and high consumption rates are often seen as factors inhibiting sustainable practices. Of chief concern is passive survivability and storm protection. Sandy devastated many communities throughout New York City; DURA is designed to respond to an environment rife with climatic change and aims to mitigate disaster damage. Proximity to the flood plain and the rising sea levels of the Atlantic Ocean increases the need for proactive resilient design in response to the threats of flood water, gale force winds, and seismic activity. Plans to return the home to the Red Hook area of Brooklyn, an area devastated by Hurricane Sandy, inform the design of the home and its systems, both passive and active.

1.3 - PASSIVE + PASSIVE

DURAhome is an urban solution to energy-efficient housing developed through a multi-pronged approach: a hybrid of passive and active systems that can adapt to various urban configurations. Combining elements of passive ventilation with Passive House building principles results in highly-efficient house with reduced heating and cooling loads. A highly-insulated envelope coupled with a passive ventilation strategy forms the basis of the hybridized approach.

ENERGY ANALYSIS RESULTS AND DISCUSSION

2.0 - FLOODPLAIN | HISTORICAL ANALYSIS

2.1 - INTRODUCTION

This section discusses the team's study of climatic change and its impact on New York and buildings' futures.

2.2 - RESEARCH

Critical to the development of a home for an urban environment is an understanding of weather patterns, climate change and possible storm tendencies. Weather systems research was the first step toward developing an appropriate response.

2.3 - RESPONSE

The house is designed for the Red Hook area of Brooklyn, a neighborhood deeply affected by the force of Hurricane Sandy. The house is elevated and designed for passive survivability in the event of another serious storm, but more importantly, the commitment to developing a sustainable net-zero solution lessens the home's dependence on those systems which contribute to global climate change.

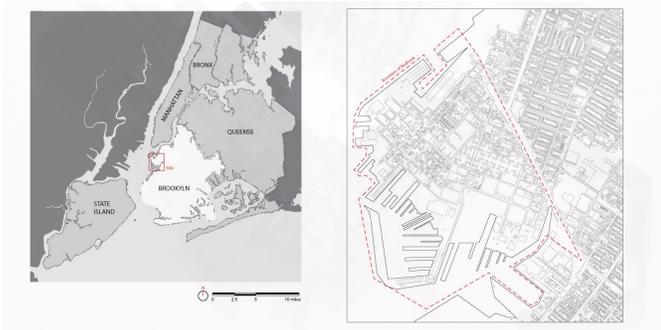


Fig 1. Map of New York with Red Hook highlighted; Red Hook

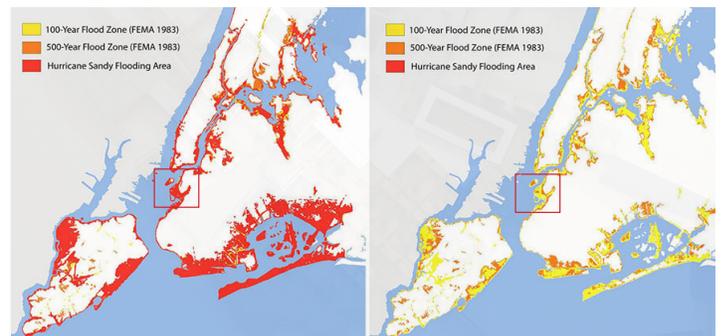


Fig 2. FEMA map, Storm infiltration in New York



Fig 3. FEMA map, Hurricane Sandy storm infiltration, Red Hook

ENERGY ANALYSIS RESULTS AND DISCUSSION

3.0 - CLIMATE ANALYSIS

3.1 - INTRODUCTION

This section discusses the team’s study of the local climate in New York.

3.2 - RESEARCH

In addition to manual research, a suite of programs from DesignBuilder to Vasari were used to evaluate and analyze the climate. A thorough understanding of the climate needs of a house based in New York is necessary to creating a right-sized response.

3.3 - RESPONSE

The house is designed for the typical New York lot, 25 x 100. With this initial constraint, as well as the considerations of designing for resilience, made an understanding of the nuances of the weather patterns important, so that an approach which is simultaneously responsive and adaptable could be found.

| | | | |
|--|---------|---------|-----|
| Weather Index | 90 | 29 | 100 |
| Hail Index | 56 | 39 | 100 |
| Hurricane Index | 119 | 93 | 100 |
| Tornado Index | 32 | 33 | 100 |
| | | | |
| Annual Maximum Avg. Temperature | 61.0 °F | 57.0 °F | N/A |
| Annual Minimum Avg. Temperature | 48.0 °F | 39.0 °F | N/A |
| Annual Avg. Temperature | 54.3 °F | 47.7 °F | N/A |
| Annual Heating Degree Days (Tot Degrees < 65) | 4,910 | 6,762 | N/A |
| Annual Cooling Degree Days (Tot Degrees > 65) | 1,052 | 484 | N/A |
| Percent of Possible Sunshine | 55 | 51 | N/A |
| Mean Sky Cover (Sunrise to Sunset - Out of 10) | 6 | 7 | N/A |
| Mean Number of Days Clear (Out of 365 Days) | 95 | 65 | N/A |
| Mean Number of Days Rain (Out of 365 Days) | 118 | 150 | N/A |
| Mean Number of Days Snow (Out of 365 Days) | 7 | 21 | N/A |
| Avg. Annual Precipitation (Total Inches) | 42.00" | 38.00" | N/A |
| Avg. Annual Snowfall (Total Inches) | 25.00" | 75.00" | N/A |

Fig 1. Climate and light data

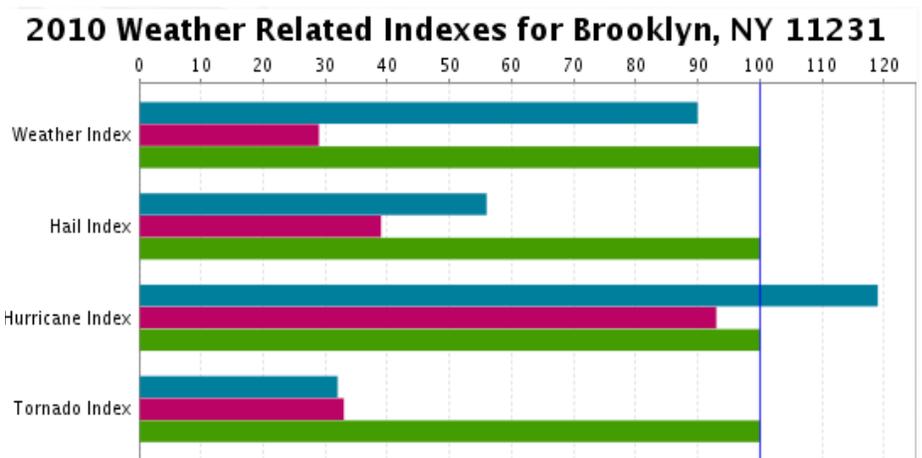


Fig 2. Weather Indexes



ENERGY ANALYSIS RESULTS AND DISCUSSION

4.0 - ENERGY ANALYSIS | DAYLIGHTING EFFECTS ON ENERGY AND COMFORT

4.1 - INTRODUCTION

This section focuses on the study of air flow, daylighting and heat.

4.2 - RESEARCH

The team used advanced building simulation with the airflow network model in EnergyPlus in order to study air flow, daylighting and heat.

4.3 - RESPONSE

Whole house energy analysis results following.

ENERGY ANALYSIS RESULTS AND DISCUSSION

1 INTRO

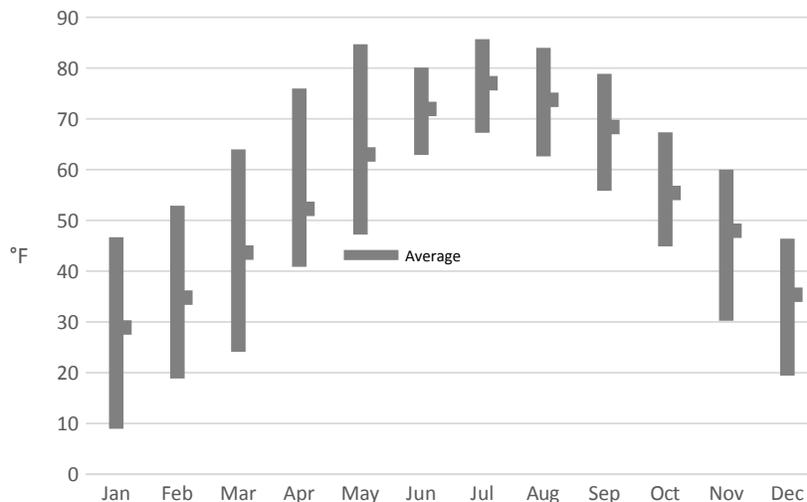
Beginning with climate analysis, three types of energy simulation are conducted: daylight, airflow, and heat. For weather inputs, the New York City, New York is also considered due to the premise of the proposal.

2 CLIMATE ANALYSIS

3 TEMPERATURE AND HUMIDITY

The monthly temperature and humidity data of the New York City are shown. This weather data is recorded at the Central Park in Typical Meteorological Year format that has been developed by the U. S. Department of Energy. The daily average temperature are analyzed for maximum, minimum and average in each month, for climate overview. General comfortable temperature ranges are indicated by colored shades: blue for summer (73~80 °F) and orange for winter (68~75 °F), both of which are extracted from ASHRAE 55-2013¹. Monthly average humidity is also shown.

The temperature in the summer months (June, July, and August) are generally agreeable. However, the high relative humidity near 70% may cause discomfort in July and August especially with the temperature over 75 °F. Temperature ranges in the colder months, October to March, fall below the winter comfortable ranges. In particular, average temperature from December to February drops below 40 °F, which may cause thermal discomfort. Humidity level stay above 60% due to the New York City's geographical proximity to the bodies of water, such as the Hudson River and the East River.



Monthly dry bulb temperature and relative humidity

¹ The comfort criteria includes dry bulb temperature, clothing level, humidity, air velocity, mean radiant temperature, and metabolic activity. Predicted Mean Vote model is used to calculate the comfort of the most people in a thermal zone.



ENERGY ANALYSIS RESULTS AND DISCUSSION

4 GENERAL DESIGN STRATEGIES FOR THERMAL COMFORT

The outdoor condition of the project location has comfortable hours in 10.7% of the entire year, by analyzing weather data. This can be improved by design strategies that are derived from an expert system that uses the climate data with The Top 20 Building Design Guidelines². A total of 3297 hours of comfortable temperature can be gained by using passive strategies for a total of 46% comfortable hours. The passive strategies are free from using additional energy for HVAC systems³.

INTERNAL HEAT GAIN 21%

Heat transmitted from lamps and appliances, direct solar gain through glazing, transmission due to solar gain on exterior surfaces, and latent heat from people in a well insulated home contribute to provide internal heat.

PASSIVE SOLAR DIRECT GAIN (LOW MASS) 9.6%

It is desirable for a floorplan to be organized so that the low winter sun can fully penetrate the dwelling during the daytime. In New York City, this space should face South.

SUN SHADING OF WINDOWS 8.4%

Shading outdoor spaces such as a porch or patio that is oriented to the prevailing winds can further provide thermal comfort by the following functions; storing heat in the winter, further protection of cold winter winds from directly hitting dwelling surfaces, and protection from direct sunlight in the summer.

WIND PROTECTION OF OUTDOOR SPACES 5.3%

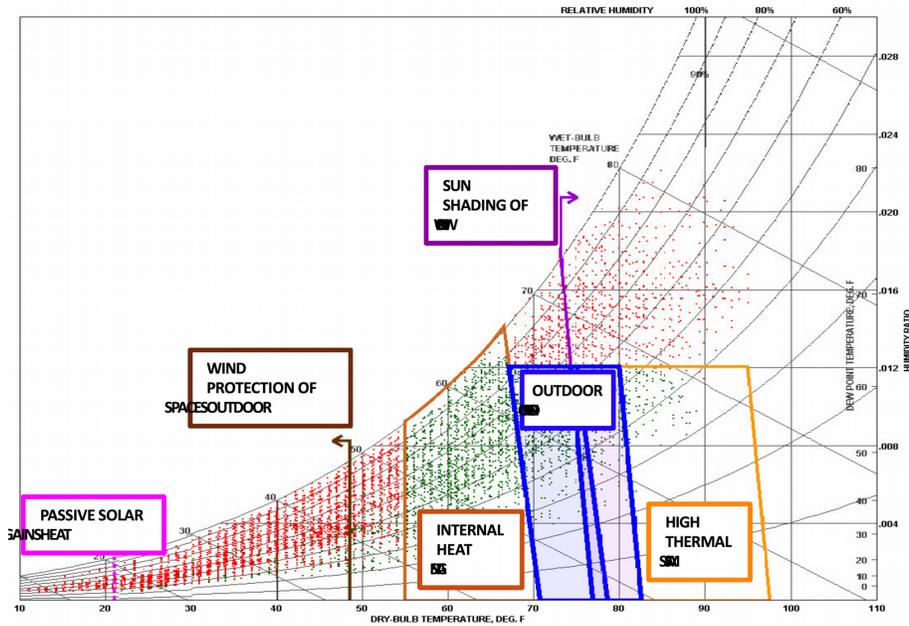
External wind protection can be further provided by extending living areas with sunny enclosed outdoor areas such as sun rooms, enclosed patios, courtyards, verandahs.

THERMAL MASS 1.3%

High mass interior surfaces absorb heat from the sun during the day and disperses it throughout the night.

² Design Strategies derived from a series of studies by Murray Milne, Robin Liggett, Andrew Benson, and Yasmin Bhattacharya UCLA Department of Architecture and Urban Design "Climate Consultant 4.0 Develops Design Guidelines for Each Unique Climate" <http://www.energy-design-tools.aud.ucla.edu/papers/ASES09-Milne.pdf>

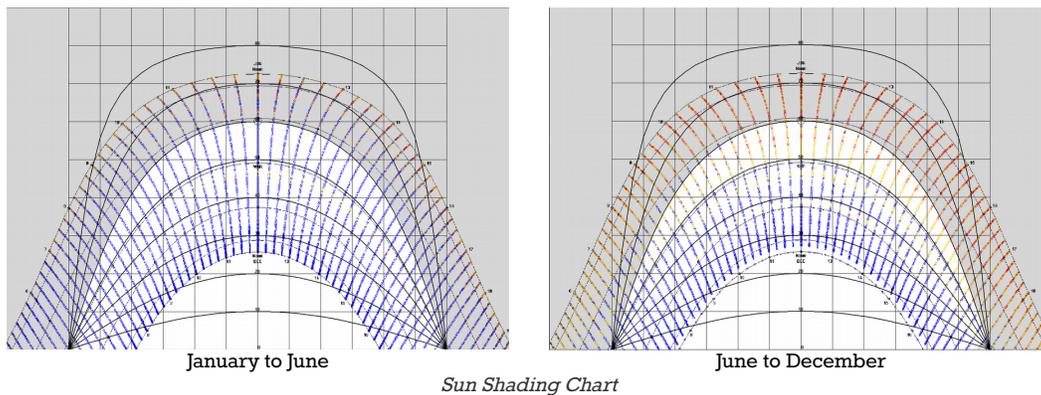
³ The strategies are general recommendation for a climate zone, not specific to the proposed design.



General Design Strategies for New York City Climate

5 SOLAR SHADING

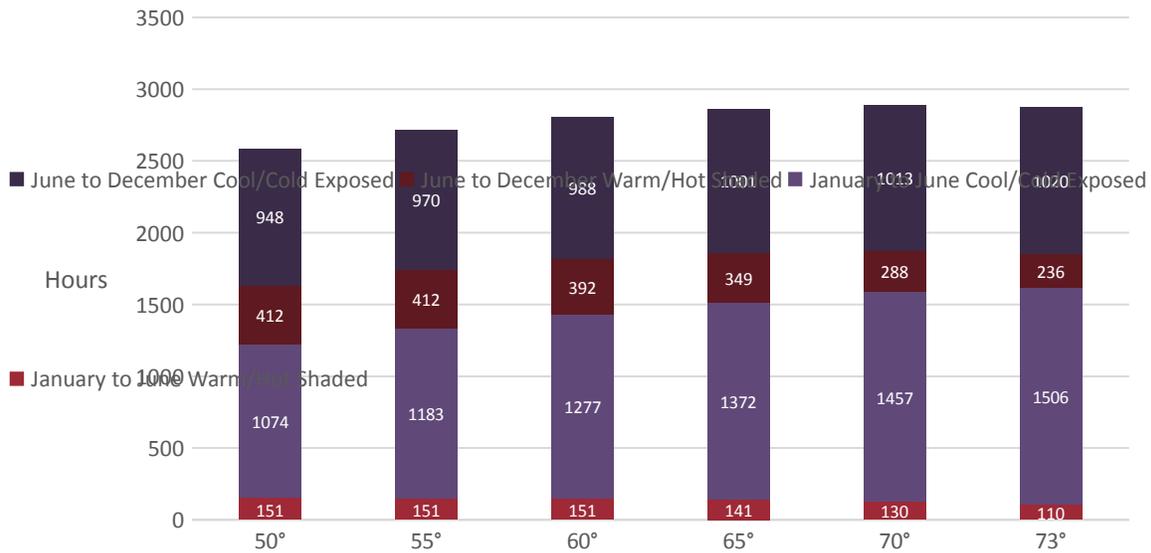
Solar shading is one of the passive strategies to prevent overheating in the summer and to heat the space in the winter. By using the Sun Shading Chart in the Climate Consultant, weather data is analyzed with the comfortable temperature range (68~80°F). Each hours in the weather data (total 8769 hours) is color-coded to indicate the temperature: red for warm/hot, yellow for comfortable, and blue for cool/cold. The window shading can be also visualized to approximate the number hours that are affected in either exposed or shaded conditions.



Sun Shading Chart

Using the sun shading chart, a parametric study was conducted to find an optimal angle for solar shading. While increasing the altitude angle for south wall, the shaded hours in the warm hours and the exposed hours in the cold hours are observed for the entire year. The tested range of altitude angles is at every 5° from the highest solar angle (73°). The lowest tested angle is 50° where the trend became evident, compared to the higher ones. Based on

this study, 65~70° is the appropriate altitude angles for passive cooling and heating. With these angles, environmental condition of the space may requires reduced thermal loads for HVAC system.

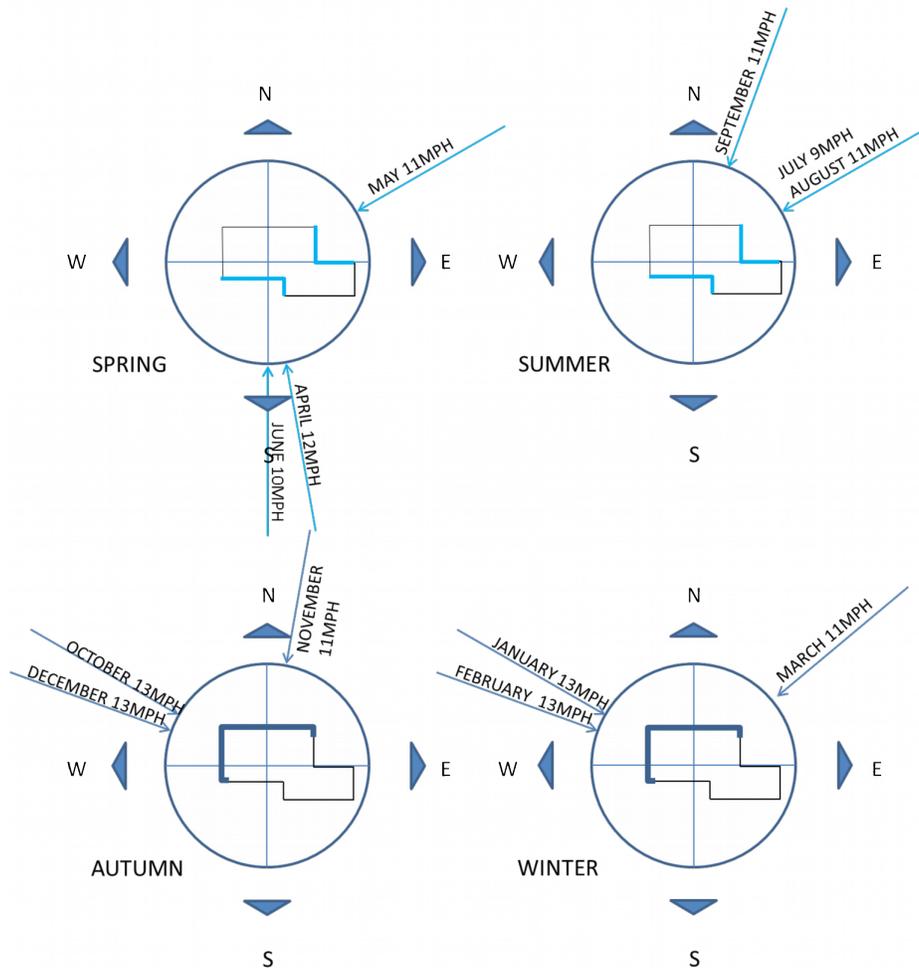


Parametric study result for window shading

6 SEASONAL WIND

The following diagram shows the prevailing wind conditions per seasons in New York City. Prevailing wind is determined by the monthly average speed and the dominant direction. For winter months when low temperature is associated, wind progresses from the North and West. This warrants that building may use passive design strategies such as wind shading or highly insulated wall toward the wind. In spring and summer, wind comes from either from North, Northeast or south. For natural ventilation, building may allocate openings at north-south direction. However, it is desirable to further consider the microclimate that dominate the wind direction and speed in urban areas.

ENERGY ANALYSIS RESULTS AND DISCUSSION



Seasonal Prevailing Wind Speed and Direction

7 DAYLIGHT

Daylight analysis was conducted with the proposed design. Analysis period is at every hour between 7AM and 6PM October 1st, which is one of the days when the building is open to the public. This allows visitors to understand the daylight condition for the New York City. Three criteria include indoor light level (illuminance), perceived light condition (rendering), and glare level.

8 BACKGROUND

An indoor light level is measured at a table height in 30" above ground. The light level is visualized at a 750 max Lux scale where the color red represents any instance the occupant experiences illumination above 750 lux. To evaluate the simulation result, the recommended light level is summarized in the table below for residential (Holton 2012).



ENERGY ANALYSIS RESULTS AND DISCUSSION

Recommended light level for residential (lux)

| Residential space | Light level | Residential space | Light level |
|--------------------|---------------|-------------------|----------------|
| Living Room | 32 | Dining | 54~215 |
| Bedroom | 54 | Home office | 215 |
| Bathroom | 54~323 | Kitchen | 215~538 |

Perceived light condition is simulated by a radiance rendered image of a selected view at a given date and time. This helps to observe how a space is day lit, especially how daylight accesses to the dining and living room and affect the quality of the space.

For glare level, Evalglare v1.0 is used in DIVA plug-in for Rhino. This is a radiance-based tool derived from analysis of glare. The metric 'Daylight Glare Probability (DGP)' chosen for average human discomfort (Wienold 2009). DGP considers overall brightness of the view, position of 'glare' sources and visual contrast. Contrast based glare sources will be seen highlighted in color.

Daylight Glare Probability (DGP)

| Residential space | Light level | Residential space | Light level |
|-------------------|----------------------|-------------------|--------------------|
| 0.33 | Imperceptible | 0.42 | Disturbing |
| 0.38 | Perceptible | 0.53 | Intolerable |

9 SIMULATION RESULT

The dining room receives enough daylight over 200 lux, in the typical meal times: 8am, 12pm, and 5pm. The full height glazed wall on the south contributed to this through allowing diffused radiation. For all tested hours, no glare was found perceptible.

The living room generally meets the recommended light level, with diffuse light throughout the day. This light level and quality is good for watching TV, music listening, and playing board games. Reading and writing can be better accommodated with task lights.

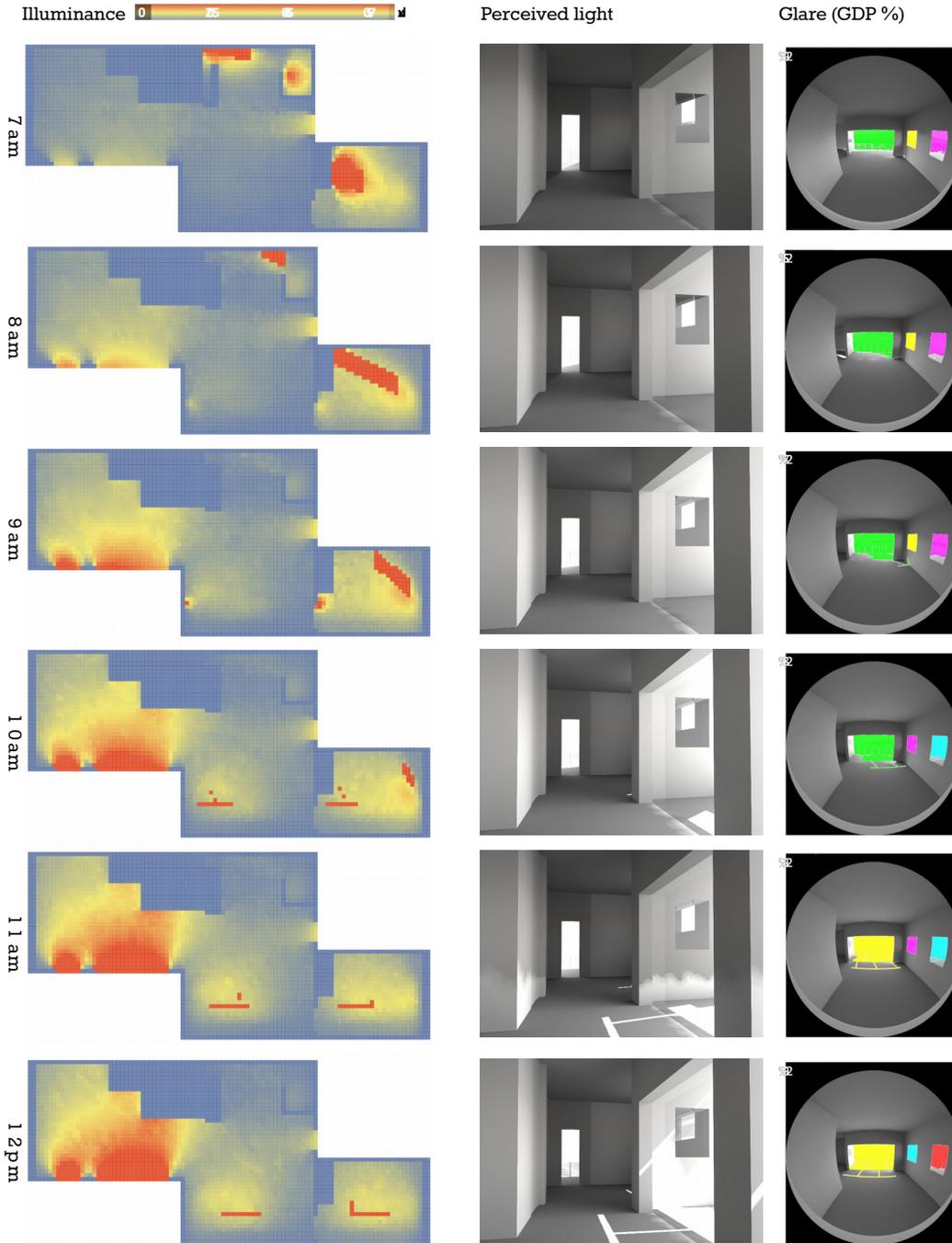
The adaptable room that is connected to the living room on the south can be regarded as a home office that can be used for other multiple purpose. Due to room location on the northern part of the building, and the window being covered with the exterior overhang, this area may rely on LED lighting later in the day.

The light level of the bedroom is above the recommended in order to facilitate a natural waking with the day. It is because of the direct solar radiation through the easterly-located window. Late day lighting needs rely on LED lighting and task lamps.

In summary, the daylight level in the various rooms serve activities satisfactorily. Strategic allocation of overhead lighting and occasional task lighting provide additional visual comfort and safety for the activities that requires high visual concentration, such as cooking and book reading.

ENERGY ANALYSIS RESULTS AND DISCUSSION

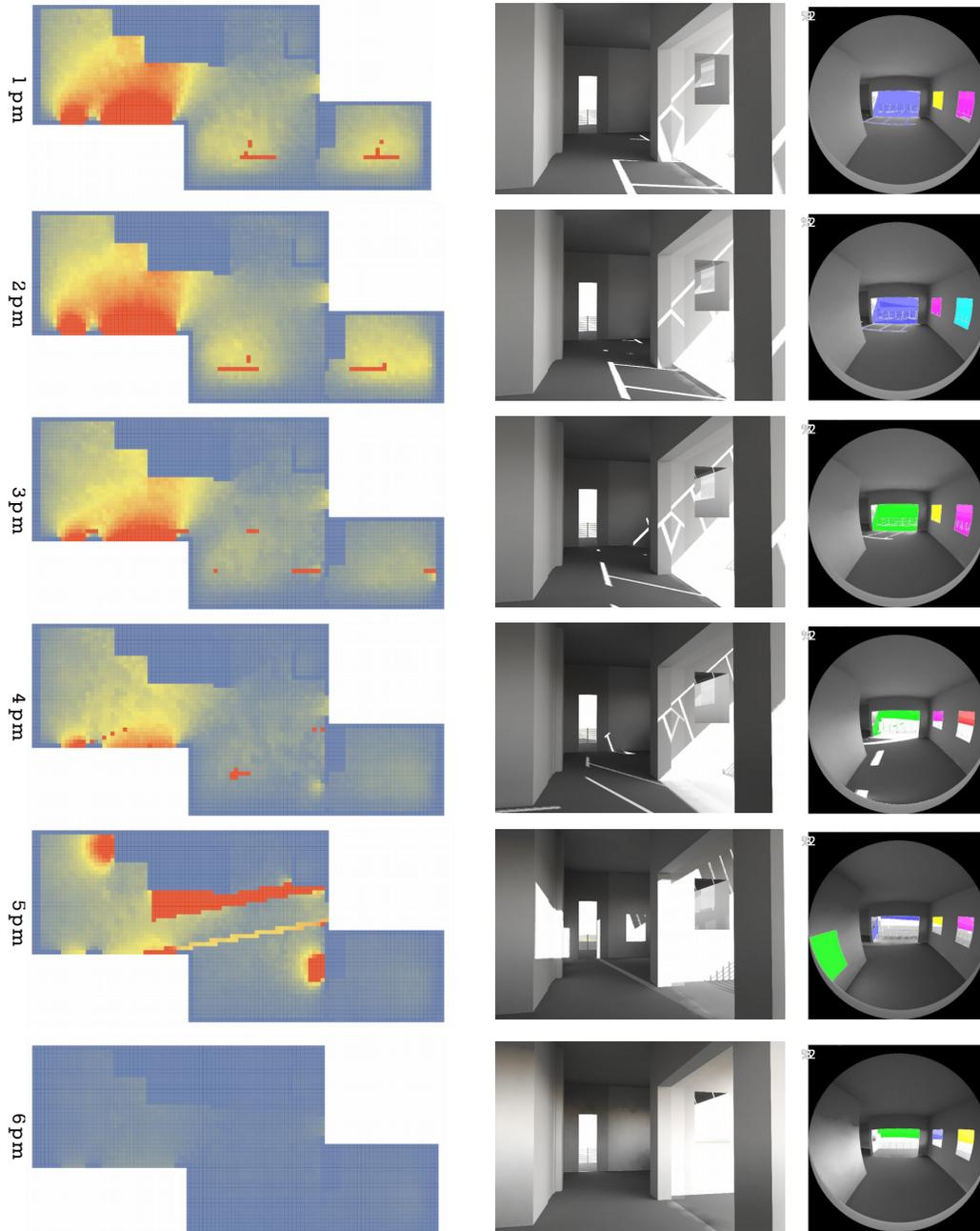
Daylight analysis, New York City, 7am-12pm October 1st



Daylight analysis, New York City, 1pm - 6pm October 1st

Illuminance 0 25 65 97 Perceived light Glare (GDP %)

ENERGY ANALYSIS RESULTS AND DISCUSSION



10 AIRFLOW

11 MATERIAL

3D geometry tool, Rhinoceros 5.0, is used to create building geometry. The geometry then used in ANSYS Meshing to generate computational grid. The boundary conditions are defined in ANSYS fluent with regional weather data, including wind speed and direction. K-epsilon model is used for turbulence.

ENERGY ANALYSIS RESULTS AND DISCUSSION

12 SEASONAL VENTILATION

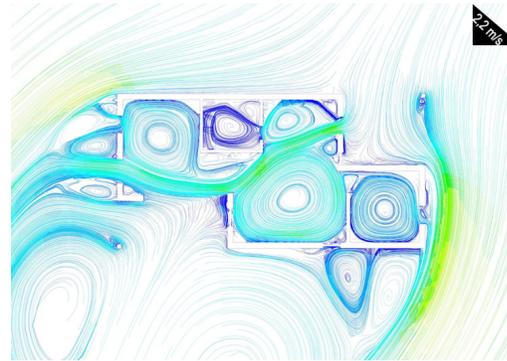
Wind intake direction and its initial velocity is the key to this simulation, we load region weather data from local weather station and calculate down to more realization velocity with NSF urban wind speed equation.

Spring

Primary spring wind is traveling to New York City from north east. The opening on the east and west side provide cross ventilation and allow air to smoothly flow thru the house. CASE B shown that by having door closed, DURAhome will significantly avoid high velocity wind, yet maintaining indoor air flow as light air condition.



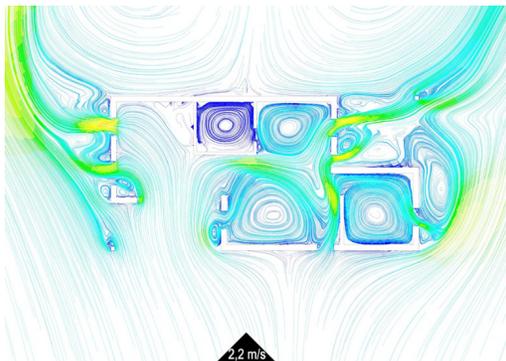
All Opened Scenario



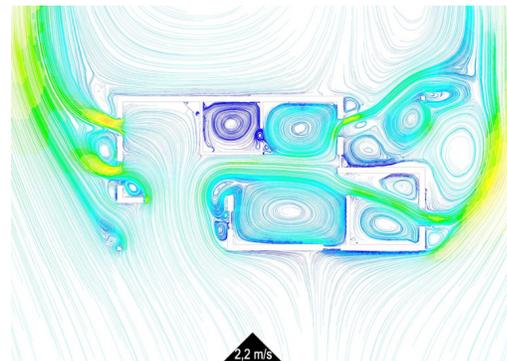
Door Closed Scenario

Summer

Primary summer wind are traveling to New York City from south. A light air breeze can help human feel a few degree cooler in summer, by having large sliding door located on south, inviting fresh breeze to indoor and increase air exchange rate to carry out the hot air in the house. CASE A shown by leaving door open, DURA home's living room will have a few light breeze spot. Which can be pleasant in a humid hot summer.



All Opened Scenario



Door Closed Scenario

Autumn

Primary autumn wind are traveling to New York City from North West. DURA home's north wall helped avoid chilly wind flowing directly thru the house. Both CASE A and B shown that wind speed velocity are significantly lower indoor as compare to outdoor.

ENERGY ANALYSIS RESULTS AND DISCUSSION



All Opened Scenario



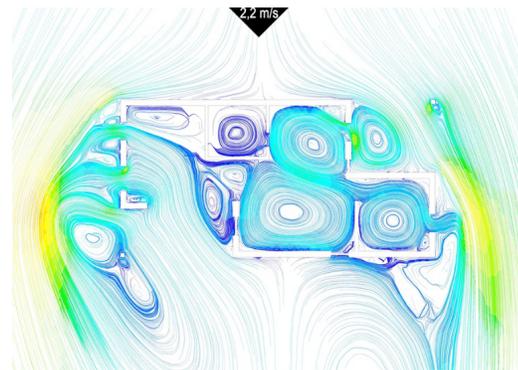
Door Closed Scenario

Winter

Primary winter wind are traveling to New York City from north. Winter wind is not pleasant at all, DURA home's highly insulated north wall with no opening will protect itself from cold winter wind. CASE A and B shown even with window and door open during summer, cold winter wind's impact on building is significantly reduced.



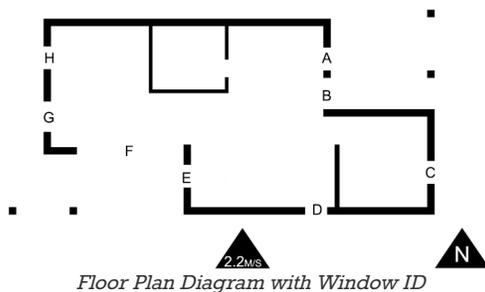
All Opened Scenario



Door Closed Scenario

13 VENTILATION STRATEGIES

To understand the openings in the proposed design and its influence on indoor airflow, more scenarios are created and assessed. Sixteen (16) test cases vary with how windows and doors are operated: open, closed, and half open. Wind direction and speed are fixed among test. The resultant wind speeds are measured 50 locations each room.



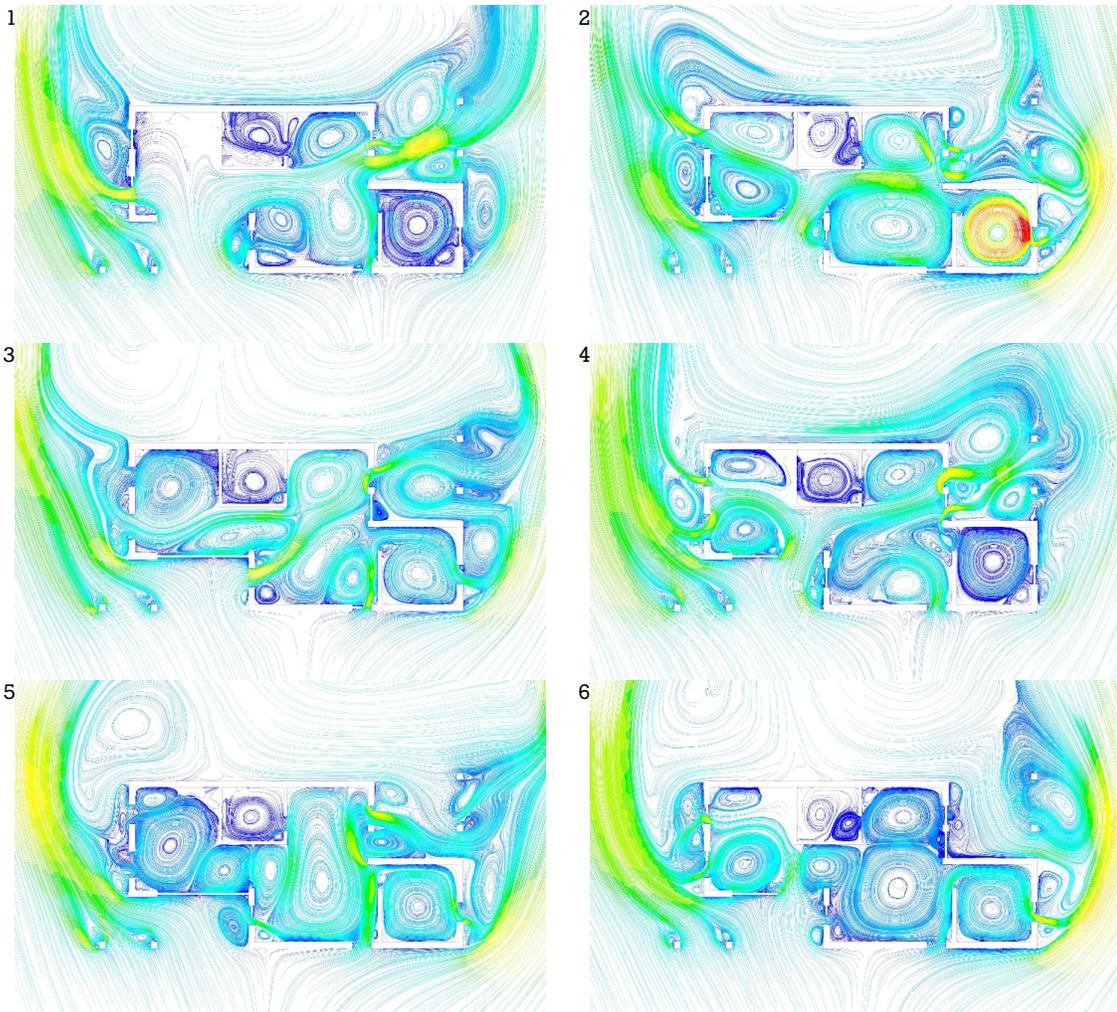
Window ID

Floor Plan Diagram with Window ID

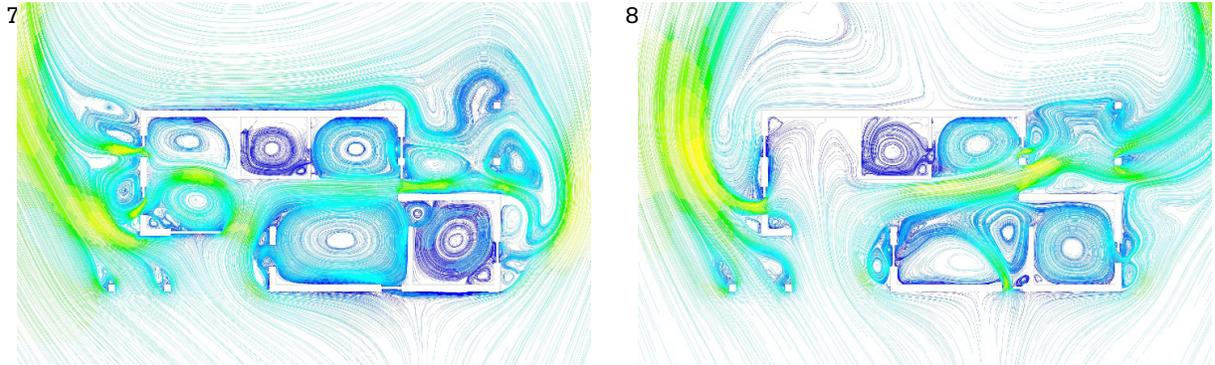
ENERGY ANALYSIS RESULTS AND DISCUSSION

| | A | B | C | D | E | F | G | H |
|----|---|---|---|---|---|---|---|---|
| 01 | ● | ○ | ● | ● | ● | ○ | ● | ● |
| 02 | ● | ○ | ○ | ● | ● | ● | ● | ○ |
| 03 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 04 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 05 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 06 | ● | ● | ○ | ○ | ○ | ○ | ○ | ○ |
| 07 | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 08 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 09 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 10 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 11 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 12 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 13 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 14 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 15 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 16 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

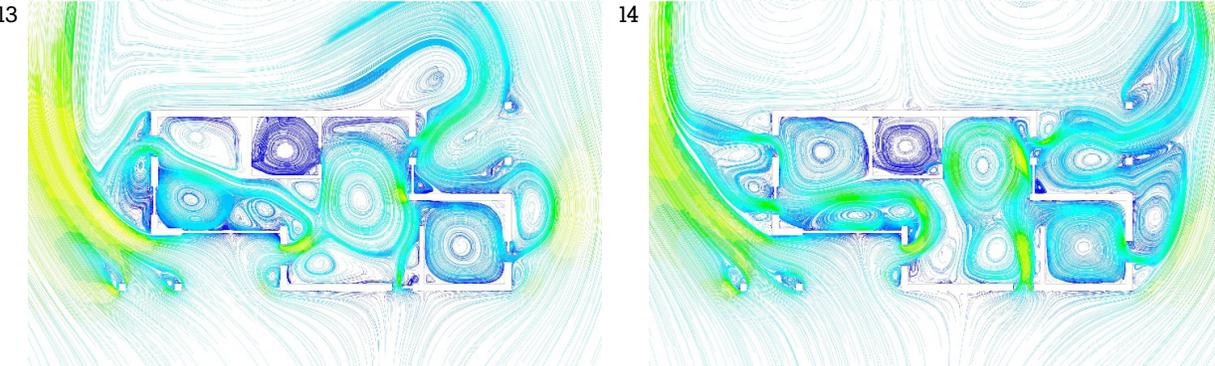
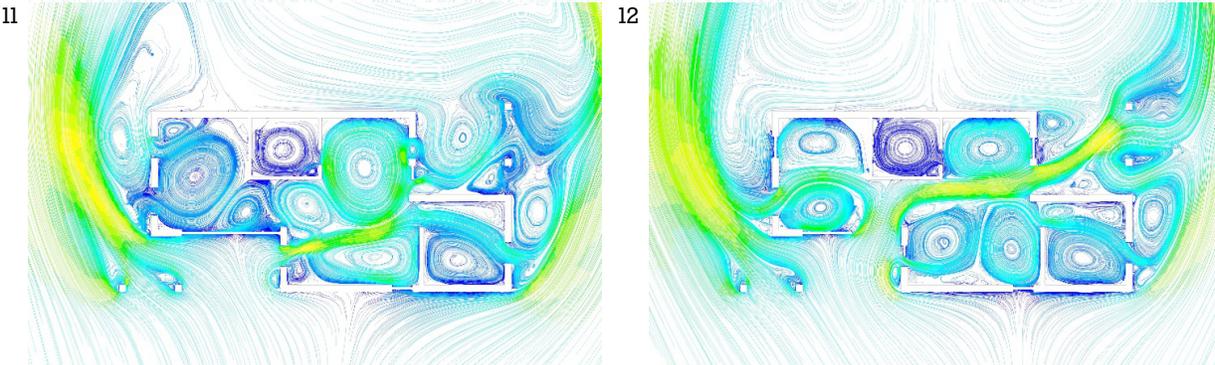
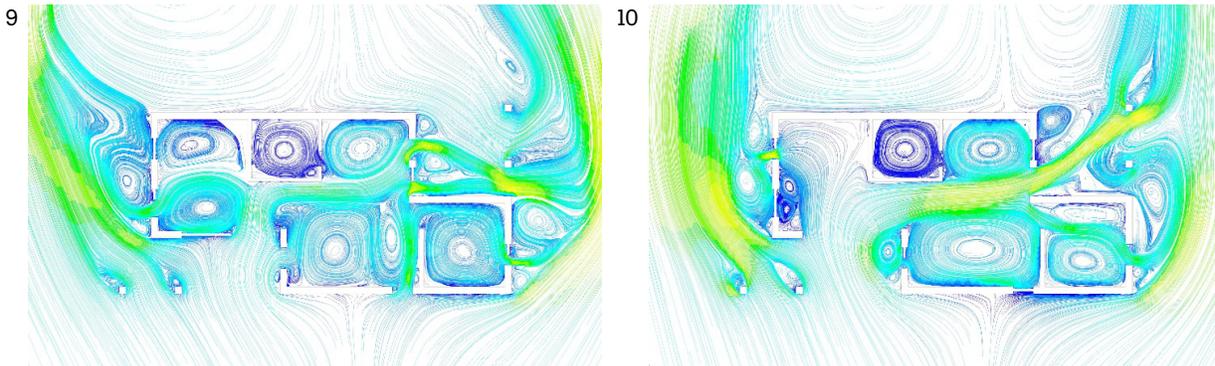
14 Result



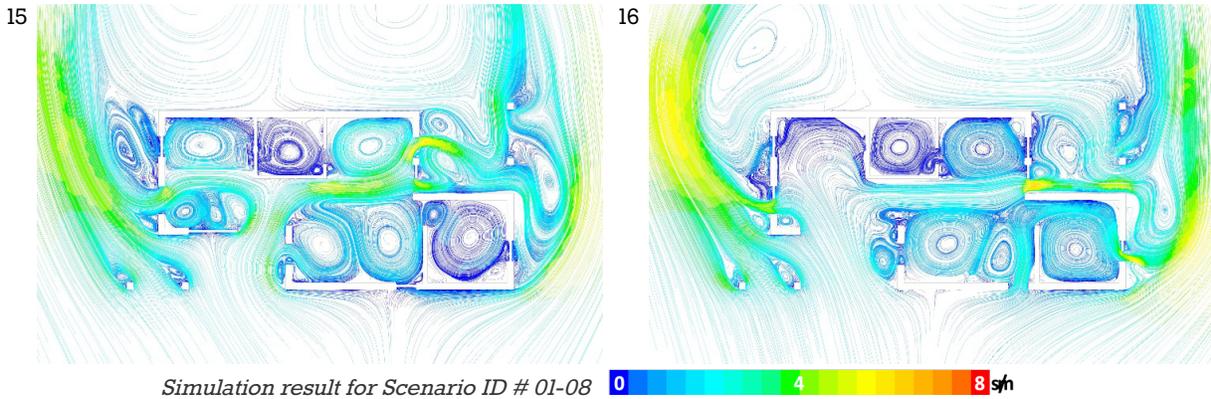
ENERGY ANALYSIS RESULTS AND DISCUSSION



Simulation result for Scenario ID # 01-08 0 4 8 kWh

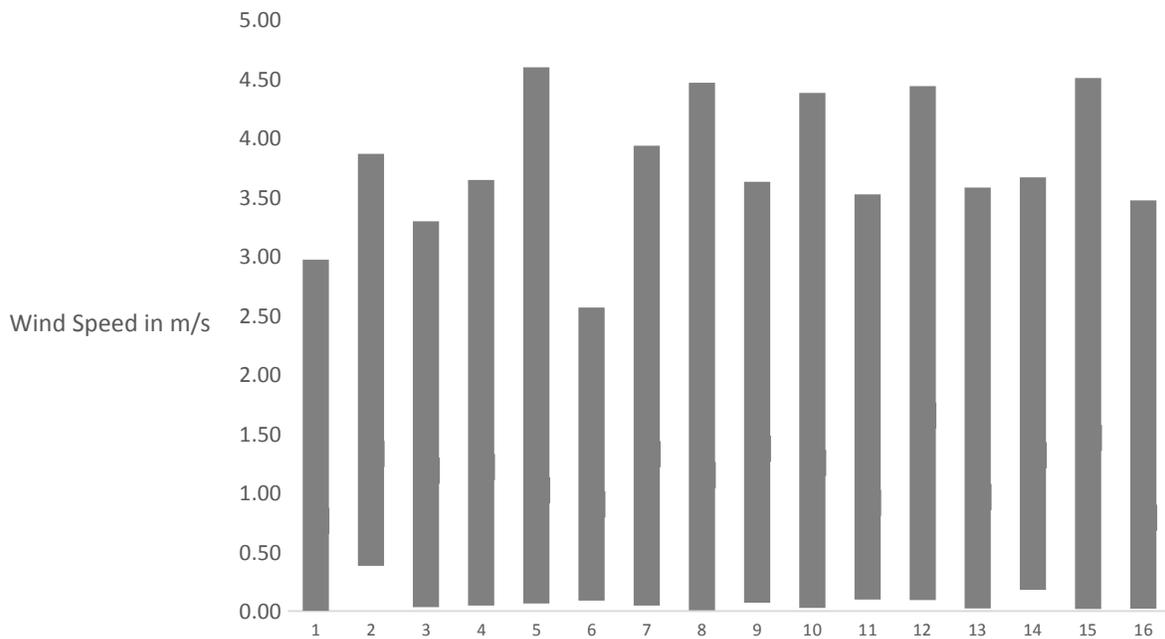


ENERGY ANALYSIS RESULTS AND DISCUSSION



15 Analysis

The simulation result is analyzed to identify which scenarios promote airflow. Average speeds of all cases are within the indoor comfortable ranges. Scenario 12 has the highest average speed that may be used in the summer to enhance ventilation and passive cooling. The lowest average speed is found in the Scenario #1, which can be suitable for when minimum ventilation is required.



16 HEAT

Energy simulation is conducted for the whole building. This includes building geometries, interior layout, material properties, window, occupant activities, artificial lights, and HVAC system.



ENERGY ANALYSIS RESULTS AND DISCUSSION

17 MATERIAL AND METHOD

18 Energy simulation engine

EnergyPlus is the energy simulation engine with the DesignBuilder user interface. EnergyPlus is a whole building energy simulation program, developed by the U.S. Departments of Energy. EnergyPlus models heating, cooling, lighting, ventilation, other energy flows, and water use. EnergyPlus has been validated under the comparative Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs BESTEST/ASHARE STD 140.

19 Key construction properties

Walls: R-44
Windows: R-8.4, SHGC-0.61
Roof: R-52 ~ R-76
Floors: R-46

20 Benchmark for annual energy use

Simulation result of the new building is compared with the existing benchmark data from the EnergyStar, which uses Energy Use Intensity (kBtu/ft²/year) with more than 100,000 buildings. In the residential category, multifamily housing, residence hall/Dormitory, and other lodging/residential are considered. The annual source energy will be used since EPA recommendations. Source energy regards to raw energy delivered to the site. It incorporates all transmission, delivery, and production losses. Therefore, simulation result for the benchmark building is desired to be in the range of 114.9 to 155.5 for source EUI.

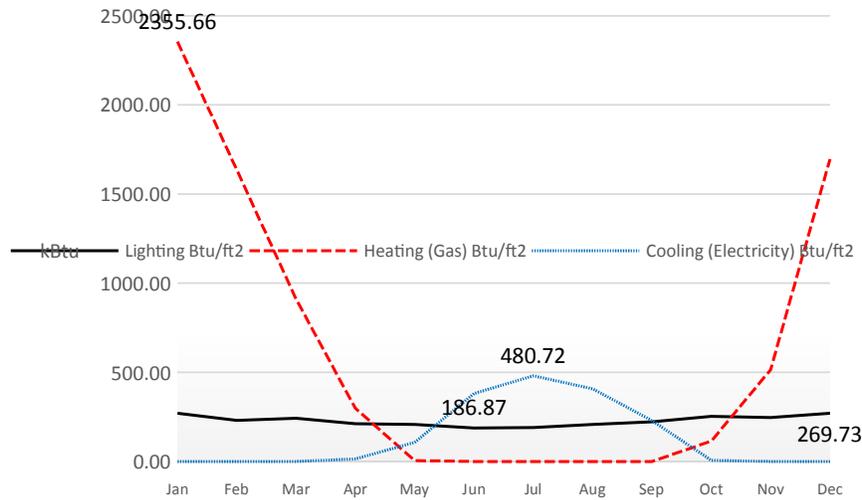
21 SIMULATION RESULT

Simulation results are analyzed for annual energy use intensity with monthly breakdown energy use for heating, cooling and lighting. Heat balances are also analyzed to understand the energy use in conjunction with the proposed building design. Finally, indoor comfort is assessed for occupant's thermal sensation.

22 Monthly Energy Use Breakdown

Total energy use is broken down to each month. Cooling consumption occurs from April to November, with its peak demand by in July. Heating consumption occurs from November to the next April, with its peak demand by in January.

ENERGY ANALYSIS RESULTS AND DISCUSSION

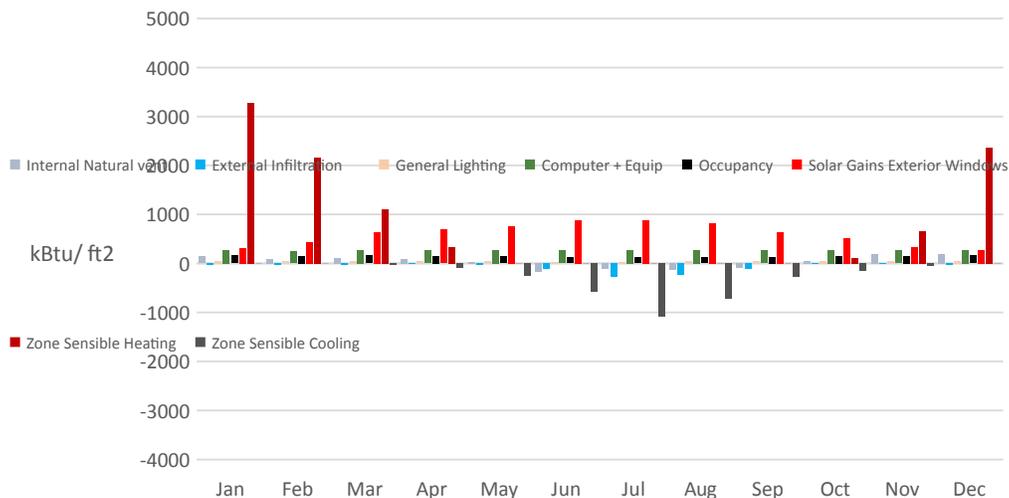


Monthly Energy Use for Heating, Cooling, and Lighting

The table below shows the annual energy use for lighting, heating and cooling. First, heating consumes 1.72 times more energy than the sum of lighting and cooling. Second, cooling consumes 40.63% less energy than lighting. This warrants more investigation for heat balance how heat is gained and supplemented by HVAC system.

23 Heat Balance

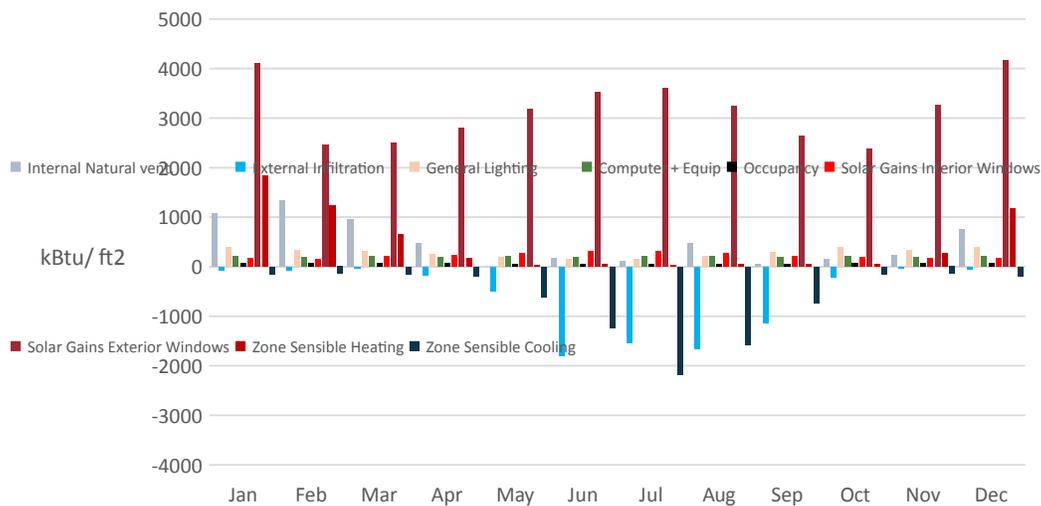
The heat balance of the bed room is shown. Main gains are due to exterior solar heat gains. This gains are distributed by the seasonal changes, high in the summer and low in the winter. The heat high heat gains in the summer months are mainly offset by the cooling system. The internal natural ventilation shows its effect for heat removal in the summer. The low heat gains in the winter months are supplemented by the minisplit.



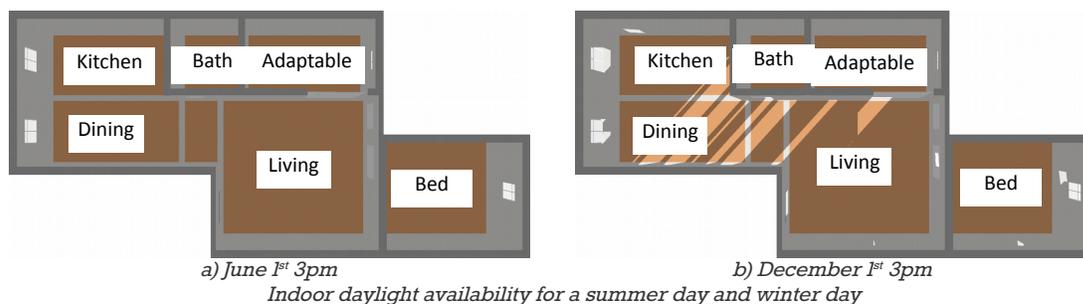
Monthly heat balance of bed room

ENERGY ANALYSIS RESULTS AND DISCUSSION

Monthly heat balance of dining room is shown as well as indoor daylight availability for a summer day and winter day. Much higher range of solar heat is gained than the bed room. This is due to the large size glazed area on the south wall as well as the window on the west wall. In December and January, solar heat gains are more than in any summer month, due to the glazed area on the south wall that is exposed to low solar altitude in the winter. The indoor daylight availability also shows that the glazed wall is not exposed to solar radiation in the summer because of the deep overhang as a part of proposed building design. This results in a reduced zone sensible heating. External infiltration through windows in the summer, together with zone sensible cooling, shows the heat loss that offsets the high gain.

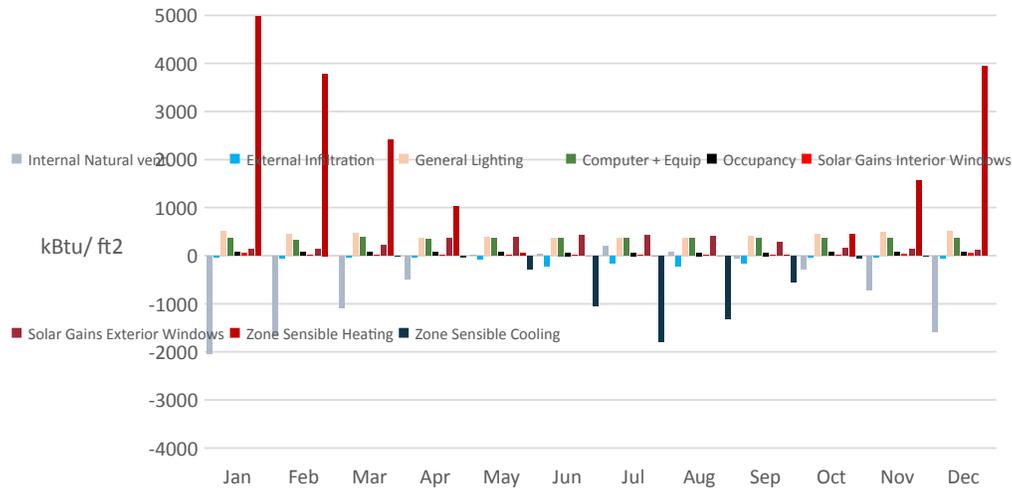


Monthly heat balance of dining room



The monthly heat balance of the living room is shown. Solar heat gains from exterior windows are distributed by the seasonal changes. This gain is only 43 % of the bedroom in annual average, even if both the living room and bed room have windows. This is due to the overhang that prevents the solar exposure to the living room window. Hence, zone sensible heating for the living rooms is 1.8 times higher than for the bed room. Another contributor is heat loss by internal natural ventilation, which is due to the open floor plan. Since there is no obstruction to the adjacent dining room, conditioned air can be freely exchanged. This open floor plan also contributes to the zone sensible cooling.

ENERGY ANALYSIS RESULTS AND DISCUSSION



Monthly heat balance of living room

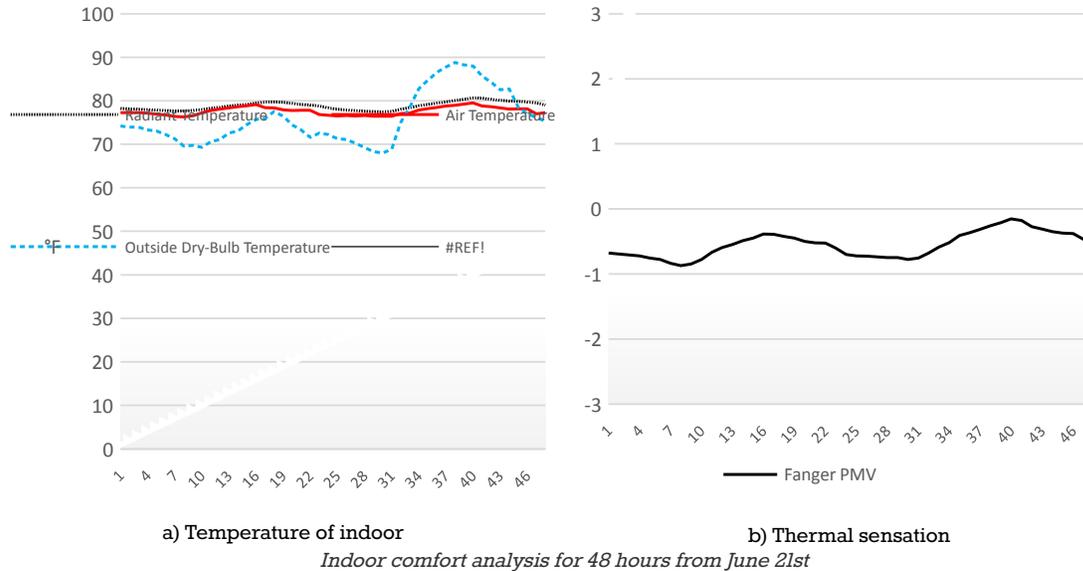
24 Thermal Comfort

To assess thermal comfort of the building, hourly indoor temperature is analyzed with ASHRAE 55 thermal sensation. Fanger's Predicted Mean Vote (PMV) model is used for thermal sensation scale. PMV accounts for air temperature, radiant temperature, clothing, activity level, humidity and air speed⁴.

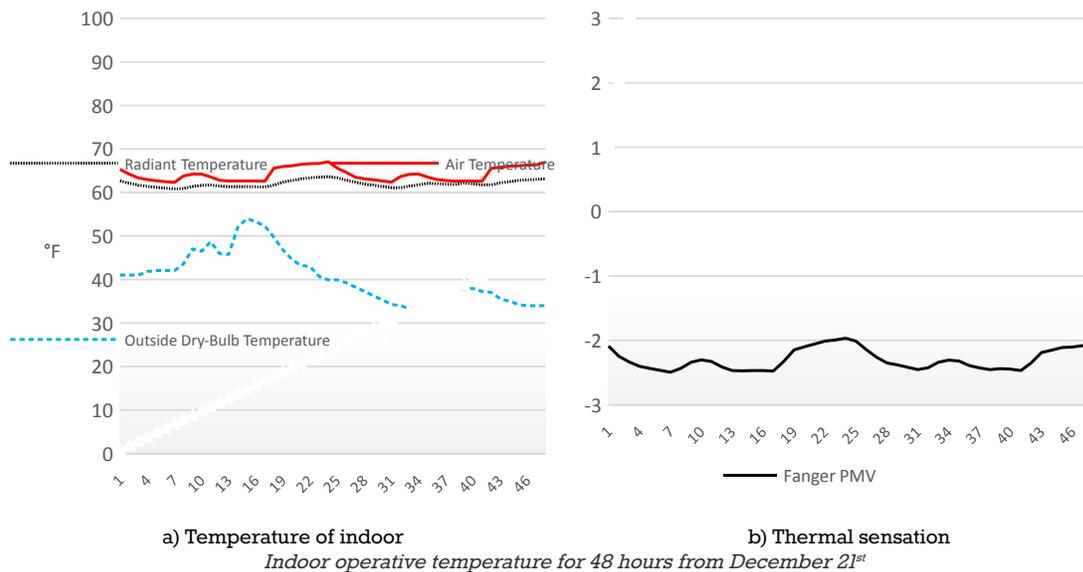
Indoor temperatures are shown for 48 hours from June 21st, with the recommended comfort range 68~75 °F in blue-colored shades. For the same period of time, thermal sensations by occupants are between neutral or slightly cool in the building. It is reasonable since outdoor temperature is mostly agreeable in most of the time, and the heat gain in the summer was relatively small, based on the heat balance analysis at the Section 5.3.3.

⁴ ASHRAE. 2009. Fundamentals Handbook – Chapter 9 Thermal Comfort

ENERGY ANALYSIS RESULTS AND DISCUSSION



For 48 hours in December 21st, thermal sensation of the occupants are cool in the building. Low heat gain in the winter contributed to this result (Section 5.3.3), especially with low outdoor temperature in the average 40.65 °F. The recommended comfort temperature is shown in the orange-colored shade. However, thermal comfort in the winter may be improved by added clothing, lower air speed, and increased activities.



25 REFERENCE

Holton, J. 2012. *Strategy Guideline: High Performance Residential Lighting*. US Department of Energy, Energy Efficiency & Renewable Energy, Building Technologies Program.
Wienold, Jan. 2009. Dynamic daylight glare evaluation. Paper read at Proceedings of Building Simulation.



ENERGY ANALYSIS RESULTS AND DISCUSSION

5.0 - MECHANICAL SYSTEM

5.1 - INTRODUCTION

This section discusses the various components which form the basis of the mechanical system, as well as some auxiliary non-mechanical components which support them. Due to the highly insulated envelope and the passive ventilation strategy, we aim to decrease our heating and cooling loads to below 6 kBtu/sq ft/year; this will allow the mechanical system to be right-sized.

The basis for our design approach relies on a carefully constructed, highly-insulated, air-tight, yet vapor permeable wall section paired with well-placed high-performance windows. Coupling this optimized envelope with a super energy-efficient ERV and minisplit allows us to create the a resilient home.

5.2 - ENERGY RECOVERY VENTILATION

An energy recovery ventilator (ERV) ensures optimal indoor air quality and comfortable living for DURA's energy-efficient construction. Our Zehnder Comfo 200 ERV is characterized by a high level of heat recovery, quiet, energy-efficient DC-motor, rugged controls and simple operation. With a maximum capacity of 125 cfm, the ERV is certified at 92% efficiency by the Passive House Institute. ECM motors allow for energy efficiency and ease of balancing; summer by-pass cooling and frost protection mode further provide for an optimized efficiency. The CA 200 is a Certified Passive House Component. A continuous supply of fresh-filtered air is extremely important in polluted urban environments such as New York; improving the interior air quality of the house is of paramount importance.

5.3 - MINI SPLIT DESIGN

As the home design emphasizes passive energy conservation strategies and the low energy ERV, only a minimal active unit is required to meet the heating and cooling demands of the house. The particular model chosen is the Mitsubishi ducted minisplit with a slim duct. This supplies high efficiency cooling and heating, advanced triple-action air filtration, and high performance heating down to -13° F outdoor ambient temperature.

5.2 - SOLAR HYDRONIC

A solar hydronic heating system uses thermal energy from the solar panels to provide hot water to the home in a heat exchange tank located in the mechanical room.

5.4 GREENWALLS

Interior and exterior green walls clean the air, provide evaporative cooling and humidity when needed.



ENERGY ANALYSIS RESULTS AND DISCUSSION

6.0 - ELECTRICAL SYSTEM

6.1 - APPLIANCES

The main objective of the appliance selection is to choose the appropriate appliances that will best fit the needs of the inhabitants while maintaining efficiency and low energy consumption. A refrigerator, washer, dryer, dishwasher, oven range were chosen based on their individual performance and affordability. The GE ENERGY STAR top-freezer refrigerator has an annual electricity consumption of about 337 kWh, a competitive efficiency rating with an estimated \$40.00 yearly energy savings. The ENERGY STAR clothes washer model is a front load washer with a stainless steel basket; its estimated annual energy consumption is 98 kWh, with a load capacity of 3.6 cubic feet. The washer is paired with a 7.0 Cu. ft. front load capacity electric dryer. This dryer has a DuraDrum interior, which provides long-lasting durability and eDry, an energy-saving option that reduces dry temperatures on select cycles without sacrificing performance. Clothes will be line-dried prior to being placed in the GE clothes drier. The GE Profile dishwasher has hidden controls; with a stainless steel interior, it ensures long-lasting durability. The 30" slide-in electric convection range is an energy-efficient model.

6.2 - CALCULATED ELECTRICITY DEMAND AND DISTRIBUTION

The table below illustrates the anticipated electrical loads on the house.

| Appliance | Power/Current Rating (watts/Amp) | Apparent Power/Current (VA/Amp) | hours / per day | kw/day conventional or kw/load(cycle) | Competition Usage (kwh) (10days/loads) |
|-------------------------------------|-------------------------------------|------------------------------------|-----------------|---|---|
| GE Refrigerator/Freezer | 15-amp circuit | 10.61 | 24 | 0.92 | 9.23 |
| GE Clothes Washer | 15amp/20amp circuit | 10.61 | 0.6 | 0.31 | 2.51 |
| GE Clothes Dryer | 5600 | 4072.94 | 0.3 | 1.22 | 9.78 |
| GE Dishwasher | 1000 | 763.68 | 2 | 1.53 | 7.64 |
| GE Stovetop/Oven | 40-amp circuit | 6788.23 | 2 | 1.70 | 8.49 |
| EcoSmart 18 Tankless Water Heater | | | | | 20.00 |
| Smart Electric Drive | 3300 | 2375.88 | 1.9 | 4.51 | 36.11 |
| 19,000 BTU minisplit | 870 | 615.18 | 2 | 0.87 | 17.40 |
| Zehnder ERV (DryCoolHD) | 82 | 57.98 | 8 | 0.08 | 6.40 |
| Television | 100 | 70.43 | 5 | 0.35 | 2.46 |
| Lighting | 400 | 282.84 | 6 | | 24.00 |
| Dell Ultrabook XPS 13 | 75 | 53.03 | 6 | 0.45 | |
| Water pump | 517.5 | 447.25 | 2.75 | 1.23 | 12.30 |
| Pump that directs greywater into th | 25 | 17.68 | 6.00 | 0.11 | 1.06 |
| | | | | | |
| | | | | | |
| | | | | TOTALS(Kwh): | 157.38 |
| PV Panels low estimate-> | # of panels = 19 | hours of sunlight = 4.8 | per panel W=305 | 25.992 | 259.92 |
| | | | | | |
| | | | | What we need for competition (kWh)----- | 157.38 |
| | | | | What we are getting from panels (kWh)----- | 259.92 |
| | | | | Net Total (kWh)= | -102.54 |
| | | | | | |
| | | | | | |
| | | | | CURRENT COMPETITION ENERGY USE | 157.38 x kWh |
| | | | | | |
| | | | | SOLAR PANEL kWh SUPPLY | 259.92 x kWh |
| | | | | | |
| | | | | EXCESS -----> | -102.54 x kWh |



ENERGY ANALYSIS RESULTS AND DISCUSSION

6.3 - SOLAR ENERGY COLLECTION

Building integrated tracking solar shutters with a seasonally optimized panel orientation allows for higher efficiency than traditional single-angle installations. Manual individualized operation responds to the urban dweller and can adjust according to a wide variety of lifestyles. A series of peltier tiles further convert excess heat into energy. 19 SunPower 305 panels, paired with SunDrum solar thermal units and microinverters, form a highly efficient 5.8kW array that allows the house to produce all the energy it requires.



CONSTRUCTION SPECIFICATIONS



DIVISION 01

GENERAL REQUIREMENTS



DIVISION 01 : GENERAL REQUIREMENTS

SECTION 014200 - REFERENCES

PART 1 - GENERAL

SCHEDULE 0 - GENERAL REQUIREMENTS

PRODUCT DATA SHEET 0 - Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

PRODUCT DATA SHEET 1 - 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.

- 1.1 AAMA - American Architectural Manufacturers Association; www.aamanet.org.
- 1.2 AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
- 1.3 AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
- 1.4 AHAM - Association of Home Appliance Manufacturers; www.aham.org.
- 1.5 AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
- 1.6 AIA - American Institute of Architects (The); www.aia.org.
- 1.7 AISC - American Institute of Steel Construction; www.aisc.org.
- 1.8 AISI - American Iron and Steel Institute; www.steel.org.
- 1.9 AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
- 1.10 ANSI - American National Standards Institute; www.ansi.org.
- 1.11 APA - APA - The Engineered Wood Association; www.apawood.org.
- 1.12 ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
- 1.13 ARI - American Refrigeration Institute; (See AHRI).
- 1.14 ASCE - American Society of Civil Engineers; www.asce.org.
- 1.15 ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
- 1.16 ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
- 1.17 ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
- 1.18 ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
- 1.19 ASTM - ASTM International; (American Society for Testing and Materials International); www.astm.org.
- 1.20 AWI - Architectural Woodwork Institute; www.awinet.org.
- 1.21 AWWPA - American Wood Protection Association; (Formerly: American Wood-Preservers' Association); www.awpa.com.
- 1.22 AWWA - American Water Works Association; www.awwa.org.
- 1.23 BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
- 1.24 C2C - Cradle to Cradle Certified Products; <http://www.c2ccertified.org/>
- 1.25 CEA - Consumer Electronics Association; www.ce.org.
- 1.26 CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
- 1.27 CPA - Composite Panel Association; www.pbmdf.com.
- 1.28 CSI - Construction Specifications Institute (The); www.csinet.org.
- 1.29 CWC - Composite Wood Council; (See CPA).
- 1.30 DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
- 1.31 DHI - Door and Hardware Institute; www.dhi.org.
- 1.32 FSC - Forest Stewardship Council U.S.; www.fscus.org.
- 1.33 GA - Gypsum Association; www.gypsum.org.
- 1.34 GANA - Glass Association of North America; www.glasswebsite.com.



DIVISION 01 : GENERAL REQUIREMENTS

- 1.35 GS - Green Seal; www.greenseal.org.
- 1.36 HI - Hydraulic Institute; www.pumps.org.
- 1.37 HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
- 1.38 HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
- 1.39 ICBO - International Conference of Building Officials; (See ICC).
- 1.40 ICC - International Code Council; www.iccsafe.org.
- 1.41 IEC - International Electrotechnical Commission; www.iec.ch.
- 1.42 IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
- 1.43 IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
- 1.44 IESNA - Illuminating Engineering Society of North America; (See IES).
- 1.45 IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
- 1.46 Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
- 1.47 ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
- 1.48 ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
- 1.49 ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
- 1.50 ISO - International Organization for Standardization; www.iso.org.
- 1.51 ISSFA - International Solid Surface Fabricators Association; (See ISFA).
- 1.52 ITU - International Telecommunication Union; www.itu.int/home.
- 1.53 KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
- 1.54 LMA - Laminating Materials Association; (See CPA).
- 1.55 LPI - Lightning Protection Institute; www.lightning.org.
- 1.56 MMPA - Moulding & Millwork Producers Association; (Formerly: Wood Moulding & Millwork Producers Association); www.wmmpa.com.
- 1.57 MPI - Master Painters Institute; www.paintinfo.com.
- 1.58 MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
- 1.59 NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
- 1.60 NAIMA - North American Insulation Manufacturers Association; www.naima.org.
- 1.61 NEBB - National Environmental Balancing Bureau; www.nebb.org.
- 1.62 NECA - National Electrical Contractors Association; www.necanet.org.
- 1.63 NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
- 1.64 NEMA - National Electrical Manufacturers Association; www.nema.org.
- 1.65 NETA - InterNational Electrical Testing Association; www.netaworld.org.
- 1.66 NFPA - NFPA; (National Fire Protection Association); www.nfpa.org.
- 1.67 NFPA - NFPA International; (See NFPA).
- 1.68 NFRC - National Fenestration Rating Council; www.nfrc.org.
- 1.69 NLGA - National Lumber Grades Authority; www.nlga.org.
- 1.70 NRCA - National Roofing Contractors Association; www.nrca.net.
- 1.71 NSF - NSF International; (National Sanitation Foundation International); www.nsf.org.
- 1.72 NSPE - National Society of Professional Engineers; www.nspe.org.
- 1.73 NWFA - National Wood Flooring Association; www.nwfa.org.
- 1.74 PDI - Plumbing & Drainage Institute; www.pdionline.org.
- 1.75 SAE - SAE International; (Society of Automotive Engineers); www.sae.org.
- 1.76 SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
- 1.77 SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
- 1.78 SPIB - Southern Pine Inspection Bureau; www.spib.org.
- 1.79 SPRI - Single Ply Roofing Industry; www.spri.org.
- 1.80 SRCC - Solar Rating and Certification Corporation; www.solar-rating.org.
- 1.81 SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
- 1.82 STI - Steel Tank Institute; www.steeltank.com.
- 1.83 SWPA - Submersible Wastewater Pump Association; www.swpa.org.



DIVISION 01 : GENERAL REQUIREMENTS

- 1.84 TCNA - Tile Council of North America, Inc.; (Formerly: Tile Council of America); www.tileusa.com.
- 1.85 TIA - Telecommunications Industry Association; (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
- 1.86 TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
- 1.87 TPI - Truss Plate Institute; www.tpinst.org.
- 1.88 UBC - Uniform Building Code; (See ICC).
- 1.89 UL - Underwriters Laboratories Inc.; www.ul.com.
- 1.90 UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
- 1.91 USGBC - U.S. Green Building Council; www.usgbc.org.
- 1.92 WASTEC - Waste Equipment Technology Association; www.wastec.org.
- 1.93 WDMA - Window & Door Manufacturers Association; www.wdma.com.
- 1.94 WI - Woodwork Institute; (Formerly: WIC - Woodwork Institute of California); www.wicnet.org.
- 1.95 WMMPA - Wood Moulding & Millwork Producers Association; (See MMPA).

PRODUCT DATA SHEET 2 - 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.

- 2.1 IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
- 2.2 ICC - International Code Council; www.iccsafe.org.
- 2.3 ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.
- 4. New York City Construction Codes
http://www.nyc.gov/html/dob/html/codes_and_reference_materials/reference.shtml
 - a. General Administrative Provisions
 - b. Plumbing Code
 - c. Mechanical Code
 - d. Building Code
 - e. Energy Conservation Code

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200



DIVISION 01 : GENERAL REQUIREMENTS

SECTION 015000

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

SCHEDULE 0 - SUMMARY

PRODUCT DATA SHEET 0 - These are temporary facilities which are only necessary for the competition in Irvine, CA.

SCHEDULE 1 - SECTION REQUIREMENTS

PRODUCT DATA SHEET 0 - Accessible Temporary Egress: Comply with applicable provisions in ICC A117.1.

PRODUCT DATA SHEET 1 - Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

PART 2 - PRODUCTS

SCHEDULE 0 - TEMPORARY FACILITIES

PRODUCT DATA SHEET 0 - Provide tool trailer and, storage and other support facilities as necessary for construction operations. Store combustible materials apart from building.

SCHEDULE 1 - EQUIPMENT

PRODUCT DATA SHEET 0 - Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures. See DURA's Health and Safety Plan.

PRODUCT DATA SHEET 1 - Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

PRODUCT DATA SHEET 2 - Generator

PART 3 - EXECUTION

3.1 GENERAL

PRODUCT DATA SHEET 0 - Install temporary service or connect to existing service.

PRODUCT DATA SHEET 1 - Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.



DIVISION 01 : GENERAL REQUIREMENTS

PRODUCT DATA SHEET 2 - Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.

3.2 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- B. Furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
- C. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

PRODUCT DATA SHEET 3 - Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

PRODUCT DATA SHEET 4 - Install and maintain temporary fire-protection facilities. Comply with NFPA 241.

SCHEDULE 1 - MOISTURE AND MOLD CONTROL

PRODUCT DATA SHEET 0 - Before installation of weather barriers, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.

- 0.1 Protect stored and installed material from flowing or standing water.
- 0.2 Remove standing water from decks.
- 0.3 Keep deck openings covered or dammed.

SCHEDULE 2 - OPERATION, TERMINATION, AND REMOVAL

PRODUCT DATA SHEET 0 - Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

PRODUCT DATA SHEET 1 - Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility.

PRODUCT DATA SHEET 2 - At completion and removal, repair, renovate, and clean permanent facilities used during construction period.

END OF SECTION 015000



DIVISION 01 : GENERAL REQUIREMENTS

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

SCHEDULE 0 - SECTION REQUIREMENTS

PRODUCT DATA SHEET 0 - The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

PRODUCT DATA SHEET 1 - Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced.

- 1.1 Show compliance with requirements for comparable product requests.

PRODUCT DATA SHEET 2 - Basis-of-Design Product Specification Submittal: Show compliance with requirements.

PRODUCT DATA SHEET 3 - Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

- 3.1 Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
- 3.2 Deliver products to Project site in manufacturer's original sealed container or packaging, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
- 3.3 Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
- 3.4 Store materials in a manner that will not endanger Project structure.
- 3.5 Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

PART 2 - PRODUCTS

SCHEDULE 0 - PRODUCT SELECTION PROCEDURES

PRODUCT DATA SHEET 0 - Provide products that comply with the Contract Documents, are undamaged, and, unless otherwise indicated, are new at the time of installation.

- 0.1 Provide products complete with accessories, trim, finish, and other devices and components needed for a complete installation and the intended use and effect.
- 0.2 Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

PRODUCT DATA SHEET 1 - Where the following headings are used to list products or manufacturers, the Contractor's options for product selection are as follows:



DIVISION 01 : GENERAL REQUIREMENTS

- 1.1 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.
- 1.2 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.

SCHEDULE 1 - COMPARABLE PRODUCTS

PRODUCT DATA SHEET 0 - Comparable products will be considered the following conditions are satisfied:

- 0.1 The specified item is no longer available.
- 0.2 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.
- 0.3 Detailed comparison of significant qualities of proposed product with those named in the Specifications.
- 0.4 List of similar installations for completed projects, if requested.
- 0.5 Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000



DIVISION 02

EXISTING CONDITIONS



DIVISION 02 : EXISTING CONDITIONS

SECTION 024313.13

TEMPORARY CONSTRUCTION AND BUILDING RELOCATION

Part One - General

1.1 Summary

A. This section includes the required equipment and materials and the installation process to transport the DURA house from Brooklyn, New York to Irvine, California.

1.2 Related Sections

- A. Section 050523 – Metal Fasteners
- B. Section 061000 – Rough Carpentry
- C. Section 061753 – Shop Fabricated Wood Trusses

1.3 Equipment

A. Flatbed Trailers

- 1. Maximum Freight Weight: 48,000 lbs.
- 2. Maximum Freight Dimensions:
 - Length 48 feet
 - Width 8.5 feet (102")
 - Height 8.5 feet (102")
- 3. <http://www.steintransportation.com/trailer-selector-guide.html>

B. Forklift

- 1. Mast Name: 2W370
- 2. Maximum Fork Height: 146"
- 3. Overall Height Lowered: 93"
- 4. Free Lift: 4.2
- 5. Tilt Angle Forward/Backward: 5/10
- 6. Rated capacity at 24" Load Center: 5000lb
- 7. <http://nissanforklift.com/images/specSheets/SS-PLATII-NOM.pdf>

C. Scissor Lift

- 1. Genie GS1930 Scissor Lift
- 2. OPERATING WEIGHT: 2702.9 lb.
- 3. MAX PLATFORM HEIGHT: 19 ft. in
- 4. PLATFORM WIDTH: 29.1 in
- 5. PLATFORM LENGTH: 64.2 in
- 6. DECK EXTENSION: 35.8 in
- 7. <http://www.ritchiespecs.com/specification?type=Lifting+%26+Material+Handling&category=Scissor+Lift&make=Genie&model=GS1930&modelid=108586>



DIVISION 02 : EXISTING CONDITIONS

1. Dimensions

- a. Inside dimensions: 14'6" x 7'8" x 7'2" (LxWxH)
- b. Mom's Attic: 2'7" x 7'8" x 2'6" (LxWxH)
- c. Deck height: 2' 10"
- d. Door opening: 7'3" x 6'5" (WxH)
- e. Loading ramp width: 2'2"

2. <http://www.uhaul.com/Trucks/14ft-Moving-Truck-Rental/DC/>

E. Additional equipment as per transport company

1. Transport Bracing
2. Threaded Rods
3. Steel tie-bar
4. Jacks
5. Lifting Loops
6. Cable ropes

Part Three - Execution

A. Description

Three modules will be brought in to the Solar Decathlon site and placed on previously installed stilts. Each trailer would pull alongside the designated area. Then using a combination of jacks and a come-along system, we would then place each module on their pre-designed stilts. Each module would be connected by bolts at 2"X12"LVL beams located in the ceiling and the floor system. Then using the forklift in combination with the scissor lift the build team would attach 12 prefabricated truss/roofing systems to the main structure.

End of Section

DIVISION 02 : EXISTING CONDITIONS

Nordicewp.com

1 3/4" x 11 7/8" x 10' LVL 1.9E Model Number: MM191210

Dimensions: 1-3/4" x 11-7/8" x 10'

Shipping Dimensions: 120.0 x 11.88 x 1.75

Shipping Weight: 47.6 lbs

http://www.menards.com/msds/100833_001.pdf

Engineered Wood Fastener

FMTSL634-50 Trusslok

Screw Length: 6 3/4"

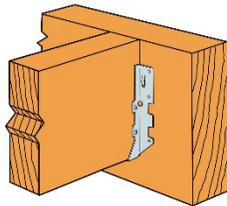
<file:///C:/Users/WorkPC.RBM/Downloads/trusslok-spec-sheet.pdf>

Joist: 2"X8" 8feet: 1 1/2" X 7 1/4" Type unknown

Column set one: 2"X8" 10feet

Column set two: 8"X8" 10feet

Joist Hangers



Joist Hangers for Plated Trusses

LUS28

Min Heel Height: 4 3/16"

GA: 18

Dimensions:

W: 1 5/8"

H: 6 5/8"

B: 1 3/4"

Carrying Member: 6-10d

Carried Member: 4-10d



DIVISION 05

METALS



DIVISION 05 : METALS

SECTION 050900

METAL FASTENINGS

PART 1 GENERAL

1.1 SUMMARY

- A. This section includes all metal fasteners which include, but are not limited to nails, screws, bolts, straps, hangers and bridging.

1.2 RELATED SECTIONS

- A. Section 061000 – Rough Carpentry
- B. Section 061533 – Wood Patio Decking
- C. Section 061600 – Sheathing
- D. Section 061753 – Wood Trusses
- E. Section 064300 – Wood Ramps and Railings
- F. Section 064600 – Wood Trim
- G. Section 092900 – Gypsum Board

1.3 REFERENCES

- A. ASTM A 36-00 Standard Specification for Carbon Structural Steel.
- B. ASTM A 37-00 Standard Specification for Carbon Steel Bolts and Studs 60000 psi Tensile Strength.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:



DIVISION 05 : METALS

1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods.
- B. Provide Plan, Section, elevation and perspective drawings as necessary to demonstrate the proper installation techniques, display fastener dimensions and position fasteners within the system.
-

1.4 QUALITY ASSURANCE

- A. **Manufacturer Qualifications:** All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten (10) years experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

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.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Simpson Strong Tie

2600 International Street, Columbus, OH 43228

Phone: (614) 876-8060

www.strongtie.com/



DIVISION 05 : METALS

A. Dykes Lumber

167 6th St, Brooklyn, NY 11215

(718) 624-3350

www.dykeslumber.com/

B. National chain hardware stores. such as Home Depot and Lowes

2.3 PRODUCTS

A. Fasteners (nails and screws) 8d or common x 2 1/2 or as specified by manufacturer

B. Seismic and Hurricane Ties

1. Type H6 for Stud – Top Plate and Stud - Band Joist Connections

2. Type H8 for Stud – Sill connections

3. Type 16 for Top plate – Truss connections

C. Strap Ties

1. PS720 for Column – Girder connection

D. Joist Hangers

1. Top Flange Hangers Type LB28 for Floor Joists

E. Bridging

1. Type TB27 for Floor Joists

F. Post

1. Type HTT4 for Post to platform connectors 1/2" bolt diameter



DIVISION 05 : METALS

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before completion.

END OF SECTION



DIVISION 06 WOOD, PLASTICS, AND COMPOSITES



DIVISION 06 : WOOD, PLASTICS, AND COMPOSITES

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

SCHEDULE 0 - SUMMARY

PRODUCT DATA SHEET 0 - This section includes all materials used in framing.

1.2 RELATED SECTIONS

1.3 REFERENCES

- A. Appendix B: Structural calculations
- B. Construction Documents

PART 2 - PRODUCTS

SCHEDULE 0 - MANUFACTURERS / SUPPLIERS

PRODUCT DATA SHEET 0 - Dykes Lumber Company 167 Sixth Street Brooklyn, New York 11215
718-624-3350 <http://www.dykeslumber.com>

PRODUCT DATA SHEET 1 - Weyerhaeuser Company P.O. Box 9777 Federal Way, WA 98063-9777
<http://www.weyerhaeuser.com>

PRODUCT DATA SHEET 2 - Georgia Pacific <http://www.buildgpc.com>

SCHEDULE 1 - WOOD PRODUCTS, GENERAL

PRODUCT DATA SHEET 0 - Certified Wood: Wood-based materials 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."

PRODUCT DATA SHEET 1 - Lumber: Provide dressed lumber, S4S, marked with grade stamp of inspection agency.

PRODUCT DATA SHEET 2 - Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

- 2.1 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.

ROUGH CARPENTRY

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DIVISION 06 : WOOD, PLASTICS, AND COMPOSITES

SCHEDULE 2 - FRAMING

PRODUCT DATA SHEET 0 - 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."

PRODUCT DATA SHEET 1 - Dimension Lumber:

- 1.1 Maximum Moisture Content: 19 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness.
- 1.2 Non-Load-Bearing Interior Partitions: Construction or No. 2 of any species.
- 1.3 Framing Other Than Non-Load-Bearing Interior Partitions: Construction or No. 2 Hem-fir: NLGA;]

PRODUCT DATA SHEET 2 - Laminated-Veneer Lumber: Manufactured with exterior-type adhesive complying with ASTM D 2559. Allowable design values determined according to ASTM D 5456.

- 2.1 Extreme Fiber Stress in Bending, Edgewise: 2600 psi for 12-inch nominal depth members.
- 2.2 Modulus of Elasticity, Edgewise: 1,800,000 psi

SCHEDULE 3 - MISCELLANEOUS LUMBER

PRODUCT DATA SHEET 0 - Miscellaneous Dimension Lumber: Construction, or No. 2 grade with 15 percent maximum moisture content of any species. Provide for nailers, blocking, and similar members.

PRODUCT DATA SHEET 1 - Utility Shelving: Ponderosa, or sugar pine, Premium or 2 Common (Sterling): NeLMA, or Mixed southern pine, No. 1: SPIB; or[Hem-fir, Select Merchantable or No. 1 Common: NLGA, with 15 percent maximum moisture content.

SCHEDULE 4 - PLYWOOD BACKING PANELS

PRODUCT DATA SHEET 0 - Equipment Backing Panels: Plywood, Exterior, C-C Plugged, fire-retardant treated, not less than 1/2-inch nominal thickness.

SCHEDULE 5 - MISCELLANEOUS PRODUCTS

PRODUCT DATA SHEET 0 - 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.

- 0.1 Bolts: Steel bolts complying with ASTM A 307, Grade A with ASTM A 563 hex nuts and, where indicated, flat washers.

PRODUCT DATA SHEET 1 - Metal Framing Anchors: Structural capacity, type, and size indicated.

1. Use anchors made from hot-dip galvanized steel complying with ASTM A 653/A 653M, G60 coating designation for interior locations where stainless steel is not indicated.

ROUGH CARPENTRY

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DIVISION 06 : WOOD, PLASTICS, AND COMPOSITES

PRODUCT DATA SHEET 2 - Sill Sealer: Glass-fiber insulation, 1 inch thick, compressible to 1/32 inch.

PART 3 - EXECUTION

SCHEDULE 0 - INSTALLATION

PRODUCT DATA SHEET 0 - 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.

PRODUCT DATA SHEET 1 - Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

PRODUCT DATA SHEET 2 - Do not splice structural members between supports unless otherwise indicated.

PRODUCT DATA SHEET 3 - Securely attach rough carpentry to substrates, complying with the following:

- 3.1 Published requirements of metal framing anchor manufacturer.
- 3.2 Table 2304.9.1, "Fastening Schedule," in the IBC

END OF SECTION 061000



DIVISION 06 : WOOD, PLASTICS, AND COMPOSITES

MICROLLAM® LVL SPECIFICATIONS

1.0 GENERAL

1.1 Scope

This work includes the complete furnishings and installation of all Microllam® laminated veneer lumber (LVL) as shown on the drawings herein specified and necessary to complete the work.

1.2 Code Approvals

These products shall be designed and manufactured to the standards set forth in the ICC Evaluation Service, Inc. report ESR-1387.

1.3 Related Work Specified Elsewhere

- A** Carpentry and Millwork
- B** Glu-Laminated Members

1.4 Design

A Products

Microllam® LVL shall be designed to fit the dimensions and loads indicated on the plans.

B Design Calculations

- ___ Member calculations shall be prepared by Weyerhaeuser. (Service Fees may apply)
- ___ Not required.

1.5 Submittals

A Drawings

- ___ Drawings showing layout and detail necessary for determining fit and placement in the building shall be provided by Weyerhaeuser. (Fees may apply)
- ___ Not required.

C Production

Fabrication and/or cutting shall not proceed until the architect and/or engineer have approved the submittal package.

2.0 PRODUCTS

2.1 Materials

A Code Reports

Materials shall comply with ICC ES ESR-1387.

B Adhesives

Adhesives shall be of the waterproof type conforming to the requirements of ASTM D-2559.

2.2 Fabrication

Microllam® LVL shall be manufactured by Weyerhaeuser in a plant listed in the reports referred to above and under the supervision of an approved third-party inspection agency. It shall be manufactured in a continuous process with all grain parallel with the length of the members. All members are to be free of finger or scarf joints or mechanical connections in full-length members.

2.3 Tolerances (dry material)

| | |
|---------------------------------|-----------------------------------|
| Finished Length (as specified): | ± 1/4" |
| Width/Depth | ≤ 3.5" wide / ≤ 14" deep: ± 1/8" |
| | > 3.5" wide / > 14" deep: ± 3/16" |



DIVISION 06 : WOOD, PLASTICS, AND COMPOSITES

2.4 Identification

Microllam® LVL shall be identified by a stamp indicating the product type and grade and ICC ES evaluation report number, manufacturer's name, plant number and the independent inspection agency's logo.

2.5 Hardware

Not applicable.

3.0 EXECUTION

3.1 Installation

Microllam® LVL, if stored prior to installation, shall be protected from the weather. It shall be installed in accordance with the plans and any Weyerhaeuser drawings and installation suggestions. Temporary construction loads that cause stresses beyond design limits are not permitted. Safety bracing is to be provided by the installer to keep the Microllam® LVL straight and plumb as required and to assure adequate lateral support for the individual Microllam® LVL members and the entire system until the sheathing material has been applied.

The contractor may give notification to the manufacturer prior to installation of Trus Joist products to review and discuss product installation guidelines.

3.2 Performance Standards

Products shall be proven by testing and evaluation in accordance with the provisions of ASTM D-5456.

3.3 Fire Rating

Microllam® LVL is permitted as a substitute for conventional wood framing in fire-resistive assemblies. Microllam® LVL shall be sized for the same load-carrying capacity as the sawn lumber specified in the assembly, and its dimensions shall be equal to or greater than those specified for the sawn lumber. The fire resistance of exposed Microllam LVL members may be calculated in accordance with Chapter 16 of the ANSI/AWC NDS.

3.4 Warranty

The products delivered shall be free from manufacturing errors or defects in workmanship and material. The products, when correctly installed and maintained, shall be warranted to perform as designed for the normal and expected life of the building.

4.0 ALTERNATES AND/OR EQUALS

4.1 Modifications/Alternates:

Due to the customized detailing and engineering characteristics of the roof and/or floor framing assembly, it is a requirement that Microllam LVL be used in the base bid.

The specification is based on Trus Joist engineered wood products. No alternatives, modifications or substitutions are allowed unless the General Contractor and Sub-Contractors submits in writing for such requests to the Project Engineer for approval, no later than two weeks prior to bid. Alternate products must have a current ICC-ES code evaluation report with listed design properties equivalent or greater than specified products. Substantiating calculations shall be submitted. All floor performance, fire endurance, holes, tapered cuts and notching shall be justified for alternate. Contract shall reflect any price changes. The engineer of record shall be reimbursed for any review time.



DIVISION 06 : WOOD, PLASTICS, AND COMPOSITES

TJI® JOIST SPECIFICATIONS

1.0 GENERAL

1.1 Scope

This work includes the complete furnishings and installation of all TJI® joists as shown on the drawings herein specified and necessary to complete the work.

1.2 Code Approvals

These products shall be designed and manufactured to the standards set forth in the ICC Evaluation Service, Inc. report ESR-1153.

1.3 Related Work Specified Elsewhere

- A Carpentry and Millwork
- B Glu-Laminated Members

1.4 Design

A Products

Trus Joist® products shall be designed to fit the dimensions and loads indicated on the plans.

A Design Calculations

- ___ Member calculations shall be prepared by Weyerhaeuser. (Service Fees may apply)
- ___ Not required.

1.5 Submittals

A Drawings

- ___ Drawings showing layout and detail necessary for determining fit and placement in the building shall be provided by Weyerhaeuser. (fees may apply)
- ___ Not required.

B Production

Fabrication and/or cutting shall not proceed until the architect and/or engineer have approved the submittal package.

2.0 PRODUCTS

2.1 Materials

Flange members, web members and adhesives shall conform to the provisions of the ICC ES ESR-1153.

2.2 Fabrication

TJI® joists shall be manufactured by Weyerhaeuser in a plant listed in the reports referred to above and under the supervision of an approved third-party inspection agency.

2.3 Tolerances (dry material)

- Depth: ± 1/16"
- Flange width: ± 1/16"

2.4 Identification

Each of the joists shall be identified by a stamp indicating the joist series and ICC ES evaluation report number, manufacturer's name, plant number and the independent inspection agency's logo.

2.5 Hardware

Not applicable.

3.0 EXECUTION

3.1 Installation

TJI® joists, if stored prior to installation, shall be stored in a vertical position and protected from the weather. They shall be handled with care so they are not damaged. TJI® joists are to be installed in accordance with the plans and any Weyerhaeuser drawings and installation suggestions. Temporary construction loads that cause stresses beyond design

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limits are not permitted. Safety bracing is to be provided by the installer to keep the TJI® joists straight and plumb as required and to assure adequate lateral support for the individual TJI® joists and the entire system until the sheathing material has been applied.

The contractor may give notification to the manufacturer prior to installation of Trus Joist products to review and discuss product installation guidelines.

3.2 Performance Standards

Products shall be proven by testing and evaluation in accordance with the provisions of ASTM D-5055.

3.3 Fire Rating/Sound Ratings

Fire and sound ratings are to be established in accordance with assemblies as detailed in ICC ES ESR-1153 or the *Directory of Listed Products*, published by Intertek Testing Services.

3.4 Warranty

The products delivered shall be free from manufacturing errors or defects in workmanship and material. The products, when correctly installed and maintained, shall be warranted to perform as designed for the normal and expected life of the building.

4.0 ALTERNATES AND/OR EQUALS

4.1 Modifications/Alternates:

Due to the customized detailing and engineering characteristics of the roof and/or floor framing assembly, it is a requirement that TJI® joists be used in the base bid.

The specification is based on Trus Joist engineered wood products. No alternatives, modifications or substitutions are allowed unless the General Contractor and Sub-Contractors submits in writing for such requests to the Project Engineer for approval, no later than two weeks prior to bid. Alternate products must have a current ICC-ES code evaluation report with listed design properties equivalent or greater than specified products. Substantiating calculations shall be submitted. All floor performance, fire endurance, holes, tapered cuts and notching shall be justified for alternate. Contract shall reflect any price changes. The engineer of record shall be reimbursed for any review time.



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SECTION 06 40 00

ARCHITECTURAL WOODWORK

GENERAL NOTES TO SPECIFIER

THE FOLLOWING PRODUCT SPECIFICATION LANGUAGE IS INTENDED TO ASSIST DESIGN PROFESSIONALS IN SPECIFYING FSC-CERTIFIED, NO-ADDED-FORMALDEHYDE DECORATIVE HARDWOOD PLYWOOD PANELS IN EXISTING 3-PART SPECIFICATIONS FOR PANELING, CASEWORK AND SIMILAR ARCHITECTURAL WOODWORK.

SAMPLE LANGUAGE IS PROVIDED FOR APPLICABLE ARTICLES IN PART 1- GENERAL, PART 2- PRODUCTS, AND

PART 3- EXECUTION FOLLOWING THE CONSTRUCTION SPECIFICATION INSTITUTE SECTION FORMAT. THE SAMPLE LANGUAGE SHOULD BE EDITED ACCORDINGLY TO FIT EACH FIRM'S SPECIFICATION STANDARDS.

ARTICLES AND PARAGRAPHS OF THIS PRODUCT SPECIFICATION ASSUME THE PROJECT MANUAL WILL CONTAIN COMPLETE DIVISION 1 DOCUMENTS. CLOSE COORDINATION WITH DIVISION 1 SECTIONS IS REQUIRED IF THE PROJECT MANUAL DOES NOT CONTAIN THESE SECTIONS ADDITIONAL INFORMATION MAY BE INCLUDED UNDER THE APPROPRIATE ARTICLES.

NOTES TO THE SPECIFIER ARE IN UPPER CASE TEXT AND ARE CONTAINED IN BOXES SIMILAR TO THIS ONE. OPTIONAL ITEMS REQUIRING SELECTION BY THE SPECIFIER ARE ENCLOSED WITHIN BRACKETS. E.G. (35) (40) [45]. MAKE APPROPRIATE SELECTIONS AND DELETE OTHERS.

ITEMS REQUIRING ADDITIONAL INFORMATION ARE UNDERLINED BLANK SPACES.

PART 1-GENERAL



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1.1 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.

1.2 SUMMARY

- A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for architectural woodwork as required for the complete performance of the work, and as shown on the Drawings and as herein specified.

1.3 REFERENCES

- A. General: The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.

- e. American Wood Council (AWC):

- 1.AWC DCA. "Design for Code Acceptance."

- C. Architectural Woodwork Institute (AWI):

- 1.AWI AWS. "Architectural Woodwork Standards."

- D. ASTM (ASTM):

- 1.ASTM D 523. "Standard Test Method for Specular Gloss:

- 2.ASTM E 84. "Standard Test Method for Surface Burning Characteristics of Building Materials:

- E. Forest Stewardship Council (FSC):



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1. FSC STD-01-001. "FSC Principles and Criteria for Forest Stewardship:"

F. Hardwood Plywood and Veneer Association (HPVA):

1. ANSI/HPVA HP-1. "American National Standard for Hardwood and Decorative Plywood"" (copyrighted by HPVA. ANSIapproved).

2.HPVA HPH. "Hardwood Plywood Handbook:"

3. HPVA VSG. "Veneer Species Guide.""

1.4 SUBMITTALS

INCLUDE ANY OR ALL OF THE FOLLOWING PARAGRAPHS AS APPLICABLE TO THE PROJECT.

A. General: See Section 01 33 00- Submittal Procedures.

e. Product Data: Submit product data showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications. Submit product data for each type of product and process specified and incorporated into items of architectural woodwork during fabrication, finishing and installation.

C. 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, location of each item in dimensioned plans and elevations, large scale details, attachment devices, and other components.

NOMINAL 3/4 INCH (19 MM) BY 3 INCH (76 MM) PUREBOND PLYWOOD SAMPLES ARE COMMONLY AVAILABLE. MANUFACTURER MAY BE ABLE TO PROVIDE ADDITIONAL SAMPLES DEPENDING ON CIRCUMSTANCES UNIQUE TO A PARTICULAR PROJECT.

D. Samples:

1. Submit samples for initial selection. Submit samples of each specified finish. Submit samples in form of manufacturer's charts showing veneers and finishes available.

DELETE ABOVE IF COLORS, VENEERS, FINISHES, ETC.. PRESELECTED AND SPECIFIED OR SCHEDULED. RETAIN BELOW WITH OR WITHOUT ABOVE.



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2. Submit samples for verification purposes. Additional samples may be required to show fabrication techniques and workmanship.

E. Quality Control Submittals:

INCLUDE BELOW IF APPLICABLE TO THE PROJECT.

1. Fire Retardant Treatment Data: Submit fire retardant treatment data for material treated to reduce combustibility.

IFOR LEED" PRCUECTS INCLUDE THE FOLLOWING,AS APPLICABLE. CREDITS REFERENCED PERTAIN TO LEEDN· C2009.

F. Submittals that are required to comply with requirements for LEED" certification. as defined by the U.S. Green

Building Council (USGBC) (<http://www.usgbc.org>), include. but shall not be limited to. the following:

1. Recycled Content Materials (Credits MR 4):Provide product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

2. Regional Materials (Credits MR 5): Provide product data for regional materials indicating location and distance from the Project of material manufacturer and point of extraction. harvest. or recovery for each raw material. Distance shall be within 500 miles (805 Km) of the Project Site. Include statement indicating cost for each regional material and. if applicable. the action by weight that is considered regional.

RETAIN BELOW IF APPLICABLE TO THE PROJECT.

a. Include requirements for Canada per Columbia LEED• Compliant Product Guide.

3. Certified Wood (Credit MR 7):Provide product invoice documentation, including, but not limited to. product description. FSC-claim. and chain-of-custody certificates. confirming what quantity, if any, of wood-based materials are certified in accordance with the Forest Stewardship Council (<http://www.fsc.org>) guidelines



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for wood products.

4. Low-Emitting Materials (Credit IEO 4.4): Submit cut sheet and/or CARB TPC certification by the manufacturer confirming that products (i.e., plywood, particleboard, medium density fiberboard, insulation, etc.) contain no added urea-formaldehyde resins as outlined in LEED® Green Building Rating System

1.5 QUALITY ASSURANCE

INCLUDE ANY OR ALL OF THE FOLLOWING PARAGRAPHS, AS APPLICABLE TO THE PROJECT:

A. 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. Quality Standard: Comply with AWI AWS for grades of architectural woodwork, construction, finishes, and other requirements. Provide AWI certification labels or AWI certificates of compliance indicating that woodwork meets requirements of grades specified.

INCLUDE BELOW IF APPLICABLE TO THE PROJECT.

1. Comply with applicable requirements of standards published by the Scientific Equipment and Furniture Association

INCLUDE BELOW IF APPLICABLE TO THE PROJECT. COLUMBIA WILL FIX AND LAY VENEER TO FIRE-TREATED SUBSTRATES. COLUMBIA HAS NOT PERFORMED ANY TESTING TO DATE ON PANEL ASSEMBLIES FEATURING THE FIRE-RATED CORE ANY CLAIMS OR STATEMENTS AS TO THE SURFACE BURNING CHARACTERISTICS OF THE PRODUCTS PROVIDED UNDER THIS SECTION ARE THE RESPONSIBILITY OF THE CONTRACTOR AND THE FABRICATOR AND THEY SHALL BE SOLELY RESPONSIBLE FOR FURNISHING ANY TESTING OR CERTIFICATION REQUIRED TO VERIFY SAID CHARACTERISTICS. COLUMBIA PROVIDES NO INDEMNIFICATION TO ANY PARTY AND EXPRESSLY DISCLAIMS ANY AND ALL LIABILITY, RELATING TO OR ARISING FROM THE USE OF COLUMBIA PRODUCTS IN ANY APPLICATION AS IT RELATES TO SURFACE BURNING CHARACTERISTICS.



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- C. **Surface Burning Characteristics:** Provide materials with the following characteristics as determined by testing identical products per ASTM test method indicated below, by Underwriters Laboratories, Inc. (UL), Intertek Testing Services (ITS), Hardwood Plywood and Veneer Association (HPVA), or another inspecting and testing agency acceptable to authorities having jurisdiction.

1. Surface burning characteristics shall not exceed values indicated below tested per ASTM E 84.

FLAME SPREAD OF 200 OR BELOW IS ACCEPTABLE FOR CLASS III (CLASS C) CODE RE-

QUIREMENTS. a. Flame Spread: 200.

b. Smoke Developed: 450.

2. Per AWC, veneer of a thickness of 1/28 inch (0.9 mm) or less can be applied to a fire-resistant core and still retain fire-resistant core properties: <http://www.awc.org/publications/DCA/DCA1/DCA1.pdf>

- O. **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 using materials indicated for final unit of work.
- E. **Pre-Installation Conference:** Conduct pre-installation conference in accordance with Section 01 3119 - Project Meetings. Prior to commencing the installation, meet at the Project site to review the material selections, installation procedures and coordination with other trades. Mock-ups shall be reviewed during the pre-installation conference. Pre-installation conference shall include, but shall not be limited to the Contractor. The Installer and any trade that requires coordination with the work. Date and time of the pre-installation conference shall be acceptable to the Owner and the Architect.

1.6 DELIVERY, STORAGE AND HANDLING

INCLUDE ANY OR ALL OF THE FOLLOWING PARAGRAPHS, AS APPLICABLE TO THE PROJECT:

- A. Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers (or suitable equivalent protection), labeled with supplier's or manufacturer's name, material or product brand name, and lot number, if any.



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- e. Store decorative hardwood plywood and fabricated products in dry interior locations where temperature is maintained between 60°F (16°C) and 90°F (32°C) and relative humidity is maintained between 30 percent and 55 percent.

- C. Remove or loosen plastic wrappings. Sticker individual panels to hasten acclimatization.

- D. Cover decorative hardwood

- E. Protect decorative hardwood plywood from edge and surface damage.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install work until building is enclosed; wet-work is completed and nominally dry and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 MATERIALS

IFOR LEED® 2009 PROJECTS INCLUDE THE FOLLOWING AS APPLICABLE. CREDITS REFERENCED PERTAIN TO LEED-N® C2009.

- A. LEED® 2009 Requirements:

SELECT APPLICABLE PERCENTAGES BELOW (10 PERCENT APPLIES TO CREDIT MR 4.1, 20 PERCENT APPLIES TO CREDIT MR 4.1

AND MR 4.2).

1. Recycled Content Materials (Credits MR 4): Provide building materials with recycled content such that post consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of [10 percent] [20 percent) of the cost of materials used for the Project. See LEED® 2009 Green Building Rating System.



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2. Regional Materials (Credits MRS): Provide a minimum of 10 percent (based on cost) of building materials that are regionally extracted, processed and manufactured.
3. Certified Wood (Credit MR 7): Provide a minimum of 50 percent (by cost) of wood-based materials that are produced from wood obtained from forests certified by an FSC accredited certification body to comply with FSC STD-01-001. Wood-based materials include, but shall not be limited to materials made from made wood, engineered wood products, or wood-based panel products.
4. Low-Emitting Materials (Credit IEO 4.4): Do not use composite wood and agrifiber products that contain urea-formaldehyde resin.

FSC MIX and FSC XX% MIX PANELS CAN BE PRODUCED USING FSC-CERTIFIED CORES AND CONTROLLED FACE AND BACK VENEERS. FSC 100%- PURE PANELS REQUIRE FSC-100% CORES, FSC 100% FACE VENEERS, AND FSC 100% BACK FOR LEED PROJECTS INCLUDE THE FOLLOWING, AS APPLICABLE. CREDITS REFERENCED PERTAIN TO LEED-NC2009. SELECT APPLICABLE PERCENTAGES BELOW (10 PERCENT APPLIES TO CREDIT MR 4.1, 20 PERCENT APPLIES TO CREDIT MR 4.1 AND MR 4.2). VENEERS, TWO-STEP PLATFORM CONSTRUCTION IS PREFERRED FOR SLICED DECORATIVE VENEERS AND WALL PANEL CONSTRUCTION TO REDUCE CORE TELEGRAPHING; SINGLE-STEP CONSTRUCTION PROVIDES A BETTER VALUE FOR CASE GOODS INTERIORS. PARTICLEBOARD OR MDF CORES ARE RECOMMENDED FOR DOOR AND DRAWER FRONTS AND OTHER USES PER AWS RECOMMENDATIONS.

SELECT ONE OF THE FOLLOWING FIVE PARAGRAPHS.

B. Hardwood Veneer Core Plywood:

manufactured by Columbia Forest Products (<http://www.columbiaforestproducts.com/Products.aspx?NeneerCore>).

C. Particleboard Core Hardwood Plywood: Provide phenolic particleboard core hardwood plywood assembled with PureBond® formaldehyde-free technology by Columbia Forest Products (<http://www.columbiaforestproducts.com/Products.aspx?NeneerCore>).

O. Medium Density Fiberboard (MDF) Core Hardwood Plywood: Provide phenolic or MDI bonded MDF-core hardwood plywood assembled with PureBond® formaldehyde-free technology by Columbia



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Forest Products (<http://..Www.columbiaforestproducts.com/Products.aspxNeneerCore>).

- E. Multi-Layered Core Hardwood Plywood: Provide specialty all hardwood European style (Europly PLUST™) high-ply count birch veneer core blank with a phenolic-bonded platform to assure a no-added urea-formaldehyde panel. This product not available as PureBond (due to the presence of added formaldehyde in phenolic glue) but is LEED con forming as manufactured by Columbia Forest Products (<http://..Www.columbiaforestproducts.com/Products.aspxNeneerCore>).

- F. Combi-Core Hardwood Plywood: Provide panels constructed of veneer core inner plies with no-added formaldehyde pMDI bonded MDF crossbands; panel shall offer similar strength and stability to veneer core but shall have the void free surface quality of PBC or MDF; panel shall provide excellent substrate for thin-sliced woods and rotary woods with face and back veneers laminated with PureBond® formaldehyde-free technology: Classic Core™ as manufactured by Columbia Forest Products (<http://..Www.columbiaforestproducts.com/Products.aspxNeneerCore>).

THE FOLLOWING SUB PARAGRAPHS, SUB-SUB PARAGRAPHS, ETC., PERTAIN TO ALL FIVE TYPES OF PLYWOOD ABOVE. MAKE SELECTIONS WHERE REQUIRED.

1. Panel:

- a. [FSC 100%- Pure] [FSC-Mix]
- b. Manufacture according to ANSI/HVPA HP-1.

SELECT ONE OF THE FOLLOWING FOUR CORE CONSTRUCTION SUB-SUB PARAGRAPHS RETAIN FIRST FOR VENEER CORE HARDWOOD PLYWOOD, SECOND FOR PARTICLEBOARD CORE HARDWOOD PLYWOOD, THIRD FOR MDF CORE HARDWOOD PLYWOOD OR FOURTH FOR MULTI-LAYERED CORE HARDWOOD PLYWOOD OR COMBI-CORE HARDWOOD PLYWOOD.

- c. Core construction shall be FSC-certified veneer core.
- d. Core construction shall be FSC-certified pMDI bonded particleboard. e. Core construction shall be FSC-certified pMDI bonded MDF.
- f. Core construction shall be FSC certified Classic Core™ combination core construction with pMDI MDF crossbands.



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2. Thickness: As shown on the Drawings.

3. Veneers:

COLUMBIA FOREST PRODUCTS MANUFACTURES ALL DECORATIVE PLYWOOD ON A BUILD-TO-ORDER BASIS. SPECIES SELECTION PRESENTED BELOW REFLECT MOST COMMON SPECIES BUT OTHER UNUSUAL VENEERS MAY ALSO BE AVAILABLE BY QUOTE BEST SPECIFICATION RESOURCE AVAILABLE FOR DECORATIVE HARDWOOD PLYWOOD IS THE

HARDWOOD HANDBOOK AVAILABLE FOR PURCHASE FROM THE HARDWOOD PLYWOOD AND VENEER ASSOCIATION (HPVA). IT IS RECOMMENDED THAT COLUMBIA FOREST PRODUCTS BE CONTACTED REGARDING AVAILABILITY OF SPECIES. GRADES, CUTS, AND MATCHES FOR VARIOUS SPECIES AND PANEL DIMENSIONS, PARTICULARLY FOR PROJECTS REQUIRING LESS THAN

30 SHEETS (<1000 SQUARE FEET [93 SQUARE METERS]).

a. Face:

IVENEER IN BOLD IS AVAILABLE IN FSC MIX CONSTRUCTIONS IN MPX VENEER CORE IN THE UNITED STATES.

- 1) Species: [Aromatic Ceciar] [Alder] [Anlgre] [Ash] [Bamboo] [Basswood] [Beech] [Birch] [Butternut] [Cedar. Red] [Cherry] [Cypress] [Elm. Red] [Fir] [Grandls] [Hemlock] [Hickory] [Khaya] [Lyptus] [Maple] [Maple. Red] [Oak. Red] [Oak. White] [Pine. East-ern Clear] [Pine. Knotty] [Pine. Radiata] [Pine. Western Clear] [Pine. Yellow] [Poplar] [Sapele] [Teak] [Walnut]

If interested in other veneer options please contact the L&L0 AP for your area for assistance.

- 2) Color Selection: [Natural] [Sap (light color)] [Heart (dark color)] [**J**

- 3) Glade: [AA] [A] [B] [C] [D]. per ANSI/HPVA HP-1.

- 4) Cut [Rotary] [Plain-sliced] [Quarter-sliced] [Rift cut]

- 5) Veneer Match: [Book-matched] [Slip match] [Random match] [Pleasing match] [Plank match].



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BALANCED CONSTRUCTION (SAME FACE AND BACK SPECIES) IS TYPICAL BUT DIFFERENT. COMPATIBLE SPECIES COMBINATIONS ARE POSSIBLE (E.G. CHERRY WITH A MAPLE BACK) IN SPECIAL CASES. PLEASE CONSULT WITH COLUMBIA FOREST PRODUCTS FOR A DETERMINATION OF FEASIBILITY.

b. Back:

IVENEER IN BOLD IS AVAILABLE IN FSC MIX CONSTRUCTIONS IN MPX VENEER CORE IN THE UNITED STATES.

- 1) Species:[Aromatic Ceclar] [Alder] [Anlgre] [Ash] [Bamboo] [Basswood] [Beech] [Birch] [Butternut] [Cedar. Red] [Cherry] [Cypress] [Elm. Red] [Fir] [Grandls] [Hemlock] [Hickory] [Khaya] [Lyptus] [Maple] [Maple. Red] [Oak. Red] [Oak. White] [Pine.Eastern Clear] [Pine.Knotty] [Pine.Radiata] [Pine. Western Clear] [Pine. Yellow] [Poplar] [Sapele] [Teak] [Walnut].

If interested in other veneer options please contact the L££0 AP for your area for assistance.

- 2) Color Selection: [Natural] [Sap (light color)] [Heart (dark color)] [J
- 3) G ade: [1] [2] [3] [4] [Same as face grade]. per ANSI/HPVA HP-1.
- 4) Cut: [Rotary] [Plain-sliced] [Quarter-sliced] [Rift cut].
- 5) Veneer Match: [Book-matched] [Slip match] [Random match] [Pleasing match] [Plank match].

TWO FACTORY FINISHES BELOW ARE OPTIONAL IN DIFFERENT RATES OF APPLICATION [REGULAR OR SEFA] RETAIN EITHER, BOTH, OR NEITHER AS APPLICABLE TO THE PROJECT.

- 4. Factory Finish: Provide clear UV-cured acrylic coating on [face side] [back side] [b o t h sides]

[Scientific Equipment and Furniture Association (SEFA) Conforming option where additional finish is applied for chemical resistance - LabCoatn•].

- a. Gloss Level: [Flat.15 to 30 gloss units] [Satin, 31 to 45 gloss units] [Semi-gloss. 46 to 60



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gloss units] [Gloss. 61 to 100 gloss units] measured on 60 degree gloss meter per ASTM D 523.

5. Factory Finish: Provide pre-applied custom stained finish (CustomColors™). Finish shall be a pre-applied. UV-cured.

100 percent solid stain applied in the factory under controlled conditions. Provide finish as indicated or, if not indicated, as selected by the Architect from the manufacturer's standards.

a. Gloss Level: [Satin, 31 to 45 gloss units] [Semi-gloss.46 to 60 gloss units] [Gloss. 61 to 100 gloss units]

measured on 60 degree gloss meter per ASTM D 523.

I INCLUDE BELOW IF APPLICABLE TO THE PROJECT.

G. Fire-Retardant Treated Materials: Where indicated, use materials impregnated with fire retardant chemical formulations indicated, by a pressure process or by other means acceptable to authorities having jurisdiction, to produce products with surface burning characteristics specified.

1. Use chemical formulations that do not bleed through or otherwise affect finishes.

2. Mill lumber before treatment and implement special procedures during treatment and drying processes that shall prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated architectural woodwork.

3. Discard treated material that does not comply with requirements of referenced woodworking standard.

Do not use twisted, warped, bowed, discolored, or otherwise damaged or defective material.

PART 3 - EXECUTION

3.1 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.



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1. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.2 PREPARATION

- A. Condition work to average prevailing humidity conditions in installation areas before installing. Before installing work, examine shop-fabricated work for completion and complete work as required.

3.3 INSTALLATION

- A. General: Install in accordance with reviewed product data, final shop drawings, manufacturer's written recommendations, and as indicated on the Drawings.
- B. Quality Standard: Install architectural woodwork to comply with AWI AWS for the same grades specified in Part 2- Products of this Section for type of architectural woodwork involved.

I INCLUDE BELOW IF APPLICABLE TO THE PROJECT.

- C. Fire Retardant-Treated Wood: Handle, store and install fire retardant-treated wood to comply with recommendations of chemical treatment manufacturer, including, but not limited to, those for adhesives used to install architectural woodwork.
- D. Installation Tolerances: Install architectural woodwork plumb, level, true, and straight with no distortions. Shim as required with concealed shims.



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3.4 ADJUSTING AND CLEANING

- A. Repair damaged and defective work where possible to eliminate functional and visual defects. Where not possible to repair, replace the work

- B. Clean architectural woodwork on exposed and semi-exposed surfaces. Touch-up shop-applied finishes to restore damaged or soiled areas.

3.5 PROTECTION

- A. Provide final protection and retain conditions in a manner acceptable to the Installer, that shall ensure that the work shall be without damage at time of Substantial Completion

END OF SECTION



DIVISION 07 THERMAL AND MOISTURE PROTECTION



DIVISION 07 : THERMAL AND MOISTURE PROTECTION

Roxul
Master Guide Specification

Blanket (and Batt) Insulation
(COMFORTBATT®)

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ROXUL GUIDE NOTE: This master specification section is based on ROXUL INC., COMFORTBATT®. Standard application: Thermal batt and blanket insulation for steel stud wall applications.

ROXUL GUIDE NOTE: This master specification section includes guide notes identified as "ROXUL GUIDE NOTE" for information purposes and to assist the specification writer in making appropriate decisions. The ROXUL GUIDE NOTE always immediately precedes the text to which it is referring. The section serves as a guideline only and should be edited with deletions and additions to meet specific project requirements.

ROXUL GUIDE NOTE: This specification section follows the recommendations of the Construction Specifications Institute, Project Resource Manual including MasterFormat™, SectionFormat™, and PageFormat™. Optional text is indicated by square brackets [_____]; delete the optional text including the brackets in the final copy of the specification and retain only text pertaining directly to the project. Delete the ROXUL GUIDE NOTES in the final copy of the specification. Trade/brand names with appropriate product model numbers, styles, and types are used in ROXUL GUIDE NOTES and in the specification text Article or Paragraph titled "Acceptable Material".

1 GENERAL

1.01 SUMMARY OF WORK

- A. This Section specifies stone fiber batt and blanket thermal insulation for steel stud wall applications.

1.02 RELATED REQUIREMENTS

ROXUL GUIDE NOTE: Include in this Paragraph only those sections and documents that directly affect the work of this section. If a reader of this section could reasonably expect to find a product or component specified in this section, but it is actually specified elsewhere, then the related section number(s) should be listed in the Paragraph below. Do not include Division 00 Documents or Division 01 Sections since it is assumed that all technical sections are related to all project Division 00 Documents and Division 01 Sections to some degree. Refer to other documents with caution since referencing them may cause them to be considered a legal part of the Contract. Edit the following paragraphs to suit specific project conditions.

- A. Section [_____].

ROXUL GUIDE NOTE: In the following Article, include only those reference standards which appear in the finished version of the project specification.

1.03 REFERENCE STANDARDS

- A. ASTM International (ASTM).
1. ASTM C165 - [2012], Standard Test Method for Measuring Compressive Properties of Thermal Insulations.
 2. ASTM C167 - [2009], Standard Test Method for Thickness and Density of Blanket or Batt Thermal Insulations.
 3. ASTM C356 - [2010], Standard Test Method for Linear Shrinkage of Preformed High-Temperature Thermal Insulation Subjected to Soaking Heat.
 3. ASTM C423 - [2009a], Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 5. ASTM C518 - [2010], Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 6. ASTM C553 - [2011], Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 7. ASTM C612 - [2010], Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
 8. ASTM C665 - [2011], Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 9. ASTM C795 - [2013], Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
 10. ASTM C1104/C1104M - [2000(2006)], Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.



DIVISION 07 : THERMAL AND MOISTURE PROTECTION

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Blanket (and Batt) Insulation
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11. ASTM E84 - [2012b], Standard Test Method for Surface Burning Characteristics of Building Materials.
 12. ASTM E90 - [2009], Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
 13. ASTM E136 - [2011], Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.
 14. ASTM E413 - [2010], Classification for Rating Sound Insulation.
 15. ASTM E1050 - [2012], Standard Test Method for Impedance and Absorption of Acoustical Materials Using a Tube, Two Microphones and a Digital Frequency Analysis System.
- B. US Green Building Council (USGBC).
1. LEED® NC Version 2.2-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations.
- C. Underwriters' Laboratories (UL).
1. UL 181 - [2005], Factory-Made Air Ducts and Connectors.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Co-ordination: Co-ordinate work of this Section with roofing or deck work and with work of other trades for proper time and sequence to avoid construction delays.

ROXUL GUIDE NOTE: The pre-installation meeting may be deleted if the size and complexity of the project does not require prior co-ordination and review of the barrier system installation.

- B. Pre-installation Meeting: Convene pre-installation meeting after Award of Contract and [one week] before starting work of this Section to verify project requirements, substrate conditions and coordination with other building sub-trades, and to review manufacturer's written installation instructions.
1. Comply with Section 01 31 19 - Project Meetings and co-ordinate with other similar pre-installation meetings.
 2. Notify attendees 2 weeks prior to meeting and ensure meeting attendees include as minimum:
 - a. Owner;
 - b. Consultant;
 - c. [Roofing] [Deck] Subcontractor;
 - d. Manufacturer's Technical Representative.
 3. Ensure meeting agenda includes review of methods and procedures related to insulation installation including co-ordination with related work.
 4. Record meeting proceedings including corrective measures and other actions required to ensure successful completion of work and distribute to each attendee within 1 week of meeting.

ROXUL GUIDE NOTE: Article below includes submittal of relevant data to be furnished by Contractor.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

- A. Make submittals in accordance with Contract Conditions and Section 01 33 00 - Submittal Procedures.
- B. Product Data: Submit product data including manufacturer's literature for insulation materials and accessories, indicating compliance with specified requirements and material characteristics.
1. Submit list on insulation manufacturer's letterhead of materials and accessories to be incorporated into Work.
 2. MSDS report.
 3. Include product name.
 4. Include preparation instructions and recommendations, installation methods, and storage and handling requirements.
 5. Include contact information for manufacturer and their representative for this Project.
- C. Samples:
1. Submit [5.5 x 7.5] inches minimum sample of insulation in thickness used on Project.
- D. Test Reports:



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1. Submit evaluation service reports or other independent testing agency reports showing compliance with specified performance characteristics and physical properties.
- E. Field Reports: Submit manufacturer's field reports within 3 days of each manufacturer representative's site visit and inspection.
- F. Sustainable Design (LEED).
 1. LEED Submittals: In accordance with Section [01 35 21 – LEED Requirements]
 2. Submit verification for items as follow:
 - a. EA Credit 1: Thermal value of insulation contributing to overall energy performance of building.
 - b. MR Credits 4: Recycled content of insulation indicating percentages by weight of preconsumer and postconsumer recycled content.
 - c. MR Credits 5: Verify location where insulation is extracted, processed and manufactured.
- G. Insulation Installer Qualifications:
 1. Submit letter verifying insulation installer's experience with work similar to work of this Section.

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Supply maintenance data for insulation materials for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

ROXUL GUIDE NOTE: If LEED is not a part of the project delete the following Paragraph in its entirety as well as the reference standards in 1.03.6.

- B. Sustainable Design Closeout Documentation (LEED).
 1. Provide calculations on end-of-project recycling rates, salvage rates, and landfill rates for work of this Section demonstrating percentage of construction wastes which were recycled.
 2. Submit verification from recycling facility showing receipt of materials.
- C. Record Documentation: In accordance with Section 01 78 00 - Closeout Submittals.
 1. List materials used in insulation work.
 2. Warranty: Submit warranty documents specified.

1.07 QUALITY ASSURANCE

- A. Batt and Blanket Insulation Installer Quality Assurance: Work experience of [5] years minimum with work similar to work of this Section.

ROXUL GUIDE NOTE: If LEED is not a part of the project delete the following Paragraph in its entirety as well as the reference standards in Articles 1.03 and 1.05.

- B. Sustainability Standards Certification (LEED).
 1. LEED submittals: In accordance with Section 01 35 21 - LEED Requirements.

ROXUL GUIDE NOTE: The following Article although not part of Quality Assurance, can be used to enhance the quality of materials by ensuring that they are delivered and handled properly at the work site.

1.08 DELIVERY STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 1. Deliver material in accordance with Section 01 61 00 - Common Product Requirements.
 2. Deliver materials and accessories in insulation manufacture's original packaging with identification labels intact and in sizes to suit project.
 3. Ensure insulation materials are not exposed to moisture during delivery.
 4. Replace wet or damaged insulation materials.



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- B. Storage and Handling Requirements: Store materials off ground in dry location and protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
1. Store in original packaging until installed.

- C. Packaging Waste Management:

ROXUL GUIDE NOTE: For smaller projects that do not have a separate Section for waste management and disposal, delete the following paragraph.

1. Separate and recycle waste packaging materials in accordance with Section 01 74 19 - Construction Waste Management and Disposal.
2. Remove waste packaging materials from site and dispose of packaging materials at appropriate recycling facilities.

ROXUL GUIDE NOTE: For smaller projects that do not have a Waste Management Plan, delete the option referring to a Waste Management Plan.

3. Collect and separate for disposal paper and plastic material in appropriate on-site storage containers for recycling [in accordance with Waste Management Plan].

1.09 WARRANTY

- A. Project Warranty: Refer to Contract Conditions 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 intended to limit other rights Owner may have under Contract Conditions.

ROXUL GUIDE NOTE: Co-ordinate article below with manufacturer's warranty requirements.

- C. Warranty period: [1] years commencing on Date of Substantial Performance of Work.

2 PRODUCTS

2.01 MANUFACTURER

1. Manufacturer: ROXUL INC., 420 Bronte Street South, Suite 105, Milton, Ontario, L9T 0H9, Phone: 905-878-8474, Toll Free: 1-800-265-6878, e-mail: contactus@roxul.com, URL: www.rspect.com.

2.02 DESCRIPTION

- A. Non-combustible, lightweight, semi-rigid stone wool batt insulation to ASTM C655, Type 1.

2.03 PERFORMANCE CRITERIA

- A. Batt Insulation for exterior stud walls: To ASTM C665, Type 1.
1. Fire performance:
 - a. Non-combustibility: To ASTM E136.
 - b. Surface Burning Characteristics: To ASTM E84.
 - 1) Flame spread: 0.
 - 2) Smoke developed: 0.
 2. Thermal resistance: To ASTM C518.
 3. Density: 2 lbs/ft³ to ASTM C167.

ROXUL GUIDE NOTE: All ROXUL insulation materials contain recycled content. ROXUL is pleased to have third-party certification of our products' recycled content for our Milton, Ontario facility completed by ICC -ES SAVE™. All ROXUL products produced in the Milton, Ontario facility contain a minimum of 40% recycled content. ROXUL products produced in our Grand Forks, British Columbia facility are currently awaiting ICC-ES Save™ certification. Check with ROXUL for recycled contents of materials manufactured in Byhalia, Mississippi. Edit the following paragraph to address the recycled content for the location of the manufacturing plant.



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- .4 Recycled content: [40] [16] % minimum.

2.04 MATERIALS

- A. Non-combustible, lightweight, semi-rigid stone wool batt insulation to ASTM C665, Type 1.
1. Size: [16] [24] x 48 inches.
 2. Thickness: [2.5] [3.5] [6] [7] [8] inches.

ROXUL GUIDE NOTE: Listed R value is for 1 inch thick insulation. Contact ROXUL INC., directly using contact information listed above for R values for other thicknesses.

3. R value/1 inch at 75 °F: 0.125 h ft² °F/Btu.
4. Acceptable Material: ROXUL INC., ROXUL COMFORTBATT™.

2.05 ACCESSORIES

- A. Mechanical fasteners in accordance with insulation manufacturer's written recommendations.

2.06 SOURCE QUALITY CONTROL

- A. Ensure insulation components and accessories are supplied or approved in writing by single manufacturer.

2.07 PRODUCT SUBSTITUTIONS

- A. 2Substitutions: [In accordance with Section 01 23 13 - Product Substitution Procedures] [No substitutions permitted].

3 EXECUTION

3.01 INSTALLERS

- A. Use only installers with [5] years minimum experience with work similar to work of this Section.

3.02 EXAMINATION

- A. Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for insulation installation in accordance with manufacturer's written recommendations.
1. Visually inspect substrate in presence of Consultant.
 2. Ensure surfaces are free of snow, ice, frost, grease and other deleterious materials.
 3. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.
- B. Start of insulation installation indicates installer's acceptance of substrate installation conditions.

3.03 INSTALLATION

ROXUL GUIDE NOTE: Refer to the insulation manufacturer's current installation guide for detailed information regarding installation.

- A. Install insulation in accordance with manufacturer's written recommendations.
- B. Install insulation to maintain continuity of thermal protection to building elements and spaces.
- C. Do not compress insulation to fit into spaces.
- D. Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.



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ROXUL GUIDE NOTE: For following paragraph, verify clearances with local building regulations, safety codes and authorities having jurisdiction.

- F. Keep insulation minimum [3] inches from heat emitting devices such as recessed light fixtures, and minimum [2] inches from sidewalls of chimneys and vents.
- G. Do not enclose insulation until before inspection and receipt of Consultant's written approval.

3.04 FIELD QUALITY CONTROL

- A. Field Inspection: Coordinate field inspection in accordance with Section [01 45 00 - Quality Control].

ROXUL GUIDE NOTE: Specify requirements if manufacturers are to provide field quality control with onsite personnel for instruction or supervision of product installation, application, erection or construction. Manufacturer field reports are included under PART 1, Action and Informational Submittals.

- B. Manufacturer's Services:

ROXUL GUIDE NOTE: Use the following Paragraphs only when manufacture's field services are provided and are required to verify the quality of the installed components. Establish the number, duration and costs of periodic site visits required by manufacturer and specify below. Consult manufacturer for services required. Contact ROXUL Inc. to determine any costs associated with the ROXUL Technical Representative providing manufacturer's field services. Delete if manufacturer's field services are not required.

- 1. Coordinate manufacturer's services with Section [01 45 00 - Quality Control].

ROXUL GUIDE NOTE: Delete the following paragraph if no costs are associated with manufacturer's services.

- a. Arrange for payment for manufacturer's services.
- b. Have manufacturer review work involved in handling, installation, protection, and cleaning of insulation and accessories, and submit written reports in acceptable format to verify compliance of Work with Contract conditions.
- 2. Manufacturer's Field Services: Provide manufacturer's field services consisting of product use recommendations and periodic site visits for product installation review in accordance with manufacturer's instructions.
 - a. Report any inconsistencies from manufacturer's recommendations immediately to Consultant.
- 3. Schedule site visits to review work at stages listed:
 - a. After delivery and storage of drainage sheet and accessories, and when preparatory work on which Work of this Section depends is complete, but before installation begins.
 - b. Twice during progress of work at 25% and 60% complete.
 - c. Upon completion of Work, after cleaning is carried out.
 - d. Obtain reports within three days of review and submit immediately to Consultant.

3.05 CLEANING

ROXUL GUIDE NOTE: For smaller projects that do not have a separate Division 01 Section for cleaning, delete the reference to Section 01 74 00 – Cleaning in the following two Paragraphs.

- A. Progress Cleaning: Perform cleanup as work progresses [in accordance with Section 01 74 00 - Cleaning and Waste Management].
 - 1. Leave work area clean at end of each day.
- B. Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment [in accordance with Section 01 74 00 – Cleaning and Waste Management].
- C. Waste Management:
 - 1. Co-ordinate recycling of waste materials with 01 74 19 - Construction Waste Management and Disposal.
 - 2. Collect recyclable waste and dispose of or recycle field generated construction waste created during construction or final cleaning related to work of this Section.



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3. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.06 PROTECTION

- A. Protect installed products and accessories from damage during construction.
- B. Repair damage to adjacent materials caused by insulation installation.

END OF SECTION 07 2116 – BLANKET (AND BATT) INSULATION (COMFORTBATT®)



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ROXUL GUIDE NOTE: This master specification section is based on ROXUL INC., MONOBOARD®. Standard application: roof insulation protection or cover board.

ROXUL GUIDE NOTE: This master specification section includes guide notes identified as "ROXUL GUIDE NOTE" for information purposes and to assist the specification writer in making appropriate decisions. The ROXUL GUIDE NOTE always immediately precedes the text to which it is referring. The section serves as a guideline only and should be edited with deletions and additions to meet specific project requirements.

ROXUL GUIDE NOTE: This specification section follows the recommendations of the Construction Specifications Institute, Project Resource Manual including MasterFormat™, SectionFormat™, and PageFormat™. Optional text is indicated by square brackets [_____]; delete the optional text including the brackets in the final copy of the specification and retain only text pertaining directly to the project. Delete the ROXUL GUIDE NOTES in the final copy of the specification. Trade/brand names with appropriate product model numbers, styles, and types are used in ROXUL GUIDE NOTES and in the specification text Article or Paragraph titled "Acceptable Material".

1 GENERAL

1.01 SUMMARY OF WORK

- A. This Section specifies roof and deck insulation.

1.02 RELATED REQUIREMENTS

ROXUL GUIDE NOTE: Include in this Paragraph only those sections and documents that directly affect the work of this section. If a reader of this section could reasonably expect to find a product or component specified in this section, but it is actually specified elsewhere, then the related section number(s) should be listed in the Paragraph below. Do not include Division 00 Documents or Division 01 Sections since it is assumed that all technical sections are related to all project Division 00 Documents and Division 01 Sections to some degree. Refer to other documents with caution since referencing them may cause them to be considered a legal part of the Contract. Edit the following paragraphs to suit specific project conditions.

- .1 Section [_____].

ROXUL GUIDE NOTE: In the following Article, include only those reference standards which appear in the finished version of the project specification.

1.03 REFERENCE STANDARDS

- A. ASTM International (ASTM).
 1. ASTM C165 - [2012], Standard Test Method for Measuring Compressive Properties of Thermal Insulations.
 2. ASTM C177 - [2010], Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus.
 3. ASTM C209 - [2007ae 1], Standard Test Methods for Cellulosic Fiber Insulating Board.
 4. ASTM C356 - [2010], Standard Test Method for Linear Shrinkage of Preformed High-Temperature Thermal Insulation Subjected to Soaking Heat.
 5. ASTM C411 - [2011], Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
 6. ASTM C423 - [2009a], Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 7. ASTM C447 - [2003(2010)], Standard Practice for Estimating the Maximum Use Temperature of Thermal Insulation.
 8. ASTM C518 - [2010], Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 9. ASTM C553 - [2011], Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 10. ASTM C612 - [2010], Standard Specification for Mineral Fiber Block and Board Thermal Insulation.



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11. ASTM C665 - [2011], Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 12. ASTM C726 - [2012], Standard Specification for Mineral Fiber Roof Insulation Board.
 13. ASTM C1104/C1104M - [2000(2006)], Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.
 14. ASTM C1338 - [2008], Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
 15. ASTM E84 - [2012], Standard Test Method for Surface Burning Characteristics of Building Materials.
 16. ASTM E90 - [2009], Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
 17. ASTM E96/E96M - [2010], Standard Test Methods for Water Vapor Transmission of Materials.
 18. ASTM E136 - [2011], Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.
- B. US Green Building Council (USGBC).
1. LEED® NC Version 2.2- [2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations.
- C. Factory Mutual Global Inc.(FM).
1. FM 4450-[1989], Approval Standard for Class 1 Insulated Steel Decks.
 2. FM 4470-[2010], Approval Standard for Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction.
 3. FM 4473-[2005], Specification Test Standard for Impact Resistance Testing of Rigid Roofing Materials by Impacting with Freezer Ice Balls.
- D. Underwriters' Laboratories (UL).
1. UL 263 - [2005], Fire Tests of Building Construction and Materials.
 2. UL 790 - [2004], Standard for Standard Test Methods for Fire Tests of Roof Covering.
 3. UL 2218 - [2010], Standard for Impact Resistance of Prepared Roof Covering Materials.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Co-ordination: Co-ordinate work of this Section with roofing or deck work and with work of other trades for proper time and sequence to avoid construction delays.

ROXUL GUIDE NOTE: The pre-installation meeting may be deleted if the size and complexity of the project does not require prior co-ordination and review of the barrier system installation.

- B. Pre-installation Meeting: Convene pre-installation meeting after Award of Contract and [one week] before starting work of this Section to verify project requirements, substrate conditions and coordination with other building sub-trades, and to review manufacturer's written installation instructions.
1. Comply with Section 01 31 19 - Project Meetings and co-ordinate with other similar pre-installation meetings.
 2. Notify attendees 2 weeks prior to meeting and ensure meeting attendees include as minimum:
 - a. Owner;
 - b. Consultant;
 - c. [Roofing] [Deck] Subcontractor;
 - d. Manufacturer's Technical Representative.
 3. Ensure meeting agenda includes review of methods and procedures related to insulation installation including co-ordination with related work.
 4. Record meeting proceedings including corrective measures and other actions required to ensure successful completion of work and distribute to each attendee within 1 week of meeting.

ROXUL GUIDE NOTE: Article below includes submittal of relevant data to be furnished by Contractor.

1.05 ACTION AND INFORMATIONAL SUBMITTALS



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- A. Make submittals in accordance with Contract Conditions and Section 01 33 00 - Submittal Procedures.
- B. Product Data: Submit product data including manufacturer's literature for insulation materials and accessories, indicating compliance with specified requirements and material characteristics.
 - 1. Submit list on insulation manufacturer's letterhead of materials and accessories to be incorporated into Work.
 - 2. MSDS report.
 - 3. Include product name.
 - 4. Include preparation instructions and recommendations, installation methods, and storage and handling requirements.
 - 5. Include contact information for manufacturer and their representative for this Project.
- C. Samples:
 - 1. Submit [6 x 6] inches minimum sample of insulation in thickness used on Project.
- D. Test Reports:
 - 1. Submit evaluation service reports or other independent testing agency reports showing compliance with specified performance characteristics and physical properties.
- E. Field Reports: Submit manufacturer's field reports within 3 days of each manufacturer representative's site visit and inspection.
- F. Sustainable Design (LEED).
 - 1. LEED Submittals: In accordance with Section [01 35 21 - LEED Requirements]
 - 2. Submit verification for items as follow:
 - a. EA Credit 1: Thermal value of insulation contributing to overall energy performance of building.
 - b. MR Credits 4.1 and 4.2: Recycled content of insulation indicating percentages by weight of preconsumer and postconsumer recycled content.
 - c. MR Credits 5.1 and 5.2: Verify location where insulation is extracted, processed and manufactured.
- G. [Roofing] [Deck] Subcontractor Qualifications:
 - .1 Submit letter verifying [roofing] [deck] subcontractor's experience with work similar to work of this Section.

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Supply maintenance data for insulation materials for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

ROXUL GUIDE NOTE: If LEED is not a part of the project delete the following Paragraph in its entirety as well as the reference standards in 1.03.F.

- B. Sustainable Design Closeout Documentation (LEED).
 - 1. Provide calculations on end-of-project recycling rates, salvage rates, and landfill rates for work of this Section demonstrating percentage of construction wastes which were recycled.
 - 2. Submit verification from recycling facility showing receipt of materials.
- C. Record Documentation: In accordance with Section 01 78 00 - Closeout Submittals.
 - 1. List materials used in insulation work.
 - 2. Warranty: Submit warranty documents specified.

1.07 QUALITY ASSURANCE

- A. [Roofing] [Deck] Subcontractor Quality Assurance: Work experience of [5] years minimum with work similar to work of this Section.

ROXUL GUIDE NOTE: If LEED is not a part of the project delete the following Paragraph in its entirety as well as the reference standards in Articles 1.03 and 1.05.



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- B. Sustainability Standards Certification (LEED).
 - 1. LEED submittals: In accordance with Section 01 35 21 - LEED Requirements.

ROXUL GUIDE NOTE: The following Article although not part of Quality Assurance, can be used to enhance the quality of materials by ensuring that they are delivered and handled properly at the work site.

1.08 DELIVERY STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Deliver material in accordance with Section 01 61 00 - Common Product Requirements.
 - 2. Deliver materials and accessories in insulation manufacturer's original packaging with identification labels intact and in sizes to suit project.
 - 3. Ensure insulation materials are not exposed to moisture during delivery.
 - 4. Replace wet or damaged insulation materials.
- B. Storage and Handling Requirements: Store materials off ground in dry location and protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
 - 1. Store in original packaging until installed.
- C. Packaging Waste Management:

ROXUL GUIDE NOTE: For smaller projects that do not have a separate Section for waste management and disposal, delete the following paragraph.

- 1. Separate and recycle waste packaging materials in accordance with Section 01 74 19 - Construction Waste Management and Disposal.
- 2. Remove waste packaging materials from site and dispose of packaging materials at appropriate recycling facilities.

ROXUL GUIDE NOTE: For smaller projects that do not have a Waste Management Plan, delete the option referring to a Waste Management Plan.

- 3. Collect and separate for disposal paper and plastic material in appropriate on-site storage containers for recycling [in accordance with Waste Management Plan].

1.09 WARRANTY

- A. Project Warranty: Refer to Contract Conditions 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 intended to limit other rights Owner may have under Contract Conditions.

ROXUL GUIDE NOTE: Co-ordinate article below with manufacturer's warranty requirements.

- C. Warranty period: [] years commencing on Date of Substantial Performance of Work.

2 PRODUCTS

2.01 MANUFACTURER

- A. Manufacturer: ROXUL INC., 420 Bronte Street South, Suite 105, Milton, Ontario, L9T 0H9, Phone: 905-878-8474, Toll Free: 1-800-265-6878, e-mail: contactus@roxul.com, URL: www.rspec.com.

2.02 DESCRIPTION

ROXUL GUIDE NOTE: Specify the insulation intended for use with mechanically fastened or ballasted roofing membranes for single ply membrane roofing applications. Specify the insulation board impregnated with bitumen top layer for torch, mop-applied or cold adhered roofing applications.



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- A. Rigid, mono-density mineral wool insulation board intended for use with mechanically fastened or ballasted roofing membranes to ASTM C726.

2.03 PERFORMANCE CRITERIA

- A. Low-Slope Roofing Insulation Protection or Cover Board: To ASTM C726.
1. Fire performance:

ROXUL GUIDE NOTE: Specify Class 1-90 for BUR, Modified Bitumen and Single-Ply roofing applications.

- a. Rated roof insulation: To FM Approval 4450/4470, [Class 1-NCC (non-combustible core)] [Class 1-90].
- b. Non-combustibility: To ASTM E136.
- c. External spread of flame on roof surface: To UL 790.
- d. Thermal degradation and charring: To UL 263.
- e. Surface Burning Characteristics: To ASTM E84.
 - 1) Flame spread: 0.
 - 2) Smoke developed: 0
2. Water Vapour Transmission: To ASTM E96, 41 Perm.
3. Moisture Resistance: To ASTM C1104, moisture sorption of 0.3 %.
4. Water absorption less than 1 %: To ASTM C209.

ROXUL GUIDE NOTE: It is essential that the correct thermal resistance be specified and that it corresponds to the temperature that the materials have been tested to and will operate under. The paragraph below shows R Values of ROXUL Inc., MONOBOARD® at different ambient temperatures. Choose the subparagraph that best meets the conditions for the project. If a different insulation manufacturer other than ROXUL Inc., is being used, then an examination of their Climate Driven R Values should be undertaken to establish what the actual R Value will be under the ambient conditions of the project.

5. Thermal resistance: To ASTM C518,
 - a. R 4.4 hr.ft².F/Btu at 25 °F.
 - b. R 4.3 hr.ft².F/Btu at 40 °F.
 - c. R 4.0 hr.ft².F/Btu at 75 °F.
- d. R 3.7 hr.ft².F/Btu at 110 °F.
6. Hail damage resistance: To FM 4470, Class 1-SH.
7. Impact resistance: To FM 4473, Class 4 and UL 2218, Class 4.
8. Corrosive resistance: To ASTM C665, Corrosive to steel - Pass.
9. Stainless steel stress corrosion: To ASTM C871 and ASTM C692.
10. Compressive resistance: To ASTM C165, 10 % deformation 12 psi.
11. Density: To ASTM C612, 11 lbs/ft³.

ROXUL GUIDE NOTE: All ROXUL insulation materials contain recycled content. ROXUL is pleased to have third-party certification of our products' recycled content for our Milton, Ontario facility completed by ICC -ES SAVE™. All ROXUL products produced in the Milton, Ontario facility contain a minimum of 40% recycled content. Check with ROXUL for recycled contents of materials manufactured in Byhalia, Mississippi. Edit the following paragraph to address the recycled content for the location of the manufacturing plant.

12. Recycled content: [40] % minimum.

2.04 MATERIALS

- A. Low-Slope Roofing Insulation: Stone wool fibre insulation board.
 1. Size: 48 x 48 inches.
 2. Thickness: [2] [2.5] [3.5] [4] [4.5] [5] [5.5] [6] inches.
 3. Acceptable Material: ROXUL INC., MONOBOARD®.

2.05 ACCESSORIES

- A. Mechanical fasteners in accordance with insulation manufacturer's written recommendations.

2.06 SOURCE QUALITY CONTROL



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- A. Ensure insulation components and accessories are supplied or approved in writing by single manufacturer.

2.07 PRODUCT SUBSTITUTIONS

- A. Substitutions: [In accordance with Section 01 23 13 - Product Substitution Procedures] [No substitutions permitted].

3 EXECUTION

3.01 INSTALLERS

- A. Use only installers with [5] years minimum experience with work similar to work of this Section.

3.02 EXAMINATION

- A. Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for insulation installation in accordance with manufacturer's written recommendations.
1. Visually inspect substrate in presence of Consultant.
 2. Ensure surfaces are free of snow, ice, frost, grease and other deleterious materials.
 3. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.
- B. Start of insulation installation indicates installer's acceptance of substrate installation conditions.

3.03 INSTALLATION

ROXUL GUIDE NOTE: Refer to the insulation manufacturer's current installation guide for detailed information regarding installation.

- A. Install protection of cover board where indicated.
1. Install protection or cover board in courses parallel to decking flutes with board ends staggered.
 2. Ensure board joints are flush and tightly butted together without gaps.
 3. Mechanically fasten boards where indicated and in accordance with manufacturer's written recommendations.
- B. [Temporarily seal] [Cover with moisture retardant barrier] exposed edges at completion of each work day.

3.04 FIELD QUALITY CONTROL

- A. Field Inspection: Coordinate field inspection in accordance with Section [01 45 00 - Quality Control].

ROXUL GUIDE NOTE: Specify requirements if manufacturers are to provide field quality control with onsite personnel for instruction or supervision of product installation, application, erection or construction. Manufacturer field reports are included under PART 1, Action and Informational Submittals.

- B. Manufacturer's Services:

ROXUL GUIDE NOTE: Use the following Paragraphs only when manufacture's field services are provided and are required to verify the quality of the installed components. Establish the number, duration and costs of periodic site visits required by manufacturer and specify below. Consult manufacturer for services required. Contact ROXUL Inc. to determine any costs associated with the ROXUL Technical Representative providing manufacturer's field services. Delete if manufacturer's field services are not required.

1. Coordinate manufacturer's services with Section [01 45 00 - Quality Control].



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ROXUL GUIDE NOTE: Delete the following paragraph if no costs are associated with manufacturer's services.

- a. Arrange for payment for manufacturer's services.
- b. Have manufacturer review work involved in handling, installation, protection, and cleaning of insulation and accessories, and submit written reports in acceptable format to verify compliance of Work with Contract conditions.
2. Manufacturer's Field Services: Provide manufacturer's field services consisting of product use recommendations and periodic site visits for product installation review in accordance with manufacturer's instructions.
 - a. Report any inconsistencies from manufacturer's recommendations immediately to Consultant.
3. Schedule site visits to review work at stages listed:
 - a. After delivery and storage of drainage sheet and accessories, and when preparatory work on which Work of this Section depends is complete, but before installation begins.
 - b. Twice during progress of work at 25% and 60% complete.
 - c. Upon completion of Work, after cleaning is carried out.
 - d. Obtain reports within three days of review and submit immediately to Consultant.

3.05 CLEANING

ROXUL GUIDE NOTE: For smaller projects that do not have a separate Division 01 Section for cleaning, delete the reference to Section 01 74 00 – Cleaning in the following two Paragraphs.

- A. Progress Cleaning: Perform cleanup as work progresses [in accordance with Section 01 74 00 - Cleaning and Waste Management].
 1. Leave work area clean at end of each day.
- B. Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment [in accordance with Section 01 74 00 – Cleaning and Waste Management].
- C. Waste Management:
 1. Co-ordinate recycling of waste materials with 01 74 19 - Construction Waste Management and Disposal.
 2. Collect recyclable waste and dispose of or recycle field generated construction waste created during construction or final cleaning related to work of this Section.
 3. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.06 PROTECTION

- A. Protect installed products and accessories from damage during construction.
- B. Repair damage to adjacent materials caused by insulation installation.

END OF SECTION 07 22 00 – ROOF AND DECK INSULATION



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ROXUL GUIDE NOTE: This master specification section is based on ROXUL Inc., COMFORTBOARD™ CIS. Standard application: exterior non-structural commercial and industrial insulation sheathing.

ROXUL GUIDE NOTE: This master specification section includes guide notes identified as “ROXUL GUIDE NOTE” for information purposes and to assist the specification writer in making appropriate decisions. The ROXUL GUIDE NOTE always immediately precedes the text to which it is referring. The section serves as a guideline only and should be edited with deletions and additions to meet specific project requirements.

ROXUL GUIDE NOTE: This specification section follows the recommendations of the Construction Specifications Institute, Project Resource Manual including MasterFormat™, SectionFormat™, and PageFormat™. Optional text is indicated by square brackets [_____]; delete the optional text including the brackets in the final copy of the specification and retain only text pertaining directly to the project. Delete the ROXUL GUIDE NOTES in the final copy of the specification. Trade/brand names with appropriate product model numbers, styles, and types are used in ROXUL GUIDE NOTES and in the specification text Article or Paragraph titled “Acceptable Material”.

1 GENERAL

1.01 SUMMARY OF WORK

1. This Section specifies stone fibre board insulation for exterior non-structural commercial and building construction insulation sheathing applications.

1.02 RELATED REQUIREMENTS

ROXUL GUIDE NOTE: Include in this Paragraph only those sections and documents that directly affect the work of this section. If a reader of this section could reasonably expect to find a product or component specified in this section, but it is actually specified elsewhere, then the related section number(s) should be listed in the Paragraph below. Do not include Division 00 Documents or Division 01 Sections since it is assumed that all technical sections are related to all project Division 00 Documents and Division 01 Sections to some degree. Refer to other documents with caution since referencing them may cause them to be considered a legal part of the Contract. Edit the following paragraphs to suit specific project conditions.

1. Section [07 46 13 - Preformed Metal Panels].

ROXUL GUIDE NOTE: In the following Article, include only those reference standards which appear in the finished version of the project specification.

1.03 REFERENCE STANDARDS

- A. ASTM International (ASTM).
 1. ASTM C165 - [2007], Standard Test Method for Measuring Compressive Properties of Thermal Insulations.
 2. ASTM C209 - [2012], Standard Test Methods for Cellulosic Fiber Insulating Board.
 3. ASTM C356 - [2010], Standard Test Method for Linear Shrinkage of Preformed High-Temperature Thermal Insulation Subjected to Soaking Heat.
 4. ASTM C423 - [2009a], Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 5. ASTM C518 - [2010], Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 6. ASTM C612 - [2010], Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
 7. ASTM C795 - [2008], Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
 8. ASTM C1104/C1104M - [2000(2006)], Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.
 9. ASTM C1338 - [2008], Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
 10. ASTM E96/E96M - [2010], Standard Test Methods for Water Vapor Transmission of Materials.



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- B. US Green Building Council (USGBC).
 - 1. LEED® NC Version 2.2-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Co-ordination: Co-ordinate work of this Section with roofing or deck work and with work of other trades for proper time and sequence to avoid construction delays.

ROXUL GUIDE NOTE: The pre-installation meeting may be deleted if the size and complexity of the project does not require prior co-ordination and review of the barrier system installation.

- B. Pre-installation Meeting: Convene pre-installation meeting after Award of Contract and [one week] before starting work of this Section to verify project requirements, substrate conditions and coordination with other building sub-trades, and to review manufacturer's written installation instructions.
 - 1. Comply with Section 01 31 19 - Project Meetings and co-ordinate with other similar pre-installation meetings.
 - 2. Notify attendees 2 weeks prior to meeting and ensure meeting attendees include as minimum:
 - a. Owner;
 - b. Consultant;
 - c. Board Insulation Installation Subcontractor;
 - d. Manufacturer's Technical Representative.
 - 3. Ensure meeting agenda includes review of methods and procedures related to insulation installation including co-ordination with related work.
 - 4. Record meeting proceedings including corrective measures and other actions required to ensure successful completion of work and distribute to each attendee within 1 week of meeting.

ROXUL GUIDE NOTE: Article below includes submittal of relevant data to be furnished by Contractor.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

- A. Make submittals in accordance with Contract Conditions and Section 01 33 00 - Submittal Procedures.
- B. Product Data: Submit product data including manufacturer's literature for insulation materials and accessories, indicating compliance with specified requirements and material characteristics.
 - 1. Submit list on insulation manufacturer's letterhead of materials and accessories to be incorporated into Work.
 - 2. MSDS report.
 - 3. Include product name.
 - 4. Include preparation instructions and recommendations, installation methods, and storage and handling requirements.
 - 5. Include contact information for manufacturer and their representative for this Project.
- C. Samples:
 - 1. Submit [6 x 6] inches minimum sample of insulation in thickness used on Project.
- D. Test Reports:
 - 1. Submit evaluation service reports, or other independent testing agency reports, if available, showing compliance with specified performance characteristics and physical properties.
- E. Field Reports: Submit manufacturer's field reports within 3 days of each manufacturer representative's site visit and inspection.
- F. Sustainable Design (LEED).
 - 1. LEED Submittals: In accordance with Section [01 35 21 - LEED Requirements]
 - 2. Submit verification for items as follow:
 - a. EA Credit 1: Thermal value of insulation contributing to overall energy performance of building.



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- b. MR Credits 4: Recycled content of insulation indicating percentages by weight of preconsumer and postconsumer recycled content.
- c. MR Credits 5: Verify location where insulation is extracted, processed and manufactured.

- .7 Insulation Installer Qualifications:
 - 1. Submit letter verifying insulation installer's experience with work similar to work of this Section.

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Supply maintenance data for insulation materials for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

ROXUL GUIDE NOTE: If LEED is not a part of the project delete the following Paragraph in its entirety as well as the reference standards in 1.03.

- B. Sustainable Design Closeout Documentation (LEED).
 - 1. Provide calculations on end-of-project recycling rates, salvage rates, and landfill rates for work of this Section demonstrating percentage of construction wastes which were recycled.
 - 2. Submit verification from recycling facility showing receipt of materials.
- C. Record Documentation: In accordance with Section 01 78 00 - Closeout Submittals.
 - 1. List materials used in insulation work.
 - 2. Warranty: Submit warranty documents specified.

1.07 QUALITY ASSURANCE

- A. Board Insulation Installer Quality Assurance: Work experience of [5] years minimum with work similar to work of this Section.

ROXUL GUIDE NOTE: If LEED is not a part of the project delete the following Paragraph in its entirety as well as the reference standards in Articles 1.03 and 1.05.

- B. Sustainability Standards Certification (LEED).
 - 1. LEED submittals: In accordance with Section 01 35 21 - LEED Requirements.

ROXUL GUIDE NOTE: The following Article although not part of Quality Assurance, can be used to enhance the quality of materials by ensuring that they are delivered and handled properly at the work site.

1.08 DELIVERY STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Deliver material in accordance with Section 01 61 00 - Common Product Requirements.
 - 2. Deliver materials and accessories in insulation manufacturer's original packaging with identification labels intact and in sizes to suit project.
 - 3. Ensure insulation materials are not exposed to moisture during delivery.
 - 4. Replace wet or damaged insulation materials.
- B. Storage and Handling Requirements: Store materials off ground in dry location and protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
 - 1. Store in original packaging until installed.
- C. Packaging Waste Management:

ROXUL GUIDE NOTE: For smaller projects that do not have a separate Section for waste management and disposal, delete the following paragraph.

- 1. Separate and recycle waste packaging materials in accordance with Section 01 74 19 - Construction Waste Management and Disposal.
- 2. Remove waste packaging materials from site and dispose of packaging materials at appropriate recycling facilities.



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ROXUL GUIDE NOTE: For smaller projects that do not have a Waste Management Plan, delete the option referring to a Waste Management Plan.

3. Collect and separate for disposal paper and plastic material in appropriate on-site storage containers for recycling [in accordance with Waste Management Plan].

1.09 WARRANTY

- A. Project Warranty: Refer to Contract Conditions 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 intended to limit other rights Owner may have under Contract Conditions.

ROXUL GUIDE NOTE: Co-ordinate article below with manufacturer's warranty requirements.

3. Warranty period: [1] years commencing on Date of Substantial Performance of Work.

2 PRODUCTS

2.01 MANUFACTURER

- A. Manufacturer: ROXUL Inc., 420 Bronte Street South, Suite 105, Milton, Ontario, L9T 0H9, Phone: 905-878-8474, Toll Free: 1-800-265-6878, e-mail: contactus@roxul.com, URL: www.roxul.com.

2.02 DESCRIPTION

- A. Non-combustible, rigid, water repellent, mineral wool insulation board for exterior non-structural commercial and industrial high performance insulation sheathing applications to ASTM C612, Type IVB.

2.03 PERFORMANCE CRITERIA

- A. Board insulation for exterior curtain wall systems: To ASTM C612, Type IVB.
 1. Fire performance:
 - a. Surface Burning Characteristics: To ASTM E84.
 - 1) Flame spread: 0.
 - 2) Smoke developed: 0.
 2. Thermal resistance (R value/inch at 75 ° F: [4.0] hr ft² F/Btu to ASTM C518.
 3. Moisture resistance:
 - a. Moisture sorption: 0.28 % maximum to ASTM C1104/C1104M.
 - b. Water vapour transmission: 35 perm to ASTM E96, Desiccant Method.
 - c. Water absorption: 1.2 % to ASTM C209.
 4. Dimensional stability: 0.38 % maximum linear shrinkage at 1200 °F to ASTM C356.
 5. Corrosive resistance:
 - a. Steel to ASTM C665: Non-corrosive.
 - b. Stainless steel to ASTM C795: Non-corrosive.
 6. Density: 11.0 lb/ft³ to ASTM C612.
 7. Compressive strength: To ASTM C165.
 - a. 1220 psf at 10 %.
 - b. 1880 psf at 25 %.

ROXUL GUIDE NOTE: ROXUL is pleased to have third-party certification of our products' recycled content for our Milton Facility completed by ICC -ES SAVE™. All ROXUL products produced in the Milton facility contain a minimum of 40% recycled content.

8. Recycled content: 40 % minimum.
9. Fungi resistance: To ASTM C1338.

ROXUL GUIDE NOTE: For sound absorption co-efficients for different insulation thicknesses, refer to manufacturer's



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web site at www.roxul.com .

10. Acoustical performance sound absorption co-efficients to ASTM C423.

Sound Absorption Co-efficiencies at Frequencies

| Thickness (inches) | 125 Hz | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | 4000 Hz | NRC |
|--------------------|--------|--------|--------|---------|---------|---------|------|
| 1 | 0.13 | 0.49 | 0.85 | 0.89 | 0.89 | 0.97 | 0.80 |
| 2 | 0.50 | 0.71 | 0.85 | 0.90 | 0.96 | 1.01 | 0.85 |

2.04 MATERIALS

- A. Non-combustible, rigid, water repellent, mineral wool insulation board to ASTM C612, Type-IVB.
1. Size: [24 x 48] [48 x 72] inches.
 2. Thickness: [1] [1 1/4] [2] [2 1/2] [3] inches.
 3. Acceptable Material: Roxul Inc., COMFORTBOARD™ CIS.

2.05 ACCESSORIES

- A. Mechanical fasteners in accordance with insulation manufacturer's written recommendations.

2.06 SOURCE QUALITY CONTROL

1. Ensure insulation components and accessories are supplied or approved in writing by single manufacturer.

2.07 PRODUCT SUBSTITUTIONS

- A. Substitutions: [In accordance with Section 01 23 13 - Product Substitution Procedures] [No substitutions permitted].

3 EXECUTION

3.01 INSTALLERS

- A. Use only installers with [5] years minimum experience with work similar to work of this Section.

3.02 EXAMINATION

- A. Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for insulation installation in accordance with manufacturer's written recommendations.
1. Visually inspect substrate in presence of Consultant.
 2. Ensure surfaces are free of snow, ice, frost, grease and other deleterious materials.
 3. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.
- B. Start of insulation installation indicates installer's acceptance of substrate installation conditions.

3.03 INSTALLATION

- A. General:

ROXUL GUIDE NOTE: Refer to the insulation manufacturer's current installation guide for detailed information regarding installation.

1. Install insulation in accordance with manufacturer's written recommendations.



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2. Install insulation to maintain continuity of thermal protection to building elements and spaces.

ROXUL GUIDE NOTE: For following paragraph, verify clearances with local building regulations, safety codes and authorities having jurisdiction.

3. Keep insulation minimum [3] inches from heat emitting devices such as recessed light fixtures, and minimum [2] inches from sidewalls of chimneys and vents.
 4. Do not enclose insulation before inspection and receipt of Consultant's written approval.
- B. Installation of Insulation Board:
1. Install insulation board in accordance with insulation manufacturer's written recommendations.

3.04 FIELD QUALITY CONTROL

- A. Field Inspection: Coordinate field inspection in accordance with Section [01 45 00 - Quality Control].

ROXUL GUIDE NOTE: Specify requirements if manufacturers are to provide field quality control with onsite personnel for instruction or supervision of product installation, application, erection or construction. Manufacturer field reports are included under PART 1, Action and Informational Submittals.

- B. Manufacturer's Services:

ROXUL GUIDE NOTE: Use the following Paragraphs only when manufacture's field services are provided and are required to verify the quality of the installed components. Establish the number and duration of periodic site visits required by manufacturer and specify below. Consult manufacturer for services required. Delete if field services are not required.

1. Coordinate manufacturer's services with Section [01 45 00 - Quality Control].
 - a. Have manufacturer review work involved in handling, installation, protection, and cleaning of insulation and accessories, and submit written reports in acceptable format to verify compliance of Work with Contract conditions.
2. Manufacturer's Field Services: Provide manufacturer's field services consisting of product use recommendations and periodic site visits for product installation review in accordance with manufacturer's instructions.
 - a. Report any inconsistencies from manufacturer's recommendations immediately to Consultant.
3. Schedule site visits to review work at stages listed:
 - a. After delivery and storage of drainage sheet and accessories, and when preparatory work on which Work of this Section depends is complete, but before installation begins.
 - b. Twice during progress of work at 25% and 60% complete.
 - c. Upon completion of Work, after cleaning is carried out.
 - d. Obtain reports within three days of review and submit immediately to Consultant.

3.05 CLEANING

ROXUL GUIDE NOTE: For smaller projects that do not have a separate Division 01 Section for cleaning, delete the reference to Section 01 74 00 – Cleaning in the following two Paragraphs.

- A. Progress Cleaning: Perform cleanup as work progresses [in accordance with Section 01 74 00 - Cleaning and Waste Management].
1. Leave work area clean at end of each day.
- B. Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment [in accordance with Section 01 74 00 – Cleaning and Waste Management].
- C. Waste Management:
1. Co-ordinate recycling of waste materials with 01 74 19 - Construction Waste Management and Disposal.
 2. Collect recyclable waste and dispose of or recycle field generated construction waste created during construction or final cleaning related to work of this Section.



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3. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.06 PROTECTION

- A. Protect installed products and accessories from damage during construction.
- B. Repair damage to adjacent materials caused by insulation installation.

END OF SECTION 07 21 13 – BOARD INSULATION (COMFORTBOARD™ CIS)



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ROXUL GUIDE NOTE: this master specification section is based on ROXUL INC., AFB®. Standard application: for wall/floor systems where acoustical performance and fire resistance are the primary concerns.

ROXUL GUIDE NOTE: If this section is being used to specify primarily thermal and fire resistance insulation, then it is recommended that the section number and title shown in the header be changed to 09 81 16 - Blanket (And Batt) Insulation.

ROXUL GUIDE NOTE: This master specification section includes guide notes identified as "ROXUL GUIDE NOTE" for information purposes and to assist the specification writer in making appropriate decisions. The ROXUL GUIDE NOTE always immediately precedes the text to which it is referring. The section serves as a guideline only and should be edited with deletions and additions to meet specific project requirements.

ROXUL GUIDE NOTE: This specification section follows the recommendations of the Construction Specifications Institute, Project Resource Manual including MasterFormat™, SectionFormat™, and PageFormat™. Optional text is indicated by square brackets [_____]; delete the optional text including the brackets in the final copy of the specification and retain only text pertaining directly to the project. Delete the ROXUL GUIDE NOTES in the final copy of the specification. Trade/brand names with appropriate product model numbers, styles, and types are used in ROXUL GUIDE NOTES and in the specification text Article or Paragraph titled "Acceptable Material".

1 GENERAL

1.01 SUMMARY OF WORK

- A. This Section specifies stone fiber batt and blanket thermal insulation and stone fibre batt and blanket acoustical insulation.

1.02 RELATED REQUIREMENTS

ROXUL GUIDE NOTE: Include in this Paragraph only those sections and documents that directly affect the work of this section. If a reader of this section could reasonably expect to find a product or component specified in this section, but it is actually specified elsewhere, then the related section number(s) should be listed in the Paragraph below. Do not include Division 00 Documents or Division 01 Sections since it is assumed that all technical sections are related to all project Division 00 Documents and Division 01 Sections to some degree. Refer to other documents with caution since referencing them may cause them to be considered a legal part of the Contract. Edit the following paragraphs to suit specific project conditions.

- A. Section [07 84 00 - Firestopping].
- B. Section [07 92 19 - Acoustical Joint Sealants].

ROXUL GUIDE NOTE: In the following Article, include only those reference standards which appear in the finished version of the project specification.

1.03 REFERENCE STANDARDS

- A. ASTM International (ASTM).
 1. ASTM C165 - [2012], Standard Test Method for Measuring Compressive Properties of Thermal Insulations.
 2. ASTM C167 - [2009], Standard Test Method for Thickness and Density of Blanket or Batt Thermal Insulations.
 3. ASTM C356 - [2010], Standard Test Method for Linear Shrinkage of Preformed High-Temperature Thermal Insulation Subjected to Soaking Heat.
 4. ASTM C423 - [2009a], Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 5. ASTM C518 - [2010], Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 6. ASTM C553 - [2011], Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 7. ASTM C612 - [2010], Standard Specification for Mineral Fiber Block and Board Thermal Insulation.



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8. ASTM C665 - [2011], Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
9. ASTM C795 - [2013], Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
10. ASTM C1104/C1104M - [2000(2006)], Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.
11. ASTM E84 - [2012b], Standard Test Method for Surface Burning Characteristics of Building Materials.
12. ASTM E90 - [2009], Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
13. ASTM E136 - [2011], Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.
14. ASTM E413 - [2010], Classification for Rating Sound Insulation.
15. ASTM E1050 - [2012], Standard Test Method for Impedance and Absorption of Acoustical Materials Using a Tube, Two Microphones and a Digital Frequency Analysis System.

B. US Green Building Council (USGBC).

1. LEED® NC Version 2.2-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations.

C. Underwriters' Laboratories (UL).

1. UL 181 - [2005], Factory-Made Air Ducts and Connectors.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Co-ordination: Co-ordinate work of this Section with roofing or deck work and with work of other trades for proper time and sequence to avoid construction delays.

ROXUL GUIDE NOTE: The pre-installation meeting may be deleted if the size and complexity of the project does not require prior co-ordination and review of the barrier system installation.

- B. Pre-installation Meeting: Convene pre-installation meeting after Award of Contract and [one week] before starting work of this Section to verify project requirements, substrate conditions and coordination with other building sub-trades, and to review manufacturer's written installation instructions.

1. Comply with Section 01 31 19 - Project Meetings and co-ordinate with other similar pre-installation meetings.
2. Notify attendees 2 weeks prior to meeting and ensure meeting attendees include as minimum:
 - a. Owner;
 - b. Consultant;
 - c. [Roofing] [Deck] Subcontractor;
 - d. Manufacturer's Technical Representative.
3. Ensure meeting agenda includes review of methods and procedures related to insulation installation including co-ordination with related work.
4. Record meeting proceedings including corrective measures and other actions required to ensure successful completion of work and distribute to each attendee within 1 week of meeting.

ROXUL GUIDE NOTE: Article below includes submittal of relevant data to be furnished by Contractor.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

- A. Make submittals in accordance with Contract Conditions and Section 01 33 00 - Submittal Procedures.

- B. Product Data: Submit product data including manufacturer's literature for insulation materials and accessories, indicating compliance with specified requirements and material characteristics.

1. Submit list on insulation manufacturer's letterhead of materials and accessories to be incorporated into Work.
2. MSDS report.
3. Include product name.
4. Include preparation instructions and recommendations, installation methods, and storage and handling requirements.



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5. Include contact information for manufacturer and their representative for this Project.
- C. Samples:
 1. Submit [5.5 x 7.5] inches minimum sample of insulation in thickness used on Project.
- D. Test Reports:
 1. Submit evaluation service reports or other independent testing agency reports showing compliance with specified performance characteristics and physical properties.
- E. Field Reports: Submit manufacturer's field reports within 3 days of each manufacturer representative's site visit and inspection.
- F. Sustainable Design (LEED).
 1. LEED Submittals: In accordance with Section [01 35 21 – LEED Requirements]
 2. Submit verification for items as follow:
 - a. EA Credit 1: Thermal value of insulation contributing to overall energy performance of building.
 - b. MR Credits 4: Recycled content of insulation indicating percentages by weight of preconsumer and postconsumer recycled content.
 - c. MR Credits 5: Verify location where insulation is extracted, processed and manufactured.
- G. Insulation Installer Qualifications:
 1. Submit letter verifying insulation installer's experience with work similar to work of this Section.

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Supply maintenance data for insulation materials for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

ROXUL GUIDE NOTE: If LEED is not a part of the project delete the following Paragraph in its entirety as well as the reference standards in 1.03.6.

- B. Sustainable Design Closeout Documentation (LEED).
 1. Provide calculations on end-of-project recycling rates, salvage rates, and landfill rates for work of this Section demonstrating percentage of construction wastes which were recycled.
 2. Submit verification from recycling facility showing receipt of materials.
- C. Record Documentation: In accordance with Section 01 78 00 - Closeout Submittals.
 1. List materials used in insulation work.
 2. Warranty: Submit warranty documents specified.

1.07 QUALITY ASSURANCE

- A. Batt and Blanket Insulation Installer Quality Assurance: Work experience of [5] years minimum with work similar to work of this Section.

ROXUL GUIDE NOTE: If LEED is not a part of the project delete the following Paragraph in its entirety as well as the reference standards in Articles 1.03 and 1.05.

- B. Sustainability Standards Certification (LEED).
 1. LEED submittals: In accordance with Section 01 35 21 - LEED Requirements.

ROXUL GUIDE NOTE: The following Article although not part of Quality Assurance, can be used to enhance the quality of materials by ensuring that they are delivered and handled properly at the work site.

1.08 DELIVERY STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 1. Deliver material in accordance with Section 01 61 00 - Common Product Requirements.



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- 2. Deliver materials and accessories in insulation manufacture's original packaging with identification labels intact and in sizes to suit project.
 - 3. Ensure insulation materials are not exposed to moisture during delivery.
 - 4. Replace wet or damaged insulation materials.
- B. Storage and Handling Requirements: Store materials off ground in dry location and protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
- 1. Store in original packaging until installed.
- C. Packaging Waste Management:

ROXUL GUIDE NOTE: For smaller projects that do not have a separate Section for waste management and disposal, delete the following paragraph.

- 1. Separate and recycle waste packaging materials in accordance with Section 01 74 19 - Construction Waste Management and Disposal.
- 2. Remove waste packaging materials from site and dispose of packaging materials at appropriate recycling facilities.

ROXUL GUIDE NOTE: For smaller projects that do not have a Waste Management Plan, delete the option referring to a Waste Management Plan.

- 3. Collect and separate for disposal paper and plastic material in appropriate on-site storage containers for recycling [in accordance with Waste Management Plan].

1.09 WARRANTY

- A. Project Warranty: lRefer to Contract Conditions 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 intended to limit other rights Owner may have under Contract Conditions.

ROXUL GUIDE NOTE: Co-ordinate article below with manufacturer's warranty requirements.

- C. Warranty period: [1] years commencing on Date of Substantial Performance of Work.

2 PRODUCTS

2.01 MANUFACTURER

- 1. Manufacturer: ROXUL INC., 420 Bronte Street South, Suite 105, Milton, Ontario, L9T 0H9, Phone: 905-878-8474, Toll Free: 1-800-265-6878, e-mail: contactus@roxul.com, URL: www.rspec.com.

2.02 DESCRIPTION

- A. Non-combustible, lightweight, semi-rigid stone wool batt insulation to ,ASTM C665 Type 1, that provides fire resistance to ASTM E136 and sound control to ASTM E423.

2.03 PERFORMANCE CRITERIA

- A. Acoustical and fire batt insulation for walls and floors to ASTM C665, Type 1.
 - 1. Fire performance:
 - a. Non-combustibility: To ASTM E136.
 - b. Surface Burning Characteristics: To ASTM E84.
 - 1) Flame spread: 0.
 - 2) Smoke developed: 0.
 - 2. Acoustical Performance:
 - a. Airborne sound transmission loss: To ASTM E90.
 - b. Rating sound insulation: To ASTM E413.



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c. Sound absorption co-efficients: To ASTM E423.

Sound Absorption Co-efficiencies at Frequencies

| Thickness (inches) | 125 Hz | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | 4000 Hz | NRC |
|--------------------|--------|--------|--------|---------|---------|---------|------|
| 1 | 0.14 | 0.25 | 0.65 | 0.90 | 1.01 | 1.01 | 0.70 |
| 1 1/2 | 0.18 | 0.44 | 0.94 | 1.04 | 1.02 | 1.03 | 0.85 |
| 2 | 0.28 | 0.60 | 1.09 | 1.09 | 1.05 | 1.07 | 0.95 |
| 3 | 0.52 | 0.96 | 1.18 | 1.07 | 1.05 | 1.05 | 1.05 |
| 4 | 0.86 | 1.11 | 1.20 | 1.07 | 1.08 | 1.07 | 1.10 |

d. Impedence and absorption of acoustic materials: To ASTM E1050.

3. Air erosion velocity: 1,000 ft/m maximum to UL 181.
4. Thermal resistance: To ASTM C518.
5. Corrosive resistance: To ASTM C665, Corrosive to steel - Pass.
6. Stainless steel stress corrosion: To ASTM C795.
7. Density: To ASTM C612, 2.8 lbs/ft³.

ROXUL GUIDE NOTE: All Roxul insulation materials contain recycled content. ROXUL is pleased to have third-party certification of our products' recycled content for our Milton, Ontario facility completed by ICC -ES SAVE™. All ROXUL products produced in the Milton, Ontario facility contain a minimum of 40% recycled content. ROXUL products produced in our Grand Forks, British Columbia facility are currently awaiting ICC-ES Save™ certification. Check with ROXUL for recycled contents of materials manufactured in Byhalia, Mississippi. Edit the following paragraph to address the recycled content for the location of the manufacturing plant.

8. Recycled content: [40] [16] % minimum.

2.04 MATERIALS

A. Non-combustible, lightweight, semi-rigid stone wool batt insulation to CAN/ULC S702, Type 1, that provides fire resistance to ASTM E136 and a sound control to ASTM E90 and ASTM E423.

1. Size: [16] [24] x 48 inches.
2. Thickness: [1] [1.5] [2] [2.5] [3] [3.5] [4] [5] [6] inches.

ROXUL GUIDE NOTE: Contact Roxul Inc., directly using contact information listed above for R values for other thicknesses.

3. R value/1 inch at 75 °F: [_____] h ft² °F/Btu.
4. Acceptable Material: ROXUL INC., ROXUL AFB®.

2.05 ACCESSORIES

- A. Mechanical fasteners in accordance with insulation manufacturer's written recommendations.
- B. Acoustical sealant in accordance with Section [07 92 19 - Acoustical Joint Sealants].
- D. Firestopping materials in accordance with Section [07 84 00 - Firestopping].

2.06 SOURCE QUALITY CONTROL

A. Ensure insulation components and accessories are supplied or approved in writing by single manufacturer.

2.07 PRODUCT SUBSTITUTIONS

A. Substitutions: [In accordance with Section 01 23 13 - Product Substitution Procedures] [No substitutions permitted].



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3 EXECUTION

3.01 INSTALLERS

- A. Use only installers with [5] years minimum experience with work similar to work of this Section.

3.02 EXAMINATION

- A. **Verification of Conditions:** Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for insulation installation in accordance with manufacturer's written recommendations.
1. Visually inspect substrate in presence of Consultant.
 2. Ensure surfaces are free of snow, ice, frost, grease and other deleterious materials.
 3. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.
- B. Start of insulation installation indicates installer's acceptance of substrate installation conditions.

3.02 INSTALLATION

ROXUL GUIDE NOTE: Refer to the insulation manufacturer's current installation guide for detailed information regarding installation.

- A. Install insulation in accordance with manufacturer's written recommendations.
- B. Install insulation to maintain continuity of thermal protection to building elements and spaces.
- C. Do not compress insulation to fit into spaces.

ROXUL GUIDE NOTE: Use the following paragraph when insulation is being used as part of a firestopping system.

- D. Co-ordinate installation of firestopping insulation with Section [07 84 00 - Firestopping].
- E. Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.

ROXUL GUIDE NOTE: For following paragraph, verify clearances with local building regulations, safety codes and authorities having jurisdiction.

- F. Keep insulation minimum [3] inches from heat emitting devices such as recessed light fixtures, and minimum [2] inches from sidewalls of chimneys and vents.

ROXUL GUIDE NOTE: Use the following paragraph when acoustical insulation is being used as part of a sound absorbing system.

- G. Seal joints with acoustical joint sealant in accordance with Section [07 92 19 - Acoustical Joint Sealants].
- H. Do not enclose insulation until before inspection and receipt of Consultant's written approval.

3.04 FIELD QUALITY CONTROL

- A. **Field Inspection:** Coordinate field inspection in accordance with Section [01 45 00 - Quality Control].

ROXUL GUIDE NOTE: Specify requirements if manufacturers are to provide field quality control with onsite personnel for instruction or supervision of product installation, application, erection or construction. Manufacturer field reports are included under PART 1, Action and Informational Submittals.

- B. **Manufacturer's Services:**

ROXUL GUIDE NOTE: Use the following Paragraphs only when manufacture's field services are provided and are required to verify the quality of the installed components. Establish the number, duration and costs of periodic site



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visits required by manufacturer and specify below. Consult manufacturer for services required. Contact ROXUL Inc. to determine any costs associated with the ROXUL Technical Representative providing manufacturer's field services. Delete if manufacturer's field services are not required.

1. Coordinate manufacturer's services with Section [01 45 00 - Quality Control].

ROXUL GUIDE NOTE: Delete the following paragraph if no costs are associated with manufacturer's services.

- a. Arrange for payment for manufacturer's services.
- b. Have manufacturer review work involved in handling, installation, protection, and cleaning of insulation and accessories, and submit written reports in acceptable format to verify compliance of Work with Contract conditions.
2. Manufacturer's Field Services: Provide manufacturer's field services consisting of product use recommendations and periodic site visits for product installation review in accordance with manufacturer's instructions.
 - a. Report any inconsistencies from manufacturer's recommendations immediately to Consultant.
3. Schedule site visits to review work at stages listed:
 - a. After delivery and storage of drainage sheet and accessories, and when preparatory work on which Work of this Section depends is complete, but before installation begins.
 - b. Twice during progress of work at 25% and 60% complete.
 - c. Upon completion of Work, after cleaning is carried out.
 - d. Obtain reports within three days of review and submit immediately to Consultant.

3.05 CLEANING

ROXUL GUIDE NOTE: For smaller projects that do not have a separate Division 01 Section for cleaning, delete the reference to Section 01 74 00 – Cleaning in the following two Paragraphs.

- A. Progress Cleaning: Perform cleanup as work progresses [in accordance with Section 01 74 00 - Cleaning and Waste Management].
 1. Leave work area clean at end of each day.
- B. Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment [in accordance with Section 01 74 00 – Cleaning and Waste Management].
- C. Waste Management:
 1. Co-ordinate recycling of waste materials with 01 74 19 - Construction Waste Management and Disposal.
 2. Collect recyclable waste and dispose of or recycle field generated construction waste created during construction or final cleaning related to work of this Section.
 3. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.06 PROTECTION

- A. Protect installed products and accessories from damage during construction.
- B. Repair damage to adjacent materials caused by insulation installation.

END OF SECTION 07 2116 – BLANKET (AND BATT) INSULATION (AFB)



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COSELLA-DÖRKEN GUIDE NOTE: This master specification section includes COSELLA-DÖRKEN GUIDE NOTES identified as “COSELLA-DÖRKEN GUIDE NOTE” for information purposes and to assist the specification writer in making appropriate decisions. The COSELLA-DÖRKEN GUIDE NOTE always immediately precedes the text to which it is referring. The section serves as a guideline only and should be edited with deletions and additions to meet specific project requirements.

COSELLA-DÖRKEN GUIDE NOTE: This specification section follows the recommendations of the Construction Specifications Institute, Project Resource Manual including MasterFormat™, SectionFormat™, and PageFormat™. Optional text is indicated by square brackets []; delete the optional text including the brackets in the final copy of the specification. Delete the COSELLA-DÖRKEN GUIDE NOTES in the final copy of the specification. Trade/brand names with appropriate product model numbers, styles and types are used in COSELLA-DÖRKEN GUIDE NOTES and in the specification text Article or Paragraph titled “Acceptable Material”.

1 GENERAL

1.01 SUMMARY OF WORK

- A. This Section specifies water-resistive barriers and accessories.

1.02 RELATED REQUIREMENTS

COSELLA-DÖRKEN GUIDE NOTE: Include in this Paragraph only those sections and documents that directly affect the work of this section. If a reader of this section could reasonably expect to find a product or component specified in this section, but it is actually specified elsewhere, then the related section number(s) should be listed in the Paragraph below. Do not include Division 00 Documents or Division 01 Sections since it is assumed that all technical sections are related to all project Division 00 Documents and Division 01 Sections to some degree. Refer to other documents with caution since referencing them may cause them to be considered a legal part of the Contract. Edit the following paragraphs to suit specific project conditions.

- A. Section [_____].

COSELLA-DÖRKEN GUIDE NOTE: In the following Article, include only those reference standards which appear in the finished version of the project specification.

1.03 REFERENCE STANDARDS

- A. Air Barrier Association of America (ABAA)
1. ABAA [2011], Installer’s Certification Program.

COSELLA-DÖRKEN GUIDE NOTE: When this section was developed, ABAA had not yet published their installation procedures for water-resistive barriers. Check with ABAA for actual installation guideline publication date and title before including the following paragraph in the project specification.

2. ABAA [2012], Water-resistive Barrier Installation Guideline.
- B. American Association of Textile Chemists and Colorists (AATCC)
1. AATCC 42 [2007], Water Resistance: Impact Penetration Test.
- C. ASTM International (ASTM).
1. ASTM D882-[2010], Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
2. ASTM E84-[2010b], Standard Test Method for Surface Burning Characteristics of Building Materials.
3. ASTM E96/96M-[2010], Standard Test Methods for Water Vapor Transmission of Materials.
4. ASTM E2178-[2003], Standard Test Method for Air Permeance of Building Materials.
- D. International Code Council (ICC)
1. AC38, Acceptance Criteria for Water-resistive Barriers
- E. US Green Building Council (USGBC).



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1. LEED® NC Version 2.2-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Co-ordination: Co-ordinate work of this Section with work of other trades for proper time and sequence to avoid construction delays.
- B. Pre-installation Meeting: Convene pre-installation meeting after Award of Contract and one week prior to commencing work of this Section to verify project requirements, substrate conditions and coordination with other building sub-trades, and to review manufacturer's written installation instructions.
 1. Comply with Section 01 31 19 - Project Meetings and co-ordinate with other similar pre-installation meetings.
 2. Notify attendees 2 weeks prior to meeting and ensure meeting attendees include as minimum:
 - a. Owner;
 - b. Consultant;
 - c. Water-resistive barrier installer;
 - d. Manufacturer's Technical Representative.
 3. Ensure meeting agenda includes review of methods and procedures related to water-resistive barrier installation including co-ordination with related work.
 4. Record meeting proceedings including corrective measures and other actions required to ensure successful completion of work and distribute to each attendee within 1 week of meeting.

COSELLA-DÖRKEN GUIDE NOTE: Article below includes submittal of relevant data to be furnished by Contractor.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

- A. Make submittals in accordance with Contract Conditions and Section 01 33 00 - Submittal Procedures.
- B. Product Data: Submit product data including manufacturer's literature for water-resistive barrier membrane and accessories, indicating compliance with specified requirements and material characteristics.
 1. Submit list on water-resistive barrier manufacturer's letterhead of materials, components and accessories to be incorporated into Work.
 2. MSDS report.
 3. Include product names, types and series numbers.
 4. Include contact information for manufacturer and their representative for this Project.
- C. Samples:
 - .1 Submit duplicate 12 x 12 inches sample of membrane.
 - .2 Submit duplicate 12 inches long samples of seam tape and each type of flashing materials.
- D. Test Reports:
 - .1 Submit test reports showing compliance with specified performance characteristics and physical properties including air permeance, water vapour permeance and structural performance.
- E. Field Reports: Submit manufacturer's field reports within 3 days of each manufacturer representative's site visit and inspection.
- F. Sustainable Design (LEED).
 - .1 LEED Submittals: In accordance with Section [01 35 21 - LEED Requirements]
- G. Installer Qualifications:
 - .1 Submit [verification of manufacturer's approval of installer] [letter verifying installer's experience with work similar to work of this Section] [verification of ABAA certification].
- H. ICC compliance: Submit ICC-ES Evaluation Report (ESR) verifying compliance with ICC AC38.



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1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Supply maintenance data for water-resistive barrier materials for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

COSELLA-DÖRKEN GUIDE NOTE: If LEED is not a part of the project delete the following Paragraph in its entirety.

- B. Sustainable Design Closeout Documentation (LEED).
1. Provide calculations on end-of-project recycling rates, salvage rates, and landfill rates for work of this Section demonstrating percentage of construction wastes which were recycled.
 2. Submit verification from recycling facility showing receipt of materials.
- C. Record Documentation: In accordance with Section 01 78 00 - Closeout Submittals.
1. List materials used in water-resistive barrier work.
 2. Warranty: Submit warranty documents specified.

1.07 QUALITY ASSURANCE

- A. Installer Quality Assurance: [manufacturer's approval of installer] [[2] years' experience with work similar to work of this Section] [ABAA certification]
- B. Sustainability Standards Certification (LEED).
1. LEED NC Version 2.2 submittals: In accordance with Section 01 35 21 - LEED Requirements.
- C. Mock-up: Construct full size 10 ft x 10 ft mock-up of wall showing water-resistive barrier using proposed procedures, materials and quality of work where directed by Consultant [and in accordance with Section 01 43 00 - Quality Assurance].
1. Include examples of window frame, door frame, interior corner, exterior corner and common protrusions or penetrations of barrier membrane.
 2. Purpose: To judge quality of work and material installation.
 3. Allow Consultant [24] hours minimum prior to inspection of mock-up.
 4. Do not proceed with work prior to receipt of written acceptance of mock-up by Consultant.
 5. When accepted, mock-up will demonstrate minimum standard of quality required for work of this Section.
 6. Approved mock-up will [not] remain part of finished work.

COSELLA-DÖRKEN GUIDE NOTE: The following Article although not part of Quality Assurance, can be used to enhance the quality of materials by ensuring that they are delivered and handled properly at the work site.

1.08 DELIVERY STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
1. Deliver material in accordance with Section 01 61 00 - Common Product Requirements.
 2. Deliver materials and components in manufacturer's original packaging with identification labels intact and in sizes to suit project.
- B. Storage and Handling Requirements: Store materials off ground and protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
1. Ensure materials are protected from sunlight and UV radiation.
- C. Packaging Waste Management:

COSELLA-DÖRKEN GUIDE NOTE: For smaller projects that do not have a separate Section for waste management and disposal, delete the following paragraph.

1. Separate and recycle waste packaging materials in accordance with Section 01 74 19 - Construction Waste Management and Disposal.
2. Remove waste packaging materials from site and dispose of packaging materials at appropriate recycling facilities.

COSELLA-DÖRKEN GUIDE NOTE: For smaller projects that do not have a Waste Management Plan, delete the option referring to a Waste Management Plan.



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3. Collect and separate for disposal paper and plastic material in appropriate on-site storage containers for recycling [in accordance with Waste Management Plan].

1.09 WARRANTY

- A. Project Warranty: Refer to Contract Conditions 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 intended to limit other rights Owner may have under Contract Conditions.
 1. [10] years limited material warranty.

COSELLA-DÖRKEN GUIDE NOTE: Coordinate article below with manufacturer's warranty requirements.

- C. Warranty period: [1] years commencing on Date of Substantial Performance of Work.

2 PRODUCTS

2.01 MANUFACTURER

- A. Manufacturer: Cosella-Dörken Products Inc., 4655 Delta Way, Beamsville, Ontario, L0R 1B4, Canada, Phone: 1-905-563-3255, Toll Free: 1-888-4DELTA4 (1-888-433-5824), e-mail: info@cosella-dorken.com , URL: <http://www.cosella-dorken.com> .

2.02 DESCRIPTION

- A. Vapor permeable water-resistive barrier with highly tear-resistant thermo-bonded non-woven polyester substrate, and waterproof acrylic highly UV resistant coating.

COSELLA-DÖRKEN GUIDE NOTE: Retain the following paragraph only if the product specified is DELTA[®]-FASSADE S PLUS.

1. Include factory applied self-adhesive strip at longitudinal edges of barrier membrane.

2.03 DESIGN CRITERIA

- A. Comply with ICC AC38.
- B. Water Vapor Permeance: To ASTM E96 (Procedure A), 74.5 perms minimum.
- C. Water Impact Penetration Resistance: To AATCC 42, no water passing.
- D. Air Permeance: To ASTM E2178, 0.9 L/(s x m²) @ 75 Pa.
- E. Tear Resistance: To ASTM D 1922, [1916] [2564] g minimum.
- F. Dry Tensile Strength: To ASTM D882, MD 47.4 lb/in², CD 28.7 lb/in² minimum.
- G. Elongation at Break: To ASTM D882, MD 40 %, CD 45 % minimum.
- H. Fire Rating Characteristics to ASTM E84:
 1. Rating: NFPA Class A, IBC Class A minimum.
 2. Flame Spread: 10 maximum.
 3. Smoke Developed: 145 maximum.

2.04 MATERIALS



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A. Water-resistive Barrier for Walls: Vapor permeable water-resistive barrier with tear-resistant thermo-bonded, non-woven polyester substrate and waterproof acrylic polymeric coating stabilized against oxidation and UV degradation [and factory applied adhesive edge strips].

1. Service Life Expectancy: > 25 years.
2. Weight: 5.5 lb/100 ft², 270 g/m², 44 lb/roll nominal.
3. Roll Dimensions: 4' 11" x 164'.
4. Color: Black

COSELLA-DÖRKEN GUIDE NOTE: Specify DELTA®-FASSADE S if you are going to include tape to seal the joints. Specify DELTA®-FASSADE S PLUS if you want to use a water-resistive barrier membrane which has factory applied adhesive strips applied to the long edges of the membrane for sealing overlapping joints.

B. Acceptable Material: Cosella-Dörken Products Inc., [DELTA®-FASSADE S] [DELTA®-FASSADE S PLUS].

2.05 ACCESSORIES

A. Seam tape: In accordance with water-resistive barrier manufacturer's written recommendations.
1. Acceptable materials: Cosella-Dörken Products Inc., DELTA®-FASSADE TAPE (2-1/2" x 65' 7")

B. Flashings: Self-adhering, water-resistive flashing membrane [in accordance with water-resistive barrier manufacturer's written recommendations] [and] [in accordance with Section 07 65 00 – Flexible Flashing].
1. Acceptable materials: Cosella-Dörken Products Inc., DELTA®-FASSADE FLASHING [(4" x 65' 7") [9" x 65' 7")].

C. Fasteners: Water and vapour resistant fasteners in accordance with water-resistive barrier manufacturer's written recommendations.

COSELLA-DÖRKEN GUIDE NOTE: For steel frame construction, use the following paragraph. Check with manufacturer before using 1-1/4 inch fasteners with 2 inch metal gasketed washer and edit paragraph to suit project.

1. [1-5/8" corrosion-resistant screw with 2" minimum diameter plastic caps] [1-1/4" fasteners with 2" metal gasketed washers].

COSELLA-DÖRKEN GUIDE NOTE: For wood frame construction, use the following paragraph.

2. #4 nails with 1" minimum diameter plastic caps.

COSELLA-DÖRKEN GUIDE NOTE: For masonry construction, use the following paragraph.

3. Masonry [tap-con fasteners] with 2" minimum diameter plastic caps

D. Sealants and Adhesives: Elastomeric sealant and adhesive in accordance with [water-resistive barrier manufacturer's written recommendations] [Section 07 92 00 – Joint Sealants].

1. Ensure sealants are UV resistant and compatible with adjacent materials.
2. Acceptable materials: Cosella-Dörken Products Inc., DELTA®-THAN.

E. Primers: In accordance with flashing manufacturer's written recommendations.

2.06 PRODUCT SUBSTITUTIONS

A. Ensure all accessories such as seam tape, flashing membranes, fasteners and sealants come from same source as water-resistive barrier membrane.

B. Substitutions: [In accordance with Section 01 23 13 - Product Substitution Procedures] [No substitutions permitted].

3 EXECUTION

3.01 INSTALLERS



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COSELLA-DÖRKEN GUIDE NOTE: [Manufacturer] authorized installers use only [Manufacturer] manufactured or approved components. Other installers may substitute other manufacturer's materials.

- A. Use only [Cosella-Dörken Products Inc. authorized installers for] [installers with 2 years minimum experience in work similar to] [ABAA certified installers for] work of this Section.

3.02 EXAMINATION

A. Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for water-resistive barrier installation in accordance with manufacturer's written recommendations.

1. Visually inspect substrate in presence of Consultant.
2. Inform Consultant of unacceptable conditions immediately upon discovery.
3. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.03 PREPARATION

A. Ensure step flashings and kick-out flashings are installed before beginning installation of water-resistive barrier membrane.

B. Ensure protrusions that may penetrate water-resistive barrier membrane are removed before beginning installation.

3.04 INSTALLATION

COSELLA-DÖRKEN GUIDE NOTE: Refer to the water-resistive barrier manufacturer's current installation guide for detailed information regarding specific details and integration of auxiliary materials.

A. Install water-resistive barrier before installation of windows and doors in accordance with manufacturer's written recommendations.

COSELLA-DÖRKEN GUIDE NOTE: When this section was developed, ABAA had not yet published their installation procedures. Check with ABAA for actual installation guideline publication before including the following paragraph in the project specification.

B. Do installation in accordance with ABAA written recommendations for installation of water-resistive barriers.

C. Unroll water-resistive barrier with printed side out, wrapping entire building, including rough openings for windows, doors and other protrusions or penetrations.

1. Install water-resistive barrier plumb and level to exterior face of structural [sheathing board] [insulation board] [exterior gypsum board] or directly to framing members in accordance with manufacturer written recommendations.
2. Ensure water-resistive barrier is installed with textured side facing substrate.

D. Start installation of water-resistive barrier at building corner, leaving 6"-12" of membrane extended beyond corner.

E. Install horizontally starting at bottom of wall.

1. Overlap water-resistive barrier membrane as follows:
 - a. Exterior Corners: [12] inches minimum.
 - b. Vertical and horizontal seems: [6] inches minimum.
 - c. Other seams, joints or at protrusions and penetrations: [6] inches minimum.

F. Sill Plate Interface: Extend lower edge of water-resistive barrier over sill plate interface 3" - 6".

1. Secure to substrate with elastomeric sealant in accordance with water-resistive barrier manufacturer's written recommendation.

G. Attachment of Water-resistive Barrier Membrane to Substrate:



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COSELLA-DÖRKEN GUIDE NOTE: For steel frame construction, use the following paragraph. Check with manufacturer before using 1-1/4 inch with 2 inch metal gasketed washer and edit paragraph to suit project.

1. Attach water-resistive barrier to steel studs through exterior sheathing with [mechanical fasteners] [and] [elastomeric adhesive in accordance with manufacturer's written recommendations].

COSELLA-DÖRKEN GUIDE NOTE: Retain the following four paragraphs if mechanical fasteners are to be used.

- a. Secure using fasteners and [custom caps] [metal gasketed washers] spaced [18] inches maximum vertically on center along stud line and 24 inches maximum on center, horizontally.
- b. Ensure fasteners penetrate securely through metal studs [3/4] inch minimum.
- c. Install fasteners [6] inches from sill and frame of window and door openings.
- d. Ensure fasteners are installed [9] inches minimum from window or door head.

COSELLA-DÖRKEN GUIDE NOTE: For wood frame construction, use the following paragraph.

2. Attach water-resistive barrier to wood stud framing through exterior sheathing with [mechanical fasteners] [and] [elastomeric adhesive in accordance with manufacturer's written recommendations].

COSELLA-DÖRKEN GUIDE NOTE: Retain the following four paragraphs if mechanical fasteners are to be used.

- a. Secure using fasteners and custom caps spaced [18] inches maximum vertically on center along stud line and 24 inches maximum on center, horizontally.
- b. Ensure fasteners penetrate wood studs [3/4] inch minimum.
- c. Install fasteners [6] inches from sill and frame of window and door openings.
- d. Ensure fasteners are installed [9] inches minimum from window or door head.

COSELLA-DÖRKEN GUIDE NOTE: For masonry construction, use the following paragraph.

3. Attach water-resistive barrier to masonry or concrete substrate with [mechanical fasteners] [and] [elastomeric adhesive in accordance with manufacturer's written recommendations].

COSELLA-DÖRKEN GUIDE NOTE: Retain the following four paragraphs if mechanical fasteners are to be used.

- a. Attach membrane to masonry or concrete substrate using tap-con fasteners and custom caps spaced [18] inches maximum vertically on center and 24 inches maximum on center, horizontally.
- b. Attach membrane to masonry or concrete substrate using adhesive in accordance with water-resistive barrier manufacturer's written recommendations.
- c. Install fasteners [6] inches from sill and frame of window and door openings.
- d. Ensure fasteners are installed [9] inches minimum from window or door head.

3.05 FIELD QUALITY CONTROL

- A. Field Inspection: Coordinate field inspection in accordance with Section [01 45 00 - Quality Control].
- B. Site Installation Tolerances:
 - 1.

COSELLA-DÖRKEN GUIDE NOTE: Specify requirements if manufacturers are to provide field quality control with onsite personnel for instruction or supervision of product installation, application, erection or construction. Manufacturer field reports are included under PART 1, Action and Informational Submittals.

- C. Manufacturer's Services:

COSELLA-DÖRKEN GUIDE NOTE: Use the following Paragraphs only when manufacture's field services are provided and are required to verify the quality of the installed components. Establish the number and duration of periodic site visits required by manufacturer and specify below. Consult manufacturer for services required. Delete if field services are not required.

1. Coordinate manufacturer's services with Section [01 45 00 - Quality Control].



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- a. Have manufacturer review work involved in handling, installation, protection, and cleaning of water-resistive barrier and components, and submit written reports in acceptable format to verify compliance of Work with Contract conditions.
2. Manufacturer's Field Services: Provide manufacturer's field services consisting of product use recommendations and periodic site visits for product installation review in accordance with manufacturer's instructions.
 - a. Report any inconsistencies from manufacturer's recommendations immediately to Consultant.
3. Schedule site visits to review work at stages listed:
 - a. After delivery and storage of water-resistive barrier and components, and when preparatory work on which Work of this Section depends is complete, but before installation begins.
 - b. Twice during progress of work at 25% and 60% complete.
 - c. Upon completion of Work, after cleaning is carried out.
 - d. Obtain reports within three days of review and submit immediately to Consultant.

3.06 CLEANING

COSELLA-DÖRKEN GUIDE NOTE: For smaller projects that do not have a separate Division 01 Section for cleaning, delete the reference to Section 01 74 00 – Cleaning in the following two Paragraphs.

- A. Progress Cleaning: Perform cleanup as work progresses [in accordance with Section 01 74 00 - Cleaning and Waste Management].
 1. Leave work area clean end of each day.
- B. Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment [in accordance with Section 01 74 00 – Cleaning and Waste Management].
- C. Waste Management:
 1. Co-ordinate recycling of waste materials with 01 74 19 - Construction Waste Management and Disposal.
 2. Collect recyclable waste and dispose of or recycle field generated construction waste created during construction or final cleaning related to work of this Section.
 3. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.07 PROTECTION

- A. Protect installed products and components from damage during construction.
- B. Repair damage to adjacent materials caused by water-resistive barrier installation.

END OF SECTION 07 28 00 – WATER-RESISTIVE BARRIERS

END OF SECTION



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COSELLA-DÖRKEN GUIDE NOTE: This master specification section includes COSELLA-DÖRKEN GUIDE NOTES identified as “COSELLA-DÖRKEN GUIDE NOTE” for information purposes and to assist the specification writer in making appropriate decisions. The COSELLA-DÖRKEN GUIDE NOTE always immediately precedes the text to which it is referring. The section serves as a guideline only and should be edited with deletions and additions to meet specific project requirements.

COSELLA-DÖRKEN GUIDE NOTE: This specification section follows the recommendations of the Construction Specifications Institute, Project Resource Manual including MasterFormat™, SectionFormat™, and PageFormat™. Optional text is indicated by square brackets []; delete the optional text including the brackets in the final copy of the specification. Delete the COSELLA-DÖRKEN GUIDE NOTES in the final copy of the specification. Trade/brand names with appropriate product model numbers, styles and types are used in COSELLA-DÖRKEN GUIDE NOTES and in the specification text Article or Paragraph titled “Acceptable Material”.

COSELLA-DÖRKEN GUIDE NOTE: If this section is to be used to specify an Air Barrier system, then use section number 07 27 00. If this section is to be used to specify a Water-resistive Barrier system, then use section number 07 28 00.

COSELLA-DÖRKEN GUIDE NOTE: This specification section is based upon the Cosella-Dörken DELTA®-VENT SA product line.

1 GENERAL

1.01 SUMMARY OF WORK

- A. This Section specifies self-adhered water-resistive barriers, air barriers, and accessories.

1.02 RELATED REQUIREMENTS

COSELLA-DÖRKEN GUIDE NOTE: Include in this Paragraph only those sections and documents that directly affect the work of this section. If a reader of this section could reasonably expect to find a product or component specified in this section, but it is actually specified elsewhere, then the related section number(s) should be listed in the Paragraph below. Do not include Division 00 Documents or Division 01 Sections since it is assumed that all technical sections are related to all project Division 00 Documents and Division 01 Sections to some degree. Refer to other documents with caution since referencing them may cause them to be considered a legal part of the Contract. Edit the following paragraphs to suit specific project conditions.

- A. Section [_____].

COSELLA-DÖRKEN GUIDE NOTE: In the following Article, include only those reference standards which appear in the finished version of the project specification.

1.03 REFERENCE STANDARDS

- A. Air Barrier Association of America (ABAA)
 - 1. ABAA [2011], Installer’s Certification Program.

COSELLA-DÖRKEN GUIDE NOTE: When this section was developed, ABAA had not yet published their installation procedures for air or water-resistive barriers. Check with ABAA for actual installation guideline publication date and title before including the following paragraph in the project specification.

- 2. ABAA [2012], Water-resistive Barrier Installation Guideline.

- B. American Association of Textile Chemists and Colorists (AATCC)



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- D. ASTM International (ASTM).
 - 1. ASTM D1204-[2008], Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature.
 - 2. ASTM D3330-[2010], Standard Test Method for Peel Adhesion of Pressure-Sensitive Tape.
 - 3. ASTM D5034-09, Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)
 - 4. ASTM E84-[2010b], Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 5. ASTM E96/96M-[2010], Standard Test Methods for Water Vapor Transmission of Materials.
 - 6. ASTM E154-[2008a], Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
 - 7. ASTM E2178-[2003], Standard Test Method for Air Permeance of Building Materials.
 - 8. ASTM E2357 – 11, Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- E. International Code Council (ICC)
 - 1. AC38, Acceptance Criteria for Water-resistive Barriers
- F. US Green Building Council (USGBC).
 - 1. LEED® NC Version 2.2-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Co-ordination: Co-ordinate work of this Section with work of other trades for proper time and sequence to avoid construction delays.
- B. Pre-installation Meeting: Convene pre-installation meeting after Award of Contract and one week prior to commencing work of this Section to verify project requirements, substrate conditions and coordination with other building sub-trades, and to review manufacturer's written installation instructions.
 - 1. Comply with Section 01 31 19 - Project Meetings and co-ordinate with other similar pre-installation meetings.
 - 2. Notify attendees 2 weeks prior to meeting and ensure meeting attendees include as minimum:
 - a. Owner;
 - b. Consultant;
 - c. [Air] [Water-resistive] barrier installer;
 - d. Manufacturer's Technical Representative.
 - 3. Ensure meeting agenda includes review of methods and procedures related to [air] [water-resistive] barrier installation including co-ordination with related work.
 - 4. Record meeting proceedings including corrective measures and other actions required to ensure successful completion of work and distribute to each attendee within 1 week of meeting.

COSELLA-DÖRKEN GUIDE NOTE: Article below includes submittal of relevant data to be furnished by Contractor.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

- A. Make submittals in accordance with Contract Conditions and Section 01 33 00 - Submittal Procedures.
- B. Product Data: Submit product data including manufacturer's literature for [air] [water-resistive] barrier membrane and accessories, indicating compliance with specified requirements and material characteristics.
 - 1. Submit list on [air] [water-resistive] barrier manufacturer's letterhead of materials, components and accessories to be incorporated into Work.
 - 2. MSDS report.
 - 3. Include product names, types and series numbers.
 - 4. Include contact information for manufacturer and their representative for this Project.
- C. Samples:
 - 1. Submit duplicate 12 x 12 inches sample of membrane.



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2. Submit duplicate 12 inches long samples of seam tape and each type of flashing materials.
- D. Test Reports:
 1. Submit test reports showing compliance with specified performance characteristics and physical properties including air permeance, water vapour permeance and structural performance.
- E. Field Reports: Submit manufacturer's field reports within 3 days of each manufacturer representative's site visit and inspection.
- F. Sustainable Design (LEED).
 1. LEED Submittals: In accordance with Section [01 35 21 – LEED Requirements]
- G. Installer Qualifications:
 1. Submit [verification of manufacturer's approval of installer] [letter verifying installer's experience with work similar to work of this Section] [verification of ABAA certification].
- H. ICC compliance: Submit ICC-ES Evaluation Report (ESR) verifying compliance with ICC AC38.

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Supply maintenance data for [air] [water-resistive] barrier materials for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

COSELLA-DÖRKEN GUIDE NOTE: If LEED is not a part of the project delete the following Paragraph in its entirety.

- B. Sustainable Design Closeout Documentation (LEED).
 1. Provide calculations on end-of-project recycling rates, salvage rates, and landfill rates for work of this Section demonstrating percentage of construction wastes which were recycled.
 2. Submit verification from recycling facility showing receipt of materials.
- C. Record Documentation: In accordance with Section 01 78 00 - Closeout Submittals.
 1. List materials used in [air] [water-resistive] barrier work.
 2. Warranty: Submit warranty documents specified.

1.07 QUALITY ASSURANCE

- A. Installer Quality Assurance: [manufacturer's approval of installer] [[2] years' experience with work similar to work of this Section] [ABAA certification]
- B. Sustainability Standards Certification (LEED).
 1. LEED NC Version 2.2 submittals: In accordance with Section 01 35 21 - LEED Requirements
- C. Mock-up: Construct full size 10 ft x 10 ft mock-up of wall showing [air] [water-resistive] barrier using proposed procedures, materials and quality of work where directed by Consultant [and in accordance with Section 01 43 00 - Quality Assurance].
 1. Include examples of window frame, door frame, interior corner, exterior corner and common protrusions or penetrations of barrier membrane.
 2. Purpose: To judge quality of work and material installation.
 3. Allow Consultant [24] hours minimum prior to inspection of mock-up.
 4. Do not proceed with work prior to receipt of written acceptance of mock-up by Consultant
 5. ~~When accepted, mock-up will demonstrate minimum standard of quality required for work of this Section.~~
 6. Approved mock-up will [not] remain part of finished work.



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- A. Delivery and Acceptance Requirements:
 - 1. Deliver material in accordance with Section 01 61 00 - Common Product Requirements.
 - 2. Deliver materials and components in manufacturer's original packaging with identification labels intact and in sizes to suit project.
- B. Storage and Handling Requirements: Store materials off ground and protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
 - 1. Ensure materials are protected from sunlight and UV radiation.
- C. Packaging Waste Management:

COSELLA-DÖRKEN GUIDE NOTE: For smaller projects that do not have a separate Section for waste management and disposal, delete the following paragraph.

- 1. Separate and recycle waste packaging materials in accordance with Section 01 74 19 - Construction Waste Management and Disposal.
- 2. Remove waste packaging materials from site and dispose of packaging materials at appropriate recycling facilities.

COSELLA-DÖRKEN GUIDE NOTE: For smaller projects that do not have a Waste Management Plan, delete the option referring to a Waste Management Plan.

- 3. Collect and separate for disposal paper and plastic material in appropriate on-site storage containers for recycling [in accordance with Waste Management Plan].

1.09 WARRANTY

- A. Project Warranty: Refer to Contract Conditions 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 intended to limit other rights Owner may have under Contract Conditions.
 - 1. [10] years limited material warranty.

COSELLA-DÖRKEN GUIDE NOTE: Coordinate article below with manufacturer's warranty requirements.

- C. Warranty period: [1] years commencing on Date of Substantial Performance of Work.

2 PRODUCTS

2.01 MANUFACTURER

- A. Manufacturer: Cosella-Dörken Products Inc., 4655 Delta Way, Beamsville, Ontario, L0R 1B4, Canada, Phone: 1-905-563-3255, Toll Free: 1-888-4DELTA4 (1-888-433-5824), e-mail: info@cosella-dorken.com , URL: <http://www.cosella-dorken.com>.

2.02 DESCRIPTION

- A. Vapor permeable [air] [water-resistive] barrier, highly tear-resistant 3-layer membrane, with 2 outer layers of spun-bonded polypropylene fabric, water-tight polymeric middle layer and highly aggressive adhesive coating on the back.
 - 1. Includes factory applied self-adhesive strip on each front upper longitudinal edge of barrier membrane.
 - 2. Ensure materials meet requirements of AAMA 711.

2.03 DESIGN CRITERIA

- A. Comply with ICC AC308.
- B. Water Vapor Permeance: To ASTM E96 (Procedure A) 31 perms, (Procedure B) 50 perms.



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- C. Water Vapor Transmission: To ASTM E96 (Procedure A), 214 g/m²/24 hr, (Procedure B) 343 g/m²/24 hr.
- D. Air Leakage of Air Barrier Assembly: To ASTM E2357 -11 < 0.2 L/(s·m²) @ 75 Pa (0.04 cfm/ft² @ 1.57 lb/ft²)
- E. Water Penetration: To AATCC 127, Pass.
- F. Air Permeance: To ASTM E2178, <0.0034 cfm/sq ft @ 0.3 inches wg (< 0.02 l/(s x m²) @ 75 Pa).
- G. Resistance to Puncture: To ASTM E154, 78.6 lbs.
- H. Breaking Strength: To ASTM D5034, MD 71 lb, CD 65.4 lb minimum.
- I. Elongation at Break: To ASTM D5034, MD 27.8 %, CD 60.1 % minimum.
- J. 90° Peel Adhesion: To ASTM D3330, Pass.
- K. Peel Adhesion at Elevated Temperatures (176° F): To ASTM D3330, Pass (Level 3).
- L. Linear Dimensional Change at Elevated Temperature: To ASTM D1204, MD -1.4 %, CD +0.1 %.
- M. Fire Rating Characteristics: To ASTM E84:
 - 1. Rating: NFPA Class A, IBC Class A minimum.
 - 2. Flame Spread: 14 maximum.
 - 3. Smoke Developed: 47 maximum.

2.04 MATERIALS

- A. [Air] [Water-resistive] Barrier for Walls: Self-adhesive vapor permeable [air] [water-resistive] barrier; highly tear-resistant 3-layer membrane, with two outer layers of spun-bonded polypropylene fabric and a water-tight polymeric middle layer and factory applied adhesive edge strip.
 - 1. Weight: 40 lb/roll nominal.
 - 2. Roll Dimensions: 4 feet 11 inches x 115 feet.
 - 3. Color: Matte Gray.
- B. Acceptable Material: Cosella-Dörken Products Inc., DELTA[®]-VENT SA.

2.05 ACCESSORIES

- A. Seam tape: Acrylic-based adhesive tape in accordance with [air] [water-resistive] barrier manufacturer's written recommendations.
 - 1. Acceptable material: Cosella-Dörken Products Inc., DELTA[®]-MULTIBAND (2-1/2" x 65' 7")
- B. Flashings: Self-adhering, butyl-rubber based [air] [water-resistive] flashing membrane [in accordance with [air] [water-resistive] barrier manufacturer's written recommendations] [and] [in accordance with Section 07 65 00 – Flexible Flashing]

COSELLA-DÖRKEN GUIDE NOTE: Specify DELTA[®]-FLASHING for flashing around windows, doors and general flashing areas.

- C. Penetration Flashings: Stretchable butyl-rubber based adhesive on non-woven fabric] flashing membrane [in accordance with [air] [water-resistive] barrier manufacturer's written recommendations.



- D. Sealants and Adhesives: Elastomeric sealant and adhesive in accordance with [[air] [water-resistive] barrier manufacturer's written recommendations] [Section 07 92 00 – Joint Sealants].
 - 1. Ensure sealants are compatible with adjacent materials.
 - 2. Acceptable material: [Cosella-Dörken Products Inc., DELTA[®]-THAN] [Dow Corning[®] 758].
- E. Window Corner: Prefabricated rubber-compound window corner.
 - 1. Acceptable materials: Cosella-Dörken Products Inc., DELTA[®]-FAS CORNER.
- F. Primers: In accordance [air] [water-resistive] barrier manufacturer's written recommendations.
 - 1. Acceptable materials: Cosella-Dörken Products Inc., DELTA[®]-LVC PRIMER.

2.06 PRODUCT SUBSTITUTIONS

- A. Ensure all accessories such as seam tape, flashing membranes, window corners, and sealants come from same source as [air] [water-resistive] barrier membrane.
- B. Substitutions: [In accordance with Section 01 23 13 - Product Substitution Procedures] [No substitutions permitted].

3 EXECUTION

3.01 INSTALLERS

COSELLA-DÖRKEN GUIDE NOTE: [Manufacturer] authorized installers use only [Manufacturer] manufactured or approved components. Other installers may substitute other manufacturer's materials.

- A. Use only [Cosella-Dörken Products Inc. authorized installers for] [installers with 2 years minimum experience in work similar to] [ABAA certified installers for] work of this Section.

3.02 EXAMINATION

- A. Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for [air] [water-resistive] barrier installation in accordance with manufacturer's written recommendations.
 - 1. Visually inspect substrate in presence of Consultant.
 - 2. Inform Consultant of unacceptable conditions immediately upon discovery.
 - 3. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.03 PREPARATION

- A. Ensure step flashings and kick-out flashings are installed before beginning installation of [air] [water-resistive] membrane.
- B. Ensure protrusions that may penetrate [air] [water-resistive] barrier membrane are removed before beginning installation.

3.04 INSTALLATION

COSELLA-DÖRKEN GUIDE NOTE: Refer to the air or water-resistive barrier manufacturer's current installation guide for detailed information regarding specific details and integration of auxiliary materials.

- A. Install [air] [water-resistive] barrier before installation of windows and doors in accordance with manufacturer's written recommendations.



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the project specification.

- B. Do installation in accordance with ABAA written recommendations for installation of [air] [water-resistive] barriers.
- C. Unroll [air] [water-resistive] barrier with printed side out, wrapping entire building, including rough openings for windows, doors and other protrusions or penetrations.
 - 1. Prime substrate before applying [air] [water-resistive] barrier in accordance with manufacturer's written recommendations.
 - a. Allow to dry 120 minutes or until tacky (depending on weather conditions) before applying [air] [water-resistive] barrier.
 - 2. Install [air] [water-resistive] barrier plumb and level to exterior face of structural [sheathing board] [insulation board] [exterior gypsum board] members in accordance with manufacturer written recommendations.
 - 3. Ensure [air] [water-resistive] barrier is installed with printed side facing installer.
 - 4. Remove release liner from back of membrane and press firmly onto substrate.
 - a. Roll firmly in place with hand roller.
- D. Start installation of [air] [water-resistive] barrier at building corner, leaving 6-12 inches of membrane extended beyond corner.
- E. Install horizontally starting at bottom of wall.
 - 1. Overlap [air] [water-resistive] barrier membrane as follows:
 - a. Exterior Corners: [12] inches minimum.
 - b. Vertical seams: [6] inches minimum.
 - c. Horizontal seams: [4] inches minimum. Remove release liner and press firmly together
 - d. Other seams, joints or at protrusions and penetrations: [6] inches minimum.
- F. Sill Plate Interface: Extend lower edge of [air] [water-resistive] barrier over sill plate interface 3 - 6 inches.
 - 1. Adhere to substrate by removing release liner in accordance with [air] [water-resistive] barrier manufacturer's written recommendation.
- G. Ensure installed [air] [water-resistive] barrier is not exposed to UV for longer than 50 days.

3.05 FIELD QUALITY CONTROL

- A. Field Inspection: Coordinate field inspection in accordance with Section [01 45 00 - Quality Control].
- B. Site Installation Tolerances:
 - 1.

COSELLA-DÖRKEN GUIDE NOTE: Specify requirements if manufacturers are to provide field quality control with onsite personnel for instruction or supervision of product installation, application, erection or construction. Manufacturer field reports are included under PART 1, Action and Informational Submittals.

- C. Manufacturer's Services:

COSELLA-DÖRKEN GUIDE NOTE: Use the following Paragraphs only when manufacture's field services are provided and are required to verify the quality of the installed components. Establish the number and duration of periodic site visits required by manufacturer and specify below. Consult manufacturer for services required. Delete if field services are not required.

- 1. Coordinate manufacturer's services with Section [01 45 00 - Quality Control].
 - a. Have manufacturer review work involved in handling, installation, protection, and cleaning of [air] [water-resistive] barrier and components, and submit written reports in acceptable format to verify compliance of Work with Contract conditions.



2. Manufacturer's Field Services: Provide manufacturer's field services consisting of product use recommendations and periodic site visits for product installation review in accordance with manufacturer's instructions.
 - a. Report any inconsistencies from manufacturer's recommendations immediately to Consultant.
3. Schedule site visits to review work at stages listed:
 - a. After delivery and storage of [air] [water-resistive] barrier and components, and when preparatory work on which Work of this Section depends is complete, but before installation begins.
 - b. Twice during progress of work at 25% and 60% complete.
 - c. Upon completion of Work, after cleaning is carried out.
 - d. 50 days after installation to ensure [air] [water-resistive] barrier has not unnecessarily been left exposed to UV.
 - e. Obtain reports within three days of review and submit immediately to Consultant.

3.06 CLEANING

COSELLA-DÖRKEN GUIDE NOTE: For smaller projects that do not have a separate Division 01 Section for cleaning, delete the reference to Section 01 74 00 – Cleaning in the following two Paragraphs.

- A. Progress Cleaning: Perform cleanup as work progresses [in accordance with Section 01 74 00 - Cleaning and Waste Management].
 1. Leave work area clean at end of each day.
- B. Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment [in accordance with Section 01 74 00 – Cleaning and Waste Management].
- C. Waste Management:
 1. Co-ordinate recycling of waste materials with 01 74 19 - Construction Waste Management and Disposal.
 2. Collect recyclable waste and dispose of or recycle field generated construction waste created during construction or final cleaning related to work of this Section.
 3. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.07 PROTECTION

- A. Protect installed products and components from damage during construction.
- B. Repair damage to adjacent materials caused by [air] [water-resistive] barrier installation.

END OF SECTION [07 27 00] [07 28 00] – [AIR] [WATER-RESISTIVE] BARRIERS



DIVISION 08 OPENINGS



DIVISION 08 : OPENINGS

SECTION 081416

FLUSH WOOD DOORS

PART 1 - GENERAL

SCHEDULE 0 - SECTION REQUIREMENTS

PRODUCT DATA SHEET 0 - Submittals: Samples for [factory-finished] [plastic-laminate-faced] doors.

PART 2 - PRODUCTS

SCHEDULE 1 - FLUSH WOOD DOORS

PRODUCT DATA SHEET 1 - Manufacturer: Masonite, One Tampa City Center, 201 North Franklin Street, Suite 300, Tampa, Florida 33602 Tel (813) 877 – 2726 and (800) 895 – 2723 Fax (813) 739 – 0204. Email Address: masonitecorp@masonite.com

PRODUCT DATA SHEET 2 - 1 3/4" side hinged door

SCHEDULE 2 - DOOR CONSTRUCTION, GENERAL

PRODUCT DATA SHEET 1 - Quality Standard: WDMA I.S.1-A.

PRODUCT DATA SHEET 2 - Certified Wood: Wood doors 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."

PRODUCT DATA SHEET 3 - Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.

PRODUCT DATA SHEET 4 - WDMA I.S.1-A Performance Grade:

4.1 Heavy duty unless otherwise indicated.

PRODUCT DATA SHEET 5 - Mineral-Core Doors: Provide the following:

5.1 Composite blocking where required to eliminate through-bolting hardware.

5.2 Laminated-edge construction.

SCHEDULE 3 - FABRICATION AND FINISHING

PRODUCT DATA SHEET 1 - Factory-fit doors to suit frame-opening sizes indicated and to comply with clearances specified.



DIVISION 08 : OPENINGS

PRODUCT DATA SHEET 2 - Factory-machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3.

PART 3 - EXECUTION

3.1 DELIVERY

Reasonable care shall be exercised during shipping and handling in keeping with the decorative nature of product.

3.2 STORAGE AND PROTECTION

- A. Store upright in a dry, well ventilated building or shelter at a constant temperature.
- B. Do not store in damp, freshly plastered, drywall or concrete areas until materials have completely dried.
- C. Doors should be stored at least 10' away from any heat source to help prevent uneven drying.
- D. Doors must be sealed with an oil-based sealer or primer if stored for long periods.

SCHEDULE 1 - INSTALLATION

PRODUCT DATA SHEET 1 - Site verification of substrate conditions, which have been previously completed, are acceptable for the product installation instructions in accordance with manufacturer's specifications

PRODUCT DATA SHEET 2 - Verify that door frame openings are constructed plumb, true and level before beginning installation process.

PRODUCT DATA SHEET 3 - Install doors to comply with manufacturer's written instructions and WDMA I.S.1-A, and as indicated.

PRODUCT DATA SHEET 4 - Align and fit doors in frames with uniform clearances and bevels. Machine doors for hardware. Seal cut surfaces after fitting and machining.

PRODUCT DATA SHEET 5 - Clearances: As follows unless otherwise indicated:



DIVISION 08 : OPENINGS

- 5.1 1/8 inch at heads, jambs, and between pairs of doors.
- 5.2 1/8 inch from bottom of door to top of decorative floor finish or covering.
- 5.3 1/4 inch from bottom of door to top of threshold.

END OF SECTION



DIVISION 09 FINISHES



DIVISION 09 : FINISHES

SECTION 092900

GYPSUM BOARD

PART 1 - GENERAL

SCHEDULE 0 - SUMMARY

PRODUCT DATA SHEET 0 - This section includes gypsum board and related work products to finish the interior walls and ceilings of the DURA house.

1.2 REFERENCE STANDARDS

PRODUCT DATA SHEET 1 - ASTM International

1. ASTM C 840 - Standard Specification for Application and Finishing of Gypsum Board
3. ASTM C 919 - Standard Practice for Use of Sealants in Acoustical Applications
4. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants.
5. ASTM C 1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
6. ASTM C 1396 - Standard Specification for Gypsum Board
7. ASTM D 3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

PRODUCT DATA SHEET 2 - Gypsum Association (GA)

1. GA-214 - Recommended Levels of Gypsum Board Finish
2. GA-216 - Application and Finishing of Gypsum Panel Products
3. GA-253 - Application of Gypsum Sheathing
4. GA-600 - Fire Resistance Design Manual

PART 2 - PRODUCTS

SCHEDULE 0 - PERFORMANCE REQUIREMENTS

PRODUCT DATA SHEET 0 - 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.



DIVISION 09 : FINISHES

PRODUCT DATA SHEET 1 - 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.

SCHEDULE 1 - PANEL PRODUCTS

PRODUCT DATA SHEET 0 - 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. Type X where indicated and sag-resistant type for ceiling surfaces.
- C. Water-Resistant Gypsum Backing Board: ASTM C 1396/C 1396M, in thickness indicated. Regular type unless otherwise indicated.

SCHEDULE 2 - ACCESSORIES

PRODUCT DATA SHEET 0 - Trim Accessories: ASTM C 1047, formed from galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet. For exterior trim, use accessories formed from hot-dip galvanized-steel sheet, plastic, or rolled zinc.

- 0.1 Provide corner bead at outside corners unless otherwise indicated.
- 0.2 Provide LC-bead (J-bead) at exposed panel edges.
- 0.3 Provide control joints where indicated.

PRODUCT DATA SHEET 1 - Joint-Treatment Materials: ASTM C 475/C 475M.

- 1.1 Joint Tape: Fiberglass self-adhering tape unless otherwise recommended by panel manufacturer.
- 1.2 Joint Compounds: Drying-type, ready-mixed, all-purpose compound.
- 1.3 Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.

PART 3 - EXECUTION

SCHEDULE 0 - INSTALLATION

PRODUCT DATA SHEET 0 - Install gypsum board to comply with ASTM C 840.

- 0.1 Isolate gypsum board assemblies from abutting structural and masonry work. Provide edge trim and acoustical sealant.
- 0.2 Single-Layer Fastening Methods: Fasten gypsum panels to supports with screws.
- 0.3 Multilayer Fastening Methods: Fasten base layers to supports with screws.

PRODUCT DATA SHEET 1 - Fire-Resistance-Rated Assemblies: Comply with requirements of listed assemblies.

END OF SECTION 092900



DIVISION 09 : FINISHES

SECTION 096490

WOOD FLOORING

PART 1 - GENERAL

SCHEDULE 0 - SUMMARY

PRODUCT DATA SHEET 0 - This section includes wood flooring to be installed throughout the DURA House, except for the bathroom.

1.2 REFERENCES

A. ASTM - American Society for Testing and Materials International.

1. ASTM E 648: Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
2. ASTM D1037: Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.
3. ASTM D3359: Standard Test Method for Measuring Adhesion by Tape Test
4. ASTM D3501: Standard Test Methods for Wood-Based Structural Panels in Compression.
5. ASTM D4060: Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
6. ASTM D4442: Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.
7. ASTM D5116-06: Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products

B. FSC – Forest Stewardship Council

C. 2012 International Building Code (ICB)

D. NYC Construction Code

1.3 WORKING CONDITIONS, DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original unopened cartons until ready for installation.

B. Reference Section 01 66 00: Product Handling and Storage Requirements.

1. Cartons are to be opened and flooring materials stored in open cartons for a minimum seventy-two (72) hours.

2. Do not store directly on concrete or near outside walls.



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C. Anticipate and schedule work to assure environmental conditions (temperature, humidity and ventilation) are within limits recommended by manufacturer for optimum results.

PART 2 - PRODUCTS

SCHEDULE 0 - DESCRIPTION

PRODUCT DATA SHEET 0 - Stiletto is a collection of natural prefinished bamboo solid strand strip flooring manufactured with no urea formaldehyde and is FSC-certified. A click-lock flooring system, it can be installed with the floating method over an approved underlayment system, The flooring is suitable for high traffic retail and commercial environments and residential installations and is compatible with radiant floor systems.

SCHEDULE 1 - MANUFACTURER

- A. Smith & Fong Company
475 Sixth Street
San Francisco, CA 94103
Toll Free Tel: (866) 835-9859
Email: sales@plyboo.com
Web: www.plyboo.com

SCHEDULE 2 - MATERIALS

- A. Products: Stiletto Bamboo Flooring by Smith & Fong Company
1. Species: Moso (Phyllostachys Pubescens) Bamboo
 2. Non-urea formaldehyde resin system
 3. FSC certified
 4. Finish: Factory applied multi-coat, polyurethane and sealer finish system formulated specifically for Plyboo Stiletto
 5. Color: Brushed Pearl
 6. Back: Channeled
 7. Edge Configuration: Floating System – Click-Locking configuration on four-sides
 8. Type: Strand Prefinished: 5 inches (127mm) wide by 9/16 inches thick by 72 inches in length
 9. Physical Mechanical Properties:
 - a. ASTM E648: Critical Radiant Flux, Class 1
 - b. ASTM D1037:
 - i. Dimensional Stability, 50% to 20% RH; Linear Expansion: Parallel -0.02%, Perpendicular -0.23%; Thickness Swell -0.25%.
 - ii. Hardness (Janka Ball Test): 3,500 lbf (avg)
 - c. ASTM D3359: Adhesion by Tape Test, Class 4B
 - d. ASTM D3501: Compressive Strength / Max Load, 9,340 lbs / 13,140 lbs.
 - e. ASTM D4060: Taber Abrasion: Avg. Wear-through / Wear rate, 11,000 cycles / 5,000 cycles per 0.001 inch
 - f. ASTM D4442: Moisture Content, 6 – 9% (average range)
 - g. ASTM D5116-06: Organic Emissions (CA Section 01350), Office scenario/ Classroom



DIVISION 09 : FINISHES

scenario: Pass/Pass (0.00 µg/m³ formaldehyde detected)

2.4 ACCESSORIES

A. Underlayment:

1. PlybooQuiet, SKU# PQR-45B, Recycled Rubber Padding: 1/8 inch x 48 inches wide x 50 feet long as supplied by Smith & Fong Company

B. Flooring Accessories and Trim

1. Accessories and trim pieces, as specified in Brushed Pearl as listed at <http://www.plyboo.com/downloads/plybostrand-accessories>

PART 3 - EXECUTION

SCHEDULE 0 - EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances, and other conditions affecting performance of flooring.
- B. Verify substrate is dry, clean, and free of loose material.
- C. Do not install bamboo flooring if wood substrate (NFWA reference) exceeds 12% moisture.
- D. Verify HVAC System is operating and maintaining temperature and humidity conditions in compliance with Manufacturer's Installation Instructions.

3.2 PREPARATION

- A. Humidity: maintain indoor air humidity levels between 35% and 55% for two weeks before installation and continually thereafter.
- B. Temperature: maintain temperature of materials and installation area between 50 degrees and 80 degrees during installation and thereafter.
- C. Acclimatization: Seventy-two (72) hours prior to installation place opened boxes on a flat, even surface in the center of the work-space.
- D. Grind and fill subfloor using methods and materials appropriate to the subfloor construction to eliminate high spots and depressions exceeding 3/16 inch in 10 feet.

3.3 INSTALLATION

- A. Flooring: Comply with Manufacturer's Installation Instructions.

3.4 CLEANING



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- A. Repair or replace damaged installed products.
- B. Clean installed products in accordance with manufacturer's instructions.

3.5 PROTECTION

- A. Protect installed product from damage during construction by covering with heavy kraft-paper or other suitable covering. Do not use non-breathable sheet or film that could cause condensation to form. Maintain covering throughout remainder of construction period.

END OF SECTION



DIVISION 11 EQUIPMENT

SECTION 113100 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

SCHEDULE 0 - SECTION REQUIREMENTS

PRODUCT DATA SHEET 0 - Submittals: Product Data.

PART 2 - PRODUCTS

SCHEDULE 0 - RESIDENTIAL APPLIANCES

PRODUCT DATA SHEET 0 - Regulatory Requirements: Comply with the following:

- 0.1 NFPA: Provide electrical appliances listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- 0.2 ANSI: Provide gas-burning appliances that comply with ANSI Z21 Series standards.

PRODUCT DATA SHEET 1 - Accessibility: Where residential appliances are indicated to comply with accessibility requirements, comply with [the U.S. Architectural & Transportation Barriers Compliance Board's Accessibility Guidelines] [ICC A117.1].

PRODUCT DATA SHEET 2 - Electric Range: 30-inch-slide-in with 4 burners and continuous cleaning oven with broiler unit.

PRODUCT DATA SHEET 3 - Microwave Oven: Undercabinet microwave oven, 1.5-cu. ft.

PRODUCT DATA SHEET 4 - Refrigerator/Freezer: Freestanding, cycle-defrost, two-door refrigerator with side-by-side freezer, baked-enamel-on-steel interior cabinet liners.

- 4.1 Energy Performance: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.

PRODUCT DATA SHEET 5 - Dishwasher: Built-in, undercounter, automatic dishwasher, sized to replace 24-inch base cabinet, four wash cycles with hot-air and heat-off drying cycles, porcelain-enamel tub and door liner nylon-coated sliding dish racks.

- 5.1 Energy Performance: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.

PRODUCT DATA SHEET 6 - Clothes Washer: Clothes Washer: Freestanding, front load automatic clothes washer with 3.6-cu. ft. capacity stainless-steel tub and four wash cycles including regular, delicate, and permanent press

- 6.1 GE GFWH1200H
- 6.2 Color: white
- 6.3 Energy Performance: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.

PRODUCT DATA SHEET 7 - Electric Clothes Dryer: Freestanding, front-loading clothes dryer,



DIVISION 11: EQUIPMENT

PART 3 - EXECUTION

SCHEDULE 0 - INSTALLATION

PRODUCT DATA SHEET 0 - 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.

PRODUCT DATA SHEET 1 - Test each item of residential appliances to verify proper operation. Make necessary adjustments.

PRODUCT DATA SHEET 2 - Verify that accessories required have been furnished and installed.

END OF SECTION



DIVISION 12 FURNISHINGS



DIVISION 12 : FURNISHINGS

IceStone surfaces are slabs made from three core ingredients: 100% recycled glass, Portland cement, and pigment. IceStone surfaces are fabricated much like a natural stone and can be used as tabletops, transaction surfaces, cash wraps, work surfaces, bathroom vanities, counter tops and more.

This Guide 3-Part Specification is ready to be edited according to your project requirements. To request samples, product literature, or additional assistance email us at customerservice@icestoneusa.com, call us at 718-624-4900, or visit our website www.icestoneusa.com

. SECTION 12 36 61 – SIMULATED STONE COUNTERTOPS

PART 1 GENERAL

NOTE TO SPECIFIER: Delete items below not applicable for project.

1.1 SUMMARY

A. This Section includes composite surfacing for the following applications:

1. Countertops
2. Bathroom vanities
3. Tabletops
4. Conference tables
5. Transaction tops
6. Reception areas
7. Window Sills
8. Other interior applications as shown on drawings

NOTE TO SPECIFIER: Delete any sections below not applicable to this project; add others as required.

B. Related Sections

1. Section 05500 - Metal Fabrications: Blocking
2. Section 06100 - Rough Carpentry: Blocking
3. Section 06200 - Finish Carpentry: Plywood substrate
4. Section 06410 - Custom Cabinets: Casework substrate
5. Section 07900 - Joint Sealers: Joint sealant and backing materials
6. Section 11450 - Residential Equipment: Cooktops
7. Section 15410 - Plumbing Fixtures: Sinks, faucets

1.2 REFERENCES

A. ASTM International:

1. ASTM C97- Absorption and Bulk Specific Gravity of Dimensional Stone.
2. ASTM C109- Compressive Strength of Hydraulic Cement Mortars (Using 2 inch (50mm) Cube Specimens).
3. ASTM C293- Flexural Strength of Concrete (Using Simple Beam with Center-Point Loading).
4. ASTM C642- Density, Absorption, and Voids in Hardened Concrete.
5. ASTM C666- Resistance of Concrete to Rapid Freezing and Thawing (Superseded).
6. ASTM C1028- Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
7. ASTM C1260- Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
8. ASTM E84- Surface Burning Characteristics of Building Materials.

B. Others

1. NSF- NSF Standard 51 Food Contact
2. MBDC- Cradle to Cradle Certification

1.3 SUBMITTALS

A. Submit under provisions of Section 01300



DIVISION 12 : FURNISHINGS

NOTE TO SPECIFIER: Subparagraphs 1-5 are included in IceStone's Fabrication Guidelines available for download on our website: http://icestoneusa.com/images/stories/documents/brochures/IceStone_Fabrication_Guidelines_2012_lowres.pdf. IceStone Certified Fabricators have access to IceStone Warranty Registration Cards.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Product description
2. Fabrication instructions and recommendations
3. Storage and handling requirements and recommendations
4. Installation methods
5. Care and maintenance data
6. Warranty registration form

C. Shop Drawings:

1. Indicate color[s] and finish[es]
2. Indicate field- verified dimensions
3. Indicate locations and dimensions of cutouts
4. Indicate locations and sizes of support, blocking, including concealed blocking and reinforcement specified in other Sections

NOTE TO SPECIFIER: Coordinate subparagraphs a-d with the color selections in Part 2-Products.

D. Samples

1. For each type of product indicated:
 - a. Cut sample and seam together for representation of inconspicuous seam.
 - b. Submit minimum 2 by 3-1/2 inch (51 by 89 mm) sample of [each] color and finish specified.
 - c. Stone Adhesive: Submit sample of an adhesive joint for [each] color selected. Show color match of adhesive.
 - d. Indicate full range of color and pattern variation.
2. Approved samples will be retained as a standard for Work.

E. Manufacturer Certificates:

1. Compliance Certificate: Signed by manufacturer indicating compliance with specified performance requirements.
2. Food contact certification: Certify that materials meet NSF/ANSI 51 Food Contact.
3. MBDC Certificate: Certify that materials meet Cradle to Cradle Certification.

NOTE TO SPECIFIER: Retain applicable subparagraphs below for projects intended to be LEED Certified.

F. LEED Submittals: Submit the following in accordance with Section 01300- LEED Submittals:

1. Credit IEQ 4.1: Low-emitting materials: Adhesives & Sealants
2. Credit ID Innovation in Design: Cradle to Cradle Certification
3. Credit ID Innovation in Design: Recycled content 30% or greater
4. Credit MR 2.2 Environmentally Preferable Material: Cradle to Cradle Certification
5. Credit MR 4.1: Recycled Content: 10%
6. Credit MR 4.2: Recycled Content: 20%
7. Credit MR 5.1: Regional Materials: 20% manufactured regionally
8. Credit MR 5.2: Regional Materials: 10% extracted and manufactured regionally

G. Fabricator/Installer Qualifications: Submit evidence of fabricator/installer's certification by manufacturer.



DIVISION 12 : FURNISHINGS

H. Maintenance Data:

1. Submit manufacturer’s care and maintenance guidelines.
2. Include in closeout documents.

I. Closeout Submittals:

1. Complete warranty registration form.
2. Include in closeout documents.

1.4 QUALITY ASSURANCE

A. 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, color, and finish are approved by Architect.
3. Refinish mock-up area as required to produce acceptable work.

B. Installer/Fabricator: Certified by composite surface manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Shipping, Handling, Unloading: Observe and follow manufacturer’s instructions and recommendations including but not limited to the following:

1. Make sure slabs are safely secured during transport.
2. All slabs shall be transported face to face and back to back.
3. If shipped on an uncovered truck, all slabs must be tarped.
4. Unload all slabs with boom or overhead crane that has sufficient weight capacities to handle material.

B. Storage: Observe and follow manufacturer’s instructions and recommendations including but not limited to the following:

1. Thoroughly inspect all slabs prior to storage.
2. Store indoors.
3. Store face to face and back to back.
4. Store on A-frames or pipe racks clamped at 4 points according to manufacturer’s fabrication guidelines.

1.6 WARRANTY

NOTE TO SPECIFIER: Delete one of the following paragraphs as applicable to the project.

A. Provide manufacturer’s Commercial 5-Year Limited Warranty against material defects when fabricated and installed by an IceStone Certified Fabricator.

B. Provide manufacturer’s Residential 10-Year Limited Warranty against material defects when fabricated and installed by an IceStone Certified Fabricator.

PART 1 PRODUCTS

1.1 MANUFACTURERS

A. Approved Manufacturer: IceStone LLC, 63 Flushing Avenue, Unit 283, Bldg. 12, Brooklyn, NY 11205. Telephone: (718) 624-4900. Fax: (718) 624-4002. Web: www.icestoneusa.com. E-mail customerservice@icestoneusa.com.

NOTE TO SPECIFIER: Delete one of the following options.

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01600.



DIVISION 12 : FURNISHINGS

1.2 MATERIAL

A. Approved Product: IceStone as manufactured by IceStone LLC.

NOTE TO SPECIFIER: All IceStone colors contain 100 percent recycled glass. Amber Pearl, Sky Pearl, Sage Pearl, and White Pearl also contain mother of pearl aggregate.

Heirloom Grey also contains recycled mirror.

Edit and coordinate B with selections under Color and Finish.

B. Composition: 100 percent recycled glass [and mother of pearl] [and recycled mirror] aggregate combined with portland cement and color pigments formed into flat slabs. Petroleum based resins not permitted.

C. Weight and Size:

1. Weight: 16.3 pounds per square foot at 1-1/4 inches (32 mm) thick.
2. Maximum Slab Size: 52-1/2 inches (1334 mm) wide, 96 inches (2438 mm) long and 1-1/4 inches (32 mm) thick.
3. Finished Thickness: 1-1/4 inch (31 mm).

D. Total recycled content by weight: 70% post-industrial

NOTE TO SPECIFIER: Edit the following according to color selection and coordinate with submittals.

E. Color and Finish

1. Provide color[s] [_____] [From manufacturer's full color range]

NOTE TO SPECIFIER: IceStone surfaces are shipped from Brooklyn with a high-gloss finish. Slabs can be honed or sandblasted by a fabricator, however these and any other alterations of the factory applied finish are not covered by IceStone Residential or Commercial Limited Warranties.

2. Provide finish[es] [Polished] [Honed] [Sandblasted]

NOTE TO SPECIFIER: Retain the following if edges and corners are not detailed on drawings.

F. Exposed Edges and Corners

1. Edges: [Half Bullnose] [Full Bullnose] [Pencil] [Eased] [Platner] [Ogee] [Mitered] [_____]
2. Outside Corners: Shape to 1/8 inch (3 mm) [_____ inch(es) (_____ mm)] radius.
3. Inside Corners: Shape to 1/4 inch (6 mm) [_____ inch(es) (_____ mm)] radius.
4. Mitered or 90 degree Corners: no radius needed.

G. Physical Performance Characteristics:

1. Compressive Strength: 13,000 psi (914 Km/cm), in accordance with ASTM C 109.
2. Flexural Strength: 890 psi (63 Km/cm), in accordance with ASTM C 293.
3. Specific Gravity: 2.31, in accordance with ASTM C 97.
4. Porosity/Absorption: 0.18 percent, unsealed, in accordance with ASTM C 642.
5. Chemical Durability: 0.05 percent expansion, in accordance with ASTM C 1260 for ASR Reactivity.
6. Freeze Thaw: 0.49 percent expansion, 300 cycles, in accordance with ASTM C666.
7. Fire Rating: Class 1 (A), in accordance with ASTM E 84. Flame spread index: 0. Fuel contribution: 0. Smoke density index: 0

NOTE TO SPECIFIER: One of the following paragraphs is to be used if IceStone is being specified in flooring application. Flooring applications are not covered by IceStone Residential and Commercial Limited Warranties.

8. Finish Level, Performance: Polished finish, with coefficient of static friction of 0.69 (dry); 0.61 (wet), ASTM C 1028.
9. Finish Level, Performance: Honed finish, with coefficient of static friction of 0.71 (dry); 0.62 (wet), ASTM C 1028.
10. Finish Level, Performance: Sandblasted finish, with coefficient of static friction of 0.85 (dry); 0.77 (wet), ASTM C 1028.

1.3 ACCESSORIES

A. Mounting Adhesives: Provide clear 100% silicone adhesive as recommended by manufacturer.



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B. Joint Sealants

1. Provide color matched two-part polyester, epoxy or acrylic joint adhesive as recommended by manufacturer.
2. Acceptable Product: Tenax Rivo 50 A & B Part Knife Grade Epoxy tinted to match Tenax Tepox Epoxy colors.

C. Sealer:

1. Provide sealer as recommended by manufacturer in care and maintenance guidelines.
2. Acceptable Products:

NOTE TO SPECIFIER: Delete products not required.

- a. Miracle 511 H2O Plus
- b. Meta Crème Next Generation Impregnating Sealer
- c. Tenax Protex
- d. DuPont StoneTech Professional BulletProof Stone Sealer

D. Wax:

1. Provide wax as recommended by manufacturer in care and maintenance guidelines to help protect surface from staining or etching.
2. Acceptable Products:

NOTE TO SPECIFIER: Delete products not required.

- a. CHENG Concrete Countertop Wax
- b. Goddard's Granite & Marble Liquid Polish

E. Cleaner:

1. Provide a pH neutral cleaner as recommended by manufacturer in care and maintenance guidelines.
2. Acceptable products:
 - a. Seventh Generation All Purpose Cleaner Free & Clear
 - b. Method Multi-Surface Cleaner
 - c. Method Daily Granite Cleaner
 - d. Simple Green Stone Cleaner

1.4 FABRICATION

A. Fabricator: Firm shall have experience fabricating natural or engineered stone and be equipped with standard stone fabricating equipment. Firm shall be evaluated and certified by manufacturer.

B. Inspect Material:

1. Inspect material for defects upon receipt and prior to fabrication.
2. Variation in size and distribution of glass and other aggregates in material that is within manufacturer's tolerances is not a defect.
3. Color Matching
 - a. Materials that are adjacent shall be from the same batch date and bear labels with the same batch dates and color name.
 - b. Visually inspect slabs to ensure that an acceptable color match is achieved.
 - c. Inspect under similar lighting conditions as will be found at the job site.
4. Record batch date[s] of all material for warranty purposes.

C. Shop Assembly: Fabricate using standard stone fabricating equipment in accordance with manufacturer's fabrication guidelines.

D. Layout: Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's fabrication guidelines.

E. Cutouts

1. Provide factory cutouts for plumbing fittings and bath accessories as indicated on approved shop drawings.
2. All rough and finished openings shall be supported with reinforcing rods. Support cutouts with 1/8 by 1/2 inch (3 by 12 mm)



DIVISION 12 : FURNISHINGS

fiberglass strips set vertically in 3/16 inch (5 mm) wide x 5/8 inch (18 mm) deep saw blade kerf positioned in the center of both the front and back bridge to extend a minimum of 6 inches (152 mm) beyond the opening to the left and to the right. Encapsulate the reinforcement "rod" with Tenax Micto VOC Free 2 Part Epoxy.

NOTE TO SPECIFIER: IceStone, LLC recommends fiberglass over metal rodding because fiberglass will not oxidize over time and will physically bond to the adhesive.

3. Cutouts shall have 1/4 inch (6 mm) [_____ inch(es)(_____ mm)] minimum inside radius.
4. All exposed edges shall be polished.

F. Aprons and Built up Edges: All visible built up edges and aprons shall be mitered to avoid the visual effect of segregation.

G. Sealing:

1. Clean surfacing back side and joints with acetone.

NOTE TO SPECIFIER: Coordinate with selection in Section 2 Product; 2.3 Accessories

2. Apply [_____] sealer to entire finished surface following the manufacturer's instructions to help protect against staining.

PART 2 EXECUTION

1.1 ACCEPTABLE INSTALLER

Installer shall be experienced in installing natural and engineered stone and shall be certified by manufacturer.

1.2 EXAMINATION

A. Site Verification

1. Verify that substrates are plumb, level and flat and that necessary supports and blocking are in place.
 - a. Four-Sided Perimeter Support: If a four-sided perimeter frame exists, additional substrate is not required. Provide front-to-back support every 36 inches (914 mm), in addition to the strong perimeter support.
 - b. Three-Sided Perimeter Support: For structures that have perimeter support on three sides require additional support. Installations with a depth of less than 26 inches (660 mm) require supports every 24 inches (610 mm). Installations with depths of over 26 inches (660 mm) require supports every 18 inches (457 mm).
 - c. Cantilevers: Cantilevers less than 9 inches (228 mm) do not require additional support. Cantilevers greater than 9 inches (228 mm) require corbels, legs, columns or reinforcing rods every 24 inches (610 mm).
2. If substrate preparation is the responsibility of another installer, notify [Architect] [_____] of unsatisfactory preparation before proceeding.

B. Materials Inspection: Inspect all finished surfaces for damage. Do not install until damaged materials have been repaired or replaced.

1.2 PREPARATION

A. Clean surfaces to receive material thoroughly prior to installation to ensure adhesion.

B. Protect jobsite and surfaces against dust and water.

1.3 INSTALLATION

A. General

1. Install materials in accordance to manufacturer's guidelines.
2. There shall be two installers at the jobsite at all times to ensure safety.



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B. Preliminary Installation

1. Position materials to verify correct dimensions and layout.
2. Make necessary adjustments.

NOTE TO SPECIFIER: IceStone requires at least 1/16-inch at each wall for expansion and contraction.

3. Verify there is a space of 1/8-inch (3 mm) between walls where the surfacing will be installed and the surfacing material.

C. Installation

1. Secure surfacing to substrate using a clear 100% silicone adhesive to allow for movement and to avoid cracking.
2. Install surfacing plumb, level, true and flat. Never shim in excess of 1/16 inch (1-1/2 mm).

D. Joints

1. Joints between adjacent pieces of composite surfacing.
 - a. All joints shall be clean, flush, and level.
 - b. All joints shall be tight fitting, spacing shall not exceed 1/16 inch (1-1/2 mm).
 - c. Seal joints with a color matched two-part polyester, epoxy or acrylic joint adhesive.
2. Joints between composite surfacing and [backsplashes] [_____]: Seal joints with clear 100% silicone adhesive.

1.4 WAXING & CLEANING

NOTE TO SPECIFIER: Coordinate paragraphs below with selections in Section 2 Product; 2.3 Accessories

A. Waxing: Apply [CHENG Concrete Countertop Wax] [Goddard's Granite & Marble Liquid Polish] to composite surfacing to help protect surface from etching. Follow the product manufacturer's instructions for application.

B. Clean: Clean exposed surfaces with [_____] [non-abrasive pH neutral cleaner].

1.5 PROTECTION

A. Protect installed products until completion of the project.

B. Touch-up, repair, or replace damaged materials in a satisfactory manner.

END OF SECTION



DIVISION 22 PLUMBING



DIVISION 22 : PLUMBING

SECTION 224000

PLUMBING FIXTURES

PART 1 - GENERAL

SCHEDULE 0 - SECTION REQUIREMENTS

PRODUCT DATA SHEET 0 - Submittals:

- 0.1 Product Data for each type of plumbing fixture, including trim, fittings, accessories, appliances, appurtenances, equipment, and supports.
- 0.2 Documentation indicating flow and water consumption requirements.

PART 2 - PRODUCTS

SCHEDULE 0 - PERFORMANCE REQUIREMENTS

PRODUCT DATA SHEET 0 - Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities" and Public Law 101-336, "Americans with Disabilities Act" for plumbing fixtures for people with disabilities.

PRODUCT DATA SHEET 1 - Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.

PRODUCT DATA SHEET 2 - NSF Standard: Comply with NSF 61, "Drinking Water System Components - Health Effects," for fixture materials that will be in contact with potable water.

SCHEDULE 1 - WATER CLOSETS

PRODUCT DATA SHEET 0 - Water Closets: Floor-mounted, floor-outlet, close-coupled gravity tank, vitreous china. Caroma Urbane Compact Invisi II with dual flush

- 0.1 Standards: ASME A112.19.2/CSA B45.1, ASME A112.19.5, and ASSE 1037. Elongated rim contour, siphon-jet bowl type, close-coupled gravity tank, floor-mounted, back outlet[with inwall tank.

SCHEDULE 2 - TOILET SEATS

PRODUCT DATA SHEET 0 - Standard: IAPMO/ANSI Z124.5. Elongated closed front with cover with bumpers and hardware, Residential class. Caroma Arc Soft Close seat supplied with water closet.



DIVISION 22 : PLUMBING

SCHEDULE 3 - LAVATORIES

SCHEDULE 4 - LAVATORY FAUCETS

PRODUCT DATA SHEET 0 - General-Duty, Solid-Brass Faucets

- 0.1 Kohler "Alteo" K45800-4
- 0.2 Standard: ASME A112.18.1/CSA B125.1; solid-brass underbody and brass cover plate.
- 0.3 Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.
- 0.4 Conforms to DOE- Energy Policy Act 1992 and EPA WaterSense.
- 0.5 Type: one piece faucet with stationary spout and lever handle and with pop-up waste.
- 0.6 Finish: Polished chrome plate.
- 0.7 Maximum Flow Rate: 0.5 gpm.
- 0.8 Drain: Pop up with NPS 1-1/4 tailpiece, included with faucet].

SCHEDULE 5 - SHOWER BASINS

PRODUCT DATA SHEET 0 - Cast-Polymer Shower Basins

- 0.1 Standard: ANSI Z124.1.3 for cast-polymer bases.
- 0.2 Bathing Surface: Slip resistant according to ASTM F 462.
- 0.3 Shower Base Receptor: [.
- 0.4 Type: Accessible.

SCHEDULE 6 - KITCHEN SINKS

PRODUCT DATA SHEET 0 - Stainless-Steel Kitchen Sinks Kohler "undertone preserve" K-3171-HCF

- 0.1 Undercounter type, 18 gauge thick, two bowls.
- 0.2 Bowl, 31-1/2" in length, 18" width and 9-1/2 depth.

SCHEDULE 7 - SINK FAUCETS

PRODUCT DATA SHEET 0 - Commercial, Solid-Brass Faucets

- 0.1 Moen model 57597
- 0.2 Certified IAPMO Green, ASME A112.18/CSA B125 and NSF 61/9 and ADA.
- 0.3 Type: Center set with central inlets with spray.
- 0.4 Finish: Polished chrome plate.
- 0.5 Handle: Single-lever toggle Spout: 360° Swing 1-1/2-gpm laminar flow



DIVISION 22 : PLUMBING

PART 3 - EXECUTION

3.1 INSTALLATION

PRODUCT DATA SHEET 0 - Install fitting insulation kits on fixtures for people with disabilities.

PRODUCT DATA SHEET 1 - Install fixtures with flanges and gasket seals.

PRODUCT DATA SHEET 2 - Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.

PRODUCT DATA SHEET 3 - Fasten wall-hanging plumbing fixtures securely to supports attached to building substrate when supports are specified and to building wall construction where no support is indicated.

PRODUCT DATA SHEET 4 - Fasten floor-mounted fixtures to substrate. Fasten fixtures having holes for securing fixture to wall construction to reinforcement built into walls.

PRODUCT DATA SHEET 5 - Fasten wall-mounted fittings to reinforcement built into walls.

PRODUCT DATA SHEET 6 - Fasten counter-mounting plumbing fixtures to casework.

PRODUCT DATA SHEET 7 - Secure supplies to supports or substrate within pipe space behind fixture.

PRODUCT DATA SHEET 8 - Set shower receptors and mop basins in leveling bed of cement grout.

PRODUCT DATA SHEET 9 - Install individual supply inlets, supply stops, supply risers, and tubular brass traps with cleanouts at fixture.

PRODUCT DATA SHEET 10 - Install water-supply stop valves in accessible locations.

PRODUCT DATA SHEET 11 - Install traps on fixture outlets. Omit traps on fixtures having integral traps. Omit traps on indirect wastes unless otherwise indicated.

PRODUCT DATA SHEET 12 - Install dishwasher air-gap fitting at each sink indicated to have air-gap fitting. Connect inlet hose to dishwasher and outlet hose to disposer.

PRODUCT DATA SHEET 13 - Install escutcheons at wall, floor, and ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons where required to conceal protruding pipe fittings.

PRODUCT DATA SHEET 14 - Seal joints between fixtures and walls, floors, and counters using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color.

PRODUCT DATA SHEET 15 - Install piping connections between plumbing fixtures and piping systems and plumbing equipment. Install insulation on supplies and drains of fixtures for people with disabilities.

PRODUCT DATA SHEET 16 - Ground equipment.

END OF SECTION



DIVISION 26 ELECTRICAL

SECTION 265000

LIGHTING

PART 1 - GENERAL

SCHEDULE 0 - SECTION REQUIREMENTS

PRODUCT DATA SHEET 0 - Submittals: Product Data for each luminaire, including lamps.

PART 2 - PRODUCTS

SCHEDULE 0 - PERFORMANCE REQUIREMENTS

PRODUCT DATA SHEET 0 - 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.

SCHEDULE 1 - LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

PRODUCT DATA SHEET 0 - Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.

PRODUCT DATA SHEET 1 - Incandescent Fixtures: Comply with UL 1598. Where luminaire efficacy rating (LER) is specified, test according to NEMA LE 5A.

PRODUCT DATA SHEET 2 - Fluorescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.

PRODUCT DATA SHEET 3 - High-Intensity Discharge (HID) Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5B.

PRODUCT DATA SHEET 4 - Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.

PRODUCT DATA SHEET 5 - Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

SCHEDULE 2 - LAMPS

PRODUCT DATA SHEET 0 - T8 rapid-start lamps, rated 32 W maximum, nominal length of 48 inches, 2800 initial lumens (minimum), CRI 75 (minimum), color temperature 3500 K, and average rated life 20,000 hours unless otherwise indicated.



DIVISION 26 : ELECTRICAL

PRODUCT DATA SHEET 1 - T8 rapid-start lamps, rated 17 W maximum, nominal length of 24 inches , 1300 initial lumens (minimum), CRI 75 (minimum), color temperature 3500 K, and average rated life of 20,000 hours unless otherwise indicated.

PRODUCT DATA SHEET 2 - Compact Fluorescent Lamps: Four-pin, CRI 80 (minimum), color temperature 3500 value> K, average rated life of 10,000 hours at three hours operation per start, and suitable for use with dimming ballasts unless otherwise indicated.

- 2.1 13 W: T4, double or triple tube, rated 900 initial lumens (minimum).
- 2.2 18 W: T4, double or triple tube, rated 1200 initial lumens (minimum).
- 2.3 26 W: T4, double or triple tube, rated 1800 initial lumens (minimum).
- 2.4 32 W: T4, triple tube, rated 2400 initial lumens (minimum).
- 2.5 42 W: T4, triple tube, rated 3200 initial lumens (minimum).
- 2.6 57 W: T4, triple tube, rated 4300 initial lumens (minimum).
- 2.7 70 W: T4, triple tube, rated 5200 initial lumens (minimum).

PART 3 - EXECUTION

SCHEDULE 0 - INSTALLATION

PRODUCT DATA SHEET 0 - Coordinate ceiling-mounted luminaires with ceiling construction, mechanical work, and security and fire-prevention features mounted in ceiling space and on ceiling.

PRODUCT DATA SHEET 1 - Lighting Fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.

PRODUCT DATA SHEET 2 - Comply with NFPA 70 for minimum fixture supports.

PRODUCT DATA SHEET 3 - Seismic Protection: Luminaire attachments to building walls and ceilings shall comply with seismic criteria in Section 260500 "Common Work Results for Electrical."

PRODUCT DATA SHEET 4 - Suspended Lighting Fixture Support:

- 4.1 Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
- 4.2 Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
- 4.3 Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.

PRODUCT DATA SHEET 5 - Air-Handling Fixtures: Install with dampers closed and ready for adjustment.

PRODUCT DATA SHEET 6 - Adjust aimable lighting fixtures to provide required light intensities.

END OF SECTION



CUTSHEETS



DIVISION 01 GENERAL REQUIREMENTS

HGG-11-004 2011 GEN BROCH C0479_HGG-11-004 2011 GEN BROCH C0479_1/11 12:58 PM Page 2

Honda Generators



HONDA



Automatic Voltage Regulation

Consistent delivery of power under different loads.

Many Honda generators feature a new DAVR (Digital Automatic Voltage Regulator) designed to hold the voltage stability within a +/- 1% change during operation to which the U.S. standard is 60Hz. The DAVR adjustments are driven off the main winding versus a sensor winding in conventional AVR systems. Additionally, the DAVR is protected from overheating by a thermistor.



Some EM and EB Series now offer a proprietary new Honda technology, iAVR (Intelligent Automatic Voltage Regulator). This consists of a digital capacitive discharge ignition, a self tuning regulator governor, a current transformer applied to the auto throttle and the new DAVR control unit. iAVR lets the generator operate well above its maximum rating for up to 10 seconds to start high initial amp draw situations. This ensures a consistent flow of power regardless of the load, which translates into protection for sensitive equipment and reliable power for you.

Model

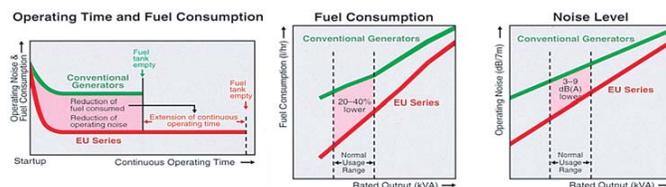
The iAVR Advantage

| | |
|---------------|---------------------------------|
| EM4000/EB4000 | 5000 watts for up to 10 seconds |
| EM5000/EB5000 | 7000 watts for up to 10 seconds |
| EM6500/EB6500 | 7000 watts for up to 10 seconds |

Eco-Throttle™ System

Fuel economy, quiet operation and low emission levels.

Honda's Eco-Throttle™ system automatically adjusts engine speed to the optimum level, given the usage load, through a load-dependent speed control-type governor. This not only results in excellent fuel economy, but also makes a quiet generator even quieter. Eco-Throttle™ is standard on all inverter models.



Honda CycloConverter™ Technology

Heavyweight power in a lighter weight unit.

Honda's CycloConverter™ generator model offers power that is equal in quality to AVR (Automatic Voltage Regulator) generators but is dramatically lighter than other units producing the same amount of power. This lighter weight is achieved by reducing the number of traditional parts with a CPU (Central Processing Unit) that conditions the raw power produced by the generator and eliminates the need for a bulky alternator. Honda CycloConverter™ technology offers the best power-to-weight ratio available anywhere. This is found on the EB3000c model only.



CycloConverter™ sine wave

Inverter technology is available on eight Honda generators, designated by an "i" after the model number.



EU1000i – Super Quiet Series



EU2000i – Super Quiet Series
EU2000iC – Super Quiet Series



EU2000i Companion – Super Quiet Series



Handi EU3000i – Super Quiet Series



EU3000is – Super Quiet Series



EU6500is – Super Quiet Series



EM5000sAB – i-Deluxe Series



DIVISION 05 METALS

Fasteners & Quik Drive® Systems

FASTENING IDENTIFICATION



Round Holes
Purpose: to fasten a connector.
FBI Requirements: always fill, unless noted otherwise.



Oval Holes
Purpose: to make fastening a connector in a tight location easier.
FBI Requirements: always fill.



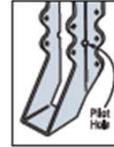
Hexagonal Holes
Purpose: to fasten a connector to concrete or masonry.
FBI Requirements: always fill when fastening a connector to concrete or masonry.



Triangular Holes
Purpose: to increase a connector's strength or to achieve Max strength.
FBI Requirements: when the Designer specifies Max nailing.



Diamond Holes
Purpose: to temporarily fasten a connector to make installing it easier.
FBI Requirements: none.



Pilot Holes
Tooling holes for manufacturing purposes. No fasteners required.



Speed Prongs
Used to temporarily position and secure the connector for easier and faster installation.



Positive Angle Nailing (PAN)
Provided when wood splitting may occur, and to speed installation.



Dome Nailing
This feature guides the nail into the joist and header at a 45° angle.
U.S. Patent 5,603,560



Double-Shear Nailing
The nail is installed into the joist and header, distributing the load through two points on each joist nail for greater strength.



ITS Strong-Grip®
(IUS Similar)
The Strong-Grip® seat allows the I-joist to "snap" in securely without the need for joist nails.

Fasteners & Quik Drive® Systems



SIMPSON STRONG-TIE® NAILS

Simpson Strong-Tie nails and structural fasteners have been developed as the optimum fasteners for connector products. Special lengths afford economy of purchase and installation, and depth compatibility with framing members. For pneumatic nail use, see Instructions to the Installer, page 17 and visit www.strongtie.com for technical bulletins.

Retail Packaging



1 lb. Retail Tub



5 lb. Retail Bucket

Simpson Strong-Tie hot-dip galvanized nails are packed in 1 lb. and 5 lb. plastic retail containers for easy handling.

Nails Sold by the Pound

| Nail | Simpson Model No. | Dimensions | Wire Gauge | Finish |
|------------|-------------------|------------------|------------|--------|
| 8dx1½" | N8 | 0.131" x 1½" | 10½ | HDG |
| | SSN8 | (3.3mm x 38.1mm) | | SS |
| 8d Common | SS8D | 0.131" x 2½" | 10½ | SS |
| 10dx1½" | N10 | 0.148" x 1½" | 9 | HDG |
| | SSN10 | (3.8mm x 38.1mm) | | SS |
| 10d Common | 10DHGD | 0.148" x 3" | 9 | HDG |
| | SS10D | (3.8mm x 76.2mm) | | SS |
| 16dx2½" | N16 | 0.162" x 2½" | 8 | Bright |
| 16d Common | 16DHGD | 0.162" x 3½" | | 8 |
| | SS16D | (4.1mm x 88.9mm) | SS | |
| N54A | N54A | 0.250" x 2½" | 3 | Bright |
| | N54AHGD | (6.4mm x 63.5mm) | | HDG |

- HDG - hot-dip galvanized; SS - stainless steel; Bright - no finish.
- For pneumatic fastener into, request additional technical information.
- Recommended minimum end distance to prevent splitting with a steel side member is 10 x the nail diameter per 2005 NDS Commentary Table 11.1.5.6.
- Use HDG nails with ZMAX® and HDG products.
- 16d sinker with GV finish is not acceptable for ZMAX or HDG applications.
- HDG nails sold by Simpson Strong-Tie meet the specifications of ASTM A153. Stainless-steel nails are type 316 stainless.

33° COLLATED STRUCTURAL CONNECTOR NAILS

The 33° collated structural-connector nail is designed to provide installers a pneumatically-driven alternative to hand-driven nails. The nail is approved for use in many popular Simpson Strong-Tie® products and serves as a replacement for 8d, 10d, and 16d hand-driven common nails in a variety of Simpson Strong-Tie connector applications. Available in 25-nail, paper-collated strips in both carbon steel and stainless steel.

MATERIAL: Heat-treated carbon steel **FINISH:** Hot-dip galvanized, stainless steel

INSTALLATION: • Use all specified fasteners;

- see General Notes.
- Follow the manufacturer's instructions and use the appropriate safety equipment.
- Tools with nail hole-locating mechanisms should be used.
- Overdriving nails may reduce allowable loads.
- Compatible with a wide variety of popular pneumatic nailers. For more information, visit www.strongtie.com/SCN.
- For applications involving pneumatic nails, refer to technical bulletin T-PNEUMATIC.

| Model No. | Nominal Size | Diameter (in.) | Length (in.) |
|---------------------------|--------------|----------------|--------------|
| Hot-Dip Galvanized | | | |
| 8DHGPT500 | 8d | 0.131 | 2½ |
| N10HDGPT500 | 10d | 0.148 | 1½ |
| N16HDGPT500 | 16d | 0.162 | 2½ |
| Stainless Steel | | | |
| T9A150MCN | 10d | 0.148 | 1½ |
| T9A250MCN | 10d | 0.148 | 2½ |



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Fasteners & Quik Drive® Systems

Fasteners & Quik Drive® Systems

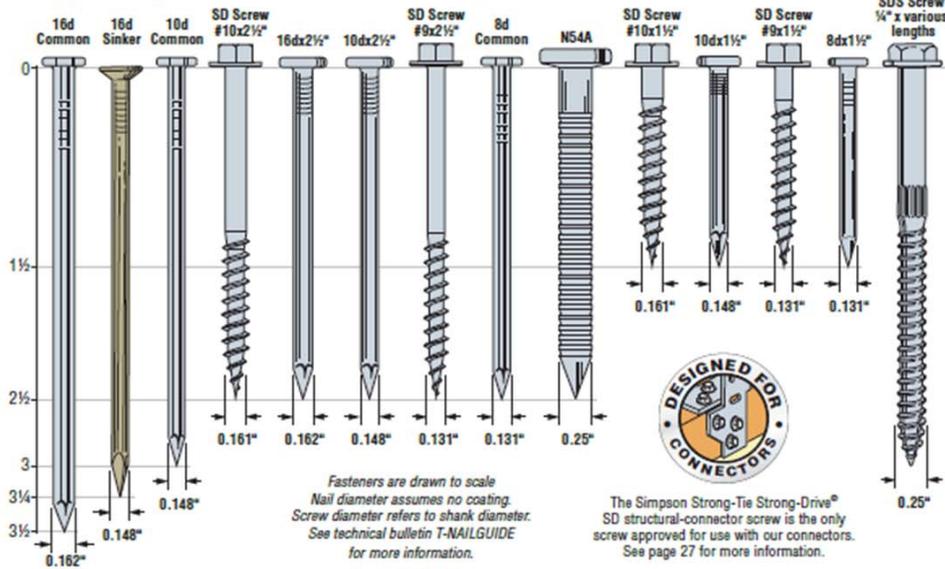
FASTENER TYPES



Fastener Types and Sizes Specified for Simpson Strong-Tie® Connectors

Many Simpson Strong-Tie connectors have been designed and tested for use with specific types and sizes of fasteners. The specified quantity, type and size of fastener must be installed in the correct holes on the connector to achieve published loads. Other factors such as fastener material and finish are also important. Incorrect fastener selection or installation can compromise connector performance and could lead to failure.

Simpson Strong-Tie does not offer all of these fasteners, see page 23 for more information. For more information about fasteners, see our [Fastening Systems catalog](http://www.strongtie.com/software) or access our [Fastener Finder software](http://www.strongtie.com/software) at www.strongtie.com/software.



FASTENER DESIGN INFORMATION

In some cases it is desirable to install Simpson Strong-Tie face mount joist hangers and straight straps with nails that are a different type or size than what is called out in the load table. In these cases these reduction factors must be applied to the allowable loads listed for the connector.

Load Adjustment Factors for Optional Fasteners Used with Face Mount Hangers and Straight Straps

| Catalog Nail | Replacement | Allowable Load Adjustment Factor | |
|--------------------------------|--|----------------------------------|-------------------|
| | | Face Mount Hangers | Straight Straps |
| 16d common (0.162"x3 1/2") | 10dx1 1/2 (0.148"x1 1/2") | 0.64 | 0.84 ^a |
| 16d common (0.162"x3 1/2") | 10d common (0.148"x3") 12d common (0.148"x3 1/4") 16d sinker (0.148"x3 1/4") | 0.84 | 0.84 |
| 16d common (0.162"x3 1/2") | 16dx2 1/2 (N16) (0.162"x2 1/2") | 1.00 | 1.00 |
| 10d common (0.148"x3") | 10dx2 1/2 (0.148"x2 1/2") | 0.85 | 1.00 |
| 16d sinker (0.148"x3 1/4") | 10dx1 1/2 (0.148"x1 1/2") | 0.77 | 1.00 ^b |
| 10d common (0.148"x3") | 10dx1 1/2 (0.148"x1 1/2") | 0.64 | 1.00 ^b |
| 10d common (0.148"x3") | 16d sinker (0.148"x3 1/4") | 1.00 | 1.00 |
| 8d common (0.131"x2 1/2") | 8dx1 1/2 (0.131"x1 1/2") | 0.85 | 1.00 |
| 10d common (0.148"x3") | 8d common (0.131"x2 1/2") | 0.83 | 0.83 |
| 16d common (0.162"x3 1/2") | SD#10x1 1/2 (0.161x1 1/2") | 1.00 ^c | 1.00 |
| 16dx2 1/2 (N16) (0.162x2 1/2") | | | |
| 10d common (0.148"x3") | | | |
| 16d sinker (0.148"x3 1/4") | | | |
| 10d x1 1/2 (0.148"x1 1/2") | SD#9x1 1/2 (0.131x1 1/2") | 1.00 ^d | 1.00 |
| 8d common (0.131"x2 1/2") | | | |
| 8dx1 1/2 (0.131"x1 1/2") | | | |



Double-shear nailing should use full length common nails



Shorter nails may not be used as double shear nails

1. Allowable load adjustment factors shown in the table are based on calculated reduction factors and are applicable for all face mount hangers and straight straps throughout this catalog, except as noted in the footnotes below.
2. Some products have been tested specifically with alternate fasteners and have allowable load adjustment factors or reduced capacities published on the specific product page which may differ from the values calculated using this table.
3. This table does not apply to hangers modified per the Hanger Options described on pages 215-224, or steel thicker than 10 gauge.
4. Unless noted otherwise, fasteners shorter than 3" in length may not be substituted for joist nails in double-shear hangers (i.e. LUS, MUS, HUS, HHUS, HGUS). For applications involving pneumatic nails, refer to technical bulletin T-PNEUMATIC (see page 231 for details).
5. Strong-Drive® SD screw substitutions in this table do not apply to sloped, skewed or double-shear hangers. For additional information and specific allowable loads, refer to www.strongtie.com/td
6. Nails and Strong-Drive SD screws may not be combined in a connection.
7. Do not substitute 10dx1 1/2" nails for face nails on slope and skew combinations or skewed only LSU and LSSU.
8. For straps installed over sheathing use a 2 1/2" long fastener minimum.
9. Where noted, use 0.80 for 10 ga, 11 ga, and 12 ga products when using SPF lumber.
10. Where noted, use 0.92 for 10 ga, 11 ga, and 12 ga products when using SPF lumber.

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Wood Construction Connectors

IMPORTANT INFORMATION & GENERAL NOTES



WARNING

Simpson Strong-Tie Company Inc. structural connectors, anchors, and other products are designed and tested to provide specified design loads. To obtain optimal performance from Simpson Strong-Tie Company Inc. products and achieve maximum allowable design load, the products must be properly installed and used in accordance with the installation instructions and design limits provided by Simpson Strong-Tie Company Inc. To ensure proper installation and use, Designers and installers must carefully read the following General Notes, General Instructions for the Installer and General Instructions for the Designer, as well as consult the applicable catalog pages for specific product installation instructions and notes.

Proper product installation requires careful attention to all notes and instructions, including these basic rules:

1. Be familiar with the application and correct use of the connector.
2. Follow all installation instructions provided in the applicable catalog, website, *Installer's Pocket Guide* or any other Simpson Strong-Tie publications.
3. Install all required fasteners per installation instructions provided by Simpson Strong-Tie Company Inc.: a) use proper fastener type; b) use proper fastener quantity; c) fill all fastener holes; d) do not overdrive or underdrive nails, including when using gun nailers; and e) ensure screws are completely driven.
4. Only bend products that are specifically designed to be bent. For those products that required bending, do not bend more than once.
5. Cut joists to the correct length, do not "short-cut". The gap between the end of the joist and the header material should be no greater than 1/8" unless otherwise noted.

In addition to following the basic rules provided above as well as all notes, warnings and instructions provided in the catalog, installers, designers, engineers and consumers should consult the Simpson Strong-Tie Company Inc. website at www.strongtie.com to obtain additional design and installation information, including:

- Instructional builder/contractor training kits containing an instructional video, an instructor guide and a student guide in both English and Spanish;

- *Installer's Pocket Guide* (form S-INSTALL, see page 229 for details) which is designed specifically for installers and uses detailed graphics and minimal text in both English and Spanish to explain visually how to install many key products;
- Information on workshops Simpson Strong-Tie conducts at various training centers throughout the country;
- Product specific installation videos;
- Specialty catalogs;
- Code reports – Simpson Strong-Tie® Code Report Finder software;
- Technical fliers and bulletins;
- Master format specifications;
- Material safety data sheets;
- Corrosion information;
- Connector selection guides for engineered wood products (*by manufacturer*);
- Simpson Strong-Tie Connector Selector™ software;
- Simpson Strong-Tie Autocad menu;
- Simpson Strong-Tie Strong-Wall® Selector software;
- Simpson Strong-Tie Anchor Tiedown System Selector and anchor-related software; and
- Answers to frequently asked questions and technical topics.

Failure to follow fully all of the notes and instructions provided by Simpson Strong-Tie Company Inc. may result in improper installation of products. Improperly installed products may not perform to the specifications set forth in this catalog and may reduce a structure's ability to resist the movement, stress, and loading that occurs from gravity loads as well as impact events such as earthquakes and high velocity winds.

Simpson Strong-Tie Company Inc. does not guarantee the performance or safety of products that are modified, improperly installed or not used in accordance with the design and load limits set forth in this catalog.

GENERAL NOTES

These general notes are provided to ensure proper installation of Simpson Strong-Tie Company Inc. products and must be followed fully.

- a. Simpson Strong-Tie Company Inc. reserves the right to change specifications, designs, and models without notice or liability for such changes.
- b. Steel used for each Simpson Strong-Tie® product is individually selected based on the product's steel specifications, including strength, thickness, formability, finish, and weldability. Contact Simpson Strong-Tie for steel information on specific products.
- c. Unless otherwise noted, dimensions are in inches, loads are in pounds.
- d. Unless otherwise noted, welds, screws, bolts and nails may not be combined to achieve highest load value. 8d (0.131"x2 1/2"), 10d (0.148"x3"), and 16d (0.162"x3 1/2") specify common nails that meet the requirements of ASTM F1667. When a shorter nail is specified, it will be noted (*for example 8dx1 1/2*). Refer to Simpson Strong-Tie Nailing Guide, NDS (*National Design Specification*) and ASTM F1667 (*American Society of Testing and Materials*) for more nail info.
- e. Do Not Overload. Do not exceed catalog allowable loads, which would jeopardize the connection.
- f. Unless otherwise noted, allowable loads are for Douglas Fir-Larch under continuously dry conditions. Allowable loads for other species or conditions must be adjusted according to the code. In many cases, Simpson Strong-Tie code reports will indicate loads derived from Doug Fir header material only. However under ICC-ES AC13, loads for Douglas Fir are the same as LVL, LSL, PSL, Glulam's and Southern Pine, since the specific gravity of these wood species fall within the specific gravity range of the AC13 criteria. The section from the AC13 criteria indicating the range of specific gravity reads as follows: **3.2.3** The species of lumber used shall have a specific gravity not greater than 0.55 as determined in accordance with the NDS. This chart shows specific gravity for the different wood species:

| Species | Fc.L | Specific Gravity |
|------------------------------|---------|------------------|
| Douglas Fir-Larch (DF) | 625 psi | 0.50 |
| Southern Pine (SP) | 565 psi | 0.55 |
| Spruce-Pine-Fir (SPF) | 425 psi | 0.42 |
| Hem Fir (HF) | 405 psi | 0.43 |
| Glulam | 650 psi | 0.50 |
| LVL (DF/SP) | 750 psi | 0.50 |
| LSL (E=1.3x10 ⁶) | 680 psi | 0.50 |
| LSL (E≥1.5x10 ⁶) | 880 psi | 0.50 |
| Parallam® PSL | 750 psi | 0.50 |

- g. Simpson Strong-Tie Company Inc. will manufacture non-catalog products provided prior approval is obtained and an engineering drawing is included with the order. Steel specified on the drawings as 1/4", 3/8", and 1/2" will be 11 gauge (0.120"), 7 ga (0.179"), and 3 gauge (0.239"), respectively. The minimum yield and tensile strengths are 33 ksi and 52 ksi, respectively.
- h. All references to bolts or machine bolts (MBs) are for structural quality through bolts (*not lag screws or carriage bolts*) equal to or better than ASTM Standard A307, Grade A.
- i. Unless otherwise noted, bending steel in the field may cause fractures at the bend line. Fractured steel will not carry load and must be replaced.
- j. A fastener that splits the wood will not take the design load. Evaluate splits to determine if the connection will perform as required. Dry wood may split more easily and should be evaluated as required. If wood tends to split, consider pre-boring holes with diameters not exceeding .75 of the nail diameter (2005 NDS 11.1.5.3). Use a 3/8" bit for SDS screws and a 3/8" bit for SD9/SD10 screws.
- k. Wood shrinks and expands as it loses and gains moisture, particularly perpendicular to its grain. Take wood shrinkage into account when designing and installing connections. Simpson Strong-Tie manufactures products to fit common dry lumber dimensions. If you need a connector with dimensions other than those listed in this catalog, Simpson Strong-Tie may be able to vary connector dimensions; contact Simpson Strong-Tie. The effects of wood shrinkage are increased in multiple lumber connections, such as floor-to-floor installations. This may result in the vertical rod nuts becoming loose, requiring post-installation tightening. (*Contact Simpson Strong-Tie for information on Takeup Devices.*)
- l. Top flange hangers may cause unevenness. Possible remedies should be evaluated by a professional and include using a face mount hanger, and routing the beam or cutting the subfloor to accommodate the top flange thickness.
- m. Built-up lumber (*multiple members*) must be fastened together to act as one unit to resist the applied load (*excluding the connector fasteners*). This must be determined by the Designer/Engineer of Record.
- n. Some model configurations may differ from those shown in this catalog. Contact Simpson Strong-Tie for details.
- o. Hanger Options (*Simpson Strong-Tie Hanger Options Matrix and Hanger Option General Notes pages 215-224*) – some combinations of

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Wood Construction Connectors

IMPORTANT INFORMATION & GENERAL NOTES



GENERAL NOTES (cont.)

- hanger options are not available. In some cases, combinations of these options may not be installable. Horizontal loads induced by sloped joists must be resisted by other members in the structural system. A qualified Designer must always evaluate each connection, including carried and carrying member limitations, before specifying the product. Fill all fastener holes with fastener types specified in the tables, unless otherwise noted. Hanger configurations, height, and fastener schedules may vary from the tables depending on joist size, skew and slope. See the allowable table load for the non-modified hanger, and adjust as indicated. Gauge may vary from that specified depending on the manufacturing process used.
- p. Simpson Strong-Tie will calculate the net height for a sloped seat. The customer must provide the H1 joist height before slope.
 - q. Truss plates shown are the responsibility of the Truss Designer.
 - r. Do not weld products listed in this catalog unless this publication specifically identifies a product as acceptable for welding, or unless specific approval for welding is provided in writing by Simpson Strong-Tie. Some steels have poor weldability and a tendency to crack when welded. Cracked steel will not carry load and must be replaced. See Simpson Strong-Tie Hanger Options Matrix and Hanger Option General Notes pages 215-224 for hangers that may be welded.
 - s. Unless noted otherwise, all references to standard cut washers refer to Type A plain washers (W) conforming to the dimensions shown in ASME B18.22.1 for the appropriate rod size in accordance with 2012 NDS Appendix L. Some products require SAE narrow washers (N) to fit in a tight space and are noted accordingly.

GENERAL INSTRUCTIONS FOR THE INSTALLER

These general instructions for the installer are provided to ensure proper selection and installation of Simpson Strong-Tie Company Inc. products and must be followed carefully. These general instructions are in addition to the specific installation instructions and notes provided for each particular product, all of which should be consulted prior to and during installation of Simpson Strong-Tie Company Inc. products.

- a. All specified fasteners must be installed according to the instructions in this catalog. Incorrect fastener quantity, size, placement, type, material, or finish may cause the connection to fail. Prior to using a particular fastener, please consult the Fastener Guide in this catalog.
 - 16d fasteners are common nails (0.162" dia. x 3 1/4" long) and cannot be replaced with 16d sinkers (0.148" dia. x 3 1/4" long) for full load value unless otherwise specified.
 - Unless otherwise noted screws may not be used to replace nails in connectors unless approved and recommended by the Designer/Engineer of Record. Unless stated otherwise, Simpson Strong-Tie cannot and does not make any representations regarding the suitability of use or load-carrying capacities of connectors with screws replacing nails.
 - When using stainless-steel connectors, use stainless-steel fasteners. When using ZMAX®/HDG galvanized connectors, use fasteners that meet the zinc coating specifications of ASTM A153 or other fasteners allowed in this catalog.
- b. Fill all fastener holes as specified in the installation instructions for that product. Refer to page 23 for the requirements of the various shapes of fastener hole.
- c. Do not overdrive nails. Overdriven nails reduce shear capacity.
- d. Use the materials specified in the installation instructions. Substitution of or failure to use specified materials may cause the connection to fail.
- e. Do not add fastener holes or otherwise modify Simpson Strong-Tie Company Inc. products. The performance of modified products may be substantially weakened. Simpson Strong-Tie will not warrant or guarantee the performance of such modified products.
- f. Install products in the position specified in the catalog.
- g. Do not alter installation procedures from those set forth in this catalog.
- h. The proper use of certain products requires that the product be bent. For those products, installers must not bend the product more than one time (one full cycle).
- i. Bolt holes shall be at least a minimum of 1/2" and no more than a maximum of 1/4" larger than the bolt diameter (per the 2005 NDS, section 11.1.2 and AISI NASSPEC, section E3a if applicable).
- j. Install all specified fasteners before loading the connection.
- k. Some hardened fasteners may have premature failure if exposed to moisture. These fasteners are recommended to be used in dry interior applications.
- l. Use proper safety equipment.
- m. Welding galvanized steel may produce harmful fumes; follow proper welding procedures and safety precautions. Welding should be in accordance with A.W.S. (American Welding Society) standards. Unless otherwise noted Simpson Strong-Tie® connectors cannot be welded.
- n. Pneumatic or powder-actuated fasteners may deflect and injure the operator or others. Pneumatic nail tools may be used to install connectors, provided the correct quantity and type of nails (length and diameter) are properly installed in the nail holes. Tools with nail hole-locating mechanisms should be used. Follow the manufacturer's instructions and use the appropriate safety equipment. Overdriving nails may reduce allowable loads. Contact Simpson Strong-Tie. Powder-actuated fasteners should not be used to install connectors.
- o. Joist shall bear completely on the connector seat, and the gap between the joist end and the header shall not exceed 1/4" per ICC-ES AC261, ASTM D1761 and ASTM D7147 test standards (unless specifically noted otherwise).
- p. For holdowns, anchor bolt nuts should be finger-tight plus 1/2 to 1/2 turn with a hand wrench, with consideration given to possible future wood shrinkage. Care should be taken to not over-torque the nut. Impact wrenches should not be used as they may preload the holdown.
- q. Holdowns and Tension Ties may be raised off the sill as dictated by field conditions to accommodate an anchor mislocated no more than 1 1/2". The holdown shall be raised off the sill at least 3" for every 1/4" that the anchor is offset from the model's centerline. Anchor bolt slope shall be no greater than 1:12 (or 5 degrees). Contact the Designer if the holdown anchor is offset more than 1 1/2" or raised more than 6". Raised holdown height is measured from the top of concrete to the top of the holdown bearing plate.
- r. Fasteners are permitted to be installed through metal truss plates when approved by the Truss Designer in accordance with ANSI/TPI 1-2007, Section 7.5.3.4 and 8.9.2. Installation of Simpson Strong-Tie® Strong-Drive® screws (SDS) through metal connector plates requires the plates to be pre-drilled using a maximum of a 1/2" bit. Do not drive nails through the truss plate on the opposite side of single-ply trusses which could force the plate off the truss.
- s. For cold-formed steel applications, all screws shall be installed in accordance with the screw manufacturer's recommendations. All screws shall penetrate and protrude through the joined materials a minimum of 3 full exposed threads per AISI Standard for Cold Formed Steel Framing – General Provisions, section D1.3, if applicable.
- t. Nuts shall be installed such that the end of the threaded rod or bolt is at least flush with the top of the nut.
- u. When installing hurricane ties on the inside of the wall special considerations must be taken to prevent condensation on the inside of the completed structure in cold climates.
- v. Unless otherwise noted, connectors shown in this catalog have been designed to be installed at the time the framing members are installed. Contact Simpson Strong-Tie for retrofit suitability of specific connectors including those manufactured in accordance with the hanger options section of this catalog.

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IMPORTANT INFORMATION & GENERAL NOTES



GENERAL INSTRUCTIONS FOR THE DESIGNER

These general instructions for the Designer are provided to ensure proper selection and installation of Simpson Strong-Tie Company Inc. products and must be followed carefully. These general instructions are in addition to the specific design and installation instructions and notes provided for each particular product, all of which should be consulted prior to and during the design process.

- a. The term "Designer" used throughout this catalog is intended to mean a licensed/certified building design professional, a licensed professional engineer, or a licensed architect.
- b. All connected members and related elements shall be designed by the Designer.
- c. All installations should be designed only in accordance with the allowable load values set forth in this catalog.
- d. Unless otherwise noted, connector allowable loads published in this catalog are limited to the lowest of: average recorded test load at 1/4" deflection, lowest ultimate recorded test load of 3 tests specimens divided by 3 (or the average of 6 specimens divided by 3), or the calculated value based on steel, wood bearing, and/or fastener capacity.
- e. When a connector is loaded simultaneously in more than one direction, the allowable load must be evaluated as shown here. For all connectors use the following equation:
 Design Uplift/Allowable Uplift + Design Lateral Parallel to Plate / Allowable Lateral Parallel to Plate + Design Lateral Perpendicular to Plate / Allowable Lateral Perpendicular to Plate < 1.0.
 The three terms in the unity equation are due to the possible directions that exist to generate force on a connector. The number of terms that must be considered for simultaneous loading is at the sole discretion of the Designer and is dependent on their method of calculating wind forces and the utilization of the connector within the structural system.
 As an alternate, certain roof to wall connectors (embedded truss anchors, pages 166 and 167, seismic and hurricane ties, pages 164-165, and twist straps, page 187) can be evaluated using the following: The design load in each direction shall not exceed the published allowable load in that direction multiplied by 0.75.
- f. Loads are based on the 2005 National Design Specifications (NDS) and the 2001 AISI Standard - North American Specification for the Design of Cold-Formed Steel Structural Members (NASPEC) if applicable, unless otherwise specified. Other code agencies may use different allowable loads.
- g. Duration of load adjustments as specified by the code are as follows:
 "FLOOR" and "DOWN" (100)—no increase for duration of load.
 "SNOW" (115)—115% of design load for 2 month duration of load.
 "ROOF LOAD" (125)—125% of design load for 7 day duration of load.
 "EARTHQUAKE/WIND" (160)—160% of design load for earthquake/wind loading.
- h. Unless otherwise noted, wood shear is not considered in the loads given; reduce allowable loads when wood shear is limiting.
- i. Simpson Strong-Tie strongly recommends the following addition to construction drawings and specifications: "Simpson Strong-Tie® connectors are specifically required to meet the structural calculations of plan. Before substituting another brand, confirm load capacity based on reliable published testing data or calculations. The Engineer/Designer of Record should evaluate and give written approval for substitution prior to installation."
- j. Verify that the dimensions of the supporting member are sufficient to receive the specified fasteners, and develop the top flange bearing length.
- k. Some catalog illustrations show connections that could cause cross-grain tension or bending of the wood during loading if not sufficiently reinforced. In this case, mechanical reinforcement should be considered.
- l. For holdowns, anchor bolt nuts should be finger-tight plus 1/2 to 1/2 turn with a hand wrench, with consideration given to possible future wood shrinkage. Care should be taken to not over-torque the nut. Impact wrenches should not be used as they may preload the holdown.
- m. Simpson Strong-Tie will provide upon request code testing data on all products that have been code tested.
- n. The allowable loads published in this catalog are for use when utilizing the traditional Allowable Stress Design methodology. A method for using Load and Resistance Factor Design (LRFD) for wood has been published in AF&PA/ASCE 16. A method for using LRFD for cold-formed steel has also been published in the 2001 AISI NASPEC. When designing with LRFD, reference lateral resistances must be used. Contact Simpson Strong-Tie for reference lateral resistances of products listed in this catalog. For more information, refer to the American Forest and Paper Association "Guideline to Pre-engineered Metal Connectors" and ASCE 16. The "Guideline" contains a soft-conversion procedure that can be used to derive reference lateral resistances.
- o. For joist hangers, Simpson Strong-Tie recommends the hanger height shall be at least 60% of joist height for stability.
- p. For cold-formed steel applications, as a minimum all screws must comply with Society of Automotive Engineers (SAE) Standard J78, Steel Self-Drilling/Tapping Screws, and must have a Type II coating in accordance with ASTM B 633, Electrodeposited Coatings of Zinc on Iron and Steel. Screw strength shall be calculated in accordance with 2001 AISI NASPEC Section E4, if applicable, or shall be based on the manufacturer's design capacity determined from testing.
- q. Local and/or regional building codes may require meeting special conditions. Building codes often require special inspection of anchors installed in concrete and masonry. For compliance with these requirements, it is necessary to contact the local and/or regional building authority. Except where mandated by code, Simpson Strong-Tie products do not require special inspection.
- r. Holdown and Tension Tie allowable loads are based on installations with an anchor rod length of 6" from the concrete to top of holdown seat, yet these products may be raised to any height with consideration of the increased deflection due to additional bolt elongation. For cases where the anchor bolt is offset, Simpson Strong-Tie offers recommendations, subject to the approval of the Designer, which permit holdowns to be raised up to 18" maximum with a corresponding horizontal anchor bolt offset of 1 1/2". See "General Instructions for the Installer" (page 17 note q).
- s. Throughout the catalog there are installation drawings showing the load transfer from one element in the structure to another. Additional connections may be required to safely transfer the loads through the structure. It is the Designer's responsibility to specify and detail all necessary connections to ensure that a continuous load path is provided as required by the building code.
- t. Top flange hanger allowable loads are typically based on testing with solid headers. Load reductions may apply when using headers comprised of multiple plies of dimensioned lumber or SCL. See technical bulletin T-MPLYHEADER for more information (see page 231 for details).

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Wood Construction Connectors

CORROSION INFORMATION



Guidelines for Selecting the Proper Connector

1. Evaluate the Application.

Consider the type of connection and how critical it is. These recommendations may not apply to non-structural applications such as fences.

2. Evaluate the Environment.

Testing and experience indicate that indoor dry environments are less corrosive than outdoor environments. Determining the type of environment where a fastener will be used is an important factor in selecting the most appropriate material and coating for fastener use. To help in your decision making, consider the following general exposure information:

Interior Dry Use: Includes wall and ceiling cavities, and raised floor applications in enclosed buildings that have been designed to ensure that condensation and other sources of moisture do not develop. Prolonged exposure during construction should also be considered, as this may constitute an exterior-wet or higher exposure.

Exterior – Dry: Includes outdoor installations in low rainfall environments and no regular exposure to moisture.

Exterior – Wet: Includes outdoor installations in higher moisture and rainfall environments.

Higher Exposure Use: Includes exposure to ocean salt air, de-icing salts, fire retardants, large bodies of water (e.g. dock boards), fumes, fertilizers, soil, some preservative-treated woods, industrial zones, acid rain, and other corrosive elements.

3. Evaluate the material to be fastened.

When fastening most untreated wood and other common building materials, additional corrosion risk caused by the fastened material is not

a significant factor. For preservative-treated wood applications, proceed to step four otherwise proceed to step five.

When fastening dissimilar metals carefully consider the correct combination of fastener and material necessary to avoid galvanic corrosion.

4. Familiarize yourself with the preservative-treated wood.

The preservative-treated-wood supplier should provide all of the pertinent information about the wood being used. This information should include the specific type of wood treatment used, if ammonia was used in the treatment and the chemical retention level. If this information is not available, then Simpson Strong-Tie Company Inc. recommends stainless steel connectors and fasteners. It is also advisable to obtain a recommendation from the treated-wood supplier for a fastener coating or material that is suitable for use with their formulation in the intended environment. If this recommendation differs from those shown in the table below, Simpson Strong-Tie Company Inc. recommends that the most conservative recommendation be followed.

5. Use the Environment/Treatment Classification Chart below to match the classification for the environment and base material application. Then use the Materials and Coatings Available listing on page 14 to select the proper coating or material.

If the material or preservative-treated wood product to be used is not shown on the chart, Simpson Strong-Tie has not evaluated it and cannot make any other recommendation than the use of coatings/materials shown in the "high" category shown below. Manufacturers may independently provide test results or other product use information; Simpson Strong-Tie Company Inc. expresses no opinion regarding such information.

Environment/Treatment Classification Chart

| Environment | Material to be Fastened | | | | | | | |
|-----------------|----------------------------------|---------------------------|---------|--|--------------|-------------------------|------|--------------------|
| | Untreated Wood or Other Material | Preservative-Treated Wood | | | | | ACZA | Other or Uncertain |
| | | SBX/DOT & Zinc Borate | MCQ/MCA | ACQ-C, ACQ-D (Carbonate), CA-B, CA-C/μCA-C | | | | |
| | | | | Without Ammonia | With Ammonia | Higher Chemical Content | | |
| Interior Dry | Low | Low | Low | Med ¹ | Med | High | High | High |
| Exterior-Dry | Low | N/A | Med | Med | High | High | High | High |
| Exterior-Wet | Med | N/A | Med | Med | High | High | High | High |
| Higher Exposure | High | N/A | High | High | High | High | High | High |
| Uncertain | High | High | High | High | High | High | High | High |

- Higher chemical content refers to wood for ground contact with actual retention levels greater than 0.40 pcf for ACQ, 0.34 pcf for MCQ, 0.21 pcf for CA-B, 0.15 pcf for CA-C and MCA, or 0.14 pcf for μCA-C. In these cases, stainless-steel products are recommended. Verify actual retention levels with the wood treater.
- Borate treated woods are not appropriate for outdoor use.
- Where noted in the table, applications where the wood is dry (*moisture content less than 19%*) when installed and will remain dry in-service may use a minimum classification coating recommendation of "Low" for connectors.
- Some treated wood may have excess surface chemicals making it potentially more corrosive. If uncertain, use types 304/305/316 stainless steel products.
- Test results indicate that ZMAX[®], hot-dip galvanized, mechanically galvanized (class 55 and 65) and double-barrier coatings (SDS screws) will perform adequately, subject to regular maintenance and periodic inspection. However, the test protocol followed was a modified version of the nationally recognized test method AWWA E12-94. This test method is an accelerated test, so data over an extended period of time is not available. Also noteworthy is that tests run in a laboratory may not correlate to service conditions. If uncertain, use stainless steel.
- Type 316 stainless-steel products are the minimum recommendation for ocean-salt air and other chloride environments.
- Ammonia is typically used as a chemical carrier for difficult to treat wood species, such as, but not exclusive to, Douglas Fir and Hem Fir, which are usually found in the western United States. Amine carriers are used in some of the eastern species, such as Southern Yellow Pine. If uncertain, verify chemical with wood treater.
- Exterior Dry applications only apply to connectors. For anchors, use Exterior Wet for any exterior application.
- Mechanically galvanized Titen HD[®] anchors (medium classification) are only recommended for temporary exterior applications.

For the latest Simpson Strong-Tie[®] coating information and additional technical information on this topic, visit our website at www.strongtie.com/info.

Interior Dry



Exterior



Higher Exposure



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Straps & Ties

H/TSP Seismic & Hurricane Ties



These products are available with additional corrosion protection. Additional products on this page may also be available with this option, check with Simpson Strong-Tie for details.

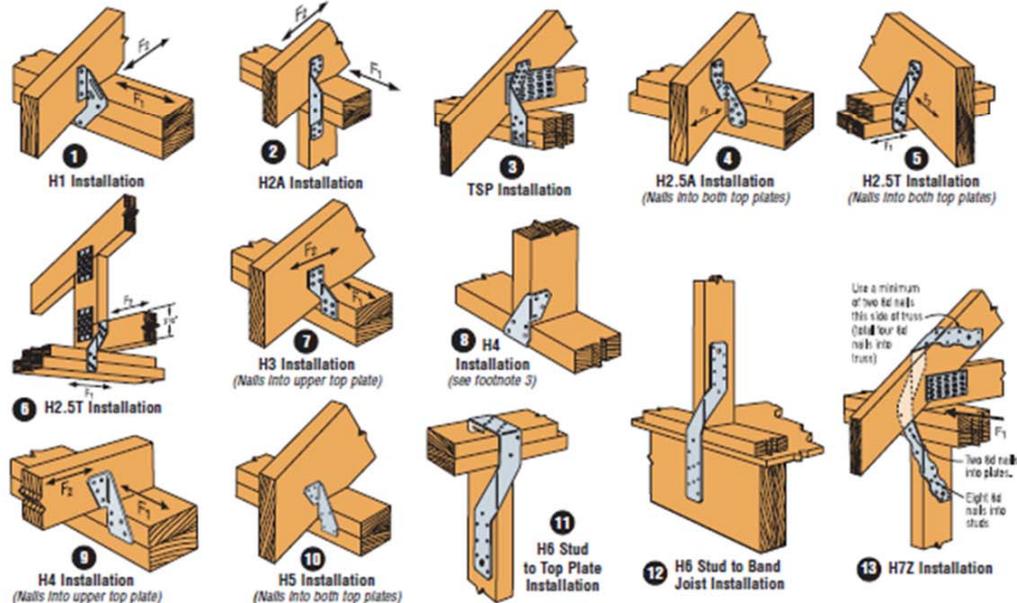
These products are approved for installation with the Strong-Drive SD Structural-Connector screw. See page 27 for more information.

| Model No. | Ga | Fasteners | | | DF/SP Allowable Loads | | | Uplift with 8dx1 1/2 Nails | | SPF/HF Allowable Loads | | | Code Ref. |
|-------------------|----|------------------|-------------------------|------------|-----------------------|---------------|-----|----------------------------|---------------|------------------------|----------------------------------|-----|---------------|
| | | To Rafters/Truss | To Plates | To Studs | Uplift (160) | Lateral (160) | | Uplift (160) | Lateral (160) | | Uplift with 8dx1 1/2 Nails (160) | | |
| H1 | 18 | 6-8dx1 1/2 | 4-8d | — | 585 | 485 | 165 | 455 | 400 | 415 | 140 | 370 | I17, L6, F16 |
| H2A | 18 | 5-8dx1 1/2 | 2-8dx1 1/2 | 5-8dx1 1/2 | 575 | 130 | 55 | — | 495 | 130 | 55 | — | IP1, L18, F25 |
| H2ASS | 18 | 5-SS8D | 2-SS8D | 5-SS8D | 400 | 130 | 55 | 400 | 345 | 130 | 55 | 345 | 170 |
| H2.5A | 18 | 5-8d | 5-8d | — | 600 | 110 | 110 | 575 | 535 | 110 | 110 | 495 | I17, F16 |
| H2.5AS | 18 | 5-SS8d | 5-SS8d | — | 440 | 75 | 70 | 365 | 380 | 75 | 70 | 310 | 170 |
| H2.5T | 18 | 5-8d | 5-8d | — | 545 | 135 | 145 | 425 | 545 | 135 | 145 | 425 | IP1, L18, F25 |
| H3 | 18 | 4-8d | 4-8d | — | 455 | 125 | 160 | 415 | 320 | 105 | 140 | 290 | I17, L6, F16 |
| H4 | 20 | 4-8d | 4-8d | — | 360 | 165 | 160 | 360 | 235 | 140 | 135 | 235 | |
| H5 | 18 | 4-8d | 4-8d | — | 455 | 115 | 200 | 455 | 265 | 100 | 170 | 265 | I17, F16 |
| H6 | 16 | — | 8-8d | 8-8d | 950 | — | — | — | 820 | — | — | — | |
| H7Z | 16 | 4-8d | 2-8dx1 1/2 | 8-8d | 985 | 400 | — | — | 845 | 345 | — | — | I17, F16 |
| H8 | 18 | 5-10dx1 1/2 | 5-10dx1 1/2 | — | 745 | 75 | — | 630 | 565 | 75 | — | 510 | L10, F26 |
| H10A Sloped | 18 | 9-10dx1 1/2 | 9-10dx1 1/2 | — | 855 | 590 | 285 | — | 760 | 505 | 285 | — | I17, L18, F25 |
| H10A | 18 | 9-10dx1 1/2 | 9-10dx1 1/2 | — | 1140 ^o | 590 | 285 | — | 1015 | 505 | 285 | — | |
| H10ASS | 18 | 9-SSN10 | 9-SSN10 | — | 970 | 565 | 170 | — | 835 | 485 | 170 | — | 170 |
| H10AR | 18 | 9-10dx1 1/2 | 9-10dx1 1/2 | — | 1050 | 490 | 285 | — | 905 | 420 | 285 | — | IP1, L18, F25 |
| H10S ^o | 18 | 8-8dx1 1/2 | 8-8dx1 1/2 ^o | 8-8d | 1010 | 660 | 215 | 550 | 870 | 570 | 185 | 475 | |
| H10A-2 | 18 | 9-10dx1 1/2 | 9-10dx1 1/2 | — | 1245 | 815 | 260 | — | 1070 | 700 | 225 | — | F25 |
| H10-2 | 18 | 6-10d | 6-10d | — | 760 | 455 | 395 | — | 655 | 390 | 340 | — | I17, F16 |
| H11Z | 18 | 6-16dx2 1/2 | 6-16dx2 1/2 | — | 830 | 525 | 760 | — | 715 | 450 | 655 | — | 170 |
| H14 | 18 | 1 12-8dx1 1/2 | 13-8d | — | 1350 ^o | 515 | 265 | — | 1050 | 480 | 245 | — | IP1, L18, F25 |
| | | 2 12-8dx1 1/2 | 15-8d | — | 1350 ^o | 515 | 265 | — | 1050 | 480 | 245 | — | |
| TSP | 16 | 9-10dx1 1/2 | 6-10dx1 1/2 | — | 740 | 310 | 190 | — | 635 | 265 | 160 | — | F26 |
| | | 9-10dx1 1/2 | 6-10d | — | 890 | 310 | 190 | — | 765 | 265 | 160 | — | |

1. Loads have been increased for wind or earthquake loading with no further increase allowed; reduce where other loads govern.
2. Allowable loads are for one anchor. A minimum rafter thickness of 2 1/2" must be used when framing anchors are used on each side of the joist and on the same side of the plate (exception: connectors installed such that nails on opposite side don't interfere).
3. Allowable DF/SP uplift load for stud to bottom plate installation (see detail 75) is 390 lbs. (H2.5A); 265 lbs. (H2.5AS); 360 lbs. (H4) and 310 lbs. (H8). For SPF/HF values multiply these values by 0.66.
4. Allowable loads in the F₁ direction are not intended to replace diaphragm boundary members or cross grain bending of the truss or rafter members.
5. When cross-grain bending or cross-grain tension cannot be avoided in the members, mechanical reinforcement to resist such forces may be considered.
6. Hurricane Ties are shown on the outside of the wall for clarity and assume a minimum overhang of 3 1/2". Installation on the inside of the wall is acceptable (see General Instructions for the installer notes u on page 17).

7. For uplift Continuous Load Path, connections in the same area (i.e. truss to plate connector and plate to stud connector) must be on the same side of the wall.
8. Southern Pine allowable uplift loads for H10A – 1340 lbs. and for the H14 – 1465 lbs.
9. Refer to Simpson Strong-Tie® technical bulletin T-HTIEBEARING for allowable bearing enhancement loads.
10. H10S can have the stud offset a maximum of 1" from rafter (center to center) for a reduced uplift of 890 lbs. (DF/SP) and 765 lbs. (SPF).
11. H10S nails to plates are optional for uplift but required for lateral loads.
12. Some load values for the stainless-steel connectors shown here are lower than those for the carbon-steel versions. Ongoing test programs have shown this to also be the case with other stainless-steel connectors in the product line that are installed with nails. Visit www.strongtie.com/corrosion for updated information.
13. NAILS: 16dx2 1/2 – 0.162" dia. x 2 1/2" long, 10d – 0.148" dia. x 3" long, 10dx1 1/2 – 0.148" dia. x 1 1/2" long, 8d – 0.131" dia. x 2 1/2" long, 8dx1 1/2 – 0.131" dia. x 1 1/2" long. See page 22-23 for other nail sizes and information.
14. SCREWS: Strong-Drive® SD #9x1 1/2" (model SD9112) – 0.131" dia. x 1 1/2" long (for the models marked with the orange flag only). Full table loads apply.

Straps & Ties



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Straps & Ties
H/TSP Seismic & Hurricane Ties



14 H8 attaching rafter to double top plates

15 H8 attaching stud to sill (4-8d into plate, 5-8d into stud, refer to footnote 3 for loads)

16 H8 attaching I-joist to double top plates

17 H10A Field-Bent Installation

18 H10S Installation (Plate nails for lateral loads only)

19 H10S Installation with stud offset (Plate nails for lateral loads only)

20 H10A Installation

21 H10-2 Installation (H11Z similar)

22 H14 Installation to double top plates (Minimum Edge Distance: 1, 8d commons to plates. Fill one of three holes to H14 bottom flange.)

23 H14 Installation to double 2x header (Minimum Edge Distance: 2, 8d commons to header. Fill all three triangle holes to straighten bottom flange.)

AVOID A MISINSTALLATION
Do not make new holes or overdrive nails!

H10A optional nailing connects shear blocking to rafter. Use 8d common nails. Slot allows maximum field-bending up to a pitch of 6/12, use 75% of the table uplift load; bend one time only.

Considerations for Hurricane Tie Selection

1. What is the uplift load?
2. What is the parallel-to-plate load?
3. What is the perpendicular-to-plate load?
4. What is the species of wood used for the rafter and the top plates?
(Select the load table based on the lowest performing species of wood.)
5. Will the hurricane tie be nailed into both top plates or the upper top plate only?
6. What load or loads will the hurricane tie be taking?

When a connector is loaded simultaneously in more than one direction, the allowable load must be evaluated as shown here. For all connectors use the following equation:

$$\frac{\text{Design Uplift/Allowable Uplift} + \text{Design Lateral Parallel to Plate} / \text{Allowable Lateral Parallel to Plate} + \text{Design Lateral Perpendicular to Plate} / \text{Allowable Lateral Perpendicular to Plate}}{1.0} < 1.0$$

The three terms in the unity equation are due to the possible directions that exist to generate force on a connector. The number of terms that must be considered for simultaneous loading is at the sole discretion of the Designer and is dependent on their method of calculating wind forces and the utilization of the connector within the structural system.

As an alternative, certain roof to wall connectors (embedded truss anchors, pages 166 and 167, seismic and hurricane ties, pages 181-183, and twist straps, page 187) can be evaluated using the following: The design load in each direction shall not exceed the published allowable load in that direction multiplied by 0.75.

7. Select hurricane tie based on performance, application, installed cost and ease of installation.

Hurricane Tie Installations to Achieve Twice the Load (Top View)

Both connectors shall be same model.

Wall Top Plate

Wall Top Plate

Wall Top Plate

Install diagonally across from each other for minimum 2x truss.

Products can be on the same side of the wall provided they are configured as shown.

Nailing into both sides of a single ply 2x truss may cause the wood to split.

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Straps & Ties

VB Knee Braces

The VB provides lateral resistance force at the bottom of beams when installed approximately 45° or more to the vertical plane.

MATERIAL: 12 gauge **FINISH:** Galvanized

INSTALLATION: • Use specified fasteners. See General Notes.

- 16-N54A fasteners are included with the brace.

CODES: See page 13 for Code Reference Key Chart.

| Model No. | H (Beam Depth) | L | Fasteners (Total) | Allowable Tension Loads ¹ | | Code Ref. |
|-----------|----------------|-----|-------------------|--------------------------------------|------------|-----------|
| | | | | Floor (100) | Roof (125) | |
| VB5 | 10" - 15" | 5" | 16-N54A | 990 | 1240 | 115, L7 |
| VB7 | 15" - 22½" | 7" | 16-N54A | 990 | 1240 | |
| VB8 | 22½" - 28½" | 8" | 16-N54A | 990 | 1240 | |
| VB10 | 28½" - 36" | 10" | 16-N54A | 990 | 1240 | |
| VB12 | 36" - 42" | 12" | 16-N54A | 990 | 1240 | |

1. Roof loads have been increased 25% with no further increase allowed.

2½" Min.

Hanger not shown

Six N54A Nails

Accommodates beam widths of 3½" to 10¼"

One N54A in each tab

Two N54A in seat

Typical VB Installation

Straps & Ties

H Seismic & Hurricane Ties



The hurricane tie series features various configurations of wind and seismic ties for trusses and rafters.
The H16 series has a presloped seat of 5/12 for double trusses.

The presloped 5/12 seat of the H16 provides for a tight fit and reduced deflection. The strap length provides for various truss height up to a maximum of 13 1/2' (H16 series). Minimum heel height for H16 series is 4'.

The HGA10 attaches to gable trusses and provides good lateral wind resistance. The HS24 attaches the bottom chord of a truss or rafter at pitches from 0/12 to 4/12 to double 2x4 top plates. Double shear nailing allows for higher lateral resistance.

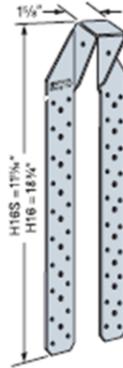
MATERIAL: See table

FINISH: Galvanized. See Corrosion Information, page 14-15.

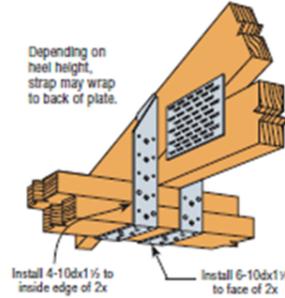
INSTALLATION: • Use all specified fasteners. See General Notes.

- HGA10KT: sold as a kit with (10) HGA10 connectors. SDS screws are included.
- HS24 requires slant nailing only when bottom chord of truss or rafter has no slope.

CODES: See page 13 for Code Reference Key Chart.



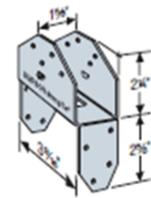
H16 and H16S
Presloped at 5/12. Truss/Rafter Pitch of 3/12 to 7/12 is acceptable



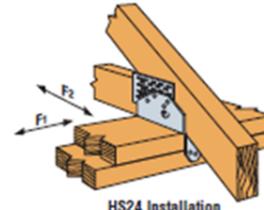
H16 Installation

| Model No. | Ga | Fasteners | | | DF/SP Allowable Loads ¹ | | | SPF/HF Allowable Loads ¹ | | | Code Ref. | | |
|-----------|----|-------------------------|---------------|----------|------------------------------------|------------------|-------------------|-------------------------------------|------------------|------------------|------------------|-----|----------|
| | | To Rafters/Truss | To Plates | To Studs | Uplift (160) | Lateral (160) | | Uplift (160) | Lateral (160) | | | | |
| HGA10KT | 14 | 4-SDS 1/2"x1 1/2" | 4-SDS 1/2"x3" | — | 695 | 1165 | 940 | 780 | 500 | 840 | 675 | 495 | F26 |
| HS24 | 18 | 8-8dx1 1/2 & 2-8d slant | 8-8d | — | 605 ² | 645 ² | 1025 ² | — | 520 ³ | 555 ³ | 880 ³ | — | I17, F16 |
| H16 | 18 | 2-10dx1 1/2 | 10-10dx1 1/2 | — | 1470 | — | — | — | 1265 | — | — | — | F26 |
| H16S | 18 | 2-10dx1 1/2 | 10-10dx1 1/2 | — | 1470 | — | — | — | 1265 | — | — | — | |
| H16-2 | 18 | 2-10dx1 1/2 | 10-10dx1 1/2 | — | 1470 | — | — | — | 1265 | — | — | — | |
| H16-2S | 18 | 2-10dx1 1/2 | 10-10dx1 1/2 | — | 1470 | — | — | — | 1265 | — | — | — | — |

1. Loads have been increased for wind or earthquake loading with no further increase allowed; reduce where other loads govern.
2. When cross-grain bending or cross-grain tension cannot be avoided, mechanical reinforcement to resist such forces should be considered.
3. HS24 DF/SP allowable loads without slant nailing are 605 lbs. (uplift), 590 lbs. (F₁), 640 lbs. (F₂). For SPF/HF loads multiply these values by 0.86.
4. For H16-2S, S = short.
5. Allowable loads in the F₁ direction are not intended to replace diaphragm boundary members or prevent cross grain bending of the truss or rafter members. Additional shear transfer elements shall be considered where there may be effects of cross grain bending or tension.
6. **NAILS:** 10dx1 1/2 = 0.148" dia. x 1 1/2" long, 8d = 0.131" dia. x 2 1/2" long, 8dx1 1/2 = 0.131" dia. x 1 1/2" long. See page 22-23 for other nail sizes and information.

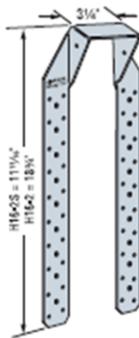


HS24
U.S. Patents 5,603,580

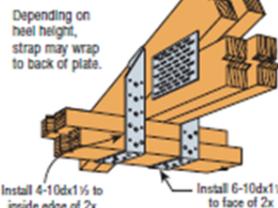


HS24 Installation

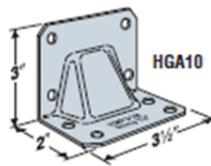
Straps & Ties



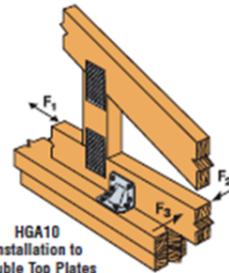
H16-2 and H16-2S
Presloped at 5/12. Pitch of 3/12 to 7/12 is acceptable



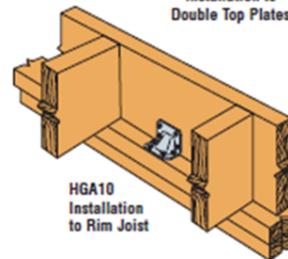
H16-2 Installation



HGA10



HGA10 Installation to Double Top Plates



HGA10 Installation to Rim Joist

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Straps & Ties
HRS/ST/PS/HST/HTP/LSTA/LSTI/MST/MSTA/MSTC/MSTI *Strap Ties*



CODES: See page 13 for Code Reference Key Chart.

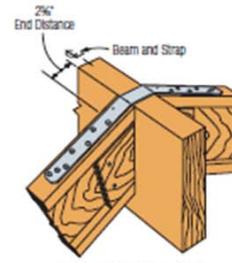
These products are available with additional corrosion protection. Additional products on this page may also be available with this option, check with Simpson Strong-Tie for details.

These products are approved for installation with the Strong-Drive SD Structural-Connector screw. See page 27 for more information.

| Model No. | Ga | Dimensions | | Fasteners (Total) | Allowable Tension Loads (DF/SP) (160) | Allowable Tension Loads (SPF/HF) (160) | Code Ref. |
|-----------|-------|------------|--------------------|-------------------|--|---|------------|
| | | W | L | | | | |
| LSTA9 | 1 1/4 | 9 | 8-10d | 8 | 740 | 635 | I4, L3, F2 |
| LSTA12 | 1 1/4 | 12 | 10-10d | 8 | 925 | 795 | |
| LSTA15 | 1 1/4 | 15 | 12-10d | 8 | 1110 | 950 | |
| LSTA18 | 1 1/4 | 18 | 14-10d | 8 | 1235 | 1110 | |
| LSTA21 | 1 1/4 | 21 | 16-10d | 8 | 1235 | 1235 | |
| LSTA24 | 1 1/4 | 24 | 18-10d | 8 | 1235 | 1235 | |
| ST292 | 2 1/4 | 9 1/2 | 12-16d | 12 | 1265 | 1120 | |
| ST2122 | 2 1/4 | 12 3/4 | 16-16d | 12 | 1530 | 1505 | |
| ST2115 | 3/4 | 16 1/4 | 10-16d | 12 | 660 | 660 | |
| ST2215 | 2 1/4 | 16 1/4 | 20-16d | 12 | 1875 | 1875 | |
| LSTA30 | 1 1/4 | 30 | 22-10d | 8 | 1640 | 1640 | |
| LSTA36 | 1 1/4 | 36 | 24-10d | 8 | 1640 | 1640 | |
| LSTI49 | 3/4 | 49 | 32-10dx1 1/2 | 12 | 2975 | 2555 | |
| LSTI73 | 3/4 | 73 | 48-10dx1 1/2 | 12 | 4205 | 3830 | |
| MSTA9 | 1 1/4 | 9 | 8-10d | 8 | 750 | 645 | |
| MSTA12 | 1 1/4 | 12 | 10-10d | 8 | 940 | 810 | |
| MSTA15 | 1 1/4 | 15 | 12-10d | 8 | 1130 | 970 | |
| MSTA18 | 1 1/4 | 18 | 14-10d | 8 | 1315 | 1130 | |
| MSTA21 | 1 1/4 | 21 | 16-10d | 8 | 1505 | 1290 | |
| MSTA24 | 1 1/4 | 24 | 18-10d | 8 | 1640 | 1455 | |
| MSTA30 | 1 1/4 | 30 | 22-10d | 8 | 2050 | 1820 | |
| MSTA36 | 1 1/4 | 36 | 26-10d | 8 | 2050 | 2050 | |
| MSTA49 | 1 1/4 | 49 | 26-10d | 8 | 2020 | 2020 | |
| ST6215 | 2 1/4 | 16 1/4 | 20-16d | 12 | 2095 | 1900 | |
| ST6224 | 2 1/4 | 23 3/4 | 28-16d | 12 | 2540 | 2540 | |
| ST9 | 1 1/4 | 9 | 8-16d | 8 | 885 | 760 | |
| ST12 | 1 1/4 | 11 1/2 | 10-16d | 8 | 1105 | 950 | |
| ST18 | 1 1/4 | 17 1/2 | 14-16d | 8 | 1420 | 1330 | |
| ST22 | 1 1/4 | 21 1/2 | 18-16d | 8 | 1420 | 1420 | |
| MSTC28 | 3 | 28 1/4 | 36-16d sinkers | 12 | 3455 | 2980 | |
| MSTC40 | 3 | 40 1/4 | 52-16d sinkers | 12 | 4745 | 4305 | |
| MSTC52 | 3 | 52 1/4 | 62-16d sinkers | 12 | 4745 | 4745 | |
| HTP37Z | 3 | 7 | 20-10dx1 1/2 | 12 | 1850 | 1600 | |
| MSTC66 | 3 | 65 1/4 | 76-16d sinkers | 12 | 5860 | 5860 | |
| MSTC78 | 3 | 77 1/4 | 76-16d sinkers | 12 | 5860 | 5860 | |
| ST6236 | 2 1/4 | 33 3/4 | 40-16d | 12 | 3845 | 3845 | |
| HRS6 | 1 1/4 | 6 | 6-10d | 6 | 605 | 525 | |
| HRS8 | 1 1/4 | 8 | 10-10d | 6 | 1010 | 880 | |
| HRS12 | 1 1/4 | 12 | 14-10d | 6 | 1415 | 1230 | |
| MST126 | 2 1/4 | 26 | 26-10dx1 1/2 | 12 | 2745 | 2325 | |
| MST136 | 2 1/4 | 36 | 36-10dx1 1/2 | 12 | 3800 | 3220 | |
| MST148 | 2 1/4 | 48 | 48-10dx1 1/2 | 12 | 5065 | 4290 | |
| MST160 | 2 1/4 | 60 | 60-10dx1 1/2 | 12 | 5080 | 5080 | |
| MST172 | 2 1/4 | 72 | 72-10dx1 1/2 | 12 | 5080 | 5080 | |
| HRS416Z | 3/4 | 16 | 16-SDS 1/2"x1 1/2" | 12 | 2835 | 2305 | |

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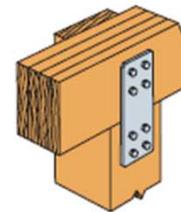
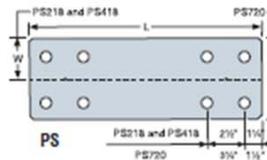
1. Loads include a 60% load duration increase on the fasteners for wind or earthquake loading.
2. 10dx1 1/2" nails may be substituted where 16d sinkers or 10d are specified at 100% of the table loads except where straps are installed over sheathing.
3. 10d commons may be substituted where 16d sinkers are specified at 100% of table loads.
4. 16d sinkers (0.148" dia. x 3 1/2" long) or 10d commons may be substituted where 16d commons are specified at 0.94 of the table loads.
5. Use half of the nails in each member being connected to achieve the listed loads.
6. Tension loads apply for uplift when installed vertically.
7. NAILS: 16d = 0.162" dia. x 3 1/2" long, 16d Sinker = 0.148" dia. x 3 1/2" long, 10d = 0.148" dia. x 3" long, 10dx1 1/2" = 0.148" dia. x 1 1/2" long. See page 22-23 for other nail sizes and information.



Typical LSTA Installation
(Hanger not shown)
Bend strap one time only

| Model No. | Material Thickness Gauge | Dim. W | Dim. L | Bolts Qty | Code Ref. |
|-----------|--------------------------|--------|--------|-----------|-----------|
| PS218 | 7 ga | 2 | 18 | 4 | 180 |
| PS418 | | 4 | 18 | 4 | |
| PS720 | | 6 1/4 | 20 | 8 | |

1. PS strap design loads must be determined by the Designer for each installation. Bolts are installed both perpendicular and parallel-to-grain. Hole diameter in the part may be oversized to accommodate the HDG. Designer must determine if the oversize creates an unacceptable installation.



Typical PS720 Installation

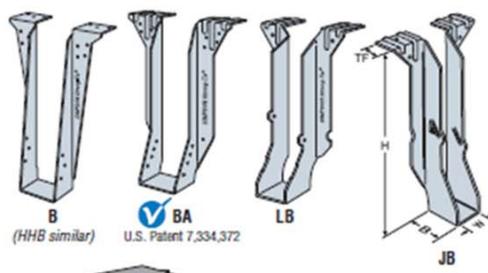
Straps & Ties

Solid Sawn Joist Hangers
TOP FLANGE HANGERS JB/LB/BA/B/HHB Joist, Beam and Purlin Hangers



ENGINEERED
This product is preferable to similar connectors because of a) easier installation, b) higher loads, c) lower installed cost, or a combination of these features.

The BA hanger is a cost effective hanger featuring min/max joist nailing option. Min Nailing featuring Positive Angle Nailing targets moderate load conditions whereas the Max Nailing generates capacities for higher loads. The unique two level embossment provides added stiffness to the top flange. The newly improved B hanger offers wide versatility with enhanced load capacities.

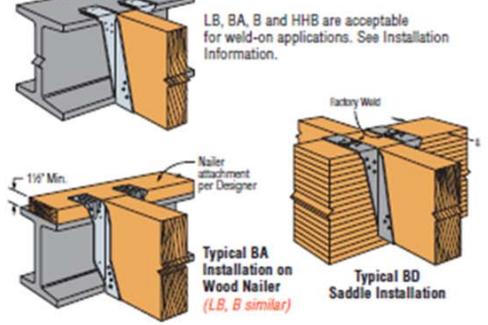


See tables on pages 80-82. See Hanger Options on pages 215-224 for hanger modifications, which may result in reduced loads.

MATERIAL: See tables, pages 80-82.
FINISH: BA, JB, LB and B—Galvanized; HHB—all saddle hangers and all welded sloped and special hangers—Simpson Strong-Tie® gray paint. BA, LB, B and HHB may be ordered hot-dip galvanized, specify HDG.

INSTALLATION: Use specified fasteners. See General Notes and nailer table.

- LB, BA, B and HHB may be welded to steel headers with weld size to match material thickness (approximate thickness shown). The minimum required weld to the top flanges is 1/2" x 2" (1/4" x 1 1/2" for LB) fillet weld to each side of each top flange tab for 14 and 12 gauge and 3/8" x 2" fillet weld to each side of each top flange tab for 7 gauge. Distribute the weld equally on both top flanges. Welding cancels the top and face nailing requirements. Consult the code for special considerations when welding galvanized steel. The area should be well-ventilated (see page 17 for welding information). Weld on applications produce the maximum allowable down load listed. For uplift loads refer to technical bulletin T-MELDUPFLT (see page 232 for details).
- Ledgers must be evaluated for each application separately. Check TF dimension, nail length and nail location on ledger.
- Refer to technical bulletin T-SLOPEJST for information regarding load reductions on selected hangers which can be used without modification to support joists which have shallow slopes ($\leq 1/4:12$) (see page 232 for details).



OPTIONS: B and HHB

- Other widths are available; specify W dimension (the minimum W dimension is 1 1/2" for B and 3/4" for HHB).
- See Hanger Options, pages 215-224. BA, JB and LB hangers cannot be modified. Use LBV as an alternative for the JB/LB.

CODES: See page 13 for Code Reference Key Chart.

NAILER TABLE

| Model No. | Nailer | Top Flange Nailing | Allowable Loads | | |
|-----------|--------|--------------------|---------------------------|-------|--------|
| | | | Uplift ¹ (160) | DF/SP | SPF/HF |
| LB26 | 2x | 4-10dx1 1/2" | — | 850 | — |
| LB28 | 2x | 4-10dx1 1/2" | — | 915 | — |
| LB210 | 2x | 4-10dx1 1/2" | — | 915 | — |
| LB212 | 2x | 4-10dx1 1/2" | — | 915 | — |
| LB214 | 2x | 4-10dx1 1/2" | — | 915 | — |
| LB216 | 2x | 4-10dx1 1/2" | — | 1150 | — |
| BA48 | 2x | 10-10dx1 1/2" | 265 ² | 2220 | 1755 |
| BA416 | 2-2x | 14-10d | 265 ² | 2695 | 2235 |
| BA412 | 3x | 14-16dx2 1/2" | 265 ² | 3230 | — |
| | 4x | 14-16d | 265 ² | 3230 | — |
| | 2-2x | 14-10d | 710 ⁴ | 3615 | 2770 |
| | 3x | 14-16dx2 1/2" | 830 ⁴ | 3725 | — |
| | 4x | 14-16d | 830 ⁴ | 3800 | — |

1. Uplift values are for DF/SP nailers only. Refer to technical bulletin T-NAILERUPLFT for SPF values (see page 231 for details).

2. Refer to technical bulletin T-NAILERUPLFT for higher uplift value options (see page 231 for details).

3. BA hangers require 2-10dx1 1/2" joist nails.

4. B hangers require 6-10dx1 1/2" joist nails to achieve published loads. For joist members 2 1/4" or wider, 16dx2 1/2" joist nails should be installed for additional uplift loads on the 3x and 4x nailer applications of 970 lbs. and 1010 lbs. respectively.

5. Attachment of nailer to supporting member is by the Designer.

B SERIES WITH VARIOUS HEADER APPLICATIONS

| Model Series | Fasteners | | | Allowable Loads Header Type | | | | Code Ref. | |
|--------------|-----------|--------|--------------|-----------------------------|------|------|-------|-----------|---------------|
| | Top | Face | Joist | Uplift (160) | LVL | PSL | DF/SP | | SPF/HF |
| BA Min. | 6-10d | 10-10d | 2-10dx1 1/2" | 265 | 3230 | 3630 | 3080 | 2425 | I19, F21, L13 |
| BA Max. | 6-16d | 10-16d | 2-10dx1 1/2" | 265 | 4015 | 3705 | 3435 | 2665 | |
| B | 6-10d | 8-10d | 6-10dx1 1/2" | 1170 | 3555 | 3630 | 3625 | 2465 | |
| | 6-16d | 8-16d | 6-10dx1 1/2" | 1170 | 4715 | 4320 | 3800 | 2665 | |
| | 6-10d | 8-10d | 6-10dx1 1/2" | 990 | 3575 | 3195 | 3625 | 2190 | |
| | 6-16d | 8-16d | 6-10dx1 1/2" | 1010 | 4135 | 3355 | 3800 | 2650 | |

1. Uplift loads are based on DF/SP lumber and have been increased for wind or earthquake loading with no further increase allowed. Reduce where other loads govern.

2. For SPF use 0.86 x DF/SP uplift load.

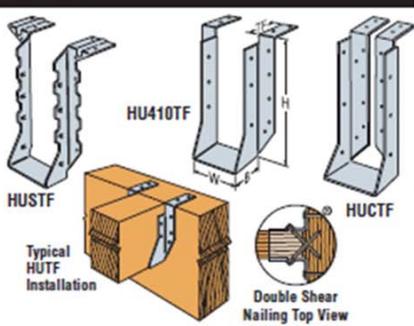
3. Where noted for single-ply joist hangers use 6-10dx1 1/2" nails.

4. NAILS: 16d = 0.162" dia x 3 1/2" long; 10d = 0.148" dia x 3" long; 10dx1 1/2" = 0.148" dia x 1 1/2" long. See page 22-23 for other nail sizes and information.

HUTF/HUSTF Heavy Duty and Double Shear Joist Hangers

See dimensions, material, loads on table pages. HUSTF has the double shear nailing advantage—distributing the joist load through two points on each nail for greater strength.

FINISH: Galvanized. See Corrosion Information, page 14-15.



INSTALLATION:

- Use all specified fasteners. See General Notes.
- Not acceptable for nailer or welded applications; see W and B hangers.
- HUTF—The minimum header or ledger size that can be used with this hanger is 3 1/2".
- HUSTF—With 3x carrying members, use 16dx2 1/2" nails into the header and 16d commons into the joist.

OPTIONS:

- HUTF rough beam sizes are available by special order.
- See Hanger Options on pages 215-224 for slope and/or skewed hangers.
- Available with flanges turned in (2-2x and 4x only for HUSTCF, 2 1/2" or greater for HUCTF).

Some model configurations may differ from those shown. Production models have projected seats. Square cut seats may be ordered. Contact Simpson Strong-Tie for details.



Nailer application is NOT acceptable. Fasteners cannot be installed

Solid Sawn Joist Hangers

TOP FLANGE HANGERS – SOLID SAWN LUMBER (DF/SP)



Don't feel like sitting through this table?
Visit www.strongtie.com/software to learn more about our new Joist Hanger Selector software.

Solid Sawn Joist Hangers

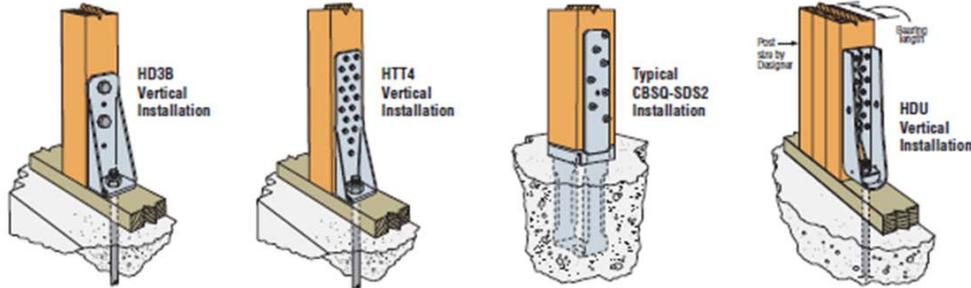
| Joist or Purlin Size | Model No. | Ga | Dimensions | | | | Fasteners | | DF/SP Allowable Loads | | | | Installed Cost Index (ICI) | Code Ref. |
|--------------------------|------------|----|------------|--------|-------|-------|-----------|-------------|-----------------------|-------------|------------|------------|----------------------------|--------------|
| | | | W | H | B | TF | Header | Joist | Uplift (160) | Floor (100) | Snow (115) | Roof (125) | | |
| SAWN LUMBER SIZES | | | | | | | | | | | | | | |
| 2x4 | HU24TF | 12 | 1 1/2 | 3 3/8 | 2 1/2 | 2 1/2 | 6-16d | 2-10dx1 1/2 | 295 | 2090 | 2100 | 2100 | Lowest | |
| DBL 2x4 | HU24-2TF | 12 | 3 1/4 | 3 3/8 | 2 1/2 | 2 1/2 | 8-16d | 2-10d | 375 | 2600 | 2600 | 2600 | Lowest | |
| 2x6 | JB26 | 18 | 1 1/2 | 5 1/2 | 1 1/2 | 1 1/2 | 4-10d | 2 PRONG | — | 1040 | 1040 | 1040 | Lowest | |
| | LB26 | 14 | 1 1/2 | 5 1/2 | 1 1/2 | 1 1/2 | 4-16d | 2-10dx1 1/2 | 290 | 1380 | 1380 | 1380 | +117% | |
| | HU26TF | 12 | 1 1/2 | 5 1/2 | 2 1/2 | 2 1/2 | 10-16d | 4-10dx1 1/2 | 590 | 2275 | 2330 | 2335 | +568% | |
| | W26 | 12 | 1 1/2 | 5 1/2 | 2 1/2 | 2 1/2 | 2-10d | 2-10dx1 1/2 | — | 2200 | 2200 | 2200 | +890% | |
| DBL 2x6 | HUS26-2TF | 14 | 3 1/4 | 5 1/2 | 2 | 1 1/4 | 6-16d | 4-16d | 1235 | 2820 | 3000 | 3000 | Lowest | |
| | WNP26-2 | 12 | 3 1/4 | 5 1/2 | 2 1/2 | 2 1/2 | 2-10d | 2-10d | — | 3255 | 3255 | 3255 | +33% | |
| | HU26-2TF | 12 | 3 1/4 | 5 1/2 | 2 1/2 | 2 1/2 | 10-16d | 4-10d | 750 | 3725 | 3900 | 3900 | +87% | |
| 2x8 | JB28 | 18 | 1 1/2 | 7 1/4 | 1 1/2 | 1 1/2 | 4-10d | 2 PRONG | — | 1050 | 1050 | 1050 | Lowest | |
| | LB28 | 14 | 1 1/2 | 7 1/4 | 1 1/2 | 1 1/2 | 4-16d | 2-10dx1 1/2 | 290 | 1270 | 1270 | 1270 | +98% | |
| | HU28TF | 12 | 1 1/2 | 7 1/4 | 2 1/2 | 2 1/2 | 10-16d | 4-10dx1 1/2 | 590 | 2335 | 2335 | 2335 | +563% | |
| | W28 | 12 | 1 1/2 | 7 1/4 | 2 1/2 | 2 1/2 | 2-10d | 2-10dx1 1/2 | — | 2200 | 2200 | 2200 | +570% | |
| DBL 2x8 | HUS28-2TF | 14 | 3 1/4 | 7 1/4 | 2 | 1 1/4 | 8-16d | 6-16d | 1550 | 3455 | 3720 | 3895 | Lowest | |
| | WNP28-2 | 12 | 3 1/4 | 7 1/4 | 2 1/2 | 2 1/2 | 2-10d | 2-10d | — | 3255 | 3255 | 3255 | +16% | H10, F9, L11 |
| | HU28-2TF | 12 | 3 1/4 | 7 1/4 | 2 1/2 | 2 1/2 | 12-16d | 4-10d | 750 | 3900 | 3900 | 3900 | +75% | |
| 2x10 | JB210 | 18 | 1 1/2 | 9 1/4 | 2 | 1 1/2 | 4-16d | 2 PRONG | — | 1255 | 1255 | 1255 | Lowest | |
| | LB210 | 14 | 1 1/2 | 9 1/4 | 2 | 1 1/2 | 4-16d | 2-10dx1 1/2 | 290 | 1550 | 1550 | 1550 | +35% | |
| | HU210TF | 12 | 1 1/2 | 9 1/4 | 2 1/2 | 2 1/2 | 12-16d | 4-10dx1 1/2 | 590 | 2335 | 2335 | 2335 | +359% | |
| | W210 | 12 | 1 1/2 | 9 1/4 | 2 1/2 | 2 1/2 | 2-10d | 2-10dx1 1/2 | — | 2200 | 2200 | 2200 | +360% | |
| DBL 2x10 | HUS210-2TF | 14 | 3 1/4 | 9 1/4 | 2 | 1 1/2 | 10-16d | 8-16d | 2590 | 3585 | 3925 | 4155 | Lowest | |
| | WNP210-2 | 12 | 3 1/4 | 9 1/4 | 2 1/2 | 2 1/2 | 2-10d | 2-10d | — | 3255 | 3255 | 3255 | +9% | |
| | HU210-2TF | 12 | 3 1/4 | 9 1/4 | 2 1/2 | 2 1/2 | 14-16d | 6-10d | 1125 | 4170 | 4170 | 4170 | +67% | |
| TPL 2x10 | HU210-3TF | 12 | 4 1/4 | 9 1/4 | 2 1/2 | 2 1/2 | 14-16d | 6-16d | 1325 | 4150 | 4150 | 4150 | Lowest | |
| 2x12 | JB212 | 18 | 1 1/2 | 11 1/2 | 2 | 1 1/2 | 6-16d | 2 PRONG | — | 1540 | 1540 | 1540 | Lowest | |
| | LB212 | 14 | 1 1/2 | 11 1/2 | 2 | 1 1/2 | 4-16d | 2-10dx1 1/2 | 290 | 1580 | 1580 | 1580 | +27% | |
| | W212 | 12 | 1 1/2 | 11 | 2 1/2 | 2 1/2 | 2-10d | 2-10dx1 1/2 | — | 2200 | 2200 | 2200 | +317% | |
| | HU212TF | 12 | 1 1/2 | 11 | 2 1/2 | 2 1/2 | 14-16d | 6-10dx1 1/2 | 885 | 2335 | 2335 | 2335 | +339% | |
| DBL 2x12 | HUS212-2TF | 14 | 3 1/4 | 11 1/2 | 2 | 2 1/4 | 10-16d | 8-16d | 2000 | 4435 | 4535 | 4605 | Lowest | H10, F9 |
| | WNP212-2 | 12 | 3 1/4 | 11 | 2 1/2 | 2 1/2 | 2-10d | 2-10d | — | 3255 | 3255 | 3255 | +12% | |
| | HU212-2TF | 12 | 3 1/4 | 11 | 2 1/2 | 2 1/2 | 16-16d | 6-10d | 1125 | 4325 | 4660 | 4880 | +48% | |
| TPL 2x12 | HU212-3TF | 12 | 4 1/4 | 11 | 2 1/2 | 2 1/2 | 16-16d | 6-16d | 1325 | 4550 | 4885 | 5105 | Lowest | |
| 2x14 | LB214 | 14 | 1 1/2 | 13 1/2 | 2 | 1 1/2 | 4-16d | 2-10dx1 1/2 | 290 | 1425 | 1425 | 1425 | Lowest | |
| | JB214 | 18 | 1 1/2 | 13 1/2 | 2 | 1 1/2 | 6-16d | 2-10dx1 1/2 | 235 | 1505 | 1505 | 1505 | +117% | |
| | W214 | 12 | 1 1/2 | 13 | 2 1/2 | 2 1/2 | 2-10d | 2-10dx1 1/2 | — | 2200 | 2200 | 2200 | +188% | |
| | HU214TF | 12 | 1 1/2 | 13 | 2 1/2 | 2 1/2 | 16-16d | 6-10dx1 1/2 | 885 | 2660 | 2745 | 2800 | +189% | |
| DBL 2x14 | HUS214-2TF | 14 | 3 1/4 | 13 1/2 | 2 | 2 1/4 | 12-16d | 8-16d | 2590 | 4435 | 4535 | 4605 | Lowest | |
| | WNP214-2 | 12 | 3 1/4 | 13 | 2 1/2 | 2 1/2 | 2-10d | 2-10d | — | 3255 | 3255 | 3255 | +2% | |
| | HU214-2TF | 12 | 3 1/4 | 13 | 2 1/2 | 2 1/2 | 18-16d | 8-10d | 1500 | 4335 | 4335 | 4335 | +33% | H10, F9, L11 |
| TPL 2x14 | HU214-3TF | 12 | 4 1/4 | 13 | 2 1/2 | 2 1/2 | 18-16d | 8-16d | 1765 | 4835 | 5050 | 5050 | Lowest | |
| 2x16 | LB216 | 14 | 1 1/2 | 15 1/2 | 2 | 1 1/2 | 4-16d | 2-10dx1 1/2 | 290 | 1425 | 1425 | 1425 | Lowest | |
| | W216 | 12 | 1 1/2 | 15 | 2 1/2 | 2 1/2 | 2-10d | 2-10dx1 1/2 | — | 2200 | 2200 | 2200 | +122% | |
| | HU216TF | 12 | 1 1/2 | 15 | 2 1/2 | 2 1/2 | 18-16d | 8-10dx1 1/2 | 1180 | 2845 | 2955 | 3030 | +199% | |
| DBL 2x16 | WNP216-2 | 12 | 3 1/4 | 15 | 2 1/2 | 2 1/2 | 2-10d | 2-10d | — | 3255 | 3255 | 3255 | Lowest | |
| | HU216-2TF | 12 | 3 1/4 | 15 | 2 1/2 | 2 1/2 | 20-16d | 8-10d | 1500 | 4335 | 4335 | 4335 | +34% | |

- NS4A fasteners are supplied with hangers.
- 16d strikers may be used where 10d commons are called out with no load reduction.
- Uplift loads are based on DF/SP lumber and have been increased for wind or earthquake loading with no further increase allowed. For normal loading applications such as cantilever construction refer to Simpson Strong-Tie® Connector Selector™ software or conservatively divide the uplift load by 1.6. For SPF use 0.86 x DF/SP uplift load.
- NAILS: 16d - 0.162" dia. x 3 1/2" long, 10d - 0.148" dia. x 3" long, 10dx1 1/2 - 0.148" dia. x 1 1/2" long. See page 22-23 for other nail sizes and information.

CODES: See page 13 for Code Reference Key Chart.
*Installed Cost Index not available on these models.



Wood Construction Connectors
POST CAPACITIES
SIMPSON Strong-Tie



Post Tension Loads for Douglas Fir Larch

| Framing | Lumber | | Allowable Tension | | | | |
|-------------|--------|-------|-----------------------------|-------|-------|-------|-------|
| | | | P _t (lbs.) (160) | | | | |
| | Size | Grade | Bolt Diameter (in.) | | | | |
| | | | 0 | 1/2 | 3/4 | 7/8 | 1 |
| 4-Inch Wall | 2x4 | #2 | 7245 | 6080 | 5820 | 5305 | 5045 |
| | 3x4 | #2 | 12075 | 10135 | 9705 | 8840 | 8410 |
| | 2-2x4 | #2 | 14490 | 12160 | 11645 | 10610 | 10090 |
| | 4x4 | #2 | 16905 | 14190 | 13585 | 12375 | 11775 |
| | 3-2x4 | #2 | 21735 | 18240 | 17465 | 15915 | 15135 |
| | 4x6 | #2 | 23025 | 19325 | 18500 | 16855 | 16035 |
| | 4x8 | #2 | 28015 | 23510 | 22510 | 20510 | 19510 |
| | 4x10 | #2 | 32765 | 27500 | 26330 | 23990 | 22815 |
| 6-Inch Wall | 2x6 | #2 | 9865 | 8860 | 8635 | 8185 | 7960 |
| | 3x6 | #2 | 16445 | 14765 | 14390 | 13640 | 13270 |
| | 2-2x6 | #2 | 19735 | 17715 | 17265 | 16370 | 15920 |
| | 4x6 | #2 | 23025 | 20670 | 20145 | 19100 | 18575 |
| | 3-2x6 | #2 | 29600 | 26575 | 25900 | 24555 | 23885 |
| | 6x6 | #1 | 39930 | 35845 | 34940 | 33125 | 32215 |
| | 6x8 | #1 | 54450 | 48880 | 47645 | 45170 | 43930 |

Post Tension Loads for Southern Pine

| Framing | Lumber | | Allowable Tension | | | | |
|-------------|--------|-------|-----------------------------|-------|-------|-------|-------|
| | | | P _t (lbs.) (160) | | | | |
| | Size | Grade | Bolt Diameter (in.) | | | | |
| | | | 0 | 1/2 | 3/4 | 7/8 | 1 |
| 4-Inch Wall | 2x4 | #2 | 5460 | 4585 | 4390 | 4000 | 3805 |
| | 3x4 | #2 | 9100 | 7640 | 7315 | 6665 | 6340 |
| | 2-2x4 | #2 | 10920 | 9165 | 8775 | 7995 | 7605 |
| | 4x4 | #2 | 12740 | 10695 | 10240 | 9330 | 8875 |
| | 3-2x4 | #2 | 16380 | 13750 | 13165 | 11995 | 11410 |
| | 4x6 | #2 | 22330 | 18740 | 17945 | 16350 | 15550 |
| | 4x8 | #2 | 26390 | 22150 | 21205 | 19320 | 18380 |
| | 4x10 | #2 | 29785 | 25000 | 23935 | 21805 | 20745 |
| 6-Inch Wall | 2x6 | #2 | 9570 | 8590 | 8375 | 7940 | 7720 |
| | 3x6 | #2 | 15950 | 14320 | 13955 | 13230 | 12870 |
| | 2-2x6 | #2 | 19140 | 17185 | 16750 | 15880 | 15445 |
| | 4x6 | #2 | 22330 | 20045 | 19540 | 18525 | 18015 |
| | 3-2x6 | #2 | 28710 | 25775 | 25120 | 23815 | 23165 |
| | 6x6 | #1 | 43560 | 39105 | 38115 | 36135 | 35145 |
| | 6x8 | #1 | 59400 | 53325 | 51975 | 49275 | 47925 |

Post Tension Loads for Spruce Pine Fir

| Framing | Lumber | | Allowable Tension | | | | |
|-------------|--------|-------|-----------------------------|-------|-------|-------|-------|
| | | | P _t (lbs.) (160) | | | | |
| | Size | Grade | Bolt Diameter (in.) | | | | |
| | | | 0 | 1/2 | 3/4 | 7/8 | 1 |
| 4-Inch Wall | 2x4 | #1/#2 | 5670 | 4760 | 4555 | 4150 | 3950 |
| | 3x4 | #1/#2 | 9450 | 7930 | 7595 | 6920 | 6580 |
| | 2-2x4 | #1/#2 | 11340 | 9520 | 9115 | 8305 | 7900 |
| | 4x4 | #1/#2 | 13230 | 11105 | 10630 | 9685 | 9215 |
| | 3-2x4 | #1/#2 | 17010 | 14275 | 13670 | 12455 | 11845 |
| | 4-2x4 | #1/#2 | 22680 | 19035 | 18225 | 16605 | 15795 |
| 6-Inch Wall | 2x6 | #1/#2 | 7720 | 6930 | 6755 | 6405 | 6230 |
| | 3x6 | #1/#2 | 12870 | 11555 | 11260 | 10675 | 10385 |
| | 2-2x6 | #1/#2 | 15445 | 13865 | 13515 | 12810 | 12460 |
| | 3-2x6 | #1/#2 | 18020 | 16175 | 15765 | 14945 | 14535 |
| | 4-2x6 | #1/#2 | 23165 | 20795 | 20270 | 19215 | 18690 |

Post Tension Loads for Hem Fir

| Framing | Lumber | | Allowable Tension | | | | |
|-------------|--------|-------|-----------------------------|-------|-------|-------|-------|
| | | | P _t (lbs.) (160) | | | | |
| | Size | Grade | Bolt Diameter (in.) | | | | |
| | | | 0 | 1/2 | 3/4 | 7/8 | 1 |
| 4-Inch Wall | 2x4 | #2 | 6615 | 5550 | 5315 | 4845 | 4605 |
| | 3x4 | #2 | 11025 | 9255 | 8860 | 8070 | 7680 |
| | 2-2x4 | #2 | 13230 | 11105 | 10630 | 9685 | 9215 |
| | 4x4 | #2 | 15435 | 12955 | 12405 | 11300 | 10750 |
| | 3-2x4 | #2 | 19845 | 16655 | 15945 | 14530 | 13820 |
| | 4-2x4 | #2 | 26460 | 22210 | 21265 | 19375 | 18430 |
| 6-Inch Wall | 2x6 | #2 | 9010 | 8090 | 7885 | 7475 | 7270 |
| | 3x6 | #2 | 15015 | 13480 | 13140 | 12455 | 12115 |
| | 2-2x6 | #2 | 18020 | 16175 | 15765 | 14945 | 14535 |
| | 3-2x6 | #2 | 21020 | 18870 | 18395 | 17440 | 16960 |
| | 4-2x6 | #2 | 27025 | 24265 | 23650 | 22420 | 21805 |

- The allowable (ASD) capacities are based on the 2012 National Design Specification for Wood Construction (NDS) including the March 2012 Addendum, for lumber with a moisture content of 19% or less.
- Compression parallel to grain loads are based on an effective post height, i.e. equal to the nominal height plus 1 1/4" (due to the most common pre-cut stud lengths) minus 4 1/4" (thickness of 3-2x plates). L/D ratio is based on d = 3 1/2" for 4-inch wall and d = 5 1/2" for 6-inch wall.
- Shaded values are limited by the Perpendicular to Grain bearing allowable load, P_{t⊥}, when posts bear on wood sill plates. Where posts and sill plates are different species, Designer shall limit allowable load to the lower of the post capacity or the perpendicular to grain capacity for each species used.
- Perpendicular to grain allowable loads do not include the NDS Bearing Area Factor, C_b. For posts whose bearing area is not closer than 3" from the end of a sill plate, the P_{t⊥} values may be multiplied by C_b.

| | | | | | | | |
|----------------------|------|------|------|------|------|------|----|
| l _g (in.) | 1.5 | 2.5 | 3 | 3.5 | 4.5 | 5.5 | ≥6 |
| C _b | 1.25 | 1.15 | 1.13 | 1.11 | 1.08 | 1.07 | 1 |

l_g = Bearing Length (post thickness)
C_b = Bearing Area Factor per NDS 3.10.4

- Allowable tension loads are based on net section assuming hole size equal to bolt diameter plus 1/8" with the hole drilled on the 3 1/2" face of post for a 4-inch wall and on the 5 1/2" face of post for a 6-inch wall. Tension loads have been increased for wind or seismic loading with no further increase allowed. Reduce where other loads govern.
- Values do not consider combined axial and out-of-plane bending.

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Miscellaneous

NCA/TB/LTB Bridging



NCA—Nailless installation eliminates callbacks for nail squeaks. Designed for secure grip before the drive-home blow, and deeper prong penetration. Precision-formed into a rigid "V" section.

TB—Tension-type bridging with maximum nailing flexibility. Use just two of the seven nail holes at each end.

LTB—Staggered nail pattern accommodates 2x8 and 2x10 joists. Use just two of the six nail holes at each end. LTB40 has rigid prongs that install easily into the joist, and embossments that allow crisp bends.

MATERIAL: LTB—22 gauge; NCA and TB—20 gauge (except NCA2x12-16—18 gauge).

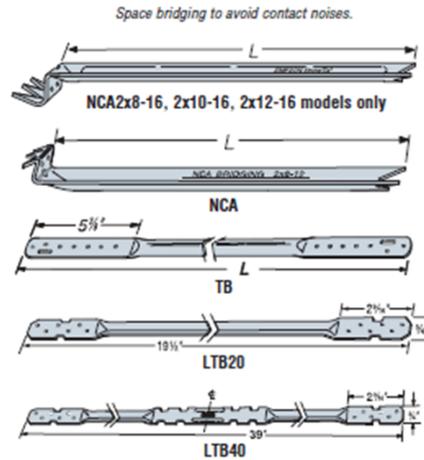
FINISH: Galvanized

INSTALLATION: • Support floor joists with a depth-to-thickness ratio of six or more with bridging at intervals not exceeding 8'. If span is greater than 8', install on 2x8 or larger joists. If span is greater than 16', use more than one pair.

- Tension bridging works only in tension, so must be used in cross pairs.
- Install bridging tightly; loose installation may allow floor movement.
- NCA may be installed before or after sheathing, from the top or bottom. Simply locate the bend line approximately 1" from the joist edge.
- NCA has nail holes in one end for use if a prong is bent during installation. Fully seat nails if they are used; otherwise, they may lead to squeaks.
- TB requires two 10dx1 1/2 fasteners per end.
- LTB requires two 6d commons per end.

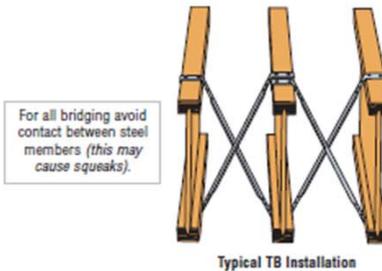
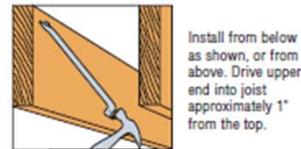
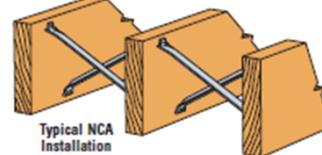
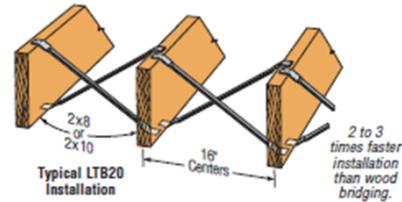
CODES: See page 13 for Code Reference Key Chart.

Code Reference: IRC 2003/2006, R502.7.1



TENSION BRIDGING FOR I-JOISTS

| Joist Height | Joist Spacing (inches) | | | | | | | | |
|--------------|------------------------|------|------|------|------|------|------|------|------|
| | 12 | 16 | 19.2 | 24 | 30 | 32 | 36 | 42 | 48 |
| 9 1/2 | TB20 | TB27 | TB27 | TB30 | TB36 | TB36 | TB42 | TB48 | TB54 |
| 10 | TB20 | TB27 | TB27 | TB30 | TB36 | TB36 | TB42 | TB48 | TB54 |
| 11 1/4 | TB20 | TB27 | TB27 | TB30 | TB36 | TB36 | TB42 | TB48 | TB54 |
| 12 | TB20 | TB27 | TB27 | TB30 | TB36 | TB36 | TB42 | TB48 | TB54 |
| 14 | TB27 | TB27 | TB27 | TB36 | TB36 | TB42 | TB42 | TB48 | TB54 |
| 16 | TB27 | TB27 | TB30 | TB36 | TB42 | TB42 | TB42 | TB48 | TB54 |
| 18 | TB27 | TB30 | TB30 | TB36 | TB42 | TB42 | TB48 | TB54 | TB56 |
| 20 | TB30 | TB30 | TB36 | TB36 | TB42 | TB42 | TB48 | TB54 | TB56 |
| 22 | TB30 | TB36 | TB36 | TB36 | TB42 | TB42 | TB48 | TB54 | TB56 |
| 24 | TB36 | TB36 | TB36 | TB42 | TB42 | TB48 | TB48 | TB54 | TB56 |
| 26 | TB36 | TB36 | TB36 | TB42 | TB48 | TB48 | TB48 | TB54 | TB60 |
| 28 | TB36 | TB36 | TB42 | TB42 | TB48 | TB48 | TB54 | TB54 | TB60 |
| 30 | TB36 | TB42 | TB42 | TB42 | TB48 | TB48 | TB54 | TB56 | TB60 |
| 32 | TB42 | TB42 | TB42 | TB42 | TB48 | TB48 | TB54 | TB56 | TB60 |



TENSION BRIDGING FOR SOLID SAWN LUMBER

| Joist Size | Spacing (in.) | NCA | | TB | | LTB | Code Ref. |
|------------|---------------|------------|--------|-----------|----|-------------|-----------|
| | | Model No. | L | Model No. | L | Model No. | |
| 2x10 | 12 | NCA2x10-12 | 12 1/4 | TB20 | 20 | — | |
| 2x12 | 12 | NCA2x12-12 | 13 3/8 | TB20 | 20 | — | |
| 2x14 | 12 | NCA2x8-16 | 15 1/4 | TB27 | 27 | — | |
| 2x16 | 12 | NCA2x10-16 | 15 5/8 | TB27 | 27 | — | |
| 2x8 | 16 | NCA2x8-16 | 15 1/4 | TB27 | 27 | LTB20 or 40 | |
| 2x10 | 16 | NCA2x10-16 | 15 5/8 | TB27 | 27 | LTB20 or 40 | |
| 2x12 | 16 | NCA2x12-16 | 16 1/4 | TB27 | 27 | — | |
| 2x14 | 16 | — | — | TB27 | 27 | — | |
| 2x16 | 16 | — | — | TB27 | 27 | — | |
| 2x10 | 24 | — | — | TB30 | 30 | — | |
| 2x12 | 24 | — | — | TB36 | 36 | — | |
| 2x14 | 24 | — | — | TB36 | 36 | — | |
| 2x16 | 24 | — | — | TB36 | 36 | — | |

Miscellaneous



DIVISION 06 WOOD, PLASTICS, AND COMPOSITES



#TJ-4000 | SPECIFIER'S GUIDE

TJI® 110, TJI® 210, TJI® 230, TJI® 360 AND TJI® 560 JOISTS

Featuring Trus Joist® TJI® Joists for
Floor and Roof Applications

- Uniform and Predictable
- Lightweight for Fast Installation
- Resource Efficient
- Resists Bowing, Twisting, and Shrinking
- Significantly Reduces Callbacks
- Available in Long Lengths
- Limited Product Warranty





The products in this guide are readily available through our nationwide network of distributors and dealers. For more information on other applications or other Trus Joist® products, contact your Weyerhaeuser representative.

Code Evaluations:
ICC ES ESR-1153; ESR-1387

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Why Choose Trus Joist® TJI® Joists?

- Engineered for strength and consistency
- Efficient installation saves time and labor
- Longer lengths allow more versatile floor plans
- Less jobsite waste
- Fewer red tags and callbacks



This guide features TJI® joists in the following sizes:

Flange Widths: 1¾", 2¼", 2⅝", and 3½"

Depths: 9½", 11⅞", 14", and 16"

Some TJI® joist series may not be available in your region.

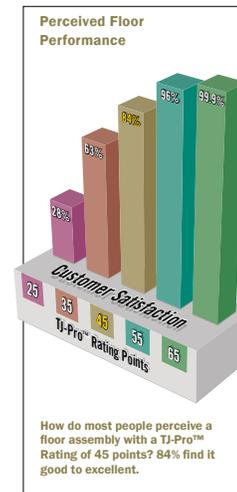
For deeper depth TJI® joists, see the Weyerhaeuser Deep Depth TJI® Joist Specifier's guide, TJ-4005, or contact your Weyerhaeuser representative.

TJ-PRO™ RATINGS TAKE THE GUESSWORK OUT OF FLOOR PERFORMANCE

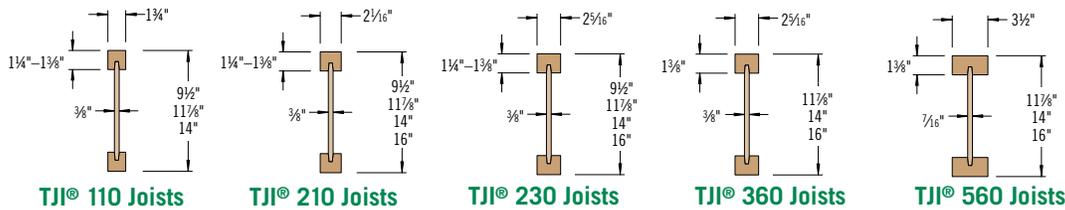
Trus Joist® TJ-Pro™ Ratings are generated by a sophisticated computer model designed to predict floor performance and evaluate the relationship between the cost and the "feel" of any given floor system. The methodology is based on extensive laboratory research, more than one million installations, and the combined expertise of some of the best engineers in the field. TJ-Pro™ Ratings go beyond deflection criteria to consider job-specific needs and expectations. In many cases, using TJ-Pro™ Ratings will offer a system that improves performance while actually reducing costs!

TJ-PRO™ RATING ADVANTAGES

- Works as part of Forte® and Javelin® software
- Provides a method for predicting floor performance
- Takes perceptions of the homeowner into account
- Provides cost comparison



DESIGN PROPERTIES



Design Properties (100% Load Duration)

| Depth | TJI® | Basic Properties | | | | Reaction Properties | | | | | |
|---------|------|-----------------------|--|---|------------------------------|-------------------------|---------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| | | Joist Weight (lbs/ft) | Maximum Resistive Moment ⁽¹⁾ (ft-lbs) | Joist Only EI x 10 ⁶ (in. ² -lbs) | Maximum Vertical Shear (lbs) | 3/4" End Reaction (lbs) | 3 1/2" End Reaction (lbs) | 3 1/2" Intermediate Reaction (lbs) | | 5 1/4" Intermediate Reaction (lbs) | |
| | | | | | | | | No Web Stiffeners | With Web Stiffeners ⁽²⁾ | No Web Stiffeners | With Web Stiffeners ⁽²⁾ |
| 9 1/2" | 110 | 2.3 | 2,500 | 157 | 1,220 | 910 | 1,220 | 1,935 | N.A. | 2,350 | N.A. |
| | 210 | 2.6 | 3,000 | 186 | 1,330 | 1,005 | 1,330 | 2,145 | N.A. | 2,565 | N.A. |
| | 230 | 2.7 | 3,330 | 206 | 1,330 | 1,060 | 1,330 | 2,410 | N.A. | 2,790 | N.A. |
| 11 1/2" | 110 | 2.5 | 3,160 | 267 | 1,560 | 910 | 1,375 | 1,935 | 2,295 | 2,350 | 2,705 |
| | 210 | 2.8 | 3,795 | 315 | 1,655 | 1,005 | 1,460 | 2,145 | 2,505 | 2,565 | 2,925 |
| | 230 | 3.0 | 4,215 | 347 | 1,655 | 1,060 | 1,485 | 2,410 | 2,765 | 2,790 | 3,150 |
| | 360 | 3.0 | 6,180 | 419 | 1,705 | 1,080 | 1,505 | 2,460 | 2,815 | 3,000 | 3,360 |
| 14" | 560 | 4.0 | 9,500 | 636 | 2,050 | 1,265 | 1,725 | 3,000 | 3,475 | 3,455 | 3,930 |
| | 110 | 2.8 | 3,740 | 392 | 1,860 | 910 | 1,375 | 1,935 | 2,295 | 2,350 | 2,705 |
| | 210 | 3.1 | 4,490 | 462 | 1,945 | 1,005 | 1,460 | 2,145 | 2,505 | 2,565 | 2,925 |
| | 230 | 3.3 | 4,990 | 509 | 1,945 | 1,060 | 1,485 | 2,410 | 2,765 | 2,790 | 3,150 |
| 16" | 360 | 3.3 | 7,335 | 612 | 1,955 | 1,080 | 1,505 | 2,460 | 2,815 | 3,000 | 3,360 |
| | 560 | 4.2 | 11,275 | 926 | 2,390 | 1,265 | 1,725 | 3,000 | 3,475 | 3,455 | 3,930 |
| | 210 | 3.3 | 5,140 | 629 | 2,190 | 1,005 | 1,460 | 2,145 | 2,505 | 2,565 | 2,925 |
| | 230 | 3.5 | 5,710 | 691 | 2,190 | 1,060 | 1,485 | 2,410 | 2,765 | 2,790 | 3,150 |
| 16" | 360 | 3.5 | 8,405 | 830 | 2,190 | 1,080 | 1,505 | 2,460 | 2,815 | 3,000 | 3,360 |
| | 560 | 4.5 | 12,925 | 1,252 | 2,710 | 1,265 | 1,725 | 3,000 | 3,475 | 3,455 | 3,930 |

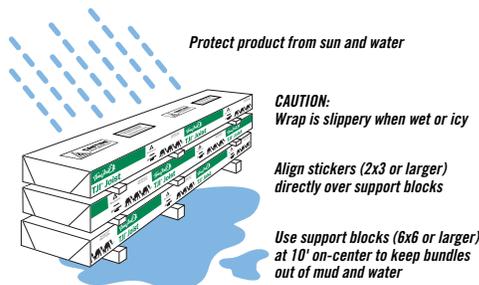
(1) Caution: Do not increase joist moment design properties by a repetitive member use factor.
 (2) See detail W on page 6 for web stiffener requirements and nailing information.

General Notes

- Design reaction includes all loads on the joist. Design shear is computed at the inside face of supports and includes all loads on the span(s). Allowable shear may sometimes be increased at interior supports in accordance with ICC ES ESR-1153, and these increases are reflected in span tables.
 - The following formulas approximate the uniform load deflection of Δ (inches):
 - For TJI® 110, 210, 230, and 360 Joists: $\Delta = \frac{22.5 wL^4}{EI} + \frac{2.67 wL^2}{d \times 10^5}$
 - For TJI® 560 Joists: $\Delta = \frac{22.5 wL^4}{EI} + \frac{2.29 wL^2}{d \times 10^5}$
- w = uniform load in pounds per linear foot
 L = span in feet
 d = out-to-out depth of the joist in inches
 EI = value from table above

PRODUCT STORAGE

TJI® joists are intended for dry-use applications



FLOOR SPAN TABLES AND MATERIAL WEIGHTS

L/480 Live Load Deflection

| Depth | TJI® | 40 PSF Live Load / 10 PSF Dead Load | | | | 40 PSF Live Load / 20 PSF Dead Load | | | |
|-------|------|-------------------------------------|----------|-----------------------|------------------------|-------------------------------------|-----------------------|-----------------------|------------------------|
| | | 12" o.c. | 16" o.c. | 19.2" o.c. | 24" o.c. | 12" o.c. | 16" o.c. | 19.2" o.c. | 24" o.c. |
| 9½" | 110 | 16'-11" | 15'-6" | 14'-7" | 13'-7" | 16'-11" | 15'-6" | 14'-3" | 12'-9" |
| | 210 | 17'-9" | 16'-3" | 15'-4" | 14'-3" | 17'-9" | 16'-3" | 15'-4" | 14'-0" |
| | 230 | 18'-3" | 16'-8" | 15'-9" | 14'-8" | 18'-3" | 16'-8" | 15'-9" | 14'-8" |
| 11¾" | 110 | 20'-2" | 18'-5" | 17'-4" | 15'-9" ⁽¹⁾ | 20'-2" | 17'-8" | 16'-1" ⁽¹⁾ | 14'-4" ⁽¹⁾ |
| | 210 | 21'-1" | 19'-3" | 18'-2" | 16'-11" | 21'-1" | 19'-3" | 17'-8" | 15'-9" ⁽¹⁾ |
| | 230 | 21'-8" | 19'-10" | 18'-8" | 17'-5" | 21'-8" | 19'-10" | 18'-7" | 16'-7" ⁽¹⁾ |
| | 360 | 22'-11" | 20'-11" | 19'-8" | 18'-4" | 22'-11" | 20'-11" | 19'-8" | 17'-10" ⁽¹⁾ |
| 14" | 110 | 22'-10" | 20'-11" | 19'-2" | 17'-2" ⁽¹⁾ | 22'-2" | 19'-2" | 17'-6" ⁽¹⁾ | 15'-0" ⁽¹⁾ |
| | 210 | 23'-11" | 21'-10" | 20'-8" | 18'-10" ⁽¹⁾ | 23'-11" | 21'-1" | 19'-2" ⁽¹⁾ | 16'-7" ⁽¹⁾ |
| | 230 | 24'-8" | 22'-6" | 21'-2" | 19'-9" ⁽¹⁾ | 24'-8" | 22'-2" | 20'-3" ⁽¹⁾ | 17'-6" ⁽¹⁾ |
| | 360 | 26'-0" | 23'-8" | 22'-4" | 20'-9" ⁽¹⁾ | 26'-0" | 23'-8" | 22'-4" ⁽¹⁾ | 17'-10" ⁽¹⁾ |
| 16" | 110 | 29'-6" | 26'-10" | 25'-4" | 23'-6" | 29'-6" | 26'-10" | 25'-4" ⁽¹⁾ | 20'-11" ⁽¹⁾ |
| | 210 | 26'-6" | 24'-3" | 22'-6" ⁽¹⁾ | 19'-11" ⁽¹⁾ | 26'-0" | 22'-6" ⁽¹⁾ | 20'-7" ⁽¹⁾ | 16'-7" ⁽¹⁾ |
| | 230 | 27'-3" | 24'-10" | 23'-6" | 21'-1" ⁽¹⁾ | 27'-3" | 23'-9" | 21'-8" ⁽¹⁾ | 17'-6" ⁽¹⁾ |
| | 360 | 28'-9" | 26'-3" | 24'-8" ⁽¹⁾ | 21'-5" ⁽¹⁾ | 28'-9" | 26'-3" ⁽¹⁾ | 22'-4" ⁽¹⁾ | 17'-10" ⁽¹⁾ |
| | 560 | 32'-8" | 29'-8" | 28'-0" | 25'-2" ⁽¹⁾ | 32'-8" | 29'-8" | 26'-3" ⁽¹⁾ | 20'-11" ⁽¹⁾ |

L/360 Live Load Deflection (Minimum Criteria per Code)

| Depth | TJI® | 40 PSF Live Load / 10 PSF Dead Load | | | | 40 PSF Live Load / 20 PSF Dead Load | | | |
|-------|------|-------------------------------------|----------|------------------------|------------------------|-------------------------------------|------------------------------|------------------------------|------------------------|
| | | 12" o.c. | 16" o.c. | 19.2" o.c. | 24" o.c. | 12" o.c. | 16" o.c. | 19.2" o.c. | 24" o.c. |
| 9½" | 110 | 18'-9" | 17'-2" | 15'-8" | 14'-0" | 18'-1" | 15'-8" | 14'-3" | 12'-9" |
| | 210 | 19'-8" | 18'-0" | 17'-0" | 15'-4" | 19'-8" | 17'-2" | 15'-8" | 14'-0" |
| | 230 | 20'-3" | 18'-6" | 17'-5" | 16'-2" | 20'-3" | 18'-1" | 16'-6" | 14'-9" |
| 11¾" | 110 | 22'-3" | 19'-4" | 17'-8" | 15'-9" ⁽¹⁾ | 20'-5" | 17'-8" | 16'-1" ⁽¹⁾ | 14'-4" ⁽¹⁾ |
| | 210 | 23'-4" | 21'-2" | 19'-4" | 17'-3" ⁽¹⁾ | 22'-4" | 19'-4" | 17'-8" | 15'-9" ⁽¹⁾ |
| | 230 | 24'-0" | 21'-11" | 20'-5" | 18'-3" | 23'-7" | 20'-5" | 18'-7" | 16'-7" ⁽¹⁾ |
| | 360 | 25'-4" | 23'-2" | 21'-10" | 20'-4" ⁽¹⁾ | 25'-4" | 23'-2" | 21'-10"⁽¹⁾ | 17'-10" ⁽¹⁾ |
| 14" | 110 | 28'-10" | 26'-3" | 24'-9" | 23'-0" | 28'-10" | 26'-3" | 24'-9" | 20'-11" ⁽¹⁾ |
| | 210 | 24'-8" | 21'-0" | 19'-2" | 17'-2" ⁽¹⁾ | 22'-2" | 19'-2" | 17'-6" ⁽¹⁾ | 15'-0" ⁽¹⁾ |
| | 230 | 26'-6" | 23'-1" | 21'-1" | 18'-10" ⁽¹⁾ | 24'-4" | 21'-1" | 19'-2" ⁽¹⁾ | 16'-7" ⁽¹⁾ |
| | 360 | 27'-3" | 24'-4" | 22'-2" | 19'-10" ⁽¹⁾ | 25'-8" | 22'-2" | 20'-3" ⁽¹⁾ | 17'-6" ⁽¹⁾ |
| 16" | 110 | 28'-9" | 26'-3" | 24'-9" ⁽¹⁾ | 21'-5" ⁽¹⁾ | 28'-9" | 26'-3"⁽¹⁾ | 22'-4" ⁽¹⁾ | 17'-10" ⁽¹⁾ |
| | 210 | 32'-8" | 29'-9" | 28'-0" | 25'-2" ⁽¹⁾ | 32'-8" | 29'-9" | 26'-3"⁽¹⁾ | 20'-11" ⁽¹⁾ |
| | 230 | 28'-6" | 24'-8" | 22'-6" ⁽¹⁾ | 19'-11" ⁽¹⁾ | 26'-0" | 22'-6" ⁽¹⁾ | 20'-7" ⁽¹⁾ | 16'-7" ⁽¹⁾ |
| | 360 | 30'-1" | 26'-0" | 23'-9" | 21'-1" ⁽¹⁾ | 27'-5" | 23'-9" | 21'-8" ⁽¹⁾ | 17'-6" ⁽¹⁾ |
| | 560 | 31'-10" | 29'-0" | 26'-10" ⁽¹⁾ | 21'-5" ⁽¹⁾ | 31'-10" | 26'-10"⁽¹⁾ | 22'-4" ⁽¹⁾ | 17'-10" ⁽¹⁾ |
| | 560 | 36'-1" | 32'-11" | 31'-0" ⁽¹⁾ | 25'-2" ⁽¹⁾ | 36'-1" | 31'-6"⁽¹⁾ | 26'-3" ⁽¹⁾ | 20'-11" ⁽¹⁾ |

(1) Web stiffeners are required at intermediate supports of continuous-span joists when the intermediate bearing length is *less* than 5¼" and the span on either side of the intermediate bearing is greater than the following spans:

| TJI® | 40 PSF Live Load / 10 PSF Dead Load | | | | 40 PSF Live Load / 20 PSF Dead Load | | | |
|------|-------------------------------------|----------|------------|----------|-------------------------------------|----------|------------|----------|
| | 12" o.c. | 16" o.c. | 19.2" o.c. | 24" o.c. | 12" o.c. | 16" o.c. | 19.2" o.c. | 24" o.c. |
| 110 | Not Req. | Not Req. | Not Req. | 15'-4" | Not Req. | Not Req. | 16'-0" | 12'-9" |
| 210 | | | 21'-4" | 17'-0" | | 21'-4" | 17'-9" | 14'-2" |
| 230 | | | Not Req. | 19'-2" | | Not Req. | 19'-11" | 15'-11" |
| 360 | | | 24'-5" | 19'-6" | | 24'-5" | 20'-4" | 16'-3" |
| 560 | 29'-10" | 23'-10" | 29'-10" | 23'-10" | 29'-10" | 24'-10" | 19'-10" | |

• Long-term deflection under dead load, which includes the effect of creep, has not been considered. ***Bold italic*** spans reflect initial dead load deflection exceeding 0.33".

How to Use These Tables

- Determine the appropriate live load deflection criteria.
- Identify the live and dead load condition.
- Select on-center spacing.
- Scan down the column until you meet or exceed the span of your application.
- Select TJI® joist and depth.

Live load deflection is not the only factor that affects how a floor will perform. To more accurately predict floor performance, use our TJI-Pro™ Ratings.

General Notes

- Tables are based on:
 - Uniform loads.
 - More restrictive of simple or continuous span.
 - Clear distance between supports
 - Minimum bearing length of 1¾" end (no web stiffeners) and 3½" intermediate.
- Assumed composite action with a single layer of 24" on-center span-rated, glue-nailed floor panels for deflection only. **Spans shall be reduced 6" when floor panels are nailed only.**
- Spans generated from Weyerhaeuser software may exceed the spans shown in these tables because software reflects actual design conditions.
- For multi-family applications and other loading conditions not shown, refer to Weyerhaeuser software or to the load table on page 5.

Material Weights

(Include TJI® weights in dead load calculations—see **Design Properties** table on page 3 for joist weights)

Floor Panels

Southern Pine

| | |
|-------------|---------|
| ½" plywood | 1.7 psf |
| ⅝" plywood | 2.0 psf |
| ¾" plywood | 2.5 psf |
| 1½" plywood | 3.8 psf |
| ½" OSB | 1.8 psf |
| ⅝" OSB | 2.2 psf |
| ¾" OSB | 2.7 psf |
| ⅞" OSB | 3.1 psf |
| 1½" OSB | 4.1 psf |

Based on: Southern pine – 40 pcf for plywood, 44 pcf for OSB

Roofing

| | |
|--|-----------------|
| Asphalt shingles | 2.5 psf |
| Wood shingles | 2.0 psf |
| Clay tile | 9.0 to 14.0 psf |
| Slate (¾" thick) | 15.0 psf |
| Roll or Batt Insulation (1" thick): | |
| Rock wool | 0.2 psf |
| Glass wool | 0.1 psf |

Floor Finishes

| | |
|---------------------------|----------|
| Hardwood (nominal 1") | 4.0 psf |
| Sheet vinyl | 0.5 psf |
| Carpet and pad | 1.0 psf |
| ¾" ceramic or quarry tile | 10.0 psf |

Concrete:

| | |
|----------------------|-----------------|
| Regular (1") | 12.0 psf |
| Lightweight (1") | 8.0 to 10.0 psf |
| Gypsum concrete (¾") | 6.5 psf |

Ceilings

| | |
|-----------------------|---------|
| Acoustical fiber tile | 1.0 psf |
| ½" gypsum board | 2.2 psf |
| ⅝" gypsum board | 2.8 psf |
| Plaster (1" thick) | 8.0 psf |

FLOOR LOAD TABLE

Floor—100% (PLF)

| Depth | TJI® | Joist Clear Span | | | | | | | | | | | | | | | | | |
|-------|------|------------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|
| | | 8' | | 10' | | 12' | | 14' | | 16' | | 18' | | 20' | | 22' | | 24' | |
| | | Live Load L/480 | Total Load | Live Load L/480 | Total Load | Live Load L/480 | Total Load | Live Load L/480 | Total Load | Live Load L/480 | Total Load | Live Load L/480 | Total Load | Live Load L/480 | Total Load | Live Load L/480 | Total Load | Live Load L/480 | Total Load |
| 9½" | 110 | * | 190 | 140 | 152 | 85 | 127 | 56 | 99 | 38 | 76 | | | | | | | | |
| | 210 | * | 210 | 161 | 169 | 99 | 141 | 65 | 119 | 45 | 90 | | | | | | | | |
| | 230 | * | 236 | 175 | 190 | 108 | 158 | 71 | 133 | 49 | 99 | | | | | | | | |
| 11½" | 110 | * | 190 | * | 152 | * | 127 | 92 | 109 | 63 | 95 | 45 | 76 | | | | | | |
| | 210 | * | 210 | * | 169 | * | 141 | 106 | 121 | 74 | 106 | 53 | 92 | | | | | | |
| | 230 | * | 236 | * | 190 | * | 158 | 116 | 136 | 80 | 119 | 58 | 102 | 43 | 83 | | | | |
| | 360 | * | 241 | * | 193 | * | 162 | 136 | 139 | 95 | 121 | 69 | 108 | 51 | 97 | 39 | 78 | | |
| 14" | 560 | * | 294 | * | 236 | * | 197 | * | 169 | 138 | 148 | 101 | 132 | 76 | 119 | 58 | 108 | 45 | 91 |
| | 110 | * | 190 | * | 152 | * | 127 | * | 109 | 91 | 95 | 66 | 85 | | | | | | |
| | 210 | * | 210 | * | 169 | * | 141 | * | 121 | * | 106 | 76 | 94 | 57 | 85 | | | | |
| | 230 | * | 236 | * | 190 | * | 158 | * | 136 | 115 | 119 | 83 | 106 | 62 | 95 | 47 | 81 | | |
| | 360 | * | 241 | * | 193 | * | 162 | * | 139 | * | 121 | 98 | 108 | 73 | 97 | 56 | 88 | 44 | 81 |
| 16" | 560 | * | 294 | * | 236 | * | 197 | * | 169 | * | 148 | * | 132 | 107 | 119 | 83 | 108 | 65 | 99 |
| | 210 | * | 210 | * | 169 | * | 141 | * | 121 | * | 106 | * | 94 | 76 | 85 | 58 | 77 | | |
| | 230 | * | 236 | * | 190 | * | 158 | * | 136 | * | 119 | * | 106 | 83 | 95 | 64 | 87 | 50 | 78 |
| | 360 | * | 241 | * | 193 | * | 162 | * | 139 | * | 121 | * | 108 | * | 97 | 75 | 88 | 59 | 81 |
| | 560 | * | 294 | * | 236 | * | 197 | * | 169 | * | 148 | * | 132 | * | 119 | * | 108 | 86 | 99 |

* Indicates that Total Load value controls.

How to Use This Table

1. Calculate actual total and live load in pounds per linear foot (plf).
2. Select appropriate Joist Clear Span.
3. Scan down the column to find a TJI® joist that meets or exceeds actual total and live loads.

General Notes

- Table is based on:
 - Minimum bearing length of 1¼" end and 3½" intermediate, without web stiffeners
 - Uniform loads.
 - More restrictive of simple or continuous span
 - No composite action provided by sheathing.
- Total Load values are limited to deflection of L/240.
- Live Load is based on joist deflection of L/480.
- If a live load deflection limit of L/360 is desired, multiply value in Live Load column by 1.33. The resulting live load must not exceed the Total Load shown.
- Table does not account for concentrated loads. Use Weyerhaeuser software when this condition applies.

PSF to PLF Conversions

| O.C. Spacing | Load in Pounds Per Square Foot (PSF) | | | | | | | | |
|--------------|--------------------------------------|----|----|----|----|----|-----|-----|-----|
| | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 |
| 12" | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 |
| 16" | 27 | 34 | 40 | 47 | 54 | 60 | 67 | 74 | 80 |
| 19.2" | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 |
| 24" | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 |



WARNING

Joists are unstable until braced laterally

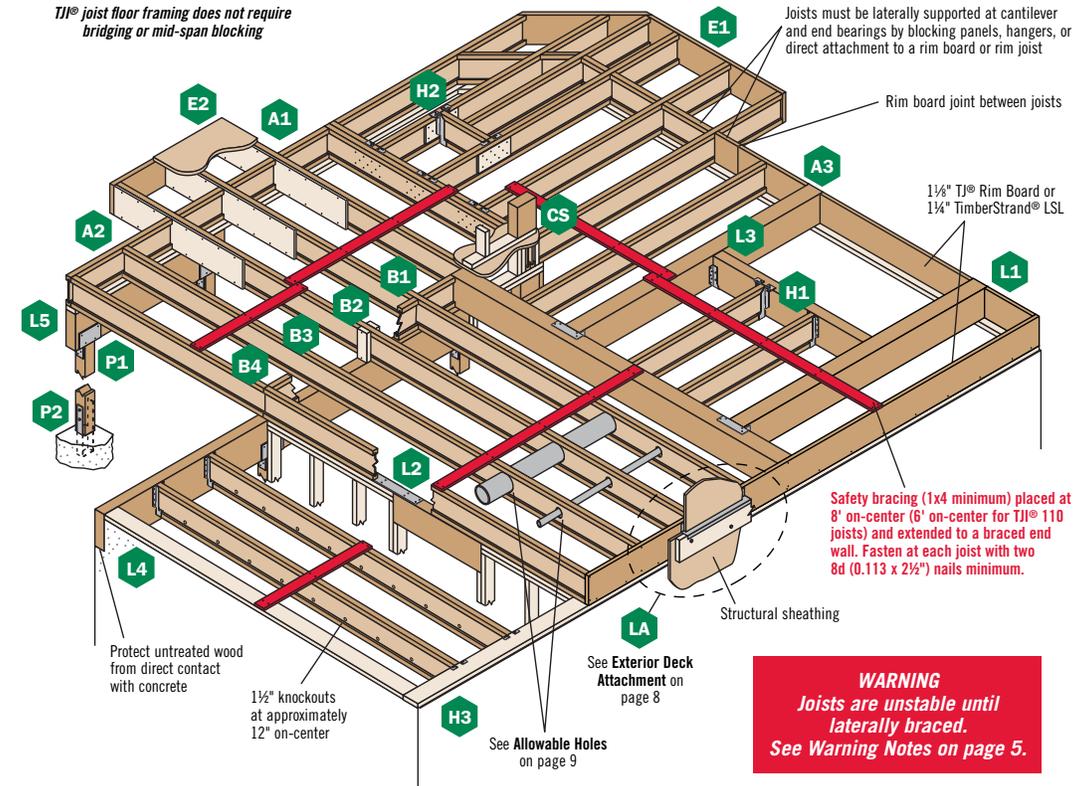
Bracing Includes:

- Blocking
- Hangers
- Rim Board
- Sheathing
- Rim Joist
- Strut Lines

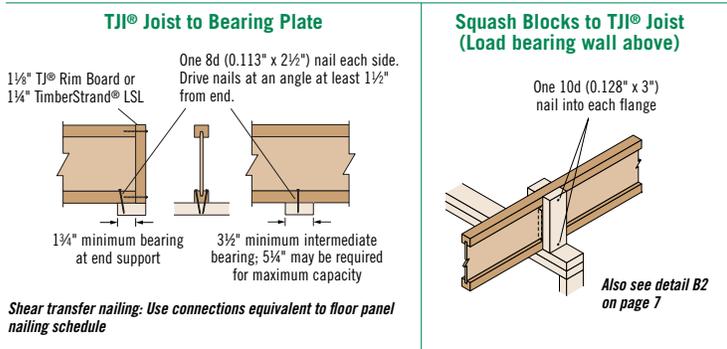
WARNING NOTES: *Lack of proper bracing during construction can result in serious accidents. Observe the following guidelines:*

1. All blocking, hangers, rim boards, and rim joists at the end supports of the TJI® joists must be completely installed and properly nailed.
2. Lateral strength, like a braced end wall or an existing deck, must be established at the ends of the bay. This can also be accomplished by a temporary or permanent deck (sheathing) fastened to the first 4 feet of joists at the end of the bay.
3. Safety bracing of 1x4 (minimum) must be nailed to a braced end wall or sheathed area (as in note 2) and to each joist. Without this bracing, buckling sideways or rollover is highly probable under light construction loads—such as a worker or one layer of unnailed sheathing.
4. Sheathing must be completely attached to each TJI® joist before additional loads can be placed on the system.
5. Ends of cantilevers require safety bracing on both the top and bottom flanges.
6. The flanges must remain straight within a tolerance of ½" from true alignment.

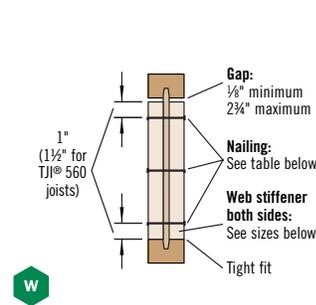
TJI® JOIST FLOOR FRAMING



TJI® Joist Nailing Requirements at Bearing



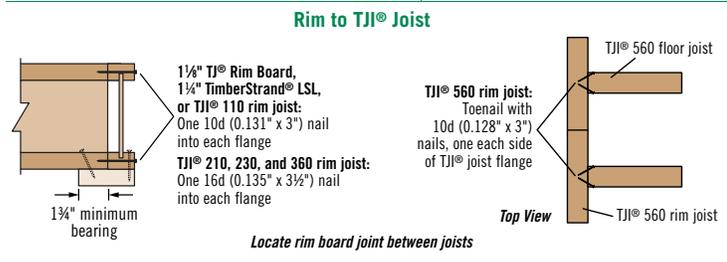
Web Stiffener Attachment



Web Stiffener Requirements

| TJI® | Min. Web Stiffener Size | Nailing Requirements | |
|----------|-------------------------------|----------------------|----------|
| | | Type | Quantity |
| 110 | 5/8" x 2 3/16" ⁽¹⁾ | 8d (0.113" x 2½") | 3 |
| 210 | 3/4" x 2 3/16" ⁽¹⁾ | | |
| 230, 360 | 7/8" x 2 3/16" ⁽¹⁾ | | |
| 560 | 2x4 ⁽²⁾ | 16d (0.135" x 3½") | 3 |

(1) PS1 or PS2 sheathing, face grain vertical
(2) Construction grade or better



FLOOR DETAILS

Load bearing or braced/shear wall above (must stack over wall below)

Blocking panel: 1½" TJI® Rim Board, 1¾" TimberStrand® LSL, or TJI® joist

Web stiffeners required on both sides at B1W ONLY. See footnote 1 under span tables.

B1 B1W IRC 502.7 requires lateral restraint (blocking) at all intermediate supports in Seismic Design Categories D_s, D_i, and D₂ to strengthen the floor diaphragm

Load bearing wall above (must stack over wall below)

2x4 minimum squash blocks

Web stiffeners required on both sides at B2W ONLY. See footnote 1 under span tables.

B2 B2W Blocking panels may be required with braced/shear walls above or below—see detail B1

No load bearing wall above

Web stiffeners required on both sides at B3W ONLY. See footnote 1 under span tables.

B3 B3W Blocking panels may be required with braced/shear walls above or below—see detail B1

H1

Top mount hanger
Face mount hanger

Web stiffeners required if sides of hanger do not laterally support at least ¾" of TJI® joist top flange

H3

Flush bearing plate required. Maximum ¼" overhang permitted at beam.

CS

Load from above

2x4 minimum squash blocks; match bearing area of column above

Use 2x4 minimum squash blocks to transfer load around TJI® joist

Backer block: Install tight to top flange (tight to bottom flange with face mount hangers). Attach with ten 10d (0.128" x 3") nails, clinched when possible. Use 15 nails in multi-family applications.

Backer block both sides of web with single TJI® joist

Filler block: Nail with ten 10d (0.128" x 3") nails, clinched. Use ten 16d (0.135" x 3½") nails from each side with TJI® 560 joists. Use 15 nails in multi-family applications.

H2 With top mount hangers, backer block required only for downward loads exceeding 250 lbs or for uplift conditions

Filler and Backer Block Sizes

| TJI® | 110 | | 210 | | 230 or 360 | | 560 | |
|---|-------------------|--------------------|----------------------------------|-----------------------------------|----------------------------------|-----------------------------------|----------------|------------|
| Depth | 9½" or 11½" | 14" | 9½" or 11½" | 14" or 16" | 9½" or 11½" | 14" or 16" | 11½" | 14" or 16" |
| Filler Block⁽¹⁾ (Detail H2) | 2x6 | 2x8 | 2x6 + ¾" sheathing | 2x8 + ¾" sheathing | 2x6 + ½" sheathing | 2x8 + ½" sheathing | Two 2x6 | Two 2x8 |
| Cantilever Filler (Detail E4) | 2x6 4'-0" long | 2x10 6'-0" long | 2x6 + ¾" sheathing 4'-0" long | 2x10 + ¾" sheathing 6'-0" long | 2x6 + ½" sheathing 4'-0" long | 2x10 + ½" sheathing 6'-0" long | Not applicable | |
| Backer Block⁽¹⁾ (Detail F1 or H2) | 5/8" or ¾" | | ¾" or 7/8" | | 7/8" or 1" net | | 2x6 | 2x8 |

(1) If necessary, increase filler and backer block height for face mount hangers and maintain 1/8" gap at top of joist. See detail W. Filler and backer block dimensions should accommodate required nailing without splitting. The suggested minimum length is 24" for filler and 12" for backer blocks.

Fastener Spacing and Diaphragm Design Information

| TJI® | Closest On-Center Spacing per Row ⁽¹⁾⁽²⁾ | | | Equivalent Nominal Framing Width | Diaphragm Design Information | | | |
|-------------|---|---|--------------------|----------------------------------|--|-----|-----|--------------------|
| | 8d (0.113" x 2½"), 8d (0.131" x 2½"), 10d (0.128" x 3"), 12d (0.128" x 3¼") | 10d (0.148" x 3"), 12d (0.148" x 3¼"), 16d (0.135" x 3½") | 16d (0.162" x 3½") | | Maximum Allowable Seismic Design Capacities ⁽⁴⁾ | | | |
| | Blocked | Unblocked Case 1 | Unblocked Case 3 | Unblocked Cases 2, 4, 5, 6 | | | | |
| 110 and 210 | 4" | 4" ⁽³⁾ | 6" | 2" | 425 | 285 | 215 | 185 ⁽⁵⁾ |
| 230 | 4" | 4" ⁽³⁾ | 6" | 3" | 480 | 320 | 240 | 205 ⁽⁵⁾ |
| 360 and 560 | 3" | 4" ⁽³⁾ | 6" | 3" | 720 | 320 | 240 | 240 |

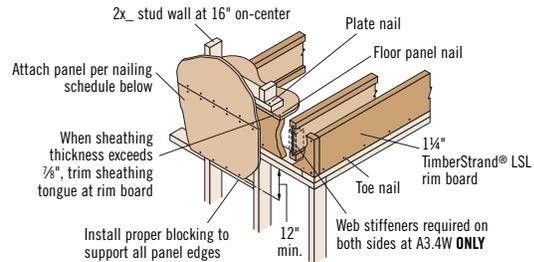
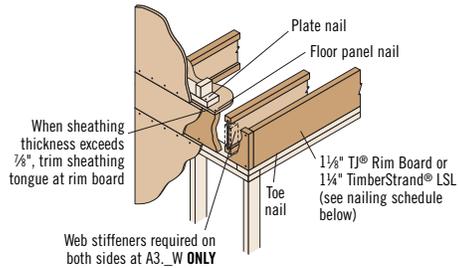
- Stagger nails when using 4" on-center spacing and maintain ¾" joist and panel edge distance. One row of fasteners is permitted (two at abutting panel edges) for diaphragms. Fastener spacing for TJI® joists in diaphragm applications cannot be less than shown in table. When fastener spacing for blocking is less than above, rectangular blocking must be used in lieu of TJI® joists.
- For non-diaphragm applications, multiple rows of fasteners are permitted if the rows are offset at least ½" and staggered.
- Can be reduced to 3" on-center for light gauge steel straps with 10d (0.148" x 1½") nails.
- The maximum allowable seismic design capacities may be increased by a factor of 1.4 for wind design applications.
- The design capacity of an unblocked diaphragm framed with TJI® 110, 210 or 230 joists may be multiplied by a factor of 1.18 if a solvent-based subfloor adhesive that meets ASTM D3498 (AFG-01) performance standards is used in combination with mechanical fasteners for sheathing attachment. See page 12 for Weyerhaeuser's adhesive recommendations.

- Maximum spacing of nails is 18" on-center.
- 14 gauge staples may be substituted for 8d (0.113" x 2½") nails if minimum penetration of 1" is achieved.
- Table also applies to the attachment of TJI® rim joists and blocking panels to the wall plate.

Also see nailing requirements on page 6

RIM BOARD SELECTION AND INSTALLATION

Rim board is often an important structural link in the ability of a home to resist lateral seismic and wind loads. It also transfers vertical load around the TJI® joists. Rim board detail A3 (shown below) satisfies conventional construction requirements. But if your project requires a designed solution, see Weyerhaeuser's *Rim Board Specifier's Guide*, TJ-8000, which features additional information on rim board selection and installation.



Rim Board Installation

| Specifications | A3 Conventional Construction, Code Minimum | A3.1, A3.2, A3.3, A3.4 Designed Solution |
|---------------------------------------|---|---|
| Rim Board Thickness | 1 1/8" TJI® Rim Board or 1 1/4" TimberStrand® LSL | |
| Plate Nail—16d (0.135" x 3 1/2") | 16" o.c. | See Weyerhaeuser's Rim Board Specifier's Guide (Reorder #TJ-8000) |
| Floor Panel Nail—8d (0.131" x 2 1/2") | 6" o.c. | |
| Toe Nail—10d (0.131" x 3") | 6" o.c. | |
| Wall Sheathing | Per code | |

Nails Installed on the Narrow Face

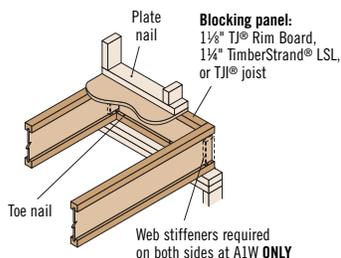
| Nail Size | Closest On-Center Spacing per Row | |
|--|-----------------------------------|--------------------------|
| | 1 1/8" TJI® Rim Board | 1 1/4" TimberStrand® LSL |
| 8d (0.113" or 0.131" x 2 1/2"), 10d (0.128" or 0.148" x 3"), 12d (0.128" or 0.148" x 3 1/4") | 6" | 4" |
| 16d (0.162" x 3 1/2") | 16" ⁽¹⁾ | 6" ⁽²⁾ |

- (1) Can be reduced to 5" on-center if nail penetration into the narrow edge is no more than 1 1/8" (to avoid splitting).
- (2) Can be reduced to 4" on-center if nail penetration into the narrow edge is no more than 1 3/8" (to avoid splitting).
- If more than one row of nails is used, the rows must be offset at least 1/2" and staggered.
- 14 gauge staples may be substituted for 8d (0.113" x 2 1/2") nails if minimum penetration of 1" is achieved.

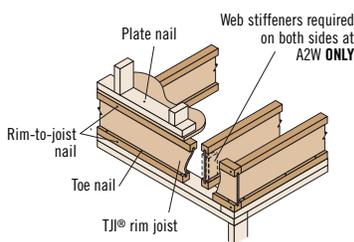
Vertical Load⁽¹⁾ Transfer at Bearing

| Rim Material | Uniform Load (PLF) | | | Concentrated Load (lbs) |
|--------------------------------------|----------------------|---------|-------|-------------------------|
| | 9 1/2" | 11 1/8" | 14" | 16" |
| TJI® rim joist or blocking | | 2,100 | | |
| 1 1/8" TJI® Rim Board or blocking | 4860 ⁽²⁾ | 4,570 | 4,000 | 3,400 |
| 1 1/4" TimberStrand® LSL or blocking | 5,400 ⁽²⁾ | | 5,000 | 3,760 |

- (1) Values may not be increased for duration of load.
- (2) Capacity is limited to a maximum of 360 psi per ASTM D7672.



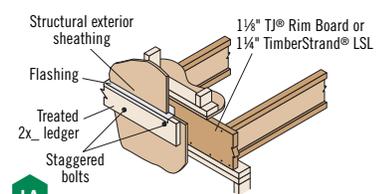
Attach blocking per A3 in Rim Board Installation table above



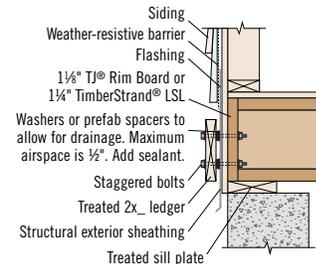
Must have 1 3/4" minimum joist bearing at ends. Attach rim joist per A3 in Rim Board Installation table above.

Also see nailing requirements on page 6

Exterior Deck Attachment



Shimmed Deck Attachment



Ledger Fastener⁽¹⁾ Capacities

| Rim Board Thickness | Fastener Allowable Load ⁽²⁾ (lbs/bolt) | | |
|---------------------|---|-------------------|----------------------------------|
| | 1/2" Lag Bolt | 1/2" Through Bolt | 1/2" Through Bolt with Air Space |
| 1 1/8" | 480 | 695 | 615 ⁽³⁾ |
| 1 1/4" | 610 | 725 | |

- (1) Corrosion-resistant fasteners required in wet-service applications.
- (2) Allowable load determined in accordance with ASTM D7672.
- (3) Maximum 1/2" shimmed air space.

General Notes

- Maintain 2" distance (minimum) from edge of ledger to edge of fastener. Stagger bolts.
- Local building codes may require through bolts with washers.
- Lateral restraining connections may be required. Refer to 2012 IRC R507.2.3 and the WJMA deck connection details.

ALLOWABLE HOLES

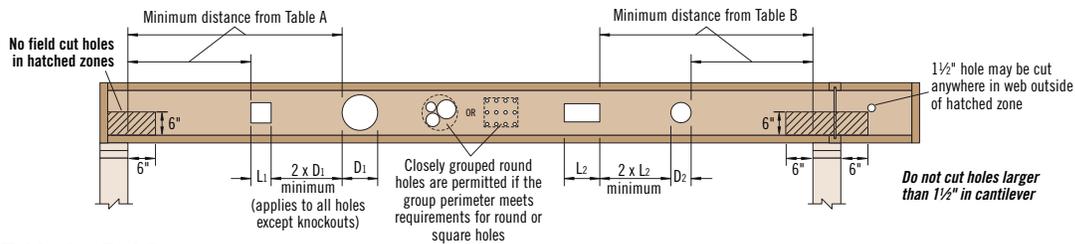


Table A—End Support
Minimum distance from edge of hole to inside face of nearest end support

| Depth | TJI® | Round Hole Size | | | | | | | | | | Square or Rectangular Hole Size | | | | | | | | | | | | | | | |
|---------|------|-----------------|-------|-------|-------|--------|-------|--------|-------|--------|----|---------------------------------|----|----|--------|----|--------|-----|-------|-------|-------|-------|-------|-------|--------|--------|--------|
| | | 2" | 3" | 4" | 5" | 6 1/2" | 7" | 8 1/2" | 11" | 13" | 2" | 3" | 4" | 5" | 6 1/2" | 7" | 8 1/2" | 11" | 13" | | | | | | | | |
| 9 1/2" | 110 | 1'-0" | 1'-6" | 2'-0" | 3'-0" | 5'-0" | | | | | | | | | | | | | 1'-0" | 1'-6" | 2'-6" | 3'-6" | 4'-6" | | | | |
| | 210 | 1'-0" | 1'-6" | 2'-6" | 3'-0" | 5'-6" | | | | | | | | | | | | | 1'-0" | 2'-0" | 2'-6" | 4'-0" | 5'-0" | | | | |
| | 230 | 1'-6" | 2'-0" | 2'-6" | 3'-6" | 5'-6" | | | | | | | | | | | | | 1'-0" | 2'-0" | 3'-0" | 4'-6" | 5'-0" | | | | |
| 11 1/8" | 110 | 1'-0" | 1'-0" | 1'-6" | 2'-0" | 2'-6" | 3'-0" | 5'-6" | | | | | | | | | | | 1'-0" | 1'-6" | 2'-0" | 2'-6" | 4'-6" | 5'-0" | 6'-0" | | |
| | 210 | 1'-0" | 1'-6" | 2'-0" | 2'-0" | 3'-0" | 3'-6" | 6'-0" | | | | | | | | | | | 1'-0" | 1'-6" | 2'-6" | 3'-0" | 5'-0" | 5'-6" | 6'-6" | | |
| | 230 | 1'-0" | 1'-6" | 2'-0" | 2'-6" | 3'-0" | 3'-6" | 6'-6" | | | | | | | | | | | 1'-0" | 2'-0" | 2'-6" | 3'-6" | 5'-6" | 5'-6" | 7'-0" | | |
| | 360 | 1'-6" | 2'-0" | 3'-0" | 3'-6" | 4'-6" | 5'-0" | 7'-0" | | | | | | | | | | | 1'-6" | 2'-6" | 3'-6" | 4'-6" | 6'-6" | 6'-6" | 7'-6" | | |
| | 560 | 1'-6" | 2'-6" | 3'-0" | 4'-0" | 5'-6" | 6'-0" | 8'-0" | | | | | | | | | | | 2'-6" | 3'-6" | 4'-6" | 5'-6" | 7'-0" | 7'-6" | 8'-0" | | |
| 14" | 110 | 1'-0" | 1'-0" | 1'-0" | 1'-6" | 2'-0" | 2'-0" | 3'-0" | 5'-6" | | | | | | | | | | 1'-0" | 1'-0" | 1'-6" | 2'-0" | 3'-6" | 4'-0" | 6'-0" | 8'-0" | |
| | 210 | 1'-0" | 1'-0" | 1'-0" | 1'-6" | 2'-0" | 2'-6" | 3'-6" | 6'-0" | | | | | | | | | | 1'-0" | 1'-0" | 2'-0" | 2'-6" | 4'-0" | 4'-6" | 6'-6" | 8'-6" | |
| | 230 | 1'-0" | 1'-0" | 1'-0" | 1'-6" | 2'-6" | 2'-6" | 4'-0" | 7'-0" | | | | | | | | | | 1'-0" | 1'-0" | 2'-0" | 3'-0" | 4'-0" | 5'-0" | 7'-0" | 9'-0" | |
| | 360 | 1'-0" | 1'-0" | 1'-6" | 2'-6" | 3'-6" | 4'-0" | 5'-6" | 8'-0" | | | | | | | | | | 1'-0" | 1'-6" | 2'-6" | 4'-0" | 6'-0" | 6'-6" | 8'-0" | 9'-6" | |
| | 560 | 1'-0" | 1'-0" | 2'-0" | 3'-0" | 4'-6" | 5'-0" | 6'-6" | 9'-0" | | | | | | | | | | 1'-6" | 3'-0" | 4'-0" | 5'-0" | 7'-0" | 7'-6" | 9'-0" | 10'-0" | |
| 16" | 210 | 1'-0" | 1'-0" | 1'-0" | 1'-0" | 1'-0" | 1'-6" | 2'-6" | 3'-6" | 6'-0" | | | | | | | | | 1'-0" | 1'-0" | 1'-0" | 2'-0" | 3'-0" | 3'-6" | 6'-6" | 8'-0" | 11'-0" |
| | 230 | 1'-0" | 1'-0" | 1'-0" | 1'-0" | 1'-6" | 1'-6" | 3'-0" | 4'-0" | 7'-0" | | | | | | | | | 1'-0" | 1'-0" | 1'-0" | 2'-0" | 3'-6" | 4'-0" | 7'-0" | 9'-0" | 11'-0" |
| | 360 | 1'-0" | 1'-0" | 1'-0" | 1'-0" | 2'-6" | 2'-6" | 4'-6" | 6'-6" | 9'-0" | | | | | | | | | 1'-0" | 1'-0" | 1'-6" | 3'-0" | 5'-0" | 5'-6" | 9'-0" | 10'-0" | 11'-6" |
| | 560 | 1'-0" | 1'-0" | 1'-0" | 1'-0" | 2'-6" | 3'-0" | 5'-0" | 7'-6" | 10'-0" | | | | | | | | | 1'-0" | 2'-0" | 3'-0" | 4'-6" | 6'-6" | 7'-0" | 10'-0" | 11'-0" | 12'-0" |

Table B—Intermediate or Cantilever Support
Minimum distance from edge of hole to inside face of nearest intermediate or cantilever support

| Depth | TJI® | Round Hole Size | | | | | | | | | | Square or Rectangular Hole Size | | | | | | | | | | | | | | | |
|---------|------|-----------------|-------|-------|-------|--------|-------|--------|--------|--------|----|---------------------------------|----|----|--------|----|--------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--|
| | | 2" | 3" | 4" | 5" | 6 1/2" | 7" | 8 1/2" | 11" | 13" | 2" | 3" | 4" | 5" | 6 1/2" | 7" | 8 1/2" | 11" | 13" | | | | | | | | |
| 9 1/2" | 110 | 2'-0" | 2'-6" | 3'-6" | 4'-6" | 7'-6" | | | | | | | | | | | | | 1'-6" | 2'-6" | 3'-6" | 5'-6" | 6'-6" | | | | |
| | 210 | 2'-0" | 2'-6" | 3'-6" | 5'-0" | 8'-0" | | | | | | | | | | | | | 2'-0" | 3'-0" | 4'-0" | 6'-6" | 7'-6" | | | | |
| | 230 | 2'-6" | 3'-0" | 4'-0" | 5'-6" | 8'-6" | | | | | | | | | | | | | 2'-0" | 3'-6" | 4'-6" | 6'-6" | 7'-6" | | | | |
| 11 1/8" | 110 | 1'-0" | 1'-0" | 1'-6" | 2'-6" | 4'-0" | | 4'-6" | 8'-6" | | | | | | | | | 1'-0" | 1'-6" | 2'-6" | 4'-0" | 7'-0" | 7'-0" | 9'-6" | | | |
| | 210 | 1'-0" | 1'-0" | 2'-0" | 3'-0" | 4'-6" | 5'-0" | 9'-0" | | | | | | | | | | 1'-0" | 2'-0" | 3'-0" | 4'-6" | 8'-0" | 8'-0" | 10'-0" | | | |
| | 230 | 1'-0" | 2'-0" | 2'-6" | 3'-6" | 5'-0" | 5'-6" | 10'-0" | | | | | | | | | | 1'-0" | 2'-6" | 3'-6" | 5'-0" | 8'-6" | 9'-0" | 10'-6" | | | |
| | 360 | 2'-0" | 3'-0" | 4'-0" | 5'-6" | 7'-0" | 7'-6" | 11'-0" | | | | | | | | | | 2'-0" | 3'-6" | 5'-0" | 7'-0" | 9'-6" | 9'-6" | 11'-0" | | | |
| | 560 | 1'-6" | 3'-0" | 4'-6" | 5'-6" | 8'-0" | 8'-6" | 12'-0" | | | | | | | | | | 3'-0" | 4'-6" | 6'-0" | 8'-0" | 10'-6" | 11'-0" | 12'-0" | | | |
| 14" | 110 | 1'-0" | 1'-0" | 1'-0" | 1'-0" | 2'-0" | 2'-6" | 4'-6" | 8'-6" | | | | | | | | | 1'-0" | 1'-0" | 1'-0" | 2'-6" | 5'-0" | 6'-0" | 9'-0" | 12'-0" | | |
| | 210 | 1'-0" | 1'-0" | 1'-0" | 1'-0" | 2'-6" | 3'-0" | 5'-6" | 9'-6" | | | | | | | | | 1'-0" | 1'-0" | 2'-0" | 3'-6" | 6'-0" | 7'-0" | 10'-0" | 13'-0" | | |
| | 230 | 1'-0" | 1'-0" | 1'-0" | 2'-0" | 3'-6" | 4'-0" | 6'-0" | 10'-6" | | | | | | | | | 1'-0" | 1'-0" | 2'-6" | 4'-0" | 6'-6" | 7'-6" | 11'-0" | 13'-6" | | |
| | 360 | 1'-0" | 1'-0" | 2'-0" | 3'-6" | 5'-6" | 6'-0" | 8'-6" | 12'-6" | | | | | | | | | 1'-0" | 2'-0" | 4'-0" | 5'-6" | 9'-0" | 10'-0" | 12'-0" | 14'-0" | | |
| | 560 | 1'-0" | 1'-0" | 1'-6" | 3'-6" | 5'-6" | 6'-6" | 9'-6" | 13'-6" | | | | | | | | | 1'-0" | 3'-0" | 5'-0" | 7'-0" | 10'-0" | 11'-0" | 13'-6" | 15'-0" | | |
| 16" | 210 | 1'-0" | 1'-0" | 1'-0" | 1'-0" | 1'-0" | 1'-0" | 3'-6" | 6'-0" | 10'-0" | | | | | | | | 1'-0" | 1'-0" | 1'-0" | 1'-6" | 4'-6" | 5'-6" | 10'-0" | 12'-6" | 16'-0" | |
| | 230 | 1'-0" | 1'-0" | 1'-0" | 1'-0" | 1'-6" | 2'-0" | 4'-0" | 6'-6" | 11'-0" | | | | | | | | 1'-0" | 1'-0" | 1'-0" | 2'-6" | 5'-0" | 6'-0" | 10'-6" | 13'-6" | 16'-6" | |
| | 360 | 1'-0" | 1'-0" | 1'-0" | 1'-0" | 3'-0" | 4'-0" | 6'-6" | 10'-0" | 13'-6" | | | | | | | | 1'-0" | 1'-0" | 2'-0" | 4'-0" | 7'-6" | 8'-6" | 13'-0" | 14'-6" | 17'-0" | |
| | 560 | 1'-0" | 1'-0" | 1'-0" | 1'-0" | 2'-6" | 3'-6" | 7'-0" | 11'-0" | 15'-0" | | | | | | | | 1'-0" | 1'-0" | 3'-6" | 5'-6" | 9'-0" | 10'-0" | 14'-6" | 16'-0" | 18'-0" | |

• Rectangular holes based on measurement of longest side.

How to Use These Tables

- Using **Table A**, **Table B**, or both if required, determine the hole shape/size and select the TJI® joist and depth.
- Scan horizontally until you intersect the correct hole size column.
- Measurement shown is minimum distance from edge of hole to support.
- Maintain the required minimum distance from the end **and** the intermediate or cantilever support.

WARNING: Drilling, sawing, sanding or machining wood products generates wood dust. The paint and/or coatings on this product may contain titanium dioxide. Wood dust and titanium dioxide are substances known to the State of California to cause cancer. For more information on Proposition 65, visit wy.com/inform.

General Notes

- Holes may be located vertically anywhere within the web. Leave 1/8" of web (minimum) at top and bottom of hole.
- Knockouts are located in web at approximately 12" on-center; they do not affect hole placement.
- For simple span (5' minimum) uniformly loaded joists meeting the requirements of this guide, one maximum size round hole may be located at the center of the joist span **provided that no other holes occur in the joist**.
- Distances are based on the maximum uniform loads shown in this guide. For other load conditions or hole configurations, use Forte® software or contact your Weyerhaeuser representative.

DO NOT
cut or notch flange.



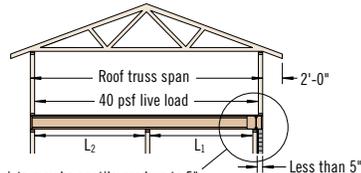
DO NOT
cut holes in cantilever reinforcement.



CANTILEVERS

Cantilevers Less than 5" (Brick Ledge)

See Section A of cantilever table on page 11

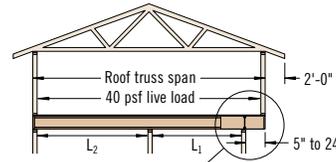


TJI® joists may be cantilevered up to 5" when supporting roof load, assuming:

- simple or continuous span
- $L_1 \leq L_2$
- minimum backspan = 2x cantilever length

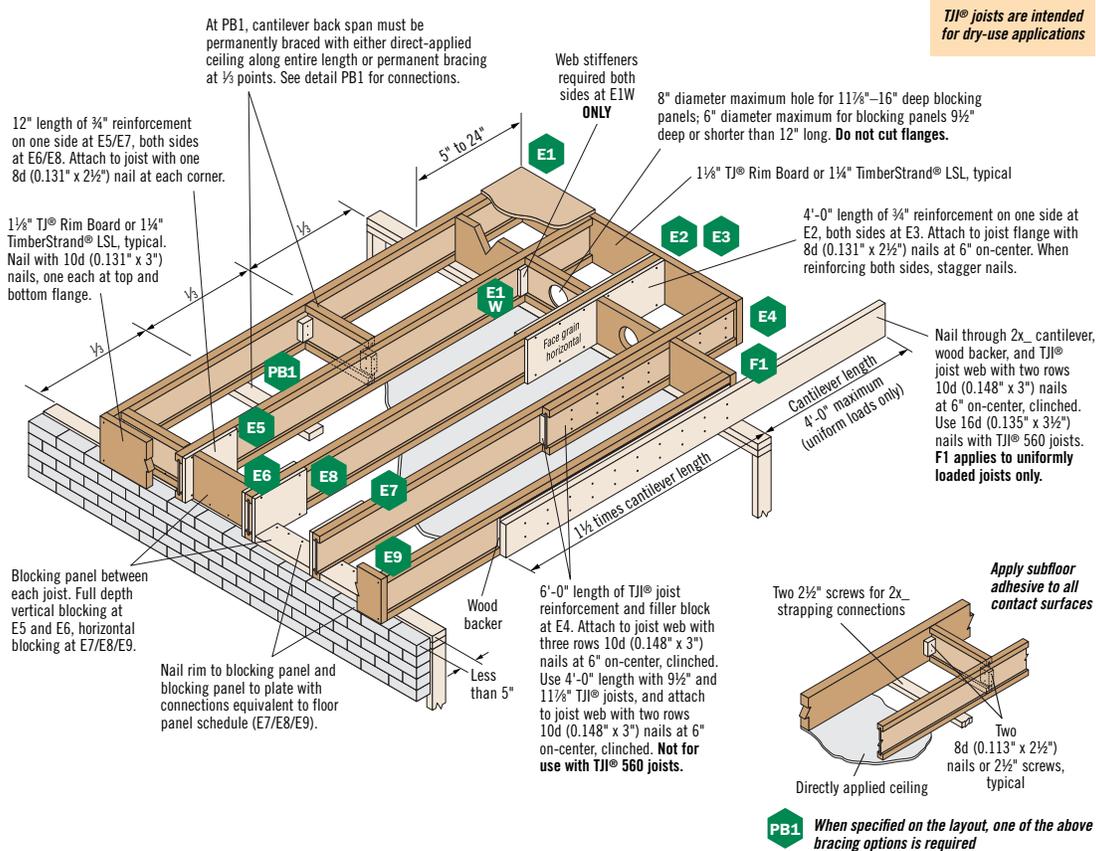
Cantilevers 5" to 24"

See Section B of cantilever table on page 11



TJI® joists may be cantilevered 5" to 24" when supporting roof load, assuming:

- simple or continuous span
- $L_1 \leq L_2$
- minimum backspan = 2x cantilever length



TJI® joists are intended for dry-use applications

These Conditions are NOT Permitted:



DO NOT use sawn lumber for rim board or blocking as it may shrink after installation. Use only engineered lumber



DO NOT bevel cut joist beyond inside face of wall.



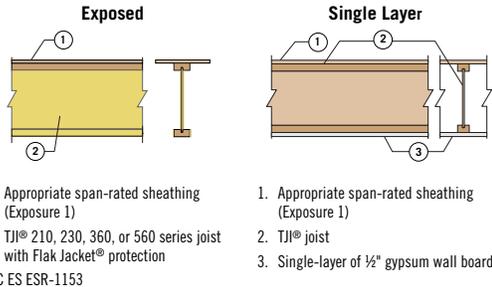
DO NOT install hanger overhanging face of plate or beam. Flush bearing plate with inside face of wall or beam.

FIRE-SAFE CONSTRUCTION

The assemblies shown below are provided to help you specify and install Trus Joist® brand products with fire safety in mind. For more information on fire assemblies and fire-safe construction, please refer to the *Weyerhaeuser Fire-Rated Assemblies and Sprinkler Systems Guide*, 1500, or visit woodbywy.com.

TJI® joists with Flak Jacket® protection meet 2012 IRC requirements for fire protection of floors and give you an effective one-hour-rated assembly for multi-family projects. This new solution helps you easily and efficiently meet code without impacting construction procedures or adding complexity to your jobs. TJI® joists with Flak Jacket® protection are available in limited markets; contact your Weyerhaeuser representative for more information.

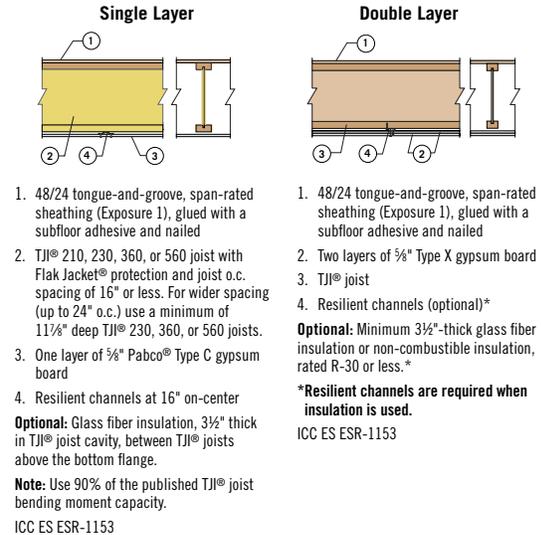
Floor Assembly Compliant with 2012 IRC R501.3



No gypsum board is required in this assembly when using TJI® joists with Flak Jacket® Protection



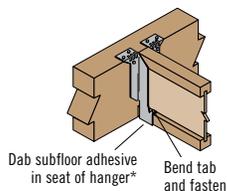
One-Hour Assembly for Rated Construction



TIPS FOR PREVENTING FLOOR NOISE

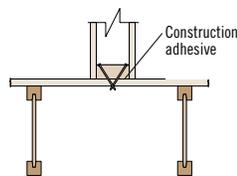
Trus Joist® TJI® joists are structurally uniform and dimensionally stable, and they resist shrinking and twisting. This helps prevent gaps from forming around the nails between the joist and the floor panels—gaps that can potentially cause squeaks or other floor noise. Using TJI® joists can help you build a quieter floor, but only if the entire floor system is installed properly. This is because other components of the floor system, such as hangers, connectors, and nails can be a source of floor noise.

Properly Seat Each Joist in Hanger



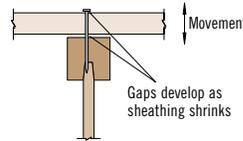
Seat the joist tight to the bottom of the hanger. When using hangers with tabs, bend the flange tabs over and nail to the TJI® joist bottom flange. Placing a dab of subfloor adhesive* in the seat of the hanger prior to installing the joist can reduce squeaks.

Use Adhesive and Special Nailing When Needed



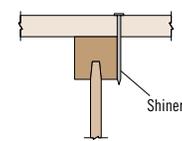
Nail interior partitions to the joists when possible. If the wall can be nailed only to the floor panel, run a bead of adhesive* under the wall and either cross nail, nail through and clinch tight, or screw tightly into the wall from below.

Prevent Shrinkage



Keep building materials dry, and properly glue floor panels to the joists. Panels that become excessively wet during construction shrink as they dry. This shrinkage may leave gaps that allow the panel to move when stepped on.

Avoid "Shiners"



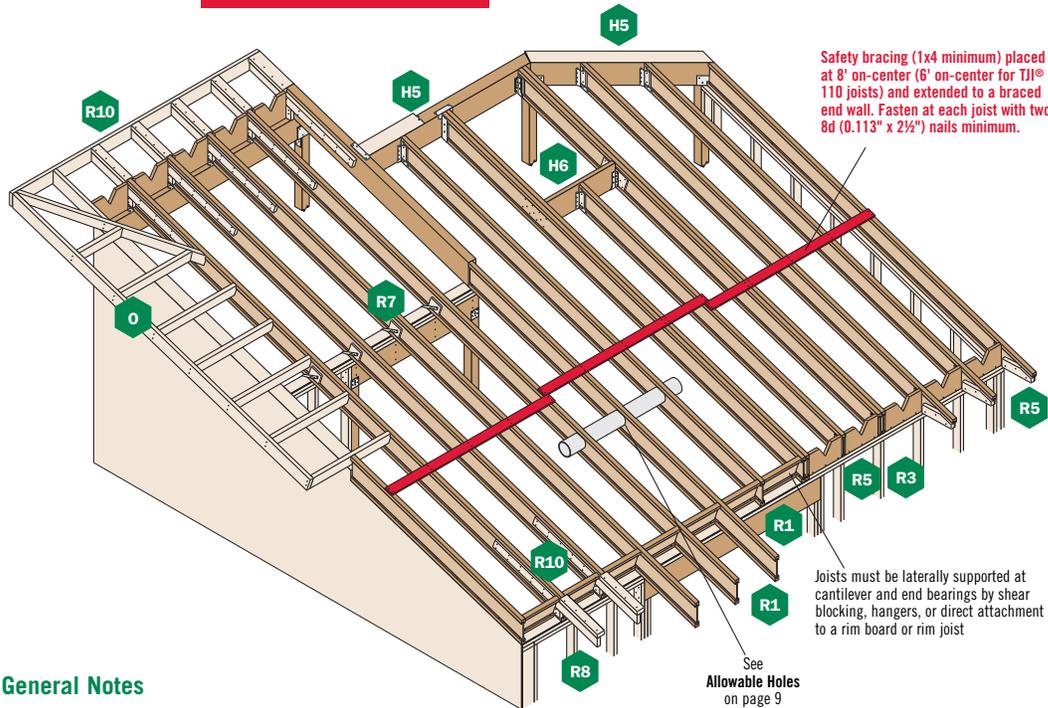
Exercise care when nailing. Nails that barely hit the joists (shiners) do not hold the panel tight to the joist and should be removed. If left in, the nails will rub against the side of the joist when the panel deflects.

* Weyerhaeuser recommends using solvent-based subfloor adhesives that meet ASTM D3498 (AFG-01) performance standards. When latex subfloor adhesive is required, careful selection is necessary due to a wide range of performance between brands.

For more information and tips on how to prevent floor noise, refer to the *Weyerhaeuser Prevention and Repair of Floor System Squeaks Technical Resource Sheet, 9009*, or contact your Weyerhaeuser representative.

ROOF FRAMING

WARNING
Joists are unstable until laterally braced.
See Warning Notes on page 5.



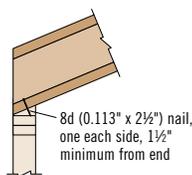
General Notes

- Unless otherwise noted, all details are valid to a maximum slope of 12:12.
- Web stiffeners are required if the sides of the hanger do not laterally support at least ¾" of the TJI® joist top flange.

TJI® Joist Nailing Requirements at Bearing

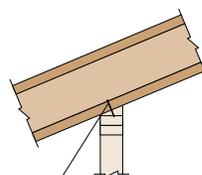
TJI® Joist to Bearing Plate

End Bearing (1¼" minimum bearing required)



When slope exceeds ¼:12, a beveled bearing plate, variable slope seat connector, or birdsmouth cut (at low end of joist only) is required

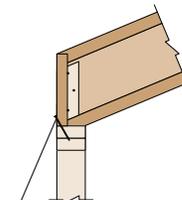
Intermediate Bearing (3½" minimum bearing required)



Slopes 3:12 or less:
One 8d (0.113" x 2½") nail each side. See detail R7.
Slopes greater than 3:12:
Two 8d (0.113" x 2½") nails each side, plus a twist strap and backer block. See detail R7S.

When slope exceeds ¼:12 for a 2x4 wall or ¼:12 for a 2x6 wall, a beveled bearing plate or variable slope seat connector is required.

Blocking to Bearing Plate

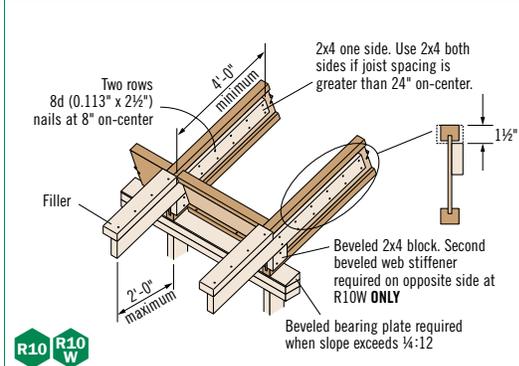
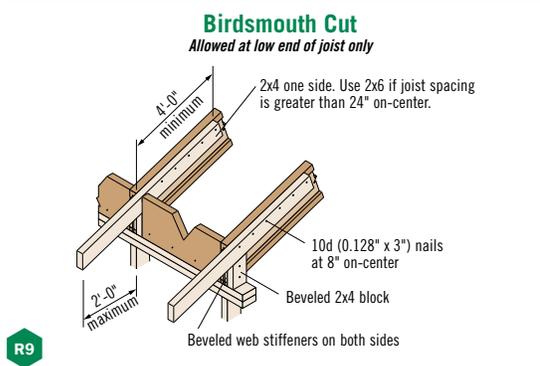
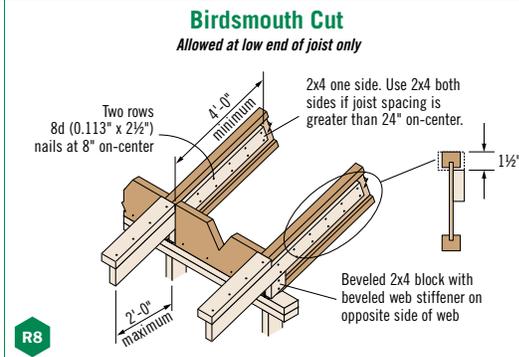
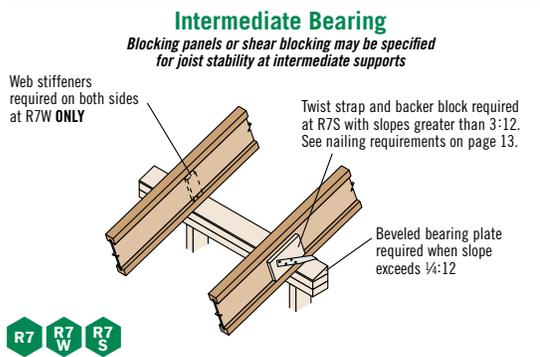
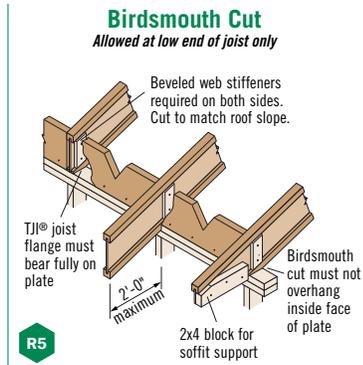
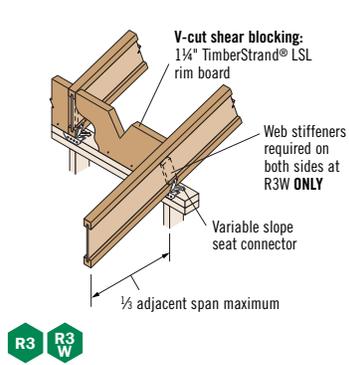
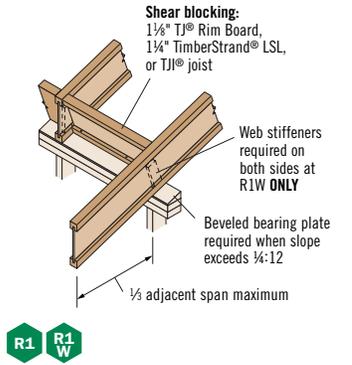


1¼" TJI® Rim Board or 1¼" TimberStrand® LSL:
Toenail with 10d (0.131" x 3") nails at 6" on-center or 16d (0.135" x 3½") nails at 12" on-center

TJI® joist blocking:
10d (0.128" x 3") nails at 6" on-center

Shear transfer nailing:
Minimum, use connections equivalent to sheathing nail schedule

ROOF DETAILS



These Conditions are **NOT** Permitted

DO NOT cut holes
too close to support.



Refer to Allowable Holes on page 9
for minimum distance from support.

DO NOT bevel cut joist
beyond inside face of wall.



DO NOT overhang birdsmouth cut
from inside face of plate.



TJ® joist flange must bear fully on the plate.
See detail BC on page 15.

ROOF DETAILS

LSTA18 (Simpson or USP) strap with twelve 10d (0.148" x 1½") nails

Double beveled bearing plate when slope exceeds ¼:12

Web stiffeners required on both sides at R14W ONLY

Strap nails: Leave 2¾" minimum end distance

R14 R14 W Additional blocking may be required for shear transfer

Double joist may be required when L exceeds joist spacing

End wall

Blocking as required

2x overhang. Notch around TJI® joist top flange.

O

Birdsmouth Cut
Allowed at low end of joist only

Beveled web stiffener on both sides of TJI® joist web

TJI® joist flange must bear fully on plate. Birdsmouth cut must not overhang inside face of plate.

BC

LSTA24 (Simpson or USP) strap with twelve 10d (0.148" x 1½") nails required at H5S with slopes greater than 3:12

Strap nails: Leave 2¾" minimum end distance

Variable slope joist hanger. See pages 18 and 19. Beveled web stiffener required on both sides.

H5 H5S Additional blocking may be required for shear transfer

Filler block: Attach with ten 10d (0.128" x 3") nails, clinched. Use ten 16d (0.135" x 3½") nails from each side with TJI® 560 joists.

Backer block: Install tight to bottom flange (tight to top flange with top mount hangers). Attach with ten 10d (0.128" x 3") nails, clinched when possible.

LSTA18 (Simpson or USP) strap required at H6S with slopes greater than 3:12

Strap nails: Leave 2¾" minimum end distance

Variable slope joist hanger. See pages 18 and 19. Beveled web stiffener required on both sides.

H6 H6S

Shear Blocking and Ventilation Holes (Roof Only)

Field trim to match joist depth at outer edge of wall or locate on wall to match joist depth

Maximum allowable V-cut

Allowed hole zone

SB For TJI® joists with slopes of 10:12 to 12:12, the vertical depth of the shear blocking at bearing will require 1¼" TJI® Rim Board or 1¼" TimberStrand® LSL that is one size deeper than the TJI® joist. DO NOT use 1¼" TJI® Rim Board in ventilation-hole applications.

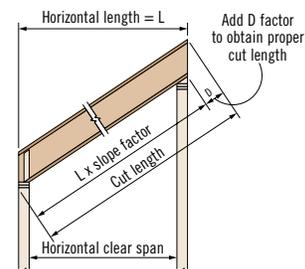
Filler and Backer Block Sizes

| TJI® | 110 | | 210 | | 230 or 360 | | 560 | |
|--------------------------|-------------|-----|--------------------|--------------------|--------------------|--------------------|---------|------------|
| Depth | 9½" or 11⅞" | 14" | 9½" or 11⅞" | 14" or 16" | 9½" or 11⅞" | 14" or 16" | 11⅞" | 14" or 16" |
| Filler Block (Detail H6) | 2x6 | 2x8 | 2x6 + ⅜" sheathing | 2x8 + ¾" sheathing | 2x6 + ½" sheathing | 2x8 + ½" sheathing | Two 2x6 | Two 2x8 |
| Backer Block (Detail H6) | ⅝" or ¾" | | ¾" or ⅞" | | ⅞" or 1" net | | 2x6 | 2x8 |

▪ If necessary, increase filler and backer block height for face mount hangers and maintain ¼" gap at top of joist; see detail W on page 6. Filler and backer block dimensions should accommodate required nailing without splitting. The suggested minimum length is 24" for filler and 12" for backer blocks.

D Factors (Cut Length Calculations)

| Depth | Slope | | | | | | | | | | | | |
|-------|-------|------|-------|------|-------|------|------|------|------|------|-------|-------|-------|
| | 2½:12 | 3:12 | 3½:12 | 4:12 | 4½:12 | 5:12 | 6:12 | 7:12 | 8:12 | 9:12 | 10:12 | 11:12 | 12:12 |
| 9½" | 2" | 2⅝" | 2⅞" | 3¼" | 3⅝" | 4" | 4¾" | 5⅝" | 6⅜" | 7⅞" | 8" | 8¾" | 9½" |
| 11⅞" | 2½" | 3" | 3½" | 4" | 4½" | 5" | 6" | 7" | 8" | 9" | 10" | 11" | 11⅞" |
| 14" | 3" | 3½" | 4⅞" | 4¾" | 5¼" | 5⅞" | 7" | 8¼" | 9¾" | 10½" | 11¾" | 12⅞" | 14" |
| 16" | 3⅝" | 4" | 4¾" | 5⅝" | 6" | 6¾" | 8" | 9⅝" | 10¾" | 12" | 13⅝" | 14¾" | 16" |



Actual cut length can be approximated by multiplying the horizontal length by the slope factor (see table on page 17) and adding the D factor.

See General Notes and nailing requirements on page 13

ROOF SPAN TABLE

Maximum Horizontal Clear Spans—Roof

| O.C. Spacing | Depth | TJI® | Design Live Load (LL) and Dead Load (DL) in PSF | | | | | | | | | | | |
|--------------|---------|---------|---|---------|-------------|---------|-----------------------|---------|-------------|---------|-------------|---------|-------------|---------|
| | | | Non-Snow (125%) | | | | Snow Load Area (115%) | | | | | | | |
| | | | 20LL + 15DL | | 20LL + 20DL | | 25LL + 15DL | | 30LL + 15DL | | 40LL + 15DL | | 50LL + 15DL | |
| Low | High | Low | High | Low | High | Low | High | Low | High | Low | High | | | |
| 16" | 9½" | 110 | 20'-0" | 17'-10" | 19'-1" | 16'-11" | 19'-2" | 17'-2" | 18'-5" | 16'-7" | 17'-2" | 15'-7" | 15'-11" | 14'-9" |
| | | 210 | 21'-2" | 18'-10" | 20'-2" | 17'-10" | 20'-3" | 18'-2" | 19'-6" | 17'-6" | 18'-2" | 16'-6" | 17'-2" | 15'-7" |
| | | 230 | 21'-11" | 19'-6" | 20'-10" | 18'-6" | 20'-11" | 18'-9" | 20'-2" | 18'-1" | 18'-10" | 17'-0" | 17'-9" | 16'-2" |
| | 11½" | 110 | 23'-11" | 21'-4" | 22'-9" | 20'-2" | 22'-8" | 20'-6" | 21'-5" | 19'-10" | 19'-5" | 18'-7" | 17'-11" | 17'-4" |
| | | 210 | 25'-3" | 22'-6" | 24'-1" | 21'-4" | 24'-2" | 21'-8" | 23'-3" | 20'-11" | 21'-4" | 19'-8" | 19'-8" | 18'-8" |
| | | 230 | 26'-1" | 23'-3" | 24'-10" | 22'-0" | 24'-11" | 22'-4" | 24'-0" | 21'-7" | 22'-5" | 20'-4" | 20'-9" | 19'-3" |
| | 14" | 110 | 27'-9" | 24'-9" | 26'-5" | 23'-5" | 26'-7" | 23'-10" | 25'-6" | 23'-0" | 23'-11" | 21'-7" | 22'-7" | 20'-6" |
| | | 210 | 28'-9" | 25'-7" | 27'-4" | 24'-3" | 27'-1" | 24'-8" | 25'-7" | 23'-9" | 23'-3" | 22'-4" | 21'-5" | 20'-9" |
| | | 230 | 29'-8" | 26'-6" | 28'-3" | 25'-1" | 28'-5" | 25'-5" | 27'-0" | 24'-7" | 24'-6" | 23'-1" | 22'-7" | 21'-10" |
| | | 360 | 31'-6" | 28'-2" | 30'-0" | 26'-8" | 30'-2" | 27'-1" | 29'-0" | 26'-1" | 27'-2" | 24'-7" | 25'-8" | 23'-4" |
| | | 560 | 36'-3" | 32'-4" | 34'-6" | 30'-7" | 34'-8" | 31'-1" | 33'-4" | 30'-0" | 31'-2" | 28'-3" | 29'-6" | 26'-9" |
| | | 210 | 31'-10" | 28'-5" | 30'-0" | 26'-11" | 29'-0" | 27'-4" | 27'-5" | 26'-2" | 24'-10" | 23'-11" | 22'-8" | 22'-2" |
| 230 | | 32'-10" | 29'-4" | 31'-4" | 27'-9" | 30'-7" | 28'-2" | 28'-11" | 27'-3" | 26'-2" | 25'-3" | 24'-2" | 23'-5" | |
| 360 | | 34'-11" | 31'-2" | 33'-3" | 29'-6" | 33'-5" | 30'-0" | 32'-2" | 28'-11" | 30'-1" | 27'-2" | 26'-0" | 25'-10" | |
| 560 | | 40'-1" | 35'-9" | 38'-2" | 33'-11" | 38'-4" | 34'-5" | 36'-11" | 33'-2" | 34'-6" | 31'-3" | 31'-8" | 29'-8" | |
| 19.2" | 9½" | 110 | 18'-9" | 16'-9" | 17'-11" | 15'-10" | 18'-0" | 16'-1" | 17'-3" | 15'-7" | 15'-9" | 14'-7" | 14'-6" | 13'-10" |
| | | 210 | 19'-10" | 17'-9" | 18'-11" | 16'-9" | 19'-0" | 17'-0" | 18'-3" | 16'-5" | 17'-1" | 15'-5" | 15'-11" | 14'-8" |
| | | 230 | 20'-7" | 18'-4" | 19'-7" | 17'-4" | 19'-8" | 17'-7" | 18'-11" | 17'-0" | 17'-8" | 16'-0" | 16'-8" | 15'-2" |
| | 11½" | 110 | 22'-5" | 20'-0" | 21'-5" | 19'-0" | 20'-9" | 19'-3" | 19'-7" | 18'-7" | 17'-9" | 17'-1" | 16'-4" | 15'-10" |
| | | 210 | 23'-9" | 21'-2" | 22'-7" | 20'-0" | 22'-8" | 20'-4" | 21'-5" | 19'-8" | 19'-6" | 18'-6" | 17'-11" | 17'-4" |
| | | 230 | 24'-6" | 21'-10" | 23'-4" | 20'-8" | 23'-5" | 21'-0" | 22'-6" | 20'-3" | 20'-6" | 19'-1" | 18'-11" | 18'-1" |
| | 14" | 110 | 26'-1" | 23'-3" | 24'-10" | 22'-0" | 24'-11" | 22'-4" | 24'-0" | 21'-7" | 22'-5" | 20'-3" | 21'-2" | 19'-3" |
| | | 210 | 30'-0" | 26'-9" | 28'-7" | 25'-4" | 28'-8" | 25'-9" | 27'-7" | 24'-10" | 25'-9" | 23'-4" | 24'-4" | 22'-2" |
| | | 230 | 25'-1" | 22'-10" | 23'-4" | 21'-7" | 22'-7" | 21'-5" | 21'-4" | 20'-4" | 19'-4" | 18'-7" | 17'-0" | 17'-3" |
| | | 210 | 27'-0" | 24'-1" | 25'-7" | 22'-10" | 24'-9" | 23'-2" | 23'-4" | 22'-4" | 21'-2" | 20'-5" | 18'-10" | 18'-11" |
| | | 230 | 27'-10" | 24'-10" | 26'-6" | 23'-7" | 26'-1" | 23'-11" | 24'-7" | 23'-1" | 22'-4" | 21'-6" | 20'-7" | 19'-11" |
| | | 360 | 29'-7" | 26'-5" | 28'-2" | 25'-0" | 28'-4" | 25'-5" | 27'-3" | 24'-6" | 25'-6" | 23'-1" | 21'-7" | 21'-8" |
| 560 | | 34'-0" | 30'-4" | 32'-5" | 28'-9" | 32'-7" | 29'-2" | 31'-4" | 28'-2" | 29'-3" | 26'-6" | 26'-5" | 25'-2" | |
| 210 | | 29'-5" | 26'-8" | 27'-5" | 25'-4" | 26'-5" | 25'-2" | 25'-0" | 23'-11" | 22'-3" | 21'-10" | 18'-10" | 20'-2" | |
| 230 | | 30'-11" | 27'-7" | 28'-11" | 26'-1" | 27'-11" | 26'-6" | 26'-4" | 25'-2" | 23'-11" | 23'-0" | 21'-2" | 21'-3" | |
| 360 | 32'-10" | 29'-3" | 31'-3" | 27'-9" | 31'-5" | 28'-2" | 30'-2" | 27'-2" | 25'-7" | 25'-3" | 21'-7" | 21'-8" | | |
| 560 | 37'-8" | 33'-7" | 35'-10" | 31'-10" | 36'-0" | 32'-4" | 34'-8" | 31'-2" | 31'-3" | 29'-4" | 26'-5" | 25'-5" | | |
| 24" | 9½" | 110 | 17'-5" | 15'-6" | 16'-7" | 14'-8" | 16'-5" | 14'-11" | 15'-6" | 14'-5" | 14'-1" | 13'-6" | 13'-0" | 12'-7" |
| | | 210 | 18'-5" | 16'-5" | 17'-6" | 15'-6" | 17'-7" | 15'-9" | 16'-11" | 15'-3" | 15'-5" | 14'-4" | 14'-3" | 13'-7" |
| | | 230 | 19'-0" | 17'-0" | 18'-1" | 16'-1" | 18'-2" | 16'-4" | 17'-6" | 15'-9" | 16'-3" | 14'-10" | 15'-0" | 14'-0" |
| | 11½" | 110 | 20'-7" | 18'-7" | 19'-2" | 17'-7" | 18'-6" | 17'-7" | 17'-6" | 16'-8" | 15'-10" | 15'-3" | 13'-7" | 14'-2" |
| | | 210 | 21'-11" | 19'-7" | 20'-11" | 18'-7" | 20'-4" | 18'-10" | 19'-2" | 18'-2" | 17'-5" | 16'-9" | 15'-0" | 15'-6" |
| | | 230 | 22'-8" | 20'-3" | 21'-7" | 19'-2" | 21'-5" | 19'-5" | 20'-3" | 18'-9" | 18'-4" | 17'-8" | 16'-11" | 16'-4" |
| | 14" | 110 | 24'-1" | 21'-6" | 23'-0" | 20'-5" | 23'-1" | 20'-8" | 22'-2" | 20'-0" | 20'-5" | 18'-9" | 17'-3" | 17'-4" |
| | | 210 | 27'-9" | 24'-9" | 26'-5" | 23'-6" | 26'-7" | 23'-10" | 25'-6" | 23'-0" | 23'-10" | 21'-7" | 21'-1" | 20'-3" |
| | | 230 | 22'-5" | 21'-1" | 20'-10" | 19'-6" | 20'-2" | 19'-2" | 19'-0" | 18'-2" | 16'-0" | 16'-7" | 13'-7" | 14'-7" |
| | | 210 | 24'-7" | 22'-4" | 22'-11" | 21'-1" | 22'-1" | 21'-0" | 20'-10" | 19'-11" | 17'-10" | 18'-3" | 15'-0" | 16'-1" |
| | | 230 | 25'-9" | 23'-0" | 24'-1" | 21'-10" | 23'-4" | 22'-2" | 22'-0" | 21'-0" | 20'-0" | 19'-3" | 16'-11" | 17'-0" |
| | | 360 | 27'-5" | 24'-6" | 26'-1" | 23'-2" | 26'-3" | 23'-6" | 25'-0" | 22'-8" | 20'-5" | 20'-2" | 17'-3" | 17'-4" |
| 560 | | 31'-6" | 28'-1" | 30'-0" | 26'-8" | 30'-2" | 27'-0" | 29'-0" | 26'-1" | 24'-11" | 23'-7" | 21'-1" | 20'-3" | |
| 210 | | 26'-3" | 24'-9" | 24'-6" | 22'-11" | 23'-8" | 22'-6" | 21'-9" | 21'-4" | 17'-10" | 18'-9" | 15'-0" | 16'-1" | |
| 230 | | 27'-9" | 25'-6" | 25'-10" | 24'-2" | 24'-11" | 23'-8" | 23'-7" | 22'-6" | 20'-0" | 19'-9" | 16'-11" | 17'-0" | |
| 360 | 30'-4" | 27'-1" | 28'-11" | 25'-8" | 28'-2" | 26'-1" | 25'-0" | 24'-1" | 20'-5" | 20'-2" | 17'-3" | 17'-4" | | |
| 560 | 34'-10" | 31'-2" | 33'-2" | 29'-6" | 33'-4" | 29'-11" | 30'-6" | 28'-3" | 24'-11" | 23'-7" | 21'-1" | 20'-3" | | |

How to Use This Table

- Determine appropriate live and dead load, and the load duration factor.
- If your slope is 6:12 or less, use the **Low** slope column. If it is between 6:12 and 12:12, use the **High** column.
- Scan down the column until you find a span that meets or exceeds the span of your application.
- Select TJI® joist and on-center spacing.

General Notes

- Table is based on:
 - Minimum bearing length of 1¾" end and 3½" intermediate, without web stiffeners.
 - Uniform loads.
 - More restrictive of simple or continuous span.
 - Minimum roof slope of ¼:12.
- Total load values are limited to deflection of L/180 and live load is based on joist deflection of L/240.
- A support beam or wall at the high end is required. Ridge board applications do not provide adequate support.
- For flat roofs or other loading conditions not shown, refer to Weyerhaeuser software.

ROOF LOAD TABLES

Roof—115% and 125% Load Duration (PLF) for 6'–16' Spans

| Depth | TJI® | Roof Joist Horizontal Clear Span | | | | | | | | | | | | | | | | | |
|-------|------|----------------------------------|---------------|-----------------|------------|---------------|-----------------|------------|---------------|-----------------|------------|---------------|-----------------|------------|---------------|-----------------|------------|---------------|-----------------|
| | | 6' | | | 8' | | | 10' | | | 12' | | | 14' | | | 16' | | |
| | | Total Load | | Defl. | Total Load | | Defl. | Total Load | | Defl. | Total Load | | Defl. | Total Load | | Defl. | Total Load | | Defl. |
| | | Snow 115% | Non-Snow 125% | Live Load L/240 | Snow 115% | Non-Snow 125% | Live Load L/240 | Snow 115% | Non-Snow 125% | Live Load L/240 | Snow 115% | Non-Snow 125% | Live Load L/240 | Snow 115% | Non-Snow 125% | Live Load L/240 | Snow 115% | Non-Snow 125% | Live Load L/240 |
| 9½" | 110 | 289 | 314 | * | 218 | 237 | * | 175 | 190 | * | 146 | 159 | * | 114 | 124 | 112 | 88 | 95 | 77 |
| | 210 | 321 | 349 | * | 242 | 263 | * | 194 | 211 | * | 162 | 176 | * | 137 | 149 | 130 | 105 | 115 | 90 |
| | 230 | 360 | 392 | * | 272 | 295 | * | 218 | 237 | * | 182 | 198 | * | 153 | 166 | 143 | 117 | 127 | 99 |
| 11½" | 110 | 289 | 314 | * | 218 | 237 | * | 175 | 190 | * | 146 | 159 | * | 125 | 136 | * | 110 | 119 | * |
| | 210 | 321 | 349 | * | 242 | 263 | * | 194 | 211 | * | 162 | 176 | * | 139 | 151 | * | 122 | 132 | * |
| | 230 | 360 | 392 | * | 272 | 295 | * | 218 | 237 | * | 182 | 198 | * | 156 | 170 | * | 137 | 149 | * |
| | 360 | 368 | 400 | * | 277 | 301 | * | 223 | 242 | * | 186 | 202 | * | 159 | 173 | * | 140 | 152 | * |
| 14" | 110 | 289 | 314 | * | 218 | 237 | * | 175 | 190 | * | 146 | 159 | * | 125 | 136 | * | 110 | 119 | * |
| | 210 | 321 | 349 | * | 242 | 263 | * | 194 | 211 | * | 162 | 176 | * | 139 | 151 | * | 122 | 132 | * |
| | 230 | 360 | 392 | * | 272 | 295 | * | 218 | 237 | * | 182 | 198 | * | 156 | 170 | * | 137 | 149 | * |
| | 360 | 368 | 400 | * | 277 | 301 | * | 223 | 242 | * | 186 | 202 | * | 159 | 173 | * | 140 | 152 | * |
| 16" | 110 | 289 | 314 | * | 218 | 237 | * | 175 | 190 | * | 146 | 159 | * | 125 | 136 | * | 110 | 119 | * |
| | 210 | 321 | 349 | * | 242 | 263 | * | 194 | 211 | * | 162 | 176 | * | 139 | 151 | * | 122 | 132 | * |
| | 230 | 360 | 392 | * | 272 | 295 | * | 218 | 237 | * | 182 | 198 | * | 156 | 170 | * | 137 | 149 | * |
| | 360 | 368 | 400 | * | 277 | 301 | * | 223 | 242 | * | 186 | 202 | * | 159 | 173 | * | 140 | 152 | * |

Roof—115% and 125% Load Duration (PLF) for 18'–28' Spans

| Depth | TJI® | Roof Joist Horizontal Clear Span | | | | | | | | | | | | | | | | | | |
|-------|------|----------------------------------|---------------|-----------------|------------|---------------|-----------------|------------|---------------|-----------------|------------|---------------|-----------------|------------|---------------|-----------------|------------|---------------|-----------------|----|
| | | 18' | | | 20' | | | 22' | | | 24' | | | 26' | | | 28' | | | |
| | | Total Load | | Defl. | Total Load | | Defl. | Total Load | | Defl. | Total Load | | Defl. | Total Load | | Defl. | Total Load | | Defl. | |
| | | Snow 115% | Non-Snow 125% | Live Load L/240 | Snow 115% | Non-Snow 125% | Live Load L/240 | Snow 115% | Non-Snow 125% | Live Load L/240 | Snow 115% | Non-Snow 125% | Live Load L/240 | Snow 115% | Non-Snow 125% | Live Load L/240 | Snow 115% | Non-Snow 125% | Live Load L/240 | |
| 9½" | 110 | | | | | | | | | | | | | | | | | | | |
| | 210 | 83 | 86 | 64 | | | | | | | | | | | | | | | | |
| | 230 | 93 | 94 | 71 | | | | | | | | | | | | | | | | |
| 11½" | 110 | 88 | 95 | 91 | | 77 | 68 | | | | | | | | | | | | | |
| | 210 | 106 | 115 | 106 | 86 | 93 | 79 | | 77 | 60 | | | | | | | | | | |
| | 230 | 117 | 128 | 116 | 95 | 103 | 86 | 79 | 85 | 66 | | | | | | | | | | |
| | 360 | 124 | 135 | * | 112 | 122 | 103 | 102 | 105 | 78 | 82 | 82 | 61 | | | | | | | |
| 14" | 110 | 98 | 106 | * | 84 | 92 | * | | 76 | 75 | | | | | | | | | | |
| | 210 | 108 | 118 | * | 97 | 106 | * | | 84 | 91 | 87 | | 77 | 68 | | | | | | |
| | 230 | 122 | 132 | * | 110 | 119 | * | | 93 | 101 | 95 | 78 | 85 | 74 | | | | | | |
| | 360 | 124 | 135 | * | 112 | 122 | * | | 102 | 111 | * | 93 | 101 | 88 | 86 | 94 | 70 | 76 | 76 | 57 |
| 16" | 110 | 152 | 165 | * | 137 | 148 | * | | 124 | 135 | * | 114 | 124 | * | 105 | 114 | 104 | 98 | 106 | 85 |
| | 210 | 108 | 118 | * | 97 | 106 | * | | 89 | 96 | * | 81 | 88 | * | | 75 | 73 | | | |
| | 230 | 122 | 132 | * | 110 | 119 | * | | 100 | 108 | * | 90 | 97 | * | 76 | 83 | 79 | | | |
| | 360 | 124 | 135 | * | 112 | 122 | * | | 102 | 111 | * | 93 | 101 | * | 86 | 94 | * | 80 | 87 | 76 |

* Indicates that Total Load value controls.

Slope Factors

| Slope | 2½:12 | 3:12 | 3½:12 | 4:12 | 4½:12 | 5:12 | 6:12 | 7:12 | 8:12 | 9:12 | 10:12 | 11:12 | 12:12 |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Factor | 1.021 | 1.031 | 1.042 | 1.054 | 1.068 | 1.083 | 1.118 | 1.158 | 1.202 | 1.250 | 1.302 | 1.357 | 1.414 |

How to Use These Tables

- Calculate actual total load in pounds per linear foot (plf).
- Select appropriate **Roof Joist Horizontal Clear Span**. For slopes greater than 2:12, approximate the increased dead load by multiplying the joist horizontal clear span by the **Slope Factor** above.
- Scan down the column to find a TJI® joist that meets or exceeds actual total load.

General Notes

- Tables are based on:
 - Minimum bearing length of 1¾" end and 3½" intermediate, without web stiffeners.
 - Uniform loads.
 - More restrictive of simple or continuous span.
 - Minimum roof slope of ¼:12.
- Total Load** values are limited to deflection of L/180. For stiffer deflection criteria, use the **Live Load L/240** values.

FRAMING CONNECTORS (SIMPSON STRONG-TIE®)

| Joist | Single Joist—Top Mount | | | | | Single Joist—Face Mount | | | | | Face Mount Skewed 45° Joist Hanger ⁽¹⁾ | | | | | | | | | |
|-------|------------------------|------------------------------|--------|----------------|---------|-------------------------------|--------|----------------|---------|--------------|---|----------------|-----------|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | |
| | Depth | TJI® | Hanger | Capacity (lbs) | Nailing | | Hanger | Capacity (lbs) | Nailing | | Hanger | Capacity (lbs) | Nailing | | | | | | | |
| | | | | Header | Joist | | | Header | Joist | | | Header | Joist | | | | | | | |
| 9½" | 110 | ITS1.81/9.5 | 975 | 10d | N.A. | IUS1.81/9.5 | 950 | 10d | N.A. | SUR/L1.81/9 | 1,220 | 16d | 10d x 1½" | | | | | | | |
| | 210 | ITS2.06/9.5 | 1,070 | 10d | N.A. | IUS2.06/9.5 | 950 | 10d | N.A. | SUR/L2.1/9 | 1,330 | 16d | 10d x 1½" | | | | | | | |
| | 230 | ITS2.37/9.5 | 1,120 | 10d | N.A. | IUS2.37/9.5 | 950 | 10d | N.A. | SUR/L2.37/9 | 1,330 | 16d | 10d x 1½" | | | | | | | |
| 11½" | 110 | ITS1.81/11.88 | 975 | 10d | N.A. | IUS1.81/11.88 ⁽⁴⁾ | 975 | 10d | N.A. | SUR/L1.81/11 | 1,240 | 16d | 10d x 1½" | | | | | | | |
| | 210 | ITS2.06/11.88 | 1,070 | 10d | N.A. | IUS2.06/11.88 ⁽⁴⁾ | 1,070 | 10d | N.A. | SUR/L2.1/11 | 1,380 | 16d | 10d x 1½" | | | | | | | |
| | 230 | ITS2.37/11.88 | 1,120 | 10d | N.A. | IUS2.37/11.88 ⁽⁴⁾ | 1,120 | 10d | N.A. | SUR/L2.37/11 | 1,410 | 16d | 10d x 1½" | | | | | | | |
| | 360 | ITS2.37/11.88 | 1,140 | 10d | N.A. | IUS2.37/11.88 ⁽⁴⁾ | 1,140 | 10d | N.A. | SUR/L2.37/11 | 1,430 | 16d | 10d x 1½" | | | | | | | |
| | 560 | ITS3.56/11.88 ⁽⁶⁾ | 1,150 | 10d | N.A. | IUS3.56/11.88 ⁽¹⁶⁾ | 1,150 | 10d | N.A. | SUR/L410 | 1,495 | 16d | 16d | | | | | | | |
| 14" | 110 | ITS1.81/14 | 975 | 10d | N.A. | IUS1.81/14 ⁽⁴⁾ | 975 | 10d | N.A. | SUR/L1.81/14 | 1,240 | 16d | 10d x 1½" | | | | | | | |
| | 210 | ITS2.06/14 | 1,070 | 10d | N.A. | IUS2.06/14 ⁽⁴⁾ | 1,070 | 10d | N.A. | SUR/L2.1/14 | 1,380 | 16d | 10d x 1½" | | | | | | | |
| | 230 | ITS2.37/14 | 1,120 | 10d | N.A. | IUS2.37/14 ⁽⁴⁾ | 1,120 | 10d | N.A. | SUR/L2.37/14 | 1,410 | 16d | 10d x 1½" | | | | | | | |
| | 360 | ITS2.37/14 | 1,140 | 10d | N.A. | IUS2.37/14 ⁽⁴⁾ | 1,140 | 10d | N.A. | SUR/L2.37/14 | 1,430 | 16d | 10d x 1½" | | | | | | | |
| | 560 | ITS3.56/14 ⁽⁶⁾ | 1,150 | 10d | N.A. | IUS3.56/14 ⁽¹⁶⁾ | 1,150 | 10d | N.A. | SUR/L414 | 1,460 | 16d | 16d | | | | | | | |
| 16" | 210 | ITS2.06/16 | 1,070 | 10d | N.A. | IUS2.06/16 ⁽⁴⁾ | 1,070 | 10d | N.A. | SUR/L2.1/16 | 1,380 | 16d | 10d x 1½" | | | | | | | |
| | 230 | ITS2.37/16 | 1,120 | 10d | N.A. | IUS2.37/16 ⁽⁴⁾ | 1,120 | 10d | N.A. | SUR/L2.37/16 | 1,410 | 16d | 10d x 1½" | | | | | | | |
| | 360 | ITS2.37/16 | 1,140 | 10d | N.A. | IUS2.37/16 ⁽⁴⁾ | 1,140 | 10d | N.A. | SUR/L2.37/16 | 1,430 | 16d | 10d x 1½" | | | | | | | |
| | 560 | ITS3.56/16 ⁽⁶⁾ | 1,150 | 10d | N.A. | IUS3.56/16 ⁽¹⁶⁾ | 1,150 | 10d | N.A. | SUR/L414 | 1,460 | 16d | 16d | | | | | | | |

| Joist | Double Joist—Top Mount | | | | | Double Joist—Face Mount | | | | | | | | | |
|-------|------------------------|---------------|--------|----------------|-----------|---------------------------|--------|----------------|-----------|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | |
| | Depth | TJI® | Hanger | Capacity (lbs) | Nailing | | Hanger | Capacity (lbs) | Nailing | | | | | | |
| | | | | Header | Joist | | | Header | Joist | | | | | | |
| 9½" | 110 | MIT49.5 | 2,115 | 16d | 10d x 1½" | MIU3.56/9 ⁽⁴⁾ | 2,215 | 16d | 10d x 1½" | | | | | | |
| | 210 | MIT4.28/9.5 | 2,115 | 16d | 10d x 1½" | MIU4.28/9 | 2,305 | 16d | 10d x 1½" | | | | | | |
| | 230 | MIT359.5-2 | 2,115 | 16d | 10d x 1½" | MIU4.75/9 | 2,305 | 16d | 10d x 1½" | | | | | | |
| 11½" | 110 | MIT411.88 | 2,115 | 16d | 10d x 1½" | MIU3.56/11 ⁽⁴⁾ | 2,215 | 16d | 10d x 1½" | | | | | | |
| | 210 | MIT4.28/11.88 | 2,115 | 16d | 10d x 1½" | MIU4.28/11 ⁽⁴⁾ | 2,395 | 16d | 10d x 1½" | | | | | | |
| | 230 | MIT3511.88-2 | 2,115 | 16d | 10d x 1½" | MIU4.75/11 ⁽⁴⁾ | 2,490 | 16d | 10d x 1½" | | | | | | |
| | 360 | MIT3511.88-2 | 2,115 | 16d | 10d x 1½" | MIU4.75/11 | 2,525 | 16d | 10d x 1½" | | | | | | |
| | 560 | B7.12/11.88 | 2,925 | 16d | 16d | HU412-2 | 2,380 | 16d | 16d | | | | | | |
| 14" | 110 | MIT414 | 2,115 | 16d | 10d x 1½" | MIU3.56/14 ⁽⁴⁾ | 2,215 | 16d | 10d x 1½" | | | | | | |
| | 210 | MIT4.28/14 | 2,115 | 16d | 10d x 1½" | MIU4.28/14 ⁽⁴⁾ | 2,395 | 16d | 10d x 1½" | | | | | | |
| | 230 | MIT3514-2 | 2,115 | 16d | 10d x 1½" | MIU4.75/14 ⁽⁴⁾ | 2,490 | 16d | 10d x 1½" | | | | | | |
| | 360 | MIT3514-2 | 2,115 | 16d | 10d x 1½" | MIU4.75/14 ⁽⁴⁾ | 2,525 | 16d | 10d x 1½" | | | | | | |
| | 560 | B7.12/14 | 2,925 | 16d | 16d | HU414-2 | 2,925 | 16d | 16d | | | | | | |
| 16" | 210 | LBV4.28/16 | 2,395 | 16d | 10d x 1½" | MIU4.28/16 ⁽⁴⁾ | 2,395 | 16d | 10d x 1½" | | | | | | |
| | 230 | LBV4.75/16 | 2,115 | 16d | 10d x 1½" | MIU4.75/16 ⁽⁴⁾ | 2,490 | 16d | 10d x 1½" | | | | | | |
| | 360 | LBV4.75/16 | 2,115 | 16d | 10d x 1½" | MIU4.75/16 ⁽⁴⁾ | 2,525 | 16d | 10d x 1½" | | | | | | |
| | 560 | B7.12/16 | 2,925 | 16d | 16d | HU414-2 | 2,925 | 16d | 16d | | | | | | |

| Joist | Variable Slope Seat Connector ⁽²⁾ | | | | |
|-------|--|--------|----------------|-----------|--|
| | | | | | |
| | TJI® | Hanger | Capacity (lbs) | Nailing | |
| | | | Header | Joist | |
| 110 | VPA25 | 975 | 10d | 10d x 1½" | |
| 210 | VPA2.1 | 1,070 | 10d | 10d x 1½" | |
| 230 | VPA35 | 1,120 | 10d | 10d x 1½" | |
| 360 | VPA35 | 1,140 | 10d | 10d x 1½" | |
| 560 | VPA4 | 1,230 | 10d | 10d x 1½" | |

Hanger information on these two pages was provided by either Simpson Strong-Tie® or USP Structural Connectors®. For additional information, please refer to their literature.

| Joist | Variable Slope Seat Joist Hanger ⁽³⁾ | | | | |
|-------|---|----------------------|-------------------|--------|-----------|
| | | | | | |
| | TJI® | Hanger | Capacity (lbs) | | Nailing |
| | | Sloped Only | Sloped and Skewed | Header | Joist |
| 110 | LSSU125 | 1,110 ⁽¹⁾ | 995 | 10d | 10d x 1½" |
| 210 | LSSU2.1 | 1,110 ⁽¹⁾ | 995 | 10d | 10d x 1½" |
| 230 | LSSU135 | 1,110 ⁽¹⁾ | 995 | 10d | 10d x 1½" |
| 360 | LSSU135 | 1,110 ⁽¹⁾ | 995 | 10d | 10d x 1½" |
| 560 | LSSU410 | 1,725 ⁽¹⁾ | 1,625 | 16d | 10d x 1½" |

General Notes

Bold italic hangers require web stiffeners.

Capacities will vary with different nailing criteria or other support conditions; contact your Weyerhaeuser representative for assistance.

- Hanger capacities shown are either joist bearing capacity or hanger capacity—whichever is less. Joist end reaction must be checked to ensure it does not exceed the capacity shown in the tables.
- All capacities are for downward loads at 100% duration of load.
- Fill all round, dimple, and positive-angle nail holes.
- Use sloped seat hangers and beveled web stiffeners when TJI® joist slope exceeds ¼:12.
- Leave ¼" clearance (¼" maximum) between the end of the supported joist and the header or hanger.
- Nails: 16d = 0.162" x 3½", 10d = 0.148" x 3", and 10d x 1½" = 0.148" x 1½".

See additional notes on page 19

FRAMING CONNECTORS (USP STRUCTURAL CONNECTORS®)

| Joist | Single Joist—Top Mount | | | | | | Single Joist—Face Mount ⁽¹⁾ | | | | | | Face Mount Skewed 45° Joist Hanger ⁽¹⁾ | | | | | |
|-------|------------------------|----------|--------|----------------|-----------|----------|--|----------------|-----------|--------------------------|--------|----------------|---|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | |
| | Depth | TJI® | Hanger | Capacity (lbs) | Nailing | | Hanger | Capacity (lbs) | Nailing | | Hanger | Capacity (lbs) | Nailing | | | | | |
| | | | | Header | Joist | | | Header | Joist | | | Header | Joist | | | | | |
| 9½" | 110 | THO17950 | 975 | 10d | 10d x 1½" | THF17925 | 910 | 10d | 10d x 1½" | SKH1720L/R | 945 | 10d | 10d x 1½" | | | | | |
| | 210 | TFL2095 | 1,070 | 10d | 10d x 1½" | THF20925 | 910 | 10d | 10d x 1½" | SKH2020L/R | 1,035 | 10d | 10d x 1½" | | | | | |
| | 230 | TFL2395 | 1,120 | 10d | 10d x 1½" | THF23925 | 1,245 | 10d | 10d x 1½" | SKH2320L/R | 1,090 | 10d | 10d x 1½" | | | | | |
| 11½" | 110 | THO17118 | 975 | 10d | 10d x 1½" | THF17112 | 910 | 10d | 10d x 1½" | SKH1720L/R | 945 | 10d | 10d x 1½" | | | | | |
| | 210 | TFL20118 | 1,070 | 10d | 10d x 1½" | THF20112 | 910 | 10d | 10d x 1½" | SKH2020L/R | 1,035 | 10d | 10d x 1½" | | | | | |
| | 230 | TFL23118 | 1,120 | 10d | 10d x 1½" | THF23118 | 1,245 | 10d | 10d x 1½" | SKH2320L/R | 1,090 | 10d | 10d x 1½" | | | | | |
| | 360 | TFL23118 | 1,140 | 10d | 10d x 1½" | THF23118 | 1,265 | 10d | 10d x 1½" | SKH2320L/R | 1,110 | 10d | 10d x 1½" | | | | | |
| 14" | 560 | THO35118 | 1,430 | 10d | 10d x 1½" | THF35112 | 1,460 | 10d | 10d x 1½" | SKH410L/R ⁽⁴⁾ | 1,460 | 10d | 16d | | | | | |
| | 110 | TFL1714 | 975 | 10d | 10d x 1½" | THF17140 | 975 | 10d | 10d x 1½" | SKH1720L/R | 945 | 10d | 10d x 1½" | | | | | |
| | 210 | TFL2014 | 1,070 | 10d | 10d x 1½" | THF20140 | 1,070 | 10d | 10d x 1½" | SKH2020L/R | 1,035 | 10d | 10d x 1½" | | | | | |
| | 230 | TFL2314 | 1,120 | 10d | 10d x 1½" | THF23140 | 1,245 | 10d | 10d x 1½" | SKH2324L/R | 1,090 | 10d | 10d x 1½" | | | | | |
| | 360 | TFL2314 | 1,140 | 10d | 10d x 1½" | THF23140 | 1,265 | 10d | 10d x 1½" | SKH2324L/R | 1,110 | 10d | 10d x 1½" | | | | | |
| 16" | 560 | THO35140 | 1,430 | 10d | 10d x 1½" | THF35140 | 1,460 | 10d | 10d x 1½" | SKH414L/R ⁽⁴⁾ | 1,460 | 10d | 16d | | | | | |
| | 210 | TFL2016 | 1,070 | 10d | 10d x 1½" | THF20157 | 1,425 | 10d | 10d x 1½" | SKH2024L/R | 1,035 | 10d | 10d x 1½" | | | | | |
| | 230 | TFL2316 | 1,120 | 10d | 10d x 1½" | THF23160 | 1,245 | 10d | 10d x 1½" | SKH2324L/R | 1,090 | 10d | 10d x 1½" | | | | | |
| | 360 | TFL2316 | 1,140 | 10d | 10d x 1½" | THF23160 | 1,265 | 10d | 10d x 1½" | SKH2324L/R | 1,110 | 10d | 10d x 1½" | | | | | |
| | 560 | THO35160 | 1,430 | 10d | 10d x 1½" | THF35157 | 1,460 | 10d | 10d x 1½" | SKH414L/R ⁽⁴⁾ | 1,460 | 10d | 16d | | | | | |

| Joist | Double Joist—Top Mount | | | | | | Double Joist—Face Mount ⁽¹⁾ | | | | | |
|-------|------------------------|------------|--------|----------------|-----------|------------|--|----------------|-----------|--|--|--|
| | | | | | | | | | | | | |
| | Depth | TJI® | Hanger | Capacity (lbs) | Nailing | | Hanger | Capacity (lbs) | Nailing | | | |
| | | | | Header | Joist | | | Header | Joist | | | |
| 9½" | 110 | THO35950 | 2,050 | 10d | 10d x 1½" | THF35925 | 1,370 | 10d | 10d x 1½" | | | |
| | 210 | THO20950-2 | 2,330 | 16d | 10d | THF20925-2 | 1,390 | 10d | 10d | | | |
| | 230 | THO23950-2 | 2,660 | 16d | 10d | THF23925-2 | 1,625 | 10d | 10d | | | |
| 11½" | 110 | THO35118 | 2,050 | 10d | 10d x 1½" | THF35112 | 1,825 | 10d | 10d x 1½" | | | |
| | 210 | THO20118-2 | 2,330 | 16d | 10d | THF20112-2 | 1,855 | 10d | 10d | | | |
| | 230 | THO23118-2 | 2,730 | 16d | 10d | THF23118-2 | 1,855 | 10d | 10d | | | |
| | 360 | THO23118-2 | 2,770 | 16d | 10d | THF23118-2 | 1,855 | 10d | 10d | | | |
| 14" | 560 | BPH71118 | 3,185 | 16d | 10d | HD7120 | 2,255 | 16d | 10d | | | |
| | 110 | THO35140 | 2,150 | 10d | 10d x 1½" | THF35140 | 2,215 | 10d | 10d x 1½" | | | |
| | 210 | THO20140-2 | 2,330 | 16d | 10d | THF20140-2 | 2,320 | 10d | 10d | | | |
| | 230 | THO23140-2 | 2,730 | 16d | 10d | THF23140-2 | 2,490 | 10d | 10d | | | |
| | 360 | THO23140-2 | 2,770 | 16d | 10d | THF23140-2 | 2,525 | 10d | 10d | | | |
| 16" | 560 | BPH7114 | 3,185 | 16d | 10d | HD7140 | 2,820 | 16d | 10d | | | |
| | 210 | THO20160-2 | 2,330 | 16d | 10d | THF20140-2 | 2,320 | 10d | 10d | | | |
| | 230 | THO23160-2 | 2,730 | 16d | 10d | THF23160-2 | 2,490 | 10d | 10d | | | |
| | 360 | THO23160-2 | 2,770 | 16d | 10d | THF23160-2 | 2,525 | 10d | 10d | | | |
| | 560 | BPH7116 | 3,185 | 16d | 10d | HD7140 | 2,820 | 16d | 10d | | | |

| Joist | Variable Slope Seat Connector ⁽⁵⁾ | | | | | |
|-------|--|--------|----------------|-----------|--|--|
| | | | | | | |
| | TJI® | Hanger | Capacity (lbs) | Nailing | | |
| | | | Header | Joist | | |
| 110 | TMP175 | 1,150 | 10d | 10d x 1½" | | |
| | TMPH175 | 1,220 | 10d | 10d x 1½" | | |
| 210 | TMP21 | 1,290 | 10d | 10d x 1½" | | |
| | TMPH21 | 1,330 | 10d | 10d x 1½" | | |
| 230 | TMP23 | 1,330 | 10d | 10d x 1½" | | |
| | TMPH23 | 1,330 | 10d | 10d x 1½" | | |
| 360 | TMP23 | 1,505 | 10d | 10d x 1½" | | |
| | TMPH23 | 1,505 | 10d | 10d x 1½" | | |
| 560 | TMP4 | 1,725 | 10d | 10d x 1½" | | |
| | TMPH4 | 1,725 | 10d | 10d x 1½" | | |

Support Requirements

- Support material assumed to be Trus Joist® engineered lumber or sawn lumber (Douglas fir or southern pine species).
- Minimum support width for single- and double-joist top mount hangers is 3" (1½" for ITS hangers).
- Minimum support width for face mount hangers with 10d and 16d nails (clinched) is 1½" and 1¾", respectively.

Footnotes:

- Face mount hanger capacities may be increased up to 15% for snow roofs or 25% for non-snow roofs. Maximum increase for LSSU, LSSUI, and LSSH hangers is 15%.
- VPA connectors are allowed on slopes of 3:12 through 12:12 only.
- LSSU, LSSUI, and LSSH hangers can be field adjusted for slopes and skews of up to 45 degrees. Additional lateral restraints are required for 16" deep TJI® joists.
- Miter cut is required at end of joist.
- TMP connectors are allowed on slopes of 1:12 through 6:12 only, and TMPH connectors are allowed on slopes of 6:12 through 12:12 only.
- Capacity may be increased to 1,330 lbs if web stiffeners are used.

| Joist | Variable Slope Seat Joist Hanger ⁽³⁾ | | | | | |
|-------|---|----------------------|-------------------|--------|-----------|--|
| | | | | | | |
| | TJI® | Hanger | Capacity (lbs) | | Nailing | |
| | | Sloped Only | Sloped and Skewed | Header | Joist | |
| 110 | LSSH179 | 1,180 | 1,180 | 10d | 10d x 1½" | |
| 210 | LSSH20 | 1,180 | 1,180 | 10d | 10d x 1½" | |
| 230 | LSSH23 | 1,180 | 1,180 | 10d | 10d x 1½" | |
| 360 | LSSH23 | 1,180 | 1,180 | 10d | 10d x 1½" | |
| 560 | LSSH35 | 1,595 ⁽¹⁾ | 1,595 | 16d | 10d x 1½" | |

See General Notes on page 18



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TECHNICAL RESOURCE SHEET

SOUND PERFORMANCE OF TRUS JOIST® TJI® JOIST FIRE-RATED FLOOR ASSEMBLIES

The transmission of sound from one unit to another is an important consideration in the design and construction of multi-family housing, hotels, and mixed-use occupancy applications. Floor systems must be designed to attenuate sound, reducing noise transmission through assemblies to acceptable levels. These applications also typically require fire-rated floor/ceiling assemblies.

This guide presents both impact and airborne sound ratings for fire-rated, TJI® joist floor/ceiling assemblies with a variety of finish flooring and noise control components. The illustrations include base assembly requirements consistent with those in the *Weyerhaeuser Fire-Rated Assemblies and Sprinkler Systems Fire Guide* and additions for sound performance. The tables list components for each assembly tested, sorted by finish flooring and sound ratings. Assemblies tested without finish flooring are also listed for reference. Tests were conducted at independent laboratories in accordance with ASTM E90, E413, E492, and E989. For more information on the fire assemblies in this guide refer to the Weyerhaeuser fire guide, 1500, noted above.

Changes to flooring components can significantly alter an assembly's impact performance and IIC rating

STC and IIC

Two common measures of sound performance between compartments are Sound Transmission Class (STC) and Impact Insulation Class (IIC). Each provides a single number to summarize assembly performance, with higher numbers representing better sound attenuation. The STC rating represents airborne noise, such as music or voice, and the IIC rating measures impact noise such as footsteps. Both values are determined by measuring the sound transmitted through a given assembly across a range of frequencies.

Performance ratings are for the assembly as a whole. Modifications to the assembly, including the substitution of materials, may affect sound performance.

Code Requirements

The International Building Code (IBC) and the National Building Code of Canada (NBC) require a minimum STC rating of 50 for floor/ceiling assemblies separating dwelling units. In addition the IBC requires a minimum IIC rating of 50.

Performance Expectations

While IIC and STC are useful tools, they don't necessarily define acceptable performance to all occupants. One shortcoming of the tests is that audible low frequency noise transmission

is not measured. Consequently, a floor/ceiling assembly with a good IIC rating may still transmit the noise of heavy footsteps. Likewise, an assembly with a good STC rating may fail to adequately attenuate the bass from stereos and home theater systems. Where attenuation of very low frequencies is a concern, a more detailed analysis by an acoustic specialist is recommended.

Effect of Finished Flooring

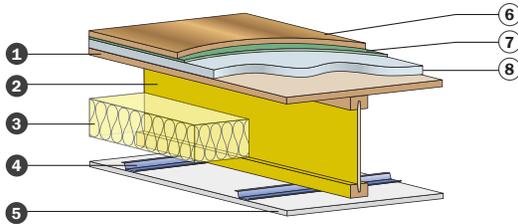
In addition to the construction of the base assembly, IIC ratings are very dependent on the combination of finished flooring and acoustic mats. Changes to flooring components can significantly alter an assembly's impact performance and IIC rating. Soft floor coverings, such as carpet with pad, perform better than hard floors such as tile, hardwood, and vinyl. With hard floors, special acoustic mats are commonly used above or below the underlayment to improve performance.

In contrast, the finished flooring typically has little effect on STC ratings, except when it adds significant mass. However, some combinations of flooring and acoustic mats may improve STC ratings. In general, STC ratings for assemblies with bare underlayment or vinyl can be conservatively used for identical assemblies with other types of finished flooring.

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BASE ASSEMBLY H

Assembly H Single Layer Ceiling, One-Hour Rated¹ ICC-ES ESR-1153, PFS FJ-1



Base Components:

1. Single layer of 48/24 minimum, span-rated tongue-and-groove sheathing (such as Weyerhaeuser's Edge™ or Edge Gold™ OSB, or equivalent), nailed and glued with a subfloor adhesive.
2. Flak Jacket™ protected TJI® 210, 230, 360, or 560 joist, with on-center spacing of 16" or less. For wider spacing, up to 24" on-center maximum, use 11 7/8" deep or greater TJI® 230, 360, or 560 joists.
3. Glass fiber insulation² placed between the TJI® joists and above the bottom flange. See tables for specifications.
4. RC1 resilient channels at 16" on-center
5. One layer 5/8" thick Type C gypsum board

Flooring Components, see tables below:

6. Finish flooring
7. Acoustic mat³
8. Underlayment³

(1) For more information about design, installation and fire performance of this assembly, see the *Weyerhaeuser Fire-Rated Assemblies and Sprinkler Systems Guide 1500*, ICC-ES ESR-1153 and PFS Listings.

(2) Insulation is optional for the fire resistance rating.

(3) In some assemblies, placement of acoustic mat is below underlayment. See tables.

Assembly H Tile Options

| Finish Flooring | IIC | STC | Acoustic Mat | Underlayment | Insulation |
|---|-----|-----|---|---|--------------------------|
| Ceramic tile bonded with thinset adhesive | 50 | 60 | ECORE 5mm QTscu® installed over gypsum concrete, bonded with E-Grip™ III adhesive | 1" gypsum concrete | 3 1/2" (R-11) fiberglass |
| Quarry tile bonded with thinset adhesive | 53 | 61 | Acousti-mat® II HP installed under gypsum concrete | 1" Maxxon® gypsum concrete underlayment | 3 1/2" (R-11) fiberglass |

Assembly H Hardwood Options

| Finish Flooring | IIC | STC | Acoustic Mat | Underlayment | Insulation |
|---|-----|-------------------|--|---|--------------------------|
| Engineered hardwood, 3/8" thick, floating | 50 | 58 | ECORE 5mm QTscu® installed over gypsum concrete | 1" gypsum concrete | 3 1/2" (R-11) fiberglass |
| Engineered hardwood, 1/2" thick, floating | 55 | 61 ⁽¹⁾ | Acousti-mat® II HP installed under gypsum concrete | 1" Maxxon® gypsum concrete underlayment | 3 1/2" (R-11) fiberglass |

(1) Value from the same assembly tested with quarry tile

Assembly H Sheet Vinyl Options

| Finish Flooring | IIC | STC | Acoustic Mat | Underlayment | Insulation |
|---|-----|-----|---|----------------------|--------------------------|
| Vinyl over 1/4" plywood | 50 | 52 | 1/2" Homasote® 440 SoundBarrier® | None | 6 1/4" (R-19) fiberglass |
| Cushioned vinyl, 0.145" thick, 0.53 psf | 50 | 56 | None | 3/4" gypsum concrete | 3 1/2" (R-11) fiberglass |
| Cushioned vinyl, 0.145" thick, 0.53 psf | 51 | 57 | None | 1" gypsum concrete | 3 1/2" (R-11) fiberglass |
| Cushioned vinyl, 0.145" thick, 0.53 psf | 53 | 58 | Acousti-mat® II installed under gypsum concrete | 1" gypsum concrete | 3 1/2" (R-11) fiberglass |

BASE ASSEMBLY H

Assembly H Vinyl Plank or Vinyl Tile Options

| Finish Flooring | IIC | STC | Acoustic Mat | Underlayment | Insulation |
|--|-----|-------------------|--|---|-----------------------|
| Vinyl tile | 50 | 58 | None | 1½" lightweight concrete | 3½" (R-11) fiberglass |
| Vinyl plank flooring, 0.2" thick, 1.75 psf | 57 | 61 ⁽¹⁾ | Acousti-mat® II HP installed under gypsum concrete | 1" Maxxon® gypsum concrete underlayment | 3½" (R-11) fiberglass |

(1) Value from the same assembly tested with quarry tile

Assembly H Carpet Options

| Finish Flooring ⁽¹⁾ | IIC | STC | Acoustic Mat | Underlayment | Insulation |
|--------------------------------|-----|-----|---|--------------------------|-----------------------|
| Carpet and pad | 61 | 55 | None | None | 3½" (R-11) fiberglass |
| Carpet and pad | 70 | 59 | Acousti-mat® II installed under gypsum concrete | 1" gypsum concrete | 3½" (R-11) fiberglass |
| Carpet and pad | 74 | 57 | None | 1" gypsum concrete | 3½" (R-11) fiberglass |
| Carpet and pad | 75 | 51 | ½" Homasote® 440 SoundBarrier® | None | 6¼" (R-19) fiberglass |
| Carpet and pad | 77 | 52 | ¾" Homasote® 440 SoundBarrier® | None | 6¼" (R-19) fiberglass |
| Carpet and pad | 77 | 58 | None | 1½" lightweight concrete | 3½" (R-11) fiberglass |

(1) For fire-resistance-rated assemblies, drainage holes in floor sheathing must be sealed or covered with an approved material to resist the free passage of flame.

Bare Assembly H No Finish Flooring

| Test Surface | IIC | STC | Acoustic Mat | Underlayment | Insulation |
|-------------------------|-----|-------------------|---|--------------------------|-----------------------|
| Bare OSB ⁽¹⁾ | 44 | 53 | None | None | 3½" (R-11) fiberglass |
| Bare gypsum concrete | 30 | 57 | None | 1" gypsum concrete | 3½" (R-11) fiberglass |
| Bare gypsum concrete | 45 | 58 ⁽²⁾ | Acousti-mat® II installed under gypsum concrete | 1" gypsum concrete | 3½" (R-11) fiberglass |
| Bare concrete | * | 57 | None | 1½" lightweight concrete | None |
| Bare concrete | * | 58 | None | 1½" lightweight concrete | 3½" (R-11) fiberglass |

(1) For fire-resistance-rated assemblies, drainage holes in floor sheathing must be sealed or covered with an approved material to resist the free passage of flame.

(2) Value from the same assembly tested with cushioned vinyl

* Not tested for IIC

Trus Joist®, the top rated brand in the industry, now offers a new fire-resistant solution—TJI® joists with Flak Jacket™ protection. Flak Jacket™ protection is a proprietary, patented coating that enhances the fire resistance of TJI® joists and enables them to meet both single- and multi-family fire protection code requirements.

Flak Jacket™ protection helps solve the challenge of shifting code requirements while providing all the quality and cost-efficiency you expect of Trus Joist® engineered lumber products.

Achieve a one-hour fire-rated assembly with just a single layer of gypsum and no expensive mineral wool. New TJI® joists with Flak Jacket™ protection save you time, maximize labor, reduce costs and complexity, and enable faster, more efficient construction.

Like all TJI® joists, no special tools, training or handling are required; you can cut and drill the joists as usual and use standard hangers for quick and smooth installation. TJI® joists with Flak Jacket™ protection deliver Weyerhaeuser quality and reliability backed by our service and support.

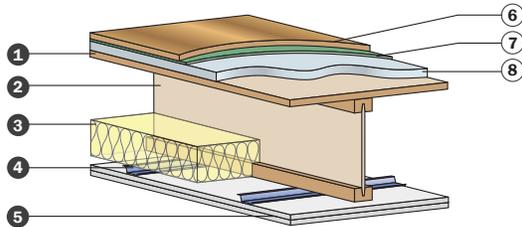
Some TJI® joist sizes and series may not be available in your region. Contact your Weyerhaeuser representative for more information.



BASE ASSEMBLY B

Assembly B Two Layer Ceiling, One-Hour Rated⁽¹⁾

ICC-ES ESR-1153, PFS FA-1,
Intertek WNR FCA 60-01, WNR FCA 60-03



Base Components:

1. Single layer of 48/24 minimum, span-rated tongue-and-groove sheathing (such as Weyerhaeuser's Edge™ or Edge Gold™ OSB, or equivalent), nailed and glued with a subfloor adhesive.
2. TJI® joists with on-center spacing of 24" maximum
3. Glass fiber insulation⁽²⁾, above resilient channels and between bottom flanges. Maximum R-30 rating. See tables for specifications.
4. RC1 resilient channels⁽²⁾ at 16" on-center. Spacing can be increased to 24" on-center for joists spaced 16" on-center.
5. Two layers of 5/8" thick Type X gypsum board complying with ASTM C36 or two layers of 1/2" thick Type C gypsum board.

Flooring Components, see tables below:

6. Finish flooring
7. Acoustic mat
8. Underlayment

(1) For more information on design, installation and fire performance of this assembly, see the *Weyerhaeuser Fire-Rated Assemblies and Sprinkler Systems Guide 1500*, ICC-ES ESR-1153, PFS and Intertek Listings.

(2) Insulation and resilient channels are optional for the fire resistance rating.

Assembly B Sheet Vinyl Options

| Finish Flooring | IIC | STC | Acoustic Mat | Underlayment | Insulation |
|-----------------|-----|-----|--------------|----------------------|--------------------------|
| Cushioned Vinyl | 50 | 58 | None | 3/4" gypsum concrete | 3 1/2" (R-11) fiberglass |

Assembly B Carpet Options

| Finish Flooring | IIC | STC | Acoustic Mat | Underlayment | Insulation |
|-----------------|-----|-----|--------------|----------------------|------------|
| Carpet and Pad | 54 | 58 | None | 3/4" gypsum concrete | None |
| Carpet and Pad | 60 | 50 | None | None | None |

Bare Assembly B No Finish Flooring

| Test Surface | IIC | STC | Acoustic Mat | Underlayment | Insulation |
|----------------------|-----|-----|--------------|----------------------|--------------------------|
| Bare OSB | * | 50 | None | None | None |
| Bare OSB | * | 54 | None | None | 3 1/2" (R-11) fiberglass |
| Bare gypsum concrete | * | 58 | None | 3/4" gypsum concrete | 3 1/2" (R-11) fiberglass |

* Not tested for IIC

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July 2015

Reorder TJ-4035

This document supersedes all previous versions. If this is more than one year old, contact your dealer or Weyerhaeuser rep.

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#TJ-9000 | SPECIFIER'S GUIDE

BEAMS, HEADERS, AND COLUMNS

Featuring Trus Joist® TimberStrand® LSL,
Microllam® LVL, and Parallam® PSL

- Uniform and Predictable
- Minimal Bowing, Twisting, and Shrinking
- Strong and Straight
- Limited Product Warranty





The products in this guide are readily available through our nationwide network of distributors and dealers. For more information on other applications or other Trus Joist® products, contact your Weyerhaeuser representative.

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Certified Sourcing
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SFI-00000

Why Choose Trus Joist® Beams, Columns, and Headers?

- Reliable performance
- Consistent quality and dependable uniformity
- Flexible solutions for your beam and header needs
- Backed by a limited product warranty

Using advanced technology, Weyerhaeuser manufactures engineered lumber that is consistently straight and strong, and resists bowing, twisting, and shrinking. That means less waste, easier installation, and higher design values for starters; plus fewer callbacks, shorter cycle times, more design flexibility, and lower overall installed cost in the end. Trus Joist® TimberStrand® LSL, Microllam® LVL, and Parallam® PSL are structural solutions you can count on—guaranteed.

This guide features Trus Joist® engineered lumber in the following widths and depths:

TimberStrand® LSL

1.55E TimberStrand® LSL sizes:

Widths: 1¾" and 3½"

Depths: 9¼", 9½", 11¼", 11⅞", 14", and 16"

1.3E TimberStrand® LSL header sizes:

Width: 3½"

Depths: 4⅜", 5½", 7¼", 8⅝", 9¼", and 11¼"

1.3E TimberStrand® LSL column and post sizes:

3½" x 3½" 3½" x 4⅜" 3½" x 5½" 3½" x 7¼" 3½" x 8⅝"

Microllam® LVL

2.0E Microllam® LVL header and beam sizes:

Width: 1¾"

Depths: 5½", 7¼", 9¼", 9½", 11¼", 11⅞", 14", 16", 18", and 20"

Parallam® PSL

2.0E Parallam® PSL header and beam sizes:

Widths: 3½", 5¼", and 7"

Depths: 9¼", 9½", 11¼", 11⅞", 14", 16", and 18"

1.8E Parallam® PSL column and post sizes:

3½" x 3½" 3½" x 5¼" 3½" x 7" 5¼" x 5¼" 5¼" x 7" 7" x 7"

For deeper depth Parallam® PSL beams, see the Trus Joist® 2.2E Parallam® PSL Deep Beam guide, TJ-7001, or contact your Weyerhaeuser representative.

Some sizes may not be available in your region.

TECHNICAL LITERATURE STRUCTURAL SOLUTIONS

Trus Joist® TimberStrand® Laminated Strand Lumber (LSL)

- One-piece members reduce labor time
- Every piece is straight and strong
- Unique properties allow you to drill larger holes through 1.55E TimberStrand® LSL. See Allowable Holes on page 36.



TimberStrand® LSL Grade Verification

TimberStrand® LSL is available in more than one grade. The product is stamped with its grade information, as shown in the examples below. With 1.55E TimberStrand® LSL, larger holes can be drilled through the beam.

 TimberStrand® LSL 1.3E ICCES ESR-1387 CCMC 12627-R  Certified Sourcing SFI-00008  0572 ■ Made in Canada 09-15-11 02 03:20

 TimberStrand® LSL 1.55E **ROUND HOLE ZONE** NO holes within 8" of beam ends ICCES ESR-1387 CCMC 12627-R  Certified Sourcing SFI-00008  0572 ■ Made in Canada 09-15-11 02 03:20

Actual stamps shown.

Code Evaluations: See ICC ES ESR-1387

Trus Joist® Microllam® Laminated Veneer Lumber (LVL)

- Can easily be built up on site to reduce heavy lifting
- Offers reliable and economical solutions for beam and header applications
- Manufacturing process minimizes many of the natural inconsistencies found in wood
- Available in some regions with a Watershed™ overlay for on-site weather protection



Code Evaluations: See ICC ES ESR-1387

Trus Joist® Parallam® Parallel Strand Lumber (PSL)

- Allows long spans for open floor plans without intermediate posts or columns
- Has warm, unique grain that is perfect for applications with exposed beams
- Provides ideal solutions for cantilever and multi-span applications
- Solid sections save time on site assembly
- Available in some regions with preservative treatment for exterior applications



Code Evaluations: See ICC ES ESR-1387

DESIGN PROPERTIES

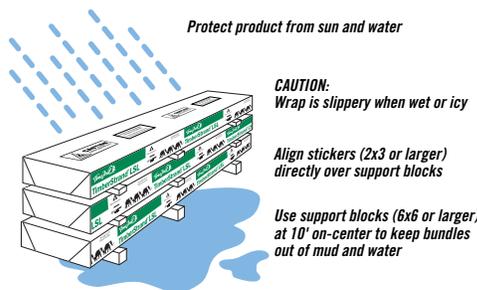
Allowable Design Properties⁽¹⁾ (100% Load Duration)

| Grade | Width | Design Property | Depth | | | | | | | | | | | | |
|--------------------------|--------|---------------------------------------|--------|--------|--------------------------|--------|--------|--------|--------|---------|---------|--------|--------|--------|--------|
| | | | 4 3/8" | 5 1/2" | 5 1/2" Plank Orientation | 7 1/4" | 8 5/8" | 9 1/4" | 9 1/2" | 11 1/4" | 11 1/8" | 14" | 16" | 18" | 20" |
| TimberStrand® LSL | | | | | | | | | | | | | | | |
| 1.3E | 3 1/2" | Moment (ft-lbs) | 1,735 | 2,685 | 1,780 | 4,550 | 6,335 | 7,240 | | 10,520 | | | | | |
| | | Shear (lbs) | 4,340 | 5,455 | 1,925 | 7,190 | 8,555 | 9,175 | | 11,155 | | | | | |
| | | Moment of Inertia (in. ⁴) | 24 | 49 | 20 | 111 | 187 | 231 | | 415 | | | | | |
| | | Weight (plf) | 4.5 | 5.6 | 5.6 | 7.4 | 8.8 | 9.4 | | 11.5 | | | | | |
| 1.55E | 1 3/4" | Moment (ft-lbs) | | | | | | 4,950 | 5,210 | 7,195 | 7,975 | 10,920 | 14,090 | | |
| | | Shear (lbs) | | | | | | 3,345 | 3,435 | 4,070 | 4,295 | 5,065 | 5,785 | | |
| | | Moment of Inertia (in. ⁴) | | | | | | 115 | 125 | 208 | 244 | 400 | 597 | | |
| | | Weight (plf) | | | | | | 5.1 | 5.2 | 6.2 | 6.5 | 7.7 | 8.8 | | |
| | 3 1/2" | Moment (ft-lbs) | | | | | | 9,905 | 10,420 | 14,390 | 15,955 | 21,840 | 28,180 | | |
| | | Shear (lbs) | | | | | | 6,690 | 6,870 | 8,140 | 8,590 | 10,125 | 11,575 | | |
| | | Moment of Inertia (in. ⁴) | | | | | | 231 | 250 | 415 | 488 | 800 | 1,195 | | |
| | | Weight (plf) | | | | | | 10.1 | 10.4 | 12.3 | 13 | 15.3 | 17.5 | | |
| Microllam® LVL | | | | | | | | | | | | | | | |
| 2.0E | 1 3/4" | Moment (ft-lbs) | | 2,125 | | 3,555 | | 5,600 | 5,885 | 8,070 | 8,925 | 12,130 | 15,555 | 19,375 | 23,580 |
| | | Shear (lbs) | | 1,830 | | 2,410 | | 3,075 | 3,160 | 3,740 | 3,950 | 4,655 | 5,320 | 5,985 | 6,650 |
| | | Moment of Inertia (in. ⁴) | | 24 | | 56 | | 115 | 125 | 208 | 244 | 400 | 597 | 851 | 1,167 |
| | | Weight (plf) | | 2.8 | | 3.7 | | 4.7 | 4.8 | 5.7 | 6.1 | 7.1 | 8.2 | 9.2 | 10.2 |
| Parallam® PSL | | | | | | | | | | | | | | | |
| 2.0E | 3 1/2" | Moment (ft-lbs) | | | | | | 12,415 | 13,055 | 17,970 | 19,900 | 27,160 | 34,955 | 43,665 | |
| | | Shear (lbs) | | | | | | 6,260 | 6,430 | 7,615 | 8,035 | 9,475 | 10,825 | 12,180 | |
| | | Moment of Inertia (in. ⁴) | | | | | | 231 | 250 | 415 | 488 | 800 | 1,195 | 1,701 | |
| | | Weight (plf) | | | | | | 10.1 | 10.4 | 12.3 | 13.0 | 15.3 | 17.5 | 19.7 | |
| | 5 1/4" | Moment (ft-lbs) | | | | | | 18,625 | 19,585 | 26,955 | 29,855 | 40,740 | 52,430 | 65,495 | |
| | | Shear (lbs) | | | | | | 9,390 | 9,645 | 11,420 | 12,055 | 14,210 | 16,240 | 18,270 | |
| | | Moment of Inertia (in. ⁴) | | | | | | 346 | 375 | 623 | 733 | 1,201 | 1,792 | 2,552 | |
| | | Weight (plf) | | | | | | 15.2 | 15.6 | 18.5 | 19.5 | 23.0 | 26.3 | 29.5 | |
| | 7" | Moment (ft-lbs) | | | | | | 24,830 | 26,115 | 35,940 | 39,805 | 54,325 | 69,905 | 87,325 | |
| | | Shear (lbs) | | | | | | 12,520 | 12,855 | 15,225 | 16,070 | 18,945 | 21,655 | 24,360 | |
| | | Moment of Inertia (in. ⁴) | | | | | | 462 | 500 | 831 | 977 | 1,601 | 2,389 | 3,402 | |
| | | Weight (plf) | | | | | | 20.2 | 20.8 | 24.6 | 26.0 | 30.6 | 35.0 | 39.4 | |

(1) For product in beam orientation, unless otherwise noted.

Some sizes may not be available in your region.

PRODUCT STORAGE



DESIGN PROPERTIES

Design Stresses⁽¹⁾ (100% Load Duration)

| Grade | Orientation | G Shear Modulus of Elasticity (psi) | E Modulus of Elasticity (psi) | E _{min} Adjusted Modulus of Elasticity ⁽²⁾ (psi) | F _b Flexural Stress ⁽³⁾ (psi) | F _t Tension Stress ⁽⁴⁾ (psi) | F _{c,⊥} Compression Perpendicular to Grain ⁽⁵⁾ (psi) | F _c Compression Parallel to Grain (psi) | F _v Horizontal Shear Parallel to Grain (psi) | SG Equivalent Specific Gravity ⁽⁶⁾ |
|--------------------------|-------------|-------------------------------------|-------------------------------|--|---|--|--|--|---|---|
| TimberStrand® LSL | | | | | | | | | | |
| 1.3E | Beam/Column | 81,250 | 1.3 x 10 ⁶ | 660,750 | 1,700 | 1,075 | 710 | 1,835 | 425 | 0.50 ⁽⁷⁾ |
| | Plank | 81,250 | 1.3 x 10 ⁶ | 660,750 | 1,900 ⁽⁸⁾ | 1,075 | 635 ⁽⁹⁾ | 1,835 | 150 | 0.50 ⁽⁷⁾ |
| 1.55E | Beam | 96,875 | 1.55 x 10 ⁶ | 787,815 | 2,325 | 1,070 ⁽¹⁰⁾ | 900 | 2,170 | 310 ⁽¹⁰⁾ | 0.50 ⁽⁷⁾ |
| Microllam® LVL | | | | | | | | | | |
| 2.0E | Beam | 125,000 | 2.0 x 10 ⁶ | 1,016,535 | 2,600 | 1,555 | 750 | 2,510 | 285 | 0.50 |
| Parallam® PSL | | | | | | | | | | |
| 1.8E | Column | 112,500 | 1.8 x 10 ⁶ | 914,880 | 2,400 ⁽¹¹⁾ | 1,755 | 425 ⁽¹¹⁾ | 2,500 | 190 ⁽¹¹⁾ | 0.50 |
| 2.0E | Beam | 125,000 | 2.0 x 10 ⁶ | 1,016,535 | 2,900 | 2,025 | 750 | 2,900 ⁽¹²⁾ | 290 | 0.50 |

(1) Unless otherwise noted, adjustment to the design stresses for duration of load are permitted in accordance with the applicable code.

(2) Reference modulus of elasticity for beam and column stability calculations, per NDS®.

(3) For 12" depth. For other depths, multiply F_b by the appropriate factor as follows:

– For TimberStrand® LSL, multiply by $\left[\frac{12}{d}\right]^{0.092}$

– For Microllam® LVL, multiply by $\left[\frac{12}{d}\right]^{0.136}$

– For Parallam® PSL, multiply by $\left[\frac{12}{d}\right]^{0.111}$

(4) F_t has been adjusted to reflect the volume effects for most standard applications.

(5) F_{c,⊥} may not be increased for duration of load.

(6) For lateral connection design only.

(7) Specific gravity of 0.58 may be used for bolts installed perpendicular to face and loaded perpendicular to grain.

(8) Values are for thickness up to 3½".

(9) For members less than 1¾" thick and in plank orientation, use F_{c,⊥} of 670 psi. NDS® bearing area factor C_b = 1.0.

(10) Value accounts for large hole capabilities. See **Allowable Holes** on page 36.

(11) Value shown is for plank orientation.

(12) For column applications, use F_{c||} of 500 psi. Alternatively, refer to ESR-1387, Table 1, footnote 15.

General Assumptions for Trus Joist® Beams

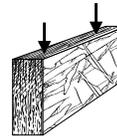
- Lateral support is required at bearing and along the span at 24" on-center, maximum.
- Bearing lengths are based on each product's bearing stress for applicable grade and orientation.
- All members 7¼" and less in depth are restricted to a maximum deflection of ¼".
- Beams that are 1¾" x 16" and deeper require multiple plies.
- No camber.
- Beams and columns must remain straight to within 51/4608 (in.) of true alignment. L is the unrestrained length of the member in feet.
- Tables on pages 8–15 include load reductions applied in accordance with code.

For applications not covered in this brochure, contact your Weyerhaeuser representative.

See pages 38 and 39 for multiple-member beam connections.

TimberStrand® LSL, Microllam® LVL, and untreated Parallam® PSL are intended for dry-use applications

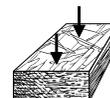
Beam Orientation



Column Orientation



Plank Orientation



SIZING TABLES

How to Use This Table

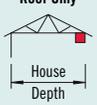
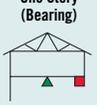
1. Determine **Header Condition**.
2. Locate **Rough Opening**.
3. Determine loading and **House Depth**.
4. Select TimberStrand® LSL header depth.

Note: ***Bold italic*** indicates that a 3½" x 5½" TimberStrand® LSL header can be installed in plank orientation in a 2x6 wall.

Also see **General Notes** on page 7.

1.3E TimberStrand® LSL

3½" Wide 1.3E TimberStrand® LSL Window and Door Headers

| Header Condition | Rough Opening | Non-Snow Area 125% | | | | | | Snow Area 115% | | | | | | | | | | | | | | | | | |
|--|---------------------|---|---------------------|---------------------|---------------------|---------------------|---------------------|---|---------------------|---------------------|---------------------|---------------------|---------------------|---|---------------------|---------------------|---------------------|--|--|---|--|--|--|--|--|
| | | Roof Load = 20LL + 15DL Floor Load = 40LL + 12DL | | | | | | Roof Load = 30LL + 15DL Floor Load = 40LL + 12DL | | | | | | Roof Load = 40LL + 15DL Floor Load = 40LL + 12DL | | | | | | Roof Load = 55LL + 15DL Floor Load = 40LL + 12DL | | | | | |
| | | House Depth | | | House Depth | | | House Depth | | | House Depth | | | House Depth | | | House Depth | | | | | | | | |
| | 24' | 28' | 32' | 24' | 28' | 32' | 24' | 28' | 32' | 24' | 28' | 32' | 24' | 28' | 32' | | | | | | | | | | |
|  Roof Only | 3'-2" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | | | | | | | | | |
| | 3'-8" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 5½" | 5½" | 5½" | 5½" | | | | | | | | | |
| | 4'-2" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | | | | | | | | | |
| | 4'-8" | 4½" | 4½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 7¼" | 7¼" | 7¼" | 7¼" | | | | | | | | | |
| | 5'-2" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | | | | | | | | | |
| | 5'-8" | 5½" | 5½" | 5½" | 5½" | 5½" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 8⅝" ⁽²⁾ | 8⅝" ⁽²⁾ | | | | | | | | |
| | 6'-2" | 5½" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 8⅝" | 8⅝" | 8⅝" | 8⅝" ⁽²⁾ | | | | | | | | |
| | 6'-8" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 8⅝" | 8⅝" | 8⅝" | 8⅝" | 8⅝" ⁽²⁾ | 8⅝" ⁽²⁾ | 9¼" ⁽²⁾ | | | | | | | | |
| | 7'-2" | 7¼" | 7¼" | 7¼" | 7¼" | 8⅝" | 8⅝" | 8⅝" | 8⅝" | 8⅝" | 8⅝" | 8⅝" | 8⅝" | 8⅝" | 9¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | | | | | | | | |
| | 8'-2" | 8⅝" | 8⅝" | 8⅝" | 8⅝" | 8⅝" | 8⅝" | 8⅝" | 8⅝" | 8⅝" | 9¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | | | | | | | | |
| 9'-2" | 8⅝" | 8⅝" | 9¼" | 9¼" | 9¼" | 9¼" | 11¼" ⁽²⁾ | 11¼" | 11¼" ⁽²⁾ | 11¼" | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | | | | | | | | | |
|  Floor – One Story | 3'-2" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | | | | | | | | | |
| | 3'-8" | 4½" | 4½" | 5½" | 4½" | 4½" | 5½" | 4½" | 4½" | 5½" | 4½" | 4½" | 5½" | 4½" | 4½" | 5½" | | | | | | | | | |
| | 4'-2" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | | | | | | | | | |
| | 4'-8" | 5½" | 5½" | 7¼" | 5½" | 5½" | 7¼" | 5½" | 5½" | 7¼" | 5½" | 5½" | 7¼" | 5½" | 5½" | 7¼" | | | | | | | | | |
| | 5'-2" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | | | | | | | | | |
| | 5'-8" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | | | | | | | | | |
| | 6'-2" | 7¼" | 7¼" | 8⅝" | 7¼" | 7¼" | 8⅝" | 7¼" | 7¼" | 8⅝" | 7¼" | 7¼" | 8⅝" | 7¼" | 7¼" | 8⅝" | | | | | | | | | |
| | 6'-8" | 7¼" | 8⅝" | 8⅝" | 7¼" | 8⅝" | 8⅝" | 7¼" | 8⅝" | 8⅝" | 7¼" | 8⅝" | 8⅝" | 7¼" | 8⅝" | 8⅝" | | | | | | | | | |
| | 7'-2" | 8⅝" | 8⅝" | 9¼" ⁽²⁾ | 8⅝" | 8⅝" | 9¼" ⁽²⁾ | 8⅝" | 8⅝" | 9¼" ⁽²⁾ | 8⅝" | 8⅝" | 9¼" ⁽²⁾ | 8⅝" | 8⅝" | 9¼" ⁽²⁾ | 9¼" ⁽²⁾ | | | | | | | | |
| | 8'-2" | 9¼" | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 9¼" | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 9¼" | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 9¼" | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 9¼" | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | | | | | | | | |
| 9'-2" | 11¼" | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | | | | | | | | | |
|  Roof Plus One Story (Bearing) | 3'-2" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 4½" | 5½" | 4½" | 4½" | 5½" | 4½" | 5½" | 5½" | 5½" | | | | | | | | | |
| | 3'-8" | 4½" | 4½" | 4½" | 4½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 7¼" | | | | | | | | | |
| | 4'-2" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" ⁽²⁾ | | | | | | | | | |
| | 4'-8" | 5½" | 5½" | 7¼" | 5½" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" ⁽²⁾ | 8⅝" ⁽²⁾ | 8⅝" ⁽²⁾ | | | | | | | | | |
| | 5'-2" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 8⅝" ⁽²⁾ | 7¼" ⁽²⁾ | 8⅝" ⁽²⁾ | 8⅝" ⁽²⁾ | 8⅝" ⁽²⁾ | 8⅝" ⁽²⁾ | 9¼" ⁽²⁾ | | | | | | | | | |
| | 5'-8" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 8⅝" ⁽²⁾ | 7¼" | 8⅝" ⁽²⁾ | 8⅝" ⁽²⁾ | 9¼" ⁽²⁾ | | | | | | | | | |
| | 6'-2" | 7¼" | 7¼" | 8⅝" | 7¼" | 8⅝" ⁽²⁾ | 8⅝" ⁽²⁾ | 8⅝" ⁽²⁾ | 8⅝" ⁽²⁾ | 9¼" ⁽²⁾ | 8⅝" ⁽²⁾ | 9¼" ⁽²⁾ | 8⅝" ⁽²⁾ | 9¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | | | | | | | | | |
| | 6'-8" | 8⅝" | 8⅝" | 8⅝" ⁽²⁾ | 8⅝" | 8⅝" ⁽²⁾ | 9¼" ⁽²⁾ | 8⅝" ⁽²⁾ | 9¼" ⁽²⁾ | 11¼" ⁽²⁾ | 9¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | | | | | | | | | |
| | 7'-2" | 8⅝" | 8⅝" ⁽²⁾ | 8⅝" ⁽²⁾ | 8⅝" ⁽²⁾ | 9¼" ⁽²⁾ | 11¼" ⁽²⁾ | 9¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 9¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | | | | | | | | | |
| | 8'-2" | 9¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | | | | | | | | | |
| 9'-2" | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | 11¼" ⁽²⁾ | | | | | | | | | | |

- Symbol represents location of TimberStrand® LSL header.
- ▲ Symbol represents supporting beam or structural bearing wall located at center of house, below floor.
- () Symbol represents minimum number of 2x trimmers required at end of header.
- * See **Bearing Requirements** on page 7 for bearing length requirements at continuous-span supports.

SIZING TABLES

General Notes

- Tables are based on:
 - Uniform loads.
 - More restrictive of simple or continuous span. Ratio of short span to long span should be greater than 0.4 to prevent uplift.
 - Roof truss framing with 24" soffits.
 - Exterior wall weights of 80 plf, interior 60 plf.
 - Deflection criteria of L/360 live load and L/240 total load.
 - Tables do not consider attic loads acting concurrently with roof or snow loads.
- Also see *How to Use This Table* on page 6 and *General Assumptions* on page 5.

Bearing Requirements

Tables assume minimum header support to be one trimmer (1½") at each end and 4½" at continuous-span supports.

In **Sizing Tables** on pages 6 and 7:

(2) Indicates minimum header support to be two trimmers (3") at each end and 7½" at continuous-span supports.

(3) Indicates minimum header support to be three trimmers (4½") at each end and 11¼" at continuous-span supports.

For additional bearing information, see pages 34 and 36.

3½" Wide 1.3E TimberStrand® LSL Window and Door Headers *continued*

| Header Condition | Rough Opening | Non-Snow Area 125% | | | | | | Snow Area 115% | | | | | |
|---|---------------|---|------|------|---|------|------|---|------|------|---|------|------|
| | | Roof Load = 20LL + 15DL Floor Load = 40LL + 12DL | | | Roof Load = 30LL + 15DL Floor Load = 40LL + 12DL | | | Roof Load = 40LL + 15DL Floor Load = 40LL + 12DL | | | Roof Load = 55LL + 15DL Floor Load = 40LL + 12DL | | |
| | | House Depth | | | House Depth | | | House Depth | | | House Depth | | |
| | | 24' | 28' | 32' | 24' | 28' | 32' | 24' | 28' | 32' | 24' | 28' | 32' |
| <p>Roof Plus One Story (No bearing)</p> | 3'-2" | 4¾" | 4¾" | 4¾" | 4¾" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" |
| | 3'-8" | 5½" | 5½" | 5½" | 5½" | 5½" | 7¼" | 5½" | 5½" | 7¼" | 5½" | 7¼" | 7¼" |
| | 4'-2" | 5½" | 5½" | 7¼" | 5½" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 8½" |
| | 4'-8" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 8½" | 7¼" | 8½" | 8½" | 8½" |
| | 5'-2" | 7¼" | 7¼" | 7¼" | 7¼" | 8½" | 8½" | 8½" | 8½" | 8½" | 8½" | 8½" | 9¼" |
| | 5'-8" | 7¼" | 8½" | 8½" | 8½" | 8½" | 9¼" | 8½" | 9¼" | 11¼" | 9¼" | 11¼" | 11¼" |
| | 6'-2" | 8½" | 8½" | 9¼" | 8½" | 9¼" | 11¼" | 9¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" |
| | 6'-8" | 8½" | 9¼" | 11¼" | 9¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" |
| | 7'-2" | 9¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" |
| 8'-2" | 11¼" | 11¼" | | 11¼" | | | | | | | 11¼" | | |
| <p>Floor - Two Stories</p> | 3'-2" | 5½" | 5½" | 7¼" | 5½" | 5½" | 7¼" | 5½" | 5½" | 7¼" | 5½" | 5½" | 7¼" |
| | 3'-8" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" |
| | 4'-2" | 7¼" | 8½" | 8½" | 7¼" | 8½" | 8½" | 7¼" | 8½" | 8½" | 7¼" | 8½" | 8½" |
| | 4'-8" | 8½" | 8½" | 9¼" | 8½" | 8½" | 9¼" | 8½" | 8½" | 9¼" | 8½" | 8½" | 9¼" |
| | 5'-2" | 8½" | 9¼" | 11¼" | 8½" | 9¼" | 11¼" | 8½" | 9¼" | 11¼" | 8½" | 9¼" | 11¼" |
| | 5'-8" | 9¼" | 11¼" | 11¼" | 9¼" | 11¼" | 11¼" | 9¼" | 11¼" | 11¼" | 9¼" | 11¼" | 11¼" |
| | 6'-2" | 11¼" | 11¼" | | 11¼" | 11¼" | | 11¼" | 11¼" | | 11¼" | 11¼" | |
| | 6'-8" | | | | | | | | | | | | |
| | 7'-2" | | | | | | | | | | | | |
| <p>Roof Plus Two Stories (Bearing)</p> | 3'-2" | 4¾" | 4¾" | 5½" | 4¾" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 5½" | 7¼" |
| | 3'-8" | 5½" | 5½" | 7¼" | 5½" | 5½" | 7¼" | 5½" | 7¼" | 7¼" | 7¼" | 7¼" | 8½" |
| | 4'-2" | 5½" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 8½" | 7¼" | 8½" | 8½" | 8½" |
| | 4'-8" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 8½" | 7¼" | 8½" | 8½" | 8½" | 8½" | 8½" |
| | 5'-2" | 7¼" | 7¼" | 8½" | 7¼" | 8½" | 8½" | 8½" | 8½" | 9¼" | 8½" | 9¼" | 9¼" |
| | 5'-8" | 7¼" | 8½" | 8½" | 8½" | 8½" | 9¼" | 8½" | 9¼" | 11¼" | 9¼" | 11¼" | 11¼" |
| | 6'-2" | 8½" | 8½" | 9¼" | 9¼" | 9¼" | 11¼" | 9¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" |
| | 6'-8" | 8½" | 9¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" |
| | 7'-2" | 9¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" |
| <p>Roof Plus Two Stories (No bearing)</p> | 3'-2" | 5½" | 5½" | 7¼" | 5½" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" |
| | 3'-8" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 7¼" | 8½" | 7¼" | 8½" | 8½" | 8½" |
| | 4'-2" | 7¼" | 7¼" | 8½" | 7¼" | 8½" | 8½" | 8½" | 8½" | 8½" | 8½" | 8½" | 9¼" |
| | 4'-8" | 8½" | 8½" | 8½" | 8½" | 8½" | 9¼" | 8½" | 9¼" | 11¼" | 8½" | 9¼" | 11¼" |
| | 5'-2" | 8½" | 9¼" | 9¼" | 9¼" | 11¼" | 11¼" | 9¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" |
| | 5'-8" | 9¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" |
| | 6'-2" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" | 11¼" |
| | 6'-8" | | | | | | | | | | | | |
| | 7'-2" | | | | | | | | | | | | |

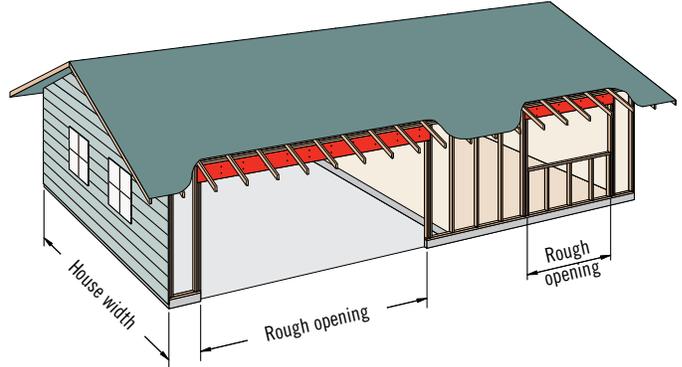
- Symbol represents location of TimberStrand® LSL header.
- ▲ Symbol represents supporting beam or structural bearing wall located at center of house, below floor.
- () Symbol represents minimum number of 2x trimmers required at end of header.
- See *Bearing Requirements* above for bearing length requirements at continuous-span supports.

SIZING TABLES

How to Use This Table

1. Determine appropriate **Roof Load** and **House Width**.
 2. Locate **Rough Opening**.
 3. Select header size and material.
- Weyerhaeuser offers 1.55E TimberStrand® LSL pre-cut garage door headers in selected regions. Call 1-888-453-8358 to determine availability.

Also see **General Notes** on page 9.



Headers Supporting Roof

| Roof Load (PSF) | House Width | Rough Opening | | | | | | | | | |
|-----------------------|------------------|--------------------------------|-----------------|----------------------------|------------------|--------------------------------|------------------|----------------------------|----------------------------|----------------------------|-------|
| | | 8' | | 9'-3" | | 10' | | 12' | | | |
| Non-Snow Area 125% | 20LL + 15DL | 24' | 1 3/4" x 9 1/4" | T M | 1 3/4" x 9 1/4" | T M | 1 3/4" x 9 1/4" | T M | 1 3/4" x 11 1/4" | T M | |
| | | | 3 1/2" x 7 1/4" | M | 3 1/2" x 9 1/4" | T M P | 1 3/4" x 11 1/8" | T M | 1 3/4" x 11 7/8" | T M | |
| | | | 3 1/2" x 9 1/4" | T M P | 5 1/4" x 7 1/4" | M | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | |
| | | 30' | 1 3/4" x 9 1/4" | T M | 1 3/4" x 9 1/4" | T M | 1 3/4" x 11 1/4" | T M | 1 3/4" x 14" | T M | |
| | | | 3 1/2" x 7 1/4" | M | 1 3/4" x 11 1/8" | T M | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | |
| | | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | | | 3 1/2" x 11 1/4" | T M P | |
| | 36' | 1 3/4" x 9 1/4" | T M | 1 3/4" x 11 1/4" | T M | 1 3/4" x 11 1/4" | T M | 1 3/4" x 14 ⁽³⁾ | T M | | |
| | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 1 3/4" x 11 7/8" | T M | 3 1/2" x 9 1/2" | T M P | | |
| | | 5 1/4" x 7 1/4" | M | | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | | |
| | | 20LL + 20DL | 24' | 1 3/4" x 9 1/4" | T M | 1 3/4" x 9 1/4" | T M | 1 3/4" x 11 1/4" | T M | 1 3/4" x 11 7/8" | T M |
| | | | | 3 1/2" x 7 1/4" | M | 1 3/4" x 9 1/2" | T M | 3 1/2" x 9 1/4" | T M P | 1 3/4" x 14" | T M |
| | | | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | | | 3 1/2" x 9 1/2" | T M P |
| | 30' | | 1 3/4" x 9 1/4" | T M | 1 3/4" x 11 1/4" | T M | 1 3/4" x 11 1/4" | T M | 1 3/4" x 14 ⁽³⁾ | T M | |
| | | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 1 3/4" x 11 7/8" | T M | 3 1/2" x 9 1/4" | T M P | |
| | | | 5 1/4" x 7 1/4" | M | | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | |
| | 36' | 1 3/4" x 9 1/4" | T M | 1 3/4" x 11 1/4" | T M | 1 3/4" x 11 7/8 ⁽³⁾ | T M | 3 1/2" x 11 1/4" | T M P | | |
| | | 1 3/4" x 11 1/4" | T M | 1 3/4" x 11 7/8" | T M | 1 3/4" x 14 ⁽³⁾ | T M | 5 1/4" x 9 1/4" | T M P | | |
| | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | | | | |
| | | 25LL + 15DL | 24' | 1 3/4" x 9 1/4" | T M | 1 3/4" x 9 1/4" | T M | 1 3/4" x 11 1/4" | T M | 1 3/4" x 14" | T M |
| | | | | 3 1/2" x 7 1/4" | M | 1 3/4" x 11 1/4" | T M | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/2" | T M P |
| | | | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | | | 5 1/4" x 9 1/4" | T M P |
| | 1 3/4" x 9 1/2" | | | T M | 1 3/4" x 11 1/4" | T M | 1 3/4" x 11 1/4" | T M | 1 3/4" x 14 ⁽³⁾ | T M | |
| | 30' | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 1 3/4" x 11 7/8" | T M | 3 1/2" x 9 1/2" | T M P | |
| | | | 5 1/4" x 7 1/4" | M | | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | |
| 1 3/4" x 11 1/4" | | | T M | 1 3/4" x 11 1/4" | T M | 1 3/4" x 14 ⁽³⁾ | T M | 3 1/2" x 11 1/4" | T M P | | |
| 3 1/2" x 9 1/4" | | | T M P | 3 1/2" x 9 1/4" | T M P | | | 5 1/4" x 9 1/4" | T M P | | |
| 36' | 1 3/4" x 11 1/4" | | T M | 1 3/4" x 11 1/4" | T M | 1 3/4" x 14 ⁽³⁾ | T M | 3 1/2" x 11 1/4" | T M P | | |
| | 3 1/2" x 9 1/4" | | T M P | 3 1/2" x 9 1/4" | T M P | | | | | | |
| | 5 1/4" x 7 1/4" | | M | | | | | | | | |
| | 30LL + 15DL | | 24' | 1 3/4" x 9 1/4" | T M | 1 3/4" x 11 1/4" | T M | 1 3/4" x 11 1/4" | T M | 1 3/4" x 14 ⁽³⁾ | T M |
| 3 1/2" x 7 1/4" | | M | | 3 1/2" x 9 1/4" | T M P | 1 3/4" x 11 7/8" | T M | 3 1/2" x 9 1/4" | T M P | | |
| 3 1/2" x 9 1/4" | | T M P | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | | |
| 1 3/4" x 9 1/2" | | T M | | 1 3/4" x 11 1/4" | T M | 1 3/4" x 14 ⁽³⁾ | T M | 3 1/2" x 11 1/4" | T M P | | |
| 30' | | 1 3/4" x 11 1/4" | T M | 1 3/4" x 11 7/8" | T M | 3 1/2" x 9 1/4" | T M P | 5 1/4" x 9 1/4" | T M P | | |
| | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | | | | | | |
| | | 1 3/4" x 11 1/4" | T M | 1 3/4" x 14 ⁽³⁾ | T M | 1 3/4" x 14 ⁽³⁾ | T M | 3 1/2" x 11 7/8" | T M P | | |
| | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/2" | T M P | 5 1/4" x 9 1/4" | T M P | | |
| 36' | | 5 1/4" x 7 1/4" | M | | | 5 1/4" x 9 1/4" | T M P | 5 1/4" x 11 1/4" | T M P | | |
| | | 1 3/4" x 9 1/2" | T M | 1 3/4" x 11 1/4" | T M | 1 3/4" x 14 ⁽³⁾ | T M | 3 1/2" x 11 1/4" | T M P | | |
| | | 1 3/4" x 11 1/4" | T M | 1 3/4" x 11 7/8" | T M | 3 1/2" x 9 1/4" | T M P | 5 1/4" x 9 1/4" | T M P | | |
| | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | | | | | | |
| 40LL + 15DL | 24' | 1 3/4" x 9 1/2" | T M | 1 3/4" x 11 1/4" | T M | 1 3/4" x 14 ⁽³⁾ | T M | 3 1/2" x 11 1/4" | T M P | | |
| | | 1 3/4" x 11 1/4" | T M | 1 3/4" x 11 7/8" | T M | 3 1/2" x 9 1/4" | T M P | 5 1/4" x 9 1/4" | T M P | | |
| | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | | | | | | |
| | 30' | 1 3/4" x 11 1/4 ⁽³⁾ | T M | 1 3/4" x 14 ⁽³⁾ | T M | 1 3/4" x 14 ⁽³⁾ | T M | 3 1/2" x 11 7/8" | T M P | | |
| | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 5 1/4" x 9 1/4" | T M P | | |
| | | 5 1/4" x 7 1/4" | M | | | | | | | | |

SIZING TABLES

General Notes

- Table is based on:
 - Uniform loads.
 - More restrictive of simple or continuous span. Ratio of short span to long span should be 0.4 or greater to prevent uplift.
 - Roof truss framing with 24" soffits.
 - Deflection criteria of L/240 live load and L/180 total load.
 - Tables do not consider attic loads acting concurrently with roof or snow loads.
- Also see **How to Use This Table** on page 8 and **General Assumptions** on page 5.

Bearing Requirements

Minimum header support to be two trimmers (3") at each end and 7½" at continuous-span supports.

In **Sizing Tables** on pages 8 and 9:

- (3) Indicates requirement of three trimmers (4½") at each end and 11¼" at continuous-span supports.

Headers Supporting Roof *continued*

| Roof Load (PSF) | House Width | Rough Opening | | | | | | | | | | | | |
|-----------------------|--------------------------|---------------|--------------------------|-----------|--------------------------|--------------------------|------------|-----------|--------------------------|--------------------------|------------|---|---|---|
| | | 14' | | 16'-3" | | 18'-3" | | | | | | | | |
| | | T | M | T | M | T | M | | | | | | | |
| Non-Snow Area 125% | 20LL + 15DL | 24' | 1¾" x 14" | T | M | 3½" x 11¼" | T | M | P | 3½" x 14" | T | M | P | |
| | | | 3½" x 9½" | T | M | P | 3½" x 14" | T | M | P | 5¼" x 11½" | T | M | P |
| | | | 3½" x 11¼" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P |
| | | 30' | 3½" x 11¼" | T | M | P | 3½" x 11½" | T | M | P | 3½" x 14" | T | M | P |
| | | | 5¼" x 9¼" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P |
| | | | 5¼" x 11¼" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P |
| | 36' | 3½" x 11½" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P | |
| | | 5¼" x 9½" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 14" | T | M | P | |
| | | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | | | | | |
| | 20LL + 20DL | 24' | 1¾" x 14" ⁽³⁾ | T | M | 3½" x 11½" | T | M | P | 3½" x 14" | T | M | P | |
| | | | 3½" x 11¼" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P |
| | | | 5¼" x 9½" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P |
| 30' | | 3½" x 11½" | T | M | P | 3½" x 14" | T | M | P | 3½" x 14" | T | M | P | |
| | | 5¼" x 9¼" | T | M | P | 5¼" x 11¼" | T | M | P | 3½" x 16" | T | M | P | |
| | | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P | |
| 36' | 3½" x 11½" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P | | |
| | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P | 5¼" x 14" | T | M | P | | |
| | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 16" | T | M | P | | |
| Snow Area 115% | 25LL + 15DL | 24' | 3½" x 11¼" | T | M | P | 3½" x 11½" | T | M | P | 3½" x 14" | T | M | P |
| | | | 5¼" x 9¼" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P |
| | | | 5¼" x 9½" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P |
| | | 30' | 3½" x 11½" | T | M | P | 3½" x 14" | T | M | P | 3½" x 14" | T | M | P |
| | | | 5¼" x 9¼" | T | M | P | 5¼" x 11¼" | T | M | P | 3½" x 16" | T | M | P |
| | | | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P |
| | 36' | 3½" x 11½" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P | |
| | | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P | 5¼" x 14" | T | M | P | |
| | | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 16" | T | M | P | |
| | 30LL + 15DL | 24' | 3½" x 11½" | T | M | P | 3½" x 14" | T | M | P | 3½" x 14" | T | M | P |
| | | | 5¼" x 9¼" | T | M | P | 5¼" x 11¼" | T | M | P | 3½" x 16" | T | M | P |
| | | | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 11½" | T | M | P |
| 30' | | 3½" x 11½" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P | |
| | | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P | 5¼" x 14" | T | M | P | |
| | | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | | | | | |
| 36' | 3½" x 14" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" ⁽³⁾ | T | M | P | | |
| | 5¼" x 11¼" | T | M | P | 3½" x 16" | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | | |
| | | | | 5¼" x 14" | T | M | P | 5¼" x 14" | T | M | P | | | |
| 40LL + 15DL | 24' | 3½" x 11½" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P | |
| | | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P | 5¼" x 14" | T | M | P | |
| | | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | | | | | |
| | 30' | 3½" x 14" | T | M | P | 3½" x 16" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | |
| | | 5¼" x 11¼" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 14" | T | M | P | |
| | | 5¼" x 11½" | T | M | P | | | | 5¼" x 16" | T | M | P | | |
| 36' | 3½" x 14" ⁽³⁾ | T | M | P | 3½" x 16" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | | |
| | 3½" x 16" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | 3½" x 20" ⁽³⁾ | T | M | P | | |
| | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | | |

T 1.55E TimberStrand® LSL

M 2.0E Microllam® LVL

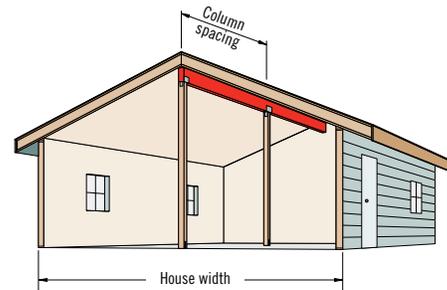
P 2.0E Parallam® PSL

SIZING TABLES

How to Use This Table

1. Determine appropriate **Roof Load** and **House Width**.
2. Locate **Column Spacing**.
3. Select beam size and material.

Also see **General Notes** on page 11.



Ridge Beams

| Roof Load (PSF) | House Width | Column Spacing | | | | | | | | | | |
|-----------------------|-------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|-------|
| | | 10' | 12' | 14' | 16' | | | | | | | |
| Non-Snow Area 125% | 20LL + 15DL | 24' | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 3 1/2" x 11 1/4" | T M P |
| | | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 5 1/4" x 9 1/4" | T M P | 5 1/4" x 9 1/4" | T M P |
| | | 30' | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 3 1/2" x 14" | T M P |
| | | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 5 1/4" x 9 1/4" | T M P | 5 1/4" x 11 1/4" | T M P |
| | | 36' | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 3 1/2" x 14" | T M P |
| | | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 5 1/4" x 9 1/4" | T M P | 5 1/4" x 11 1/4" | T M P |
| | 20LL + 20DL | 24' | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/2" | T M P | 3 1/2" x 11 1/4" | T M P | 3 1/2" x 11 1/4" | T M P |
| | | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 5 1/4" x 9 1/4" | T M P | 5 1/4" x 11 1/4" | T M P |
| | | 30' | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/2" | T M P | 3 1/2" x 11 1/4" | T M P | 3 1/2" x 11 1/4" | T M P |
| | | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 5 1/4" x 9 1/4" | T M P | 5 1/4" x 11 1/4" | T M P |
| | | 36' | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 3 1/2" x 11 1/8" | T M P | 3 1/2" x 14" | T M P |
| | | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 5 1/4" x 9 1/2" | T M P | 5 1/4" x 11 1/4" | T M P |
| Snow Area 115% | 25LL + 15DL | 24' | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/2" | T M P | 3 1/2" x 11 1/4" | T M P | 3 1/2" x 11 1/8" | T M P |
| | | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 5 1/4" x 9 1/4" | T M P | 5 1/4" x 11 1/4" | T M P |
| | | 30' | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/2" | T M P | 3 1/2" x 11 1/4" | T M P | 3 1/2" x 11 1/8" | T M P |
| | | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 5 1/4" x 9 1/4" | T M P | 5 1/4" x 11 1/4" | T M P |
| | | 36' | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/2" | T M P | 3 1/2" x 11 1/8" | T M P | 3 1/2" x 14" | T M P |
| | | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 5 1/4" x 9 1/4" | T M P | 5 1/4" x 11 1/4" | T M P |
| | 30LL + 15DL | 24' | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 3 1/2" x 14" | T M P |
| | | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 5 1/4" x 9 1/4" | T M P | 5 1/4" x 11 1/4" | T M P |
| | | 30' | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 3 1/2" x 11 1/8" | T M P | 3 1/2" x 14" | T M P |
| | | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 5 1/4" x 9 1/4" | T M P | 5 1/4" x 11 1/4" | T M P |
| | | 36' | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 3 1/2" x 11 1/8" | T M P | 3 1/2" x 14" | T M P |
| | | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 5 1/4" x 9 1/4" | T M P | 5 1/4" x 11 1/4" | T M P |
| 40LL + 15DL | 24' | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 3 1/2" x 11 1/8" | T M P | 3 1/2" x 14" | T M P | |
| | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 5 1/4" x 9 1/4" | T M P | 5 1/4" x 11 1/4" | T M P | |
| | 30' | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 3 1/2" x 11 1/8" | T M P | 3 1/2" x 14" | T M P | |
| | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 5 1/4" x 9 1/4" | T M P | 5 1/4" x 11 1/4" | T M P | |
| | 36' | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 3 1/2" x 14" | T M P | 3 1/2" x 16" | T M P | |
| | | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 9 1/4" | T M P | 3 1/2" x 11 1/4" | T M P | 5 1/4" x 9 1/4" | T M P | 5 1/4" x 11 1/4" | T M P | |

T 1.55E TimberStrand® LSL M 2.0E Microllam® LVL P 2.0E Parallam® PSL

Trus Joist® Beam, Header and Column Specifier's Guide TJ-9000 | May 2015

SIZING TABLES

General Notes

- Table is based on:
 - Uniform loads.
 - More restrictive of simple or continuous span. Ratio of short span to long span should be 0.4 or greater to prevent uplift.
 - Deflection criteria of L/240 live load and L/180 total load.

Also see **How to Use This Table** on page 10 and **General Assumptions** on page 5.

Bearing Requirements

Minimum beam supports to be two trimmers (3") at each end and 7½" at continuous-span supports.

In **Sizing Tables** on pages 10 and 11:

- (3) Indicates requirement of three trimmers (4½") at each end and 11¼" at continuous-span supports.

Ridge Beams *continued*

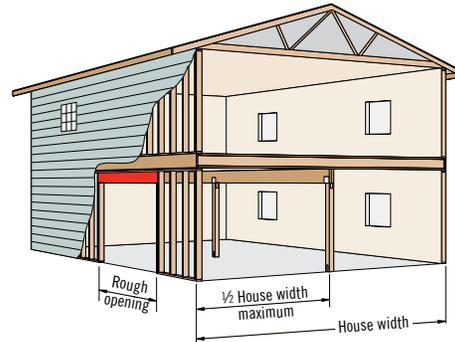
| Roof Load (PSF) | House Width | Column Spacing | | | | | | | | | | | | | | | | | | | |
|-----------------------|-------------|-------------------------|------------|-----------|-------------------------|------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-----------|-----------|-----------|---|---|---|
| | | 18' | | | 20' | | | 22' | | | 24' | | | | | | | | | | |
| Non-Snow Area 125% | 20LL + 15DL | 24' | 3½" x 11½" | M | P | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P | 3½" x 16" | M | P | | | | | |
| | | | 3½" x 14" | T | M | P | 5¼" x 11¼" | M | P | 5¼" x 14" | T | M | P | 5¼" x 14" | M | P | | | | | |
| | | | 5¼" x 11¼" | T | M | P | | | | 5¼" x 16" | T | M | P | 5¼" x 16" | T | M | P | | | | |
| | | 30' | 3½" x 14" | T | M | P | 3½" x 14" | M | P | 3½" x 16" | M | P | 3½" x 18" | M | P | 3½" x 18" | M | P | | | |
| | | | 5¼" x 11¼" | M | P | 3½" x 16" | T | M | P | 5¼" x 14" | M | P | 5¼" x 16" | T | M | P | 5¼" x 16" | T | M | P | |
| | | | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | 7" x 14" | M | P | 7" x 14" | M | P | |
| | 36' | 24' | 3½" x 14" | M | P | 3½" x 16" | M | P | 3½" x 18" | M | P | 3½" x 18" | M | P | 3½" x 18" | M | P | | | | |
| | | | 3½" x 16" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | 5¼" x 16" | T | M | P | | | |
| | | | 5¼" x 11½" | M | P | | | | 7" x 14" | M | P | 7" x 14" | M | P | 7" x 14" | M | P | | | | |
| | | 30' | 3½" x 14" | T | M | P | 3½" x 14" | M | P | 3½" x 16" | M | P | 3½" x 18" | M | P | 3½" x 18" | M | P | | | |
| | | | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | M | P | 5¼" x 16" | T | M | P | 7" x 14" | M | P | 7" x 14" | M | P | | |
| | | | 3½" x 14" | M | P | 3½" x 16" | T | M | P | 3½" x 16" | M | P | 3½" x 18" | M | P | 3½" x 18" | M | P | | | |
| | 20LL + 20DL | 24' | 3½" x 16" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 14" | M | P | 5¼" x 16" | T | M | P | 5¼" x 16" | T | M | P |
| | | | 5¼" x 11½" | M | P | | | | 5¼" x 16" | T | M | P | 7" x 14" | M | P | 7" x 14" | M | P | | | |
| | | | 3½" x 14" | M | P | 3½" x 16" | M | P | 3½" x 18 ⁽³⁾ | M | P | 3½" x 20 ⁽³⁾ | M | P | 3½" x 20 ⁽³⁾ | M | P | | | | |
| | | 30' | 3½" x 16" | T | M | P | 5¼" x 14" | M | P | 5¼" x 16" | M | P | 5¼" x 16" | M | P | 5¼" x 16" | M | P | | | |
| | | | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | 7" x 14" | M | P | 7" x 16" | M | P | 7" x 16" | M | P | | |
| | | | 3½" x 14" | M | P | 3½" x 16" | M | P | 3½" x 18 ⁽³⁾ | M | P | 3½" x 20 ⁽³⁾ | M | P | 3½" x 20 ⁽³⁾ | M | P | | | | |
| 25LL + 15DL | 24' | 3½" x 14" | T | M | P | 3½" x 14" | M | P | 3½" x 16" | M | P | 3½" x 18" | M | P | 3½" x 18" | M | P | | | | |
| | | 5¼" x 11¼" | M | P | 3½" x 16" | T | M | P | 5¼" x 14" | M | P | 5¼" x 14" | T | M | P | 5¼" x 14" | T | M | P | | |
| | | 5¼" x 11½" | T | M | P | 5¼" x 11½" | M | P | 5¼" x 16" | T | M | P | 7" x 14" | M | P | 7" x 14" | M | P | | | |
| | 30' | 3½" x 14" | M | P | 3½" x 16" | T | M | P | 3½" x 16" | M | P | 3½" x 18" | M | P | 3½" x 18" | M | P | | | | |
| | | 3½" x 16" | T | M | P | 5¼" x 14" | T | M | P | 3½" x 18" | M | P | 5¼" x 16" | T | M | P | 5¼" x 16" | T | M | P | |
| | | 5¼" x 11½" | M | P | | | | 5¼" x 14" | M | P | 5¼" x 14" | M | P | 7" x 14" | M | P | 7" x 14" | M | P | | |
| 30LL + 15DL | 24' | 3½" x 14" | M | P | 3½" x 16" | T | M | P | 3½" x 16" | M | P | 3½" x 18" | M | P | 3½" x 18" | M | P | | | | |
| | | 5¼" x 11¼" | M | P | 5¼" x 14" | T | M | P | 5¼" x 14" | M | P | 5¼" x 16" | T | M | P | 5¼" x 16" | T | M | P | | |
| | | 3½" x 14" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | 7" x 14" | M | P | 7" x 14" | M | P | | |
| | 30' | 3½" x 14" | M | P | 3½" x 16" | M | P | 3½" x 18" | M | P | 3½" x 20 ⁽³⁾ | M | P | 3½" x 20 ⁽³⁾ | M | P | | | | | |
| | | 3½" x 16" | T | M | P | 5¼" x 14" | M | P | 5¼" x 16" | T | M | P | 5¼" x 16" | T | M | P | 5¼" x 16" | T | M | P | |
| | | 5¼" x 11½" | M | P | 5¼" x 16" | T | M | P | 7" x 14" | M | P | 7" x 14" | M | P | 7" x 14" | M | P | | | | |
| 40LL + 15DL | 24' | 3½" x 16" | M | P | 3½" x 18 ⁽³⁾ | M | P | 3½" x 18 ⁽³⁾ | M | P | 3½" x 20 ⁽³⁾ | M | P | 3½" x 20 ⁽³⁾ | M | P | | | | | |
| | | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | 5¼" x 16" | M | P | 5¼" x 16" | M | P | 5¼" x 16" | M | P | | | |
| | | 3½" x 14" | M | P | 3½" x 16" | M | P | 3½" x 18 ⁽³⁾ | M | P | 3½" x 20 ⁽³⁾ | M | P | 3½" x 20 ⁽³⁾ | M | P | | | | | |
| | 30' | 3½" x 16" | T | M | P | 5¼" x 14" | M | P | 5¼" x 16" | T | M | P | 5¼" x 16" | T | M | P | 5¼" x 16" | T | M | P | |
| | | 5¼" x 11½" | M | P | 5¼" x 16" | T | M | P | 7" x 14" | M | P | 7" x 14" | M | P | 7" x 14" | M | P | | | | |
| | | 3½" x 18 ⁽³⁾ | M | P | 3½" x 20 ⁽³⁾ | M | P | 5¼" x 18" | M | P | 5¼" x 18" | M | P | 5¼" x 18 ⁽³⁾ | M | P | | | | | |
| 36' | 3½" x 14" | M | P | 3½" x 16" | M | P | 3½" x 18 ⁽³⁾ | M | P | 3½" x 20 ⁽³⁾ | M | P | 3½" x 20 ⁽³⁾ | M | P | | | | | | |
| | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | 7" x 16" | M | P | 7" x 16" | M | P | 7" x 16" | M | P | | | | |
| | 3½" x 16" | T | M | P | 5¼" x 16" | T | M | P | 7" x 14" | M | P | 7" x 14" | M | P | 7" x 14" | M | P | | | | |

T 1.55E TimberStrand® LSL **M** 2.0E Microllam® LVL **P** 2.0E Parallam® PSL

SIZING TABLES

How to Use This Table

1. Verify that floor loading of 40 psf live load and 12 psf dead load is adequate.
 2. Determine appropriate **Load** and **House Width**.
 3. Locate **Rough Opening**.
 4. Select header size and material.
- Also see **General Notes** on page 13.



Headers Supporting Floor and Roof

| Load (PSF) | House Width | Rough Opening | | | | | | | | | | | | | | | | | | | |
|---|---|-----------------------------|---------------------------------|-------|---|---------------------------------|-----------------------------|-----|-----------------------------|-----------------------------|-----------------------------|------------------|---|-----------------------------|-----------------------------|---|---|---|------------------|---|---|
| | | 8' | | 9'-3" | | 10' | | 12' | | | | | | | | | | | | | |
| Non-Snow Area 125% | Roof Load 20LL + 15DL Floor Load 40LL + 12DL | 24' | 1 3/4" x 11 1/4" | T | M | 1 3/4" x 11 7/8" ⁽³⁾ | T | M | 1 3/4" x 14" ⁽³⁾ | T | M | 3 1/2" x 11 1/4" | T | M | P | | | | | | |
| | | | 3 1/2" x 9 1/4" | T | M | P | 1 3/4" x 14" ⁽³⁾ | T | M | P | 3 1/2" x 9 1/2" | T | M | P | 3 1/2" x 11 1/4" | T | M | P | 5 1/4" x 11 1/4" | T | M |
| | | 30' | 1 3/4" x 11 7/8" ⁽³⁾ | T | M | P | 1 3/4" x 14" ⁽³⁾ | T | M | P | 3 1/2" x 11 1/4" | T | M | P | 3 1/2" x 14" | T | M | P | | | |
| | | | 3 1/2" x 9 1/4" | T | M | P | 3 1/2" x 9 1/4" | T | M | P | 5 1/4" x 9 1/4" | T | M | P | 5 1/4" x 11 1/4" | T | M | P | | | |
| | | 36' | 1 3/4" x 14" ⁽³⁾ | T | M | P | 3 1/2" x 11 1/4" | T | M | P | 3 1/2" x 11 7/8" | T | M | P | 3 1/2" x 14" ⁽³⁾ | T | M | P | | | |
| | | | 5 1/4" x 9 1/4" | T | M | P | 5 1/4" x 9 1/4" | T | M | P | 5 1/4" x 11 1/4" | T | M | P | 5 1/4" x 11 1/4" | T | M | P | | | |
| | Roof Load 20LL + 20DL Floor Load 40LL + 12DL | 24' | 1 3/4" x 11 1/4" ⁽³⁾ | T | M | P | 1 3/4" x 14" ⁽³⁾ | T | M | P | 1 3/4" x 14" ⁽³⁾ | T | M | P | 3 1/2" x 11 7/8" | T | M | P | | | |
| | | | 3 1/2" x 9 1/4" | T | M | P | 3 1/2" x 9 1/4" | T | M | P | 3 1/2" x 11 1/4" | T | M | P | 3 1/2" x 14" | T | M | P | | | |
| | | 30' | 1 3/4" x 14" ⁽³⁾ | T | M | P | 1 3/4" x 14" ⁽³⁾ | T | M | P | 3 1/2" x 11 1/4" | T | M | P | 3 1/2" x 14" | T | M | P | | | |
| | | | 3 1/2" x 9 1/4" | T | M | P | 3 1/2" x 9 1/2" | T | M | P | 5 1/4" x 9 1/4" | T | M | P | 5 1/4" x 11 1/4" | T | M | P | | | |
| | | 36' | 1 3/4" x 14" ⁽³⁾ | T | M | P | 3 1/2" x 11 1/4" | T | M | P | 3 1/2" x 11 7/8" | T | M | P | 3 1/2" x 14" ⁽³⁾ | T | M | P | | | |
| | | | 3 1/2" x 9 1/4" | T | M | P | 5 1/4" x 9 1/4" | T | M | P | 5 1/4" x 9 1/2" | T | M | P | 3 1/2" x 16" ⁽³⁾ | T | M | P | | | |
| Snow Area 115% | Roof Load 25LL + 15DL Floor Load 40LL + 12DL | 24' | 1 3/4" x 11 1/4" ⁽³⁾ | T | M | P | 1 3/4" x 14" ⁽³⁾ | T | M | P | 1 3/4" x 14" ⁽³⁾ | T | M | P | 3 1/2" x 11 7/8" | T | M | P | | | |
| | | | 3 1/2" x 9 1/4" | T | M | P | 3 1/2" x 9 1/4" | T | M | P | 3 1/2" x 11 1/4" | T | M | P | 3 1/2" x 14" | T | M | P | | | |
| | | 30' | 1 3/4" x 14" ⁽³⁾ | T | M | P | 3 1/2" x 9 1/2" | T | M | P | 3 1/2" x 11 1/4" | T | M | P | 5 1/4" x 11 1/4" | T | M | P | | | |
| | | | 3 1/2" x 9 1/4" | T | M | P | 5 1/4" x 9 1/4" | T | M | P | 5 1/4" x 9 1/4" | T | M | P | 5 1/4" x 11 7/8" | T | M | P | | | |
| | | 36' | 1 3/4" x 14" ⁽³⁾ | T | M | P | 3 1/2" x 11 1/4" | T | M | P | 3 1/2" x 11 7/8" | T | M | P | 3 1/2" x 14" ⁽³⁾ | T | M | P | | | |
| | | | 3 1/2" x 9 1/4" | T | M | P | 5 1/4" x 9 1/4" | T | M | P | 5 1/4" x 11 1/4" | T | M | P | 3 1/2" x 16" ⁽³⁾ | T | M | P | | | |
| | Roof Load 30LL + 15DL Floor Load 40LL + 12DL | 24' | 1 3/4" x 11 1/8" | T | M | P | 1 3/4" x 14" ⁽³⁾ | T | M | P | 3 1/2" x 11 1/4" | T | M | P | 3 1/2" x 11 7/8" | T | M | P | | | |
| | | | 1 3/4" x 14" ⁽³⁾ | T | M | P | 3 1/2" x 9 1/4" | T | M | P | 5 1/4" x 9 1/4" | T | M | P | 3 1/2" x 14" | T | M | P | | | |
| | | 30' | 1 3/4" x 14" ⁽³⁾ | T | M | P | 3 1/2" x 11 1/4" | T | M | P | 3 1/2" x 11 1/4" | T | M | P | 5 1/4" x 11 1/4" | T | M | P | | | |
| | | | 3 1/2" x 9 1/4" | T | M | P | 5 1/4" x 9 1/4" | T | M | P | 5 1/4" x 9 1/4" | T | M | P | 5 1/4" x 11 1/4" | T | M | P | | | |
| | | 36' | 3 1/2" x 9 1/4" | T | M | P | 3 1/2" x 11 7/8" | T | M | P | 3 1/2" x 11 7/8" | T | M | P | 3 1/2" x 14" ⁽³⁾ | T | M | P | | | |
| | | | 3 1/2" x 11 1/4" | T | M | P | 5 1/4" x 9 1/4" | T | M | P | 3 1/2" x 14" | T | M | P | 3 1/2" x 16" ⁽³⁾ | T | M | P | | | |
| Roof Load 40LL + 15DL Floor Load 40LL + 12DL | 24' | 1 3/4" x 14" ⁽³⁾ | T | M | P | 3 1/2" x 11 1/4" | T | M | P | 3 1/2" x 11 7/8" | T | M | P | 5 1/4" x 11 1/4" | T | M | P | | | | |
| | | 3 1/2" x 9 1/4" | T | M | P | 5 1/4" x 9 1/4" | T | M | P | 5 1/4" x 9 1/4" | T | M | P | 5 1/4" x 11 1/4" | T | M | P | | | | |
| | 30' | 3 1/2" x 9 1/4" | T | M | P | 3 1/2" x 11 7/8" | T | M | P | 3 1/2" x 11 7/8" | T | M | P | 3 1/2" x 14" ⁽³⁾ | T | M | P | | | | |
| | | 3 1/2" x 11 1/4" | T | M | P | 5 1/4" x 9 1/4" | T | M | P | 3 1/2" x 14" | T | M | P | 3 1/2" x 16" ⁽³⁾ | T | M | P | | | | |
| | 36' | 5 1/4" x 9 1/4" | T | M | P | 5 1/4" x 11 1/4" | T | M | P | 5 1/4" x 11 1/4" | T | M | P | 5 1/4" x 11 7/8" | T | M | P | | | | |
| | | 3 1/2" x 11 1/4" | T | M | P | 3 1/2" x 11 7/8" ⁽³⁾ | T | M | P | 3 1/2" x 14" ⁽³⁾ | T | M | P | 3 1/2" x 16" ⁽³⁾ | T | M | P | | | | |

T 1.55E TimberStrand® LSL

M 2.0E Microllam® LVL

P 2.0E Parallam® PSL

SIZING TABLES

General Notes

- Table is based on:
 - Uniform loads.
 - More restrictive of simple or continuous span. Ratio of short span to long span should be greater than 0.4 to prevent uplift.
 - Roof truss framing with 24" soffits.
 - Exterior wall weights of 80 plf, interior 60 plf.
 - Deflection criteria of L/360 live load and L/240 total load at floor.
- Tables do not consider attic loads acting concurrently with roof or snow loads.

Also see *How to Use This Table* on page 12 and *General Assumptions* on page 5.

Bearing Requirements

Minimum header supports to be two trimmers (3") at each end and 7½" at continuous-span supports.

In **Sizing Tables** on pages 12 and 13:

(3) Indicates requirement of three trimmers (4½") at each end and 11¼" at continuous-span supports.

Headers Supporting Floor and Roof *continued*

| Roof Load (PSF) | House Width | Rough Opening | | | | | | | | | | | |
|-----------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---|---|
| | | 14' | | 16'-3" | | 18'-3" | | | | | | | |
| Non-Snow Area 125% | Roof Load 20LL + 15DL | 24' | 3½" x 14" | M | P | 3½" x 16" | M | P | 3½" x 18" ⁽³⁾ | M | P | | |
| | | | 3½" x 16" | T | M | P | 5¼" x 14" | M | P | 5¼" x 16" | M | P | |
| | | | 5¼" x 11½" | M | P | 5¼" x 16" | T | M | P | 7" x 14" | M | P | |
| | | 30' | 3½" x 14" | M | P | 3½" x 18" ⁽³⁾ | M | P | 3½" x 20" ⁽³⁾ | M | P | | |
| | | | 3½" x 16" | T | M | P | 5¼" x 14" | M | P | 5¼" x 16" | M | P | |
| | | | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | | | |
| | 36' | 3½" x 16" ⁽³⁾ | M | P | 3½" x 18" ⁽³⁾ | M | P | 5¼" x 18" ⁽³⁾ | M | P | | | |
| | | 5¼" x 14" | T | M | P | 5¼" x 16" | M | P | 7" x 16" | M | P | | |
| | | | | | 7" x 14" | P | | | | | | | |
| | | Roof Load 20LL + 20DL | 24' | 3½" x 14" | M | P | 3½" x 16" ⁽³⁾ | M | P | 3½" x 18" ⁽³⁾ | M | P | |
| | | | | 3½" x 16" | T | M | P | 5¼" x 14" | M | P | 5¼" x 16" | M | P |
| | | | | 5¼" x 11½" | M | P | 5¼" x 16" | T | M | P | 7" x 14" | M | P |
| 30' | 3½" x 16" ⁽³⁾ | | T | M | P | 3½" x 18" ⁽³⁾ | M | P | 3½" x 20" ⁽³⁾ | M | P | | |
| | 5¼" x 14" | | T | M | P | 5¼" x 16" | T | M | P | 5¼" x 18" | M | P | |
| | | | | | 7" x 14" | P | | | 7" x 16" | M | P | | |
| 36' | 3½" x 16" ⁽³⁾ | M | P | 3½" x 18" ⁽³⁾ | M | P | 5¼" x 18" ⁽³⁾ | M | P | | | | |
| | 5¼" x 14" | M | P | 5¼" x 16" | M | P | 7" x 16" | M | P | | | | |
| | 5¼" x 16" | T | M | P | 7" x 14" | P | | | | | | | |
| | Snow Area 115% | Roof Load 25LL + 15DL | 24' | 3½" x 14" | M | P | 3½" x 16" ⁽³⁾ | M | P | 3½" x 18" ⁽³⁾ | M | P | |
| | | | | 3½" x 16" | T | M | P | 5¼" x 14" | M | P | 5¼" x 16" | M | P |
| | | | | 5¼" x 11½" | M | P | 5¼" x 16" | T | M | P | 7" x 14" | M | P |
| 30' | | | 3½" x 16" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | M | P | 3½" x 20" ⁽³⁾ | M | P | |
| | | | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | 5¼" x 18" | M | P |
| | | | | | | 7" x 14" | P | | | 7" x 16" | M | P | |
| 36' | | 3½" x 16" ⁽³⁾ | M | P | 3½" x 18" ⁽³⁾ | M | P | 5¼" x 18" ⁽³⁾ | M | P | | | |
| | | 5¼" x 14" | M | P | 3½" x 20" ⁽³⁾ | M | P | 7" x 16" | M | P | | | |
| | | 5¼" x 16" | T | M | P | 5¼" x 16" | M | P | | | | | |
| | | Roof Load 30LL + 15DL | 24' | 3½" x 14" | M | P | 3½" x 16" ⁽³⁾ | M | P | 3½" x 18" ⁽³⁾ | M | P | |
| | | | | 3½" x 16" | T | M | P | 3½" x 18" ⁽³⁾ | M | P | 3½" x 20" ⁽³⁾ | M | P |
| | | | | 5¼" x 11½" | M | P | 5¼" x 14" | M | P | 5¼" x 16" | M | P | |
| 30' | 3½" x 16" ⁽³⁾ | | T | M | P | 3½" x 18" ⁽³⁾ | M | P | 5¼" x 18" ⁽³⁾ | M | P | | |
| | 5¼" x 14" | | T | M | P | 5¼" x 16" | M | P | 7" x 16" | M | P | | |
| | | | | | 7" x 14" | P | | | | | | | |
| 36' | 3½" x 16" ⁽³⁾ | M | P | 5¼" x 16" ⁽³⁾ | M | P | 5¼" x 18" ⁽³⁾ | M | P | | | | |
| | 3½" x 18" ⁽³⁾ | M | P | | | | 7" x 16" | M | P | | | | |
| | 5¼" x 14" | M | P | | | | | | | | | | |
| | Roof Load 40LL + 15DL | 24' | 3½" x 16" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | M | P | 3½" x 20" ⁽³⁾ | M | P | |
| | | | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | 5¼" x 18" | M | P |
| | | | | | | 7" x 14" | P | | | 7" x 16" | M | P | |
| 30' | | 3½" x 16" ⁽³⁾ | M | P | 5¼" x 16" ⁽³⁾ | M | P | 5¼" x 18" ⁽³⁾ | M | P | | | |
| | | 3½" x 18" ⁽³⁾ | M | P | 7" x 14" | P | | | 7" x 16" | M | P | | |
| | | 5¼" x 14" | M | P | | | | | | | | | |
| 36' | 5¼" x 16" ⁽³⁾ | T | M | P | 5¼" x 18" ⁽³⁾ | M | P | 5¼" x 20" ⁽³⁾ | M | P | | | |
| | 7" x 14" | T | M | P | 7" x 16" | M | P | 7" x 18" ⁽³⁾ | M | P | | | |

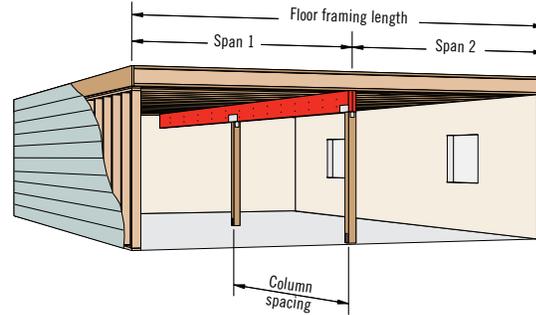
T 1.55E TimberStrand® LSL **M** 2.0E Microllam® LVL **P** 2.0E Parallam® PSL

SIZING TABLES

How to Use This Table

1. Determine appropriate **Floor Load**.
2. Find the **Floor Framing Length** that meets or exceeds the sum of Spans 1 and 2 for the supported floor joists. When floor joists are continuous span, Span 1 or 2 cannot be less than 40% of the **Floor Framing Length**. If floor joists are simple span (not continuous over the beam), then the **Floor Framing Length** may be taken as 80% of Span 1 plus Span 2.
3. Locate **Column Spacing**.
4. Select beam size and material.

Also see **General Notes** on page 15.



Floor Beams

| Floor Load (PSF) | Floor Framing Length | Column Spacing | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------|----------------------|----------------|-----------|-----|---|------------|------------|-----|---|--------------------------|------------|---|---|--------------------------|------------|---|----------|--------------------------|------------|---|---|--------------------------|-----------|---|---|--------------------------|--------------------------|---|---|---|
| | | 8' | | 10' | | 12' | | 14' | | 16' | | | | | | | | | | | | | | | | | | | | |
| 40LL + 12DL | 24' | 3½" x 9¼" | T | M | P | 3½" x 9¼" | T | M | P | 3½" x 11¼" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P | 3½" x 14" | T | M | P | | | | | |
| | | | | | | 3½" x 11¼" | T | M | P | 3½" x 14" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 14" | T | M | P | | | | | | | | | |
| | | | | | | 5¼" x 9¼" | T | M | P | 5¼" x 9½" | T | M | P | | | | | | | | | | | | | | | | | |
| | 28' | 3½" x 9¼" | T | M | P | 3½" x 11¼" | T | M | P | 3½" x 11½" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P | 3½" x 16" | T | M | P | 5¼" x 14" | T | M | P | |
| | | | | | | 5¼" x 9¼" | T | M | P | 5¼" x 9½" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | |
| | | | | | | 5¼" x 9½" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | | | | | |
| | 30' | 3½" x 9¼" | T | M | P | 3½" x 11¼" | T | M | P | 3½" x 11½" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P | 3½" x 16" | T | M | P | 5¼" x 14" | T | M | P | |
| | | | | | | 5¼" x 9¼" | T | M | P | 5¼" x 9½" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | |
| | | | | | | 5¼" x 9½" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | | | | | |
| | 32' | 3½" x 9¼" | T | M | P | 3½" x 11¼" | T | M | P | 3½" x 14" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P | 3½" x 16" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | |
| | | | | | | 5¼" x 9¼" | T | M | P | 5¼" x 9½" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | |
| | | | | | | 5¼" x 9½" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | |
| | 34' | 3½" x 9¼" | T | M | P | 3½" x 11¼" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P | 3½" x 16" | T | M | P | 3½" x 16" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | |
| | | | | | | 5¼" x 9¼" | T | M | P | 5¼" x 9½" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | |
| | | | | | | 5¼" x 9½" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | |
| | 36' | 3½" x 9¼" | T | M | P | 3½" x 11½" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P | 3½" x 16" | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | |
| | | | | | | 5¼" x 9¼" | T | M | P | 5¼" x 9½" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | |
| | | | | | | 5¼" x 9½" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | |
| | 40' | 3½" x 9¼" | T | M | P | 3½" x 11½" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" ⁽³⁾ | T | M | P | 3½" x 16" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | |
| | | 3½" x 11¼" | T | M | P | 5¼" x 9½" | T | M | P | 3½" x 16" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | 5¼" x 16" | T | M | P | |
| | | 5¼" x 9¼" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11¼" | T | M | P | | | | 7" x 14" | T | M | P | | | | | | | | | | |
| | 40LL + 20DL | 24' | 3½" x 9¼" | T | M | P | 3½" x 9½" | T | M | P | 3½" x 11½" | T | M | P | 3½" x 14" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P | 3½" x 16" | T | M | P |
| | | | | | | | 3½" x 11¼" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P | 3½" x 16" | T | M | P | 3½" x 16" | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P |
| | | | | | | | 5¼" x 9¼" | T | M | P | 5¼" x 9½" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 14" | T | M | P |
| 28' | | 3½" x 9¼" | T | M | P | 3½" x 11¼" | T | M | P | 3½" x 11½" | T | M | P | 3½" x 14" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P | 3½" x 16" ⁽³⁾ | T | M | P | |
| | | | | | | 5¼" x 9¼" | T | M | P | 5¼" x 9½" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 14" | T | M | P | |
| | | | | | | 5¼" x 9½" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | |
| 30' | | 3½" x 9¼" | T | M | P | 3½" x 11¼" | T | M | P | 3½" x 14" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" | T | M | P | 3½" x 16" | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | |
| | | | | | | 5¼" x 9¼" | T | M | P | 5¼" x 9½" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 14" | T | M | P | |
| | | | | | | 5¼" x 9½" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | |
| 32' | | 3½" x 9¼" | T | M | P | 3½" x 11½" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" ⁽³⁾ | T | M | P | 3½" x 16" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | |
| | | | | | | 5¼" x 9¼" | T | M | P | 5¼" x 9½" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 14" | T | M | P | |
| | | | | | | 5¼" x 9½" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | |
| 34' | | 3½" x 9¼" | T | M | P | 3½" x 11½" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" ⁽³⁾ | T | M | P | 3½" x 16" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | |
| | | 3½" x 9½" | T | M | P | 5¼" x 9¼" | T | M | P | 3½" x 16" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | 5¼" x 16" | T | M | P | |
| | | 5¼" x 9¼" | T | M | P | 5¼" x 11¼" | T | M | P | 5¼" x 11½" | T | M | P | | | | 7" x 14" | T | M | P | | | | | | | | | | |
| 36' | | 3½" x 9¼" | T | M | P | 3½" x 11½" | T | M | P | 3½" x 14" ⁽³⁾ | T | M | P | 3½" x 16" ⁽³⁾ | T | M | P | 3½" x 16" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | |
| | | 3½" x 11¼" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | 3½" x 20" ⁽³⁾ | T | M | P | 3½" x 20" ⁽³⁾ | T | M | P | |
| | | 5¼" x 9¼" | T | M | P | 5¼" x 9¼" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | 5¼" x 16" | T | M | P | |
| 40' | | 3½" x 9½" | T | M | P | 3½" x 11½" | T | M | P | 3½" x 14" ⁽³⁾ | T | M | P | 3½" x 16" ⁽³⁾ | T | M | P | 3½" x 16" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | |
| | | 3½" x 11¼" | T | M | P | 3½" x 14" | T | M | P | 3½" x 16" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | 3½" x 18" ⁽³⁾ | T | M | P | 3½" x 20" ⁽³⁾ | T | M | P | 3½" x 20" ⁽³⁾ | T | M | P | |
| | | 5¼" x 9¼" | T | M | P | 5¼" x 9½" | T | M | P | 5¼" x 11½" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 14" | T | M | P | 5¼" x 16" | T | M | P | 5¼" x 16" | T | M | P | |

T 1.55E TimberStrand® LSL M 2.0E Microllam® LVL P 2.0E Parallam® PSL

SIZING TABLES

General Notes

- Table is based on:
 - Uniform loads.
 - More restrictive of simple or continuous beam span. Ratio of short span to long span should be greater than 0.4 to prevent uplift.
 - Deflection criteria of L/360 live load and L/240 total load.

Also see *How to Use This Table* on page 14 and *General Assumptions* on page 5.

Bearing Requirements

Minimum beam supports to be two trimmers (3") at each end and 7½" at continuous-span supports.

In *Sizing Tables* on pages 14 and 15:

- (3) Indicates requirement of three trimmers (4½") at each end and 11¼" at continuous-span supports.

Floor Beams *continued*

| Floor Load (PSF) | Floor Framing Length | Column Spacing | | | | | | | | | | | | |
|------------------|----------------------|-------------------------|-------------------------|-----|-------------------------|-------------------------|-----------|-------------------------|-------------------------|----------|-----------|-----------|----------|---|
| | | 18' | | 20' | | 22' | | 24' | | | | | | |
| 40LL + 12DL | 24' | 3½" x 18" | M | P | 3½" x 18" | M | P | 3½" x 20 ⁽³⁾ | M | P | 5¼" x 20" | M | P | |
| | | 5¼" x 14" | T | M | P | 5¼" x 16" | M | P | 5¼" x 18" | M | P | 7" x 18" | P | |
| | | 5¼" x 16" | T | M | P | 7" x 14" | P | | 7" x 16" | P | | | | |
| | 28' | 3½" x 18" | M | P | 3½" x 20 ⁽³⁾ | M | | 5¼" x 18" | M | P | 5¼" x 20" | M | P | |
| | | 5¼" x 16" | T | M | P | 5¼" x 16" | M | P | 7" x 16" | P | | 7" x 18" | P | |
| | | 7" x 14" | P | | | | | | | | | | | |
| | 30' | 3½" x 18 ⁽³⁾ | M | P | 3½" x 20 ⁽³⁾ | M | | 5¼" x 18" | M | P | 5¼" x 20" | M | P | |
| | | 5¼" x 16" | M | P | 5¼" x 18" | M | P | 7" x 16" | P | | 7" x 18" | P | | |
| | | 7" x 14" | P | | | 7" x 16" | P | | | | | | | |
| | 32' | 3½" x 18 ⁽³⁾ | M | P | 3½" x 20 ⁽³⁾ | M | | 5¼" x 18" | M | P | 5¼" x 20" | M | P | |
| | | 3½" x 20 ⁽³⁾ | M | | | 5¼" x 18" | M | P | | | 7" x 18" | P | | |
| | | 5¼" x 16" | M | P | 7" x 16" | P | | | | | | | | |
| | 34' | 3½" x 18 ⁽³⁾ | M | P | 5¼" x 18" | M | P | 5¼" x 20" | M | | 5¼" x 20" | M | P | |
| | | 3½" x 20 ⁽³⁾ | M | | | 7" x 16" | P | | 7" x 18" | P | | 7" x 18" | P | |
| | | 5¼" x 16" | M | P | | | | | | | | | | |
| | 36' | 3½" x 18 ⁽³⁾ | M | P | 5¼" x 18" | M | P | 5¼" x 20" | M | | 7" x 18" | P | | |
| | | 3½" x 20 ⁽³⁾ | M | | | 7" x 16" | P | | 7" x 18" | P | | | | |
| | | 5¼" x 16" | M | P | | | | | | | | | | |
| | 40' | 3½" x 20 ⁽³⁾ | M | P | 5¼" x 18" | M | P | 5¼" x 20 ⁽³⁾ | M | | | | | |
| | | 5¼" x 16" | M | P | 7" x 16" | P | | 7" x 18" | P | | | | | |
| | | | | | | | | | | | | | | |
| | 40LL + 20DL | 24' | 3½" x 18 ⁽³⁾ | M | P | 3½" x 20 ⁽³⁾ | M | | 5¼" x 18" | M | P | 5¼" x 20" | M | P |
| | | | 5¼" x 16" | T | M | P | 5¼" x 16" | M | P | 7" x 16" | P | | 7" x 18" | P |
| | | | 7" x 14" | P | | | | | | | | | | |
| 28' | | 3½" x 18 ⁽³⁾ | M | P | 5¼" x 18" | M | P | 5¼" x 18" | P | | 5¼" x 20" | M | P | |
| | | 3½" x 20 ⁽³⁾ | M | | | 7" x 16" | P | | 5¼" x 20" | M | | 7" x 18" | P | |
| | | 5¼" x 16" | M | P | | | | | | | | | | |
| 30' | | 3½" x 18 ⁽³⁾ | M | P | 5¼" x 18" | M | P | 5¼" x 20" | M | | 7" x 18" | P | | |
| | | 3½" x 20 ⁽³⁾ | M | | | 7" x 16" | P | | 7" x 18" | P | | | | |
| | | 5¼" x 16" | M | P | | | | | | | | | | |
| 32' | | 3½" x 20 ⁽³⁾ | M | | | 5¼" x 18" | M | P | 5¼" x 20 ⁽³⁾ | M | | | | |
| | | 5¼" x 16" | M | P | 7" x 16" | P | | 7" x 18" | P | | | | | |
| | | 7" x 14" | P | | | | | | | | | | | |
| 34' | | 5¼" x 16" | P | | | 5¼" x 18" | M | P | 5¼" x 20 ⁽³⁾ | M | | | | |
| | | 5¼" x 18" | M | P | 7" x 16" | P | | 7" x 18" | P | | | | | |
| | | | | | | | | | | | | | | |
| 36' | | 5¼" x 16" | P | | | 5¼" x 18 ⁽³⁾ | P | | 7" x 18" | P | | | | |
| | | 5¼" x 18" | M | P | 5¼" x 20 ⁽³⁾ | M | | | | | | | | |
| | | | | | | 7" x 16" | P | | | | | | | |
| 40' | | 5¼" x 18 ⁽³⁾ | M | P | 5¼" x 20 ⁽³⁾ | M | | 7" x 18" | P | | | | | |
| | | 7" x 16" | P | | | 7" x 18" | P | | | | | | | |
| | | | | | | | | | | | | | | |

T 1.55E TimberStrand® LSL **M** 2.0E Microllam® LVL **P** 2.0E Parallam® PSL

FLOOR LOAD TABLES

How to Use This Table

1. Calculate total and live load (neglect beam weight) on the beam or header in pounds per linear foot (plf).
2. Select appropriate **Span** (center-to-center of bearing).
3. Scan horizontally to find the proper width, and a depth with a capacity that exceeds actual total and live loads.
4. Review bearing length requirements to ensure adequacy.

Also see **General Notes** on page 17.

TimberStrand® LSL: Floor—100% (PLF)

| Span | Condition | 1.3E Grade | | | | | | 1.55E Grade | | | | | |
|--------|-----------------------------|------------|---------|---------|---------|---------|----------|-----------------------|---------|-----------|----------|----------|----------|
| | | 3½" Width | | | | | | 5½" Plank Orientation | | 1¾" Width | | | |
| | | 4¾" | 5½" | 7¼" | 8¾" | 9¼" | 11¼" | 3½" | 9¼" | 9½" | 11¼" | 11½" | 14" |
| 3' | Total Load | 1,538 | 2,381 | 4,036 | 5,624 | 6,428 | 7,442 | 1,210 | 3,024 | 3,166 | 4,333 | 4,717 | 4,717 |
| | Live Load L/360 | 1,420 | * | * | * | * | * | * | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.6 | 2.4/6.1 | 3.4/8.5 | 3.9/9.7 | 4.5/11.3 | 1.5/3.5 | 2.9/7.2 | 3/7.6 | 4.1/10.3 | 4.5/11.3 | 4.5/11.3 |
| 4' | Total Load | 863 | 1,337 | 2,267 | 3,159 | 3,611 | 5,249 | 814 | 1,929 | 2,006 | 2,597 | 2,836 | 3,536 |
| | Live Load L/360 | 651 | 1,215 | * | * | * | * | 546 | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.8/4.6 | 2.6/6.4 | 2.9/7.3 | 4.2/10.6 | 1.5/3.5 | 2.5/6.1 | 2.6/6.4 | 3.3/8.3 | 3.6/9 | 4.5/11.3 |
| 5' | Total Load | 517 | 853 | 1,448 | 2,019 | 2,308 | 3,355 | 425 | 1,416 | 1,467 | 1,853 | 2,004 | 2,577 |
| | Live Load L/360 | 347 | 662 | 1,398 | * | * | * | 287 | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.7 | 2/5.1 | 2.3/5.8 | 3.4/8.5 | 1.5/3.5 | 2.3/5.6 | 2.3/5.8 | 3/7.4 | 3.2/8 | 4.1/10.3 |
| 6' | Total Load | 304 | 590 | 1,003 | 1,399 | 1,599 | 2,326 | 248 | 1,095 | 1,152 | 1,440 | 1,549 | 1,952 |
| | Live Load L/360 | 206 | 397 | 857 | 1,367 | * | * | 169 | 978 | 1,048 | * | * | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.7/4.3 | 1.9/4.9 | 2.8/7.1 | 1.5/3.5 | 2.1/5.2 | 2.2/5.5 | 2.8/6.9 | 3/7.4 | 3.7/9.3 |
| 7' | Total Load | 171 | 336 | 735 | 1,025 | 1,172 | 1,706 | 138 | 803 | 845 | 1,168 | 1,262 | 1,570 |
| | Live Load L/360 | 131 | 255 | 560 | 904 | 1,092 | * | 107 | 651 | 699 | 1,089 | 1,250 | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 1.7/4.2 | 2.4/6 | 1.5/3.5 | 1.8/4.5 | 1.9/4.7 | 2.6/6.5 | 2.8/7 | 3.5/8.8 |
| 8' | Total Load | 99 | 198 | 443 | 783 | 895 | 1,303 | 79 | 613 | 646 | 893 | 990 | 1,313 |
| | Live Load L/360 | 89 | 173 | 384 | 626 | 759 | 1,290 | 72 | 453 | 487 | 769 | 886 | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 2.1/5.3 | 1.5/3.5 | 1.6/3.9 | 1.7/4.1 | 2.3/5.7 | 2.5/6.3 | 3.4/8.4 |
| 9'-6" | Total Load | | 98 | 224 | 552 | 632 | 921 | | 416 | 448 | 631 | 700 | 960 |
| | Live Load L/360 | | * | * | 386 | 470 | 811 | | 280 | 302 | 483 | 560 | 870 |
| | Min. End/Int. Bearing (in.) | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.8/4.5 | | 1.5/3.5 | 1.5/3.5 | 1.9/4.8 | 2.1/5.3 | 2.9/7.3 |
| 10' | Total Load | | 79 | 182 | 492 | 569 | 830 | | 359 | 387 | 569 | 631 | 865 |
| | Live Load L/360 | | * | * | 333 | 407 | 704 | | 242 | 261 | 420 | 487 | 760 |
| | Min. End/Int. Bearing (in.) | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.7/4.2 | | 1.5/3.5 | 1.5/3.5 | 1.8/4.6 | 2/5.1 | 2.8/6.9 |
| 12' | Total Load | | | 85 | 287 | 353 | 573 | | 211 | 228 | 372 | 434 | 599 |
| | Live Load L/360 | | | * | 197 | 241 | 423 | | 144 | 155 | 252 | 293 | 464 |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 1.7/4.2 | 2.3/5.8 |
| 14' | Total Load | | | | 180 | 222 | 397 | | 133 | 144 | 237 | 278 | 438 |
| | Live Load L/360 | | | | 126 | 154 | 272 | | 92 | 99 | 162 | 189 | 302 |
| | Min. End/Int. Bearing (in.) | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2/5 |
| 16'-6" | Total Load | | | | 108 | 134 | 242 | | 80 | 87 | 145 | 170 | 277 |
| | Live Load L/360 | | | | 77 | 95 | 169 | | 57 | 61 | 101 | 118 | 189 |
| | Min. End/Int. Bearing (in.) | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.7 |
| 18'-6" | Total Load | | | | 74 | 93 | 170 | | 56 | 60 | 102 | 120 | 197 |
| | Live Load L/360 | | | | 55 | 68 | 121 | | 40 | 44 | 72 | 84 | 136 |
| | Min. End/Int. Bearing (in.) | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 |
| 20' | Total Load | | | | 57 | 72 | 133 | | | | 80 | 94 | 156 |
| | Live Load L/360 | | | | 44 | 54 | 96 | | | | 57 | 67 | 109 |
| | Min. End/Int. Bearing (in.) | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 |
| 24' | Total Load | | | | | | 73 | | | | | 52 | 88 |
| | Live Load L/360 | | | | | | 56 | | | | | 39 | 64 |
| | Min. End/Int. Bearing (in.) | | | | | | 1.5/3.5 | | | | | 1.5/3.5 | 1.5/3.5 |
| 28' | Total Load | | | | | | | | | | | | 53 |
| | Live Load L/360 | | | | | | | | | | | | 40 |
| | Min. End/Int. Bearing (in.) | | | | | | | | | | | | 1.5/3.5 |

* Indicates Total Load value controls.

FLOOR LOAD TABLES

General Notes

- Table is based on:
 - Uniform loads (beam weight considered).
 - More restrictive of simple or continuous span.
 - Deflection criteria of L/240 total load (TL) and L/360 live load (LL).
- For live load deflection limits of L/240 or L/480, multiply **Live Load L/360** values by 1.5 or 0.75, respectively. The resulting live load must not exceed the total load shown.

Also see **How to Use this Table** on page 16 and **General Assumptions** on page 5.

TimberStrand® LSL: Floor—100% (PLF) *continued*

| Span | Condition | 1.55E Grade | | | | | | | | | | | |
|--------|-----------------------------|-------------|---------|----------|----------|----------|----------|-------------------------|---------|----------|----------|----------|----------|
| | | 3½" Width | | | | | | 5¼" Width (2- or 3-ply) | | | | | |
| | | 9¼" | 9½" | 11¼" | 11½" | 14" | 16" | 9¼" | 9½" | 11¼" | 11½" | 14" | 16" |
| 3' | Total Load | 6,049 | 6,332 | 8,667 | 9,432 | 9,432 | 9,432 | 9,074 | 9,499 | 13,001 | 14,148 | 14,148 | 14,148 |
| | Live Load L/360 | * | * | * | * | * | * | * | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 2.9/7.2 | 3/7.6 | 4.1/10.3 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 2.9/7.2 | 3/7.6 | 4.1/10.3 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 4' | Total Load | 3,859 | 4,012 | 5,195 | 5,673 | 7,070 | 7,070 | 5,788 | 6,018 | 7,793 | 8,510 | 10,605 | 10,605 |
| | Live Load L/360 | * | * | * | * | * | * | * | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 2.5/6.1 | 2.6/6.4 | 3.3/8.3 | 3.6/9 | 4.5/11.3 | 4.5/11.3 | 2.5/6.1 | 2.6/6.4 | 3.3/8.3 | 3.6/9 | 4.5/11.3 | 4.5/11.3 |
| 5' | Total Load | 2,832 | 2,934 | 3,707 | 4,009 | 5,155 | 5,652 | 4,248 | 4,401 | 5,561 | 6,014 | 7,733 | 8,478 |
| | Live Load L/360 | * | * | * | * | * | * | * | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 2.3/5.6 | 2.3/5.8 | 3/7.4 | 3.2/8 | 4.1/10.3 | 4.5/11.3 | 2.3/5.6 | 2.3/5.8 | 3/7.4 | 3.2/8 | 4.1/10.3 | 4.5/11.3 |
| 6' | Total Load | 2,190 | 2,305 | 2,881 | 3,098 | 3,904 | 4,707 | 3,286 | 3,458 | 4,321 | 4,648 | 5,857 | 7,061 |
| | Live Load L/360 | 1,957 | 2,097 | * | * | * | * | 2,936 | 3,146 | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 2.1/5.2 | 2.2/5.5 | 2.8/6.9 | 3/7.4 | 3.7/9.3 | 4.5/11.3 | 2.1/5.2 | 2.2/5.5 | 2.8/6.9 | 3/7.4 | 3.7/9.3 | 4.5/11.3 |
| 7' | Total Load | 1,606 | 1,691 | 2,336 | 2,524 | 3,141 | 3,787 | 2,410 | 2,536 | 3,505 | 3,786 | 4,711 | 5,681 |
| | Live Load L/360 | 1,302 | 1,399 | 2,179 | 2,501 | * | * | 1,954 | 2,098 | 3,269 | 3,752 | * | * |
| | Min. End/Int. Bearing (in.) | 1.8/4.5 | 1.9/4.7 | 2.6/6.5 | 2.8/7 | 3.5/8.8 | 4.2/10.6 | 1.8/4.5 | 1.9/4.7 | 2.6/6.5 | 2.8/7 | 3.5/8.8 | 4.2/10.6 |
| 8' | Total Load | 1,227 | 1,292 | 1,786 | 1,981 | 2,626 | 3,138 | 1,841 | 1,938 | 2,679 | 2,971 | 3,939 | 4,708 |
| | Live Load L/360 | 906 | 974 | 1,538 | 1,773 | * | * | 1,359 | 1,462 | 2,307 | 2,660 | * | * |
| | Min. End/Int. Bearing (in.) | 1.6/3.9 | 1.7/4.1 | 2.3/5.7 | 2.5/6.3 | 3.4/8.4 | 4/10 | 1.6/3.9 | 1.7/4.1 | 2.3/5.7 | 2.5/6.3 | 3.4/8.4 | 4/10 |
| 9'-6" | Total Load | 832 | 897 | 1,263 | 1,401 | 1,920 | 2,480 | 1,248 | 1,346 | 1,894 | 2,101 | 2,880 | 3,720 |
| | Live Load L/360 | 561 | 605 | 967 | 1,121 | 1,740 | 2,456 | 842 | 907 | 1,451 | 1,681 | 2,610 | 3,684 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.9/4.8 | 2.1/5.3 | 2.9/7.3 | 3.8/9.4 | 1.5/3.5 | 1.5/3.5 | 1.9/4.8 | 2.1/5.3 | 2.9/7.3 | 3.8/9.4 |
| 10' | Total Load | 718 | 775 | 1,138 | 1,263 | 1,731 | 2,236 | 1,077 | 1,162 | 1,708 | 1,894 | 2,597 | 3,355 |
| | Live Load L/360 | 485 | 523 | 840 | 974 | 1,520 | 2,154 | 728 | 785 | 1,260 | 1,462 | 2,280 | 3,232 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.8/4.6 | 2/5.1 | 2.8/6.9 | 3.6/8.9 | 1.5/3.5 | 1.5/3.5 | 1.8/4.6 | 2/5.1 | 2.8/6.9 | 3.6/8.9 |
| 12' | Total Load | 422 | 456 | 744 | 868 | 1,198 | 1,547 | 633 | 685 | 1,116 | 1,302 | 1,797 | 2,321 |
| | Live Load L/360 | 288 | 311 | 504 | 587 | 928 | 1,334 | 432 | 467 | 756 | 881 | 1,393 | 2,001 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 1.7/4.2 | 2.3/5.8 | 3/7.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 1.7/4.2 | 2.3/5.8 | 3/7.5 |
| 14' | Total Load | 266 | 288 | 475 | 556 | 876 | 1,132 | 400 | 433 | 713 | 834 | 1,314 | 1,698 |
| | Live Load L/360 | 184 | 199 | 325 | 379 | 605 | 877 | 276 | 299 | 487 | 569 | 907 | 1,316 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2/5 | 2.6/6.4 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2/5 | 2.6/6.4 |
| 16'-6" | Total Load | 161 | 174 | 291 | 341 | 554 | 810 | 241 | 262 | 436 | 512 | 831 | 1,215 |
| | Live Load L/360 | 81 | 88 | 144 | 169 | 273 | 401 | 122 | 132 | 217 | 254 | 410 | 601 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.7 | 2.2/5.4 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.7 | 2.2/5.4 |
| 18'-6" | Total Load | 112 | 121 | 205 | 241 | 395 | 584 | 168 | 182 | 307 | 362 | 592 | 876 |
| | Live Load L/360 | 87 | 94 | 160 | 189 | 312 | 463 | 130 | 142 | 240 | 284 | 468 | 695 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.8 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.8 |
| 20' | Total Load | 87 | 94 | 160 | 189 | 312 | 463 | 130 | 142 | 240 | 284 | 468 | 695 |
| | Live Load L/360 | 64 | 70 | 115 | 135 | 218 | 320 | 97 | 105 | 172 | 202 | 327 | 481 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.8 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.8 |
| 24' | Total Load | | | 88 | 105 | 177 | 266 | 69 | 76 | 133 | 158 | 265 | 400 |
| | Live Load L/360 | | | 67 | 79 | 128 | 189 | 56 | 61 | 101 | 118 | 192 | 284 |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 |
| 28' | Total Load | | | 51 | 62 | 107 | 163 | | | 77 | 93 | 160 | 245 |
| | Live Load L/360 | | | 42 | 50 | 81 | 120 | | | 64 | 75 | 122 | 181 |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 |

* Indicates Total Load value controls.

FLOOR LOAD TABLES

How to Use This Table

1. Calculate total and live load (neglect beam weight) on the beam or header in pounds per linear foot (plf).
2. Select appropriate **Span** (center-to-center of bearing).
3. Scan horizontally to find the proper width, and a depth with a capacity that exceeds actual total and live loads.
4. Review bearing length requirements to ensure adequacy.

Also see **General Notes** on page 19.

2.0E Microllam® LVL: Floor—100% (PLF)

| Span | Condition | 1½" Width | | | | | | | 3½" Width (2-ply) | | | | | |
|--------|-----------------------------|-----------|---------|---------|---------|---------|---------|----------|-------------------|---------|---------|---------|---------|---------|
| | | 5½" | 7¼" | 9¼" | 9½" | 11¼" | 11½" | 14" | 5½" | 7¼" | 9¼" | 9½" | 11¼" | 11½" |
| 6' | Total Load | 455 | 762 | 1,027 | 1,062 | 1,324 | 1,424 | 1,794 | 910 | 1,525 | 2,055 | 2,125 | 2,648 | 2,848 |
| | Live Load L/360 | 305 | 659 | * | * | * | * | * | 610 | 1,319 | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.8/4.4 | 2.4/5.9 | 2.4/6.1 | 3/7.6 | 3.3/8.2 | 4.1/10.3 | 1.5/3.5 | 1.8/4.4 | 2.4/5.9 | 2.4/6.1 | 3/7.6 | 3.3/8.2 |
| 8' | Total Load | 153 | 342 | 695 | 731 | 915 | 978 | 1,207 | 307 | 685 | 1,391 | 1,462 | 1,830 | 1,956 |
| | Live Load L/360 | 133 | 295 | 584 | 628 | * | * | * | 267 | 591 | 1,169 | 1,257 | * | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 2.1/5.3 | 2.2/5.6 | 2.8/7 | 3/7.5 | 3.7/9.3 | 1.5/3.5 | 1.5/3.5 | 2.1/5.3 | 2.2/5.6 | 2.8/7 | 3/7.5 |
| 9'-6" | Total Load | 77 | 174 | 491 | 517 | 709 | 784 | 968 | 154 | 349 | 983 | 1,034 | 1,418 | 1,569 |
| | Live Load L/360 | * | * | 362 | 390 | 624 | 723 | * | * | * | 724 | 780 | 1,248 | 1,446 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.8/4.5 | 1.9/4.7 | 2.6/6.5 | 2.9/7.2 | 3.5/8.8 | 1.5/3.5 | 1.5/3.5 | 1.8/4.5 | 1.9/4.7 | 2.6/6.5 | 2.9/7.2 |
| 10' | Total Load | 62 | 142 | 443 | 466 | 639 | 707 | 908 | 124 | 284 | 886 | 932 | 1,279 | 1,415 |
| | Live Load L/360 | * | * | 313 | 337 | 542 | 628 | * | * | * | 626 | 675 | 1,084 | 1,257 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.7/4.3 | 1.8/4.5 | 2.5/6.1 | 2.7/6.8 | 3.5/8.7 | 1.5/3.5 | 1.5/3.5 | 1.7/4.3 | 1.8/4.5 | 2.5/6.1 | 2.7/6.8 |
| 12' | Total Load | 67 | 274 | 296 | 442 | 489 | 666 | 666 | 57 | 135 | 548 | 593 | 885 | 979 |
| | Live Load L/360 | * | 186 | 200 | 325 | 379 | 599 | * | * | 372 | 401 | 651 | 758 | |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2/5.1 | 2.3/5.7 | 3.1/7.7 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2/5.1 | 2.3/5.7 | |
| 14' | Total Load | 173 | 188 | 308 | 358 | 487 | 487 | 487 | 70 | 347 | 376 | 617 | 716 | |
| | Live Load L/360 | | | 119 | 128 | 209 | 244 | 390 | * | 238 | 257 | 419 | 489 | |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.7/4.2 | 1.9/4.9 | 2.6/6.6 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.7/4.2 | 1.9/4.9 | |
| 16'-6" | Total Load | 105 | 114 | 189 | 222 | 349 | 349 | 349 | 211 | 229 | 379 | 445 | 445 | |
| | Live Load L/360 | | | 73 | 79 | 130 | 152 | 245 | | | 147 | 159 | 260 | 305 |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 2.2/5.6 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 |
| 18'-6" | Total Load | 74 | 80 | 134 | 158 | 257 | 257 | 257 | 148 | 161 | 268 | 316 | 316 | |
| | Live Load L/360 | | | 52 | 56 | 93 | 109 | 176 | | | 105 | 113 | 186 | 218 |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.9/4.7 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 |
| 20' | Total Load | 57 | 62 | 105 | 124 | 204 | 204 | 204 | 115 | 125 | 211 | 249 | 249 | |
| | Live Load L/360 | | | 41 | 45 | 74 | 87 | 140 | | | 83 | 90 | 148 | 174 |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.6/4 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 |
| 22' | Total Load | | | | 78 | 92 | 152 | 152 | | | 85 | 92 | 157 | 185 |
| | Live Load L/360 | | | | | 56 | 65 | 106 | | | 63 | 68 | 112 | 131 |
| | Min. End/Int. Bearing (in.) | | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 |
| 24' | Total Load | | | | 59 | 70 | 117 | 117 | | | 63 | 69 | 118 | 140 |
| | Live Load L/360 | | | | | 43 | 51 | 82 | | | 48 | 52 | 86 | 102 |
| | Min. End/Int. Bearing (in.) | | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 |
| 26' | Total Load | | | | | 54 | 91 | 91 | | | | 52 | 91 | 108 |
| | Live Load L/360 | | | | | | 40 | 65 | | | | 41 | 68 | 80 |
| | Min. End/Int. Bearing (in.) | | | | | | 1.5/3.5 | 1.5/3.5 | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 |
| 28' | Total Load | | | | | | | 71 | | | | | 71 | 84 |
| | Live Load L/360 | | | | | | | | | | | | 55 | 64 |
| | Min. End/Int. Bearing (in.) | | | | | | | | | | | | 1.5/3.5 | 1.5/3.5 |
| 30' | Total Load | | | | | | | 57 | | | | | 55 | 66 |
| | Live Load L/360 | | | | | | | 42 | | | | | 44 | 52 |
| | Min. End/Int. Bearing (in.) | | | | | | | 1.5/3.5 | | | | | 1.5/3.5 | 1.5/3.5 |

* Indicates Total Load value controls.



FLOOR LOAD TABLES

General Notes

- Table is based on:
 - Uniform loads (beam weight considered).
 - More restrictive of simple or continuous span.
 - Deflection criteria of L/240 total load (TL) and L/360 live load (LL).
- For live load deflection limits of L/240 or L/480, multiply **Live Load L/360** values by 1.5 or 0.75, respectively. The resulting live load must not exceed the total load shown.

Also see **How to Use This Table** on page 18 and **General Assumptions** on page 5.

2.0E Microllam® LVL: Floor—100% (PLF) *continued*

| Span | Condition | 3½" Width (2-ply) | | | | 5¼" Width (3-ply) | | | | | | | | | |
|--------|-----------------------------|-------------------|----------|----------|----------|-------------------|---------|---------|---------|---------|---------|----------|----------|----------|----------|
| | | 14" | 16" | 18" | 20" | 5½" | 7¼" | 9¼" | 9½" | 11¼" | 11½" | 14" | 16" | 18" | 20" |
| 6' | Total Load | 3,589 | 3,919 | 3,919 | 3,919 | 1,366 | 2,287 | 3,082 | 3,188 | 3,972 | 4,272 | 5,384 | 5,878 | 5,878 | 5,878 |
| | Live Load L/360 | * | * | * | * | 916 | 1,978 | * | * | * | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 4.1/10.3 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 1.5/3.5 | 1.8/4.4 | 2.4/5.9 | 2.4/6.1 | 3/7.6 | 3.3/8.2 | 4.1/10.3 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 8' | Total Load | 2,414 | 2,885 | 2,934 | 2,934 | 461 | 1,028 | 2,086 | 2,193 | 2,745 | 2,935 | 3,621 | 4,328 | 4,402 | 4,402 |
| | Live Load L/360 | * | * | * | * | 401 | 887 | 1,753 | 1,886 | * | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 3.7/9.3 | 4.4/11.1 | 4.5/11.3 | 4.5/11.3 | 1.5/3.5 | 1.5/3.5 | 2.1/5.3 | 2.2/5.6 | 2.8/7 | 3/7.5 | 3.7/9.3 | 4.4/11.1 | 4.5/11.3 | 4.5/11.3 |
| 9'-6" | Total Load | 1,937 | 2,294 | 2,468 | 2,468 | 231 | 524 | 1,475 | 1,551 | 2,128 | 2,354 | 2,905 | 3,441 | 3,702 | 3,702 |
| | Live Load L/360 | * | * | * | * | * | * | 1,086 | 1,171 | 1,872 | 2,170 | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 3.5/8.8 | 4.2/10.5 | 4.5/11.3 | 4.5/11.3 | 1.5/3.5 | 1.5/3.5 | 1.8/4.5 | 1.9/4.7 | 2.6/6.5 | 2.9/7.2 | 3.5/8.8 | 4.2/10.5 | 4.5/11.3 | 4.5/11.3 |
| 10' | Total Load | 1,817 | 2,147 | 2,344 | 2,344 | 187 | 427 | 1,330 | 1,398 | 1,919 | 2,123 | 2,725 | 3,221 | 3,516 | 3,516 |
| | Live Load L/360 | * | * | * | * | * | * | 940 | 1,013 | 1,626 | 1,886 | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 3.5/8.7 | 4.1/10.3 | 4.5/11.3 | 4.5/11.3 | 1.5/3.5 | 1.5/3.5 | 1.7/4.3 | 1.8/4.5 | 2.5/6.1 | 2.7/6.8 | 3.5/8.7 | 4.1/10.3 | 4.5/11.3 | 4.5/11.3 |
| 12' | Total Load | 1,333 | 1,709 | 1,950 | 1,950 | 86 | 203 | 823 | 889 | 1,327 | 1,469 | 2,000 | 2,563 | 2,925 | 2,925 |
| | Live Load L/360 | 1,198 | * | * | * | * | * | 558 | 602 | 976 | 1,137 | 1,797 | * | * | * |
| | Min. End/Int. Bearing (in.) | 3.1/7.7 | 3.9/9.9 | 4.5/11.3 | 4.5/11.3 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2/5.1 | 2.3/5.7 | 3.1/7.7 | 3.9/9.9 | 4.5/11.3 | 4.5/11.3 | |
| 14' | Total Load | 975 | 1,253 | 1,563 | 1,669 | | 106 | 521 | 564 | 926 | 1,074 | 1,463 | 1,880 | 2,345 | 2,503 |
| | Live Load L/360 | 780 | 1,132 | 1,561 | * | | * | 357 | 386 | 629 | 734 | 1,171 | 1,698 | 2,342 | * |
| | Min. End/Int. Bearing (in.) | 2.6/6.6 | 3.4/8.5 | 4.2/10.5 | 4.5/11.3 | | 1.5/3.5 | 1.5/3.5 | 1.7/4.2 | 1.9/4.9 | 2.6/6.6 | 3.4/8.5 | 4.2/10.5 | 4.5/11.3 | |
| 16'-6" | Total Load | 698 | 897 | 1,120 | 1,365 | | | 317 | 343 | 569 | 668 | 1,047 | 1,346 | 1,680 | 2,048 |
| | Live Load L/360 | 490 | 716 | 995 | 1,330 | | | 220 | 238 | 391 | 457 | 735 | 1,074 | 1,493 | 1,995 |
| | Min. End/Int. Bearing (in.) | 2.2/5.6 | 2.9/7.2 | 3.6/8.9 | 4.4/10.9 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 2.2/5.6 | 2.9/7.2 | 3.6/8.9 | 4.4/10.9 |
| 18'-6" | Total Load | 515 | 710 | 887 | 1,081 | | | 222 | 241 | 403 | 474 | 772 | 1,066 | 1,331 | 1,622 |
| | Live Load L/360 | 352 | 517 | 722 | 970 | | | 157 | 170 | 280 | 328 | 529 | 776 | 1,084 | 1,456 |
| | Min. End/Int. Bearing (in.) | 1.9/4.7 | 2.6/6.4 | 3.2/8 | 3.9/9.7 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.9/4.7 | 2.6/6.4 | 3.2/8 | 3.9/9.7 |
| 20' | Total Load | 408 | 604 | 756 | 922 | | | 173 | 188 | 317 | 374 | 612 | 907 | 1,135 | 1,384 |
| | Live Load L/360 | 281 | 414 | 579 | 780 | | | 125 | 135 | 223 | 261 | 422 | 621 | 869 | 1,171 |
| | Min. End/Int. Bearing (in.) | 1.6/4 | 2.4/5.9 | 3/7.4 | 3.6/9 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.6/4 | 2.4/5.9 | 3/7.4 | 3.6/9 |
| 22' | Total Load | 305 | 455 | 622 | 759 | | | 127 | 138 | 235 | 278 | 458 | 683 | 933 | 1,138 |
| | Live Load L/360 | 213 | 314 | 441 | 596 | | | 94 | 102 | 168 | 197 | 320 | 472 | 662 | 895 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 2/4.9 | 2.7/6.7 | 3.3/8.2 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2/4.9 | 2.7/6.7 | 3.3/8.2 |
| 24' | Total Load | 234 | 350 | 497 | 634 | | | 95 | 104 | 178 | 211 | 351 | 525 | 746 | 951 |
| | Live Load L/360 | 165 | 244 | 343 | 465 | | | 73 | 79 | 130 | 153 | 248 | 366 | 515 | 698 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.7/4.2 | 2.4/5.9 | 3/7.5 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.7/4.2 | 2.4/5.9 | 3/7.5 |
| 26' | Total Load | 182 | 274 | 390 | 534 | | | 72 | 78 | 137 | 163 | 273 | 411 | 586 | 801 |
| | Live Load L/360 | 130 | 193 | 272 | 370 | | | 57 | 62 | 102 | 120 | 196 | 290 | 409 | 555 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.6 | 2/5.1 | 2.7/6.9 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 2/5.1 | 2.7/6.9 |
| 28' | Total Load | 143 | 217 | 311 | 427 | | | 55 | 60 | 106 | 127 | 215 | 326 | 467 | 641 |
| | Live Load L/360 | 105 | 155 | 219 | 298 | | | 46 | 50 | 82 | 97 | 157 | 233 | 329 | 448 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.8/4.4 | 2.4/6 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.8/4.4 | 2.4/6 |
| 30' | Total Load | 114 | 174 | 251 | 346 | | | | | 83 | 100 | 171 | 261 | 376 | 519 |
| | Live Load L/360 | 85 | 127 | 179 | 244 | | | | | 67 | 79 | 128 | 190 | 269 | 366 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.9 | 2.1/5.2 | | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.9 | 2.1/5.2 |

* Indicates Total Load value controls.

FLOOR LOAD TABLES

How to Use This Table

1. Calculate total and live load (neglect beam weight) on the beam or header in pounds per linear foot (plf).
2. Select appropriate **Span** (center-to-center of bearing).
3. Scan horizontally to find the proper width, and a depth with a capacity that exceeds actual total and live loads.
4. Review bearing length requirements to ensure adequacy.

Also see **General Notes** on page 21.

2.0E Parallam® PSL: Floor—100% (PLF)

| Span | Condition | 3½" Width | | | | | | | 5¼" Width | | | | | | |
|--------|-----------------------------|-----------|---------|---------|---------|---------|----------|----------|-----------|---------|---------|---------|---------|----------|----------|
| | | 9¼" | 9½" | 11¼" | 11½" | 14" | 16" | 18" | 9¼" | 9½" | 11¼" | 11½" | 14" | 16" | 18" |
| 8' | Total Load | 1,469 | 1,517 | 1,861 | 1,990 | 2,456 | 2,933 | 2,933 | 2,204 | 2,275 | 2,792 | 2,985 | 3,683 | 4,400 | 4,400 |
| | Live Load L/360 | 1,169 | 1,257 | * | * | * | * | * | 1,753 | 1,886 | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 2.3/5.6 | 2.3/5.8 | 2.9/7.1 | 3.1/7.6 | 3.8/9.4 | 4.5/11.3 | 4.5/11.3 | 2.3/5.6 | 2.3/5.8 | 2.9/7.1 | 3.1/7.6 | 3.8/9.4 | 4.5/11.3 | 4.5/11.3 |
| 9'-6" | Total Load | 1,076 | 1,147 | 1,510 | 1,611 | 1,970 | 2,333 | 2,467 | 1,614 | 1,720 | 2,265 | 2,416 | 2,955 | 3,500 | 3,700 |
| | Live Load L/360 | 724 | 780 | 1,248 | 1,446 | * | * | * | 1,086 | 1,171 | 1,872 | 2,170 | * | * | * |
| | Min. End/Int. Bearing (in.) | 2.0/4.9 | 2.1/5.2 | 2.8/6.9 | 2.9/7.3 | 3.6/9.0 | 4.3/10.6 | 4.5/11.3 | 2.0/4.9 | 2.1/5.2 | 2.8/6.9 | 2.9/7.3 | 3.6/9.0 | 4.3/10.6 | 4.5/11.3 |
| 10' | Total Load | 930 | 1,003 | 1,420 | 1,514 | 1,848 | 2,184 | 2,342 | 1,395 | 1,505 | 2,130 | 2,271 | 2,772 | 3,276 | 3,514 |
| | Live Load L/360 | 626 | 675 | 1,084 | 1,257 | * | * | * | 940 | 1,013 | 1,626 | 1,886 | * | * | * |
| | Min. End/Int. Bearing (in.) | 1.8/4.5 | 1.9/4.8 | 2.7/6.8 | 2.9/7.3 | 3.5/8.9 | 4.2/10.5 | 4.5/11.3 | 1.8/4.5 | 1.9/4.8 | 2.7/6.8 | 2.9/7.3 | 3.5/8.9 | 4.2/10.5 | 4.5/11.3 |
| 12' | Total Load | 548 | 592 | 964 | 1,092 | 1,480 | 1,738 | 1,949 | 822 | 888 | 1,446 | 1,639 | 2,220 | 2,607 | 2,923 |
| | Live Load L/360 | 372 | 401 | 651 | 758 | 1,198 | 1,721 | * | 558 | 602 | 976 | 1,137 | 1,797 | 2,582 | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 2.2/5.6 | 2.5/6.3 | 3.4/8.5 | 4.0/10.0 | 4.5/11.3 | 1.5/3.5 | 1.5/3.5 | 2.2/5.6 | 2.5/6.3 | 3.4/8.5 | 4.0/10.0 | 4.5/11.3 |
| 14' | Total Load | 347 | 375 | 616 | 721 | 1,093 | 1,409 | 1,660 | 520 | 563 | 925 | 1,082 | 1,639 | 2,113 | 2,490 |
| | Live Load L/360 | 238 | 257 | 419 | 489 | 780 | 1,132 | 1,561 | 357 | 386 | 629 | 734 | 1,171 | 1,698 | 2,342 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.7/4.2 | 2.0/4.9 | 3.0/7.4 | 3.8/9.5 | 4.5/11.3 | 1.5/3.5 | 1.5/3.5 | 1.7/4.2 | 2.0/4.9 | 3.0/7.4 | 3.8/9.5 | 4.5/11.3 |
| 16'-6" | Total Load | 210 | 228 | 379 | 444 | 720 | 1,009 | 1,263 | 316 | 342 | 568 | 667 | 1,080 | 1,514 | 1,895 |
| | Live Load L/360 | 147 | 159 | 260 | 305 | 490 | 716 | 995 | 220 | 238 | 391 | 457 | 735 | 1,074 | 1,493 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 2.3/5.8 | 3.2/8.1 | 4.0/10.1 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 2.3/5.8 | 3.2/8.1 | 4.0/10.1 |
| 18'-6" | Total Load | 147 | 160 | 268 | 315 | 514 | 759 | 1,000 | 221 | 240 | 402 | 473 | 771 | 1,138 | 1,501 |
| | Live Load L/360 | 105 | 113 | 186 | 218 | 352 | 517 | 722 | 157 | 170 | 280 | 328 | 529 | 776 | 1,084 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.9/4.7 | 2.7/6.8 | 3.6/9.0 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.9/4.7 | 2.7/6.8 | 3.6/9.0 |
| 20' | Total Load | 115 | 125 | 210 | 248 | 407 | 603 | 850 | 172 | 187 | 316 | 372 | 610 | 905 | 1,275 |
| | Live Load L/360 | 83 | 90 | 148 | 174 | 281 | 414 | 579 | 125 | 135 | 223 | 261 | 422 | 621 | 869 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.6/4.0 | 2.4/5.9 | 3.3/8.3 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.6/4.0 | 2.4/5.9 | 3.3/8.3 |
| 22' | Total Load | 84 | 91 | 156 | 184 | 304 | 454 | 642 | 126 | 137 | 234 | 277 | 457 | 681 | 964 |
| | Live Load L/360 | 63 | 68 | 112 | 131 | 213 | 314 | 441 | 94 | 102 | 168 | 197 | 320 | 472 | 662 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2.0/4.9 | 2.8/6.9 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2.0/4.9 | 2.8/6.9 |
| 24' | Total Load | 62 | 68 | 118 | 140 | 232 | 349 | 496 | 94 | 103 | 177 | 210 | 349 | 523 | 744 |
| | Live Load L/360 | 48 | 52 | 86 | 102 | 165 | 244 | 343 | 73 | 79 | 130 | 153 | 248 | 366 | 515 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.7/4.2 | 2.4/5.9 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.7/4.2 | 2.4/5.9 |
| 26' | Total Load | | 51 | 90 | 107 | 180 | 272 | 389 | 71 | 77 | 135 | 161 | 271 | 409 | 584 |
| | Live Load L/360 | | 41 | 68 | 80 | 130 | 193 | 272 | 57 | 62 | 102 | 120 | 196 | 290 | 409 |
| | Min. End/Int. Bearing (in.) | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 2.0/5.1 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 2.0/5.1 |
| 28' | Total Load | | | 70 | 84 | 142 | 216 | 310 | 54 | 59 | 105 | 126 | 213 | 324 | 465 |
| | Live Load L/360 | | | 55 | 64 | 105 | 155 | 219 | 46 | 50 | 82 | 97 | 157 | 233 | 329 |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.8/4.4 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.8/4.4 |
| 30' | Total Load | | | 55 | 66 | 113 | 173 | 249 | | | 82 | 99 | 170 | 260 | 374 |
| | Live Load L/360 | | | 44 | 52 | 85 | 127 | 179 | | | 67 | 79 | 128 | 190 | 269 |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.9 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.9 |
| 32' | Total Load | | | 52 | 91 | 140 | 203 | | | | 64 | 78 | 136 | 210 | 305 |
| | Live Load L/360 | | | 43 | 70 | 105 | 148 | | | | 55 | 65 | 106 | 157 | 223 |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 |

* Indicates Total Load value controls.



FLOOR LOAD TABLES

General Notes

- Table is based on:
 - Uniform loads (beam weight considered).
 - More restrictive of simple or continuous span.
 - Deflection criteria of L/240 total load (TL) and L/360 live load (LL).
- For live load deflection limits of L/240 or L/480, multiply **Live Load L/360** values by 1.5 or 0.75, respectively. The resulting live load must not exceed the total load shown.

Also see **How to Use This Table** on page 20 and **General Assumptions** on page 5.

2.0E Parallam® PSL: Floor—100% (PLF) *continued*

| Span | Condition | 7" Width | | | | | | |
|--------|-----------------------------|----------|---------|---------|---------|---------|----------|----------|
| | | 9¼" | 9½" | 11¼" | 11½" | 14" | 16" | 18" |
| 8' | Total Load | 2,939 | 3,034 | 3,723 | 3,981 | 4,912 | 5,866 | 5,866 |
| | Live Load L/360 | 2,338 | 2,515 | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 2.3/5.6 | 2.3/5.8 | 2.9/7.1 | 3.1/7.6 | 3.8/9.4 | 4.5/11.3 | 4.5/11.3 |
| 9'-6" | Total Load | 2,153 | 2,294 | 3,020 | 3,222 | 3,940 | 4,667 | 4,934 |
| | Live Load L/360 | 1,448 | 1,561 | 2,496 | 2,893 | * | * | * |
| | Min. End/Int. Bearing (in.) | 2.0/4.9 | 2.1/5.2 | 2.8/6.9 | 2.9/7.3 | 3.6/9.0 | 4.3/10.6 | 4.5/11.3 |
| 10' | Total Load | 1,860 | 2,006 | 2,841 | 3,029 | 3,696 | 4,369 | 4,685 |
| | Live Load L/360 | 1,253 | 1,351 | 2,168 | 2,515 | * | * | * |
| | Min. End/Int. Bearing (in.) | 1.8/4.5 | 1.9/4.8 | 2.7/6.8 | 2.9/7.3 | 3.5/8.9 | 4.2/10.5 | 4.5/11.3 |
| 12' | Total Load | 1,096 | 1,184 | 1,928 | 2,185 | 2,960 | 3,476 | 3,898 |
| | Live Load L/360 | 744 | 803 | 1,302 | 1,516 | 2,396 | 3,443 | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 2.2/5.6 | 2.5/6.3 | 3.4/8.5 | 4.0/10.0 | 4.5/11.3 |
| 14' | Total Load | 694 | 751 | 1,233 | 1,443 | 2,186 | 2,818 | 3,320 |
| | Live Load L/360 | 476 | 514 | 839 | 979 | 1,561 | 2,264 | 3,122 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.7/4.2 | 2.0/4.9 | 3.0/7.4 | 3.8/9.5 | 4.5/11.3 |
| 16'-6" | Total Load | 421 | 457 | 758 | 889 | 1,440 | 2,019 | 2,526 |
| | Live Load L/360 | 294 | 318 | 521 | 610 | 980 | 1,432 | 1,991 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 2.3/5.8 | 3.2/8.1 | 4.0/10.1 |
| 18'-6" | Total Load | 295 | 320 | 536 | 630 | 1,028 | 1,518 | 2,001 |
| | Live Load L/360 | 210 | 227 | 373 | 437 | 705 | 1,035 | 1,445 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.9/4.7 | 2.7/6.8 | 3.6/9.0 |
| 20' | Total Load | 230 | 250 | 421 | 497 | 814 | 1,207 | 1,700 |
| | Live Load L/360 | 167 | 180 | 297 | 348 | 563 | 828 | 1,159 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.6/4.0 | 2.4/5.9 | 3.3/8.3 |
| 22' | Total Load | 168 | 183 | 312 | 369 | 609 | 909 | 1,285 |
| | Live Load L/360 | 126 | 136 | 224 | 263 | 426 | 629 | 883 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2.0/4.9 | 2.8/6.9 |
| 24' | Total Load | 125 | 137 | 236 | 280 | 465 | 698 | 992 |
| | Live Load L/360 | 97 | 105 | 173 | 204 | 331 | 488 | 687 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.7/4.2 | 2.4/5.9 |
| 26' | Total Load | 94 | 103 | 181 | 215 | 361 | 545 | 779 |
| | Live Load L/360 | 76 | 83 | 137 | 161 | 261 | 387 | 545 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 2.0/5.1 |
| 28' | Total Load | 72 | 79 | 140 | 168 | 285 | 432 | 620 |
| | Live Load L/360 | 61 | 66 | 110 | 129 | 210 | 311 | 439 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.8/4.4 |
| 30' | Total Load | 54 | 60 | 110 | 132 | 226 | 346 | 499 |
| | Live Load L/360 | 50 | 54 | 89 | 105 | 171 | 254 | 359 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.9 |
| 32' | Total Load | | | 86 | 104 | 182 | 280 | 406 |
| | Live Load L/360 | | | 74 | 87 | 141 | 210 | 297 |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 |

* Indicates Total Load value controls.



SNOW ROOF LOAD TABLES

How to Use This Table

1. Calculate total load (neglect beam weight) on the beam or header in pounds per linear foot (plf).
2. Select appropriate **Span** (center-to-center of bearing).
3. Scan horizontally to find the proper width, and a depth with a capacity that exceeds actual total load.
4. Review bearing length requirements to ensure adequacy.

Also see **General Notes** on page 23.

TimberStrand® LSL: Roof—Snow Load Area 115% (PLF)

| Span | Condition | 1.3E Grade | | | | | | | 1.55E Grade | | | | |
|--------|-----------------------------|------------|---------|---------|---------|----------|----------|-----------------------|-------------|---------|----------|----------|----------|
| | | 3½" Width | | | | | | 5½" Plank Orientation | 1¾" Width | | | | |
| | | 4¾" | 5½" | 7¼" | 8¾" | 9¼" | 11¼" | 3½" | 9¼" | 9½" | 11¼" | 11½" | 14" |
| 3' | Total Load | 1,769 | 2,739 | 4,643 | 6,469 | 7,393 | 7,442 | 1,392 | 3,479 | 3,642 | 4,717 | 4,717 | 4,717 |
| | Deflection L/240 / L/360 | *1,420 | *2,547 | */* | */* | */* | */* | *1,224 | */* | */* | */* | */* | */* |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.7/4.1 | 2.8/7 | 3.9/9.8 | 4.5/11.2 | 4.5/11.3 | 1.5/3.5 | 3.3/8.3 | 3.5/8.7 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 4' | Total Load | 993 | 1,538 | 2,608 | 3,635 | 4,154 | 5,579 | 996 | 2,219 | 2,307 | 2,988 | 3,263 | 3,536 |
| | Deflection L/240 / L/360 | 977/651 | *1,215 | *2,476 | */* | */* | */* | 820/546 | */* | */* | */* | */* | */* |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 2.1/5.3 | 2.9/7.3 | 3.4/8.4 | 4.5/11.3 | 1.5/3.5 | 2.8/7.1 | 2.9/7.3 | 3.8/9.5 | 4.2/10.4 | 4.5/11.3 |
| 5' | Total Load | 634 | 982 | 1,666 | 2,323 | 2,655 | 3,860 | 533 | 1,629 | 1,688 | 2,132 | 2,306 | 2,827 |
| | Deflection L/240 / L/360 | 521/347 | *662 | *1,398 | *2,188 | *2605 | */* | 431/287 | *1,553 | *1,658 | */* | */* | */* |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.7/4.2 | 2.3/5.9 | 2.7/6.7 | 3.9/9.7 | 1.5/3.5 | 2.6/6.5 | 2.7/6.7 | 3.4/8.5 | 3.7/9.2 | 4.5/11.3 |
| 6' | Total Load | 317 | 614 | 1,155 | 1,610 | 1,841 | 2,677 | 258 | 1,260 | 1,326 | 1,657 | 1,782 | 2,246 |
| | Deflection L/240 / L/360 | 309/206 | 595/397 | *857 | *1,367 | *1,641 | */* | 253/169 | *978 | *1,048 | *1,605 | */* | */* |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2/4.9 | 2.2/5.6 | 3.2/8.1 | 1.5/3.5 | 2.4/6 | 2.5/6.3 | 3.2/7.9 | 3.4/8.5 | 4.3/10.7 |
| 7' | Total Load | 171 | 336 | 742 | 1,181 | 1,350 | 1,963 | 138 | 924 | 973 | 1,344 | 1,452 | 1,807 |
| | Deflection L/240 / L/360 | *131 | *255 | *560 | *904 | *1,092 | *1,828 | *107 | *651 | *699 | *1,089 | *1,250 | */* |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.7/4.2 | 1.9/4.8 | 2.8/7 | 1.5/3.5 | 2.1/5.2 | 2.2/5.4 | 3/7.5 | 3.2/8.1 | 4/10.1 |
| 8' | Total Load | 99 | 198 | 443 | 902 | 1,031 | 1,500 | 79 | 706 | 743 | 1,028 | 1,140 | 1,511 |
| | Deflection L/240 / L/360 | *89 | *173 | *384 | *626 | *759 | *1,290 | *72 | 679/453 | 731/487 | *769 | *886 | *1,352 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.7 | 1.7/4.2 | 2.4/6.1 | 1.5/3.5 | 1.8/4.5 | 1.9/4.8 | 2.6/6.6 | 2.9/7.3 | 3.9/9.6 |
| 9'-6" | Total Load | | 98 | 224 | 637 | 728 | 1,061 | | 499 | 525 | 727 | 806 | 1,105 |
| | Deflection L/240 / L/360 | | */* | */* | 579/386 | 706/470 | *811 | | 421/280 | 453/302 | 725/483 | *560 | *870 |
| | Min. End/Int. Bearing (in.) | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2.1/5.1 | | 1.5/3.8 | 1.6/4 | 2.2/5.5 | 2.5/6.1 | 3.4/8.4 |
| 10' | Total Load | | 79 | 182 | 574 | 656 | 956 | | 450 | 474 | 655 | 727 | 996 |
| | Deflection L/240 / L/360 | | */* | */* | 500/333 | 611/407 | *704 | | 364/242 | 392/261 | 630/420 | *487 | *760 |
| | Min. End/Int. Bearing (in.) | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.9/4.9 | | 1.5/3.6 | 1.5/3.8 | 2.1/5.3 | 2.3/5.8 | 3.2/8 |
| 12' | Total Load | | | 85 | 386 | 453 | 660 | | 283 | 306 | 453 | 503 | 690 |
| | Deflection L/240 / L/360 | | | */* | 296/197 | 362/241 | 634/423 | | 216/144 | 233/155 | 378/252 | 440/293 | *464 |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.6/4.1 | | 1.5/3.5 | 1.5/3.5 | 1.8/4.4 | 1.9/4.9 | 2.7/6.6 |
| 14' | Total Load | | | | 243 | 300 | 482 | | 179 | 194 | 318 | 367 | 504 |
| | Deflection L/240 / L/360 | | | | 189/126 | 232/154 | 409/272 | | 138/92 | 149/99 | 243/162 | 284/189 | 453/302 |
| | Min. End/Int. Bearing (in.) | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 1.7/4.2 | 2.3/5.7 |
| 16'-6" | Total Load | | | | 147 | 182 | 327 | | 109 | 118 | 196 | 230 | 361 |
| | Deflection L/240 / L/360 | | | | 116/77 | 143/95 | 254/169 | | 85/57 | 92/61 | 151/101 | 177/118 | 284/189 |
| | Min. End/Int. Bearing (in.) | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.9/4.8 |
| 18'-6" | Total Load | | | | 102 | 127 | 231 | | 76 | 83 | 138 | 163 | 265 |
| | Deflection L/240 / L/360 | | | | 83/55 | 102/68 | 182/121 | | 61/40 | 66/44 | 108/72 | 127/84 | 205/136 |
| | Min. End/Int. Bearing (in.) | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.6/4 |
| 20' | Total Load | | | | 79 | 99 | 181 | | 59 | 64 | 109 | 128 | 210 |
| | Deflection L/240 / L/360 | | | | 66/44 | 81/54 | 145/96 | | 48/32 | 52/35 | 86/57 | 101/67 | 163/109 |
| | Min. End/Int. Bearing (in.) | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 |
| 24' | Total Load | | | | | 53 | 101 | | | | 61 | 72 | 120 |
| | Deflection L/240 / L/360 | | | | | 47/31 | 84/56 | | | | 50/33 | 59/39 | 96/64 |
| | Min. End/Int. Bearing (in.) | | | | | 1.5/3.5 | 1.5/3.5 | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 |
| 28' | Total Load | | | | | | 60 | | | | | | 73 |
| | Deflection L/240 / L/360 | | | | | | 53/35 | | | | | | 61/40 |
| | Min. End/Int. Bearing (in.) | | | | | | 1.5/3.5 | | | | | | 1.5/3.5 |

* Indicates Total Load value controls.

SNOW ROOF LOAD TABLES

General Notes

- Table is based on:
 - Uniform loads (beam weight considered).
 - More restrictive of simple or continuous span.
 - Deflection criteria of L/180 total load. For stiffer deflection criteria, use L/240 values for total load deflection.
- For door and window applications, Weyerhaeuser recommends using the L/360 value for a live load deflection limit and the L/240 value for a total load limit.

Also see *How to Use This Table* on page 22 and *General Assumptions* on page 5.

TimberStrand® LSL: Roof—Snow Load Area 115% (PLF) *continued*

| Span | Condition | 1.55E Grade | | | | | | | | | | | | |
|--------|-----------------------------|-------------|-----------|-----------|----------|----------|----------|-------------------------|-------------|-------------|-----------|-----------|-----------|----------|
| | | 3½" Width | | | | | | 5¼" Width (2- or 3-ply) | | | | | | |
| | | 9¼" | 9½" | 11¼" | 11½" | 14" | 16" | 9¼" | 9½" | 11¼" | 11½" | 14" | 16" | |
| 3' | Total Load | 6,958 | 7,284 | 9,432 | 9,432 | 9,432 | 9,432 | 10,437 | 10,926 | 14,148 | 14,148 | 14,148 | 14,148 | 14,148 |
| | Deflection L/240 / L/360 | */* | */* | */* | */* | */* | */* | */* | */* | */* | */* | */* | */* | */* |
| | Min. End/Int. Bearing (in.) | 3.3/8.3 | 3.5/8.7 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 3.3/8.3 | 3.5/8.7 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 4' | Total Load | 4,439 | 4,615 | 5,976 | 6,526 | 7,070 | 7,070 | 6,659 | 6,923 | 8,965 | 9,790 | 10,605 | 10,605 | |
| | Deflection L/240 / L/360 | */* | */* | */* | */* | */* | */* | */* | */* | */* | */* | */* | */* | |
| | Min. End/Int. Bearing (in.) | 2.8/7.1 | 2.9/7.3 | 3.8/9.5 | 4.2/10.4 | 4.5/11.3 | 4.5/11.3 | 2.8/7.1 | 2.9/7.3 | 3.8/9.5 | 4.2/10.4 | 4.5/11.3 | 4.5/11.3 | |
| 5' | Total Load | 3,258 | 3,376 | 4,265 | 4,612 | 5,652 | 5,652 | 4,887 | 5,064 | 6,398 | 6,919 | 8,478 | 8,478 | |
| | Deflection L/240 / L/360 | */3,106 | */3,316 | */* | */* | */* | */* | */4,659 | */4,975 | */* | */* | */* | */* | |
| | Min. End/Int. Bearing (in.) | 2.6/6.5 | 2.7/6.7 | 3.4/8.5 | 3.7/9.2 | 4.5/11.3 | 4.5/11.3 | 2.6/6.5 | 2.7/6.7 | 3.4/8.5 | 3.7/9.2 | 4.5/11.3 | 4.5/11.3 | |
| 6' | Total Load | 2,521 | 2,652 | 3,315 | 3,565 | 4,492 | 4,707 | 3,781 | 3,979 | 4,972 | 5,348 | 6,739 | 7,061 | |
| | Deflection L/240 / L/360 | */1,957 | */2,097 | */3,210 | */* | */* | */* | */2,936 | */3,146 | */4,816 | */* | */* | */* | |
| | Min. End/Int. Bearing (in.) | 2.4/6 | 2.5/6.3 | 3.2/7.9 | 3.4/8.5 | 4.3/10.7 | 4.5/11.3 | 2.4/6 | 2.5/6.3 | 3.2/7.9 | 3.4/8.5 | 4.3/10.7 | 4.5/11.3 | |
| 7' | Total Load | 1,849 | 1,946 | 2,689 | 2,904 | 3,614 | 4,032 | 2,774 | 2,919 | 4,034 | 4,357 | 5,421 | 6,048 | |
| | Deflection L/240 / L/360 | */1,302 | */1,399 | */2,179 | */2,501 | */* | */* | */1,954 | */2,098 | */3,269 | */3,752 | */* | */* | |
| | Min. End/Int. Bearing (in.) | 2.1/5.2 | 2.2/5.4 | 3/7.5 | 3.2/8.1 | 4/10.1 | 4.5/11.3 | 2.1/5.2 | 2.2/5.4 | 3/7.5 | 3.2/8.1 | 4/10.1 | 4.5/11.3 | |
| 8' | Total Load | 1,413 | 1,487 | 2,056 | 2,280 | 3,022 | 3,526 | 2,120 | 2,231 | 3,084 | 3,420 | 4,534 | 5,289 | |
| | Deflection L/240 / L/360 | 1,359/906 | 1,462/974 | */1,538 | */1,773 | */2,705 | */* | 2,038/1,359 | 2,193/1,462 | */2,307 | */2,660 | */4,058 | */* | |
| | Min. End/Int. Bearing (in.) | 1.8/4.5 | 1.9/4.8 | 2.6/6.6 | 2.9/7.3 | 3.9/9.6 | 4.5/11.3 | 1.8/4.5 | 1.9/4.8 | 2.6/6.6 | 2.9/7.3 | 3.9/9.6 | 4.5/11.3 | |
| 9'-6" | Total Load | 999 | 1,051 | 1,454 | 1,613 | 2,211 | 2,854 | 1,499 | 1,577 | 2,181 | 2,419 | 3,316 | 4,282 | |
| | Deflection L/240 / L/360 | 842/561 | 907/605 | 1,451/967 | */1,121 | */1,740 | */2,456 | 1,263/842 | 1,361/907 | 2,176/1,451 | */1,681 | */2,610 | */3,684 | |
| | Min. End/Int. Bearing (in.) | 1.5/3.8 | 1.6/4 | 2.2/5.5 | 2.5/6.1 | 3.4/8.4 | 4.3/10.8 | 1.5/3.8 | 1.6/4 | 2.2/5.5 | 2.5/6.1 | 3.4/8.4 | 4.3/10.8 | |
| 10' | Total Load | 901 | 948 | 1,311 | 1,454 | 1,993 | 2,574 | 1,351 | 1,422 | 1,967 | 2,182 | 2,990 | 3,862 | |
| | Deflection L/240 / L/360 | 728/485 | 785/523 | 1,260/840 | */974 | */1,520 | */2,154 | 1,092/728 | 1,178/785 | 1,890/1,260 | */1,462 | */2,280 | */3,232 | |
| | Min. End/Int. Bearing (in.) | 1.5/3.6 | 1.5/3.8 | 2.1/5.3 | 2.3/5.8 | 3.2/8 | 4.1/10.3 | 1.5/3.6 | 1.5/3.8 | 2.1/5.3 | 2.3/5.8 | 3.2/8 | 4.1/10.3 | |
| 12' | Total Load | 566 | 612 | 907 | 1,006 | 1,380 | 1,782 | 850 | 918 | 1,360 | 1,509 | 2,070 | 2,674 | |
| | Deflection L/240 / L/360 | 432/288 | 467/311 | 756/504 | 881/587 | */928 | */1,334 | 649/432 | 700/467 | 1,135/756 | 1,322/881 | */1,393 | */2,001 | |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.8/4.4 | 1.9/4.9 | 2.7/6.6 | 3.4/8.6 | 1.5/3.5 | 1.5/3.5 | 1.8/4.4 | 1.9/4.9 | 2.7/6.6 | 3.4/8.6 | |
| 14' | Total Load | 359 | 388 | 637 | 735 | 1,009 | 1,305 | 538 | 582 | 956 | 1,103 | 1,514 | 1,957 | |
| | Deflection L/240 / L/360 | 276/184 | 299/199 | 487/325 | 569/379 | 907/605 | */877 | 415/276 | 448/299 | 731/487 | 854/569 | 1,361/907 | */1,316 | |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 1.7/4.2 | 2.3/5.7 | 2.9/7.3 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 1.7/4.2 | 2.3/5.7 | 2.9/7.3 | |
| 16'-6" | Total Load | 218 | 236 | 392 | 460 | 722 | 934 | 327 | 354 | 588 | 690 | 1,084 | 1,402 | |
| | Deflection L/240 / L/360 | 171/114 | 185/123 | 303/202 | 354/236 | 569/379 | 832/555 | 256/171 | 277/185 | 455/303 | 532/354 | 854/569 | 1,248/832 | |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.9/4.8 | 2.5/6.2 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.9/4.8 | 2.5/6.2 | |
| 18'-6" | Total Load | 152 | 166 | 277 | 326 | 531 | 739 | 229 | 249 | 416 | 489 | 797 | 1,109 | |
| | Deflection L/240 / L/360 | 122/81 | 132/88 | 217/144 | 254/169 | 410/273 | 601/401 | 183/122 | 198/132 | 326/217 | 381/254 | 615/410 | 902/601 | |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.6/4 | 2.2/5.6 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.6/4 | 2.2/5.6 | |
| 20' | Total Load | 119 | 129 | 218 | 257 | 421 | 624 | 179 | 194 | 327 | 385 | 631 | 936 | |
| | Deflection L/240 / L/360 | 97/64 | 105/70 | 172/115 | 202/135 | 327/218 | 481/320 | 145/97 | 157/105 | 259/172 | 304/202 | 491/327 | 722/481 | |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2/5.1 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2/5.1 | |
| 24' | Total Load | 65 | 71 | 122 | 145 | 241 | 361 | 98 | 106 | 183 | 217 | 361 | 542 | |
| | Deflection L/240 / L/360 | 56/37 | 61/40 | 101/67 | 118/79 | 192/128 | 284/189 | 84/56 | 91/61 | 151/101 | 177/118 | 288/192 | 426/284 | |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | |
| 28' | Total Load | | | 73 | 87 | 147 | 224 | 56 | 61 | 109 | 130 | 221 | 336 | |
| | Deflection L/240 / L/360 | | | 64/42 | 75/50 | 122/81 | 181/120 | 53/35 | 58/38 | 96/64 | 112/75 | 183/122 | 271/181 | |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | |

* Indicates Total Load value controls.



SNOW ROOF LOAD TABLES

How to Use This Table

1. Calculate total load (neglect beam weight) on the beam or header in pounds per linear foot (plf).
2. Select appropriate **Span** (center-to-center of bearing).
3. Scan horizontally to find the proper width, and a depth with a capacity that exceeds actual total load.
4. Review bearing length requirements to ensure adequacy.

Also see **General Notes** on page 25.

2.0E Microllam® LVL: Roof—Snow Load Area 115% (PLF)

| Span | Condition | 1¾" Width | | | | | | | 3½" Width (2-ply) | | | | | |
|--------|-----------------------------|-----------|---------|---------|---------|---------|---------|----------|-------------------|---------|---------|---------|---------|---------|
| | | 5½" | 7¼" | 9¼" | 9½" | 11¼" | 11½" | 14" | 5½" | 7¼" | 9¼" | 9½" | 11¼" | 11½" |
| 6' | Total Load | 474 | 877 | 1,182 | 1,223 | 1,523 | 1,638 | 1,961 | 948 | 1,755 | 2,365 | 2,446 | 3,047 | 3,277 |
| | Deflection L/240 | 458 | * | * | * | * | * | * | 916 | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 2/5 | 2.7/6.8 | 2.8/7 | 3.5/8.7 | 3.8/9.4 | 4.5/11.3 | 1.5/3.5 | 2/5 | 2.7/6.8 | 2.8/7 | 3.5/8.7 | 3.8/9.4 |
| 8' | Total Load | 153 | 342 | 800 | 841 | 1,053 | 1,126 | 1,389 | 307 | 685 | 1,601 | 1,682 | 2,106 | 2,252 |
| | Deflection L/240 | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 2.5/6.1 | 2.6/6.4 | 3.2/8.1 | 3.5/8.6 | 4.3/10.6 | 1.5/3.5 | 1.5/3.5 | 2.5/6.1 | 2.6/6.4 | 3.2/8.1 | 3.5/8.6 |
| 9'-6" | Total Load | 77 | 174 | 566 | 595 | 816 | 903 | 1,114 | 154 | 349 | 1,132 | 1,190 | 1,633 | 1,807 |
| | Deflection L/240 | * | * | 543 | 585 | * | * | * | * | * | 1,086 | 1,171 | * | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 2.1/5.2 | 2.2/5.4 | 3/7.4 | 3.3/8.2 | 4.1/10.2 | 1.5/3.5 | 1.5/3.5 | 2.1/5.2 | 2.2/5.4 | 3/7.4 | 3.3/8.2 |
| 10' | Total Load | 62 | 142 | 510 | 536 | 736 | 814 | 1,045 | 124 | 284 | 1,021 | 1,073 | 1,473 | 1,629 |
| | Deflection L/240 | * | * | 470 | 506 | * | * | * | * | * | 940 | 1,013 | * | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 2/4.9 | 2.1/5.2 | 2.8/7.1 | 3.1/7.8 | 4/10 | 1.5/3.5 | 1.5/3.5 | 2/4.9 | 2.1/5.2 | 2.8/7.1 | 3.1/7.8 |
| 12' | Total Load | | 67 | 353 | 371 | 509 | 564 | 767 | 57 | 135 | 706 | 742 | 1,019 | 1,128 |
| | Deflection L/240 | | * | 279 | 301 | 488 | * | * | * | * | 558 | 602 | 976 | * |
| | Min. End/Int. Bearing (in.) | | 1.5/3.5 | 1.6/4.1 | 1.7/4.3 | 2.4/5.9 | 2.6/6.5 | 3.5/8.9 | 1.5/3.5 | 1.5/3.5 | 1.6/4.1 | 1.7/4.3 | 2.4/5.9 | 2.6/6.5 |
| 14' | Total Load | | | 233 | 252 | 372 | 412 | 562 | | 70 | 466 | 505 | 745 | 825 |
| | Deflection L/240 | | | 178 | 193 | 314 | 367 | * | | * | 357 | 386 | 629 | 734 |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 2/5 | 2.2/5.6 | 3/7.6 | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2/5 | 2.2/5.6 |
| 16'-6" | Total Load | | | 142 | 154 | 255 | 295 | 402 | | | 285 | 308 | 510 | 591 |
| | Deflection L/240 | | | 110 | 119 | 195 | 228 | 367 | | | 220 | 238 | 391 | 457 |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.6/4.1 | 1.9/4.7 | 2.6/6.4 | | | 1.5/3.5 | 1.5/3.5 | 1.6/4.1 | 1.9/4.7 |
| 18'-6" | Total Load | | | 100 | 108 | 181 | 212 | 318 | | | 200 | 217 | 362 | 425 |
| | Deflection L/240 | | | 78 | 85 | 140 | 164 | 264 | | | 157 | 170 | 280 | 328 |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.9 | 2.3/5.7 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.9 |
| 20' | Total Load | | | 78 | 85 | 143 | 168 | 271 | | | 157 | 171 | 286 | 336 |
| | Deflection L/240 | | | 62 | 67 | 111 | 130 | 211 | | | 125 | 135 | 223 | 261 |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2.1/5.3 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 |
| 22' | Total Load | | | 58 | 63 | 106 | 125 | 206 | | | 116 | 126 | 213 | 251 |
| | Deflection L/240 | | | 47 | 51 | 84 | 98 | 160 | | | 94 | 102 | 168 | 197 |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.8/4.5 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 |
| 24' | Total Load | | | | | 81 | 95 | 158 | | | 87 | 95 | 162 | 191 |
| | Deflection L/240 | | | | | 65 | 76 | 124 | | | 73 | 79 | 130 | 153 |
| | Min. End/Int. Bearing (in.) | | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.8 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 |
| 26' | Total Load | | | | | 62 | 74 | 123 | | | 67 | 73 | 125 | 148 |
| | Deflection L/240 | | | | | 51 | 60 | 98 | | | 57 | 62 | 102 | 120 |
| | Min. End/Int. Bearing (in.) | | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 |
| 28' | Total Load | | | | | | 58 | 98 | | | 52 | 56 | 98 | 117 |
| | Deflection L/240 | | | | | | 48 | 78 | | | 46 | 50 | 82 | 97 |
| | Min. End/Int. Bearing (in.) | | | | | | 1.5/3.5 | 1.5/3.5 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 |
| 30' | Total Load | | | | | | | 64 | | | | | 78 | 93 |
| | Deflection L/240 | | | | | | | | | | | | 67 | 79 |
| | Min. End/Int. Bearing (in.) | | | | | | | 1.5/3.5 | | | | | 1.5/3.5 | 1.5/3.5 |

* Indicates Total Load value controls.



SNOW ROOF LOAD TABLES

General Notes

- Table is based on:
 - Uniform loads (beam weight considered).
 - More restrictive of simple or continuous span.
 - Deflection criteria of L/180 total load. For stiffer deflection criteria, use L/240 values for total load deflection.

Also see *How to Use This Table* on page 24 and *General Assumptions* on page 5.

2.0E Microllam® LVL: Roof—Snow Load Area 115% (PLF) *continued*

| Span | Condition | 3½" Width (2-ply) | | | | 5¼" Width (3-ply) | | | | | | | | | |
|--------|-----------------------------|-------------------|----------|----------|----------|-------------------|---------|---------|---------|---------|---------|----------|----------|----------|----------|
| | | 14" | 16" | 18" | 20" | 5½" | 7¼" | 9¼" | 9½" | 11¼" | 11½" | 14" | 16" | 18" | 20" |
| 6' | Total Load | 3,919 | 3,919 | 3,919 | 3,919 | 1,423 | 2,632 | 3,547 | 3,669 | 4,571 | 4,916 | 5,878 | 5,878 | 5,878 | 5,878 |
| | Deflection L/240 | * | * | * | * | 1,374 | * | * | * | * | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 1.5/3.5 | 2/5 | 2.7/6.8 | 2.8/7 | 3.5/8.7 | 3.8/9.4 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 8' | Total Load | 2,778 | 2,934 | 2,934 | 2,934 | 461 | 1,028 | 2,401 | 2,524 | 3,159 | 3,378 | 4,168 | 4,402 | 4,402 | 4,402 |
| | Deflection L/240 | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 4.3/10.6 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 1.5/3.5 | 1.5/3.5 | 2.5/6.1 | 2.6/6.4 | 3.2/8.1 | 3.5/8.6 | 4.3/10.6 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 9'-6" | Total Load | 2,229 | 2,468 | 2,468 | 2,468 | 231 | 524 | 1,698 | 1,785 | 2,450 | 2,710 | 3,344 | 3,702 | 3,702 | 3,702 |
| | Deflection L/240 | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 4.1/10.2 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 1.5/3.5 | 1.5/3.5 | 2.1/5.2 | 2.2/5.4 | 3/7.4 | 3.3/8.2 | 4.1/10.2 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 10' | Total Load | 2,091 | 2,344 | 2,344 | 2,344 | 187 | 427 | 1,531 | 1,610 | 2,209 | 2,444 | 3,137 | 3,516 | 3,516 | 3,516 |
| | Deflection L/240 | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 4/10 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 1.5/3.5 | 1.5/3.5 | 2/4.9 | 2.1/5.2 | 2.8/7.1 | 3.1/7.8 | 4/10 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 12' | Total Load | 1,535 | 1,950 | 1,950 | 1,950 | 86 | 203 | 1,059 | 1,113 | 1,529 | 1,692 | 2,303 | 2,925 | 2,925 | 2,925 |
| | Deflection L/240 | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 3.5/8.9 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 1.5/3.5 | 1.5/3.5 | 1.6/4.1 | 1.7/4.3 | 2.4/5.9 | 2.6/6.5 | 3.5/8.9 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 14' | Total Load | 1,124 | 1,444 | 1,669 | 1,669 | 106 | 700 | 757 | 1,118 | 1,238 | 1,686 | 2,166 | 2,503 | 2,503 | 2,503 |
| | Deflection L/240 | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 3/7.6 | 3.9/9.7 | 4.5/11.3 | 4.5/11.3 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2/5 | 2.2/5.6 | 3/7.6 | 3.9/9.7 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 16'-6" | Total Load | 805 | 1,035 | 1,291 | 1,413 | 427 | 463 | 765 | 886 | 1,208 | 1,552 | 1,936 | 2,120 | 2,120 | 2,120 |
| | Deflection L/240 | 735 | * | * | * | 331 | 358 | 587 | 686 | 1,103 | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 2.6/6.4 | 3.3/8.3 | 4.1/10.3 | 4.5/11.3 | 1.5/3.5 | 1.5/3.5 | 1.6/4.1 | 1.9/4.7 | 2.6/6.4 | 3.3/8.3 | 4.1/10.3 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 18'-6" | Total Load | 637 | 820 | 1,023 | 1,247 | 301 | 326 | 543 | 638 | 956 | 1,230 | 1,535 | 1,871 | 1,871 | 1,871 |
| | Deflection L/240 | 529 | 776 | * | * | 236 | 256 | 420 | 492 | 794 | 1,164 | * | * | * | |
| | Min. End/Int. Bearing (in.) | 2.3/5.7 | 2.9/7.4 | 3.7/9.2 | 4.5/11.2 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.9 | 2.3/5.7 | 2.9/7.4 | 3.7/9.2 | 4.5/11.2 | 4.5/11.2 | 4.5/11.2 |
| 20' | Total Load | 543 | 699 | 872 | 1,064 | 236 | 256 | 429 | 504 | 815 | 1,048 | 1,309 | 1,596 | 1,596 | 1,596 |
| | Deflection L/240 | 422 | 621 | 869 | * | 188 | 203 | 334 | 392 | 633 | 931 | 1,304 | * | * | |
| | Min. End/Int. Bearing (in.) | 2.1/5.3 | 2.7/6.8 | 3.4/8.5 | 4.1/10.3 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2.1/5.3 | 2.7/6.8 | 3.4/8.5 | 4.1/10.3 | 4.1/10.3 | 4.1/10.3 |
| 22' | Total Load | 412 | 575 | 718 | 876 | 174 | 190 | 320 | 377 | 619 | 862 | 1,077 | 1,314 | 1,314 | 1,314 |
| | Deflection L/240 | 320 | 472 | 662 | * | 141 | 153 | 252 | 296 | 480 | 708 | 994 | * | * | |
| | Min. End/Int. Bearing (in.) | 1.8/4.5 | 2.5/6.2 | 3.1/7.7 | 3.8/9.4 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.8/4.5 | 2.5/6.2 | 3.1/7.7 | 3.8/9.4 | 3.8/9.4 | |
| 24' | Total Load | 316 | 472 | 600 | 732 | 131 | 143 | 243 | 287 | 475 | 708 | 900 | 1,099 | 1,099 | 1,099 |
| | Deflection L/240 | 248 | 366 | 515 | 698 | 109 | 118 | 195 | 229 | 372 | 550 | 773 | 1,047 | 1,047 | 1,047 |
| | Min. End/Int. Bearing (in.) | 1.5/3.8 | 2.2/5.6 | 2.8/7.1 | 3.4/8.6 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.8 | 2.2/5.6 | 2.8/7.1 | 3.4/8.6 | 3.4/8.6 | |
| 26' | Total Load | 247 | 370 | 509 | 621 | 101 | 110 | 188 | 223 | 371 | 556 | 763 | 932 | 932 | 932 |
| | Deflection L/240 | 196 | 290 | 409 | 555 | 86 | 93 | 154 | 181 | 294 | 435 | 613 | 832 | 832 | 832 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.9/4.8 | 2.6/6.5 | 3.2/7.9 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.9/4.8 | 2.6/6.5 | 3.2/7.9 | 3.2/7.9 | |
| 28' | Total Load | 196 | 295 | 421 | 533 | 78 | 85 | 148 | 175 | 294 | 442 | 632 | 799 | 799 | 799 |
| | Deflection L/240 | 157 | 233 | 329 | 448 | 69 | 75 | 123 | 145 | 236 | 350 | 494 | 672 | 672 | 672 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.7/4.2 | 2.3/5.9 | 3/7.4 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.7/4.2 | 2.3/5.9 | 3/7.4 | 3/7.4 | |
| 30' | Total Load | 157 | 238 | 341 | 461 | 61 | 66 | 117 | 139 | 236 | 357 | 511 | 692 | 692 | 692 |
| | Deflection L/240 | 128 | 190 | 269 | 366 | 56 | 61 | 101 | 118 | 193 | 286 | 404 | 550 | 550 | 550 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.6 | 2.1/5.1 | 2.8/6.9 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 2.1/5.1 | 2.8/6.9 | 2.8/6.9 | |

* Indicates Total Load value controls.

SNOW ROOF LOAD TABLES

How to Use This Table

1. Calculate total load (neglect beam weight) on the beam or header in pounds per linear foot (plf).
2. Select appropriate **Span** (center-to-center of bearing).
3. Scan horizontally to find the proper width, and a depth with a capacity that exceeds actual total load.
4. Review bearing length requirements to ensure adequacy.

Also see **General Notes** on page 27.

2.0E Parallam® PSL: Roof—Snow Load Area 115% (PLF)

| Span | Condition | 3½" Width | | | | | | | 5¼" Width | | | | | | |
|--------|------------------|-----------|---------|---------|---------|----------|----------|----------|-----------|---------|---------|---------|----------|----------|----------|
| | | 9¼" | 9½" | 11¼" | 11½" | 14" | 16" | 18" | 9¼" | 9½" | 11¼" | 11½" | 14" | 16" | 18" |
| 8' | Total Load | 1,691 | 1,746 | 2,142 | 2,291 | 2,826 | 2,933 | 2,933 | 2,537 | 2,619 | 3,213 | 3,436 | 4,240 | 4,400 | 4,400 |
| | Deflection L/240 | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 9'-6" | Total Load | 1,255 | 1,320 | 1,738 | 1,854 | 2,268 | 2,467 | 2,467 | 1,883 | 1,980 | 2,607 | 2,781 | 3,402 | 3,700 | 3,700 |
| | Deflection L/240 | 1,086 | 1,171 | * | * | * | * | * | 1,630 | 1,757 | * | * | * | * | * |
| 10' | Total Load | 2,3/5.7 | 2,4/6.0 | 3,2/7.9 | 3,4/8.4 | 4,1/10.3 | 4,5/11.3 | 4,5/11.3 | 2,3/5.7 | 2,4/6.0 | 3,2/7.9 | 3,4/8.4 | 4,1/10.3 | 4,5/11.3 | 4,5/11.3 |
| | Deflection L/240 | 1,132 | 1,190 | 1,635 | 1,743 | 2,127 | 2,342 | 2,342 | 1,698 | 1,786 | 2,453 | 2,615 | 3,191 | 3,514 | 3,514 |
| 12' | Total Load | 940 | 1,013 | 1,626 | * | * | * | * | 1,410 | 1,520 | 2,439 | * | * | * | * |
| | Deflection L/240 | 2,2/5.4 | 2,3/5.7 | 3,1/7.8 | 3,3/8.4 | 4,1/10.2 | 4,5/11.3 | 4,5/11.3 | 2,2/5.4 | 2,3/5.7 | 3,1/7.8 | 3,3/8.4 | 4,1/10.2 | 4,5/11.3 | 4,5/11.3 |
| 14' | Total Load | 734 | 793 | 1,135 | 1,258 | 1,704 | 1,949 | 1,949 | 1,101 | 1,190 | 1,703 | 1,887 | 2,557 | 2,923 | 2,923 |
| | Deflection L/240 | 558 | 602 | 976 | 1,137 | * | * | * | 837 | 904 | 1,464 | 1,706 | * | * | * |
| 16'-6" | Total Load | 1,7/4.3 | 1,8/4.6 | 2,6/6.6 | 2,9/7.3 | 3,9/9.8 | 4,5/11.3 | 4,5/11.3 | 1,7/4.3 | 1,8/4.6 | 2,6/6.6 | 2,9/7.3 | 3,9/9.8 | 4,5/11.3 | 4,5/11.3 |
| | Deflection L/240 | 466 | 504 | 826 | 921 | 1,259 | 1,623 | 1,667 | 699 | 756 | 1,240 | 1,381 | 1,889 | 2,434 | 2,501 |
| 18'-6" | Total Load | 357 | 386 | 629 | 734 | 1,171 | * | * | 535 | 579 | 943 | 1,102 | 1,757 | * | * |
| | Deflection L/240 | 1,5/3.5 | 1,5/3.5 | 2,2/5.6 | 2,5/6.2 | 3,4/8.5 | 4,4/10.9 | 4,5/11.3 | 1,5/3.5 | 1,5/3.5 | 2,2/5.6 | 2,5/6.2 | 3,4/8.5 | 4,4/10.9 | 4,5/11.3 |
| 20' | Total Load | 284 | 308 | 509 | 597 | 902 | 1,163 | 1,412 | 426 | 462 | 764 | 896 | 1,353 | 1,745 | 2,118 |
| | Deflection L/240 | 220 | 238 | 391 | 457 | 735 | 1,074 | * | 331 | 358 | 587 | 686 | 1,103 | 1,611 | * |
| 22' | Total Load | 1,5/3.5 | 1,5/3.5 | 1,6/4.1 | 1,9/4.8 | 2,9/7.2 | 3,7/9.3 | 4,5/11.3 | 1,5/3.5 | 1,5/3.5 | 1,6/4.1 | 1,9/4.8 | 2,9/7.2 | 3,7/9.3 | 4,5/11.2 |
| | Deflection L/240 | 200 | 217 | 361 | 424 | 690 | 922 | 1,154 | 300 | 325 | 542 | 637 | 1,035 | 1,383 | 1,731 |
| 24' | Total Load | 157 | 170 | 280 | 328 | 529 | 776 | 1,084 | 236 | 256 | 420 | 492 | 794 | 1,164 | 1,626 |
| | Deflection L/240 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,5/3.9 | 2,5/6.2 | 3,3/8.3 | 4,1/10.3 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,5/3.9 | 2,5/6.2 | 3,3/8.3 | 4,1/10.3 |
| 26' | Total Load | 157 | 170 | 285 | 335 | 548 | 786 | 984 | 235 | 255 | 427 | 503 | 822 | 1,179 | 1,476 |
| | Deflection L/240 | 125 | 135 | 223 | 261 | 422 | 621 | 869 | 188 | 203 | 334 | 392 | 633 | 931 | 1,304 |
| 28' | Total Load | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 2,1/5.4 | 3,1/7.7 | 3,8/9.6 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 2,1/5.4 | 3,1/7.7 | 3,8/9.6 |
| | Deflection L/240 | 115 | 126 | 212 | 250 | 411 | 611 | 810 | 173 | 189 | 318 | 375 | 617 | 917 | 1,215 |
| 30' | Total Load | 94 | 102 | 168 | 197 | 320 | 472 | 662 | 141 | 153 | 252 | 296 | 480 | 708 | 994 |
| | Deflection L/240 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,8/4.5 | 2,6/6.6 | 3,5/8.7 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,8/4.5 | 2,6/6.6 | 3,5/8.7 |
| 32' | Total Load | 87 | 95 | 161 | 191 | 315 | 471 | 668 | 130 | 142 | 242 | 286 | 473 | 707 | 1,002 |
| | Deflection L/240 | 73 | 79 | 130 | 153 | 248 | 366 | 515 | 109 | 118 | 195 | 229 | 372 | 550 | 773 |
| 34' | Total Load | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,5/3.8 | 2,2/5.6 | 3,1/7.9 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,5/3.8 | 2,2/5.6 | 3,1/7.9 |
| | Deflection L/240 | 66 | 72 | 124 | 148 | 246 | 369 | 525 | 100 | 109 | 187 | 222 | 369 | 554 | 788 |
| 36' | Total Load | 57 | 62 | 102 | 120 | 196 | 290 | 409 | 86 | 93 | 154 | 181 | 294 | 435 | 613 |
| | Deflection L/240 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,9/4.8 | 2,7/6.8 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,9/4.8 | 2,7/6.8 |
| 38' | Total Load | 51 | 56 | 97 | 116 | 195 | 294 | 420 | 77 | 84 | 146 | 174 | 292 | 441 | 630 |
| | Deflection L/240 | 46 | 50 | 82 | 97 | 157 | 233 | 329 | 69 | 75 | 123 | 145 | 236 | 350 | 494 |
| 40' | Total Load | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,7/4.2 | 2,3/5.9 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,5/3.5 | 1,7/4.2 | 2,3/5.9 |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 42' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 44' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 46' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 48' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 50' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 52' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 54' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 56' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 58' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 60' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 62' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 64' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 66' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 68' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 70' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 72' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 74' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 76' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 78' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 80' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 82' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 84' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 86' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 88' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 90' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 92' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 94' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 96' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 98' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |
| 100' | Total Load | | | | | | | | | | | | | | |
| | Deflection L/240 | | | | | | | | | | | | | | |

* Indicates Total Load value controls.



SNOW ROOF LOAD TABLES

General Notes

- Table is based on:
 - Uniform loads (beam weight considered).
 - More restrictive of simple or continuous span.
 - Deflection criteria of L/180 total load. For stiffer deflection criteria, use L/240 values for total load deflection.

Also see *How to Use This Table* on page 26 and *General Assumptions* on page 5.

2.0E Parallam® PSL: Roof—Snow Load Area 115% (PLF) *continued*

| Span | Condition | 7" Width | | | | | | |
|--------|------------------------------|----------|---------|---------|---------|----------|----------|----------|
| | | 9¼" | 9½" | 11¼" | 11½" | 14" | 16" | 18" |
| 8' | Total Load | 3,383 | 3,492 | 4,285 | 4,582 | 5,653 | 5,866 | 5,866 |
| | Deflection L/240 | * | * | * | * | * | * | * |
| | Min. End./Int. Bearing (in.) | 2.6/6.5 | 2.7/6.7 | 3.3/8.2 | 3.5/8.8 | 4.3/10.8 | 4.5/11.3 | 4.5/11.3 |
| 9'-6" | Total Load | 2,511 | 2,641 | 3,477 | 3,709 | 4,536 | 4,934 | 4,934 |
| | Deflection L/240 | 2,173 | 2,342 | * | * | * | * | * |
| | Min. End./Int. Bearing (in.) | 2.3/5.7 | 2.4/6.0 | 3.2/7.9 | 3.4/8.4 | 4.1/10.3 | 4.5/11.3 | 4.5/11.3 |
| 10' | Total Load | 2,264 | 2,381 | 3,271 | 3,487 | 4,255 | 4,685 | 4,685 |
| | Deflection L/240 | 1,880 | 2,027 | 3,252 | * | * | * | * |
| | Min. End./Int. Bearing (in.) | 2.2/5.4 | 2.3/5.7 | 3.1/7.8 | 3.3/8.4 | 4.1/10.2 | 4.5/11.3 | 4.5/11.3 |
| 12' | Total Load | 1,468 | 1,586 | 2,271 | 2,517 | 3,409 | 3,898 | 3,898 |
| | Deflection L/240 | 1,116 | 1,205 | 1,953 | 2,274 | * | * | * |
| | Min. End./Int. Bearing (in.) | 1.7/4.3 | 1.8/4.6 | 2.6/6.6 | 2.9/7.3 | 3.9/9.8 | 4.5/11.3 | 4.5/11.3 |
| 14' | Total Load | 932 | 1,008 | 1,653 | 1,842 | 2,519 | 3,246 | 3,335 |
| | Deflection L/240 | 714 | 772 | 1,258 | 1,469 | 2,342 | * | * |
| | Min. End./Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 2.2/5.6 | 2.5/6.2 | 3.4/8.5 | 4.4/10.9 | 4.5/11.3 |
| 16'-6" | Total Load | 569 | 616 | 1,019 | 1,195 | 1,805 | 2,327 | 2,824 |
| | Deflection L/240 | 441 | 477 | 782 | 915 | 1,470 | 2,148 | * |
| | Min. End./Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.6/4.1 | 1.9/4.8 | 2.9/7.2 | 3.7/9.3 | 4.5/11.3 |
| 18'-6" | Total Load | 400 | 434 | 723 | 849 | 1,381 | 1,844 | 2,308 |
| | Deflection L/240 | 315 | 341 | 560 | 656 | 1,058 | 1,553 | 2,168 |
| | Min. End./Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.9 | 2.5/6.2 | 3.3/8.3 | 4.1/10.3 |
| 20' | Total Load | 314 | 340 | 570 | 671 | 1,096 | 1,572 | 1,969 |
| | Deflection L/240 | 250 | 271 | 446 | 523 | 845 | 1,242 | 1,739 |
| | Min. End./Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2.1/5.4 | 3.1/7.7 | 3.8/9.6 |
| 22' | Total Load | 231 | 252 | 425 | 501 | 823 | 1,223 | 1,620 |
| | Deflection L/240 | 189 | 204 | 337 | 395 | 640 | 944 | 1,325 |
| | Min. End./Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.8/4.5 | 2.6/6.6 | 3.5/8.7 |
| 24' | Total Load | 174 | 190 | 323 | 382 | 631 | 942 | 1,336 |
| | Deflection L/240 | 146 | 158 | 260 | 306 | 496 | 733 | 1,031 |
| | Min. End./Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.8 | 2.2/5.6 | 3.1/7.9 |
| 26' | Total Load | 133 | 145 | 249 | 296 | 492 | 739 | 1,051 |
| | Deflection L/240 | 115 | 124 | 205 | 241 | 392 | 580 | 818 |
| | Min. End./Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.9/4.8 | 2.7/6.8 |
| 28' | Total Load | 102 | 112 | 195 | 232 | 390 | 588 | 840 |
| | Deflection L/240 | 92 | 100 | 165 | 194 | 315 | 467 | 659 |
| | Min. End./Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.7/4.2 | 2.3/5.9 |
| 30' | Total Load | 80 | 87 | 154 | 184 | 312 | 473 | 679 |
| | Deflection L/240 | 75 | 81 | 134 | 158 | 257 | 381 | 539 |
| | Min. End./Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 2.1/5.1 |
| 32' | Total Load | 62 | 68 | 123 | 148 | 253 | 385 | 555 |
| | Deflection L/240 | 62 | 67 | 111 | 130 | 212 | 315 | 446 |
| | Min. End./Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.8/4.5 |

* Indicates Total Load value controls.



NON-SNOW ROOF LOAD TABLES

How to Use This Table

1. Calculate total load (neglect beam weight) on the beam or header in pounds per linear foot (plf).
2. Select appropriate **Span** (center-to-center of bearing).
3. Scan horizontally to find the proper width, and a depth with a capacity that exceeds actual total load.
4. Review bearing length requirements to ensure adequacy.

Also see **General Notes** on page 29.

TimberStrand® LSL: Roof—Non-Snow Load Area 125% (PLF)

| Span | Condition | 1.3E Grade | | | | | | 1.55E Grade | | | | | |
|--------|-----------------------------|------------|---------|---------|----------|----------|-----------------------|-------------|---------|-----------|----------|----------|----------|
| | | 3½" Width | | | | | 5½" Plank Orientation | 1¾" Width | | | | | |
| | | 4¾" | 5½" | 7¼" | 8½" | 9¼" | | 11¼" | 3½" | 9¼" | 9½" | 11¼" | 11½" |
| 3' | Total Load | 1,924 | 2,978 | 5,047 | 7,032 | 7,442 | 7,442 | 1,514 | 3,782 | 3,959 | 4,717 | 4,717 | 4,717 |
| | Deflection L/240 / L/360 | */1,420 | */2,547 | */4,885 | */* | */* | */* | */1,224 | */* | */* | */* | */* | */* |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.8/4.5 | 3.1/7.6 | 4.3/10.6 | 4.5/11.3 | 4.5/11.3 | 1.5/3.5 | 3.6/9 | 3.8/9.4 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 4' | Total Load | 1,080 | 1,673 | 2,836 | 3,951 | 4,516 | 5,579 | 1,084 | 2,413 | 2,508 | 3,248 | 3,536 | 3,536 |
| | Deflection L/240 / L/360 | 977/651 | */1,215 | */2,476 | */3,764 | */4,423 | */* | 820/546 | */* | */* | */* | */* | */* |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 2.3/5.7 | 3.2/8 | 3.6/9.1 | 4.5/11.3 | 1.5/3.5 | 3.1/7.7 | 3.2/8 | 4.1/10.3 | 4.5/11.3 | 4.5/11.3 |
| 5' | Total Load | 647 | 1,068 | 1,812 | 2,526 | 2,887 | 4,197 | 533 | 1,771 | 1,835 | 2,318 | 2,507 | 2,827 |
| | Deflection L/240 / L/360 | 521/347 | 993/662 | */1,398 | */2,188 | */2,605 | */4,154 | 431/287 | */1,553 | */1,658 | */* | */* | */* |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.8/4.6 | 2.6/6.4 | 2.9/7.3 | 4.2/10.6 | 1.5/3.5 | 2.8/7 | 2.9/7.3 | 3.7/9.2 | 4/10 | 4.5/11.3 |
| 6' | Total Load | 317 | 614 | 1,256 | 1,751 | 2,002 | 2,911 | 258 | 1,370 | 1,442 | 1,802 | 1,938 | 2,354 |
| | Deflection L/240 / L/360 | 309/206 | 595/397 | */857 | */1,367 | */1,641 | */2,692 | 253/169 | */978 | */1,048 | */1,605 | */1,831 | */* |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.8 | 2.1/5.3 | 2.4/6.1 | 3.5/8.8 | 1.5/3.5 | 2.6/6.6 | 2.8/6.9 | 3.4/8.6 | 3.7/9.3 | 4.5/11.3 |
| 7' | Total Load | 171 | 336 | 742 | 1,284 | 1,468 | 2,135 | 138 | 1,005 | 1,058 | 1,462 | 1,579 | 1,965 |
| | Deflection L/240 / L/360 | */131 | */255 | */560 | */904 | */1,092 | */1,828 | */107 | 977/651 | 1,049/699 | */1,089 | */1,250 | */1,877 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.8/4.6 | 2.1/5.2 | 3/7.6 | 1.5/3.5 | 2.2/5.6 | 2.4/5.9 | 3.3/8.2 | 3.5/8.8 | 4.4/11 |
| 8' | Total Load | 99 | 198 | 443 | 981 | 1,122 | 1,632 | 79 | 768 | 809 | 1,118 | 1,239 | 1,643 |
| | Deflection L/240 / L/360 | */89 | */173 | */384 | 939/626 | */759 | */1,290 | */72 | 679/453 | 731/487 | */769 | */886 | */1,352 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.6/4 | 1.8/4.6 | 2.6/6.6 | 1.5/3.5 | 2/4.9 | 2.1/5.2 | 2.9/7.1 | 3.2/7.9 | 4.2/10.5 |
| 9'-6" | Total Load | | 98 | 224 | 693 | 793 | 1,154 | | 543 | 572 | 791 | 877 | 1,202 |
| | Deflection L/240 / L/360 | | */* | */* | 579/386 | 706/470 | */811 | | 421/280 | 453/302 | 725/483 | 840/560 | */870 |
| | Min. End/Int. Bearing (in.) | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.8 | 2.2/5.6 | | 1.7/4.1 | 1.7/4.4 | 2.4/6 | 2.7/6.7 | 3.6/9.1 |
| 10' | Total Load | | 79 | 182 | 624 | 714 | 1,040 | | 480 | 515 | 713 | 791 | 1,084 |
| | Deflection L/240 / L/360 | | */* | */* | 500/333 | 611/407 | */704 | | 364/242 | 392/261 | 630/420 | 731/487 | */760 |
| | Min. End/Int. Bearing (in.) | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 2.1/5.3 | | 1.5/3.9 | 1.7/4.1 | 2.3/5.7 | 2.5/6.3 | 3.5/8.7 |
| 12' | Total Load | | | 85 | 386 | 474 | 719 | | 283 | 306 | 493 | 547 | 750 |
| | Deflection L/240 / L/360 | | | */* | 296/197 | 362/241 | 634/423 | | 216/144 | 233/155 | 378/252 | 440/293 | 696/464 |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.8/4.4 | | 1.5/3.5 | 1.5/3.5 | 1.9/4.8 | 2.1/5.3 | 2.9/7.2 |
| 14' | Total Load | | | 243 | 300 | 525 | | | 179 | 194 | 318 | 373 | 549 |
| | Deflection L/240 / L/360 | | | | 189/126 | 232/154 | 409/272 | | 138/92 | 149/99 | 243/162 | 284/189 | 453/302 |
| | Min. End/Int. Bearing (in.) | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.8 | | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 1.7/4.2 | 2.5/6.2 |
| 16'-6" | Total Load | | | 147 | 182 | 327 | | | 109 | 118 | 196 | 230 | 372 |
| | Deflection L/240 / L/360 | | | | 116/77 | 143/95 | 254/169 | | 85/57 | 92/61 | 151/101 | 177/118 | 284/189 |
| | Min. End/Int. Bearing (in.) | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2/5 |
| 18'-6" | Total Load | | | 102 | 127 | 231 | | | 76 | 83 | 138 | 163 | 265 |
| | Deflection L/240 / L/360 | | | | 83/55 | 102/68 | 182/121 | | 61/40 | 66/44 | 108/72 | 127/84 | 205/136 |
| | Min. End/Int. Bearing (in.) | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.6/4 |
| 20' | Total Load | | | 79 | 99 | 181 | | | 59 | 64 | 109 | 128 | 210 |
| | Deflection L/240 / L/360 | | | | 66/44 | 81/54 | 145/96 | | 48/32 | 52/35 | 86/57 | 101/67 | 163/109 |
| | Min. End/Int. Bearing (in.) | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 |
| 24' | Total Load | | | | 53 | 101 | | | | | 61 | 72 | 120 |
| | Deflection L/240 / L/360 | | | | | 47/31 | 84/56 | | | | 50/33 | 59/39 | 96/64 |

NON-SNOW ROOF LOAD TABLES

General Notes

- Table is based on:
 - Uniform loads (beam weight considered).
 - More restrictive of simple or continuous span.
 - Deflection criteria of L/180 total load. For stiffer deflection criteria, use L/240 values for total load deflection.
- For door and window applications, Weyerhaeuser recommends using the L/360 value for a live load deflection limit and the L/240 value for a total load limit.

Also see *How to Use This Table* on page 28 and *General Assumptions* on page 5.

TimberStrand® LSL: Roof—Non-Snow Load Area 125% (PLF) *continued*

| Span | Condition | 1.55E Grade | | | | | | | | | | | |
|--------|-----------------------------|-------------|-------------|-----------|-------------|-----------|-------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | | 3½" Width | | | | | 5¼" Width (2- or 3-ply) | | | | | | |
| | | 9¼" | 9½" | 11¼" | 11½" | 14" | 16" | 9¼" | 9½" | 11¼" | 11½" | 14" | 16" |
| 3' | Total Load | 7,564 | 7,918 | 9,432 | 9,432 | 9,432 | 9,432 | 11,346 | 11,877 | 14,148 | 14,148 | 14,148 | 14,148 |
| | Deflection L/240 / L/360 | */* | */* | */* | */* | */* | */* | */* | */* | */* | */* | */* | */* |
| | Min. End/Int. Bearing (in.) | 3.6/9 | 3.8/9.4 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 3.6/9 | 3.8/9.4 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 4' | Total Load | 4,826 | 5,017 | 6,497 | 7,070 | 7,070 | 7,070 | 7,239 | 7,526 | 9,746 | 10,605 | 10,605 | 10,605 |
| | Deflection L/240 / L/360 | */* | */* | */* | */* | */* | */* | */* | */* | */* | */* | */* | */* |
| | Min. End/Int. Bearing (in.) | 3.1/7.7 | 3.2/8 | 4.1/10.3 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 3.1/7.7 | 3.2/8 | 4.1/10.3 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 5' | Total Load | 3,542 | 3,670 | 4,637 | 5,015 | 5,652 | 5,652 | 5,313 | 5,506 | 6,956 | 7,522 | 8,478 | 8,478 |
| | Deflection L/240 / L/360 | */3,106 | */3,316 | */* | */* | */* | */* | */4,659 | */4,975 | */* | */* | */* | */* |
| | Min. End/Int. Bearing (in.) | 2.8/7 | 2.9/7.3 | 3.7/9.2 | 4/10 | 4.5/11.3 | 4.5/11.3 | 2.8/7 | 2.9/7.3 | 3.7/9.2 | 4/10 | 4.5/11.3 | 4.5/11.3 |
| 6' | Total Load | 2,741 | 2,884 | 3,604 | 3,876 | 4,707 | 4,707 | 4,111 | 4,326 | 5,406 | 5,814 | 7,061 | 7,061 |
| | Deflection L/240 / L/360 | */1,957 | */2,097 | */3,210 | */3,662 | */* | */* | */2,936 | */3,146 | */4,816 | */5,493 | */* | */* |
| | Min. End/Int. Bearing (in.) | 2.6/6.6 | 2.8/6.9 | 3.4/8.6 | 3.7/9.3 | 4.5/11.3 | 4.5/11.3 | 2.6/6.6 | 2.8/6.9 | 3.4/8.6 | 3.7/9.3 | 4.5/11.3 | 4.5/11.3 |
| 7' | Total Load | 2,011 | 2,116 | 2,924 | 3,158 | 3,930 | 4,032 | 3,016 | 3,174 | 4,386 | 4,737 | 5,895 | 6,048 |
| | Deflection L/240 / L/360 | 1,954/1,302 | 2,098/1,399 | */2,179 | */2,501 | */3,755 | */* | 2,931/1,954 | 3,148/2,098 | */3,269 | */3,752 | */5,633 | */* |
| | Min. End/Int. Bearing (in.) | 2.2/5.6 | 2.4/5.9 | 3.3/8.2 | 3.5/8.8 | 4.4/11 | 4.5/11.3 | 2.2/5.6 | 2.4/5.9 | 3.3/8.2 | 3.5/8.8 | 4.4/11 | 4.5/11.3 |
| 8' | Total Load | 1,537 | 1,618 | 2,236 | 2,479 | 3,286 | 3,526 | 2,306 | 2,427 | 3,354 | 3,719 | 4,930 | 5,289 |
| | Deflection L/240 / L/360 | 1,359/906 | 1,462/974 | */1,538 | */1,773 | */2,705 | */* | 2,038/1,359 | 2,193/1,462 | */2,307 | */2,660 | */4,058 | */* |
| | Min. End/Int. Bearing (in.) | 2/4.9 | 2.1/5.2 | 2.9/7.1 | 3.2/7.9 | 4.2/10.5 | 4.5/11.3 | 2/4.9 | 2.1/5.2 | 2.9/7.1 | 3.2/7.9 | 4.2/10.5 | 4.5/11.3 |
| 9'-6" | Total Load | 1,087 | 1,144 | 1,582 | 1,754 | 2,404 | 2,966 | 1,631 | 1,716 | 2,373 | 2,631 | 3,606 | 4,450 |
| | Deflection L/240 / L/360 | 842/561 | 907/605 | 1,451/967 | 1,681/1,121 | */1,740 | */2,456 | 1,263/842 | 1,361/907 | 2,176/1,451 | 2,522/1,681 | */2,610 | */3,684 |
| | Min. End/Int. Bearing (in.) | 1.7/4.1 | 1.7/4.4 | 2.4/6 | 2.7/6.7 | 3.6/9.1 | 4.5/11.3 | 1.7/4.1 | 1.7/4.4 | 2.4/6 | 2.7/6.7 | 3.6/9.1 | 4.5/11.3 |
| 10' | Total Load | 961 | 1,031 | 1,426 | 1,582 | 2,168 | 2,800 | 1,442 | 1,547 | 2,139 | 2,373 | 3,253 | 4,200 |
| | Deflection L/240 / L/360 | 728/485 | 785/523 | 1,260/840 | 1,462/974 | */1,520 | */2,154 | 1,092/728 | 1,178/785 | 1,890/1,260 | 2,193/1,462 | */2,280 | */3,232 |
| | Min. End/Int. Bearing (in.) | 1.5/3.9 | 1.7/4.1 | 2.3/5.7 | 2.5/6.3 | 3.5/8.7 | 4.5/11.2 | 1.5/3.9 | 1.7/4.1 | 2.3/5.7 | 2.5/6.3 | 3.5/8.7 | 4.5/11.2 |
| 12' | Total Load | 566 | 612 | 986 | 1,094 | 1,501 | 1,939 | 850 | 918 | 1,480 | 1,642 | 2,252 | 2,908 |
| | Deflection L/240 / L/360 | 432/288 | 467/311 | 756/504 | 881/587 | 1,393/928 | */1,334 | 649/432 | 700/467 | 1,135/756 | 1,322/881 | 2,089/1,393 | */2,001 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.9/4.8 | 2.1/5.3 | 2.9/7.2 | 3.7/9.3 | 1.5/3.5 | 1.5/3.5 | 1.9/4.8 | 2.1/5.3 | 2.9/7.2 | 3.7/9.3 |
| 14' | Total Load | 359 | 388 | 637 | 746 | 1,098 | 1,420 | 538 | 582 | 956 | 1,119 | 1,648 | 2,130 |
| | Deflection L/240 / L/360 | 276/184 | 299/199 | 487/325 | 569/379 | 907/605 | 1,316/877 | 415/276 | 448/299 | 731/487 | 854/569 | 1,361/907 | 1,974/1,316 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 1.7/4.2 | 2.5/6.2 | 3.2/8 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 1.7/4.2 | 2.5/6.2 | 3.2/8 |
| 16'-6" | Total Load | 218 | 236 | 392 | 460 | 744 | 1,017 | 327 | 354 | 588 | 690 | 1,116 | 1,526 |
| | Deflection L/240 / L/360 | 171/114 | 185/123 | 303/202 | 354/236 | 569/379 | 832/555 | 256/171 | 277/185 | 455/303 | 532/354 | 854/569 | 1,248/832 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2/5 | 2.7/6.8 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2/5 | 2.7/6.8 |
| 18'-6" | Total Load | 152 | 166 | 277 | 326 | 531 | 785 | 229 | 249 | 416 | 489 | 797 | 1,177 |
| | Deflection L/240 / L/360 | 122/81 | 132/88 | 217/144 | 254/169 | 410/273 | 601/401 | 183/122 | 198/132 | 326/217 | 381/254 | 615/410 | 902/601 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.6/4 | 2.4/5.9 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.6/4 | 2.4/5.9 |
| 20' | Total Load | 119 | 129 | 218 | 257 | 421 | 624 | 179 | 194 | 327 | 385 | 631 | 936 |
| | Deflection L/240 / L/360 | 97/64 | 105/70 | 172/115 | 202/135 | 327/218 | 481/320 | 145/97 | 157/105 | 259/172 | 304/202 | 491/327 | 722/481 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2/5.1 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2/5.1 |
| 24' | Total Load | 65 | 71 | 122 | 145 | 241 | 361 | 98 | 106 | 183 | 217 | 361 | 542 |
| | Deflection L/240 / L/360 | 56/37 | 61/40 | 101/67 | 118/79 | 192/128 | 284/189 | 84/56 | 91/61 | 151/101 | 177/118 | 288/192 | 426/284 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 |
| 28' | Total Load | | | 73 | 87 | 147 | 224 | 56 | 61 | 109 | 130 | 221 | 336 |
| | Deflection L/240 / L/360 | | | 64/42 | 75/50 | 122/81 | 181/120 | 53/35 | 58/38 | 96/64 | 112/75 | 183/122 | 271/181 |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 |

* Indicates Total Load value controls.



NON-SNOW ROOF LOAD TABLES

How to Use This Table

1. Calculate total load (neglect beam weight) on the beam or header in pounds per linear foot (plf).
2. Select appropriate **Span** (center-to-center of bearing).
3. Scan horizontally to find the proper width, and a depth with a capacity that exceeds actual total load.
4. Review bearing length requirements to ensure adequacy.

Also see **General Notes** on page 31.

2.OE Microllam® LVL: Roof—Non-Snow Load Area 125% (PLF)

| Span | Condition | 1½" Width | | | | | | | | 3½" Width (2 ply) | | | | |
|--------|-----------------------------|-----------|---------|---------|---------|---------|----------|----------|---------|-------------------|---------|---------|---------|----------|
| | | 5½" | 7¼" | 9¼" | 9½" | 11¼" | 11½" | 14" | 5½" | 7¼" | 9¼" | 9½" | 11¼" | 11½" |
| 6' | Total Load | 474 | 954 | 1,285 | 1,329 | 1,656 | 1,781 | 1,961 | 948 | 1,908 | 2,571 | 2,659 | 3,313 | 3,563 |
| | Deflection L/240 | 458 | * | * | * | * | * | * | 916 | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 2.2/5.5 | 2.9/7.4 | 3.1/7.6 | 3.8/9.5 | 4.1/10.2 | 4.5/11.3 | 1.5/3.5 | 2.2/5.5 | 2.9/7.4 | 3.1/7.6 | 3.8/9.5 | 4.1/10.2 |
| 8' | Total Load | 153 | 342 | 870 | 915 | 1,145 | 1,224 | 1,469 | 307 | 685 | 1,741 | 1,830 | 2,290 | 2,449 |
| | Deflection L/240 | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 2.7/6.7 | 2.8/7 | 3.5/8.8 | 3.8/9.4 | 4.5/11.3 | 1.5/3.5 | 1.5/3.5 | 2.7/6.7 | 2.8/7 | 3.5/8.8 | 3.8/9.4 |
| 9'-6" | Total Load | 77 | 174 | 615 | 647 | 888 | 982 | 1,212 | 154 | 349 | 1,231 | 1,294 | 1,776 | 1,965 |
| | Deflection L/240 | * | * | 543 | 585 | * | * | * | * | * | 1,086 | 1,171 | * | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 2.2/5.6 | 2.4/5.9 | 3.2/8.1 | 3.6/8.9 | 4.4/11 | 1.5/3.5 | 1.5/3.5 | 2.2/5.6 | 2.4/5.9 | 3.2/8.1 | 3.6/8.9 |
| 10' | Total Load | 62 | 142 | 555 | 583 | 801 | 886 | 1,137 | 124 | 284 | 1,110 | 1,167 | 1,602 | 1,772 |
| | Deflection L/240 | * | * | 470 | 506 | * | * | * | * | * | 940 | 1,013 | * | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 2.1/5.3 | 2.2/5.6 | 3.1/7.7 | 3.4/8.5 | 4.4/10.9 | 1.5/3.5 | 1.5/3.5 | 2.1/5.3 | 2.2/5.6 | 3.1/7.7 | 3.4/8.5 |
| 12' | Total Load | 67 | 367 | 397 | 554 | 613 | 835 | 57 | 135 | 735 | 794 | 1,109 | 1,227 | |
| | Deflection L/240 | * | 279 | 301 | 488 | 568 | * | * | * | 558 | 602 | 976 | 1,137 | |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.7/4.3 | 1.8/4.6 | 2.6/6.4 | 2.8/7.1 | 3.9/9.6 | 1.5/3.5 | 1.5/3.5 | 1.7/4.3 | 1.8/4.6 | 2.6/6.4 | 2.8/7.1 | |
| 14' | Total Load | 233 | 252 | 405 | 449 | 611 | | | 70 | 466 | 505 | 811 | 898 | |
| | Deflection L/240 | | | 178 | 193 | 314 | 367 | 585 | * | 357 | 386 | 629 | 734 | |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 2.2/5.5 | 2.4/6.1 | 3.3/8.3 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2.2/5.5 | 2.4/6.1 | |
| 16'-6" | Total Load | 142 | 154 | 255 | 299 | 438 | | | | 285 | 308 | 510 | 598 | |
| | Deflection L/240 | | | 110 | 119 | 195 | 228 | 367 | | 220 | 238 | 391 | 457 | |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.6/4.1 | 1.9/4.8 | 2.8/7 | | 1.5/3.5 | 1.5/3.5 | 1.6/4.1 | 1.9/4.8 | |
| 18'-6" | Total Load | 100 | 108 | 181 | 212 | 345 | | | | 200 | 217 | 362 | 425 | |
| | Deflection L/240 | | | 78 | 85 | 140 | 164 | 264 | | 157 | 170 | 280 | 328 | |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.9 | 2.5/6.2 | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.9 | |
| 20' | Total Load | 78 | 85 | 143 | 168 | 274 | | | | 157 | 171 | 286 | 336 | |
| | Deflection L/240 | | | 62 | 67 | 111 | 130 | 211 | | 125 | 135 | 223 | 261 | |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2.1/5.4 | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | |
| 22' | Total Load | 58 | 63 | 106 | 125 | 206 | | | | 116 | 126 | 213 | 251 | |
| | Deflection L/240 | | | 47 | 51 | 84 | 98 | 160 | | 94 | 102 | 168 | 197 | |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.8/4.5 | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | |
| 24' | Total Load | | | | 81 | 95 | 158 | | | 87 | 95 | 162 | 191 | |
| | Deflection L/240 | | | | 65 | 76 | 124 | | | 73 | 79 | 130 | 153 | |
| | Min. End/Int. Bearing (in.) | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.8 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | |
| 26' | Total Load | | | | 62 | 74 | 123 | | | 67 | 73 | 125 | 148 | |
| | Deflection L/240 | | | | 51 | 60 | 98 | | | 57 | 62 | 102 | 120 | |
| | Min. End/Int. Bearing (in.) | | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | |
| 28' | Total Load | | | | | 58 | 98 | | | 52 | 56 | 98 | 117 | |
| | Deflection L/240 | | | | | 48 | 78 | | | 46 | 50 | 82 | 97 | |
| | Min. End/Int. Bearing (in.) | | | | | 1.5/3.5 | 1.5/3.5 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | |
| 30' | Total Load | | | | | | 78 | | | | | 78 | 93 | |
| | Deflection L/240 | | | | | | 64 | | | | | 67 | 79 | |
| | Min. End/Int. Bearing (in.) | | | | | | 1.5/3.5 | | | | | 1.5/3.5 | 1.5/3.5 | |

* Indicates Total Load value controls.



NON-SNOW ROOF LOAD TABLES

General Notes

- Table is based on:
 - Uniform loads (beam weight considered).
 - More restrictive of simple or continuous span.
 - Deflection criteria of L/180 total load. For stiffer deflection criteria, use L/240 values for total load deflection.

Also see *How to Use This Table* on page 30 and *General Assumptions* on page 5.

2.0E Microllam® LVL: Roof—Non-Snow Load Area 125% (PLF) *continued*

| Span | Condition | 3½" Width (2-ply) | | | | 5¼" Width (3-ply) | | | | | | | | | |
|--------|-----------------------------|-------------------|----------|----------|----------|-------------------|---------|---------|---------|---------|----------|----------|----------|----------|----------|
| | | 14" | 16" | 18" | 20" | 5½" | 7¼" | 9¼" | 9½" | 11¼" | 11½" | 14" | 16" | 18" | 20" |
| 6' | Total Load | 3,919 | 3,919 | 3,919 | 3,919 | 1,423 | 2,862 | 3,857 | 3,989 | 4,970 | 5,345 | 5,878 | 5,878 | 5,878 | 5,878 |
| | Deflection L/240 | * | * | * | * | 1,374 | * | * | * | * | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 1.5/3.5 | 2.2/5.5 | 2.9/7.4 | 3.1/7.6 | 3.8/9.5 | 4.1/10.2 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 8' | Total Load | 2,934 | 2,934 | 2,934 | 2,934 | 461 | 1,028 | 2,611 | 2,745 | 3,435 | 3,673 | 4,402 | 4,402 | 4,402 | 4,402 |
| | Deflection L/240 | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 1.5/3.5 | 1.5/3.5 | 2.7/6.7 | 2.8/7 | 3.5/8.8 | 3.8/9.4 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 9'-6" | Total Load | 2,425 | 2,468 | 2,468 | 2,468 | 231 | 524 | 1,847 | 1,942 | 2,664 | 2,948 | 3,637 | 3,702 | 3,702 | 3,702 |
| | Deflection L/240 | * | * | * | * | * | * | 1,630 | 1,757 | * | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 4.4/11 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 1.5/3.5 | 1.5/3.5 | 2.2/5.6 | 2.4/5.9 | 3.2/8.1 | 3.6/8.9 | 4.4/11 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 10' | Total Load | 2,275 | 2,344 | 2,344 | 2,344 | 187 | 427 | 1,666 | 1,751 | 2,403 | 2,659 | 3,412 | 3,516 | 3,516 | 3,516 |
| | Deflection L/240 | * | * | * | * | * | * | 1,410 | 1,520 | * | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 4.4/10.9 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 1.5/3.5 | 1.5/3.5 | 2.1/5.3 | 2.2/5.6 | 3.1/7.7 | 3.4/8.5 | 4.4/10.9 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 12' | Total Load | 1,670 | 1,950 | 1,950 | 1,950 | 86 | 203 | 1,102 | 1,191 | 1,663 | 1,841 | 2,505 | 2,925 | 2,925 | 2,925 |
| | Deflection L/240 | * | * | * | * | * | * | 837 | 904 | 1,464 | 1,706 | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 3.9/9.6 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 1.5/3.5 | 1.5/3.5 | 1.7/4.3 | 1.8/4.6 | 2.6/6.4 | 2.8/7.1 | 3.9/9.6 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 14' | Total Load | 1,223 | 1,571 | 1,669 | 1,669 | | 106 | 700 | 757 | 1,217 | 1,347 | 1,835 | 2,356 | 2,503 | 2,503 |
| | Deflection L/240 | 1,171 | * | * | * | | * | 535 | 579 | 943 | 1,102 | 1,757 | * | * | * |
| | Min. End/Int. Bearing (in.) | 3.3/8.3 | 4.2/10.6 | 4.5/11.3 | 4.5/11.3 | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2.2/5.5 | 2.4/6.1 | 3.3/8.3 | 4.2/10.6 | 4.5/11.3 | 4.5/11.3 |
| 16'-6" | Total Load | 876 | 1,126 | 1,405 | 1,413 | | | 427 | 463 | 765 | 897 | 1,315 | 1,689 | 2,107 | 2,120 |
| | Deflection L/240 | 735 | 1,074 | * | * | | | 331 | 358 | 587 | 686 | 1,103 | 1,611 | * | * |
| | Min. End/Int. Bearing (in.) | 2.8/7 | 3.6/9 | 4.5/11.2 | 4.5/11.3 | | | 1.5/3.5 | 1.5/3.5 | 1.6/4.1 | 1.9/4.8 | 2.8/7 | 3.6/9 | 4.5/11.2 | 4.5/11.3 |
| 18'-6" | Total Load | 691 | 892 | 1,113 | 1,258 | | | 301 | 326 | 543 | 638 | 1,037 | 1,339 | 1,670 | 1,887 |
| | Deflection L/240 | 529 | 776 | 1,084 | * | | | 236 | 256 | 420 | 492 | 794 | 1,164 | 1,626 | * |
| | Min. End/Int. Bearing (in.) | 2.5/6.2 | 3.2/8 | 4/10 | 4.5/11.3 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.9 | 2.5/6.2 | 3.2/8 | 4/10 | 4.5/11.3 |
| 20' | Total Load | 549 | 761 | 950 | 1,158 | | | 236 | 256 | 429 | 504 | 823 | 1,142 | 1,425 | 1,737 |
| | Deflection L/240 | 422 | 621 | 869 | * | | | 188 | 203 | 334 | 392 | 633 | 931 | 1,304 | * |
| | Min. End/Int. Bearing (in.) | 2.1/5.4 | 3/7.4 | 3.7/9.2 | 4.5/11.2 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2.1/5.4 | 3/7.4 | 3.7/9.2 | 4.5/11.2 |
| 22' | Total Load | 412 | 613 | 782 | 954 | | | 174 | 190 | 320 | 377 | 619 | 919 | 1,173 | 1,431 |
| | Deflection L/240 | 320 | 472 | 662 | 895 | | | 141 | 153 | 252 | 296 | 480 | 708 | 994 | 1,342 |
| | Min. End/Int. Bearing (in.) | 1.8/4.5 | 2.6/6.6 | 3.4/8.4 | 4.1/10.2 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.8/4.5 | 2.6/6.6 | 3.4/8.4 | 4.1/10.2 |
| 24' | Total Load | 316 | 472 | 654 | 798 | | | 131 | 143 | 243 | 287 | 475 | 708 | 981 | 1,197 |
| | Deflection L/240 | 248 | 366 | 515 | 698 | | | 109 | 118 | 195 | 229 | 372 | 550 | 773 | 1,047 |
| | Min. End/Int. Bearing (in.) | 1.5/3.8 | 2.2/5.6 | 3.1/7.7 | 3.7/9.4 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.8 | 2.2/5.6 | 3.1/7.7 | 3.7/9.4 |
| 26' | Total Load | 247 | 370 | 527 | 677 | | | 101 | 110 | 188 | 223 | 371 | 556 | 790 | 1,015 |
| | Deflection L/240 | 196 | 290 | 409 | 555 | | | 86 | 93 | 154 | 181 | 294 | 435 | 613 | 832 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.9/4.8 | 2.7/6.8 | 3.5/8.6 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.9/4.8 | 2.7/6.8 | 3.5/8.6 |
| 28' | Total Load | 196 | 295 | 421 | 576 | | | 78 | 85 | 148 | 175 | 294 | 442 | 632 | 865 |
| | Deflection L/240 | 157 | 233 | 329 | 448 | | | 69 | 75 | 123 | 145 | 236 | 350 | 494 | 672 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.7/4.2 | 2.3/5.9 | 3.2/8 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.7/4.2 | 2.3/5.9 | 3.2/8 |
| 30' | Total Load | 157 | 238 | 341 | 468 | | | 61 | 66 | 117 | 139 | 236 | 357 | 511 | 702 |
| | Deflection L/240 | 128 | 190 | 269 | 366 | | | 56 | 61 | 101 | 118 | 193 | 286 | 404 | 550 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.6 | 2.1/5.1 | 2.8/7 | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 2.1/5.1 | 2.8/7 |

* Indicates Total Load value controls.



NON-SNOW ROOF LOAD TABLES

How to Use This Table

1. Calculate total load (neglect beam weight) on the beam or header in pounds per linear foot (plf).
2. Select appropriate **Span** (center-to-center of bearing).
3. Scan horizontally to find the proper width, and a depth with a capacity that exceeds actual total load.
4. Review bearing length requirements to ensure adequacy.

Also see **General Notes** on page 33.

2.0E Parallam® PSL: Roof—Non-Snow Load Area 125% (PLF)

| Span | Condition | 3½" Width | | | | | | | 5¼" Width | | | | | | |
|--------|-----------------------------|-----------|---------|---------|---------|----------|----------|----------|-----------|---------|---------|---------|----------|----------|----------|
| | | 9¼" | 9½" | 11¼" | 11½" | 14" | 16" | 18" | 9¼" | 9½" | 11¼" | 11½" | 14" | 16" | 18" |
| 8' | Total Load | 1,839 | 1,899 | 2,330 | 2,491 | 2,933 | 2,933 | 2,933 | 2,759 | 2,848 | 3,494 | 3,737 | 4,400 | 4,400 | 4,400 |
| | Deflection L/240 | 1,753 | 1,886 | * | * | * | * | * | 2,630 | 2,830 | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 2.8/7.0 | 2.9/7.3 | 3.6/8.9 | 3.8/9.5 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 2.8/7.0 | 2.9/7.3 | 3.6/8.9 | 3.8/9.5 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 9'-6" | Total Load | 1,365 | 1,436 | 1,890 | 2,017 | 2,467 | 2,467 | 2,467 | 2,048 | 2,154 | 2,836 | 3,025 | 3,700 | 3,700 | 3,700 |
| | Deflection L/240 | 1,086 | 1,171 | 1,872 | * | * | * | * | 1,630 | 1,757 | 2,808 | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 2.5/6.2 | 2.6/6.5 | 3.4/8.6 | 3.7/9.2 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 | 2.5/6.2 | 2.6/6.5 | 3.4/8.6 | 3.7/9.2 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 10' | Total Load | 1,231 | 1,295 | 1,778 | 1,896 | 2,314 | 2,342 | 2,342 | 1,847 | 1,942 | 2,668 | 2,844 | 3,471 | 3,514 | 3,514 |
| | Deflection L/240 | 940 | 1,013 | 1,626 | 1,886 | * | * | * | 1,410 | 1,520 | 2,439 | 2,830 | * | * | * |
| | Min. End/Int. Bearing (in.) | 2.4/5.9 | 2.5/6.2 | 3.4/8.5 | 3.6/9.1 | 4.4/11.1 | 4.5/11.3 | 4.5/11.3 | 2.4/5.9 | 2.5/6.2 | 3.4/8.5 | 3.6/9.1 | 4.4/11.1 | 4.5/11.3 | 4.5/11.3 |
| 12' | Total Load | 734 | 793 | 1,235 | 1,369 | 1,854 | 1,949 | 1,949 | 1,101 | 1,190 | 1,853 | 2,053 | 2,781 | 2,923 | 2,923 |
| | Deflection L/240 | 558 | 602 | 976 | 1,137 | 1,797 | * | * | 837 | 904 | 1,464 | 1,706 | 2,696 | * | * |
| | Min. End/Int. Bearing (in.) | 1.7/4.3 | 1.8/4.6 | 2.9/7.1 | 3.2/7.9 | 4.3/10.7 | 4.5/11.3 | 4.5/11.3 | 1.7/4.3 | 1.8/4.6 | 2.9/7.1 | 3.2/7.9 | 4.3/10.7 | 4.5/11.3 | 4.5/11.3 |
| 14' | Total Load | 466 | 504 | 826 | 966 | 1,370 | 1,667 | 1,667 | 699 | 756 | 1,240 | 1,449 | 2,055 | 2,501 | 2,501 |
| | Deflection L/240 | 357 | 386 | 629 | 734 | 1,171 | * | * | 535 | 579 | 943 | 1,102 | 1,757 | * | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 2.2/5.6 | 2.6/6.5 | 3.7/9.2 | 4.5/11.3 | 4.5/11.3 | 1.5/3.5 | 1.5/3.5 | 2.2/5.6 | 2.6/6.5 | 3.7/9.2 | 4.5/11.3 | 4.5/11.3 |
| 16'-6" | Total Load | 284 | 308 | 509 | 597 | 965 | 1,266 | 1,412 | 426 | 462 | 764 | 896 | 1,447 | 1,899 | 2,118 |
| | Deflection L/240 | 220 | 238 | 391 | 457 | 735 | 1,074 | * | 331 | 358 | 587 | 686 | 1,103 | 1,611 | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.6/4.1 | 1.9/4.8 | 3.1/7.7 | 4.0/10.1 | 4.5/11.3 | 1.5/3.5 | 1.5/3.5 | 1.6/4.1 | 1.9/4.8 | 3.1/7.7 | 4.0/10.1 | 4.5/11.3 |
| 18'-6" | Total Load | 200 | 217 | 361 | 424 | 690 | 1,003 | 1,256 | 300 | 325 | 542 | 637 | 1,035 | 1,505 | 1,884 |
| | Deflection L/240 | 157 | 170 | 280 | 328 | 529 | 776 | 1,084 | 236 | 256 | 420 | 492 | 794 | 1,164 | 1,626 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.9 | 2.5/6.2 | 3.6/9.0 | 4.5/11.3 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.9 | 2.5/6.2 | 3.6/9.0 | 4.5/11.3 |
| 20' | Total Load | 157 | 170 | 285 | 335 | 548 | 810 | 1,071 | 235 | 255 | 427 | 503 | 822 | 1,216 | 1,607 |
| | Deflection L/240 | 125 | 135 | 223 | 261 | 422 | 621 | 869 | 188 | 203 | 334 | 392 | 633 | 931 | 1,304 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2.1/5.4 | 3.2/7.9 | 4.2/10.4 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2.1/5.4 | 3.2/7.9 | 4.2/10.4 |
| 22' | Total Load | 115 | 126 | 212 | 250 | 411 | 611 | 863 | 173 | 189 | 318 | 375 | 617 | 917 | 1,295 |
| | Deflection L/240 | 94 | 102 | 168 | 197 | 320 | 472 | 662 | 141 | 153 | 252 | 296 | 480 | 708 | 994 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.8/4.5 | 2.6/6.6 | 3.7/9.3 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.8/4.5 | 2.6/6.6 | 3.7/9.3 |
| 24' | Total Load | 87 | 95 | 161 | 191 | 315 | 471 | 668 | 130 | 142 | 242 | 286 | 473 | 707 | 1,002 |
| | Deflection L/240 | 73 | 79 | 130 | 153 | 248 | 366 | 515 | 109 | 118 | 195 | 229 | 372 | 550 | 773 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.8 | 2.2/5.6 | 3.1/7.9 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.8 | 2.2/5.6 | 3.1/7.9 |
| 26' | Total Load | 66 | 72 | 124 | 148 | 246 | 369 | 525 | 100 | 109 | 187 | 222 | 369 | 554 | 788 |
| | Deflection L/240 | 57 | 62 | 102 | 120 | 196 | 290 | 409 | 86 | 93 | 154 | 181 | 294 | 435 | 613 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.9/4.8 | 2.7/6.8 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.9/4.8 | 2.7/6.8 |
| 28' | Total Load | 51 | 56 | 97 | 116 | 195 | 294 | 420 | 77 | 84 | 146 | 174 | 292 | 441 | 630 |
| | Deflection L/240 | 46 | 50 | 82 | 97 | 157 | 233 | 329 | 69 | 75 | 123 | 145 | 236 | 350 | 494 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.7/4.2 | 2.3/5.9 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.7/4.2 | 2.3/5.9 |
| 30' | Total Load | 77 | 92 | 156 | 236 | 339 | 60 | 65 | 116 | 138 | 234 | 355 | 509 | | |
| | Deflection L/240 | | | 67 | 79 | 128 | 190 | 269 | 56 | 61 | 101 | 118 | 193 | 286 | 404 |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 2.1/5.1 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 2.1/5.1 |
| 32' | Total Load | 61 | 74 | 126 | 192 | 277 | | | 51 | 92 | 111 | 189 | 289 | 416 | |
| | Deflection L/240 | | | 55 | 65 | 106 | 157 | 223 | 50 | 83 | 97 | 159 | 236 | 334 | |
| | Min. End/Int. Bearing (in.) | | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.8/4.5 | | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.8/4.5 |

* Indicates Total Load value controls.

NON-SNOW ROOF LOAD TABLES

General Notes

- Table is based on:
 - Uniform loads (beam weight considered).
 - More restrictive of simple or continuous span.
 - Deflection criteria of L/180 total load. For stiffer deflection criteria, use L/240 values for total load deflection.

Also see *How to Use This Table* on page 32 and *General Assumptions* on page 5.

2.0E Parallam® PSL: Roof—Non-Snow Load Area 125% (PLF) *continued*

| Span | Condition | 7" Width | | | | | | |
|--------|-----------------------------|----------|---------|---------|---------|----------|----------|----------|
| | | 9¼" | 9½" | 11¼" | 11½" | 14" | 16" | 18" |
| 8' | Total Load | 3,679 | 3,798 | 4,660 | 4,983 | 5,866 | 5,866 | 5,866 |
| | Deflection L/240 | 3,507 | 3,773 | * | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 2.8/7.0 | 2.9/7.3 | 3.6/8.9 | 3.8/9.5 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 9'-6" | Total Load | 2,731 | 2,872 | 3,781 | 4,034 | 4,934 | 4,934 | 4,934 |
| | Deflection L/240 | 2,173 | 2,342 | 3,745 | * | * | * | * |
| | Min. End/Int. Bearing (in.) | 2.5/6.2 | 2.6/6.5 | 3.4/8.6 | 3.7/9.2 | 4.5/11.3 | 4.5/11.3 | 4.5/11.3 |
| 10' | Total Load | 2,462 | 2,590 | 3,557 | 3,792 | 4,628 | 4,685 | 4,685 |
| | Deflection L/240 | 1,880 | 2,027 | 3,252 | 3,773 | * | * | * |
| | Min. End/Int. Bearing (in.) | 2.4/5.9 | 2.5/6.2 | 3.4/8.5 | 3.6/9.1 | 4.4/11.1 | 4.5/11.3 | 4.5/11.3 |
| 12' | Total Load | 1,468 | 1,586 | 2,471 | 2,738 | 3,708 | 3,898 | 3,898 |
| | Deflection L/240 | 1,116 | 1,205 | 1,953 | 2,274 | 3,595 | * | * |
| | Min. End/Int. Bearing (in.) | 1.7/4.3 | 1.8/4.6 | 2.9/7.1 | 3.2/7.9 | 4.3/10.7 | 4.5/11.3 | 4.5/11.3 |
| 14' | Total Load | 932 | 1,008 | 1,653 | 1,933 | 2,741 | 3,335 | 3,335 |
| | Deflection L/240 | 714 | 772 | 1,258 | 1,469 | 2,342 | * | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 2.2/5.6 | 2.6/6.5 | 3.7/9.2 | 4.5/11.3 | 4.5/11.3 |
| 16'-6" | Total Load | 569 | 616 | 1,019 | 1,195 | 1,930 | 2,532 | 2,824 |
| | Deflection L/240 | 441 | 477 | 782 | 915 | 1,470 | 2,148 | * |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.6/4.1 | 1.9/4.8 | 3.1/7.7 | 4.0/10.1 | 4.5/11.3 |
| 18'-6" | Total Load | 400 | 434 | 723 | 849 | 1,381 | 2,007 | 2,512 |
| | Deflection L/240 | 315 | 341 | 560 | 656 | 1,058 | 1,553 | 2,168 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.9 | 2.5/6.2 | 3.6/9.0 | 4.5/11.3 |
| 20' | Total Load | 314 | 340 | 570 | 671 | 1,096 | 1,621 | 2,143 |
| | Deflection L/240 | 250 | 271 | 446 | 523 | 845 | 1,242 | 1,739 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 2.1/5.4 | 3.2/7.9 | 4.2/10.4 |
| 22' | Total Load | 231 | 252 | 425 | 501 | 823 | 1,223 | 1,727 |
| | Deflection L/240 | 189 | 204 | 337 | 395 | 640 | 944 | 1,325 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.8/4.5 | 2.6/6.6 | 3.7/9.3 |
| 24' | Total Load | 174 | 190 | 323 | 382 | 631 | 942 | 1,336 |
| | Deflection L/240 | 146 | 158 | 260 | 306 | 496 | 733 | 1,031 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.8 | 2.2/5.6 | 3.1/7.9 |
| 26' | Total Load | 133 | 145 | 249 | 296 | 492 | 739 | 1,051 |
| | Deflection L/240 | 115 | 124 | 205 | 241 | 392 | 580 | 818 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.9/4.8 | 2.7/6.8 |
| 28' | Total Load | 102 | 112 | 195 | 232 | 390 | 588 | 840 |
| | Deflection L/240 | 92 | 100 | 165 | 194 | 315 | 467 | 659 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.7/4.2 | 2.3/5.9 |
| 30' | Total Load | 80 | 87 | 154 | 184 | 312 | 473 | 679 |
| | Deflection L/240 | 75 | 81 | 134 | 158 | 257 | 381 | 539 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.6 | 2.1/5.1 |
| 32' | Total Load | 62 | 68 | 123 | 148 | 253 | 385 | 555 |
| | Deflection L/240 | 62 | 67 | 111 | 130 | 212 | 315 | 446 |
| | Min. End/Int. Bearing (in.) | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.5/3.5 | 1.8/4.5 |

* Indicates Total Load value controls.

BEAM DETAILS

| | | |
|--|---|---|
| <p>Bearing at Wall</p> <p>1 1/2" TJ® Rim Board or 1 1/2" TimberStrand® LSL blocking for lateral support</p> <p>Strap per code if top plate is not continuous over column</p> <p>Column</p> <p>L1</p> | <p>Bearing for Door or Window Header</p> <p>Strap per code if top plate is not continuous over header</p> <p>L2</p> | <p>Beam to Beam Connection</p> <p>Top mount hanger</p> <p>Face mount hanger</p> <p>L3 See Framing Connectors on pages 40 and 41</p> |
| <p>Bearing at Concrete Wall</p> <p>Protect untreated wood from direct contact with concrete</p> <p>L4</p> | <p>Bearing at Column</p> <p>Verify beam bearing length on page 36 and column capacity on page 42</p> <p>L5</p> | <p>Beam to Column Lateral Brace</p> <p>TJ® joist</p> <p>Floor beam</p> <p>Strap</p> <p>Steel column</p> <p>L14 Suggested lateral bracing detail for beams when required. Verify beam bearing length on page 36.</p> |

WINDOW AND DOOR HEADER DETAILS

2x4 Wall Framing

| | | |
|--|---|---|
| <p>Full Depth Header</p> <p>Header</p> <p>L7</p> | <p>Low Header</p> <p>Header</p> <p>L8</p> | <p>High Header</p> <p>Header</p> <p>2x_nailer*</p> <p>L9 *Double nailer may be required depending upon the opening size and window type</p> |
|--|---|---|

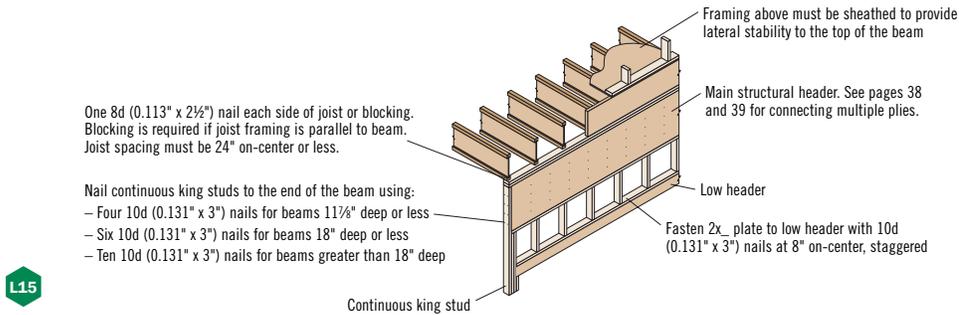
2x6 Wall Framing

Headers not matching wall thickness may be installed flush to the inside or outside of the wall, depending upon sheathing and trim attachment requirements

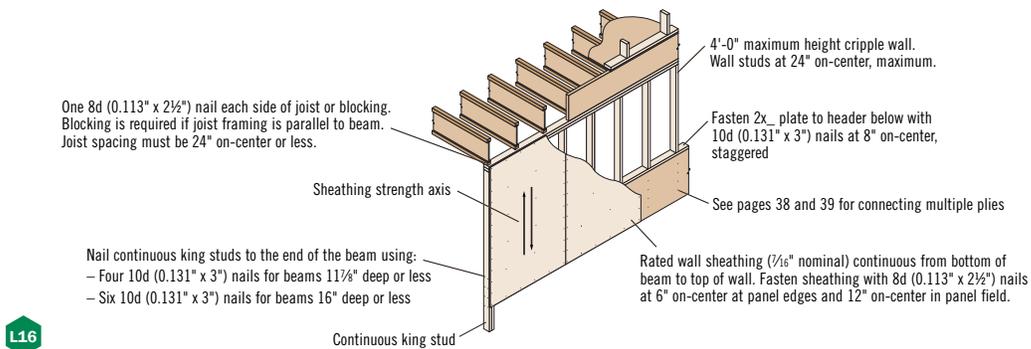
| | | |
|--|---|--|
| <p>Plank Orientation Header</p> <p>3 1/2" x 5 1/2" TimberStrand® LSL in plank orientation</p> <p>L10</p> | <p>Low Header</p> <p>3 1/2"-wide header</p> <p>2x_framing at opening</p> <p>L11</p> | <p>High Header</p> <p>Double top plate</p> <p>2x6 wall framing</p> <p>3 1/2"-wide header</p> <p>2x_nailer*</p> <p>L12 *Double nailer may be required depending upon the opening size and window type</p> |
|--|---|--|

WINDOW AND DOOR HEADER DETAILS

Dropped Header with Full Lateral Bracing



Dropped Header with Acceptable Lateral Bracing



When framed as shown above, the following dropped headers are considered fully braced under uniform-load, simple-span conditions:

Single-ply:

- 1¾" wide headers, 11⅞" deep or less
- 3½" wide headers, 16" deep or less, with a maximum span of 18'-6"

Multiple-ply:

- Headers up to four 1¾" plies, 11⅞" deep or less
- Headers up to four 1¾" x 14" plies, with a maximum span of 8'-6"

NAILING ON NARROW FACE

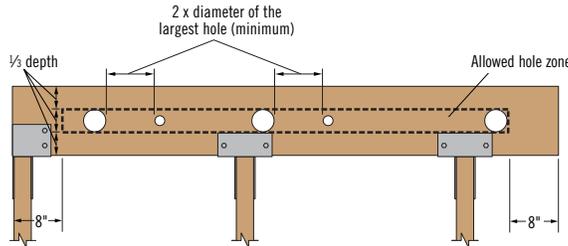
Nails Installed on the Narrow Face

| Nail Size | Closest On-Center Spacing Per Row | | | |
|---|-----------------------------------|-----------------------|----------------|---------------|
| | 1¾" TimberStrand® LSL | 3½" TimberStrand® LSL | Microllam® LVL | Parallam® PSL |
| 8d (0.131" x 2½") or 10d (0.128" x 3") | 3" | 3" | 3" | 3" |
| 10d (0.148" x 3") or 12d (0.148" x 3¼") | 4" | 3" | 4" | 4" |
| 16d (0.162" x 3½") | 6" | 3½" | 8" | 6" |

▪ If more than one row of nails is used, the rows must be offset at least ½" and staggered.

ALLOWABLE HOLES

1.55E TimberStrand® LSL Headers and Beams



General Notes

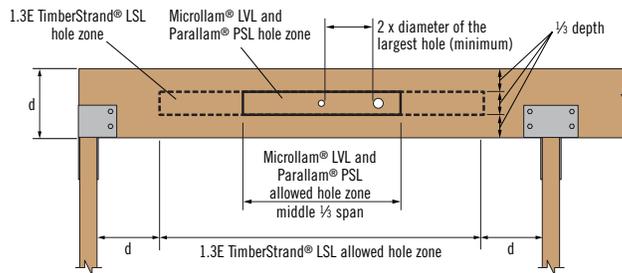
- Allowed hole zone suitable for headers and beams with **uniform and/or concentrated loads** anywhere along the member.
- Round holes only.
- No holes in headers or beams in plank orientation.

1.55E TimberStrand® LSL

| Header or Beam Depth | Maximum Round Hole Size |
|----------------------|-------------------------|
| 9 1/4"–9 1/2" | 3" |
| 11 1/4"–11 1/4" | 3 3/8" |
| 14"–16" | 4 5/8" |

- See illustration for allowed hole zone.

Other Trus Joist® Headers and Beams



General Notes

- Allowed hole zone suitable for headers and beams with **uniform loads only**.
- Round holes only.
- No holes in cantilevers.
- No holes in headers or beams in plank orientation.

Other Trus Joist® Beams

| Header or Beam Depth | Maximum Round Hole Size |
|----------------------|-------------------------|
| 4 3/8" | 1" |
| 5 1/2" | 1 3/4" |
| 7 1/4"–20" | 2" |

- See illustration for allowed hole zone.

Larger holes in Trus Joist® structural composite lumber may be possible; refer to Forte® or Javelin® software.

WARNING: Drilling, sawing, sanding or machining wood products generates wood dust. The paint and/or coatings on this product may contain titanium dioxide. Wood dust and titanium dioxide are substances known to the State of California to cause cancer. For more information on Proposition 65, visit wy.com/inform.



DO NOT cut, notch, or drill holes in headers or beams except as indicated in the illustrations and tables

BEARING LENGTH REQUIREMENTS

| Reaction (lbs) | 1.3E TimberStrand® LSL | | 1.55E TimberStrand® LSL | | | 2.0E Microllam® LVL | | | 2.0E Parallam® PSL | | |
|----------------|------------------------|-------------------|-------------------------|--------|--------|---------------------|--------|--------|--------------------|--------|--------|
| | Beam Orientation | Plank Orientation | Beam Orientation | | | Beam Orientation | | | Beam Orientation | | |
| | Width | Width | Width | | | Width | | | Width | | |
| | 3 1/2" | 5 1/2" | 1 3/4" | 3 1/2" | 5 1/4" | 1 3/4" | 3 1/2" | 5 1/4" | 3 1/2" | 5 1/4" | 7" |
| 2,000 | 1 1/2" | 1 1/2" | 1 1/2" | 1 1/2" | 1 1/2" | 1 3/4" | 1 1/2" | 1 1/2" | 1 1/2" | 1 1/2" | 1 1/2" |
| 4,000 | 1 3/4" | 2" | 2 3/4" | 1 1/2" | 1 1/2" | 3 1/4" | 1 3/4" | 1 1/2" | 1 3/4" | 1 1/2" | 1 1/2" |
| 6,000 | 2 1/2" | 3" | 4" | 2" | 1 1/2" | 4 3/4" | 2 1/2" | 1 3/4" | 2 1/2" | 1 3/4" | 1 1/2" |
| 8,000 | 3 1/4" | 4" | 5 1/4" | 2 3/4" | 1 3/4" | 6 1/4" | 3 1/4" | 2 1/4" | 3 1/4" | 2 1/4" | 1 3/4" |
| 10,000 | 4 1/4" | 5" | 6 1/2" | 3 1/4" | 2 1/4" | 7 3/4" | 4" | 2 3/4" | 4" | 2 3/4" | 2" |
| 12,000 | 5" | 6" | 7 3/4" | 4" | 2 3/4" | | 4 3/4" | 3 1/4" | 4 3/4" | 3 1/4" | 2 1/2" |
| 14,000 | 5 3/4" | 7" | | 4 1/2" | 3" | | 5 1/2" | 3 3/4" | 5 1/2" | 3 3/4" | 2 3/4" |
| 16,000 | 6 1/2" | | | 5 1/4" | 3 1/2" | | 6 1/4" | 4 1/4" | 6 1/4" | 4 1/4" | 3 1/4" |
| 18,000 | 7 1/4" | | | 5 3/4" | 4" | | 7" | 4 3/4" | 7" | 4 3/4" | 3 1/2" |
| 20,000 | | | | 6 1/2" | 4 1/4" | | 7 3/4" | 5 1/4" | 7 3/4" | 5 1/4" | 4" |
| 22,000 | | | | 7" | 4 3/4" | | | 5 3/4" | | 5 3/4" | 4 1/4" |
| 24,000 | | | | 7 3/4" | 5 1/4" | | | 6 1/4" | | 6 1/4" | 4 3/4" |
| 26,000 | | | | | 5 3/4" | | | 6 3/4" | | 6 3/4" | 5" |
| 28,000 | | | | | 6" | | | 7 1/4" | | 7 1/4" | 5 1/2" |
| 30,000 | | | | | 6 1/2" | | | 7 3/4" | | 7 3/4" | 5 3/4" |

General Notes

- Minimum bearing length: 1 1/2" at ends, 3 1/2" at intermediate supports.
- Bearing across full beam width is required.
- Interpolation between reaction loads is permitted for determining bearing lengths.
- Bearing lengths based on the following bearing stresses:
 - 1.3E TimberStrand® LSL: 710 psi; 375 psi for plank orientation.
 - 1.55E TimberStrand® LSL: 900 psi.
 - 2.0E Microllam® LVL: 750 psi.
 - 2.0E Parallam® PSL: 750 psi.

TAPERED END CUTS

Allowable Reactions for 3 1/2" (1) TimberStrand® LSL Headers and Beams (lbs)

| Bearing | Beam Depth | Outside Heel Height D ₁ | | | | | | | |
|----------------------------------|------------|------------------------------------|-------|--------|-------|--------|-------|--------|-------|
| | | 4 1/2" | 5" | 5 1/2" | 6" | 6 1/2" | 7" | 7 1/2" | 8" |
| 3 1/2" Wood Plate ⁽²⁾ | 7 1/4" | 5,205 | 5,205 | 5,205 | 5,205 | | | | |
| | 8 3/4" | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | |
| | 9 1/4" | 4,860 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 |
| | 9 1/2" | 4,860 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 |
| | 11 1/4" | 4,860 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 |
| | 11 1/8" | 4,860 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 |
| | 14" | | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 |
| 16" | | | | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | |
| 5 1/4" Wood Plate ⁽²⁾ | 7 1/4" | 7,190 | 7,190 | 7,190 | | | | | |
| | 8 3/4" | 7,205 | 7,810 | 7,810 | 7,810 | 7,810 | 7,810 | | |
| | 9 1/4" | 5,255 | 5,710 | 6,160 | 6,610 | 6,690 | 6,690 | 6,690 | |
| | 9 1/2" | 5,255 | 5,710 | 6,160 | 6,610 | 6,870 | 6,870 | 6,870 | 6,870 |
| | 11 1/4" | 5,255 | 5,710 | 6,160 | 6,610 | 7,065 | 7,515 | 7,810 | 7,810 |
| | 11 1/8" | 5,255 | 5,710 | 6,160 | 6,610 | 7,065 | 7,515 | 7,810 | 7,810 |
| | 14" | 5,255 | 5,710 | 6,160 | 6,610 | 7,065 | 7,515 | 7,810 | 7,810 |
| 16" | | | 6,160 | 6,610 | 7,065 | 7,515 | 7,810 | 7,810 | |
| 3 1/2" Column ⁽³⁾ | 7 1/4" | 6,665 | 7,190 | 7,190 | 7,190 | | | | |
| | 8 3/4" | 6,665 | 7,285 | 7,900 | 8,520 | 8,555 | 8,555 | 8,555 | |
| | 9 1/4" | 4,860 | 5,310 | 5,765 | 6,215 | 6,670 | 6,690 | 6,690 | 6,690 |
| | 9 1/2" | 4,860 | 5,310 | 5,765 | 6,215 | 6,670 | 6,870 | 6,870 | 6,870 |
| | 11 1/4" | 4,860 | 5,310 | 5,765 | 6,215 | 6,670 | 7,120 | 7,570 | 8,025 |
| | 11 1/8" | 4,860 | 5,310 | 5,765 | 6,215 | 6,670 | 7,120 | 7,570 | 8,025 |
| | 14" | | 5,310 | 5,765 | 6,215 | 6,670 | 7,120 | 7,570 | 8,025 |
| 16" | | | | 6,215 | 6,670 | 7,120 | 7,570 | 8,025 | |

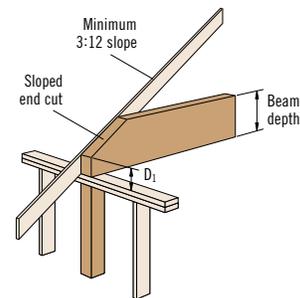
(1) For 1 3/4" and 5 1/4" beams, multiply by 0.5 and 1.5, respectively.

(2) Bearing lengths, based on F_{cL} of 425 psi.

(3) Bearing lengths based on F_{cL} of 710 psi for 1.3E TimberStrand® LSL and 900 psi for 1.55E TimberStrand® LSL.

General Notes

- No increase for duration of load is permitted.
- No holes or concentrated load within tapered cut.
- Table considers only downward loading. Contact your Weyerhaeuser representative for assistance with uplift loading or other conditions.



Tapered end cut detailed above is not allowed with T1® joists

Allowable Reactions for 3 1/2" (1) Microllam® LVL and Parallam® PSL Beams (lbs)

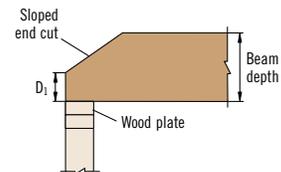
| Bearing | Beam Depth | Outside Heel Height D ₁ | | | | | | | | |
|----------------------------------|------------|------------------------------------|-------|--------|-------|--------|-------|--------|-------|-------|
| | | 4 1/2" | 5" | 5 1/2" | 6" | 6 1/2" | 7" | 7 1/2" | 8" | 10" |
| 3 1/2" Wood Plate ⁽²⁾ | 7 1/4" | 4,470 | 4,820 | 4,820 | 4,820 | | | | | |
| | 9 1/4" | 4,470 | 4,885 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | |
| | 9 1/2" | 4,470 | 4,885 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 |
| | 11 1/4" | 4,470 | 4,885 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 |
| | 11 1/8" | 4,470 | 4,885 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 |
| | 14" | | 4,885 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 |
| | 16" | | | | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 |
| 18" | | | | | 5,205 | 5,205 | 5,205 | 5,205 | 5,205 | |
| 20" | | | | | | 5,205 | 5,205 | 5,205 | 5,205 | |
| 5 1/4" Wood Plate ⁽²⁾ | 7 1/4" | 4,820 | 4,820 | 4,820 | | | | | | |
| | 9 1/4" | 4,830 | 5,245 | 5,665 | 6,080 | 6,150 | 6,150 | 6,150 | | |
| | 9 1/2" | 4,830 | 5,245 | 5,665 | 6,080 | 6,320 | 6,320 | 6,320 | 6,320 | |
| | 11 1/4" | 4,830 | 5,245 | 5,665 | 6,080 | 6,495 | 6,910 | 7,325 | 7,480 | |
| | 11 1/8" | 4,830 | 5,245 | 5,665 | 6,080 | 6,495 | 6,910 | 7,325 | 7,740 | 7,810 |
| | 14" | 4,830 | 5,245 | 5,665 | 6,080 | 6,495 | 6,910 | 7,325 | 7,740 | 7,810 |
| | 16" | | | 5,665 | 6,080 | 6,495 | 6,910 | 7,325 | 7,740 | 7,810 |
| 18" | | | | 6,080 | 6,495 | 6,910 | 7,325 | 7,740 | 7,810 | |
| 20" | | | | | | 6,910 | 7,325 | 7,740 | 7,810 | |
| 3 1/2" Column ⁽³⁾ | 7 1/4" | 4,470 | 4,820 | 4,820 | 4,820 | | | | | |
| | 9 1/4" | 4,470 | 4,885 | 5,300 | 5,715 | 6,130 | 6,150 | 6,150 | 6,150 | |
| | 9 1/2" | 4,470 | 4,885 | 5,300 | 5,715 | 6,130 | 6,320 | 6,320 | 6,320 | |
| | 11 1/4" | 4,470 | 4,885 | 5,300 | 5,715 | 6,130 | 6,545 | 6,960 | 7,375 | 7,480 |
| | 11 1/8" | 4,470 | 4,885 | 5,300 | 5,715 | 6,130 | 6,545 | 6,960 | 7,375 | 7,895 |
| | 14" | | 4,885 | 5,300 | 5,715 | 6,130 | 6,545 | 6,960 | 7,375 | 9,040 |
| | 16" | | | | 5,715 | 6,130 | 6,545 | 6,960 | 7,375 | 9,040 |
| 18" | | | | | 6,130 | 6,545 | 6,960 | 7,375 | 9,040 | |
| 20" | | | | | | 6,130 | 6,545 | 6,960 | 7,375 | 9,040 |

(1) For 1 3/4", 5 1/4", and 7" beams, multiply by 0.5, 1.5, and 2.0, respectively.

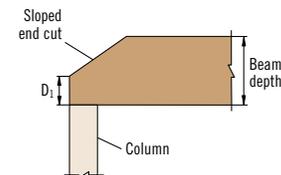
(2) Bearing lengths based on F_{cL} of 425 psi.

(3) Bearing lengths based on F_{cL} of 750 psi.

Wood Plate Connection



Column Connection



DO NOT overhang seat cuts on beams beyond inside face of support member

MULTIPLE-MEMBER CONNECTIONS FOR SIDE-LOADED BEAMS

L17 Uniform Load—Maximum Uniform Load Applied to Either Outside Member (PLF)

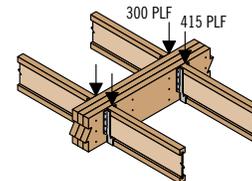
| Fastener Type | Location | Number of Rows | Fastener On-Center Spacing | Fastener Pattern | | | | | |
|--|---------------|------------------|----------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|------------------------------|------------------------------|
| | | | | Assembly A 3½" wide, 2-ply | Assembly B 5¼" wide, 3-ply | Assembly C 5¼" wide, 2-ply | Assembly D 7" wide, 3-ply | Assembly E 7" wide, 2-ply | Assembly F 7" wide, 4-ply |
| 10d (0.128" x 3") Nail ⁽¹⁾ | As shown | 2 ⁽⁵⁾ | 12" | 370 | 280 | 280 | 245 | | |
| | | 3 | 12" | 555 | 415 | 415 | 370 | | |
| ½" A307 Through Bolt ⁽²⁾⁽³⁾ | — | 2 | 24" | 505 | 380 | 520 | 465 | 860 | 340 |
| | | | 19.2" | 635 | 475 | 655 | 580 | 1,075 | 425 |
| | | | 16" | 760 | 570 | 785 | 695 | 1,290 | 505 |
| Screw Length ▶ | | | | 3½" | 3½" | 3½" | 3½" | 6" | 6" |
| SDS ⁽³⁾ | As shown | 2 | 24" | 680 | 510 | 510 | 455 | 1,360 | 555 |
| | | | 19.2" | 850 | 640 | 640 | 565 | 1,700 | 695 |
| | | | 16" | 1,020 | 765 | 765 | 680 | 2,040 | 835 |
| USP WS ⁽³⁾ | As shown | 2 | 24" | 485 | 365 | 365 | 325 | | 325 ⁽⁶⁾ |
| | | | 19.2" | 610 | 455 | 455 | 405 | | 405 ⁽⁶⁾ |
| | | | 16" | 730 | 545 | 545 | 485 | | 485 ⁽⁶⁾ |
| Screw Length ▶ | | | | 3¾" | 5" | 3¾" | 6¾" | 6¾" | 6¾" |
| TrussLOK-EWP™ ⁽³⁾ | One side only | 2 | 24" | 580 | 450 | 435 | 415 | 620 | 415 |
| | | | 19.2" | 725 | 565 | 545 | 515 | 775 | 515 |
| | | | 16" | 870 | 675 | 655 | 620 | 930 | 620 |
| SDW22 ⁽³⁾⁽⁴⁾ | One side only | 2 | 24" | 800 | 450 | 600 | 400 | 800 | 400 |
| | | | 19.2" | 1,000 | 565 | 750 | 500 | 1,000 | 500 |
| | | | 16" | 1,200 | 675 | 900 | 600 | 1,200 | 600 |

- (1) Nailed connection values may be doubled for 6" on-center or tripled for 4" on-center nail spacing.
- (2) Washers required. Bolt holes to be 3/16" maximum.
- (3) 24" on-center bolted or screwed connection values may be doubled for 12" on-center spacing.
- (4) When loading the head side of a SDW22 screw, assemblies B, D, and F can be increased by 30%.
- (5) For beams up to 14" deep, maximum.
- (6) Assembly F is not recommended for TimberStrand® LSL or Parallam® PSL.

Uniform Load Design Example

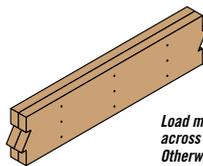
First, check allowable load tables on pages 16–33 to verify that three pieces can carry the total load of 715 plf with proper live load deflection criteria. Maximum load applied to either outside member is 415 plf. For an assembly of three 1¾" plies (Assembly B), two rows of 10d (0.128" x 3") nails at 12" o.c. center is good for only 280 plf. Therefore, use three rows of 10d (0.128" x 3") nails at 12" o.c. (good for 415 plf).

Alternative: Two rows of ½" A307 bolts or 3½" USP WS screws at 19.2" on-center.



MULTIPLE-MEMBER CONNECTIONS FOR TOP-LOADED BEAMS

When fasteners are required on both sides, stagger fasteners on the second side so they fall halfway between fasteners on the first side.



Load must be applied evenly across entire beam width. Otherwise, use connections for side-loaded beams

L6 Multiple pieces can be nailed or bolted together to form a header or beam of the required size, up to a maximum width of 7"

Fastener Installation Requirements

| Piece Width | Number of Plies | Fastener | | | | |
|-------------|-----------------|------------------------------|-------------|------------------|--------------|--------------------|
| | | Type ⁽¹⁾ | Min. Length | # Rows | O.C. Spacing | Location |
| 1¾" | 2 | 10d nails | 3" | 3 ⁽²⁾ | 12" | One side |
| | | 12d–16d nails | 3¾" | 2 ⁽²⁾ | | |
| | | Screws | 3¾" or 3½" | 2 | | |
| | 3 | 10d nails | 3" | 3 ⁽²⁾ | 12" | Both sides |
| | | 12d–16d nails | 3¾" | 2 ⁽²⁾ | | |
| | | Screws | 3¾" or 3½" | 2 | | |
| 3½" | 2 | 10d nails ⁽³⁾ | 3" | 3 ⁽²⁾ | 12" | One side (per ply) |
| | | 12d–16d nails ⁽³⁾ | 3¾" | 2 ⁽²⁾ | | |
| | | Screws | 5" or 6" | 2 | | |
| | 2 | Screws | 6¾" | 2 | 24" | Both sides |
| | | ½" bolts | 8" | 2 | | |
| | | ½" bolts | 8" | 2 | | |

- (1) 10d nails are 0.128" diameter; 12d–16d nails are 0.148"–0.162" diameter; screws are SDS, USP WS, TrussLOK-EWP™ or SDW.
- (2) An additional row of nails is required with depths of 14" or greater.
- (3) When connecting 4-ply members, nail each ply to the other and offset nail rows by 2" from rows in the ply below.

MULTIPLE-MEMBER CONNECTIONS FOR SIDE-LOADED BEAMS

L18 Point Load—Maximum Point Load Applied to Either Outside Member (lbs)

| Fastener Type | Location | Number of Fasteners per Side | Fastener Pattern | | | | | |
|------------------------|---------------|------------------------------|------------------|----------------|----------------|----------------|----------------|----------------------|
| | | | Assembly A | Assembly B | Assembly C | Assembly D | Assembly E | Assembly F |
| 10d (0.128" x 3") Nail | As shown | 6 | 1,110 | 835 | 835 | 740 | | |
| | | 12 | 2,225 | 1,670 | 1,670 | 1,485 | | |
| | | 18 | 3,335 | 2,505 | 2,505 | 2,225 | | |
| | | 24 | 4,450 | 3,335 | 3,335 | 2,965 | | |
| | | Screw Length ▶ | 3 1/2" | 3 1/2" | 3 1/2" | 3 1/2" | 6" | 6" |
| SDS | As shown | 4 | 2,720 | 2,040 | 2,040 | 1,815 | 5,440 | 2,225 |
| | | 6 | 4,080 | 3,060 | 3,060 | 2,720 | 8,160 | 3,335 |
| | | 8 | 5,440 | 4,080 | 4,080 | 3,625 | 10,880 | 4,450 |
| USP WS | As shown | 4 | 1,945 | 1,460 | 1,460 | 1,295 | | 1,295 ⁽²⁾ |
| | | 6 | 2,915 | 2,185 | 2,185 | 1,945 | | 1,945 ⁽²⁾ |
| | | 8 | 3,890 | 2,915 | 2,915 | 2,590 | | 2,590 ⁽²⁾ |
| | | Screw Length ▶ | 3 3/4" | 5" | 3 3/4" | 6 3/4" | 6 3/4" | 6 3/4" |
| TrussLOK-EWP™ | One side only | 4 | 2,320 | 1,800 | 1,740 | 1,655 | 2,480 | 1,655 |
| | | 6 | 3,480 | 2,700 | 2,610 | 2,480 | 3,720 | 2,480 |
| | | 8 | 4,640 | 3,600 | 3,480 | 3,305 | 4,960 | 3,305 |
| SDW22 ⁽¹⁾ | One side only | 4 | 3,200 | 1,800 | 1,800 | 1,600 | 3,200 | 1,600 |
| | | 6 | 4,800 | 2,700 | 2,700 | 2,400 | 4,800 | 2,400 |
| | | 8 | 6,400 | 3,600 | 3,600 | 3,200 | 6,400 | 3,200 |

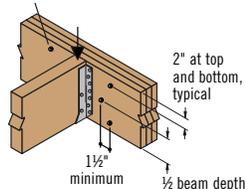
(1) When loading the head side of a SDW22 screw, assemblies B, D, and F can be increased by 30%.

(2) Assembly F is not recommended for TimberStrand® LSL or Parallam® PSL.

Point Load Connector Spacing

4- or 6-Screw Connection

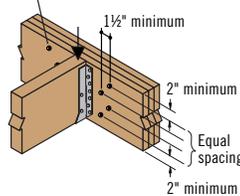
SDS, USP WS, TrussLOK-EWP™, or SDW screw, typical



L19

8-Screw Connection

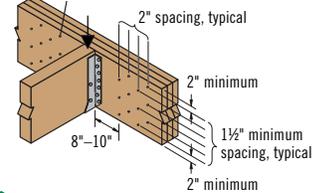
SDS, USP WS, TrussLOK-EWP™, or SDW screw, typical



L20

Nail Connection

10d (0.128" x 3") nails, typical. Stagger to prevent splitting.

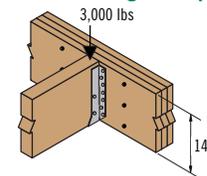


L21 There must be an equal number of nails on each side of the connection

General Notes for Side-Loaded Beam Tables

- Connections are based on NDS® or manufacturer's test or code reports.
- Use specific gravity of 0.5 when designing lateral connections.
- Values listed are for 100% stress level. Increase 15% for snow-loaded roof conditions or 25% for non-snow roof conditions, where code allows.
- When fasteners are required on both sides, stagger fasteners on the second side so they fall halfway between fasteners on the first side.
- Verify adequacy of beam in allowable load tables on pages 16–33.
- 7" wide beams should be side-loaded only when loads are applied to both sides of the members (to minimize rotation).
- Minimum end distance for bolts and screws is 6".
- Beams wider than 7" require special consideration by the design professional of record.

Point Load Design Example



First, verify that a 3-ply, 1 3/4" x 14" beam can support a 3,000 lb point load and all other loads applied. The 3,000 lb point load is being transferred to the beam with a face mount hanger. For an assembly of three 1 3/4" plies (Assembly B), six 3 1/2" SDS screws are good for 3,060 lbs with a face mount hanger.

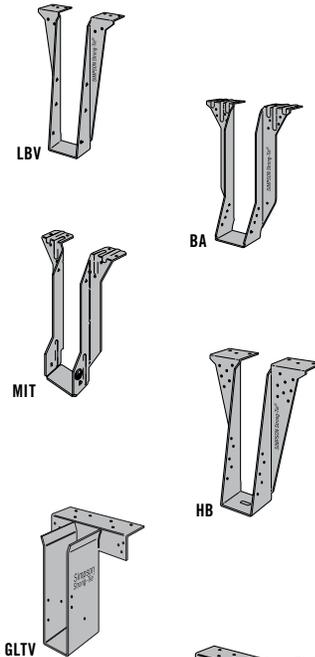
FRAMING CONNECTORS

Top Mount Hangers—Simpson Strong-Tie®

| Supported Member Width | Supported Member Depth | Hanger | Nail Type | | Allowable Load (lbs)—100% ⁽¹⁾ | | |
|------------------------|-----------------------------|--------------------------|---------------|--------------|--|-------|-------|
| | | | Header | Joist | Support Member Material | | |
| | | | | | LSL, LVL, PSL | DF/SP | SPF |
| 1 3/4" | 9 1/4" | LBV1.81/9.25 | 16d | 10d x 1 1/2" | 2,885 | 2,590 | 2,060 |
| | 9 1/2" | MIT9.5 | 16d | 10d x 1 1/2" | 2,115 | 2,305 | 1,665 |
| | | BA1.81/9.5 | 16d | 10d x 1 1/2" | 3,705 | 3,435 | 2,665 |
| | 11 1/4" | LBV1.81/11.25 | 16d | 10d x 1 1/2" | 2,885 | 2,590 | 2,060 |
| | 11 1/2" | MIT11.88 | 16d | 10d x 1 1/2" | 2,115 | 2,305 | 1,665 |
| | | BA1.81/11.88 | 16d | 10d x 1 1/2" | 3,705 | 3,435 | 2,665 |
| 14" | MIT14 | 16d | 10d x 1 1/2" | 2,115 | 2,305 | 1,665 | |
| | | BA1.81/14 | 16d | 10d x 1 1/2" | 3,705 | 3,435 | 2,665 |
| 3 1/2" | 9 1/4" | HB3.56/9.25 | 16d | 16d | 5,640 | 5,650 | 3,820 |
| | 9 1/2" | BA3.56/9.5 | 16d | 16d | 3,705 | 3,435 | 2,665 |
| | | HB3.56/9.5 | 16d | 16d | 5,640 | 5,650 | 3,820 |
| | 11 1/4" | HB3.56/11.25 | 16d | 16d | 5,640 | 5,650 | 3,820 |
| | 11 1/2" | BA3.56/11.88 | 16d | 16d | 3,705 | 3,435 | 2,665 |
| | | HB3.56/11.88 | 16d | 16d | 5,640 | 5,650 | 3,820 |
| | 14" | BA3.56/14 | 16d | 16d | 3,705 | 3,435 | 2,665 |
| | | GLTV3.514 | 16d | 16d | 5,915 | 7,200 | 5,145 |
| | 16" | BA3.56/16 | 16d | 16d | 3,705 | 3,435 | 2,665 |
| | 18" | GHLT3.518 | 16d | 16d | 9,000 | 8,835 | 6,770 |
| 20" | HGLTV3.520 | 16d | 16d | 9,000 | 8,835 | 6,770 | |
| 5 1/4" | 9 1/4" | GLTV5.50/9.25 | 16d | 16d | 5,915 | 7,200 | 5,145 |
| | 9 1/2" | GLTV5.59 | 16d | 16d | 5,915 | 7,200 | 5,145 |
| | | GLTV5.50/11.25 | 16d | 16d | 5,915 | 7,200 | 5,145 |
| | 11 1/4" | HGLTV5.511 | 16d | 16d | 9,000 | 8,835 | 6,770 |
| | 14" | HGLTV5.514 | 16d | 16d | 9,000 | 8,835 | 6,770 |
| | | HGLTV5.516 | 16d | 16d | 9,000 | 8,835 | 6,770 |
| 11 1/4"—20" | EGQ5.50-SDS3 ⁽²⁾ | SDS 3/4" x 3" | SDS 3/4" x 3" | 18,680 | 19,800 | — | |
| 7" | 9 1/4" | HB7.12/9.25 | 16d | 16d | 5,640 | 5,650 | 3,820 |
| | 9 1/2" | HB7.12/9.5 | 16d | 16d | 5,640 | 5,650 | 3,820 |
| | | HGLTV7.12 ⁽²⁾ | 16d | 16d | 9,000 | 8,835 | 6,770 |
| 11 1/4"—20" | EGQ7.25-SDS3 ⁽²⁾ | SDS 3/4" x 3" | SDS 3/4" x 3" | 18,680 | 19,800 | — | |

- (1) Maximum load for top mount hangers shall **not** be increased for duration of load.
 (2) Specify hanger height when ordering.

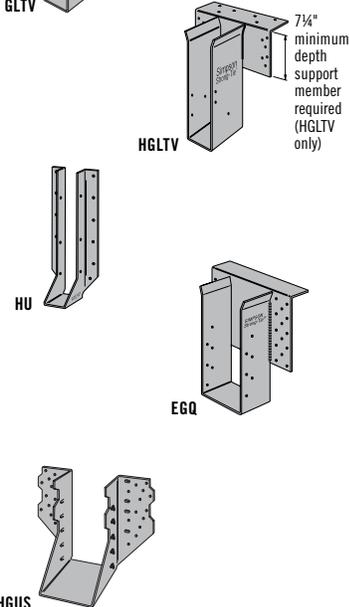
See General Notes on page 41



Face Mount Hangers—Simpson Strong-Tie®

| Supported Member Width | Supported Member Depth | Hanger | Nail Type | | Allowable Load (lbs)—100% ⁽¹⁾ | | |
|------------------------|------------------------|-----------------------------|-------------------|-------------------|--|--------|--------|
| | | | Header | Joist | Support Member Material | | |
| | | | | | LSL, LVL, PSL | DF/SP | SPF |
| 1 3/4" | 7 1/4"—9 1/2" | HU7 | 16d | 10d x 1 1/2" | 1,785 | 1,785 | 1,540 |
| | 9 1/4"—9 1/2" | HU9 | 16d | 10d x 1 1/2" | 2,680 | 2,680 | 2,305 |
| | | HU11 | 16d | 10d x 1 1/2" | 3,275 | 3,275 | 2,820 |
| 3 1/2" | 11 1/4"—14" | HUS1.81/10 | 16d | 16d | 5,135 | 5,135 | 4,705 |
| | 7 1/4"—11 1/4" | HHUS48 | 16d | 16d | 4,210 | 4,210 | 3,615 |
| | | HHUS410 | 16d | 16d | 5,635 | 5,635 | 4,835 |
| | 9 1/2"—18" | HGUS410 | 16d | 16d | 9,100 | 9,100 | 7,825 |
| | | HGUS414 | 16d | 16d | 10,100 | 10,100 | 8,685 |
| 5 1/4" | 9 1/4"—9 1/2" | HHUS5.50/10 | 16d | 16d | 5,635 | 5,635 | 4,835 |
| | 11 1/4"—11 1/2" | HGUS5.50/12 | 16d | 16d | 9,600 | 9,600 | 8,255 |
| | | HGUS5.50/14 | 16d | 16d | 10,100 | 10,100 | 8,685 |
| | 14"—20" | HGU5.50 | SDS 3/4" x 2 1/2" | SDS 3/4" x 2 1/2" | 14,145 | 14,145 | 10,185 |
| 7" | 9 1/4"—9 1/2" | HGUS7.25/10 | 16d | 16d | 9,100 | 9,100 | 7,825 |
| | 11 1/4"—14" | HGUS7.25/12 | 16d | 16d | 9,600 | 9,600 | 8,255 |
| | | HGU7.25-SDS ⁽²⁾ | SDS 3/4" x 2 1/2" | SDS 3/4" x 2 1/2" | 14,145 | 14,145 | 10,185 |
| | 14"—20" | HGUS7.25/14 | 16d | 16d | 10,100 | 10,100 | 8,685 |
| | | HHGU7.25-SDS ⁽²⁾ | SDS 3/4" x 2 1/2" | SDS 3/4" x 2 1/2" | 17,845 | 17,845 | 12,850 |

- (1) For other duration-of-load values, refer to hanger manufacturer's literature.
 (2) Specify hanger height when ordering.



Hanger information on these two pages was provided by either Simpson Strong-Tie® or USP Structural Connectors®. For additional information, please refer to their literature.

FRAMING CONNECTORS

Top Mount Hangers—USP Structural Connectors®

| Supported Member Width | Supported Member Depth | Hanger | Nail Type | | Allowable Load (lbs)—100% ⁽¹⁾ | | | |
|------------------------|------------------------|-----------|-----------|--------------|--|-------|-------|-------|
| | | | Header | Joist | Support Member Material | | | |
| | | | | | LSL, LVL, PSL | DF/SP | SPF | |
| 1 3/4" | 9 1/4" | BPH17925 | 16d | 10d x 1 1/2" | 3,340 | 3,030 | 2,245 | |
| | | PHXU17925 | 16d | 10d x 1 1/2" | 4,420 | 4,425 | 3,070 | |
| | 9 1/2" | BPH1795 | 16d | 10d x 1 1/2" | 3,340 | 3,030 | 2,245 | |
| | | PHXU1795 | 16d | 10d x 1 1/2" | 4,420 | 4,425 | 3,070 | |
| | 11 1/4" | BPH17112 | 16d | 10d x 1 1/2" | 3,340 | 3,030 | 2,245 | |
| | | PHXU17112 | 16d | 10d x 1 1/2" | 4,420 | 4,425 | 3,070 | |
| | 11 1/8" | BPH17118 | 16d | 10d x 1 1/2" | 3,340 | 3,030 | 2,245 | |
| | | PHXU17118 | 16d | 10d x 1 1/2" | 4,420 | 4,425 | 3,070 | |
| | 14" | BPH1714 | 16d | 10d x 1 1/2" | 3,340 | 3,030 | 2,245 | |
| | | PHXU1714 | 16d | 10d x 1 1/2" | 4,420 | 4,425 | 3,070 | |
| | 3 1/2" | 9 1/4" | PHXU35925 | 16d | 10d | 5,785 | 5,285 | 3,590 |
| | | 9 1/2" | PHXU3595 | 16d | 10d | 5,785 | 5,285 | 3,590 |
| 11 1/4" | | PHXU35112 | 16d | 10d | 5,785 | 5,285 | 3,590 | |
| 11 1/8" | | PHXU35118 | 16d | 10d | 5,785 | 5,285 | 3,590 | |
| 14" | | HLBH3514 | NA16D-RS | 16d | 9,600 | 9,600 | 8,915 | |
| 16" | | HLBH3516 | NA16D-RS | 16d | 9,600 | 9,600 | 8,915 | |
| 18" | | HLBH3518 | NA16D-RS | 16d | 9,600 | 9,600 | 8,915 | |
| 20" | | PHXU3520 | 16d | 10d | 5,785 | 5,285 | 3,590 | |
| | | HLBH3520 | NA16D-RS | 16d | 9,600 | 9,600 | 8,915 | |
| 5 1/4" | | 9 1/4" | PHXU55925 | 16d | 10d | 5,785 | 5,285 | 3,590 |
| | 9 1/2" | PHXU5595 | 16d | 10d | 5,785 | 5,285 | 3,590 | |
| | 11 1/4" | PHXU55112 | 16d | 10d | 5,785 | 5,285 | 3,590 | |
| | 11 1/8" | PHXU55118 | 16d | 10d | 5,785 | 5,285 | 3,590 | |
| | 14" | HLBH5514 | NA16D-RS | 16d | 9,600 | 9,600 | 8,915 | |
| | 16" | HLBH5516 | NA16D-RS | 16d | 9,600 | 9,600 | 8,915 | |
| | 18" | PHXU5518 | 16d | 10d | 5,785 | 5,285 | 3,590 | |
| | | HLBH5518 | NA16D-RS | 16d | 9,600 | 9,600 | 8,915 | |
| | 20" | PHXU5520 | 16d | 10d | 5,785 | 5,285 | 3,590 | |
| | | HLBH5520 | NA16D-RS | 16d | 9,600 | 9,600 | 8,915 | |
| 7" | 11 1/8" | PHXU71118 | 16d | 10d | 5,785 | 5,285 | 3,590 | |
| | 14" | HLBH7114 | NA16D-RS | 16d | 9,600 | 9,600 | 8,915 | |
| | 16" | HLBH7116 | NA16D-RS | 16d | 9,600 | 9,600 | 8,915 | |
| | 18" | HLBH7118 | NA16D-RS | 16d | 9,600 | 9,600 | 8,915 | |

(1) Maximum value for top mount hangers shall not be increased for duration of load.

Face Mount Hangers—USP Structural Connectors®

| Supported Member Width | Supported Member Depth | Hanger | Nail Type | | Allowable Load (lbs)—100% ⁽¹⁾ | | |
|------------------------|------------------------|----------------|-----------|--------------|--|-------|-------|
| | | | Header | Joist | Support Member Material | | |
| | | | | | LSL, LVL, PSL | DF/SP | SPF |
| 1 3/4" | 9 1/4"—14" | HD17925 | 16d | 10d x 1 1/2" | 2,540 | 2,540 | 2,105 |
| | | HUS179 | 16d | 10d x 1 1/2" | 5,310 | 5,310 | 4,410 |
| | 11 1/4"—14" | HD17112 | 16d | 10d x 1 1/2" | 2,900 | 2,900 | 2,105 |
| | | HD1714 | 16d | 10d x 1 1/2" | 3,140 | 3,140 | 2,310 |
| 3 1/2" | 9 1/4"—14" | HD410 | 16d | 10d | 2,540 | 2,540 | 2,180 |
| | | THD410 | 16d | 10d | 5,360 | 5,360 | 4,600 |
| | | THDH410 | 16d | 16d | 8,260 | 8,260 | 7,120 |
| | 11 1/4"—18" | HD412 | 16d | 10d | 3,100 | 3,100 | 2,660 |
| | | THD412 | 16d | 10d | 6,770 | 6,770 | 5,810 |
| | | THDH412 | 16d | 16d | 9,845 | 9,845 | 8,270 |
| | 14"—20" | HD414 | 16d | 10d | 3,385 | 3,385 | 2,905 |
| | | THD414 | 16d | 10d | 7,045 | 7,045 | 5,920 |
| | | THDH414 | 16d | 16d | 9,845 | 9,845 | 8,270 |
| | 5 1/4" | 9 1/4"—11 1/8" | HD5210 | 16d | 10d | 2,540 | 2,540 |
| THD610 | | | 16d | 10d | 5,660 | 5,660 | 4,900 |
| THDH610 | | | 16d | 16d | 8,725 | 8,725 | 7,520 |
| 11 1/4"—16" | | HD5212 | 16d | 10d | 3,100 | 3,100 | 2,660 |
| | | THD612 | 16d | 10d | 7,150 | 7,150 | 6,190 |
| | | THDH612 | 16d | 16d | 9,935 | 9,935 | 8,345 |
| 14"—18" | | HD5214 | 16d | 10d | 3,385 | 3,385 | 2,905 |
| | | THD614 | 16d | 10d | 8,415 | 8,415 | 7,070 |
| 14"—20" | THDH614 | 16d | 16d | 11,645 | 11,645 | 9,780 | |
| 7" | 9 1/4"—14" | HD7100 | 16d | 10d | 1,690 | 1,690 | 1,450 |
| | | THD7210 | 16d | 16d | 5,660 | 5,660 | 4,900 |
| | | THDH7210 | 16d | 16d | 8,260 | 8,260 | 7,120 |
| | 11 1/4"—16" | HD7120 | 16d | 10d | 2,255 | 2,255 | 1,935 |
| | | THD7212 | 16d | 16d | 9,845 | 9,845 | 8,270 |
| | | THDH7212 | 16d | 16d | 9,845 | 9,845 | 8,270 |
| | 14"—18" | HD7140 | 16d | 10d | 2,820 | 2,820 | 2,420 |
| | | THD7214 | 16d | 16d | 9,845 | 9,845 | 8,270 |

(1) For other duration-of-load values, refer to hanger manufacturer's literature.

General Notes

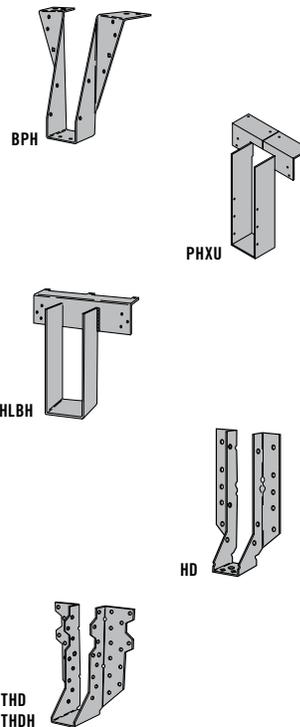
- Hanger capacity may be more or less than that of the supported member; therefore, check both the hanger and the beam capacities.
- Leave 1/16" clearance (1/8" maximum) between the end of the beam or header and its support member or hanger.

Header Assumptions

- Hangers to be supported by headers of TimberStrand® LSL, Microllam® LVL, Parallam® PSL, Douglas fir, southern pine, or spruce-pine-fir.
- When using top mount hangers in back-to-back applications, ensure that the supporting beam width is adequate to prevent hanger interference.
- Face mount hangers to be supported by 1 3/4" width headers, minimum.

Nailing Requirements

- Fill all round and positive-angle nail holes with the proper nails.
 - 10d x 1 1/2" nails are 0.148" dia. by 1 1/2" long.
 - 10d nails are 0.148" dia. by 3" long.
 - 16d nails are 0.162" dia. by 3 1/2" long.
 - For USP: 16d R.S. nails are (9 gauge) 0.148" dia. by 3 1/2" long ring-shank nails.



COLUMNS

Allowable Axial Loads (lbs) for 1.3E TimberStrand® LSL

| Column Bearing Type | Effective Column Length | Column Size | | | | | | | | | | | | | | |
|---------------------------------|-------------------------|-------------|--------|--------|-----------|--------|--------|-----------|--------|--------|-----------|--------|--------|-----------|--------|--------|
| | | 3½" x 3½" | | | 3½" x 4¾" | | | 3½" x 5½" | | | 3½" x 7¼" | | | 3½" x 8½" | | |
| | | 100% | 115% | 125% | 100% | 115% | 125% | 100% | 115% | 125% | 100% | 115% | 125% | 100% | 115% | 125% |
| On Column Base | 3' | 12,165 | 13,665 | 14,625 | 15,210 | 17,085 | 18,280 | 19,120 | 21,475 | 22,980 | 25,205 | 28,310 | 30,290 | 29,985 | 33,680 | 36,035 |
| | 4' | 10,745 | 11,830 | 12,490 | 13,435 | 14,790 | 15,610 | 16,885 | 18,590 | 19,625 | 22,260 | 24,505 | 25,870 | 26,480 | 29,155 | 30,780 |
| | 5' | 9,120 | 9,810 | 10,215 | 11,400 | 12,265 | 12,765 | 14,335 | 15,420 | 16,050 | 18,895 | 20,325 | 21,155 | 22,480 | 24,180 | 25,170 |
| | 6' | 7,550 | 7,985 | 8,235 | 9,440 | 9,980 | 10,295 | 11,865 | 12,550 | 12,945 | 15,640 | 16,540 | 17,060 | 18,610 | 19,680 | 20,300 |
| | 7' | 6,235 | 6,525 | 6,695 | 7,795 | 8,160 | 8,370 | 9,800 | 10,255 | 10,520 | 12,915 | 13,520 | 13,870 | 15,365 | 16,085 | 16,500 |
| | 8' | 5,195 | 5,400 | 5,515 | 6,490 | 6,750 | 6,895 | 8,160 | 8,485 | 8,670 | 10,755 | 11,185 | 11,430 | 12,795 | 13,305 | 13,595 |
| | 9' | 4,375 | 4,525 | 4,610 | 5,465 | 5,655 | 5,765 | 6,870 | 7,110 | 7,245 | 9,060 | 9,370 | 9,550 | 10,775 | 11,150 | 11,360 |
| | 10' | 3,725 | 3,840 | 3,905 | 4,655 | 4,795 | 4,880 | 5,850 | 6,030 | 6,135 | 7,715 | 7,950 | 8,085 | 9,175 | 9,460 | 9,620 |
| | 12' | 2,785 | 2,855 | 2,895 | 3,480 | 3,565 | 3,615 | 4,375 | 4,485 | 4,545 | 5,770 | 5,910 | 5,995 | 6,860 | 7,030 | 7,130 |
| | 14' | 2,155 | 2,200 | 2,225 | 2,695 | 2,750 | 2,780 | 3,385 | 3,455 | 3,495 | 4,465 | 4,555 | 4,610 | 5,310 | 5,420 | 5,485 |
| On Wood Plate ⁽¹⁾⁽²⁾ | 3'-7' | 5,765 | 5,765 | 5,765 | 7,065 | 7,065 | 7,065 | 8,740 | 8,740 | 8,740 | 10,785 | 10,785 | 10,785 | 12,830 | 12,830 | 12,830 |
| | 8' | 5,195 | 5,400 | 5,515 | 6,490 | 6,750 | 6,895 | 8,160 | 8,485 | 8,670 | 10,755 | 10,785 | 10,785 | 12,795 | 12,830 | 12,830 |
| | 9' | 4,375 | 4,525 | 4,610 | 5,465 | 5,655 | 5,765 | 6,870 | 7,110 | 7,245 | 9,060 | 9,370 | 9,550 | 10,775 | 11,150 | 11,360 |
| | 10' | 3,725 | 3,840 | 3,905 | 4,655 | 4,795 | 4,880 | 5,850 | 6,030 | 6,135 | 7,715 | 7,950 | 8,085 | 9,175 | 9,460 | 9,620 |
| | 12' | 2,785 | 2,855 | 2,895 | 3,480 | 3,565 | 3,615 | 4,375 | 4,485 | 4,545 | 5,770 | 5,910 | 5,995 | 6,860 | 7,030 | 7,130 |
| | 14' | 2,155 | 2,200 | 2,225 | 2,695 | 2,750 | 2,780 | 3,385 | 3,455 | 3,495 | 4,465 | 4,555 | 4,610 | 5,310 | 5,420 | 5,485 |

(1) Wood plate bearing is based on compression perpendicular-to-grain stress of 425 psi adjusted per the NDS®, 3.10.4.

(2) See connection details below.

Allowable Axial Loads (lbs) for 1.8E Parallam® PSL

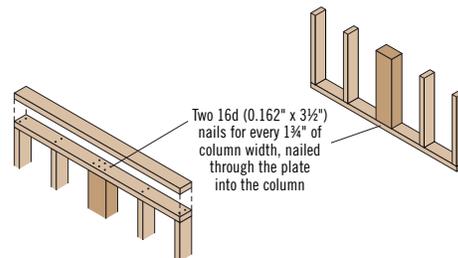
| Column Bearing Type | Effective Column Length | Column Size | | | | | | | | | | | | | | | | | | |
|---------------------|-------------------------|-------------|--------|--------|-----------|--------|--------|----------|--------|--------|-----------|--------|--------|----------|--------|--------|------------------------------|--------|--------|--------|
| | | 3½" x 3½" | | | 3½" x 5¼" | | | 3½" x 7" | | | 5¼" x 5¼" | | | 5¼" x 7" | | | 7" x 7" | | | |
| | | 100% | 115% | 125% | 100% | 115% | 125% | 100% | 115% | 125% | 100% | 115% | 125% | 100% | 115% | 125% | 100% | 115% | 125% | |
| On Column Base | 6' | 10,595 | 11,200 | 11,545 | 15,890 | 16,800 | 17,320 | 21,190 | 22,395 | 23,095 | 33,295 | 36,675 | 38,735 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 |
| | 7' | 8,735 | 9,140 | 9,370 | 13,105 | 13,710 | 14,060 | 17,475 | 18,280 | 18,745 | 30,010 | 32,545 | 34,030 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 |
| | 8' | 7,265 | 7,550 | 7,715 | 10,900 | 11,325 | 11,570 | 14,535 | 15,100 | 15,425 | 26,650 | 28,490 | 29,555 | 35,530 | 37,985 | 39,410 | 40,000 | 40,000 | 40,000 | 40,000 |
| | 9' | 6,115 | 6,320 | 6,440 | 9,170 | 9,480 | 9,660 | 12,225 | 12,640 | 12,880 | 23,475 | 24,835 | 25,620 | 31,300 | 33,115 | 34,165 | 40,000 | 40,000 | 40,000 | 40,000 |
| | 10' | 5,200 | 5,355 | 5,445 | 7,800 | 8,035 | 8,170 | 10,400 | 10,715 | 10,895 | 20,660 | 21,695 | 22,290 | 27,545 | 28,925 | 29,725 | 40,000 | 40,000 | 40,000 | 40,000 |
| | 12' | 3,885 | 3,980 | 4,030 | 5,825 | 5,965 | 6,050 | 7,765 | 7,955 | 8,065 | 16,160 | 16,805 | 17,175 | 21,545 | 22,405 | 22,900 | 40,000 | 40,000 | 40,000 | 40,000 |
| | 14' | 3,000 | 3,065 | 3,100 | 4,500 | 4,595 | 4,645 | 6,005 | 6,125 | 6,195 | 12,890 | 13,315 | 13,560 | 17,185 | 17,755 | 18,080 | 34,155 | 35,785 | 36,720 | 36,720 |
| | 16' | | | | | | | | | | 10,480 | 10,775 | 10,950 | 13,970 | 14,370 | 14,595 | 28,485 | 29,640 | 30,300 | 30,300 |
| | 18' | | | | | | | | | | 8,670 | 8,885 | 9,010 | 11,560 | 11,850 | 12,010 | 24,020 | 24,860 | 25,345 | 25,345 |
| | 20' | | | | | | | | | | 7,285 | 7,445 | 7,535 | 9,710 | 9,925 | 10,050 | 20,475 | 21,110 | 21,475 | 21,475 |
| | 22' | | | | | | | | | | | | | | | | 17,630 | 18,125 | 18,405 | 18,405 |
| | 24' | | | | | | | | | | | | | | | | 15,325 | 15,715 | 15,935 | 15,935 |
| | | | | | | | | | | | | | | | | | Slenderness ratio exceeds 50 | | | |

General Notes

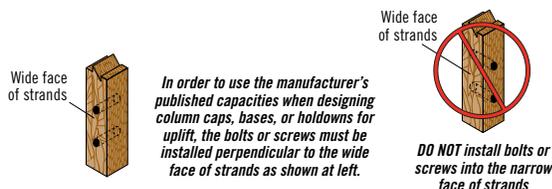
- Tables are based on:
 - Solid, one-piece column members used in dry-service conditions.
 - Bracing in both directions at column ends.
 - NDS®.
 - Simple columns with axial loads only. For side loads or other combined bending and axial loads, see the NDS®.
- Allowable loads have been adjusted to accommodate the worst case of the following eccentric conditions: ¼ of column thickness (first dimension) or ¼ of column width.
- Beams and columns must remain straight to within $\frac{5L}{4608}$ (in.) of true alignment. L is the unrestrained length of the member in feet.

For column allowable design stresses see page 5.

Top or Bottom Plate Connection



The column and connector values listed are for dry-service conditions ONLY. When wet-service conditions exist, contact your Weyerhaeuser representative for other product solutions.

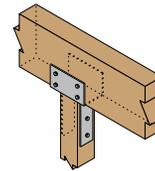


COLUMNS

Column Caps for TimberStrand® LSL and Parallam® PSL

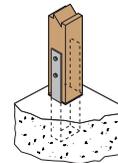
| Column Product | Beam Width | Column Size | Location on Beam | Simpson Strong-Tie® | | USP Structural Connectors® | | |
|------------------------------|-----------------|-----------------|------------------|---------------------|------------|----------------------------|------------|--------|
| | | | | Connector | Load (lbs) | Connector | Load (lbs) | |
| 1.3E TimberStrand® LSL | 3 1/2" | 3 1/2" x 3 1/2" | End | ECC44 | 7,655 | KECC44 | 12,030 | |
| | | | Intermediate | CC44 | 15,310 | KCC44 | 15,315 | |
| | | 3 1/2" x 5 1/2" | End | ECC46 | 12,030 | KECC46 | 18,595 | |
| | | | Intermediate | CC46 | 24,060 | KCC46 | 24,065 | |
| | | 3 1/2" x 7 1/4" | End | ECC48 | 16,405 | KECC48 | 20,780 | |
| | | | Intermediate | CC48 | 24,060 | KCC48 | 24,065 | |
| 1.8E Parallam® PSL | 3 1/2" | 3 1/2" x 3 1/2" | End | ECC44 | 7,655 | KECC44 | 12,030 | |
| | | | Intermediate | CC44 | 15,310 | KCC44 | 15,315 | |
| | | 3 1/2" x 5 1/2" | End | ECC46 | 12,030 | KECC45 | 16,405 | |
| | | | Intermediate | CC46 | 24,060 | KCC45 | 24,065 | |
| | | 5 1/4" | 5 1/4" x 3 1/2" | End | ECC64 | 12,030 | KECC64 | 25,780 |
| | | | | Intermediate | CC64 | 28,586 | KCC64 | 37,815 |
| | 5 1/4" x 5 1/2" | | End | ECC66 | 18,905 | KECC66 | 25,780 | |
| | | | Intermediate | CC66 | 30,250 | KCC66 | 37,815 | |
| | 5 1/4" x 7" | End | ECC6-7 1/2 | 24,060 | KECC57 | 31,170 | | |
| | | Intermediate | CC6-7 1/2 | 37,810 | KCC57 | 36,095 | | |
| | 7" | 7" x 3 1/2" | End | ECC7 1/2-4 | 18,375 | - | - | |
| | | | Intermediate | CC7 1/2-4 | 34,736 | - | - | |
| | | 7" x 5 1/2" | End | ECC7 1/2-6 | 28,875 | KECC75X | 45,940 | |
| | | | Intermediate | CC7 1/2-6 | 58,500 | KCC75X | 56,875 | |
| | | 7" x 7" | End | ECC7 1/2-7 1/2 | 36,750 | KECC77X | 45,940 | |
| | | | Intermediate | CC7 1/2-7 1/2 | 57,750 | KCC77X | 56,875 | |

Beam on Column Cap



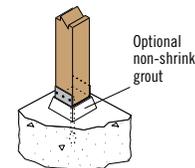
P1

Column Base



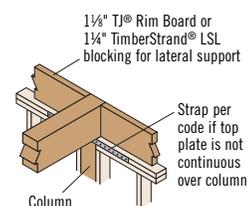
P2

Elevated Column Base



P3

Beam on Column



L1

Column Bases for TimberStrand® LSL and Parallam® PSL

| Column Product | Column Size | Simpson Strong-Tie® | | USP Structural Connectors® | |
|------------------------------|-----------------|---------------------|--------------------------|----------------------------|--------------------------|
| | | Connector | Load (lbs) | Connector | Load (lbs) |
| 1.3E TimberStrand® LSL | 3 1/2" x 3 1/2" | ABA44Z | 6,000 | PA44 | 5,135 |
| | | LCB44 | Post or concrete control | PAU44 | 6,775 |
| | | | | CBSQ44-TZ | 6,775 |
| | 3 1/2" x 5 1/2" | ABA46 | 9,435 | KCB44 | Post or concrete control |
| | | LCB46 | Post or concrete control | PA46 | 6,285 |
| | | CB48 | Post or concrete control | KCB46 | Post or concrete control |
| 1.8E Parallam® PSL | 3 1/2" x 3 1/2" | LCB44 | Post or concrete control | CBE44 | Post or concrete control |
| | | LCB46 | | KCB44 | |
| | 3 1/2" x 5 1/2" | LCB46 | | CBE46 | |
| | | | | KCB45 | |
| | 3 1/2" x 7" | CB7 1/2-4 | | KCB47 | |
| | | | | KCB74 | |
| | 5 1/4" x 5 1/2" | LCB66 | | CBE66 | |
| | | | | KCB66 | |
| 5 1/4" x 7" | CB6-7 | KCB76 | | | |
| | CB7 1/2-6 | | | | |
| 7" x 7" | CB7 1/2-7 | KCB77 | | | |
| | | | | | |

General Notes

- Capacities shown cannot be adjusted for duration of load.
- Connector capacities assume a beam material with a minimum perpendicular-to-grain bearing of 625 psi.
- Connector capacities may be more than the column capacity; therefore, check both the connector and the column capacity and use the lower capacity.
- Other connectors may be available. Capacities may vary depending on orientation of member. Contact the hanger manufacturer for more information.



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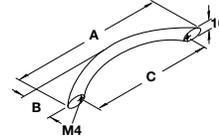
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Steel Handles



Black nickel-plated

| A x B | Dimension C | Cat. No. |
|----------|-------------|------------|
| 115 x 30 | 96 | 117.31.920 |
| 153 x 30 | 128 | 117.31.936 |
| 190 x 32 | 160 | 117.31.940 |
| 221 x 36 | 192 | 117.31.954 |
| 324 x 40 | 288 | 117.31.972 |
| 394 x 41 | 352 | 117.31.980 |

Packing: 10 & 25 pcs.*



Chrome polished

| A x B | Dimension C | Cat. No. |
|----------|-------------|------------|
| 115 x 30 | 96 | 117.31.221 |
| 153 x 30 | 128 | 117.31.230 |
| 190 x 32 | 160 | 117.31.249 |
| 221 x 36 | 192 | 117.31.258 |
| 324 x 40 | 288 | 117.31.276 |
| 394 x 41 | 352 | 117.31.285 |

Packing: 10 & 25 pcs.*



New Item
Dark oil-rubbed bronze

| A x B | C | Item No. |
|----------|-----|------------|
| 115 x 30 | 96 | 117.31.323 |
| 153 x 30 | 128 | 117.31.333 |
| 190 x 32 | 160 | 117.31.343 |
| 221 x 36 | 192 | 117.31.353 |
| 324 x 40 | 288 | 117.31.373 |

Packing: 10 and 25 pcs.*



New Item
Satin brass

| A x B | C | Item No. |
|----------|-----|------------|
| 115 x 30 | 96 | 117.31.525 |
| 153 x 30 | 128 | 117.31.535 |
| 190 x 32 | 160 | 117.31.545 |
| 221 x 36 | 192 | 117.31.555 |
| 324 x 40 | 288 | 117.31.575 |

Packing: 10 and 25 pcs.*



Chrome matt

| A x B | Dimension C | Cat. No. |
|----------|-------------|------------|
| 115 x 30 | 96 | 117.31.427 |
| 153 x 30 | 128 | 117.31.436 |
| 221 x 36 | 192 | 117.31.454 |
| 324 x 40 | 288 | 117.31.472 |

Packing: 10 & 25 pcs.*

*96 mm and 128 mm are packed 25 pcs.
All others are 10 pcs.

Dimensional data not binding. We reserve the right to alter specifications without notice.



M4 screws

page 309

Dimensions in mm
Inches are approximate

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154



SEKTION

Base cab f cooktop/drawer+2 doors, white
Förvara, Häggeby white

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Cabinet number:: SE CT2D1E

FÖRVARA drawer can be pulled out to ¾ of its total depth and has plenty of storage space. [Read more](#)

Frame color

white

Front

Häggeby white

Size

30x24x30 "

Type of drawer

Fö

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Frame color



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SEKTION

Wall cabinet with 2 doors, white, Höggeby white

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The price reflects selected options

Article Number: 590.344.56

Cabinet number:: SE W2D

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Frame color

white

Front

Höggeby white

Size

24x15x30 "

1

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[View the tip-over restraint assembly instructions for chest of drawers](#)

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Frame color

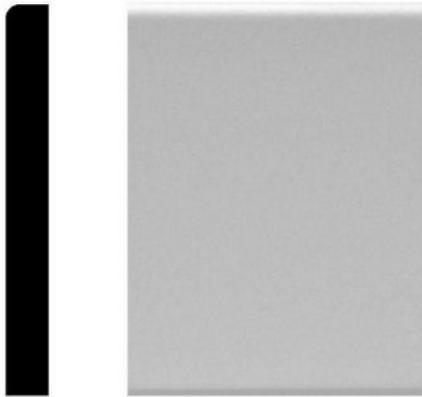


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1/2 in. x 4-1/4 in. x 96 in. MDF Primed Base Moulding

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PRODUCT OVERVIEW Model # 8807 | Internet # 204318363

The House of Fara 1/2 in. x 4-1/4 in. x 8 ft. MDF Primed Base Moulding will add a clean smooth contemporary look to any room. It's constructed from primed MDF and is ready for painting to match your existing decor. This wide profile baseboard moulding is economical and will add a unique detail and an architectural touch to any room or project. California residents: see [Proposition 65 information](#)

- Clean smooth contemporary look
- Primed MDF
- Wide profile
- Economical

Info & Guides

Installation Guide

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07 21 00



Technical Product Information



ROOF & DECK INSULATION 07220*

MINERAL BOARD INSULATION
07 21 13**

ROOF INSULATION 07 22 00**

General Product Information:

ROXUL® products are mineral wool fiber 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 mineral wool is a water repellent yet vapor permeable material.

Description & Common Applications:

ROXUL MONOBOARD® Plus is a rigid, single density, dimensionally stable, mineral wool insulation board coated with a top layer of bitumen; compatible with torch, hot, cold applied and fully adhered roof systems. It is intended for commercial and industrial roofs and is suitable for new roof, re-roof and re-cover applications as an insulation coverboard.

Compliance and Performance:

| | | |
|-------------------|---|-------------|
| ASTM C726 | Standard Specification for Mineral Fiber Roof Insulation Boards | Complies*** |
| FM Approvals 4470 | Approval Standard for Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction | Complies |
| FM Approvals 4470 | NCC – (Noncombustible Core) Rated Roof Insulation | Complies |

Fire Performance:

| | | |
|---------------------|---|---|
| NFPA 276 | Standard Method of Fire Tests for Determining the Heat Release Rate of Roofing Assemblies with Combustible Above-Deck Roofing Components | Class 1 |
| CAN4 S114 | Test for Non-Combustibility | Non-Combustible |
| CAN/ULC-S107-03 | Fire Tests of Roof Coverings | Class A |
| CAN/ULC-S126-06 | Fire Spread Under Roof Deck Assemblies | Construction C7, C18, C28, C38 |
| ASTM E 84 (UL 723) | Surface Burning Characteristics*** | Flame Spread = 0 Smoke Developed = 0 |
| CAN/ULC S102 | Surface Burning Characteristics*** | Flame Spread = 0 Smoke Developed = 0 |
| UL 790 (ASTM E 108) | Standard Test Methods for Fire Tests of Roof Coverings See UL Roofing and Materials Directory for Assembly Details | Class A |
| UL 263 (ASTM E 119) | Fire Tests of Building Construction and Materials See UL Fire Resistance Directory at the following link for assembly details: http://database.ul.com/cgi-bin/XYV/template/LISCANADA/1FRAME/index.html P004, P213, P214, P225, P228, P230, P237, P238, P242, P245, P250, P254, P259, P404, P409, P501, P502, P504, P506, P508, P510, P512, P514, P701, P708, P710, P711, P718, P729, P732, P734, P735, P737, P740, P801, P810, P815, P828, P904, P909, P912, P915. | |

Dimensional Stability:

| | | |
|-------------|--|-------|
| ASTM C 356 | Linear Shrinkage 24 Hrs. @ 1200°F (650°C) | 1.1 % |
| ASTM D 2126 | Linear change 7 days @ 40°F (-40°C) ambient RH | 0.0 % |
| | Linear change 7 days @ 200°F (93°C) ambient RH | 0.1 % |
| | Linear change 7 days @ 158°F (70°C) 97% RH | 0.1 % |

Hail Performance:

| | | |
|---------|---|----------------------------|
| FM 4470 | Test Standard for Susceptibility to Hail Damage | Class 1 – SH (Severe Hail) |
| FM 4473 | Impact Resistance by Impacting with Freezer Ice Balls | Class 4 |
| UL 2218 | Impact Resistance of Prepared Roof Covering Materials | Class 4 |

Moisture Resistance:

| | | |
|-------------|--|---------------------------------------|
| ASTM C 1104 | Water Vapor Sorption | 0.29 % |
| ASTM E 96 | Water Vapor Transmission, Desiccant Method | 2360 ng/Pa.s.m ² (41 Perm) |
| ASTM C 209 | Water Absorption | <1.0 % |

Thermal Resistance:

| | | | |
|--------------------|--------------------|------------------------------------|------------------------------|
| ASTM C 518 (C 177) | Mean Temperature | R-value | RSI value |
| | 25°F (-4°C) | 4.4 hr.ft ² .F/Btu | 0.77 m ² K/W |
| | 40°F (4°C) | 4.3 hr.ft ² .F/Btu | 0.75 m ² K/W |
| | 75°F (24°C) | 4.0 hr.ft².F/Btu | 0.70 m²K/W |
| | 110°F (43°C) | 3.7 hr.ft ² .F/Btu | 0.66 m ² K/W |

*MASTER FORMAT 1995 EDITION **MASTER FORMAT 2004 EDITION *** all tests based on uncoated mineral wool

ROXUL
MonoBoard Plus

Corrosive Resistance:

| | | |
|-----------------|---|---------------|
| ASTM C 665 | Corrosiveness to Steel | Non-corrosive |
| ASTM C 795 **** | Stainless Steel Stress Corrosion Specification as per Test Methods C871 and C692: U.S. Nuclear Regulatory Commission, Reg. Guide #1.36: U.S. Military Specifications MIL-I-24244 (all versions including B and C) | Non-corrosive |

Acoustical Performance:

| ASTM C 423 | | CO-EFFICIENTS AT FREQUENCIES | | | | | |
|------------|--------|------------------------------|--------|---------|---------|---------|------|
| Thickness | 125 Hz | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | 4000 Hz | NRC |
| 1.0" | 0.13 | 0.49 | 0.85 | 0.89 | 0.89 | 0.97 | 0.80 |

Compressive Strength:

| | | | |
|----------------|--------|--------|-----------|
| ASTM C 165 | at 10% | 12 psi | (85 kPa) |
| (1" thickness) | at 25% | 28 psi | (190 kPa) |

Density:

ASTM C 612-09 – Actual 12.5 lb/ft³ 200 kg/m³

Dimensions:

48" (width) x 48" (length)
1219 mm (width) x 1219 mm (length)

Thickness:

nominal 1 inch - actual 1.04" inch (26.5 mm)

Key Application Qualifiers:

- Will not promote blistering
- Does not off gas
- Will not warp or cup
- Dimensionally stable
- High impact resistance
- Low moisture sorption
- Non-corrosive
- Long term stable R-value
- Noncombustible
- Excellent acoustical properties
- Made from natural & recycled materials

Limitations:

This product should not be exposed to inclement weather during shipment, storage or installation. At the completion of a day's work, all exposed edges should be temporarily sealed by lapping roof membrane over them. The products are not intended for use as a structural roof deck or for use under heavy traffic areas.

On-Site Storage:

The factory packaging is intended for the protection of the insulation boards during transit and is not intended for job site protection against the elements. When product is stored outdoors, the plastic shroud must be slit and the insulation protected by a waterproof, breathable covering such as a tarpaulin. Insulation must be stored minimum 4 in. (102 mm) above ground and kept on a solid flat surface.

Other ROXUL Products:

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.

**** "Provisions for lot testing may be required, consult manufacturer."

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.
www.roxul.com

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Revised: April 08, 2013
Supersedes: March 14, 2012



Technical Product Information



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:

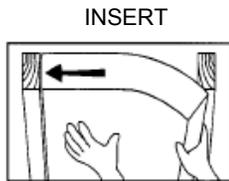
ASTM C 665
ASTM E 136
ASTM E 84

Mineral Fiber Blanket Insulation
Determination of Non-Combustibility
Surface Burning Characteristics

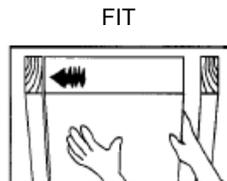
Type 1, Complies
Non-Combustible
Flame Spread = 0
Smoke Developed = 0

Installation:

The flexible edge is identified by the marking.



Place COMFORTBATT into opening, flexible edge against stud



Compress COMFORTBATT edge and fit batt



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



07 21 00

ROXUL Thermal Home Insulation

Dimensions:

| | Wood Stud | | Steel Stud |
|------------|---|--------------|---|
| R15 | 15.25" x 47" x 3.5" (387 mm x 1194 mm x 89 mm) | R10 | 16.25" x 48" x 2.5" (413 mm x 1219 mm x 64 mm) |
| | 23" x 47" x 3.5" (584 mm x 1194 mm x 89 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) | R15 | 16.25" x 48" x 3.5" (413 mm x 1219 mm x 89 mm) |
| | 23" x 47" x 5.5" (584 mm x 1194 mm x 140 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) | R22.5 | 16.25" x 48" x 6" (413 mm x 1219 mm x 152 mm) |
| | 23" x 47" x 7.25" (584 mm x 1194 mm x 184 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/m ² |
| 3.5" (89 mm) | > 2.8 kg/m ² |
| 5.5" (140 mm) | > 4.8 kg/m ² |
| 6.0" (150 mm) | > 4.8 kg/m ² |
| 7.25" (184 mm) | > 5.9 kg/m ² |

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.

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Revised: 26 June, 2013
Supersedes: 10 April, 2013



ROXUL® Insulation.

Insulation for an Energy Efficient,
Quiet & Safe Home



Fire
Resistant



Water
Repellent



Made
from Stone

ROXUL®
The Better Insulation™



072100

A global leader

ROXUL Inc. is part of ROCKWOOL International, the world's largest producer of stone wool insulation – a material that improves the quality of life for millions of people. ROCKWOOL operates **21 factories** on **3 continents**. In North America, ROXUL is the leading manufacturer of stone wool insulation products.

ROXUL's unique thermal insulation products provide indoor comfort in summer and winter, and help reduce heating and cooling costs. Those energy savings also translate into reduced CO₂ emissions.

The choice of professionals

Many contractors and homeowners insist on **ROXUL'S COMFORTBATT®** and **SAFE'N'SOUND®** residential products for the **advantages they offer over conventional insulations**. ROXUL also produces the insulation products used in some of the most demanding commercial building projects and industrial environments. That includes the insulation used to **reduce the noise levels inside** major airports, and the fire-resistant insulation used to protect commercial apartments and office buildings – and the people who occupy them.

Insulation that's planet-friendly



ROXUL is a member of the U.S. Green Building Council (USGBC) representing environmental responsibility & sustainability.



ROXUL insulation has received GreenGuard's most stringent certification for indoor air quality.



CFC- and HCFC-free, so they don't deplete the earth's protective ozone layer.

The ROXUL® difference

ROXUL COMFORTBATT® and SAFE'N'SOUND® offer far more than conventional insulations. Don't settle for anything less when you build or renovate:



Fire Resistant

In the event of a fire, every second counts. ROXUL insulation helps protect you and your family by delaying the spread of fire. Made from stone, ROXUL products can withstand temperatures up to 2150°F.



Water Repellent

ROXUL insulation repels water, so R-value is not affected. It is also completely resistant to rot, mildew, mold, and bacterial growth – contributing to a safer indoor environment in your home.



Made from Stone

ROXUL insulation is made from natural stone and recycled material. Its non-directional fiber structure and higher density give it better dimensional stability and make it an effective barrier against noise.

Insulate to save energy

An energy efficient house is a better home. With ROXUL COMFORTBATT® insulation, it's also a more comfortable living environment for you and your family. ROXUL COMFORTBATT helps keep the outside outside, to keep your home warm in the winter, and cool in the summer. That also translates into reduced heating and air conditioning costs – and a house that is easier on the environment.

R-value is the measurement of an insulation's ability to prevent heat flow. The higher the R-value, the more insulating power it provides. ROXUL COMFORTBATT is available in R15 and R23 to deliver top thermal performance. Additionally, while moisture significantly reduces the R-value of many other popular insulation materials, ROXUL COMFORTBATT does not store or transfer moisture so the R-value you install will remain the same year after year.

Insulate for a quiet home

Nothing beats the tranquility of a quiet home – and that's exactly what ROXUL SAFE'N'SOUND® provides. It's an innovative, high density insulation that's specifically designed to absorb sound and reduce noise from traveling from one room to another. Unlike thermal insulation, ROXUL SAFE'N'SOUND is used for soundproofing interior walls and for ceilings between rooms. Made from stone wool, ROXUL SAFE'N'SOUND reduces sound transmission by trapping sound waves and vibrations in the thousands of tiny interconnected spaces created by its unique fiber structure.

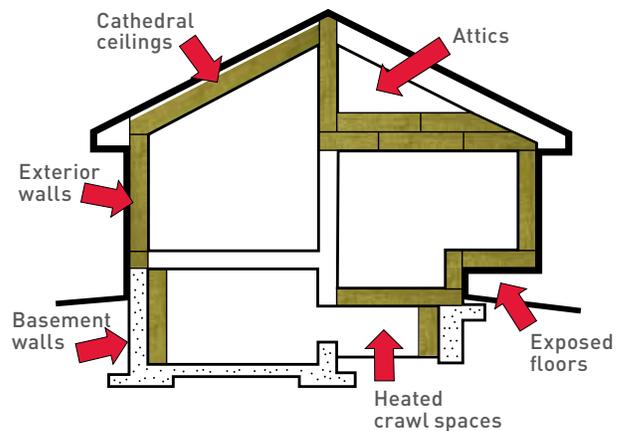
A safer home

ROXUL SAFE'N'SOUND is made from stone, so it provides an extra barrier of safety – fire resistance. In the event of a house fire, it helps slow the spread, and can provide precious extra minutes for a safe escape.



Maximize the comfort

ROXUL COMFORTBATT® installed in **exterior walls** is a great way to **save energy**, but there are other applications that can make a big difference in your home's comfort. Insulating the **exposed concrete walls** in basements and **heated crawl spaces**, as well as increasing the insulation in your **attic** are all effective ways to improve your home's **energy efficiency**.



Vapor barrier or no vapor barrier?

If you live in the Northern half of the US, chances are that a vapor barrier is required to control vapor transmission and minimize condensation in walls and ceilings. While many professional contractors feel that polyethylene is the best choice, you should always consult local building codes when determining whether or not to install a vapor barrier and if so, what product may be best to use.

For technical support email us at or contact us at www.ROXUL.com or by phone at 1-800-265-6878.

ROXUL

ComfortBatt

Thermal Home Insulation

Also available
in steel stud sizes.
Ask your retailer
for details

R15 - 16" ON CENTER

Covers: 59.7 ft² (5.55 m²)
Length: 47 in. (1194 mm)
Width: 15¹/₄ in. (387 mm)
Thickness: 3¹/₂ in. (89 mm)

12 BATTS



R15 - 24" ON CENTER

Covers: 60.1 ft² (5.58 m²)
Length: 47 in. (1194 mm)
Width: 23 in. (584 mm)
Thickness: 3¹/₂ in. (89 mm)

8 BATTS



R23 - 16" ON CENTER

Covers: 39.8 ft² (3.70 m²)
Length: 47 in. (1194 mm)
Width: 15¹/₄ in. (387 mm)
Thickness: 5¹/₂ in. (140 mm)

8 BATTS



R23 - 24" ON CENTER

Covers: 37.5 ft² (3.48 m²)
Length: 47 in. (1194 mm)
Width: 23 in. (584 mm)
Thickness: 5¹/₂ in. (140 mm)

5 BATTS



R30 - 16" ON CENTER

Covers: 29.9 ft² (2.78 m²)
Length: 47 in. (1194 mm)
Width: 15¹/₄ in. (387 mm)
Thickness: 7¹/₄ in. (184 mm)

6 BATTS



R30 - 24" ON CENTER

Covers: 30.0 ft² (2.87 m²)
Length: 47 in. (1194 mm)
Width: 23 in. (584 mm)
Thickness: 7¹/₄ in. (184 mm)

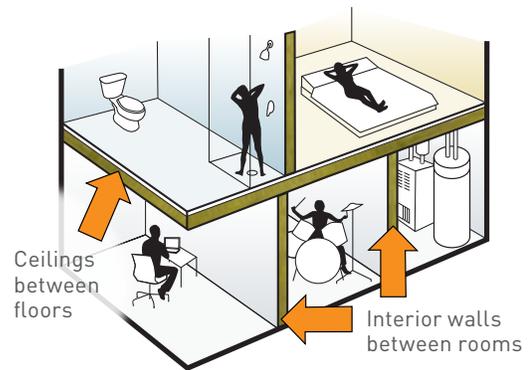
4 BATTS



COMFORTBATT® is a registered trademark of ROXUL Inc.

Maximize the peace & quiet

Installing ROXUL SAFE 'N' SOUND® inside interior walls, and in ceilings between floors is a great way to reduce sound transmission and improve fire resistance. ROXUL SAFE 'N' SOUND's stonewool composition and high density make it an ideal choice for soundproofing applications.



Typical applications include:

- Bedrooms
- Bathrooms
- Home Offices
- Home Theater Rooms
- Basements
- Furnace/Laundry Rooms



When it comes to home theaters and media rooms, ROXUL SAFE 'N' SOUND delivers **excellent sound absorption** within the wall cavity.

ROXUL

Safen'Sound®

Fire & Soundproofing Insulation

16" – WOOD ON CENTER

Covers: 59.7 ft² (5.55 m²)
Length: 47 in. (1194 mm)
Width: 15^{1/4} in. (387 mm)
Thickness: 3 in. (76 mm)

12 BATTS



24" – WOOD ON CENTER

Covers: 60.1 ft² (5.58 m²)
Length: 47 in. (1194 mm)
Width: 23 in. (584 mm)
Thickness: 3 in. (76 mm)

8 BATTS



16" – STEEL ON CENTER

Covers: 64.0 ft² (5.95 m²)
Length: 48 in. (1219 mm)
Width: 16^{1/4} in. (413 mm)
Thickness: 3 in. (76 mm)

12 BATTS



24" – STEEL ON CENTER

Covers: 64.0 ft² (5.95 m²)
Length: 48 in. (1219 mm)
Width: 24^{1/4} in. (584 mm)
Thickness: 3 in. (76 mm)

8 BATTS



SAFE 'N'SOUND® is a registered trademark used under license by Masonite Inc.

Easy to install

Working with ROXUL insulation is a breeze.



It **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.



Insert. Compress. Release.

Those three simple steps are all it takes to get a snug fit. That great fit is one of the reasons **ROXUL COMFORTBATT®** delivers **maximum R-value and energy savings**, and why **ROXUL SAFE 'N'SOUND®** is so effective at bringing **peace and quiet** to your home. Unlike some conventional insulation, **ROXUL won't slump or settle** inside your walls over time.



Conventional Insulation



ROXUL Insulation

Insist on ROXUL for your next renovation project. It's available at quality building supply retailers near you.

For additional information, visit www.ROXUL.com

ROXUL®
The Better Insulation™



420 Bronte Street South
Suite 105, Milton, Ontario L9T 0H9
Tel: 1-800-265-6878 or 905-878-8474

ROX2598_0913



07 21 00

ROXUL®

The Better Insulation™

Technical Product Information



BOARD INSULATION 07210*
BOARD INSULATION 07 21 13**

General Product Information:

ROXUL® products are mineral wool fibre 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 mineral wool is a water repellent yet vapour permeable material.

Description & Common Applications:

The COMFORTBOARD™ IS product is a rigid mineral wool insulation sheathing board that is non-combustible, water repellent, fire resistant and sound absorbent. This product is an exterior non-structural insulation sheathing board for high performance residential wall systems.

Compliance and Performance:

ASTM C 612 Mineral Fiber Block and Board Thermal Insulation
CAN/ULC-S702 Mineral Fibre Thermal Insulation for Buildings
CCMC Evaluation Listing

Type IVB, Complies
Type 1, Complies
13573-L

Fire Performance:

ASTM E 136 Behaviour of Materials at 750°C (1382°F)
CAN/ULC-S114 Test for Non-Combustibility
ASTM E 84 (UL 723) Surface Burning Characteristics

CAN/ULC-S102 Surface Burning Characteristics

Non-Combustible
Non-Combustible
Flame Spread = 0
Smoke Developed = 0
Flame Spread = 0
Smoke Developed = 0

Moisture Resistance:

ASTM C 1104 Moisture Sorption

0.05 %

Water Vapour Permeance:

ASTM E 96 Water Vapour Transmission, Desiccant Method

1768 ng/Pa.s.m² (31 perm)

Fungi Resistance:

ASTM C 1338 Determination of Fungi Resistance

Passed

Thermal Resistance:

ASTM C 518 (C 177) R-value/inch @ 75°F
RSI value/25.4 mm @ 24°C

4.0 hr.ft².F/Btu
0.70 m²K/W

Corrosive Resistance:

ASTM C 665 Corrosiveness to Steel
ASTM C 795 **** Stainless Steel Stress Corrosion Specification as per Test Methods C871 and C692: U.S. Nuclear Regulatory Commission, Reg. Guide #1.36: U.S. Military Specifications MIL-I-24244 (all versions including B and C)

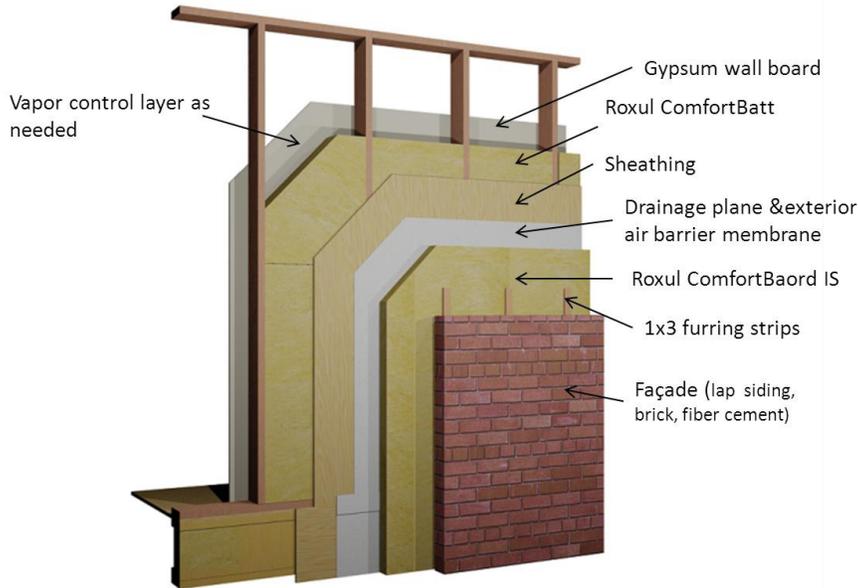
Non-corrosive
Non-corrosive

Acoustical Performance:

| ASTM C 423 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 | 0.94 | 1.00 | 1.00 | 0.90 |

*MASTER FORMAT 1995 EDITION **MASTER FORMAT 2004 EDITION

ROXUL
ComfortBoard IS
Residential Insulated Sheathing



Compressive Strength:

| | | |
|------------|---------|--------------------|
| ASTM C 165 | at 10 % | 745 psf (35.5 kPa) |
| | at 25 % | 1270 psf (61 kPa) |

Density:

| | | |
|------------------------|------------------------|-----------------------|
| ASTM C 612-00 – Actual | 8.0 lb/ft ³ | 128 kg/m ³ |
|------------------------|------------------------|-----------------------|

Dimensions:

24" (width) x 48" (length)
610 mm x 1219 mm

36" (width) x 48" (length)
610 mm x 1219 mm

48" (width) x 96" (length)
1219 mm x 2438 mm

Thickness:

Product is available in 1.25" 1.5" 2" 3"
For additional sizes, please contact our customer service representatives.

Note:

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Key Application Qualifiers:

- Good compressive strength
- Low moisture sorption
- Durability
- Fire resistance
- Excellent thermal resistance
- Non-corrosive
- Chemically inert
- CFC and HCFC free product and process
- Made from natural & recycled materials

Other ROXUL Products:

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.

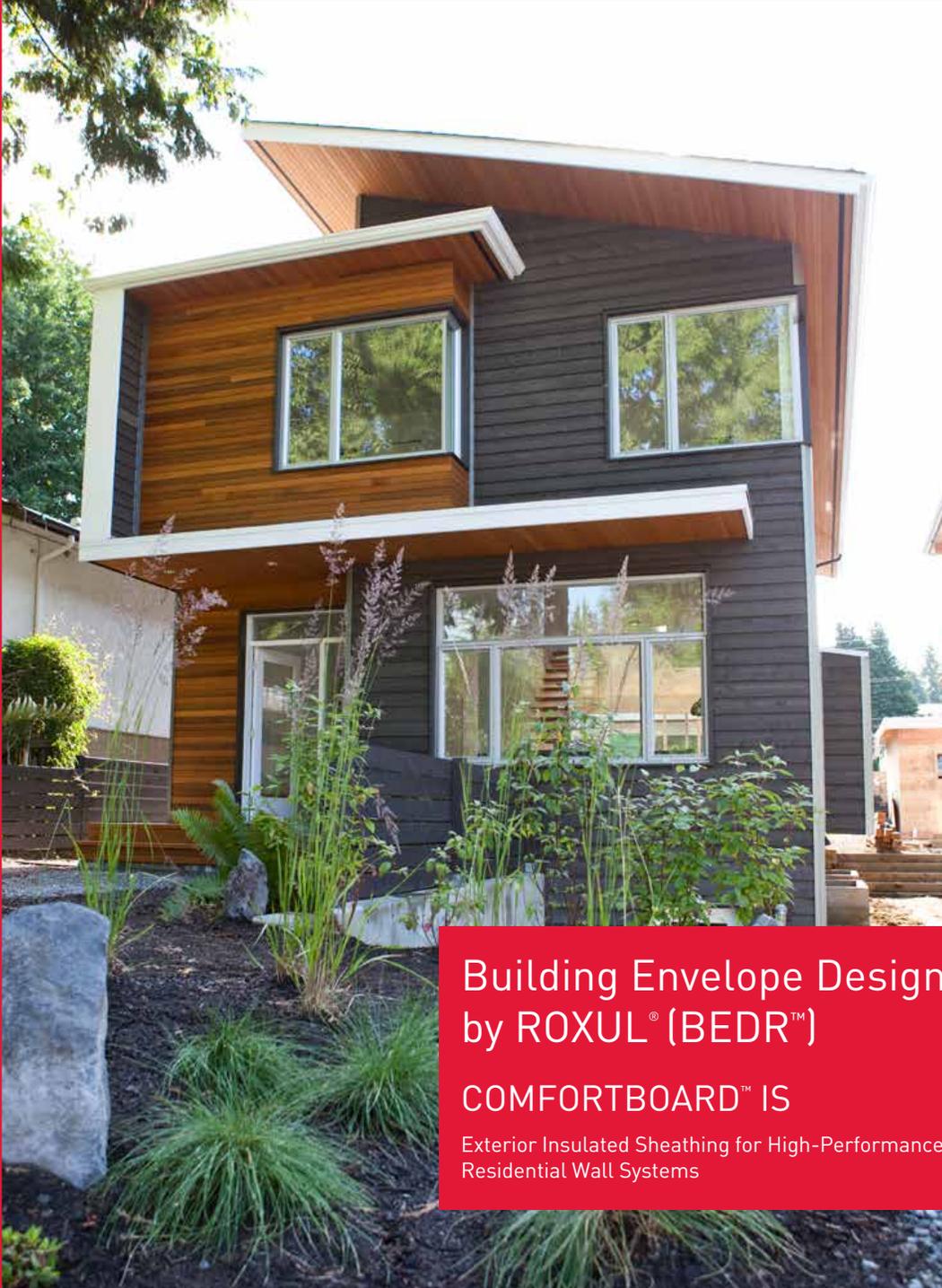
ROXUL INC.
www.roxul.com

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Revised: October 27, 2014
Replaces: July 04, 2013

BUILDING ENVELOPE DESIGN BY ROXUL®



Building Envelope Design by ROXUL® (BEDR™)

COMFORTBOARD™ IS

Exterior Insulated Sheathing for High-Performance
Residential Wall Systems

The Shore House
North Vancouver, BC, Canada



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:

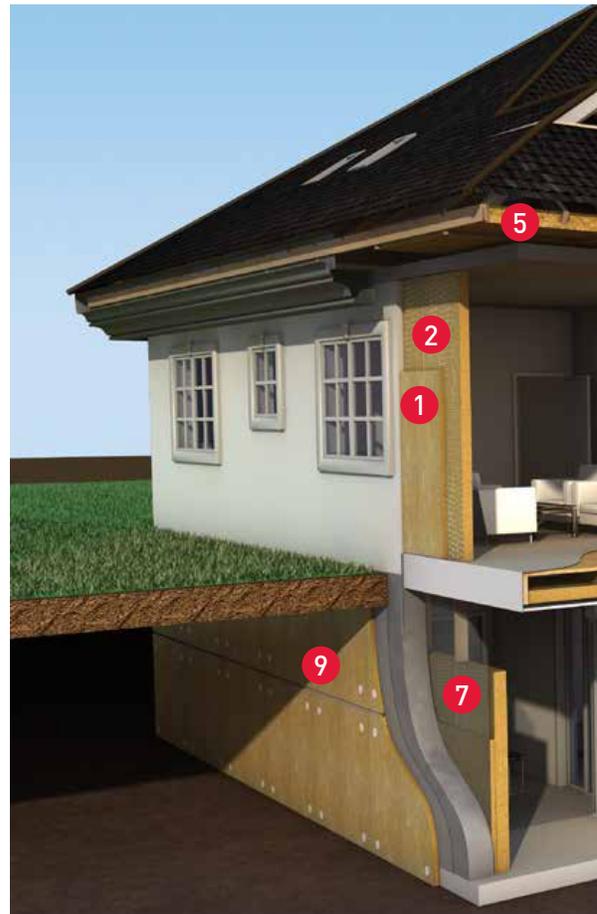
ROXUL COMFORTBOARD™ IS: Rigid stone wool insulation board fastened to outside studs to improve thermal performance to the building envelope.

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

BUILDING ENVELOPE DESIGN BY ROXUL®



7 Basement Wall – COMFORTBOARD™ IS (1.5") against the concrete wall (moisture barrier behind the COMFORTBOARD™ IS) with wood studs in front and COMFORTBATT™ R14/15 in the studs (basement system) therefore full height R20/21

8 SAFE'N'SOUND™ on interior partition and basement ceiling

9 DRAINBOARD® on exterior foundation wall below grade



ROXUL COMFORTBOARD™ IS

Superior Building Envelope Performance

As society demands more energy efficient buildings, codes and builders are responding by increasing the R-value of the building enclosure, in particular, the above-grade wall. Given that the cavity of the standard 2 x 6 wood frame wall used in low-rise housing is already filled with insulation, the clear path forward to higher R-values is to add layers of exterior insulation.

ROXUL COMFORTBOARD IS is a rigid stone wool insulation board fastened to the outside face of the exterior studs used in residential construction and designed to provide increased thermal performance to the building envelope. The stone wool-based insulation is made from natural stone with a minimum of 40% recycled content, which gives it thermal and fire-resistant properties that other insulations can't match.

As building codes adjust to increased effective R-value requirements, the need for insulated sheathing will increase accordingly, and ROXUL COMFORTBOARD IS leads the way as the exterior insulation of choice for residential applications.

Today, building codes are moving to mandate "effective R-values" vs. nominal – and insulated exterior wall sheathing will play a major role to help builders achieve this requirement. ROXUL COMFORTBOARD IS is the better sheathing insulation.



As an exterior insulation, ROXUL COMFORTBOARD IS is fastened to the exterior OSB/plywood sheathing or structural stud wall and is designed to provide increased thermal performance to the building envelope

BUILDING ENVELOPE DESIGN BY ROXUL®

Canada’s Highest Rated LEED®-Platinum Residence Built With ROXUL®



ROXUL Leads The Way

North Vancouver’s first LEED® for Homes project and the highest rated LEED-Platinum single family residence in Canada was built using both ROXUL stone wool COMFORTBOARD™ IS and COMFORTBATT on the building envelope.

Affectionately known as “Shore House”, this modern and green architectural home incorporates the latest in sustainable design, construction techniques and eco-friendly quality products. The combination creates a high-performance, energy-efficient home that reduces monthly utility bills, maintenance and energy costs and promises a higher re-sale value for the new owners.

To view this remarkable home, built using ROXUL COMFORTBOARD IS on the exterior and COMFORTBATT in the interior, visit www.theshorehouse.ca

LEED® for Homes Canada is a Green Building rating system that was established by the Canada Green Building Council. It is a third-party certification that is unbiased and confirms a Homebuilder’s best building practices.



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 $10^{-4} \text{ m/m}^\circ\text{C}$ | 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.

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 (SBP) | 0.00 | 0.00 | 0.00 | 0.00 |
| Oriented Strand Board | 83.25 | 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 (SBP) | 0.00 | 0.00 | 0.00 | 0.01 |
| Oriented Strand Board | 83.25 | 90.99 | 49.79 | 95.28 |
| ROXUL COMFORTBATT | 0.07 | 0.05 | 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

| Thickness | ASTM C423 CO-EFFICIENTS AT FREQUENCIES | | | | | | NRC |
|-----------|---|--------|--------|---------|---------|---------|------|
| | 125 Hz | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | 4000 Hz | |
| 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 | 0.94 | 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 COMFORTBOARD™ IS

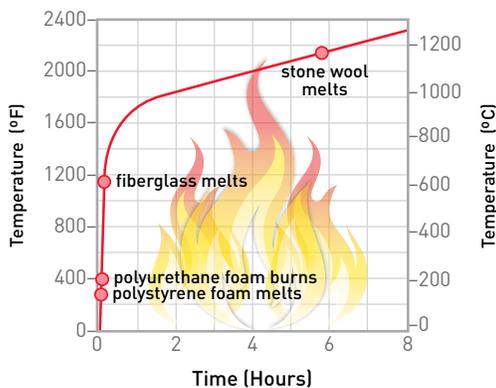
ROXUL® Stone Wool: Fire-Resistant, Non-Combustible Insulation

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.

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.

Temperature Development in a Standard Fire (ASTM E119)



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 |

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™ | | COMFORTBATT™ | | COMFORTBATT™ | | COMFORTBATT™ | | |
|---|------------------------------|---------------|-------|---------------|-------|---------------|-------|---------------|-------|-------------------|
| | | 16" On Center | | 24" On Center | | 16" On Center | | 24" On Center | | |
| | | 3.5" | | 3.5" | | 5.5" | | 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 | 21.14 | 21.84 | 21.77 | 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.



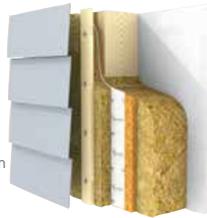
ROXUL COMFORTBOARD™ IS

The ROXUL® BEDR™ Wall System: Applications and Installation

BEDR™ Wall Applications (Outside Wall to Interior Wall)

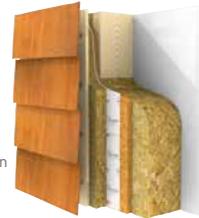
Vinyl Wall Components

- 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



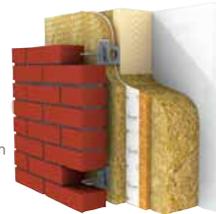
Wood Fiber Wall Components

- 1 Wood Lay 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
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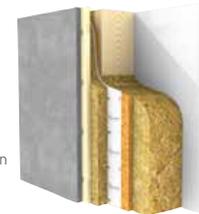
Brick Wall Components

- 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.

BUILDING ENVELOPE DESIGN BY ROXUL®

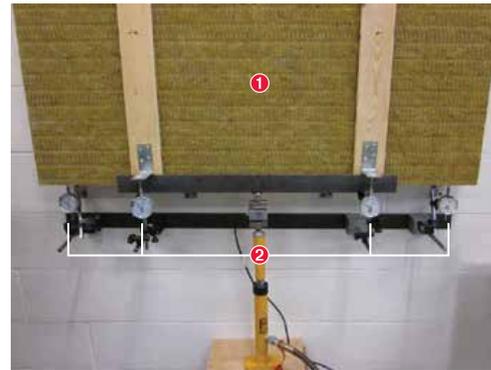
ROXUL COMFORTBOARD™ IS: Superior Cladding Load Performance

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 gauges 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 | 1 st Loading [inches] | 2 nd Loading [inches] | 3 rd Loading [inches] | Vinyl Siding [1 PSF] | Fiber Cement Siding [4 PSF] |
| 1 | 1 1/4" COMFORTBOARD™ IS, #8 3" screws, all embedded in framing | .034 | .018 | 0.19 | <0.01 | <0.01 |
| 2 | 1 1/4" COMFORTBOARD™ IS, #8 3" screws, none embedded in framing | .050 | .026 | .026 | <0.01 | <0.01 |
| 3 | 1 1/4" COMFORTBOARD™ IS, #8 3" screws, embedded in top & bottom plate | 0.90 | 0.36 | .032 | <0.01 | <0.01 |
| 4 | 1 1/4" COMFORTBOARD™ IS, #10 3" screws, all embedded in framing | .030 | .016 | .016 | <0.01 | <0.01 |
| 5 | 1 1/4" 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 COMFORTBOARD™ IS



A Global Leader

ROXUL Inc. is part of Rockwool International, the largest producer of stone wool insulation, which is made from natural basalt rock and recycled material.

Rockwool International was founded in 1909 and today operates worldwide with more than 8,500 employees, with 27 factories across three continents.

Rockwool has more than 40 years experience in developing and manufacturing advanced wall system products. For 25 years, ROXUL has been serving the North American market.

In addition to exterior board insulation for residential construction, ROXUL also manufactures a range of other premium insulation products for multiple applications.

ROXUL is the Better Insulation

ROXUL COMFORTBATT™ and COMFORTBOARD™ IS are innovative insulation products offering a world of green features. When ROXUL is the specified insulation, green building developers can earn a variety of LEED® (Leadership in Energy and Environmental Design) points across four key construction categories toward sustainable development.

Environmentally Sustainable

Our stone wool production process utilizes some of the most advanced technology available. The ROXUL facility is designed to capture and recycle rainwater, reduce energy consumption, and create zero waste to landfill by recycling raw materials back into the production process.

ROXUL insulations are created using naturally occurring, inorganic raw materials and materials with a high-recycled content. Stone wool insulation is non-combustible and achieves its thermal performance without the use of blowing agents. The products do not off-gas and are fully recyclable, therefore contributing to a sustainable environment.

ROXUL is pleased to have third-party certification of our products' recycled content for our Milton facility completed by ICC -ES SAVE™. All ROXUL products produced in the Milton facility contain a minimum of 40% recycled content. ROXUL products produced in our Grand Forks facility are currently awaiting ICC-ES Save™ certification.

ROXUL demonstrates its commitment to the environment through eco-friendly insulation products and green manufacturing processes.

For further details contact your ROXUL sales representative. Please visit www.roxul.com for the latest information.



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www.roxul.com



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ISSUED: 05-12-14 SUPERSEDES 04-15-14
WWW.ROXUL.COM

TECHNICAL COMMUNICATION



ROXUL REPORT: Fastener Guidelines



Fastener Guidelines

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1 OF 8

ROXUL
The Better Insulation

CREATE AND PROTECT®



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TECHNICAL COMMUNICATION

DESIGN BASIS

1. MECHANICAL ATTACHMENT

For permanent attachment, ROXUL stone wool (mineral wool) insulation should be mechanically attached or pressure held by supporting members.

2. ADHESIVES

Adhesives and adhesive applied stick-pins should NOT be used for permanent attachment of ROXUL stone wool insulation. Adhesives, and adhesive based systems can be used for temporary attachment, but mechanical attachment (or supporting members) must be used for permanent attachment.

3. EXPOSED INSULATION

ROXUL stone wool insulation is not intended to be left exposed to the elements. Cladding should be installed after insulation attachment. If the insulation is to be left exposed, or installation takes place in bad weather, the insulation should be permanently mechanically attached and covered with a breathable protective layer (such as tarp). Designers can increase number of fasteners to meet specific conditions and design requirements (including wind-driven rain-loads).

4. DESIGN LOADS

Fastening connections should be designed to withstand all the combined applied loads, including (but not limited to) Dead-Load and Wind-Loads. Where applicable, consideration should also be given to Seismic- Load, Live-Load and Wind-Driven Rain-Load (Not covered in this guide).

5. DEAD LOAD

Fastening connections should be designed to withstand all the combined applied dead loads, including (but not limited to) the insulation, fasteners and any other supported members or cladding.

6. WIND LOAD (LIVE LOAD)

Fastening connections should be designed to withstand horizontal loads imposed by wind pressures. Wind loads often govern lateral load scenarios

7. FASTENER SELECTION

Fasteners should be: a) appropriate type for the substrate; b) capable of withstanding applied pull-out and shear-loads ; c) numerous enough and of large enough cross-section to prevent tear-through of the insulation under expected conditions; d) suitable for use outside if being used in exterior applications.

8. ENGINEERED DESIGN

The design of fastened connections is a task normally completed, or reviewed, by a structural engineer. The primary purpose of this fastener guide is to provide suggestions for attachment design of ROXUL stone wool insulation attachment to various structures and buildings.

9. LIMITATION

ROXUL stone wool insulation boards are suitable for mechanical attachment using a number of fasteners and fastening systems. Mechanically attached fastening systems are subject to various loads including dead load, wind load and seismic load; all of which vary with location and over time. **WARNING:** Failure to include safety factors or adequately design for applied loads can result in failure of mechanical attachment. The determination of the specific design requirements and safety factors regarding a fastener system is the sole responsibility of the installer and/or end user. ROXUL Inc assumes no responsibility whatsoever for any failure of insulation attachment or related fastening systems.

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ROXUL
The Better Insulation™

CREATE AND PROTECT®

Plain Insulation

1. APPLICATIONS

- Exposed Exterior Insulation
- Basements (Inside / Outside)
- Parking Garages
- Acoustic Panels

2. EXPOSED INSULATION

ROXUL stone wool insulation is not intended to be left exposed to the elements. Cladding should ideally be installed immediately after insulation attachment. If the insulation is to be left exposed, or installation takes place in bad weather, ROXUL recommends a minimum of 5 mechanically attached insulation fasteners per board.

3. TYPE OF FASTENERS

- Screw & Washer
- Insulation Fastener
- Plastic Cap Nails
- Impaling Pins

4. NUMBER OF FASTENERS

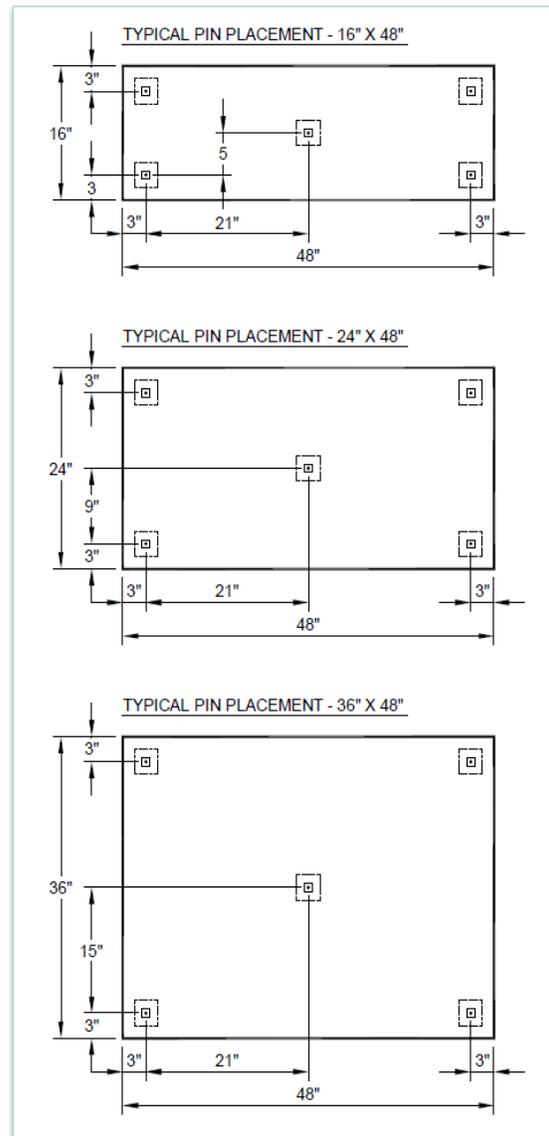
ROXUL recommends a minimum of 5 mechanically attached insulation fasteners per board. Designers can increase number of fasteners to meet specific conditions and design requirements (including wind-driven rain-loads).

5. EMBEDDED DEPTH OF FASTENER

Embedded depth required to resist fastener pull-out will vary with both substrate material and the fastener type. ROXUL recommends a minimum 1" embedded depth, designers may vary this amount.

6. PROPRIETARY FASTENERS

Some proprietary Insulation Fasteners can provide adequate support with fewer than 5 fasteners per board and less than 1" embedded depth. Individual fastener manufacturers should be consulted for details.



Strapping

1. GENERAL

Strapping, attached to the building structure, will act like giant clamps to hold insulation in place. ROXUL insulation boards will be permanently mechanically supported by the strapping attachment if the attachment is designed to withstand live loads and total applied dead loads. Insulation boards can be temporarily held in place prior to strapping unless the insulation is to be left exposed without strapping or installation takes place in bad weather; in which case guidelines for Plain Insulation attachment in the previous section should be followed

2. DESIGN

- ❑ ROXUL recommends installing strapping vertically to provide a drained cavity; drained metal hat-channels can be installed horizontally.
- ❑ Strapping attachment should be designed to withstand wind loads and total applied dead loads (Insulation + Fasteners + Strapping + Cladding)
- ❑ ROXUL recommends a maximum system dead load area weight of 12 psf for wood frame construction and 5 psf for metal frame construction.



3. FASTENERS

- ❑ Fasteners should be: a) appropriate type for the substrate; b) capable of withstanding applied pull-out and shear-loads.
- ❑ Required length, number, spacing and embedded depth of fasteners will depend on the type of fastener, the applied loads, the substrate and the thickness of the insulation, strapping and any sheathing.
- ❑ Anti-unwinding fasteners (or alternative precautions) should be used for metal frame construction.
- ❑ Fasteners should be embedded 1.5" in wood studs and concrete, and extend at least 3 full threads past the inside face of steel studs.
- ❑ Designers can vary the type, number and embedded depth of fasteners to meet specific requirements.

4. STRAPPING TYPE

Metal or treated wood strapping can be used. ROXUL recommends using 2x3 or 2x4 dimensional lumber (laid on the flat), or metal hat-channels.

5. INSTALLATION TIPS

- ❑ Use Experienced Installers or a laser-level with inexperienced installers
- ❑ Use 2x3 or 2x4 lumber instead of thinner strapping
- ❑ Use double-thread screws for wood strapping
- ❑ Recommended for maximum insulation thickness $\leq 3"$

6. REFERENCES

- ❑ *NTA Engineering Evaluation Report TRU110910-21* can be used to design strapping attachment for wood-frame and concrete with TRUFAST SIP and TRUFAST Tru-Grip fasteners.
- ❑ *ROXUL Continuous Exterior Insulation – Deflection Report*
- ❑ *IMETCO IntelliScreen* system is recommended for cladding installation using horizontally installed drained metal hat channels



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TECHNICAL COMMUNICATION

Masonry Ties

1. GENERAL

Wedges / clips installed over masonry ties can be used to attach ROXUL insulation boards. Non-proprietary or proprietary masonry ties can be used.

2. DESIGN

Spacing and design of the masonry tie pattern should follow accepted practice and be adequate to support wind and dead loads.

Where permissible by codes and design, the spacing of ties should be made to be 16" or 24" in at least one orientation (vertical or horizontal) to allow easy installation of ROXUL insulation boards with little or no cutting of the insulation.

3. INSULATION ATTACHMENT

Wedges or clips over masonry ties can be used to hold the insulation in place at board edges. Additional fasteners can be used in the middle of boards if needed.

The average number of masonry tie wedges and / or fasteners holding a single piece of insulation should be a minimum of 5.

Designers can increase the number of fasteners or wedges to meet specific conditions and design requirements.

4. FASTENERS

ROXUL recommends wedges or clips designed for the particular type of masonry tie being used.

If additional fasteners are required in the middle of boards these can be:

- Plastic cap nails
- Screws & washers
- Insulation Fasteners
- Impaling Pins

5. STPE – ADHESIVE WRB

Some STPE based WRB (Weather Resistive Barrier) compounds have adhesive properties prior to curing and can be used to attach ROXUL stone wool insulation to the wall **when used in combination** with brick ties and wedges around board edges.

Follow manufacturers direction when using an STPE based WRB as an adhesive for ROXUL insulation.

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Clips & Girts

1. GENERAL

Proprietary clips / brackets or non-proprietary stand-offs designed to support vertically installed z-girts or L-channels can be used. Insulation is not required to provide any structural support with this type of system.

2. THERMAL BRIDGING & Z-GIRTS

ROXUL does NOT recommend using z-girts through the full thickness of insulation.

Clips, brackets or stand-offs should be used to minimize thermal bridging.

3. DESIGN

Z-girts and fastening system should be designed to support wind loads and total applied dead loads independently of the insulation.

If clips & girts do NOT provide structural support to the insulation it should be fastened per directions for *Plain Insulation*. If clips & girts provide structural support to the insulation then designers can reduce the required number of fasteners appropriately.

4. CASCADIA CLIPS & OTHER PROPRIETARY SYSTEMS

Follow manufacturers recommendations

5. FASTENERS

- Fasteners should be appropriate type for the substrate
- Use the manufacturers recommended fasteners when using proprietary clips & brackets
- Anti-unwinding fasteners (or alternative precautions) should be used for metal frame construction and metal-to-metal fastening of clips & girts.

Fasteners for attaching insulation

- Impaling Pins
- Screws & Washers
- Plastic Cap Nails
- Insulation Fasteners

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Fastener - Examples



Fastener & Washer

Recommended for use with all types of ROXUL stone wool insulation boards
Fastener should be appropriate type for the substrate



Plastic Cap Nails

Recommended for temporarily holding insulation and fastening insulation to wood and wood based substrates



Clip & Z-Girt

e.g. CASCADIA CLIPS
Recommended for thick exterior insulation (over 3")
Follow manufacturers recommendations for use



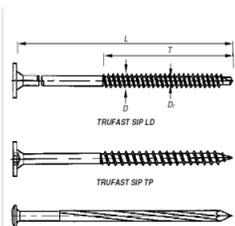
Metal Fasteners

Recommended for use with metal frame construction.
Anti-unwinding fasteners (or other precautions) should be used with metal frame construction



Insulation Fasteners

e.g. RAMSET INSULFAST
Recommended for fastening insulation to concrete, masonry block and through gypsum sheathing (steel stud)



Regular

Wood Screws
Concrete Screws
Concrete Nails

Must be right type for the substrate and suitable for outside use if not being used inside.



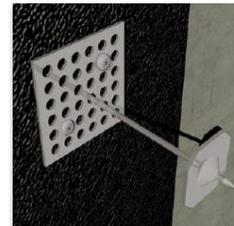
Brick-Tie & Wedge

Wedges or clips used with masonry ties can be used to attach ROXUL CAVITYROCK DD and MD insulation



Dual-Thread Fasteners

e.g. Heco-Topix
Recommended for use with wood strapping to reduce risk of compression deflection



Impaling Pin

Mechanically attached or bonded to structure. Recommended for use with all types of ROXUL stone wool insulation boards.
Adhesive "stick" pins should be avoided

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BEDR Walls™
 Building Envelope Design using **ROXUL®**

Insulation Solutions
 That Drive Building Performance

Curtain Wall

Rainscreen and Cavity Wall

Insulated Sheathing

Head of Wall Fire Safing

Parking Garage

Interior Wall

Metal Building

Sound Studio and Mechanical Rooms

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072100

PRODUCTS

| | | | | | Fire | | Acoustic (at 3" Thickness) | | | | Corrosive Resistance | Compliance | | | | |
|---|--------------------------------|---|----------------------------------|------------------------|-----------------|--------------------|--|-------------|-------------------------|------|----------------------|--------------------|------------------|--|-------------------------|-------------------------|
| Interior Wall | Standard Thickness | Dimensions (WxL) | Density pcf (Kg/m ³) | R-value Per Inch | ASTM E 136 | ASTM E 84 (UL 723) | ASTM C 423 250Hz 500Hz 1000Hz 2000Hz | | | | ASTM C 423 NRC | ASTM C 665 | ASTM C 665 | CAN/ULC 5702 | ASTM C 553 | UL Design Nos. |
| AFB* | 1"-4", 0.5" increments, 5", 6" | 16"x48", 24"x48" | 2.8 (45) | N/A | Non-combustible | Complies | 0.96 | 1.18 | 1.07 | 1.05 | 1.05 | Pass | Type 1, Complies | Type 1, Complies | Complies | Consult UL/ULC Listings |
| SAFE N' SOUND* (Residential Applications) | 3" | 55: 16.25"x48", 24.25"x48 W5: 15.25"x47", 23"x47" | 2.5 (40) | N/A | Non-combustible | Complies | 0.96 | 1.18 | 1.07 | 1.05 | 1.05 | N/A | Type 1, Complies | Type 1, Complies | N/A | N/A |
| Exterior Wall Batt | Standard Thickness | Dimensions (WxL) | Density pcf (Kg/m ³) | R-value Per Inch | ASTM E 136 | ASTM E 84 (UL 723) | ASTM C 423 250Hz 500Hz 1000Hz 2000Hz | | | | ASTM C 423 NRC | ASTM C 665 | ASTM C 665 | CAN/ULC 5702 | ASTM C 553 | UL Design Nos. |
| COMFORTBATT® Steel Stud | 2.5", 3.5", 6" | 16.25"x48", 24.25"x48" | >2 (32) | 4.0 (CAN) 4.2 (USA) | Non-combustible | Complies | N/A | | | | N/A | Pass | Type 1, Complies | Type 1, Complies | N/A | N/A |
| COMFORTBATT® Wood Stud | 3.5", 5.5", 7.25", 8" | 15.25"x47", 23"x47" (all) 15"x47" 22.75"x47" (5" only) | >2 (32) | 4.0 (CAN) 4.2 (USA) | Non-combustible | Complies | N/A | | | | N/A | N/A | Type 1, Complies | Type 1, Complies | N/A | N/A |
| Exterior Wall Rainscreen & Cavity Wall | Standard Thickness | Dimensions (WxL) | Density pcf (Kg/m ³) | R-value Per Inch | ASTM E 136 | ASTM E 84 (UL 723) | ASTM C 423 250Hz 500Hz 1000Hz 2000Hz | | | | ASTM C 423 NRC | ASTM C 665 | ASTM C 1104 | ASTM C 1338 | ASTM E96 | ASTM C 665 |
| CAVITYROCK® DD | 2.5"-4", 0.5" increments, 5" | 16"x48" (2.5" and 3"), 24"x48" | 6.2 / 4.1 (100 / 65) | 4.3 | Non-combustible | Complies | 0.93 | 0.88 | 0.84 | 0.90 | 0.90 | Pass | 0.07% | Zero Growth | 27 perm | Type IVB, Complies |
| CAVITYROCK® MD | 1", 1.5", 2" | 16"x48", 24"x48" (2" only) | 4.4 (70) | 4.2 | Non-combustible | Complies | N/A | | | | N/A | Pass | 0.03% | Zero Growth | 33 perm | Type IVB, Complies |
| Insulated Sheathing for Continuous Insulation | Standard Thickness | Dimension (WxL) | Density pcf (Kg/m ³) | R-value Per Inch | ASTM E 136 | ASTM E 84 (UL 723) | ASTM C 423 250Hz 500Hz 1000Hz 2000Hz | | | | ASTM C 423 NRC | ASTM C 665 | ASTM C 1104 | ASTM E96 | ASTM C 145 (19% - 102%) | ASTM C 612 |
| COMFORTBOARD® CIS | 1", 1.25", 2", 2.5", 3" | 24"x48", 48"x72" | 11 (174) | 4 | N/A | Complies | 0.71 | 0.85 | 0.90 | 0.96 | 0.85 | Pass | 0.28% | 35 perm | 1220 1880 | Type IVB, Complies |
| COMFORTBOARD® IS | 1.25", 1.5", 2", 3" | 48"x24", 48"x36", 96"x48" (1.25" only) | 8 (128) | 4 | Non-combustible | Complies | 0.78 | 0.90 | 0.97 | 0.97 | 0.90 | Pass | 0.05% | 31 perm | 745 1270 | Type IVB, Complies |
| Curtain Wall Systems | Standard Thickness | Dimensions (WxL) | Density pcf (Kg/m ³) | R-value Per Inch | ASTM E 136 | ASTM E 84 (UL 723) | ASTM C 423 250Hz 500Hz 1000Hz 2000Hz | | | | ASTM C 423 NRC | ASTM C 665 | ASTM C 1104 | UL/ULC Design Nos. | ASTM C 612 | |
| CURTAINROCK® | 1", 1.5", 2", 3", 4", 5" | 24"x48" | 4 (64) Nominal | 4.2 | Non-combustible | Complies | 0.95 | 1.14 | 1.01 | 1.03 | 1.05 | Pass | 0.01% | Consult UL/ULC Listings | Type IVB, Complies | |
| CURTAINROCK® 40 | 2", 3", 4" | 24"x48", 48"x72" | 4 (64) Nominal | 4.2 | Non-combustible | Complies | 0.94 | 1.13 | 1.07 | 1.06 | 1.05 | Pass | 0.01% | Consult UL/ULC Listings | Type IVB, Complies | |
| CURTAINROCK® 80 | 1", 2", 3", 4", 5" | 24"x48", 48"x72" (2"-4") | 8 (128) Nominal | 4.2 | Non-combustible | Complies | 0.92 | 1.08 | 1.03 | 1.03 | 1.00 | Pass | 0.04% | Consult UL/ULC Listings | Type IVB, Complies | |
| ROXUL SAFE® | 2", 4" | 24"x48" | 4.5 (72) | N/A | Non-combustible | Complies | 0.95 | 1.14 | 1.01 | 1.03 | 1.05 | Pass | 0.04% | Consult UL/ULC Listings | Type IVA, Complies | |
| Multi-Purpose Boards | Standard Thickness | Dimensions (WxL) | Density pcf (Kg/m ³) | R-value Per Inch | ASTM E 136 | ASTM E 84 (UL 723) | ASTM C 423 250Hz 500Hz 1000Hz 2000Hz | | | | ASTM C 423 NRC | ASTM C 665 | ASTM C 1104 | Alternative Solutions | Compliance | |
| ROCKBOARD® 40 | 1", 2", 3", 4" | 24"x48" | 4 (64) | 4.1 | Non-combustible | Complies | 0.95 | 1.14 | 1.01 | 1.03 | 1.05 | Pass | 0.03% | Aluminum, White Polypropylene, Pin perforated White Polypropylene, Black Mat | Type IVA, Complies | |
| ROCKBOARD® 60 | 2", 3", 4" | 24"x48" | 6 (96) | 4.2 | Non-combustible | Complies | 0.89 | 1.04 | 0.98 | 1.01 | 1.00 | Pass | 0.07% | Aluminum, White Polypropylene, Pin perforated White Polypropylene, Black Mat | Type IVB, Complies | |
| ROCKBOARD® 80 | 1", 2", 3", 4" | 24"x48" | 8 (128) | 4.1 | Non-combustible | Complies | 0.82 | 0.89 | 0.94 | 1.00 | 0.90 | Pass | 0.05% | Aluminum, White Polypropylene, Pin perforated White Polypropylene, Black Mat | Type IVB, Complies | |
| ROCKBOARD® PG | 2", 3", 4" | 24"x48" | 3.5 (56) | 4.1 | Non-combustible | Complies | 0.50 | 0.52 | 0.51 | 0.46 | 0.50 4" Thickness | Pass | 0.03% | White Polypropylene, Pin Perforated | Type IVA, Complies | |
| Metal Building | Standard Thickness | Dimension (WxL) | Density pcf (Kg/m ³) | R-value Per Inch | ASTM E 136 | ASTM E 84 (UL 723) | ASTM C 665 | ASTM C 1104 | UL Design Nos. | | | ASTM C 612 | ASTM C 553 | DISCLAIMER AND LIMITATION OF LIABILITY: The statements and data contained in this brochure are for general information purposes ONLY. They are NOT specific technical recommendations as to any particular design or application and the ultimate determination as to product suitability is the sole responsibility of the installer or end user. Although the information contained herein, including ROXUL product descriptions, is believed to be correct at the time of publication, accuracy cannot be guaranteed. ROXUL fully reserves the right to make product specification changes, without notice or obligation, and to modify or discontinue any of its products at any time. In no event shall ROXUL be liable for any direct, indirect, or consequential damages of any kind arising from information contained in this brochure, including, but not limited to, claims for loss of profits, business interruption, or damages to business reputation. This limitation of liability shall apply to all claims whether those claims are based in contract, tort, or any legal cause of action. | | |
| FIREWALL® 1HR | 3" | 24"x48", 31.5"x48", 32"x48" | N/A | 4.2 | Non-combustible | Complies | Pass | 0.04% | Consult UL/ULC Listings | | | Type IVB, Complies | N/A | | | |
| FIREWALL® 2HR | 4" | 24"x48", 31.5"x48", 32"x48" | N/A | 4.3 | Non-combustible | Complies | Pass | 0.04% | Consult UL/ULC Listings | | | Type IVB, Complies | N/A | | | |
| ROXUL PLUS® MB | 2"-4", 0.5" increments, 5", 6" | 24"x48" | 2 (32) | 4 | Non-combustible | Complies | Pass | 0.03% | N/A | | | N/A | Type I, II, III | | | |

Thermal Batt Insulation



ROXUL COMFORTBATT®

Thermal Batt Insulation for Residential
& Commercial Construction.

ROXUL
The Better Insulation

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 accidentally 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 9.25.2.2 | Insulation Materials | Conforms |
| CCMC Evaluation Listing | Master Format 07212: Mineral Wool Batt Insulation | 12018-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.

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 if it 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/m ² |
| R22/23 | 150 mm | 4.8 kg/m ² |
| R28/30 | 184 mm | 5.9 kg/m ² |
| R32 | 203 mm | 6.5 kg/m ² |
| Density | ASTM C 612-00 – 32 kg/m ³ (2 lb/ft ³) | |
| 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.

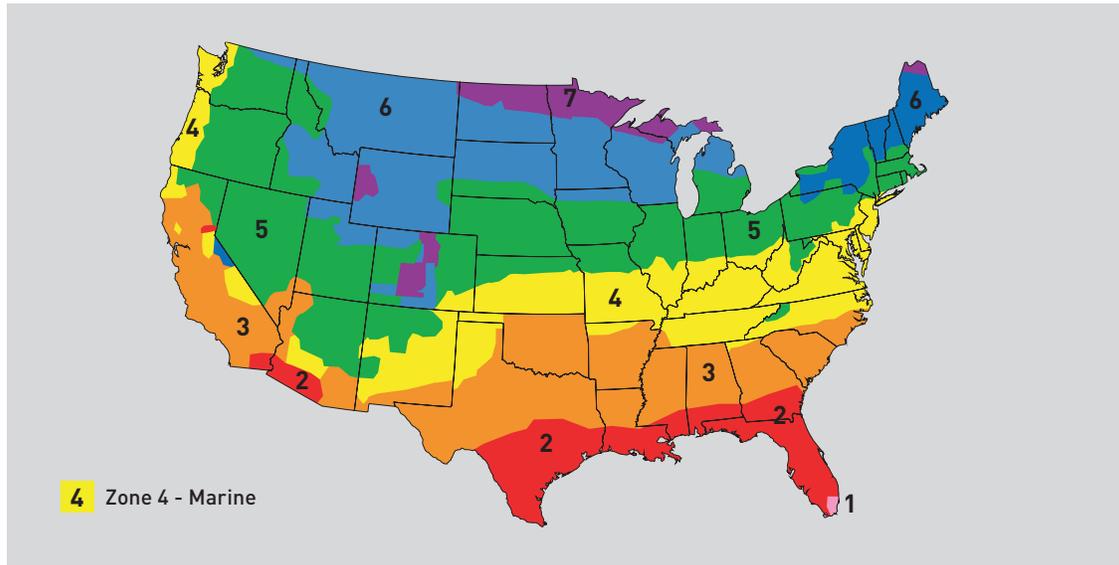
Higher density batts reduce airflow within the wall cavity, reducing convective losses. This translates into a better performing and more comfortable thermal wall.



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.

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.

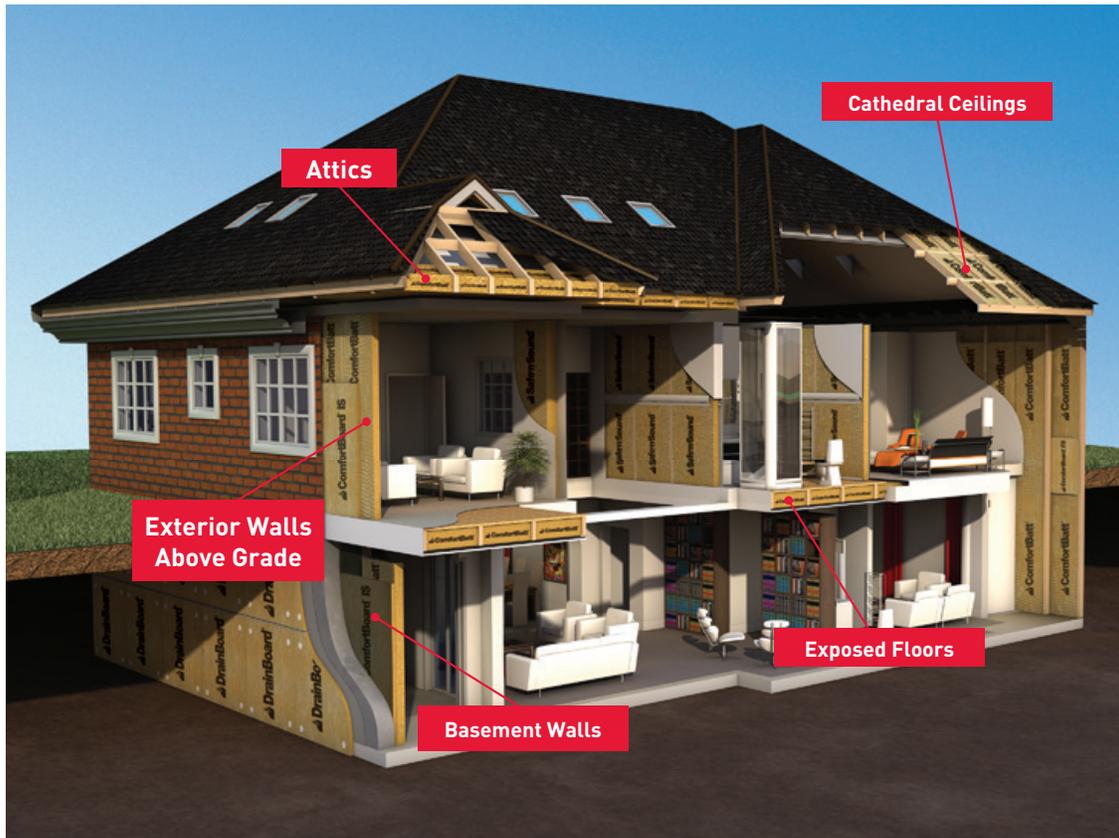
ASHRAE map of climate zones ^(above)

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.

Thermal Batt Insulation

Specifically engineered for use in all residential thermal applications.



Environmental Benefits That Go Beyond Residential Homes

The GREENGUARD Environmental Institute (GEI) is a non-profit organization that oversees the GREENGUARD® Gold standards. The GEI's mission is to protect human health and quality of life through programs that improve indoor air that people breathe. Greenguard® Gold Certification (formerly known as Greenguard Children & Schools Certification) offers stricter certification criteria, considering safety factors to account for sensitive individuals (such as children and the elderly), and ensures that a product is acceptable for use in environments such as schools and healthcare facilities). ROXUL COMFORTBATT® products are certified to this standard and are recognized by the United States Green Building Council's (USGBC) LEED® program.

ROXUL COMFORTBATT®

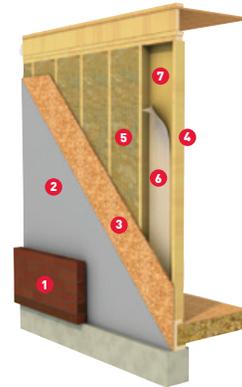
Ideal applications for COMFORTBATT® insulation.

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)

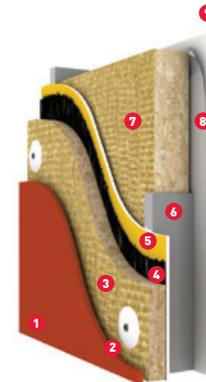
- 1 Cladding
- 2 Air Barrier
- 3 Sheathing
- 4 2" x 6" Wood Studs
- 5 5.5" COMFORTBATT
- 6 Vapor Retarder*
- 7 Gypsum



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

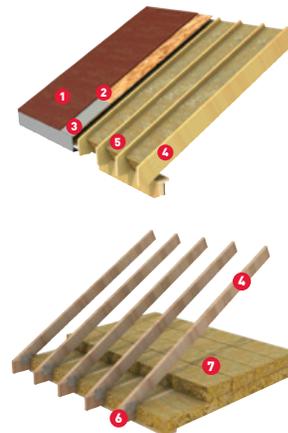


When insulating attics, use two layers of COMFORTBATT to achieve the required R-value. The bottom layer should run parallel to the joists and the top layer run in the opposite direction. For attics and cathedral ceilings, only a single layer of COMFORTBATT is required between the roof trusses.

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 R28/R30) two layers running perpendicular



6

*Check with your local building code for approved vapor barrier/retarder information.

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" | 60.1 |
| R15 | ✗ | ✓ | 2.64 | Wood | 3.5" | 15.25" | 47" | 59.7 |
| R15 | ✗ | ✓ | 2.64 | Wood | 3.5" | 23" | 47" | 60.1 |
| 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" | 29.7 |
| 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" | 30.0 |
| 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" | 65.0 |
| 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 | 6.0" | 16.25 | 48" | 43.3 |
| R22.5 | ✓ | ✓ | 3.96 | Steel | 6.0" | 24.25 | 48" | 40.4 |
| R24 | ✓ | ✓ | 4.22 | Steel | 6.0" | 16.25 | 48" | 43.3 |
| R24 | ✓ | ✓ | 4.22 | Steel | 6.0" | 24.25 | 48" | 40.4 |

ROXUL COMFORTBATT™



A global leader

ROXUL® Inc. is part of ROCKWOOL International, the largest producer of stone wool insulation, which is made from natural basalt rock and recycled material. ROCKWOOL International was founded in 1909 and today operates worldwide with more than 9,700 employees, with 26 factories across three continents.

ROCKWOOL has more than 40 years experience in developing and manufacturing advanced wall system products. For more than 25 years, ROXUL has been serving the North American market.

In addition to residential insulation, ROXUL also manufactures a range of other premium insulation products for commercial and industrial applications.

ROXUL is The Better Insulation™

ROXUL COMFORTBATT® is an innovative insulation offering a world of green features. When ROXUL is the specified insulation, green building developers can earn a variety of LEED® (Leadership in Energy and Environmental Design) points across four key categories toward sustainable development.

Environmentally sustainable

Our stone wool production process utilizes some of the most advanced technology available. The ROXUL facility is designed to capture and recycle rainwater, reduce energy consumption, and create zero waste to landfill by recycling raw materials back into the production process.

ROXUL insulations are created using naturally occurring, inorganic raw materials and materials with a high-recycled content. Stone wool insulation is non-combustible and achieves its thermal performance without the use of blowing agents. The products do not off-gas and are fully recyclable, therefore contributing to a sustainable environment.

ROXUL is pleased to have third-party certification of our products' recycled content for our Milton facility, completed by **ICC-ES SAVE™**. All ROXUL products produced at the Milton facility contain a minimum of 40% recycled content. For further details, contact your ROXUL Sales Representative. Please visit www.roxul.com for the latest information.

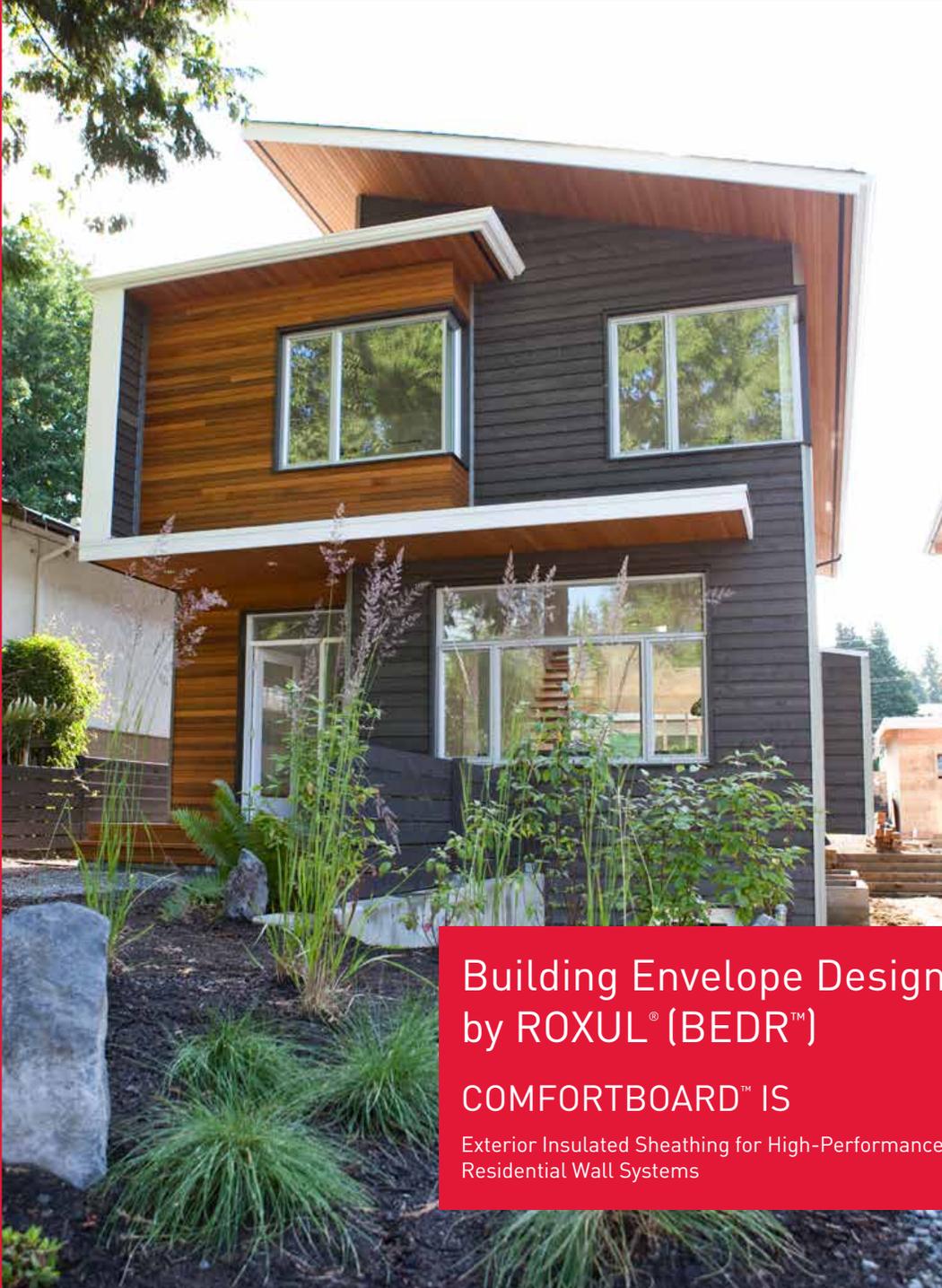


ROXUL®
The Better Insulation™

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420 Bronte Street South
Suite 105, Milton, Ontario L9T 0H9
Tel: 1-800-265-6878
www.roxul.com

COMFORTBATT® is a registered trademark of ROXUL Inc.
LEED® is a registered trademark of United States Green Building Council.
GREENGUARD® is a registered trademark of Greenguard Environmental Institute.
ROX-2492_1113

BUILDING ENVELOPE DESIGN BY ROXUL®



Building Envelope Design by ROXUL® (BEDR™)

COMFORTBOARD™ IS

Exterior Insulated Sheathing for High-Performance
Residential Wall Systems

The Shore House
North Vancouver, BC, Canada



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:

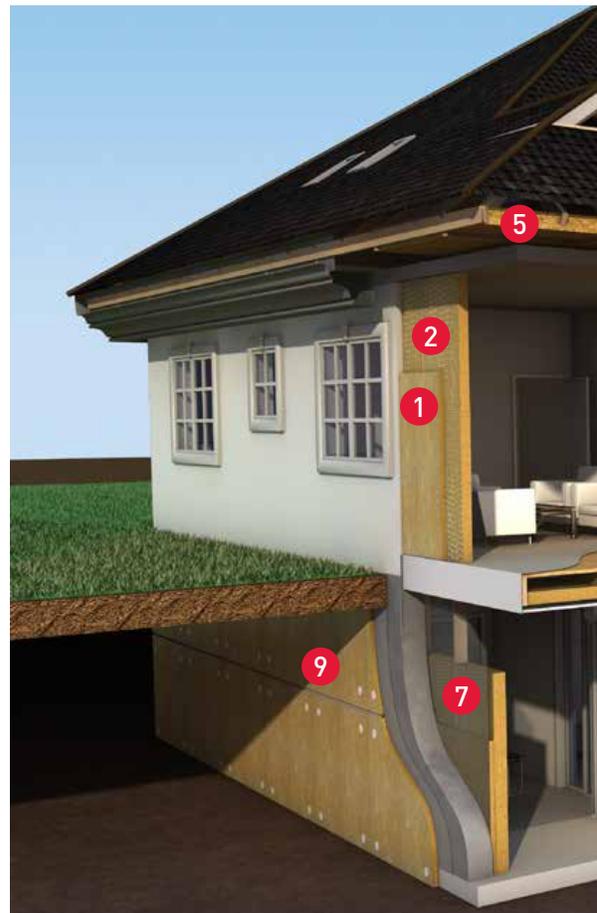
ROXUL COMFORTBOARD™ IS: Rigid stone wool insulation board fastened to outside studs to improve thermal performance to the building envelope.

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.



- ❶ COMFORTBOARD™ IS on exterior wall (outside)
- ❷ COMFORTBATT™ R14/R15 on a 2 x 4 wall
- ❸ COMFORTBATT™ R22/23 on a 2 x 6 wall
- ❹ COMFORTBATT™ R28/R30 in a cathedral ceiling

- ❺ COMFORTBATT™ R28/30 + CB R14/R15 parallel on the attic
- ❻ Multi-unit partition wall with 3.5" COMFORTBATT™ on both sides and COMFORTBOARD™ FS as fire separation board

BUILDING ENVELOPE DESIGN BY ROXUL®



7 Basement Wall – COMFORTBOARD™ IS (1.5") against the concrete wall (moisture barrier behind the COMFORTBOARD™ IS) with wood studs in front and COMFORTBATT™ R14/15 in the studs (basement system) therefore full height R20/21

8 SAFE'N'SOUND™ on interior partition and basement ceiling
 9 DRAINBOARD® on exterior foundation wall below grade



ROXUL COMFORTBOARD™ IS

Superior Building Envelope Performance

As society demands more energy efficient buildings, codes and builders are responding by increasing the R-value of the building enclosure, in particular, the above-grade wall. Given that the cavity of the standard 2 x 6 wood frame wall used in low-rise housing is already filled with insulation, the clear path forward to higher R-values is to add layers of exterior insulation.

ROXUL COMFORTBOARD IS is a rigid stone wool insulation board fastened to the outside face of the exterior studs used in residential construction and designed to provide increased thermal performance to the building envelope. The stone wool-based insulation is made from natural stone with a minimum of 40% recycled content, which gives it thermal and fire-resistant properties that other insulations can't match.

As building codes adjust to increased effective R-value requirements, the need for insulated sheathing will increase accordingly, and ROXUL COMFORTBOARD IS leads the way as the exterior insulation of choice for residential applications.

Today, building codes are moving to mandate "effective R-values" vs. nominal – and insulated exterior wall sheathing will play a major role to help builders achieve this requirement. ROXUL COMFORTBOARD IS is the better sheathing insulation.



As an exterior insulation, ROXUL COMFORTBOARD IS is fastened to the exterior OSB/plywood sheathing or structural stud wall and is designed to provide increased thermal performance to the building envelope





ROXUL® COMMERCIAL ROOFING

Understanding Climate Requirements That Drive Performance

ROXUL®
The Better Insulation

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ROXUL® COMMERCIAL ROOFING

High Performance Roofing Insulation Products

ROXUL®/ROCKWOOL® commercial roofing products have been available globally for more than 35 years and have been the insulation of choice for many building owners, architects and roofing consultants who are interested in roofing performance and safety.

In this brochure, we begin to introduce you to our products and explain why you should specify ROXUL stone wool insulation. Our products feature a 30-year limited thermal warranty, and are competitively positioned versus other insulation materials in overall performance.



This brochure highlights our discussion of CLIMATE DRIVEN R-VALUES, based on research initiated by the National Roofing Contractors' Association (NRCA) that looked into the performance of roofing insulation at varying temperatures. The research has been continued by outside firms such as Building Science Corporation, Building Science Consulting Inc., and RDH Building Engineering. This research compares R-value claims for ROXUL stone wool vs. polyiso insulation from four leading North American manufacturers. The study details thermal performance of these types of insulations in the various ASHRAE-defined climate zones. The study clearly points to the advantages that ROXUL stone wool products can provide.

Members of our ROXUL Sales and Specification Team would welcome the opportunity to invite you to "Lunch & Learn" sessions to further the conversation, and to explore why ROXUL stone wool products should be part of your next project.

Learn more about ROXUL products by visiting our website at roxul.com. There you will find additional information such as: technical bulletins, case studies, technical data, additional third-party studies, and more. A special section of our website, called ROXUL RSPEC, has been developed specifically for architects and specifiers. ROXUL RSPEC offers easy-to-navigate tabs with case studies, technical data and design information.

- ✓ No R-value loss over time
- ✓ Vapour permeable
- ✓ Sound absorbent
- ✓ Non-combustible
- ✓ No off-gassing
- ✓ Environmentally sustainable
- ✓ Impact resistant
- ✓ Resistant to rot, mould, fungi and chemicals
- ✓ Made from stone
- ✓ Water repellent

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ROXUL® COMMERCIAL ROOFING

TOPROCK® DD

Fire Resistant Roofing Insulation

ROXUL® TOPROCK DD has exclusive stone wool dual density properties that feature a higher-density top layer, providing strong point load resistance and effective load distribution to minimize puncture damage to the membrane – particularly during installation.

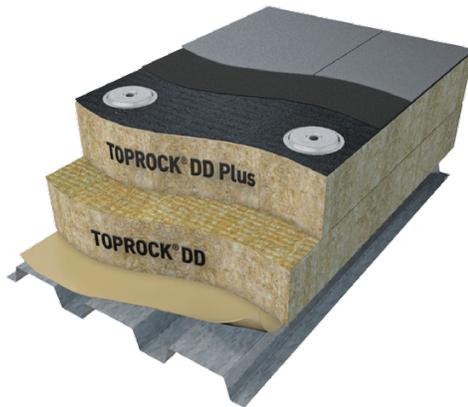
- Insulation and coverboard in one
- Suitable for new building, re-roofing and re-cover applications
- Also used in tapered systems
- Available thicknesses: 2", 2.5", 3", 3.5", 4", 4.5", 5", 5.5", 6"
- R-value of 3.8 per inch as tested at 75°F per ASTM standard

MONOBOARD®

The Ultimate Insulating Coverboard

ROXUL MONOBOARD is a rigid, mono-density roof coverboard with a uniform density that can provide tremendous versatility, and is designed for use as a coverboard and re-coverboard.

- Higher density: now 200 kg/m³ (12.5 lb/ft³)
- Suitable for new building, re-roofing, and re-cover applications
- Also used in tapered systems and fabrications
- Standard thickness: 1.04" / R4 as tested at 75°F per ASTM standard



TOPROCK DD Plus and MONOBOARD Plus are available with an impregnated surface layer of bitumen. This pre-applied coating makes the products compatible with both torch and mop applied membranes, and simplifies the application process, saving time as well as material and labour costs on-site.

ROXUL® COMMERCIAL ROOFING

Climate Driven R-Value (CDRV)

Declared R-Values – Industry Standard

All insulation manufacturers follow the R-value rule that requires all types of insulation to be tested in accordance with one of the standard industry test methods defined by the American Society of Testing and Materials (ASTM).

The rule requires that R-value tests be conducted at a mean temperature of 23.9°C (75°F) and a temperature differential of 27.8°C (50°F). This means that insulation is usually tested with the cold side at 10°C (50°F) and the warm side at 37.8°C (100°F).

Roofs are subjected to a significant range of temperatures – not only seasonally, but daily as well. Of course, those temperature ranges will vary depending on how and where the roofs are built, as factors such as the climate and the membrane colour affect the heating and cooling of the roof. What does this mean?

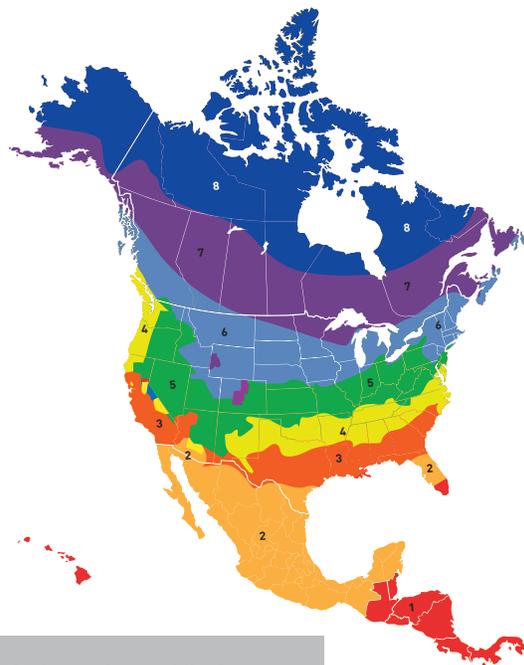
“Some insulation materials exhibit better thermal performance... and some materials exhibit worse thermal performance as temperatures get colder.”

- John Straube, Building Science Consulting:
“Understanding the Temperature Dependence of R-values for Polyisocyanurate Roof Insulation.”

Climate Driven R-Value – In Situ Performance Consideration

Climate driven R-value serves to recognize that some insulation materials exhibit different thermal performance as temperatures change (i.e., the apparent R-value increases as the temperature decreases), and some materials exhibit a loss of thermal performance as temperatures decrease (i.e., the apparent R-value decreases as the temperature decreases).

ROXUL® stone wool insulation is an example of an insulation that performs better than manufacturer declared R-value in colder temperatures, while polyisocyanurate (polyiso or ISO) insulation R-values have been shown to decrease in colder temperatures. In warm temperatures, all insulations exhibit drops in performance, to varying degrees.



**In which climate zone are you designing roof assemblies?
Think about climate driven R-values for improved performance.**

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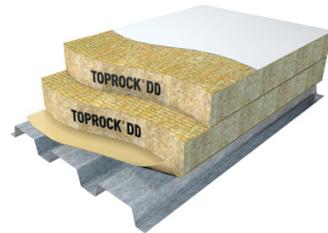
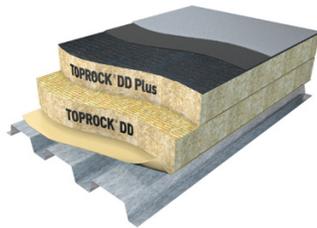
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ROXUL® Solutions

STONE WOOL ASSEMBLIES FOR ULTIMATE PERFORMANCE

1st Recommended Design Consideration

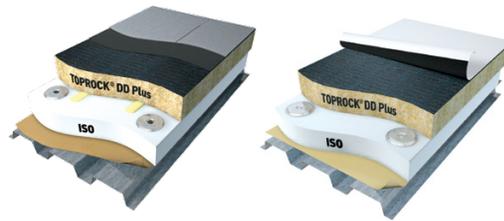
With recent research into roof system performance showing the effects that insulation and the membrane system can have on the performance of the building, designers now have more information to help them make better decisions on building performance. By using different materials, such as membrane, fasteners and insulation, designers are able to create optimal solutions that are economically feasible and will perform as designed over the long term.



DUAL INSULATION ASSEMBLY USING ROXUL

2nd Recommended Design Consideration

A dual insulation assembly is a roof assembly that combines two different types of roofing insulation materials. An example of a dual insulation assembly is a top layer of ROXUL TOPROCK® DD placed upon a base layer of polyiso insulation. This type of roof takes advantage of the distinct properties of both materials to create a high performance roof system.



A dual insulation assembly has been shown to be competitively priced to a two layer polyiso roof with coverboard due to the reduction of layers and labour required.

Individual project pricing will depend on region.

Benefits of a dual insulation assembly

This assembly takes advantage of the properties of two materials. By using TOPROCK DD as the top layer of the roof system, a standard coverboard is not needed, because the higher density top layer of the product acts as an insulating coverboard. In addition, the dimensional stability of the product and its stable R-value help to minimize heat loss, and will keep the second layer at a more constant temperature. With the polyiso layer's temperature kept more constant by the top layer, the R-value performance will be closer to optimal performance, and the system will have the advantage of the higher R-value-per-inch of the product.

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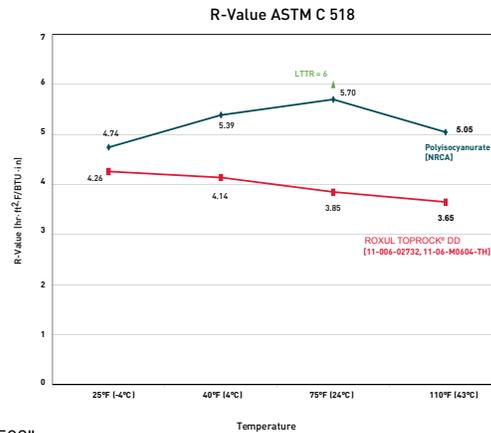
Climate Driven R-value

The NRCA conducted a research study after noticing a drop in thermal performance in polyiso roof boards over varying temperatures. Their original results are displayed here for your reference.

In recent years, BSC and RDH have also conducted their own studies into the effects of climate and temperature on R-value performance.

The concept of **climate driven R-value focuses strictly on climate or temperature when predicting R-values in situ**. That is to say other factors such as aging, off-gassing, dimensional stability and thermal bridging can further reduce the expected performance of your design.

Learn more about the studies conducted on these websites:
 NRCA: www.nrca.net "Comparing Polyiso R-values"
 Building Science Corporation: www.buildingscience.com "BSC-502"
 RDH Building Engineering: www.rdh.com "Conventional Roofing Study"



Beyond Climate Driven R-Value Performance

Other factors that negatively impact thermal performance are:

Blowing Agents

Blowing agents may condense (changing from a gas to a liquid) in cold climates, causing the R-value to decrease. Unlike foam plastic insulation materials that use blowing agents, ROXUL® stone wool insulation does not.

Dimensional Stability

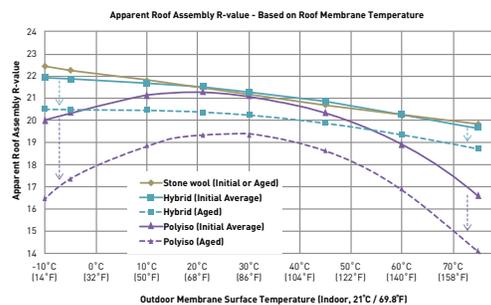
Polyiso roof boards, per ASTM 1289 standard, can lose up to 2% of their size and be within standards, increasing gaps in the insulation layer.

Thermal Bridging

Heat transfer will increase when conducted through attachment systems. The type and quantity of fastener will influence the rate of heat transfer and therefore influence thermal performance of the system.

Aging

The graph below, excerpted from RDH Building Engineering, shows the effects that the aging of the Polyiso roof board has on its thermal performance over varying surface temperatures.¹



¹Source: RDH Building Engineering, "Monitored Field Performance of Conventional Roofing Assemblies – Measuring the Benefits of Insulation Strategy" as presented at the Symposium on Building Envelope Technology, November 2013.

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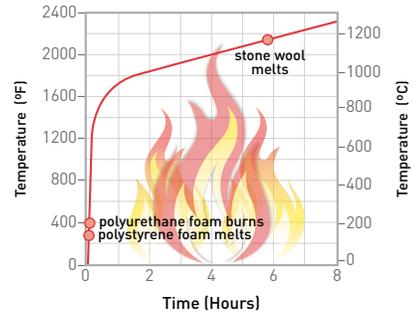
ROXUL® COMMERCIAL ROOFING

Fire Resistant Insulation To Prevent Flame Spread And Toxic Smoke Development

ROXUL® stone wool insulation has a melting point that exceeds the temperatures of most commercial fires.

ROXUL stone wool roofing insulation is non-combustible and will not develop toxic smoke or promote flame spread, even when directly exposed to fire.

Therefore it will not add fuel to an existing fire, as foam plastics tend to do; making it ideal for use in high occupancy buildings.



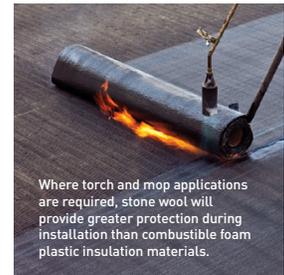
Stone wool provides passive fire protection – a strong complement to active systems such as sprinklers. This is important while a building is operational and just as important in the construction and maintenance stages.

TOPROCK® DD and MONOBOARD® products meet the requirements for FM 4470 NCC (Non-Combustible Core) Rated Roof Insulation.

Designed For Simplified Application And Safer Installation

“The only insulation you can directly torch membranes to.”

The pre-applied bitumen coating on TOPROCK DD Plus and MONOBOARD Plus makes these insulation materials compatible with both torch and mop applied membranes, simplifying the application process and saving time, as well as material and labour costs on-site.



Fire Performance

| Specification | Test | Result |
|------------------------------------|--|---------------------------------------|
| FM 4470 | NCC | Complies |
| CAN/ULC S114 | Test for Non-combustibility | Non-combustible |
| CAN/ULC S107 | Fire Tests of Roof Coverings | Class A |
| CAN/ULC S126 | Fire Spread Under Roof Deck Assemblies | C7, C18, C28, C38, C48, C52 |
| ASTM E 84 (UL 723) CAN/ULC S102 | Surface Burning Characteristics | Flame Spread=0 Smoke Development=0 |

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Moisture Management Properties; Better Than Other Insulations

Repels Water

ROXUL® insulation has superior drying potential, minimizing the risk of condensation buildup – effectively managing stresses on the membrane from changes in temperature. Built-up moisture can cause the formation of blisters and ridging, which can lead to leaks and premature failure of the roofing membrane.



TOPROCK® DD and MONOBOARD® are water repellent yet vapour permeable and will not promote rot, corrosion, mould or bacterial growth.



Minimizing Noise With Superior Sound Absorption

ROXUL stone wool insulation products demonstrate superior sound absorption characteristics. The unique non-directional structure is denser than traditional insulations. This effectively reduces airflow and sound transmissions for excellent noise reduction. These denser structures, coupled with tight, seamless joints, create effective barriers to noise and contribute to a much quieter work environment.



Although Ridgewood High School has served the Chicago suburb of Norridge for over six decades, changing flight plans at O'Hare created a major noise issue. The solution - **ROXUL Tapered System with ROXUL TOPROCK® DD Plus.** ROXUL TOPROCK® DD Plus stone wool insulation demonstrates superior sound reduction characteristics as its non-directional fibre orientation helps to trap and dissipate sound waves.

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Dimensionally Stable: ROXUL® Holds Up Year After Year

ROXUL stone wool retains its physical characteristics over time. Unlike foam insulation materials, both TOPROCK® DD and MONOBOARD® have minimal contraction or expansion due to fluctuating temperatures, nor are they adversely affected by the presence of moisture – two critical factors that can compromise a building’s roofing system.

The exceptional stability of ROXUL stone wool eliminates stresses on the roofing membrane, and extends the overall service life of the roof.

Dimensional Stability

| Material Type | Co-Efficient of Linear Expansion | Actual Expansion at Temperature Difference of 50°C on a 10 m Section | Actual Expansion at Temperature Difference of 50°F on a 50 ft Section |
|----------------------|----------------------------------|--|---|
| | 10 ⁻⁶ m/m°C | mm | inch |
| Stone Wool | 11 | 5.5 | 1/4 |
| Concrete | 12 | 6 | 1/4 |
| Steel | 12 | 6 | 1/4 |
| Expanded Polystyrene | 63 | 32 | 1 1/8 |
| Extruded Polystyrene | 63 | 32 | 1 1/8 |
| Polyurethane | 40-70 | 20-35 | 3/4 - 1 1/4 |
| Polyisocyanurate | 40-70 | 20-35 | 3/4 - 1 1/4 |

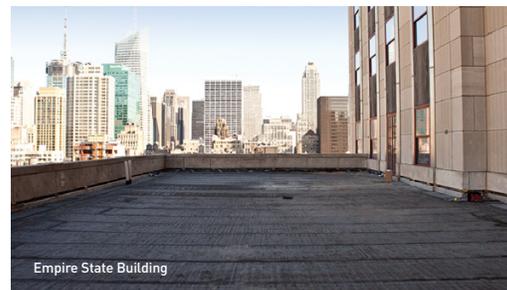
- Stone wool is thermally stable and maintains its R-value over time
- Low thermal expansion/contraction due to temperature variance
- No shrinkage due to off-gassing
- No warping or curling over time
- Life-cycle costing becomes more definitive



Constructability: Easy To Handle, Cut And Install

Comments about stone wool insulation

- Stone wool insulation is easy to install
- No coverboard required
- Easy to cut / fit around edges and openings
- Insulation lies flat and takes up uneven surfaces
- Tight board installation limits gaps
- Tapered solutions to match design requirements available (density of stone wool allows for tapering down to zero)
- Weight not an issue: light enough to handle yet heavy enough to avoid being blown away



Tapered Down to Zero

Experience will vary and proficiency increases as contractors take on more projects using ROXUL stone wool roofing products.

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ROXUL® COMMERCIAL ROOFING

A Global Leader

ROXUL Inc. is a subsidiary of ROCKWOOL International A/S, the world's leading supplier of innovative products and systems based on stone wool. ROCKWOOL International A/S is a publicly held company, which trades on the NASDAQ OMX Nordic Exchange Copenhagen. Operating 28 factories in 18 countries, the ROCKWOOL Group employs more than 10,000 people and features a global network of sales companies, trade offices and dedicated commercial partners. ROXUL® products provide superior thermal and acoustical value and are fire resistant, water repellent, non-corrosive, and resistant to mould.

For more information, visit roxul.com

ROXUL is the Better Insulation Choice

ROXUL insulation is innovative, offering a world of green features. When ROXUL is the specified insulation, green building developers can earn a variety of LEED® (Leadership in Energy and Environmental Design) accreditations toward sustainable development across four key categories.

Find out more about how we can assist with your roofing design projects

A ROXUL representative will be pleased to provide you with further details on the products described in this brochure, and can also update you with comprehensive information on the entire line of ROXUL products.

Visit our website at roxul.com, or contact us directly at **1-800-265-6878**.



Environmentally Sustainable

Our stone wool production process uses some of the most advanced technology available. The last decade has seen a new generation of ROXUL manufacturing advancements designed to lower our environmental footprint. These endeavours have included:

- the capture and recycling of rainwater;
- reduction in energy consumption;
- recycling of raw materials back into the production process, resulting in zero waste to landfill;
- the use of natural lighting in our facilities; and
- repurposing water used during the manufacturing process.

We are proud that these steps have minimized our impact on the environment and surrounding community resources. But our green programs don't stop there.

ROXUL insulation is created using naturally occurring inorganic raw materials, and reuses waste from other manufacturers as well as from our own plants. Stone wool insulation is non-combustible and achieves its thermal performance without the use of blowing agents. Therefore, our products do not off-gas over time. This feature alone makes a substantial contribution to a cleaner environment.

To remain efficient and environmentally friendly, each ROXUL plant uses a varying combination of new and recycled content. For example, as a direct result of producing less manufacturing waste during the production process, we are able to use up to 40 per cent recycled content. Our continuing effort to improve our overall efficiencies further solidifies our commitment to environmental stewardship within our organization.

Fire Resistant

Water Repellent

Saves Energy

Sound Absorbent

Better Fit

Made from Stone

TOPROCK® DD is a registered trademark of ROXUL Inc. MONOBOARD® is a registered trademark of ROXUL Inc. LEED® is a registered trademark of United States Green Building Council.

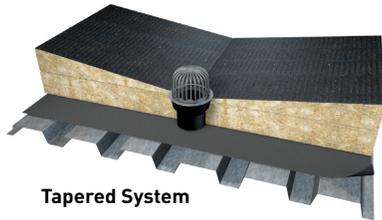


ROXUL® Tapered US Program

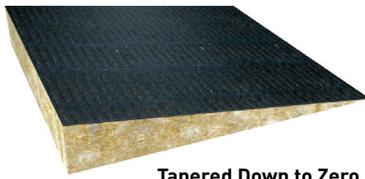
MONOBOARD® and TOPROCK® DD
Commercial Roofing Insulation



ROXUL® Tapered US Program



Tapered System



Tapered Down to Zero

ROXUL roof insulation boards are ideal for designs that require tapered roof systems. The insulation cuts easily and cleanly to produce precise, straight lines that taper down to zero and provides a tight, seamless fit. This saves both time and money during installation.

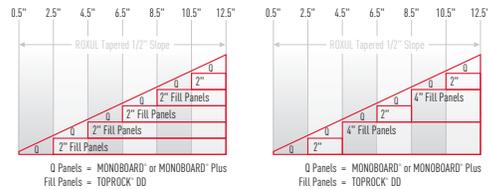
MONOBOARD® and TOPROCK® DD insulation products are specifically designed and manufactured for the roofing industry. Both are available with a bitumen coating for torch or mop applied membranes, as well as being compatible with tapered roofing systems, air/vapor barriers, membranes, fasteners, and various adhesives.

MONOBOARD is used for the tapered panels and TOPROCK DD is used for the fill panels of a tapered roof system.

ROXUL tapered systems also offer the option of using 4" fill panels as well as 2" fill panels. This option could further cut costs due to the reduction in labor during installation.

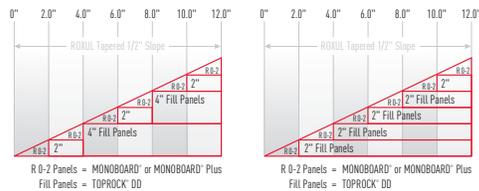
- ✓ Long-term Stable R-value
- ✓ Non-combustible
- ✓ Impact Resistant
- ✓ Water Repellent
- ✓ Sound Absorbent
- ✓ Environmentally Sustainable

ROXUL Tapered 1/2" Slope:



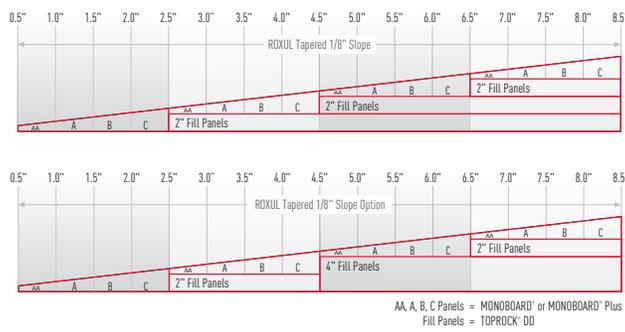
| Thickness (in) | MONOBOARD® Panel | ROXUL® Panel | ROXUL® Option Panel |
|----------------|--------------------------------------|----------------------------|----------------------------|
| 0.5 to 2.5 | Q | Q | Q |
| 2.5 to 4.5 | Q + TOPROCK + 2" | Q + TOPROCK + 2" | Q + TOPROCK + 2" |
| 4.5 to 6.5 | Q + TOPROCK + 2" + 2" | Q + TOPROCK + 4" | Q + TOPROCK + 4" |
| 6.5 to 8.5 | Q + TOPROCK + 2" + 2" + 2" | Q + TOPROCK + 4" + 2" | Q + TOPROCK + 4" + 2" |
| 8.5 to 10.5 | Q + TOPROCK + 2" + 2" + 2" + 2" | Q + TOPROCK + 4" + 4" | Q + TOPROCK + 4" + 4" |
| 10.5 to 12.5 | Q + TOPROCK + 2" + 2" + 2" + 2" + 2" | Q + TOPROCK + 4" + 4" + 2" | Q + TOPROCK + 4" + 4" + 2" |

ROXUL Tapered 1/2" Slope:



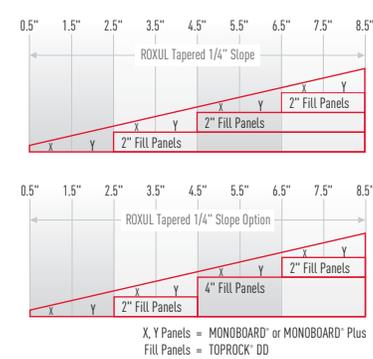
| Thickness (in) | MONOBOARD® Panel | ROXUL® Panel | ROXUL® Option Panel |
|----------------|--|--------------------------------|--------------------------------|
| 0 to 2 | R 0-2 | R 0-2 | R 0-2 |
| 2 to 4 | R 0-2+TOPROCK DD+ 2" | R 0-2+TOPROCK DD+ 2" | R 0-2+TOPROCK DD+ 2" |
| 4 to 6 | R 0-2+TOPROCK DD+ 2" + 2" | R 0-2+TOPROCK DD+ 4" | R 0-2+TOPROCK DD+ 4" |
| 6 to 8 | R 0-2+TOPROCK DD+ 2" + 2" + 2" | R 0-2+TOPROCK DD+ 4" + 2" | R 0-2+TOPROCK DD+ 4" + 2" |
| 8 to 10 | R 0-2+TOPROCK DD+ 2" + 2" + 2" + 2" | R 0-2+TOPROCK DD+ 4" + 4" | R 0-2+TOPROCK DD+ 4" + 4" |
| 10 to 12 | R 0-2+TOPROCK DD+ 2" + 2" + 2" + 2" + 2" | R 0-2+TOPROCK DD+ 4" + 4" + 2" | R 0-2+TOPROCK DD+ 4" + 4" + 2" |

ROXUL Tapered 1/8" Slope:



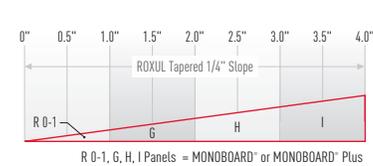
| MONOBOARD® | ROXUL® | ROXUL® Option |
|----------------|--------------------------|-----------------------|
| Thickness (in) | Panel | Panel |
| 0.5 to 1 | AA | AA |
| 1 to 1.5 | A | A |
| 1.5 to 2 | B | B |
| 2 to 2.5 | C | C |
| 2.5 to 3 | AA + TOPROCK DD 2" | AA + TOPROCK DD 2" |
| 3 to 3.5 | A + TOPROCK DD 2" | A + TOPROCK DD 2" |
| 3.5 to 4 | B + TOPROCK DD 2" | B + TOPROCK DD 2" |
| 4 to 4.5 | C + TOPROCK DD 2" | C + TOPROCK DD 2" |
| 4.5 to 5 | AA + TOPROCK DD 2"+2" | AA + TOPROCK DD 4" |
| 5 to 5.5 | A + TOPROCK DD 2"+2" | A + TOPROCK DD 4" |
| 5.5 to 6 | B + TOPROCK DD 2"+2" | B + TOPROCK DD 4" |
| 6 to 6.5 | C + TOPROCK DD 2"+2" | C + TOPROCK DD 4" |
| 6.5 to 7 | AA + TOPROCK DD 2"+2"+2" | AA + TOPROCK DD 4"+2" |
| 7.00 to 7.50 | A + TOPROCK DD 2"+2"+2" | A + TOPROCK DD 4"+2" |
| 7.50 to 8.00 | B + TOPROCK DD 2"+2"+2" | B + TOPROCK DD 4"+2" |
| 8.00 to 8.50 | C + TOPROCK DD 2"+2"+2" | C + TOPROCK DD 4"+2" |

ROXUL Tapered 1/4" Slope:



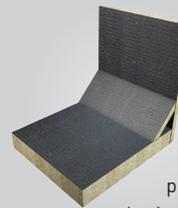
| MONOBOARD® | ROXUL® | ROXUL® Option |
|----------------|-------------------------|----------------------|
| Thickness (in) | Panel | Panel |
| 0.5 to 1.5 | X | X |
| 1.5 to 2.5 | Y | Y |
| 2.5 to 3.5 | X + TOPROCK DD 2" | X + TOPROCK DD 2" |
| 3.5 to 4.5 | Y + TOPROCK DD 2" | Y + TOPROCK DD 2" |
| 4.5 to 5.5 | X + TOPROCK DD 2"+2" | X + TOPROCK DD 4" |
| 5.5 to 6.5 | Y + TOPROCK DD 2"+2" | Y + TOPROCK DD 4" |
| 6.5 to 7.5 | X + TOPROCK DD 2"+2"+2" | X + TOPROCK DD 4"+2" |
| 7.5 to 8.5 | Y + TOPROCK DD 2"+2"+2" | Y + TOPROCK DD 4"+2" |

ROXUL Tapered 1/4" Slope:



| MONOBOARD® | ROXUL® | ROXUL® Option |
|----------------|--------|---------------|
| Thickness (in) | Panel | Panel |
| 0 to 1 | R 0-1 | R 0-1 |
| 1 to 2 | G | G |
| 2 to 3 | H | H |
| 3 to 4 | I | I |

ROXUL Cant Strip



ROXUL Cant Strips are a rigid mineral wool cant, coated with a bitumen coating and a lightly sanded surface. They are intended for commercial and industrial roof insulation applications. Cant strips provide 45 degree transition from a horizontal to a vertical surface in modified bitumen or built-up roof membrane systems.

Standard sizes available:

- 4" (width) x 48" (length) x 1.5" (thickness)
- 101 mm (width) x 1220 mm (length) x 38 mm (thickness)



A Global Leader

ROXUL Inc. is part of ROCKWOOL International, the largest producer of stone wool insulation, which is made from natural basalt rock and recycled material.

ROCKWOOL International was founded in 1909 and today operates worldwide with more than 9,300 employees, with 27 factories across three continents.

ROCKWOOL has more than 40 years experience in developing and manufacturing advanced wall system products. For 25 years, ROXUL has been serving the North American market.

In addition to high temperature insulation for industrial applications, ROXUL also manufactures a range of other premium insulation products for multiple applications.

ROXUL is the Better Insulation

ROXUL® tapered products are an innovative insulation offering a world of green features. When ROXUL is the specified insulation, green building developers can earn a variety of LEED® (Leadership in Energy and Environmental Design) points across four key categories toward sustainable development.

Environmentally Sustainable

Our stone wool production process utilizes some of the most advanced technology available. The ROXUL facility is designed to capture and recycle rainwater, reduce energy consumption, and create zero waste to landfill by recycling raw materials back into the production process.

ROXUL insulations are created using naturally occurring, inorganic raw materials and materials with a high-recycled content. Stone wool insulation is non-combustible and achieves its thermal performance without the use of blowing agents. The products do not off-gas and are fully recyclable, therefore contributing to a sustainable environment.

ROXUL is pleased to have third-party certification of our products' recycled content for our Milton facility completed by ICC -ES SAVE™. All ROXUL products produced in the Milton facility contain a minimum of 40% recycled content. ROXUL products produced in our Grand Forks facility are currently awaiting ICC-ES Save™ certification.

ROXUL demonstrates its commitment to the environment through eco-friendly insulation products and green manufacturing processes

For further details contact your ROXUL sales representative. Please visit www.roxul.com for the latest information.



ROXUL INC.
420 Bronte Street South
Suite 105,
Milton, Ontario L9T 0H9
Tel: 1-800-265-6878
www.roxul.com



Fire Resistant



Water Repellent



Sound Absorbent



Saves Energy



Made from Stone



ROXBETAPERED-01_0613



Material Safety Data Sheet
Material Name: Mineral Wool Insulation

1. Identification:

- 1.1 Product Generic Name: Mineral Wool Insulation
- 1.2 Product Use: Commercial, Industrial, Residential, and Marine Insulation
- 1.3 Products: APB®, CAVITYROCK®, COMFORTBATT®, COMFORTBOARD™, CONROCK®, CURTAINROCK®, DRAINBOARD®, ENERWRAP®, FABROCK™, FIREWALL®, MONOBOARD®, ProRox®, RHM®, RHT®, ROCKBOARD®, ROCKFILL™, ROXUL Plus®, SAFE®, SAFE'n'SOUND®1, SeaRox®, STURDIROCK®, TECHTON 1200®, TECHTON 1200® MARINE, TOPROCK®
- 1.4 Company Address: ROXUL Inc.
420 Bronte St. S.
Suite 105
Milton, Ontario
Canada
L9T 0H9
- 1.5 Web Site: www.roxul.com
- 1.6 If further information is required, please call or fax ROXUL Inc.
Telephone: 1-800-265-6878 or 905-878-8474 Fax: 905-878-8077

1. SAFE'n'SOUND® is a registered Trademark used under license by ROXUL Inc.

2. Information on Ingredients:

| <u>Ingredient Name</u> | <u>CAS Number</u> | <u>%</u> |
|--|-------------------|----------|
| Mineral Fiber | RN 65997-17-3 | 94-99 |
| Cured Urea Extended Phenolic Formaldehyde Binder | 25104-55-6 | 1-6 |

3. Hazards Identification:

- 3.1 Appearance and Odor: Grey, green, brown fibrous batt, blanket, preformed pipe or board.
- 3.2 Emergency Overview: Acrid smoke may be generated during a fire.
Exposure to dust may be irritating to the eyes, nose and throat.
- 3.3 Potential Health Effects:
- 3.3.1 Inhalation: Temporary mechanical irritation of the upper respiratory tract (scratchy throat, coughing, congestion) may result from exposures to dusts and fibers in excess of applicable exposure limits.
- 3.3.2 Skin Contact: Dusts and fibers may cause temporary mechanical irritation (itching) or redness to the skin.
- 3.3.3 Eye Contact: Dusts and fibers may cause temporary mechanical irritation (itching) or redness to the eyes.
- 3.3.4 Ingestion: Ingestion of this product is unlikely and not intended under normal conditions of use. Ingestion of this product may cause gastrointestinal irritation.
- 3.3.5 Existing Medical Conditions: Pre-existing chronic eye, skin and respiratory conditions may temporarily worsen due to exposure to dusts and fibers.



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Material Safety Data Sheet

Material Name: Mineral Wool Insulation

4. First-Aid Measures:

- 4.1 Inhalation: If irritation occurs, remove the affected person to fresh air. Drink water, and blow nose, to clear dusts and fibers from throat and nose. If irritation persists, consult a physician.
- 4.2 Skin: If irritation occurs, do not rub or scratch. Rinse under running water prior to washing with mild soap and water. Use a washcloth to help remove fibers. If irritation persists, consult a physician.
- 4.3 Eyes: If irritation occurs, flush eyes with plenty of water for at least 15 minutes. Do not rub the eyes. Consult a physician if irritation persists.
- 4.4 Ingestion: Ingestion of this product is unlikely and not intended under normal conditions of use. If it does occur, rinse mouth with plenty of water to help remove dust and fibers, and drink plenty of water to help reduce potential gastrointestinal irritation. Do not induce vomiting unless directed to do so by a physician.

5. Fire-Fighting Measures:

The products are non-combustible and do not pose a fire hazard. However, packaging material may burn.

- 5.1 Suitable extinguishing media: Water, foam, carbon dioxide or dry powder
 - 5.2 Extinguishing media which must not be used for safety reasons: None
 - 5.3 Combustion products: Carbon dioxide, carbon monoxide and trace gases
 - 5.4 Special protective equipment for fire-fighters: Observe normal fire fighting procedures
 - 5.5 Flash point: None Flash Point Method Used: Not Applicable
- | | |
|---|---|
| <u>Upper Flammable Limit (UFL)</u> : Not Applicable | <u>Lower Flammable Limit</u> : Not Applicable |
| <u>Autoignition</u> : Not Applicable | <u>Explosive Properties</u> : Not Applicable |

6. Accidental Release Measures:

- 6.1 Containment Procedures: Pick up large pieces and scoop up dusts and fibers after they have settled out of air. These materials will disperse and settle along the bottom of waterways and ponds. It cannot easily be removed once it is waterborne, but is considered non-hazardous in water.
- 6.2 Cleanup Procedures: Use OSHA-recommended work practices and protective equipment as described in Section 8 of this Material Safety Data Sheet. Avoid generating airborne dusts and fibers during cleanup. Do not use compressed air. Vacuum dusts and fibers. Place material in an appropriate container for disposal as non-hazardous waste.
- 6.3 Response Procedures: Isolate area. Keep unnecessary personnel away. If dry methods or compressed air are used to collect dusts and fibers, all personnel in the area should wear OSHA-approved protective equipment (see Section 8 of this Material Safety Data Sheet).



Material Safety Data Sheet
Material Name: Mineral Wool Insulation

7. Handling and Storage:

7.1 General Precautions:

- Utilize OSHA-recommended work practices and protective equipment when using the products (see Section 8 of this Material Safety Data Sheet).

7.2 Handling:

- Unpack material at application site to avoid unnecessary handling of product.
- Keep work areas clean. Avoid unnecessary handling of scrap material and debris by placing such materials in suitable containers, which should be kept as close to the work area as possible.
- Ensure good ventilation. Local exhaust ventilation may be required if the method of use produces dust levels which exceed applicable exposure limits (see Section 8 of this Material Safety Data Sheet).
- Avoid excessive eye and skin contact with dusts and fibers.
- Use recommended cleanup procedures to avoid buildup of dusts and fibers in the work area.

7.3 Storage:

- Keep material in original packaging until it is to be used.
- Store material to protect against adverse conditions including precipitation.

8. Exposure Controls/Personal Protection:

8.1 Exposure Guidelines:

8.1.1 General Product Information: Follow all applicable exposure limits. Local regulations may apply. Roxul recommends that users of the products adhere to the OSHA-recommended PEL of 1 f/cc TWA (fibers longer than 5 µm with diameters less than 3 µm). This recommended PEL, together with recommended work practices and personal protective equipment, were adopted in a Health and Safety Partnership Program (HSPP) agreement in 1999 between OSHA and the North American Insulation Manufacturers Association (NAIMA), of which Roxul is a member. Adherence to the OSHA-recommended PEL, work practices and protective equipment in the HSPP is expected to provide appropriate protection against all inhalation-related health risks that may be associated with exposures to mineral wool fibers (ACGIH 1997; NAIMA 1999; OSHA 1999; National Research Council 2000, IARC 2001), and to minimize eye and skin irritation.

8.1.2 Component Exposure Limits:

| Source | Legal or Recommended Exposure Limit | Exposure |
|--------|--|--|
| OSHA | 1 f/cc TWA (recommended) | Synthetic Vitreous Fibers, > 5 µm length, < 3 µm diameter |
| ACGIH | 1 f/cc TWA (threshold limit value – TLV) | Synthetic Vitreous Fibers, > 5 µm length, < 3 µm diameter |
| OSHA | 15 mg/m ³ TWA-PEL (total particulate) 5 mg/m ³ TWA-PEL (respirable particulate) | Inert dust and particulates not otherwise regulated |
| ACGIH | 10 mg/m ³ TWA-TLV (inhalable particulate) 3 mg/m ³ TWA-TLV (respirable particulate) | Particulates not otherwise classified, containing no asbestos and <1% crystalline silica |



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Material Safety Data Sheet

Material Name: Mineral Wool Insulation

- 8.2 **Equipment and Work Practices:** Follow OSHA-recommended equipment and work practices. A complete copy of these practices can be obtained from Roxul Inc. (see Section 1 of this Material Safety Data Sheet), and is available on the OSHA website (<http://www.osha.gov/SLTC/syntheticmineralfibers>).
- 8.2.1 Follow OSHA-recommended safe handling practices listed in Section 7.2 above.
 - 8.2.2 Where feasible, general dilution ventilation or local exhaust ventilation should be used as necessary to maintain exposures below applicable exposure limits. Dust collection systems should be used in cutting or machining operations and may be needed when using power tools.
 - 8.2.3 Follow OSHA-recommended work practices when fabricating, installing or removing product.
- 8.3 **Personal Protective Equipment:**
- 8.3.1 **Respiratory:**
 - 8.3.1.1 **General:**
In poorly ventilated areas when dusty conditions exist and/or dust levels exceed applicable exposure limits, wear a NIOSH certified dust respirator with an efficiency rating of N95 or higher. Use disposable face masks complying with NIOSH respirator standards, such as a 3M Model 8210 (or 8710) (3M Model 9900 in high humidity environments) or equivalent. For exposures up to five times the established exposure limits use a quarter-mask respirator, rated N95 or higher; and for exposures up to ten times the established exposure limits use a half-mask respirator (e.g. MSA's DM-11, Rascal's Delta N95, 3M's 8210), rated N95 or higher. For exposures up to 50 times the established exposure limits use a full-face respirator, rated N99 or higher.
 - 8.3.1.2 **Specific Operations:**
In poorly ventilated areas when dusty conditions exist and/or dust levels exceed applicable exposure limits, wear a NIOSH certified dust respirator with an efficiency rating of N95 or higher, such as a 3M Model 8210 (or 8710) (3M Model 9900 in high humidity environments) or equivalent, when fabricating, installing or removing product.
 - 8.3.2 **Skin:**
Wear loose fitting, long sleeved and long-legged clothing to prevent irritation. A head cover is also recommended, especially when working with material overhead. The use of suitable gloves is also recommended. Skin irritation cannot occur if there is no contact with the skin. Do not tape sleeves or pants at wrists or ankles. Remove fibers from the work clothes, before leaving work to reduce potential skin irritation. If working in a very dusty environment it is advisable to shower and change clothes
 - 8.3.3 **Eyes/Face:**
Wear safety goggles or safety glasses with side shields.

9. Physical and Chemical Properties:

- 9.1 **Appearance:** Grey, green fibrous batt or board
- 9.2 **State:** Solid
- 9.3 **Odor:** May have slight resin odour
- 9.4 **Boiling point:** n.a.
- 9.5 **Melting point:** Approximately 2150 °F (1177 °C)
- 9.6 **Vapour pressure:** n.a.
- 9.7 **Vapour Density:** n.a.
- 9.8 **Specific Gravity:** n.a.
- 9.9 **Evaporation Rate:** n.a.
- 9.10 **Freezing Point:** n.a.
- 9.11 **Viscosity:** n.a.
- 9.12 **Solubility:** Insoluble (H₂O)
- 9.13 **Partition coefficient:** n.a.

n.a. = not applicable



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ROXUL[®]

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Material Name: Mineral Wool Insulation

10. Stability and Reactivity:

- 10.1 Stability: Stable
- 10.2 Reactivity: Not reactive
- 10.3 Thermal decomposition products:
Primary combustion products of the cured urea extended phenolic formaldehyde binder, when heated above 390 °F (200 °C), are carbon monoxide, carbon dioxide, ammonia, water and trace amounts of formaldehyde. Other undetermined compounds could be released in trace quantities. Emission usually only occurs during the first heating. The released gases may be irritating to the eyes, nose and throat during initial heat-up. Use appropriate respirators (air supplied) particularly in tightly confined or poorly ventilated areas during initial heat-up.
- 10.4 Hazardous Polymerization: Will not occur
- 10.5 Incompatible Materials: This product reacts with hydrofluoric acid.

11. Toxicological Information:

- 11.1 Acute Toxicity:
Coarse fibers and dust from mineral wool products can cause temporary mechanical irritation (itching, redness) of the skin, and of the mucous membranes in the eyes and in the upper respiratory tract (nose and throat). The itching and possible inflammation are a mechanical reaction to dust and coarse fibers (of more than about 5 µm in diameter), and are not damaging in the way chemical irritants may be. They generally abate within a short time after the end of exposure. When products are handled continually, the skin itching generally diminishes.
- 11.2 Chronic Toxicity:
- 11.2.1 Summary: In October 2001, IARC completed a re-evaluation of respirable mineral wool fibers and classified them in Group 3 (not classifiable as to their carcinogenicity to humans). A summary of the most important scientific studies appears below:
- 11.2.2 Human Data:
- 11.2.2.1 The possible carcinogenic effects of exposure to mineral wool fibers has been evaluated in a number of epidemiological (human) studies. Most of this research, including large long-term studies of mineral wool production workers in the U.S. and Europe, has been sponsored or supported by the North American and International thermal insulation industries, including Roxul Inc. Published reports of the early results of these studies identified significantly elevated rates of respiratory cancer in several subcohorts of the worker populations under evaluation (e.g., Simonato et al. 1987; Enterline et al. 1987). However, the studies had several methodological limitations, including failure to control for confounding exposures to other possible causes of the elevated cancer risk, including tobacco use and occupational exposures to recognized carcinogens such as asbestos. For these reasons, the authors of these reports did not interpret the results as establishing an association between exposure to mineral wool fibers and an increased risk of cancer. Several of these earlier reports formed part of the basis for IARC's previous classification of mineral wool fibers in Group 2B (possibly carcinogenic to humans) (IARC 1987).
- 11.2.2.2 Follow-up studies, including case-control studies designed to exclude the contribution of confounding exposures to the cancer experience of the study populations, found no evidence that mineral wool fibers are associated with an increased cancer risk (Marsh et al. 1996; Wong, et al. 1991; Kjaerheim et al. 2001). In announcing the new Group 3 classification for mineral wool fibers, IARC stated: "Epidemiologic studies published during the 15 years since the previous IARC Monographs review of these fibers in 1988 provide no evidence of increased risks of lung cancer or of mesothelioma (cancer of the lining of the body cavities) from occupational exposures during manufacture of these materials" (IARC 2001).
- 11.2.3 Animal Data:
- 11.2.3.1 Several studies of intraperitoneal injection of high doses of mineral wool fibers have produced significant increases in the incidence of mesothelioma (IARC 2002). The intraperitoneal injection studies formed part of the basis for IARC's previous (IARC 1987) Group 2B classification for mineral wool fibers. Leading scientists agree that intraperitoneal injection studies (i.e., surgical implantation or injection into the chest or abdomen) are the least relevant type of animal study for evaluating



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Material Name: Mineral Wool Insulation

potential human risk for fiber exposures, because such studies bypass the animals' natural defense mechanisms and involve a type and pattern of exposure (implantation of a high dose early in life) that does not mimic human patterns of exposure (inhalation of much lower doses over a lifetime) (National Research Council 2000).

11.2.3.2 A well-designed long-term inhalation study in rats exposed to mineral wool fibers found no significant increase in lung tumor incidence, and no mesotheliomas (IARC 2002). Likewise, in two intratracheal instillation studies of mineral wool fibers, no significant increase in the incidence of lung tumors or mesotheliomas was found (IARC 2002). Inhalation studies are regarded as the most relevant type of animal data for evaluating potential human risk, and intratracheal instillation studies, while less relevant, are considered valuable for the initial screening of fibrous compounds (National Research Council 2000). Thus, evaluating all the available animal studies in conjunction with the human data, IARC's most recent review finds "inadequate evidence overall for any cancer risk" from mineral wool fibers (IARC 2001).

11.3 Evaluations of Potential Carcinogenicity:

| Source | Classification | Description |
|--------|----------------|--|
| IARC | Group 3 | Not Classifiable as a Human Carcinogen |
| ACGIH | Group A3 | Confirmed Animal Carcinogen with Unknown Relevance to Humans |

12. Ecological Information:

- 12.1 Ecotoxicity: No data available for the products. The products are stable, are not expected to cause harm to animals, plants or fish, and have no other known adverse environmental effects.
- 12.2 Environmental Fate: No data available for the products.

13. Disposal Considerations:

13.1 US EPA Waste Number & Descriptions:

13.1.1 General Product Information: The products, as supplied, are not expected to be a characteristic hazardous waste under RCRA if discarded.

13.1.2 EPA Waste Numbers: No EPA Waste Numbers are applicable for this product's components.

13.2 Disposal Instructions: Product is not considered a hazardous waste. Dispose of waste material according to Federal, State, Provincial, and Local environmental regulations.

14. Transport Information:

- 14.1 General: No special precautions.
- 14.2 US DOT Information: This product is not classified as a hazardous material for transport.

15. Regulatory Information:

15.1 U.S. Regulations:

15.1.1 Toxic Substances Control Act (TSCA): All components in this product are listed, as required, on the US EPA TSCA inventory, or are not required to be listed

15.1.2 CERCLA: Includes mineral fiber emissions from facilities manufacturing or processing glass rock or slag fibers (or other mineral derived fibers) of average diameter 1 micrometer or less; Statutory RQ = 1 pound (.454 kg); no final RQ is being assigned to the generic or broad class (related to Fine mineral fibers).



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Material Safety Data Sheet

Material Name: Mineral Wool Insulation

- 15.1.3 Clean Air Act: Mineral wool fiber appears on the Clean Air Act-1990 Hazardous Air Pollutants List.
- 15.2 State and Local Regulations: State, Provincial, and Local regulations not identified in this Material Safety Data Sheet may apply.
- 15.3 WHMIS: The products have been classified in accordance with the hazard criteria of the Controlled Product Regulations and this Material Safety Data Sheet contains all the information required by the Controlled Product Regulations
 - 15.3.1: WHMIS IDL: No components are listed on the IDL
 - 15.3.2: WHMIS Classification: No components are classified as controlled products.

16. Further Information:

- 16.1 Potential Health Effects:
IARC Monograph Man-made Vitreous Fibres, press release October 2001

Safety in the Use of Mineral and Synthetic Fibers, Occupational Safety and Health Series. International Labor Office (ILO).

Information about "Health and Safety Research on Rock- and Slag-wool" can be obtained from the North American Insulation Manufacturers Association (NAIMA), 44 Canal Center Plaza, Suite 310, Alexandria, VA 22314, USA). Home-page: <http://www.naima.org>
- 16.2 Key/Legend:
ACGIH = American Conference of Governmental Industrial Hygienists; CAA = Clean Air Act; CAS = Chemical Abstracts Service; CERCLA = Comprehensive Environmental Response, Compensation and Liability Act; DOT = Department of Transportation; EPA = Environmental Protection Agency; HMS = Hazardous Material Identification System; HSPP = Health and Safety Partnership Program; IARC = International Agency for Research on Cancer; MSDS = Material Safety Data Sheet; NAIMA = North American Insulation Manufacturers Association; NFPA = National Fire Protection Association; NIOSH = National Institute for Occupational Safety and Health; OSHA = Occupational Safety and Health Administration; PEL = Permissible Exposure Limit; RCRA = Resource Conservation and Recovery Act; RQ = Reportable Quantity; SVF = synthetic vitreous fibers; TSCA = Toxic Substances Control Act; TWA = time-weighted average; WHMIS = Workplace Hazardous Materials Information System.
- 16.3 References: Complete citations, or copies, of all references cited in this Material Safety Data Sheet can be obtained from Roxul Inc. (see Section 1).
- 16.4 Accuracy: The information contained herein is based upon data considered to be accurate. However, no warranty is expressed or implied regarding the accuracy of these data, the results to be obtained from the use thereof, or that any such use will not infringe upon any patent. This information is furnished as a guide only and upon the condition that the person receiving it shall make tests to determine the accuracy and suitability for his or her own purpose.

DELTA®

DELTA® protects property. Saves energy. Creates comfort.

TECHNICAL DATA SHEET

DELTA®-FASSADE S

Water-resistant Barrier for Façade Systems with Open Joint Claddings.

MATERIAL

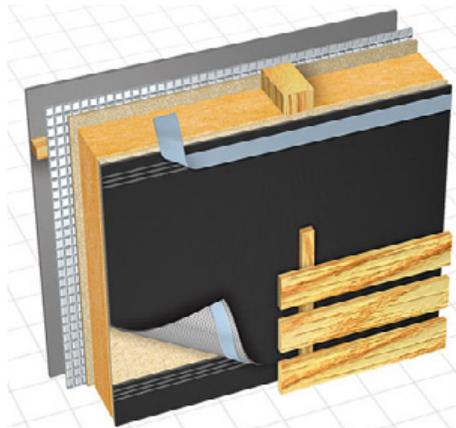
Highly tear-resistant polyester substrate with a special, highly UV-stabilized acrylic coating.

PROPERTIES

DELTA®-FASSADE S, highly stabilized against damage from UV exposure, is designed for use in cladding systems that have open joints of up to 2" (50 mm) wide which expose up to 40 % of the entire facade surface. It acts as a durable drainage plane, channeling bulk (liquid) water from wind-driven rain and snow to the outside of the structure. The watertight membrane helps protect the building enclosure from damaging effects of moisture infiltration. Its high vapor permeability allows moisture within the cavity to escape swiftly. DELTA®-FASSADE S is very light-weight and tear-resistant. This membrane withstands the rigors of jobsites, as well as tough wind and weather. Its performance is unaffected by surfactants.

APPLICATION

DELTA®-FASSADE S is installed outboard of the sheathing prior to the application of the final cladding system. DELTA® Accessories complete a UV resistant WRB system.



DELTA® products support sustainable and energy-efficient building practices, including efforts toward achieving LEED® certification (LEED® for New Construction & Major Renovations, LEED® for Core and Shell, LEED® for Existing Buildings and LEED® for Homes).

For technical support, call our technical support team at 1-888-4DELTA4 (1-888-433-5824) extension 326, or visit www.cosella-dorcken.com.

ICC ESR-2932 DELTA® Water-resistant Barriers

Cosella-Dörken Products Inc. 4655 Delta Way Beamsville, Ontario L0R 1B4
1-888-4 DELTA 4, (905) 563-3255 Fax: (905) 563-5582
info@cosella-dorcken.com, www.cosella-dorcken.com

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Technical Data

| | | |
|---|---|--|
| Product name | DELTA®-FASSADE S | |
| Color | black | |
| Material | PET substrate with UV stable acrylic coating | |
| Water vapor transmission | 1414.6 g/m ² /24 h | ASTM E96-05, Proc. A |
| | 2247.4 g/m ² /24 h | ASTM E96-05, Proc. A |
| Vapor permeance | 204 perms [grains/h/ft ² /in Hg] | ASTM E96-05, Proc. A |
| | 328 perms [grains/h/ft ² /in Hg] | ASTM E96-05, Proc. B |
| Dry tensile strength | MD 47.4 lbs/in | ASTM D882-02 |
| | CD 28.7 lbs/in | |
| Elongation at break | MD 40% | ASTM D882-02 |
| | CD 45% | |
| Tear resistance | MD 1916 g | ASTM D1922-06a |
| | CD 2564 g | |
| Fastener pull-through force | 211.3 N | ASTM D3462-03 |
| Water penetration resistance (Water Ponding Test) | Pass (> 10 min.) Meets requirements of AC308 for Grade D water-resistant barrier | ICC AC308, 4.2.2, June 2011 (CCMC MF07102, Section 6.4.5) |
| Water penetration resistance | 103.8 cm | CAN/CGSB-4.2 #26.3-95 |
| Water impact penetration resistance | no water passing | AATCC 42-2000 |
| Bent test | Pass (no cracking) | ICC AC 38, 3.3.3 |
| Pliability | Pass (no cracking) | CAN/CGSB-51.32-M77 § 5.2 |
| Flame Spread | 10 | ASTM E84-09 |
| | NFPA Class A; IBC Class A | |
| Smoke developed | 145 | ASTM E84-09 |
| | NFPA Class A; IBC Class A | |
| Air permeance | 0.9 l/(s x m ²) @ 75 Pa | ASTM E2178 |
| Temperature range | -40 °F to +176 °F (-40 °C to +80 °C) | |
| Roll weight | approx. 44 lb (20 kg) | |
| Roll length | 164 ft (50 m) | |
| Roll width | 4' 11" ft (1.5 m) | |
| Maximum UV (sunlight) exposure | Always cover as soon as possible. Maximum exposure 30 weeks (prior to installation of cladding). | |
| Service life expectancy | > 25 years, if installed behind cladding systems that have open joints of up to 2" (50 mm) width which expose no more than 40% of entire façade surface | |
| DELTA® Accessories | DELTA®-FASSADE TAPE 2 1/2" x 65' 7" (10 / box) DELTA®-FASSADE FLASHING 4" x 65' 7" (6 / box) DELTA®-FASSADE FLASHING 9" X 65' 7" (2 / box) | Working temperature from 40 °F to 104 °F (+5 °C to 40 °C) |

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PREMIUM QUALITY

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TECHNICAL DATA SHEET

DELTA®-VENT SA

Self-Adhered Water-resistive Barrier & Air Barrier

MATERIAL

DELTA®-VENT SA is a 3-layer self-adhered water-resistive barrier (WRB) and air barrier. Its two outer layers are made of a high strength spun-bonded polypropylene (PP) fabric. They are thermally bonded to a highly vapor permeable, watertight polymeric middle layer. DELTA®-VENT SA maintains high vapor permeability and has a full surface coating of a high tack adhesive for bonding to common substrates. It has a split release liner for ease of application. The matte gray color of DELTA®-VENT SA prevents blinding glare during installation.

PROPERTIES

DELTA®-VENT SA is a vapor permeable WRB, allowing moisture within the building enclosure to escape through the membrane via diffusion. Its permeability and air-tightness make it an ideal air and water-resistive barrier membrane for energy-efficient construction. DELTA®-VENT SA not only passes, but also dramatically exceeds the most stringent requirements of the Air Barrier Association of America (ABAA) and of the National Building Code of Canada (NBC 2010) based on the results of ASTM E2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies. Full adhesion maximizes air tightness and minimizes fastener penetrations. The product is watertight and protects the building enclosure from wind-driven rain. DELTA®-VENT SA is very light-weight and tear-resistant. This membrane withstands the rigors of jobsites, as well as tough wind and weather. Its performance is unaffected by surfactants. DELTA®-VENT SA is equivalent to a 60 minute Grade D building paper.

APPLICATION

DELTA®-VENT SA is installed outboard of the sheathing prior to the application of the final cladding system. DELTA® Accessories complement the WRB / Air Barrier installation. It may be adhered to concrete, masonry, OSB, plywood, or exterior grade drywall. Where required DELTA® primers are available.



P R E M I U M Q U A L I T Y

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Technical Data

| | | |
|---------------------------------------|---|---------------------------|
| Product name | DELTA®-VENT SA | |
| Color | gray | |
| Adhesive coating | Full surface coating with vapor permeable pressure-sensitive adhesive | |
| Water vapor transmission | 214 g/m ² /24 h | ASTM E96-05, Proc. A |
| | 343 g/m ² /24 h | ASTM E96-05, Proc. B |
| Vapor permeance | 31 perms [grains/h/ft ² /in Hg] | ASTM E96-05, Proc. A |
| | 50 perms [grains/h/ft ² /in Hg] | ASTM E96-05, Proc. B |
| Air Leakage of Air Barrier Assemblies | < 0.2 L/(s•m ²) @ 75 Pa (0.04 cfm/ft ² @ 1.57 lb/ft ²) as per ABAA and NBC 2010 requirements | |
| Breaking strength | MD 71 lb | ASTM D5034-95 |
| | CD 65.4 lb | |
| Elongation at break | MD 27.8 % | ASTM D5034-95 |
| | CD 60.1 % | |
| 90° Peel adhesion | Pass | AAMA 711-5.3 (ASTM D3330) |
| Accelerated aging (U.V) | Pass | AAMA 711-5.4 |
| Elevated temperature | Pass (Level 3) | AAMA 711-5.5 (ASTM D3330) |
| Thermal cycling | Pass | AAMA 711-5.6 |
| Adhesion after water immersion | Pass | AAMA 711-5.8 |
| Bent test | Pass | AC-308 3.3.4 |
| Nail Sealability | Pass | ASTM D1970-01 |
| Water resistance hydrostatic pressure | Pass (55 cm > 5 hours) | AATCC 127-1985 |

DELTA® products support sustainable and energy-efficient building practices, including efforts toward achieving LEED® certification (LEED® for New Construction & Major Renovations, LEED® for Core and Shell, LEED® for Existing Buildings and LEED® for Homes).

For technical support, call our technical support team at 1-888-4DELTA4 (1-888-433-5824) extension 326, or visit www.cosella-dorken.com.

LOCKED TIGHT ADHESIVE EDGE

DELTA®-VENT SA has a special edge running along the front side of one long edge. It has a release liner that, when removed, exposes a high tack adhesive. This adhesive bonds tightly and permanently with the next overlapping course of DELTA®-VENT SA, creating a secure and very air and water-tight seal.



PREMIUM QUALITY

Technical Data

| | | |
|--|--|------------------|
| Water resistance hydrostatic pressure | Pass (55 cm > 5 hours) | AATCC 127-1985 |
| Linear dimensional change at elevated temperature (185 °F (85 °C)) | MD -1.4% | ASTM D1204-08 |
| | CD +0.1% | |
| Resistance to puncture | 78.6 lbs (333.1N) | ASTM E154-99(10) |
| Low temperature flexibility | Pass | ASTM D1970-01 |
| Crack bridging ability | Pass -15 °F (-26 °C) | ASTM C1305-06 |
| Flame spread | 14 | ASTM E84-09 |
| | NFPA Class A; IBC Class A | |
| Smoke developed | 47 | ASTM E84-09 |
| | NFPA Class A; IBC Class A | |
| Air permeance | Pass (< 0.02 l/(s x m²) @ 75 Pa) | ASTM E2178 |
| Application temperature | Minimum 40 °F (5 °C) | |
| Service temperature | -40 °F to +176 °F (-40 °C to +80 °C) W / Primer | |
| | -13 °F to +176 °F (-25 °C to +80 °C) W/O primer | |
| Roll weight | approx. 40 lb (18 kg) | |
| Roll size | 4' 11" (1.5 m) x 115' (35 m) | |
| Maximum UV (sunlight) exposure | Do not expose to UV (sunlight) for longer than 50 days. | |
| DELTA® Accessories | DELTA®-MULTI BAND 2" x 82' (60 mm x 25m) DELTA®-FLEX-BAND 4" x 33' (100 mm x 10 m) DELTA®-FLASHING 4" x 75' (100 mm x 22.8 m) DELTA®-FLASHING 9" x 75' (230 mm x 22.8 m) DELTA®-FAS CORNER DELTA®-THAN 310 ml (10.9 lf oz) / cartridge or DOW CORNING® 758 DELTA®-LVC PRIMER 4.72 gal. (17.9 L) / pail | |

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DELTA[®] System

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Technical Guide DELTA[®]-VENT SA

COSELLA DÖRKEN



Air Barrier Systems for Low- and Mid-rise Commercial
and Residential Buildings

www.cosella-dorken.com

January 2015 Edition

Cosella-Dörken – Leading Through Technical Competence

Cosella-Dörken Products, Inc. is a subsidiary of the Dörken Group that has over 100 years of experience in the construction industry. Developed from innovative ideas and manufactured on state-of-the-art production lines, the premium quality products for moisture management in building enclosures set standards for reliability, durability, and energy savings. Located in Beamsville, Ontario, Canada, Cosella-Dörken provides customized solutions and products of outstanding quality. Cosella-Dörken Products, Inc. is and always will be a trustworthy and highly respected partner for designers, architects, distributors and installers.

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Residential Application - Risinger Homes, Austin, TX

In this Technical Guide, you will find a building science primer with recommendations by climate zone and a series of best practice enclosure detail drawings for low- and mid-rise commercial and residential buildings.



Commercial Application - Whole Foods, Cherry Hill, NJ

The Building Enclosure and Air Barrier Systems

A functional overview of the building enclosure

The building enclosure is defined as the physical component of a building that separates the interior environment from the exterior environment: it is an environmental separator. In general, the physical function of environmental separation can be further grouped into three sub-categories:

- **1. Support**, i.e., to support, resist, transfer and otherwise accommodate all structural loading imposed by the interior and exterior environments, by the enclosure, and by the building itself. Sometimes, the enclosure, or portions of it, can be an integral part of the building superstructure either by design or in actual performance.
- **2. Control**, i.e., to control, block, regulate and/or moderate all the loadings due to the separation of the interior and exterior environments. This means the flow of mass (rain, air, water vapor, pollutants, etc.) and energy (heat, sound, fire, light, etc.).
- **3. Finish**, i.e., to finish the surfaces at the interface of the enclosure with the interior and exterior environments. Each of the two interfaces must meet the relevant visual, aesthetic, durability and other performance requirements.



For physical performance, the required enclosure control functions include resistance to: rain penetration, air flow, heat transfer, condensation, fire and smoke propagation, sound and light transmission (including view, solar heat, and daylight), insect infestation and particulate penetration, and human access. Because these functions are required everywhere, continuity of these control functions, especially at penetrations, connections and interfaces between materials, is critical to a high performance enclosure.



Air barrier continuity at penetrations

The most important control function with respect to durability is rain control, followed by air control, thermal control, and vapor control. The level of fire and sound control required varies with code and owner requirements. This guide provides recommendations for commercial and residential wall construction encompassing rain control, air control, thermal control, and vapor control requirements.

The Building Enclosure and Air Barrier Systems

The “Perfect” Wall

The support/control/finish components of a typical enclosure assembly are presented in a conceptually “perfect” sequence in Figure 1.

The concept diagram shows a drained and ventilated exterior finish layer (the “cladding”) outside of the thermal, air, vapor, and

water control layers, all of which are to the exterior of the building structure and interior finishes.

By locating the thermal (heat flow) control layer (insulation) on the exterior of the structure and by locating the combined air,

water, and vapor control layers between the structure and the insulation, the structure and control layers are protected from UV exposure, impact, and temperature extremes, thereby increasing the durability of the critical control layers.

Such a strategy works well in all climate zones, from Northern heating-dominated climates to hot and humid Southern climates. The idea of the perfect wall is intended to guide designers on the proper principles during concept design. The same approach can be extended to other enclosure elements such as roofs and foundations. It should be used to ensure continuity of the enclosure control layers when designing details describing the connection between enclosure components like control joints, window and mechanical penetrations. The details provided in this guide use this approach.

DELTA®-VENT SA is intended to be used as the primary water and air control layer in walls systems.

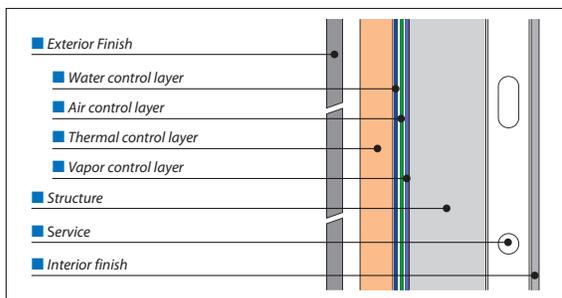


Figure 1: Diagram of the “Perfect” Wall showing ideal sequence of assembly layers (From John Straube, High Performance Enclosures, Building Science Press)

Rain Penetration Control

There are three recognized design strategies to control rain penetration within and through the enclosure: Storage, Drained Screen, or Perfect Barriers.

In a **Storage (or Mass) approach**, it is assumed that water penetrates the outer surface of the wall and then is stored within the mass of the enclosure, eventually removed by drying to the inside or outside. The maximum quantity of rain that can be controlled is limited by the storage capacity available relative to drying conditions. Some examples of mass systems include adobe walls, thatched roofs, solid multi-wythe brick masonry, and single-wythe block masonry that is still employed for some modern buildings.

Drained enclosures assume some rainwater will penetrate the outer surface (hence the cladding “screens” the rain) and therefore the assembly must be designed to remove this water by providing drainage (comprised of a capillary breaking drainage plane such as DELTA®-VENT SA, a drainage gap, flashing, and weep hole/drain). Many cladding systems, such as brick veneer and stucco, leak, as do the joints between other cladding types, such as shakes, terra-cotta, small metal panels, or natural stone. For these cladding types, drainage is a practical and successful approach for rain penetration control. Ventilated rainscreen systems like DELTA®-DRY are designed to provide for drainage and drying in wall assemblies that use these claddings.

Perfect Barrier systems stop all water penetration at a single plane. Such “perfect” control required the advent of modern materials. Because it is difficult to build and maintain a perfect barrier with many materials, it is common to recommend the use of drained walls. However, some systems, usually factory built, provide wall elements that are practical “perfect” barriers. For example, architectural precast concrete can be considered watertight, as can glazing, and roof membranes. The joints between perfect barrier elements almost always should be drained joints in the form of two-stage sealant joints or similar.

Recommendations for rain penetration control

The significance of rainwater management cannot be over-emphasized. Along with the structural support function, it is usually this functional requirement that defines an enclosure design approach.

The climate and site play a large role in defining the amount of rain to which a building is exposed. The amount of annual rainfall is one factor in gauging the rain exposure for a wall assembly (see Figure 2). This is modified by other factors, including the coincidence of rainfall with wind events, the orientation of the building, and height of the building. Most parts of

the world experience a significant amount of wind-driven rain, and those areas exposed to hurricanes can have extreme exposure conditions. While this type of climate demands good rain control strategies for enclosure walls, the rain deposited on walls can be significantly reduced by good design and siting.

Figure 2: Annual Rainfall Map
(From John Straube, *High Performance Enclosures*, Building Science Press. Based on information from the U.S. Department of Agriculture and Environment Canada)



Drained screen wall recommendations

Screened wall systems are inherently more forgiving than either mass or perfect barrier systems. Properly designed and built screened wall systems will provide economical and durable rain penetration control. Failures in screened systems tend to occur because drainage was not provided (either through a design or construction failure).

The most reliable and widely applicable approach is to follow the mantra: **“Deflection, Drainage/Exclusion/Storage, and Drying”**

Proper siting of the building and the use of sloped hip roofs and generous overhangs deflect driving rain, even for tall buildings. Water on the surface of the wall is shed from and deflected around openings by

surface features, drip edges, and protruding flashing. Water is removed from the base of the wall by sloping the grade, and siding is kept at least 8” (200 mm) above grade to protect it from splashes.

Rainwater will penetrate the cladding at joints, laps and penetrations. This water should be removed by drainage on a drainage plane, such as DELTA®-VENT SA, and through a drainage space and redirected to the exterior by the use of waterproof flashing with lap joints sealed and overlapped in shingle fashion. DELTA®-VENT SA has a unique feature that makes a simple overlap reliably water- and air-tight. Each membrane sheet has an adhesive strip with a release liner on the exterior side of the top edge. When the sheet above is lapped over and adhered, this makes an adhesive-to-adhesive sealed lap, reducing the possibility of peeling and leakage at material laps.

Water that remains within the drainage cavity will be absorbed into the cladding and may even penetrate into the structural sheathing or stud space. This water should be removed by drying to the exterior and/or the interior by allowing diffusion drying and ventilating the space behind the cladding. Even for adhered cladding systems (such as stucco or manufactured stone veneer) and directly attached claddings (such as wood or fiber cement) a space for drainage and drying can be created with the DELTA®-DRY structured membrane.

Pressure equalized screened systems offer only marginal benefits in most situations. So long as drainage and capillary breaks are provided, the reduced water penetration that may (and in many cases may not) result from pressure equalization does not aid rain control – failure will still be by a failure to drain.

The Building Enclosure and Air Barrier Systems

Window Installation

Perhaps the most common rainwater control failure occurs at window penetrations. Regardless of which rain penetration control strategy is used, window and door penetrations through a cavity wall should be drained. Sub-sill flashings (see Figure 3) of various types are widely available for this purpose. For drained systems, the flashing can drain into the drainage gap.

Figure 3 shows sub-sill flashings for "punched" window openings in an opaque

wall section. Larger openings, such as curtainwall, window wall, or storefront glazing systems should be treated in a similar way. Many unitized window systems come with drainage tracks or pans that are integrated into the window system. It should be noted that the purpose of these components is to drain the window unit – not necessarily the window opening – and rainwater penetration often occurs at the interface between the window frame system and the opening in the adjacent enclosure.

Figure 4 shows DELTA®-FAS CORNER components, which when used as part of the DELTA®-VENT SA system, protect all four corners of the window rough opening.

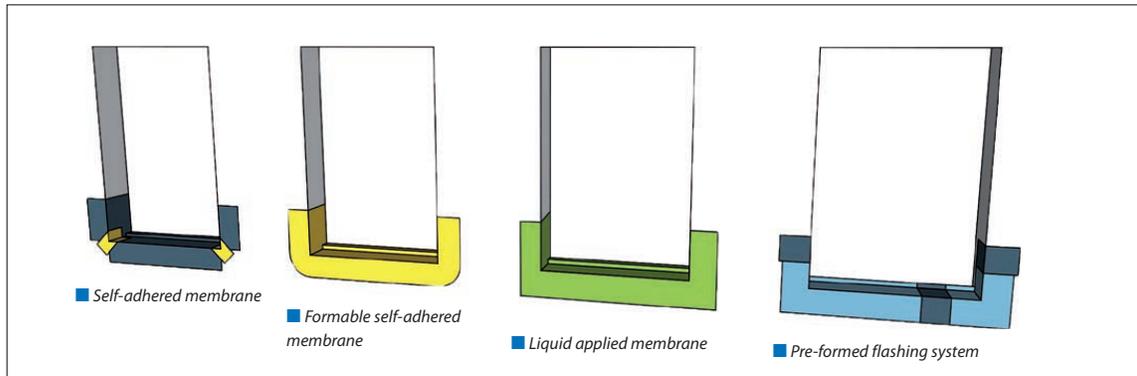


Figure 3: Sub-sill flashing below all window and door openings is a critical component to ensure resistance to rain penetration.



8 Figure 4: DELTA®-FAS CORNER sub-sill flashing system

Air Control

There are three primary reasons why the control of air flow is important to building performance:

- **1. Moisture control** – water vapor in the air can condense within the enclosure and cause serious health, durability, and performance problems.
- **2. Energy savings** – air leaking out of a building must be replaced with additional air, usually outdoor air, which requires energy to condition it. Approximately 30% to 50% of space-conditioning energy consumption in many well-insulated

buildings is due to air leakage through the building enclosure. Air movement within the enclosure, either through low-density insulation or in spaces around insulation, can reduce the effectiveness of thermal insulation and thus increase energy transfer across the enclosure.

- **3. Comfort and health** – cold drafts and dry winter air that result from excessive air leakage can directly affect human comfort. Convective looping of cold outdoor air around low-density insulation can cool the interior side of the enclosure, resulting in condensation which can

cause biological growth. This, in turn, affects indoor air quality. Airborne sound transmission control requires good airflow control. Odors and gases from outside and adjoining buildings often annoy occupants or cause health problems.

There are other circumstances that require the control of air flow, such as the control of smoke and fire spread through air spaces and building voids and shafts. However, these are precautions to deal with extreme events, not typical service conditions.

The Air Barrier System (ABS)

The primary plane of air flow control in a wall is generally called the air barrier. Because such a plane is, in practice, comprised of elements and joints, the term air barrier system (ABS) is preferred. In framed, low-rise residential buildings, the primary air barrier system is often located on the interior side of the exterior wall, comprised of either an inner layer of drywall (sealed around the perimeter and at all penetrations) or a sealed polyethylene

sheet (see Figure 5, left). An interior air barrier approach must include all transitions at interior floor and wall intersections.

However, an exterior air barrier system (Figure 5, right) is preferred because fewer penetrations need to be accommodated and it is more easily inspected. An exterior ABS can be constructed using outer layers of sheathing (such as gypsum, waferboard, fiberboard) with a fully-adhered membrane like DELTA®-VENT SA.

Since multiple materials and systems make up an ABS and these materials and systems must be installed to form a continuous system, all architectural sections should indicate which components are intended to be the air barrier. The plane of airtightness labeled by the designer or builder as the air barrier system may not in fact act as the ABS if that plane is not made continuous through all construction details.

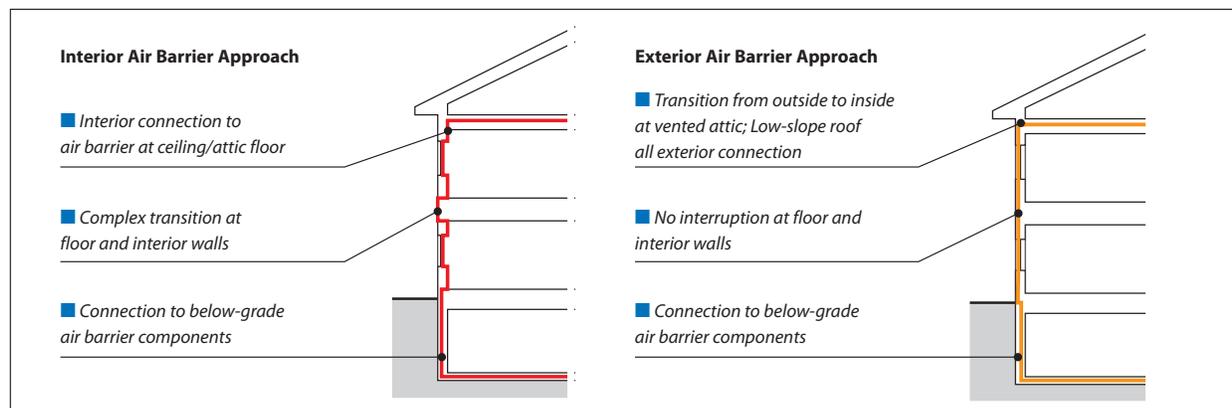


Figure 5: Interior (left) and Exterior (right) Air Barrier System Approach

The Building Enclosure and Air Barrier Systems

Basic requirements for Air Barrier Systems

Typically, several different materials, joints and assemblies are combined to provide an uninterrupted plane of primary airflow control. Regardless of how air control is achieved, the following five requirements must be met by the air barrier system:

- **1. Continuity** – This is the most important and most difficult requirement. Enclosures are *3-dimensional systems*. ABS continuity must be ensured through doors, windows, penetrations, around corners, at floor lines, soffits, etc.
- **2. Strength** – If the ABS is, as designed, much less air permeable than the remainder of the enclosure assembly, then it must also be designed to transfer the full design wind load (e.g., the 1-in-30 year gust) to the structural system. Often, fastenings are critical, especially for flexible non-adhered membrane systems.
- **3. Durability** – The ABS must continue to perform for its service life. Therefore, the ease of repair and replacement, the imposed stresses and material resistance to movement, fatigue, temperature, UV exposure during construction, etc. must all be considered.
- **4. Stiffness** – The stiffness of the ABS (including fastening methods) must reduce or eliminate deflections to control air movement into the enclosure by pumping (the movement of the air barrier that pulls and pushes air into and out of enclosure cavities, see Figure 6). The ABS must also be stiff enough that deformations do not change the air permeance (e.g., by stretching holes around fasteners) and/or distribute loads through unintentional load paths.
- **5. Impermeability** – Naturally, the ABS must be impermeable to air. Air barrier materials are commonly defined as materials which pass less than 0.02 l/s/m² @75 Pa. Although this is an easy property to measure, it is not as important as might be thought. In practice, the ability to achieve other requirements (especially continuity) are more important to performance, and the air “permeance” of joints, cracks, and penetrations outweighs the air permeance of the solid materials that make up most of the area of the ABS. Hence, a component should have an air leakage rate of less than 0.2 l/s/m² @75 Pa, and the whole building system should leak less than 2.0 l/s/m² @75 Pa.

Joints, penetrations, and transitions are the critical link in achieving airtightness. At penetrations and transitions, details must show how an uninterrupted, strong and airtight plane continues from the wall element to the adjoining curtainwall, roof, canopy, etc. while accommodating dimensional construction tolerances and in-service movements. Sealant, sheet metal, and membranes are common components in successful details.

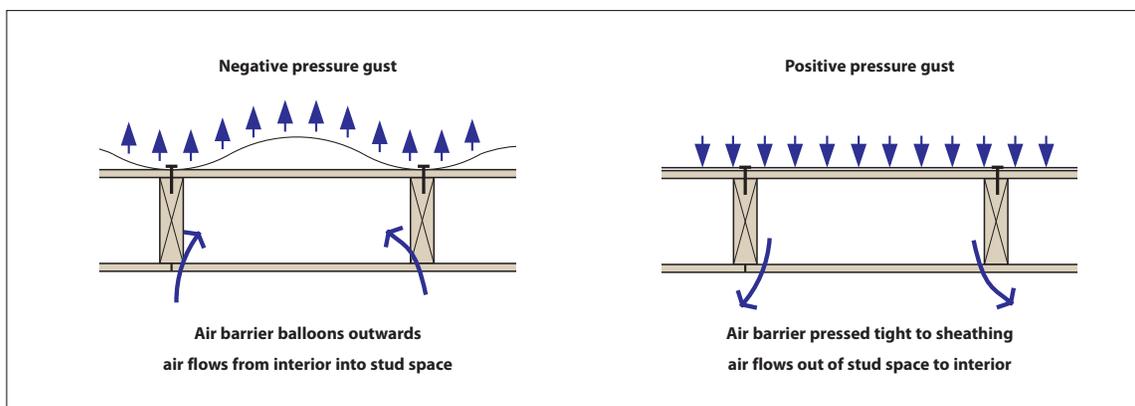


Figure 6: Wind-induced “pumping” of mechanically attached air barrier

Recommendations for air control in all climate zones

■ Testing of Air Barrier Systems

Since whole building airtightness is specified as a performance target, airtightness testing is generally required to prove to the building owner and code officials that the contractors and the designer together have delivered a good, airtight building enclosure. It provides quantitative verification that the methods used were successful, much like crushing a concrete cylinder shows that the required concrete strength was achieved.

Air barrier systems are tested by measuring air leakage through either a building's whole enclosure or through a representative section of the building enclosure (for example, using a construction mock-up of an enclosure section).

Airtightness testing can also be used diagnostically in both residential and commercial construction. For new construction, a test should be done as early as possible in the construction process so that if the building fails, remedial work can be undertaken to find the cause and fix it. Air barrier systems construction on the exterior, like the DELTA®-VENT SA System described in this guide, have the advantage that they can be tested, inspected, and have deficiencies corrected at an early stage in construction.

■ Residential air barrier tests

In residential construction, air leakage tests are often referred to as blower door tests because these tests are most commonly conducted using a piece of equipment called a blower door. A large fan or "blower" is used to extract air from or supply air to the building.

A typical new low-rise residential building in Ontario will have an airtightness of around 2 ACH@50 Pa (two complete air volumes of the house will leak through the enclosure every hour when a uniform pressure difference of 50 Pascal is imposed) for single-detached construction, and up to 4 ACH@50 Pa for multi-unit buildings. Older homes often reported results of 8 or 12 ACH@50 Pa. As far back as the 1980's, the R-2000 program required airtightness to be tested and be below 1.5 ACH@50 Pa. More recently, the German PassivHaus program has required airtightness of 0.6 ACH@50 Pa.

In all cases, a building must be prepared for testing beforehand by blocking intentional openings such as HVAC intake and exhaust grills, kitchen and bathroom exhaust fans, relief dampers, etc.

■ Commercial air barrier tests

For larger buildings with a floor area of over 10,000 ft² (929m²), an airtightness test usually requires numerous coordinated blower doors running at the same time or using the building's own HVAC system to pressurize or depressurize the building as needed. In all cases, a building must be prepared for testing beforehand by blocking intentional openings such as HVAC



intake and exhaust grills, kitchen and bathroom exhaust fans, relief dampers, etc. The test equipment measures the airflow (how much air is moved into or out of the building) and the corresponding pressure difference acting across the building enclosure.

For over 20 years, the National Research Council Canada has recommended that air leakage across the enclosure of commercial buildings be limited to a maximum of 2 l/s/m² at a pressure difference of 75 Pa. In the United States, the building industry has adopted the Canadian standard and converted it to imperial units: 0.4 cfm/ft² at 0.3" H₂O. Both of these numbers are good targets for commercial building enclosures. In the United States, the General Services Administration requires that all new buildings meet these targets. For higher performance buildings, the U.S. Army Corps of Engineers has a target of 0.25 cfm/ft² at 0.3" H₂O, which works out to about 1.3 l/s/m² at 75 Pa. Very high performance buildings sometimes use a target of under 1.0 l/s/m², but that is not always easy to reach without above average quality control.

The Building Enclosure and Air Barrier Systems

Thermal Control

As society demands that buildings consume less energy and generate less pollution, minimizing the flow of heat through the enclosure has become an increasingly important function. The control of heat flow is also important for the control of interior surface temperatures, hence ensuring human comfort and avoiding cold weather condensation. Controlling the temperature of various elements and layers within an enclosure assembly can be used to avoid condensation or enhance drying, both of which influence durability.

R-value is commonly used to measure the thermal control of insulation products. However, this metric does not account for the impacts of thermal bridging, air leakage, installation quality, or thermal mass. It is this multitude of factors that, working together, deliver good thermal control.

Thermal bridging

Heat flow (heat loss or gain) is often greater at corners, window frames, parapets, intersections between different assemblies, etc. This is usually a result of requiring additional structural elements, which are frequently more thermally conductive than insulation material. When heat flows at a much higher rate through one part of an assembly than another, the term thermal bridge is used to reflect the fact that heat has bypassed the thermal insulation. Thermal bridges become important when:

- they cause cold spots within an assembly that might cause performance (e.g., surface condensation), durability or comfort problems
- they are either large enough or intense enough (highly conductive) that they affect the total heat loss through the enclosure

Thermal bridging can severely compromise thermal control and comfort in some building types. Heat flow through steel stud walls and metal curtainwalls is dominated by heat flow through the metal components (see Figure 7).

Failure to break these thermal bridges can reduce the R-value of the insulating components (the insulated glazing unit or batt insulation respectively) by 50 to 80 %. Filling the voids in concrete block masonry with insulation is not very effective: adding R-15 insulation to a 12" block will increase the R-value of the wall only by about R-2. For these reasons, continuous exterior insulation is recommended.

Convective Loops

Convective loops can form within highly air permeable cavity fill insulation and around insulation through small gaps - increasing heat loss. Insulating sheathing reduces the impact. It is recommended that lower air permeance fibrous or airtight foam insulation be used for framing cavity installations.

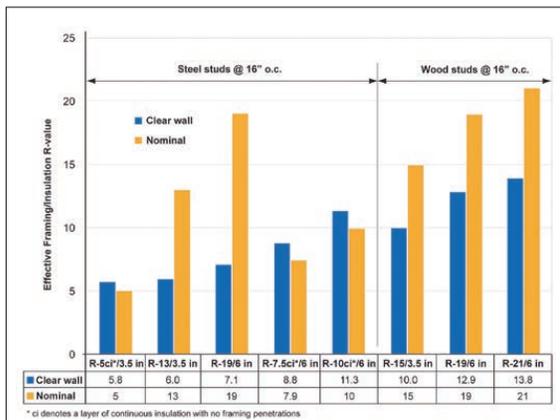


Figure 7: Effective R-value of the framing/insulation layer in wood and steel framed walls (adapted from ASHRAE 90.1-2007; Table A9.2B)

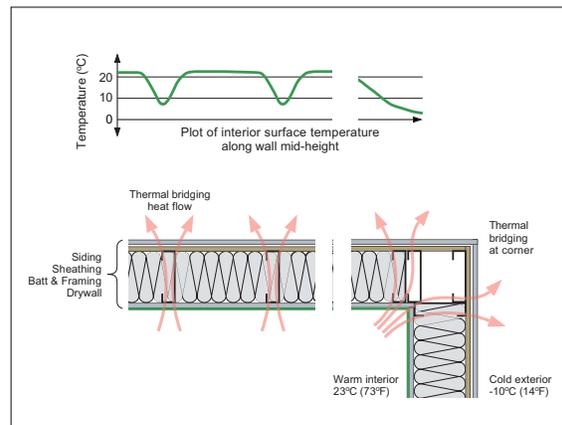


Figure 8: Thermal bridging can cause localized temperature depressions during cold weather, resulting in condensation, mold growth, and staining. (From John Straube, High Performance Enclosures, Building Science Press.)

Condensation control

Air leaking outward through the enclosure in cold weather may come in contact with cold wall elements and can form condensation.

This condensation can accumulate and result in moisture durability problems. When these elements are below the freezing point of water, the condensation can form as frost in cold weather and subsequently cause “leaks” when the frost thaws and liquid water drains down. It may also cause rot if the moisture does not dry quickly upon the return of warmer and sunnier weather.

In walls with sufficient exterior insulation, the sheathing temperature is kept sufficiently warm that it is warmer than the temperature at which the interior air will allow water vapor to condense. Therefore, condensation due to air leakage cannot occur within the stud space. If an assembly is shown by calculation to be safe against air leakage condensation (using the ratio of exterior-to-interior insulation method described below), then diffusion condensation cannot occur, even if absolutely no vapor resistance is pro-

vided inside of the sheathing (i.e., no vapor barrier or other control layer), and even if the sheathing is a vapor barrier (such as foil-faced insulations).

The interior conditions, specifically temperature and relative humidity, within a building during cold weather are critical variables in understanding the risk of condensation. These conditions must be known if predictions and calculations are to be made for the enclosure durability. Interior temperatures are often in the 68-72 °F / 20-22 °C range, but relative humidity levels, and thus air moisture content, can vary significantly. In most office, school, and retail occupancies, ventilation rates are high enough that the RH during winter months is in the range of 25 to 35%. In some residential occupancy, the interior moisture generation is higher and exterior air ventilation rate lower than commercial occupancies, and hence the RH will often be higher. In special occupancies, such as swimming pools, both the interior temperature and relative humidity levels will be higher (78 °F/25 °C and 60 % RH), resulting in very high absolute humidity levels.

As air temperature decreases, the maximum amount of water vapor that it can hold also decreases. As outdoor conditions become colder, mixing between infiltrating cold, dry outdoor air and the warm, humid interior air results in a drop in relative humidity. This effect provides some protection against condensation, as the coldest week of the year is likely to coincide with some of the lowest interior humidity levels, but it should not be depended upon.

Table 1 provides the level of insulation (including the sheathing, airspace and cladding) that should be provided outside of a stud space filled with air permeable insulation (i.e., batt or blown fibrous insulation) to prevent cold-weather exfiltration condensation. Mild temperatures and dry interior air require less exterior insulation to control condensation, whereas a museum maintained at 50 % RH in Fairbanks, Alaska or Yellowknife, Northwest Territories should have essentially all of the insulation on the exterior.

If the sheathing layers are very vapor permeable (e.g., EPS or stone wool over fiberboard or gypsum sheathing, and vapor permeable sheathing membranes) then concerns of vapor diffusion are lessened, if not eliminated. However, the increased outward drying potential only marginally decreases the risk from air leakage condensation. Air leakage condensation is an order of magnitude more serious than vapor diffusion. This demonstrates the importance of airflow control and proper use and levels of insulation.

For important projects or situations in which the design team has little historical experience, investigation using widely available computer models such as WUFI® Pro would be prudent.

| Indoor | RH | 20 | 25 | 30 | 35 | 40 | 50 | 60 | |
|----------------------|-----|------|------|------|------|------|------|------|------|
| Dew point | °C | -3.0 | 0.0 | 2.5 | 4.7 | 6.6 | 9.9 | 12.7 | |
| | °F | 26.6 | 32.0 | 36.6 | 40.5 | 44.0 | 49.9 | 54.8 | |
| T _{outdoor} | °C | °F | | | | | | | |
| | 0 | 32 | 0.00 | 0.00 | 0.12 | 0.23 | 0.32 | 0.47 | 0.60 |
| | -5 | 23 | 0.08 | 0.19 | 0.29 | 0.37 | 0.45 | 0.57 | 0.68 |
| | -10 | 14 | 0.23 | 0.32 | 0.40 | 0.48 | 0.54 | 0.64 | 0.73 |
| | -15 | 5 | 0.33 | 0.42 | 0.49 | 0.55 | 0.60 | 0.69 | 0.77 |
| | -20 | -4 | 0.41 | 0.49 | 0.55 | 0.60 | 0.65 | 0.73 | 0.80 |
| | -25 | -13 | 0.48 | 0.54 | 0.60 | 0.65 | 0.69 | 0.76 | 0.82 |
| | -30 | -22 | 0.53 | 0.59 | 0.64 | 0.68 | 0.72 | 0.78 | 0.84 |
| | -35 | -31 | 0.57 | 0.63 | 0.67 | 0.71 | 0.74 | 0.80 | 0.85 |
| -40 | -40 | 0.61 | 0.66 | 0.70 | 0.73 | 0.76 | 0.82 | 0.86 | |

Table 1: Ratio of exterior-interior insulation to control air leakage condensation
(from John Straube, High Performance Enclosures, Building Science Press;
based on ASHRAE Standard 90.1-2007)

The Building Enclosure and Air Barrier Systems

Recommendations for thermal control by climate zone

The effect of thermal bridging should be considered when selecting thermal resistance values for all enclosure elements. The term *nominal R-value* refers to the R-value rating of the insulation material and is typically stated on the packaging or in the accompanying product literature. Although

the nominal R-value has been used in the past when specifying the thermal resistance of an enclosure assembly, this rating does not capture the effect of thermal bridging and, depending on the particulars of the installation, may overstate the actual thermal performance of the installed product. The

term *effective R-value* refers to the thermal resistance of an enclosure (not just a material) when thermal bridging has been accounted for. Figure 7 above provides an example of the difference between *nominal* and *effective R-values*. The recommendations provided below are stated as *effective R-values*.

Starting with the climate zone in which the project is located (see Figure 9), use Table 2 or Table 3 to find the recommended total R-value of the wall assembly. Recommendations for other enclosure elements are also provided.

- Zone 1** 1A – Very Hot-Humid with $5000 < CDD 10\text{ }^{\circ}\text{C}$ ($9000 < CDD 50\text{ }^{\circ}\text{F}$)
1B – Dry with $5000 < CDD 10\text{ }^{\circ}\text{C}$ ($9000 < CDD 50\text{ }^{\circ}\text{F}$)
- Zone 2** 2A – Hot-Humid with $3500 < CDD 10\text{ }^{\circ}\text{C} \leq 5000$ ($6300 < CDD 50\text{ }^{\circ}\text{F} \leq 9000$)
2B – Dry with $3500 < CDD 10\text{ }^{\circ}\text{C} \leq 5000$ ($6300 < CDD 50\text{ }^{\circ}\text{F} \leq 9000$)
- Zone 3** 3A – Warm-Humid with $2500 < CDD 10\text{ }^{\circ}\text{C} < 3500$ ($4500 < CDD 50\text{ }^{\circ}\text{F} \leq 6300$)
3B – Dry with $2500 < CDD 10\text{ }^{\circ}\text{C} < 3500$ ($4500 < CDD 50\text{ }^{\circ}\text{F} \leq 6300$)
3C – Warm-Marine with $CDD 10\text{ }^{\circ}\text{C} \leq 2500$ AND $HDD 18\text{ }^{\circ}\text{C} \leq 2000$
($CDD 50\text{ }^{\circ}\text{F} \leq 4500$ AND $HDD 65\text{ }^{\circ}\text{F} \leq 3600$)
- Zone 4** 4A – Mixed-Humid with $CDD 10\text{ }^{\circ}\text{C} \leq 2500$ AND $HDD 18\text{ }^{\circ}\text{C} \leq 3000$
($CDD 50\text{ }^{\circ}\text{F} \leq 4500$ AND $3600 < HDD 65\text{ }^{\circ}\text{F} \leq 5400$)
4B – Dry with $CDD 10\text{ }^{\circ}\text{C} \leq 2500$ AND $HDD 18\text{ }^{\circ}\text{C} \leq 3000$
($CDD 50\text{ }^{\circ}\text{F} \leq 4500$ AND $3600 < HDD 65\text{ }^{\circ}\text{F} \leq 5400$)
4C – Mixed-Marine with $2000 < HDD 18\text{ }^{\circ}\text{C} \leq 3000$ ($3600 < HDD 65\text{ }^{\circ}\text{F} \leq 5400$)
- Zone 5** 5A – Cool-Humid with $3000 < HDD 18\text{ }^{\circ}\text{C} \leq 4000$ ($5400 < HDD 65\text{ }^{\circ}\text{F} \leq 7200$)
5B – Dry with $3000 < HDD 18\text{ }^{\circ}\text{C} \leq 4000$ ($5400 < HDD 65\text{ }^{\circ}\text{F} \leq 7200$)
5C – Marine with $3000 < HDD 18\text{ }^{\circ}\text{C} \leq 4000$ ($5400 < HDD 65\text{ }^{\circ}\text{F} \leq 7200$)
- Zone 6** 6A – Cold-Humid with $4000 < HDD 18\text{ }^{\circ}\text{C} \leq 5000$ ($7200 < HDD 65\text{ }^{\circ}\text{F} \leq 9000$)
6B – Dry with $4000 < HDD 18\text{ }^{\circ}\text{C} \leq 5000$ ($7200 < HDD 65\text{ }^{\circ}\text{F} \leq 9000$)
- Zone 7** Very Cold with $5000 < HDD 18\text{ }^{\circ}\text{C} \leq 7000$ ($9000 < HDD 65\text{ }^{\circ}\text{F} \leq 12600$)
- Zone 8** Subarctic with $7000 < HDD 18\text{ }^{\circ}\text{C}$ ($12600 < HDD 65\text{ }^{\circ}\text{F}$)

HDD = Heating Degree Days, CDD = Cooling Degree Days

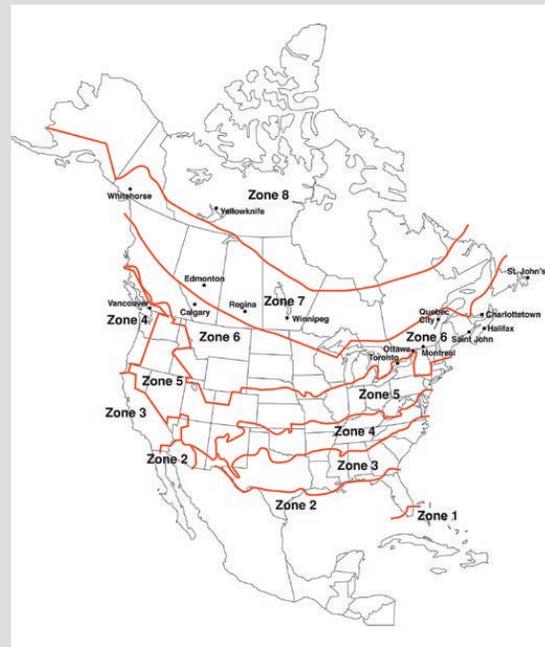


Figure 9: North American Climate Zone Map
(from John Straube, High Performance Enclosures, Building Science Press.
based on ASHRAE Standard 90.1-2007)



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| Climate Zone | Wall | Vented Attic | Compact Roof | Basement Wall | Exposed floor | Slab edge | Windows (U/SHGC) | Sub-slab |
|--------------|------|--------------|--------------|---------------|---------------|-----------|------------------|----------|
| 1 | 10 | 40 | 35 | 5 | 10 | none | yes | none |
| 2 | 15 | 50 | 40 | 10 | 20 | 5 | 0.35 / < 0.25 | none |
| 3 | 20 | 50 | 45 | 10 | 20 | 7.5 | 0.30 / < 0.3 | 5 |
| 4 | 25 | 60 | 45 | 15 | 30 | 7.5 | 0.30 / < 0.35 | 7.5 |
| 5 | 30 | 65 | 50 | 15 | 30 | 10 | 0.24 / < 0.50 | 7.5 |
| 6 | 35 | 75 | 60 | 20 | 40 | 10 | 0.18 / -- | 10 |
| 7 | 40 | 90 | 65 | 25 | 45 | 15 | 0.15 / -- | 15 |
| 8 | 50 | 100 | 75 | 35 | 50 | 20 | 0.15 / -- | 20 |

Table 2: Effective R-value Recommendations by Climate Zone for High Performance Residential Construction, as per BSCI

| Climate Zone | Wall | Vented Attic | Compact Roof | Foundation Wall | Exposed floor | Slab edge | Windows (U/SHGC) | Sub-slab |
|--------------|------|--------------|--------------|-----------------|---------------|-----------|------------------|----------|
| 1 | 10 | 30 | 15 | 5 | 10 | none | 1.2 / < 0.25 | none |
| 2 | 10 | 40 | 20 | 5 | 20 | 5 | 1.2 / < 0.25 | 7.5 |
| 3 | 15 | 40 | 20 | 5 | 20 | 7.5 | 0.6 / < 0.25 | 10 |
| 4 | 20 | 40 | 20 | 5 | 30 | 7.5 | 0.40 / < 0.4 | 15 |
| 5 | 20 | 40 | 20 | 5 | 30 | 10 | 0.35 / < 0.4 | 15 |
| 6 | 20 | 40 | 20 | 10 | 30 | 10 | 0.35 / < .40 | 15 |
| 7 | 20 | 40 | 20 | 10 | 30 | 15 | 0.35 / -- | 20 |
| 8 | 20 | 50 | 20 | 10 | 40 | 20 | 0.35 / -- | 20 |

Table 3: Effective R-value Recommendations by Climate Zone for Steel-Framed, Commercial Construction, adapted from ASHRAE 90.1

The Building Enclosure and Air Barrier Systems

Vapor Control

Although most condensation problems occur because of air leakage, vapor diffusion can also occasionally cause damaging amounts of wetting. However, vapor diffusion is also an important drying mechanism, which may be an important part of a wall assembly design.

Vapor diffusion is the movement of water vapor molecules through the microscopic openings of porous materials (glass, solid plastics, and metals are not porous; wood, gypsum, and concrete are). Vapor diffusion always flows from high to low vapor concentrations. Practically, this means vapor moves from the warm side to the cold side of an enclosure or material layer until equilibrium is reached. As the process is relatively slow, it usually requires weeks or months to move significant quantities of water vapor. Vapor permeance is used to describe the ease of vapor diffusion through a layer of material. The need for and class of a vapor control layer depends strongly on the enclosure design, the air and vapor permeance of the insulation layers, the interior conditions, and the exterior climate. The exterior climate is divided into zones from 1 to 8 based on heating degree days (HDD) (Figure 9). The zones are further sub-divided into different exterior humidity levels, indicated by appending the letters A to C (e.g., zone 6C).

The class of vapor control required can be prescribed for many common wall or roof assemblies for interior conditions of normal residential, school, retail, and office occupancy. Normal interior conditions for these occupancies are assumed to be indoor temperatures of around 72 °F (21 °C) and indoor winter relative humidity of less than 40 % (less than 35 % in zones 7 and 8). Special analysis and unique enclosure details may be required for buildings with higher interior relative humidity.

Inward Vapor Drive

Inward vapor drive in building enclosures occurs when the cladding absorbs and stores rain water (e.g. masonry, stucco, etc.) and is heated by the exterior environment and solar radiation. This combination of water and heat energy in the cladding results in an elevated vapor pressure, driving the moisture into the enclosure. Inward vapor drive or “solar-driven moisture” is a design concern for buildings in Climate Zones 1 to 4 and for some enclosures with absorptive claddings in other climate zones.

The amount of vapor diffusion is dependent on the vapor pressure gradient (i.e. the difference in vapor pressures between two points in the assembly), and the vapor permeance of the building materials. The most common moisture-related durability issue caused by inward moisture drive is moisture accumulation inside the gypsum wall board as a result of a low permeance coating such as vinyl wall paper, polyethylene sheet, or on the back of low permeance materials installed on the interior of the gypsum wall board (such as mirrors, cabinetry, whiteboards, etc.). This often results in the formation of mold, either on the drywall or the back of the wall covering, and, in the worst case, disintegration of the gypsum wall board.

Inward vapor drives can be minimized by using non-absorptive claddings, ensuring a ventilated cavity/capillary break behind the cladding, or using a lower vapor permeance layer between the absorptive cladding and structure. DELTA®-DRY can be used to create a ventilated space behind the cladding and provide a low vapor permeance layer to control solar-driven moisture.

Where and when to use DELTA®-VENT SA

DELTA®-VENT SA is a sheathing membrane that offers the air and water control benefits of traditional asphaltic peel-and-stick membranes while also providing the drying benefits from being vapor permeable (low vapor resistance). Vapor permeable sheathing membranes can be applied in all climate regions / zones and over a wide range of wall assemblies.

In cold climates, vapor permeable sheathing membranes offer an advantage over vapor impermeable sheathing membranes because they allow for the use of a wider range of interior vapor control strategies. They also facilitate outward drying and promote durability over a wider range of applications than membranes that have low vapor permeance.

Inward vapor drives must be considered whenever absorptive or reservoir claddings are used. Vapor permeable sheathing membranes can be employed in these assemblies; however, it is critical that a drained and ventilated space be provided on the inboard side of the absorptive cladding. This allows the back of the cladding to dry outward and reduces the inward vapor drive.

Further considerations and guidance are provided in Table 4.



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| Consideration | Options | Examples | Recommendations / Cautions |
|-------------------------------|-------------------|---|--|
| Climate Zone | All | Zones 1-8 | Recommendation: DELTA®-VENT SA can be used in all climates. See climate specific guidance in the sections that follow. |
| Cladding Type | Non-absorptive | metal panel, high density laminates, vinyl siding, etc. | Recommendation: In all climates (Zones 1-8), recommend installation over a drained & ventilated space but can be installed over a drained & vented space. |
| | Absorptive | fiber cement, brick, stucco, stone, tiles, terracotta, wood | Caution: In all climates (Zones 1-8), do not direct apply absorptive claddings! Must be installed over a drained & ventilated space. |
| Exterior Insulation | None | i.e. NO insulation outboard | Recommendation: In all climates (Zones 1-8), Sheathing membrane must be detailed as the drainage plane. |
| | Vapor Permeable | semi-rigid glass fiber, stone wool | Recommendation: In all climates (Zones 1-8), Sheathing membrane must be detailed as a drainage plane regardless of any other drainage plane that may be provided outboard of the exterior insulation. |
| | Vapor Impermeable | polyisocyanurate, XPS, 2 pcf ccSPF, EPS | Recommendation: In all climates (Zones 1-8), Sheathing membrane must be detailed as a drainage plane regardless of any other drainage plane that may be provided outboard of the exterior insulation. |
| Cavity Insulation | None | i.e. ALL insulation outboard | Recommendation: In all climates (Zones 1-8) there are no further recommendations. Note this application assumes that ALL of the required insulation is placed outboard of the sheathing membrane so sheathing temperature and moisture content are controlled. |
| | Vapor Permeable | fiber glass, stone wool, cellulose, 0.5 pcf ocSPF | Recommendation: In all climates (Zones 1-8), any vapor permeable insulation can be used. |
| | Vapor Impermeable | 2 pcf ccSPF | Caution: In warm climates (Zones 1-4), do not install vapor permeable sheathing membrane over a vapor impermeable cavity insulation, especially when using a moisture absorptive cladding. Recommendation: In cold climates (Zones 5-8), vapor permeable sheathing membrane can be installed over a vapor impermeable cavity insulation. |
| Interior Vapor Control | Vapor Permeable | latex paint, kraft paper | Recommendation: In hot climates (Zones 1-4) vapor permeable interior control layers can and should be used. See section below for interior vapor control specifics. Caution: In cold climates (Zones 5-8) the vapor permeance of interior control layers should be selected to moderate outward vapor diffusion. See section below for interior vapor control specifics. |
| | Vapor Impermeable | vinyl wall coverings, polyethylene vapor retarder | Caution: In hot climates (Zones 1-4), do not install vapor permeable sheathing membrane on a wall that employs a low permeance interior vapor control layer, especially when using a moisture absorptive cladding. See section below for interior vapor control specifics. Recommendation: In cold climates (Zones 5-8), vapor permeable sheathing membranes can be used on walls that employ a low permeance interior vapor control layer. See below for interior vapor control specifics. |
| | | | |

Table 4: Selection Guide for DELTA®-VENT SA

The Building Enclosure and Air Barrier Systems

Recommendations for interior vapor control by climate zone

Different types of assemblies have different vapor control requirements. Although the requirements can be developed through engineering analysis, a simplified summary of recommendations, many from the US international building codes (“I” codes), is presented below for the “normal” occupancies described above. Buildings with indoor relative humidity levels of over 40 % RH when the outdoor temperature is below 20 °F (- 7 °C) for prolonged periods of time require special analysis and often unique enclosure details to prevent moisture problems.

Vapor control recommendations are divided into three categories:

- 1 Assemblies with all or most (more than 75 % of the total) of the insulation value located outboard of the structure (framing or solid)
- 2 Framed assemblies with some insulation value outside of the framing or structure
- 3 Framed assemblies with all or most of the insulation inside of the sheathing and between the framing members

1 Assemblies with all or most (more than 75 % of the total) of the insulation value located outboard of the structure (framing or solid)

This is the simplest and most robust wall to design with respect to vapor control. Such walls should ideally have all moisture sensitive components and materials located on the inside of the insulation. In this location, a Class I or II vapor control layer on the inside of all or most of the insulation value is acceptable and recommended if all outboard components are moisture tolerant (i.e. the Class I or II layer is located on the structural sheathing, with 75 % of the wall’s insulation outboard of this layer). A Class III layer on the interface of a high permeance (more than 10 perms) insulation layer outboard of a moisture-sensitive structure should only be used if warm weather and inward vapor drive condensation are not an issue or are controlled by interior drying, ventilation of the cladding, or other means. This requires careful consideration of inward vapor drives (see the section on Inward Vapor Drives).

Condensation during warm weather and condensation caused by vapor driven inward from wetted cladding heated by the sun (i.e., solar-driven moisture) will occur on the exterior of the vapor control layer. Hence, it is best detailed as a drainage plane water control layer.

2 Framed assemblies with some insulation value outside of the framing or structure.

It is desirable to design for drying, especially in warmer climate zones (particularly 4 and 5). The use of insulation on the exterior of the sheathing increases its temperature in cold weather, thereby relaxing the need to control cold-weather vapor diffusion. Exterior insulation made of mineral or glass fibers is highly vapor permeable. When semi-rigid fibrous insulation is combined with more vapor permeable sheathing and membrane layers, enclosures will behave differently than with less permeable sheathings/membranes. Less R-value of such products is needed to perform well than is required by the rules in this category. But note that thermal performance will be lower if less insulation is used.

A Class III vapor control layer can be used instead of Class I or Class II in zones 4c, 5, 6, 7, or 8 where any of the criteria for the specific zone from the list below is met (see Table 6 below). These criteria may depend upon the climate zone and the ratio of the insulation value in the stud space to insulation value installed outboard of the sheathing. The insulation value in the stud space is often a function of whether 3.5”, 5.5”, 6” or 8” framing is filled with insulation. Batt insulation products, as long as they are well supported, DO NOT need to fill the whole stud space, and thereby reduce the required

| Class | Permeance (US perms) | Metric perms | Description |
|-------|----------------------|--------------|------------------|
| I | Less than 0.1 | Less than 6 | Impermeable |
| II | 0.1 to 1.0 | 6 - 60 | Semi-Impermeable |
| III | 1 to 10 | 60 - 600 | Semi-permeable |
| none | Over 10 | Over 600 | Permeable |

Table 5: Vapor control layer classification; tested as per ASTM E96 dry-cup (Method A)

insulation value of the exterior continuous insulation layer. Cavity insulations need to be in tight contact on five surfaces: the sixth surface can be open to the interior.

A Class III vapor control layer may be used on the interior of framed walls in zone 4c and higher, if any of the following criteria are met:

| |
|--|
| Zone 1-3 (e.g., Miami to Atlanta) |
| <ul style="list-style-type: none"> No requirements |
| Zone 4c (e.g., Vancouver, Seattle or Portland) |
| <ul style="list-style-type: none"> Sheathing-to-cavity R-value ratio of > 0.20 Insulated sheathing with an R-value \geq 2.5 on a 2x4 insulated framed wall Insulated sheathing with an R-value \geq 3.75 on a 2x6 insulated framed wall |
| Zone 5 (e.g., Chicago, Windsor, Boston) |
| <ul style="list-style-type: none"> Sheathing-to-cavity R-value ratio of > 0.35 Insulated sheathing with an R-value \geq 5 on a 2x4 insulated framed wall Insulated sheathing with an R-value \geq 7.5 on a 2x6 insulated framed wall |
| Zone 6 (e.g., Toronto, Ottawa, Helena, Montreal, Halifax, Minneapolis) |
| <ul style="list-style-type: none"> Sheathing-to-cavity R-value ratio of > 0.50 Insulated sheathing with an R-value \geq 7.5 on a 2x4 insulated framed wall Insulated sheathing with an R-value \geq 11.25 on a 2x6 insulated framed wall |
| Zones 7 and 8 (e.g., Calgary, Edmonton, Whitehorse, Anchorage, Fairbanks) |
| <ul style="list-style-type: none"> Sheathing-to-cavity R-value ratio of > 0.70 Insulated sheathing with an R-value \geq 10 on a 2x4 insulated framed wall Insulated sheathing with an R-value \geq 15 on a 2x6 insulated framed wall |

Table 6: Criteria for Use of a Class III Vapor Control Layer by Climate Zone (IRC-2009)

3 Framed assemblies with all or most of the insulation inside of the sheathing and between the framing or structure (e.g., wood or steel stud) as vapor permeable (more than 10 perm) insulation (e.g., fiberglass, stone wool, cellulose, or open-cell foam)

The goal of the vapor control design is to prevent vapor diffusing and condensing on either the cold sheathing in cold weather or the cold interior finish during warm weather.

- No vapor control layer is needed in climate zones 1, 2, 3, 4a or 4b.
- A Class I or Class II vapor control layer is required on the interior side of framed walls in zones 4c, 5, 6, 7, and 8, with the exceptions of basement walls, below-grade portion of any wall, and wall construction that is not sensitive to moisture or freezing (e.g., concrete).
- Class I vapor control layers, including non-perforated vinyl wallpaper, reflective foil, glass, epoxy paint, white boards, melamine, etc. are not recommended and should be avoided on the interior of air-conditioned building occupancies in climates with humid summers in zones

1-6. The dividing line between dry (B) and moist (A) climate zones can be found in ASHRAE 90.1. Enclosures clad with unvented water absorbent claddings (e.g., stucco, masonry, fiber cement, wood) are at especially high risk of summer condensation.

- A Class III vapor retarder can be used instead of a Class I or Class II when
 - In zones 4c, or 5, vented cladding is used over sheathing with a perm rating of more than 1 US perm (wet-cup; ASTM E96, Method B), i.e., OSB, plywood, or exterior gypsum sheathing, OR
 - In zone 6, vented cladding is used over high permeance (more than 10 perm) sheathings such as fiberboard and exterior gypsum.

Vented claddings include vinyl siding, metal panels, terra cotta, wood or fiber cement siding over air gaps, and masonry veneers with clear airspaces and vent openings top and bottom. A clear gap of around 3/8" (10 mm) will generally provide sufficient airflow to allow for ventilation, but at least 1" (25 mm) should be specified for masonry walls.

Material Properties

The following tables summarize the relevant material properties for the DELTA® products mentioned in this guide.

DELTA®-VENT SA – Self-Adhered Water-resistive Barrier & Air Barrier

Material

DELTA®-VENT SA is a 3-layer self-adhered water-resistive barrier (WRB) and air barrier. Its two outer layers are made of a high strength spun-bonded polypropylene (PP) fabric. They are thermally bonded to a highly vapor permeable, watertight polymeric middle layer. DELTA®-VENT SA maintains high vapor permeability and has a full surface coating of a high tack adhesive for bonding to common substrates. It has a split release liner for ease of application. The matte gray color of DELTA®-VENT SA prevents blinding glare during installation.

Properties

DELTA®-VENT SA is vapor permeable, allowing moisture within the building enclosure to escape through the membrane via diffusion. Its permeability and air-tightness make it an ideal air and water-resistive barrier membrane for energy-efficient construction. DELTA®-VENT SA not only passes, but also dramatically exceeds the most stringent

requirements of the Air Barrier Association of America (ABAA) and of the National Building Code of Canada (NBC 2010) based on the results of ASTM E2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies. Full adhesion maximizes air tightness and minimizes fastener penetrations. The product is watertight and protects the building enclosure from wind-driven rain. DELTA®-VENT SA is very light-weight and tear-resistant. This membrane withstands the rigors of jobsites, as well as tough wind and weather. Its performance is unaffected by surfactants. DELTA®-VENT SA far exceeds the water resistance of 60 minute Grade D building paper.

Application

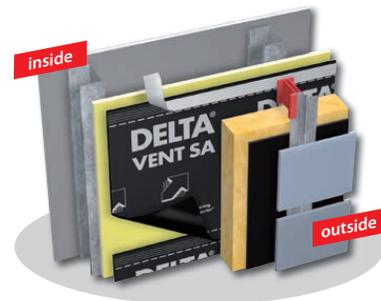
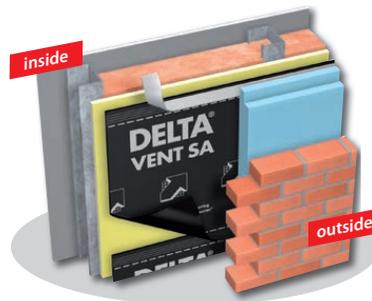
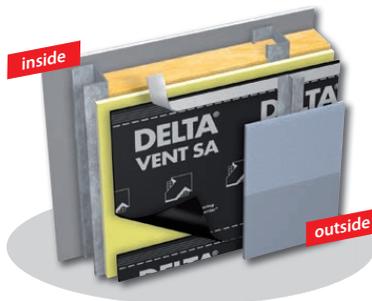
DELTA®-VENT SA is installed outboard of the sheathing prior to the application of the final cladding system. DELTA® Accessories complement the WRB / Air Barrier installation. It may be adhered to concrete, masonry, OSB, plywood, or exterior grade drywall. Where required DELTA® primers are available.

Locked tight adhesive edge

DELTA®-VENT SA has a special edge running along the front side of one long edge. It has a release liner that, when removed, exposes a high tack adhesive. This adhesive bonds tightly and permanently with the next overlapping course of DELTA®-VENT SA, creating a secure and very air and water-tight seal. The use of DELTA®-MULTI-BAND is recommended for any other seams and overlaps to ensure fully air tight installations.

DELTA® products support sustainable and energy efficient building practices, including efforts toward achieving LEED® certification (LEED® for New Construction & Major Renovations, LEED® for Core and Shell, LEED® for Existing Buildings and LEED® for Homes).

For technical support, call our technical support team at 1-888-4DELTA4 (1-888-433-5824) extension 326, or visit www.cosella-dorken.com





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Technical Data

| | | |
|---|--|--------------------------------|
| Product name | DELTA®-VENT SA | |
| Color | gray | |
| Material | 3-ply polypropylene membrane with vapor permeable adhesive coating | |
| Adhesive coating | Full surface coating with vapor permeable pressure-sensitive adhesive | |
| Water vapor transmission | 214 g/m ² /24 h | ASTM E96-05, Proc. A (dry cup) |
| | 343 g/m ² /24 h | ASTM E96-05, Proc. B (wet cup) |
| Vapor permeance | 31 perms [grains/h/ft ² /in Hg] | ASTM E96-05, Proc. A (dry cup) |
| | 50 perms [grains/h/ft ² /in Hg] | ASTM E96-05, Proc. B (wet cup) |
| Air leakage of air barrier assemblies | < 0.2 L/(s · m ²) @ 75 Pa (0.04 cfm/ft ² @ 1.57 lb/ft ²) as per ABAA and NBC 2010 requirements | |
| Breaking strength | Machine direction 71 lb | ASTM D5034-95 |
| | Cross direction 65.4 lb | |
| Elongation at break | Machine direction 27.8 % | ASTM D5034-95 |
| | Cross direction 60.1 % | |
| 90° Peel adhesion | Pass | AAMA 711-5.3 (ASTM D3330) |
| Accelerated aging (U.V.) | Pass | AAMA 711-5.4 |
| Elevated temperature | Pass (Level 3) | AAMA 711-5.5 (ASTM D3330) |
| Thermal cycling | Pass | AAMA 711-5.6 |
| Adhesion after water immersion | Pass | AAMA 711-5.8 |
| Bent test | Pass | AC-38 3.3.4 |
| Nail sealability | Pass | ASTM D1970-01 |
| Water resistance hydrostatic pressure | Pass (55 cm > 5 hours) | AATCC 127-1985 |
| Linear dimensional change at elevated temperature (185 °F (85 °C)) | Machine direction -1.4% | ASTM D1204-08 |
| | Cross direction +0.1% | |
| Resistance to puncture | 78.6 lbs (333.1N) | ASTM E154-99(10) |
| Low temperature flexibility | Pass | ASTM D1970-01 |
| Crack bridging ability | Pass - 15 °F (- 26 °C) | ASTM C1305-06 |
| Flame spread | 14 | ASTM E84-09 |
| | NFPA Class A; IBC Class A | |
| Smoke developed | 47 | ASTM E84-09 |
| | NFPA Class A; IBC Class A | |
| Air permeance | Pass (< 0.02 l/(s · m ²) @ 75 Pa) | ASTM E2178 |
| Application temperature | Minimum 40 °F (5 °C) | |
| Service temperature | - 40 °F to + 176 °F (- 40 °C to + 80 °C) W / Primer | |
| | - 13 °F to + 176 °F (- 25 °C to + 80 °C) W/O Primer | |
| Roll weight | approx. 40 lb (18 kg) | |
| Roll size | 4' 11" (1.5 m) x 115' (35 m) | |
| Maximum UV (sunlight) exposure | No polymeric membrane should be exposed to UV (sunlight) for longer than 50 days. | |
| DELTA® Accessories | DELTA®-MULTI-BAND, 2" x 82' (60 mm x 25 m), DELTA®-FLEXX-BAND, 4" x 33' (100 mm x 10 m), DELTA®-FLASHING, 4" x 75' (100 mm x 22.8 m), DELTA®-FLASHING, 9" x 75' (230 mm x 22.8 m), DELTA®-FAS CORNER, DELTA®-THAN, 310 ml (10.9 fl oz) / cartridge or DOW CORNING® 758, DELTA®-ADHESIVE LVC, 4.72 gal. (17.9 L) / pail | |



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DELTA[®]-VENT SA and LEED[®] Building Design and Construction

The Leadership in Energy and Environmental Design program, commonly known as LEED, has design-based green rating systems that includes the building enclosure within their scope. Building Design and Construction standards are available for Homes, New Construction, and Multifamily Midrise. Other building type-specific standards are similar to New Construction in how they relate to

DELTA[®]-VENT SA. The standards similarly define green building features in terms of prerequisite and point earning requirements. When all prerequisites are fulfilled and a minimum number of points are achieved, a project can receive a certified silver, gold, or platinum rating. Also, it is important to note that the standards are evolving. New projects can pursue either LEED v2009 (or v2008

for Homes & Multifamily Midrise) or LEED v4 standards until 2015, when projects will be able to pursue only v4. This is an overview of how DELTA[®]-VENT SA affects specific credit opportunities with these current LEED rating systems.

| Credits | Points | How DELTA [®] -VENT SA Contributes to LEED Certification |
|-----------------------------|----------|---|
| Minimum Energy Performance | PR | <p>New Construction/Multifamily Midrise</p> <p>Option 1 – Whole-building energy simulation</p> <p>Energy performance must be at least 10 % below baseline defined in ASHRAE 90.1-2007 and 90.1-2010 for LEED v2009/v2008 and LEED v4, respectively. Credits are earned for surpassing this minimum threshold. DELTA[®]-VENT SA can be used to improve considerably building air tightness. To claim energy savings from air tightness, applicants must use the Exceptional Calculation Method defined in Appendix G2.5. See LEED Interpretation 5060, 5691 and 5495 for guidance.</p> <p>ASHRAE 90.1-2010 (5.4.3.1) further requires that “the entire building envelope shall be designed and constructed with a continuous air barrier.” Using DELTA[®]-VENT SA, designers will help to ensure that air leakage rates are below the maximum allowed.</p> <p>Option 2 – Prescriptive compliance</p> <p>Projects must meet the prescriptive requirements of the ASHRAE Advanced Energy Design Guides (the 50 % savings required for LEED v4). These guides have similar air barrier requirements as ASHRAE 90.1-2010 under which DELTA[®]-VENT SA can serve as an effective continuous air barrier.</p> <p>To achieve an additional point for building enclosure, Small to Medium Office Buildings and Large Hospitals must implement and document compliance with recommendations that include a continuous air barrier, for which DELTA[®]-VENT SA is well suited.</p> <p>Homes</p> <p>Homes must meet minimum Energy Star performance requirements that include blower door performance thresholds. Houses using DELTA[®]-VENT SA have been found to achieve exemplary air tightness performance. For projects following the Energy Star performance path, additional points are available for a more air tight house.</p> |
| Optimize Energy Performance | Up to 20 | |



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| Credits | Points | How DELTA®-VENT SA Contributes to LEED Certification | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------|--|------------------|-------------------|---------|---------|--|-----|---------|-----|---------|---------------------|-------|--------------|-------|---------------|-----------------------------------|-----|----------------|-----|---------------|--------------|-----|------|-----|------|--------------|-----|-----|-----|-----|--|-------------------|--|--|--|-----|-----|-----|---|--|------------------|------------------|------------------|------------------|-------------|--------------|------------|--------------|--------------|--------------|--------------|-------------|--------------|--------------|
| | | <p>In LEED v2008, up to 3 points can be achieved for meeting performance thresholds as given below.</p> <table border="1"> <thead> <tr> <th rowspan="2"></th> <th colspan="4">IECC Climate Zone</th> </tr> <tr> <th>1-2</th> <th>3-4</th> <th>5-7</th> <th>8</th> </tr> </thead> <tbody> <tr> <td></td> <td>ACH50</td> <td>ACH50</td> <td>ACH50</td> <td>ACH50</td> </tr> <tr> <td>1 pt</td> <td>7.0</td> <td>6.0</td> <td>5.0</td> <td>4.0</td> </tr> <tr> <td>2 pts</td> <td>5.0</td> <td>4.25</td> <td>3.5</td> <td>2.75</td> </tr> <tr> <td>3 pts</td> <td>3.0</td> <td>2.5</td> <td>2.0</td> <td>1.5</td> </tr> </tbody> </table> <p>Up to 2 points are available under LEED v4 as given below</p> <table border="1"> <thead> <tr> <th rowspan="2"></th> <th colspan="4">IECC Climate Zone</th> </tr> <tr> <th>1-2</th> <th>3-4</th> <th>5-7</th> <th>8</th> </tr> </thead> <tbody> <tr> <td></td> <td>ACH50 (cfm50/sf)</td> <td>ACH50 (cfm50/sf)</td> <td>ACH50 (cfm50/sf)</td> <td>ACH50 (cfm50/sf)</td> </tr> <tr> <td>1 pt</td> <td>4.25 (0.195)</td> <td>3.5 (0.16)</td> <td>2.75 (0.125)</td> <td>2.0 (0.0925)</td> </tr> <tr> <td>2 pts</td> <td>3.0 (0.1375)</td> <td>2.5 (0.115)</td> <td>2.0 (0.0925)</td> <td>1.5 (0.0675)</td> </tr> </tbody> </table> | | IECC Climate Zone | | | | 1-2 | 3-4 | 5-7 | 8 | | ACH50 | ACH50 | ACH50 | ACH50 | 1 pt | 7.0 | 6.0 | 5.0 | 4.0 | 2 pts | 5.0 | 4.25 | 3.5 | 2.75 | 3 pts | 3.0 | 2.5 | 2.0 | 1.5 | | IECC Climate Zone | | | | 1-2 | 3-4 | 5-7 | 8 | | ACH50 (cfm50/sf) | ACH50 (cfm50/sf) | ACH50 (cfm50/sf) | ACH50 (cfm50/sf) | 1 pt | 4.25 (0.195) | 3.5 (0.16) | 2.75 (0.125) | 2.0 (0.0925) | 2 pts | 3.0 (0.1375) | 2.5 (0.115) | 2.0 (0.0925) | 1.5 (0.0675) |
| | IECC Climate Zone | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1-2 | 3-4 | 5-7 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ACH50 | ACH50 | ACH50 | ACH50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 pt | 7.0 | 6.0 | 5.0 | 4.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 pts | 5.0 | 4.25 | 3.5 | 2.75 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 pts | 3.0 | 2.5 | 2.0 | 1.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | IECC Climate Zone | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1-2 | 3-4 | 5-7 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ACH50 (cfm50/sf) | ACH50 (cfm50/sf) | ACH50 (cfm50/sf) | ACH50 (cfm50/sf) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 pt | 4.25 (0.195) | 3.5 (0.16) | 2.75 (0.125) | 2.0 (0.0925) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 pts | 3.0 (0.1375) | 2.5 (0.115) | 2.0 (0.0925) | 1.5 (0.0675) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Innovation in Design | 1 | <p>New Construction/Multifamily Midrise</p> <p>Using DELTA®-VENT SA for air and moisture control is an effective part of meeting these building enclosure commissioning requirements. This can earn an innovation in design point in LEED v2009/v2008 as detailed in LEED Interpretation 5366. In LEED v4, an additional 2 points are available for including building enclosure with the scope of Enhanced Commissioning.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Enhanced Commissioning | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Environmental Tobacco Smoke Control | PR | <p>New Construction/Multifamily Midrise</p> <p>For multi-unit residential buildings over 6 stories, the New Construction standard is used that provides the options of either having a complete no smoking policy or meeting unit compartmentalization requirements (given below), as part of the Environmental Tobacco Smoke Control prerequisite. This test captures interior separation between units and the exterior enclosure. Using DELTA®-VENT SA will ensure minimum air leakage contribution of the exterior enclosure. For multi-residential buildings 4-6 stories, the Multifamily Midrise requires all projects meet unit Compartmentalization requirements, regardless of smoking policy. This standard also provides additional point(s) for exceeding suite air tightness thresholds in the Enhanced Compartmentalization credit.</p> <table border="1"> <thead> <tr> <th rowspan="2"></th> <th colspan="2">LEED v2009/v2008</th> <th colspan="2">LEED v4</th> </tr> <tr> <th>Pts</th> <th>Minimum</th> <th>Pts</th> <th>Minimum</th> </tr> </thead> <tbody> <tr> <td>Prerequisite</td> <td>PR</td> <td>0.3 cfm50/sf</td> <td>PR</td> <td>0.23 cfm50/sf</td> </tr> <tr> <td>Multifamily Midrise Credit</td> <td>1</td> <td>0.225 cfm50/sf</td> <td>3</td> <td>0.15 cfm50/sf</td> </tr> </tbody> </table> | | LEED v2009/v2008 | | LEED v4 | | Pts | Minimum | Pts | Minimum | Prerequisite | PR | 0.3 cfm50/sf | PR | 0.23 cfm50/sf | Multifamily Midrise Credit | 1 | 0.225 cfm50/sf | 3 | 0.15 cfm50/sf | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | LEED v2009/v2008 | | | LEED v4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Pts | | Minimum | Pts | Minimum | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Prerequisite | PR | 0.3 cfm50/sf | PR | 0.23 cfm50/sf | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Multifamily Midrise Credit | 1 | 0.225 cfm50/sf | 3 | 0.15 cfm50/sf | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Compartmentalization | PR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Enhanced Compartmentalization | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

DELTA[®]-VENT SA and LEED[®] Building Design and Construction

| Credits | Points | How DELTA [®] -VENT SA Contributes to LEED Certification |
|---|--------|---|
| Low Emitting Materials – Adhesives and Sealants | 1 | <p>New Construction/Multifamily Midrise</p> <p>To attain this credit in LEED v2009/v2008, all adhesives and sealants used in the building interior must comply with SCAQMD 1168 VOC content limits. The building interior is defined as being inside of the weatherproofing system. VOC content documentation does not need to be submitted for DELTA[®]-VENT SA because it serves as the weatherproofing system.</p> <p>The requirements are less clear for primers used with DELTA[®]-VENT SA. A definition of <u>weather-proofing system</u> isn't found in USGBC LEED literature. For example, one could consider an inner vapor barrier part of the weatherproofing system. Under this scenario the VOC content of primers used with DELTA[®]-VENT SA would not need to be submitted.</p> <p>CaGBC ruled in CIR 910 that sealant, adhesives, and primers that are considered part of the <u>air barrier system</u> for the building can be excluded from this credit's requirement for LEED Canada 2009. Hence, in Canada, VOC documentation clearly does not need to be submitted for primers used with DELTA[®]-VENT SA.</p> <p>Cosella-Dörken recommends DELTA[®]-ADHESIVE LVC as a primer for DELTA[®]-VENT SA. This product has a VOC content of 135 g/L which is well below SCAQMD 1168's 250 g/L allowance for Sealant Primers – Architectural Non-Porous. Just to be safe, the product's MSDS sheet can be downloaded as supporting documentation for LEED applications.</p> <p>In LEED v4, the <u>building interior</u> is more clearly defined as everything within the waterproofing membrane. The <u>building exterior</u> is defined as everything outside and inclusive of the primary and secondary weatherproofing system, such as waterproofing membranes and air- and water-resistive barrier materials.</p> <p>DELTA[®]-VENT SA is typically the waterproofing and air barrier membrane, so VOC documentation clearly does not need to be submitted. Guidance has not been provided in LEED v4 on whether or not VOC content documentation for primers is required.</p> <p>LEED v4 also requires 90 % of building interior products to be tested in accordance with California Department of Public Health (CDPH) Standard Method v1.1–2010. Cosella-Dörken is currently working to have DELTA[®]-ADHESIVE LVC tested under this standard.</p> |



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| Credits | Points | How DELTA®-VENT SA Contributes to LEED Certification |
|---|---------|---|
| Materials and Resources | – | <p>New Construction/Multifamily Midrise/Homes</p> <p>Material contribution in LEED v2009 (v2008) are considered in terms of their portion of the building's material costs. DELTA®-VENT SA has a low cost relative to other building materials and significantly contribute to achieving these credits. Hence, project teams do not need to provide additional documentation for the project. If pressed, use the following:</p> <ul style="list-style-type: none"> ■ Pre/Post Consumer Recycled Content – 0 % ■ Regional Content - Extraction – 0 % (raw materials sources from variety of international locations) ■ Regional Content - Manufacturing in Germany |
| Building Product Disclosure and Optimization | 3 | <p>In LEED v4, up to 3 points can be achieved each for using at least 20 different products with approved Environmental Product Declaration, Corporate Sustainability Reports, and/or Material Ingredient Reporting certifications. Cosella-Dörken is reviewing these certifications and how our products can contribute to the minimum of 20 products.</p> <p>LEED v4 has also introduced up to 5 points for building life-cycle impact reduction. With life-cycle assessment calculation for new buildings, the service life of components must be considered. DELTA®-VENT SA and the substrate material it protects can be expected to last beyond the service life defined in the credit.</p> |
| Regional Priority | Up to 4 | <p>New Construction/Multifamily Midrise/Homes</p> <p>These credits vary depending on project location. Use of DELTA®-VENT SA will improve performance which can contribute to the 40 % energy savings threshold, a common regional performance goal.</p> |

PR – Prerequisite requirement and hence, no points earned.





Typical blower door test at multi-story building



Air barrier application in residential construction



Surface preparation

Installation Details

The following details are included in this guide:

The following drawings illustrate common construction details for commercial rain screen wall assemblies using the products and building science information provided in this guide. The drawings are not project-specific and are meant to be modified by the project architect to include selected cladding, structural, and other construction materials. Each drawing, however, clearly labels assembly elements by function and a description of each detail is included.

| | |
|--|-----------|
| Field of Wall | 28 |
| ■ 1. Light-weight Cladding Attachment System | 28 |
| ■ 2. Heavy-weight Cladding Attachment System | 30 |
| ■ 3. Mechanical Penetration | 32 |
| ■ 4. Vertical Control Joint | 34 |
| Punched Window Opening | 36 |
| ■ 5. Flanged Window – Sill Detail | 36 |
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Installation Details

1. Field of Wall – Light-weight Cladding Attachment System

DELTA®-VENT SA – Building Science Notes

1. General

- a. Detail is applicable to light-weight cladding systems (see 7.b below) for low-, mid-, and high-rise construction.

2. Structure

- a. A cast-in-place concrete structure with light gauge metal stud frame and exterior gypsum board sheathing infill structure is illustrated in this detail.

3. Rain water control layer

- a. A drained-screen approach to rain water control (as illustrated) is recommended.
- b. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary rain water control layer in the wall assembly. Water penetrating the exterior cladding must be directed to the exterior by this layer.

4. Air control layer

- a. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary air control layer. The membrane is fully supported by the exterior sheathing and continuous through the detail illustrated.
- b. Critical air barrier details:
 - I. **Movement Joint:** the joint below concrete slab must be constructed with a transition membrane to prevent tearing of the DELTA®-VENT SA air barrier membrane as the structure moves. A backer rod is used to fill the joint and prevent the transition membrane from bonding at this location.

5. Thermal control layer

- a. Continuous exterior insulation is the primary thermal control layer. Insulation may also be included in the wall cavity but exterior insulation is preferred to address thermal bridging.
- b. The amount of insulation recommended varies by climate region (see Table 3).
- c. Convection-suppressing insulation is preferred for cavity insulation to control convection in framing cavity.

6. Vapor control layer

- a. Depending on climate and insulation materials, the primary vapor control layer may be located to the interior or exterior of the DELTA®-VENT SA membrane.
- b. Design the assembly as a “vapor open” assembly, meaning that there is a single line of vapor control and that drying can occur towards the interior or towards the exterior from this line. Selection of vapor-open interior finishes should be considered.

7. Exterior cladding

- a. Light-weight metal panel cladding is illustrated.
- b. Material options for the exterior cladding include:
 - I. Wood or wood panel
 - II. Traditional stucco
 - III. Exterior Insulation Finish System (EIFS)
 - IV. Fiber cement siding or panels

8. Quality control considerations

- a. Inspect the lapping of membrane pieces to ensure that pieces are installed in “shingle” fashion.
- b. Confirm installation of DELTA®-MULTI-BAND tape at vertical edges of DELTA®-VENT SA membrane sheets.
- c. Ensure tight fit of continuous exterior insulation material at structural penetrations.

■ Light-weight cladding attached with "clip and rail" system to minimize thermal bridging through insulation

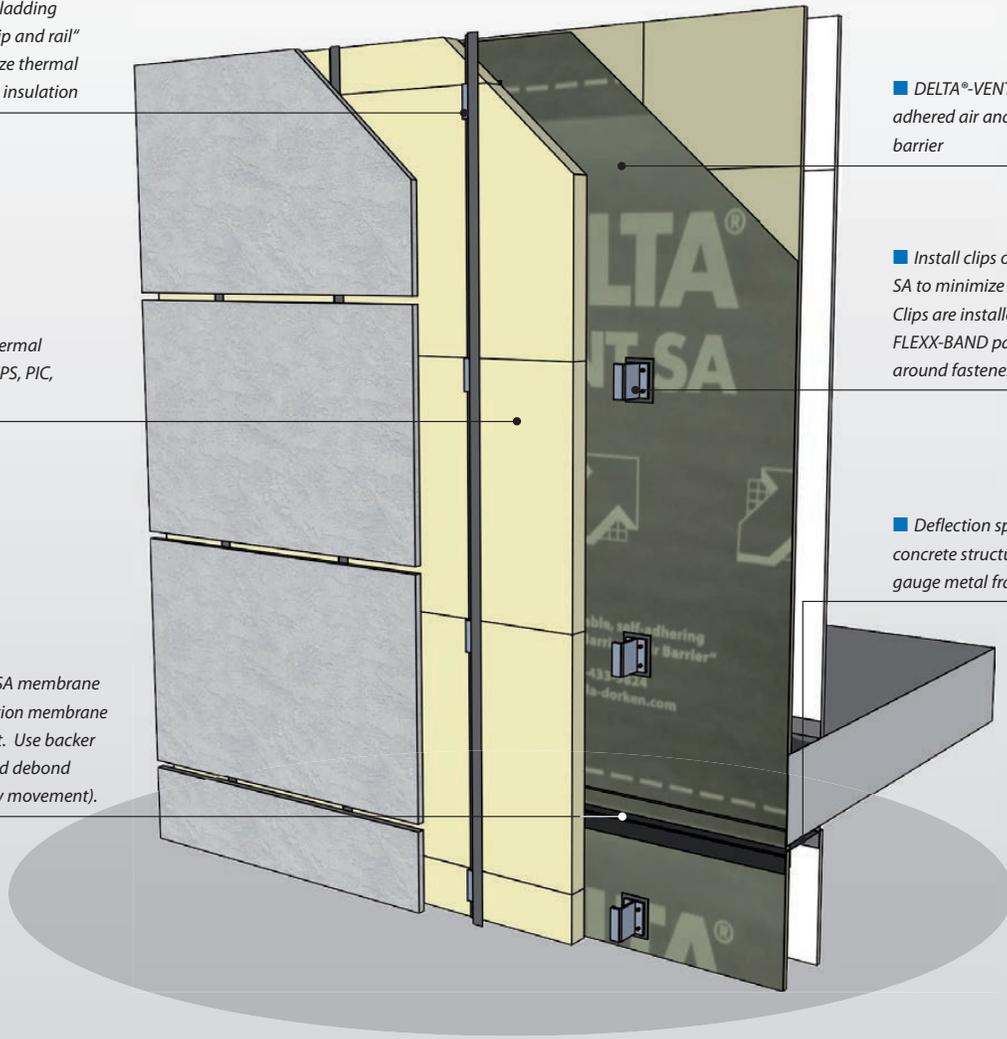
■ Continuous thermal insulation (XPS, EPS, PIC, semi-rigid MFI)

■ DELTA®-VENT SA membrane wraps over transition membrane at deflection joint. Use backer rod to fill joint and debond membrane (allow movement).

■ DELTA®-VENT SA fully adhered air and water-resistive barrier

■ Install clips over DELTA®-VENT SA to minimize penetrations. Clips are installed over DELTA®-FLEXX-BAND patch to seal around fasteners

■ Deflection space between concrete structure and light gauge metal frame



Installation Details

2. Field of Wall – Heavy-weight Cladding Attachment System

DELTA®-VENT SA – Building Science Notes

1. General

- a. Detail is applicable to heavy-weight cladding systems (see 7.b below) for low-, mid-, and high-rise construction.

2. Structure

- a. A cast-in-place concrete structure with light gauge metal stud frame and exterior gypsum board sheathing infill structure is illustrated in this detail.

3. Rain water control layer

- a. A drained-screen approach to rain water control (as illustrated) is recommended.
- b. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary rain water control layer in the wall assembly. Water penetrating the exterior cladding must be directed to the exterior by this layer.

4. Air control layer

- a. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary air control layer. The membrane is fully supported by the exterior sheathing and continuous through the detail illustrated.
- b. Critical air barrier details:
 - I. **Movement Joint:** the joint below concrete slab must be constructed with a transition membrane to prevent tearing of the DELTA®-VENT SA air barrier membrane as the structure moves. A backer rod is used to fill the joint and prevent the transition membrane from bonding at this location.
 - II. **Structural Penetration:** Knife edge or tube sections are welded to cast-in place plates at wide intervals (36" to 48" or 900 mm to 1200 mm o.c.) to support the heavy-weight cladding system on a continuous shelf angle. The DELTA®-VENT SA membrane must be installed around these penetrations. Ensure that:
 1. Cast-in plates are sized with min 2" (50 mm) on all sides of knife edge or tube section to allow for membrane adhesion.

- 2. Lower DELTA®-VENT SA sheet must be notched at knife edge and adhered to plate.
- 3. Upper sheet must be notched at penetration and lapped over the lower sheet.
- 4. Seal around structural penetration with DELTA®-THAN sealant.

5. Thermal control layer

- a. Continuous exterior insulation is the primary thermal control layer. Insulation may also be included in the wall cavity but exterior insulation is preferred to address thermal bridging.
- b. The amount of insulation recommended varies by climate region (see Table 3).
- c. Convection-suppressing insulation is preferred for cavity insulation to control convection in framing cavity.

6. Vapor control layer

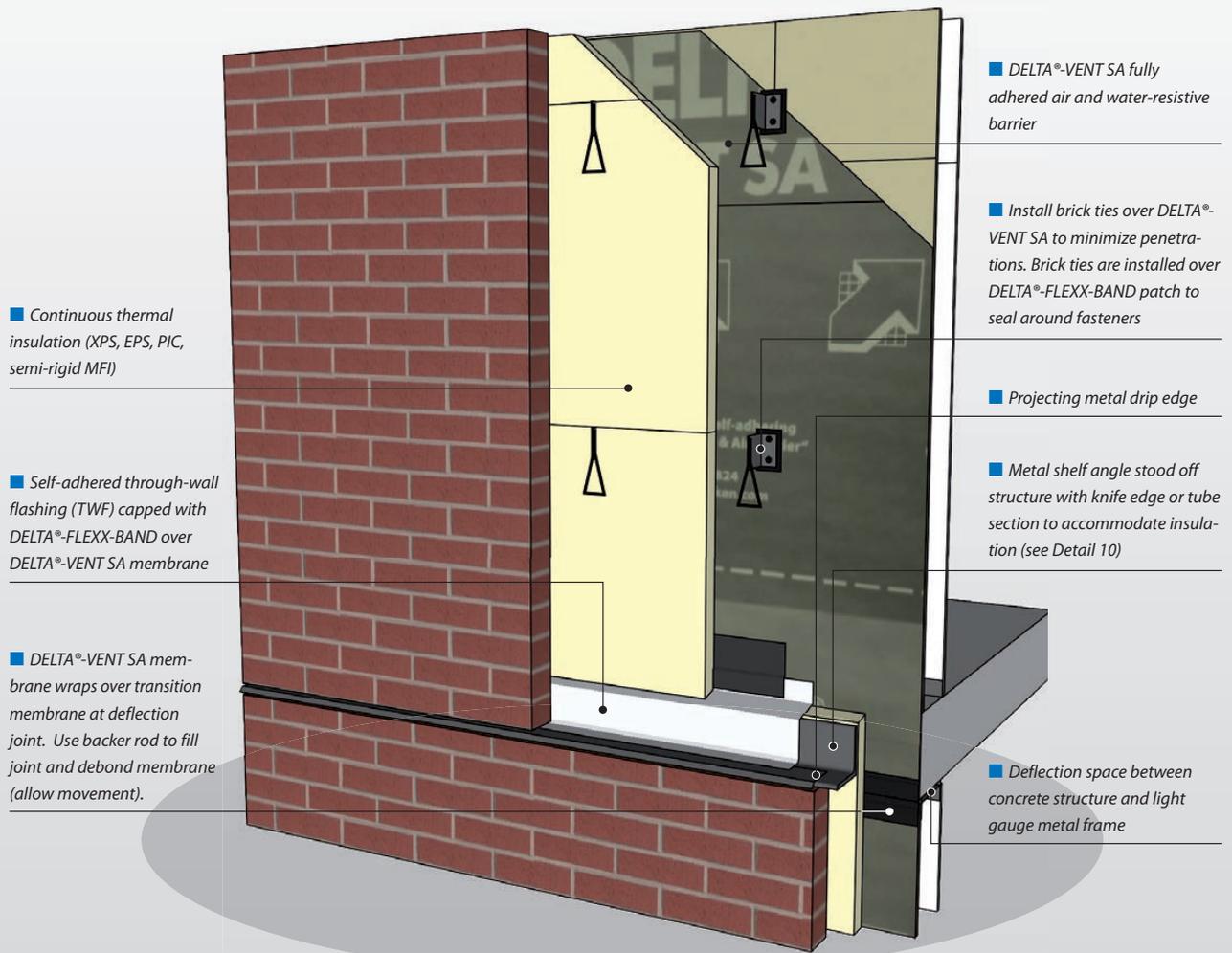
- a. Depending on climate and insulation materials, the primary vapor control layer may be located to the interior or exterior of the DELTA®-VENT SA membrane.
- b. Design the assembly as a "vapor open" assembly, meaning that there is a single line of vapor control and that drying can occur towards the interior or towards the exterior from this line. Selection of vapor-open interior finishes should be considered.

7. Exterior cladding

- a. Clay brick masonry veneer is illustrated.
- b. Material options for the exterior cladding include:
 - I. Architectural precast panels
 - II. Adhered veneer
 - III. Drained and ventilated stucco

8. Quality control considerations

- a. Inspect the lapping of membrane pieces to ensure that pieces are installed in "shingle" fashion.
- b. Confirm installation of DELTA®-MULTI-BAND tape at vertical edges of DELTA®-VENT SA membrane sheets.
- c. Ensure tight fit of continuous exterior insulation material at structural penetrations.
- d. Ensure that the masonry veneer cavity is vented top and bottom and free of mortar droppings.



Installation Details

3. Field of Wall – Mechanical Penetration

DELTA®-VENT SA – Building Science Notes

1. General

- a. Detail is applicable to light- and heavy-weight cladding systems (see 7.b below) for low-, mid-, and high-rise construction.

2. Structure

- a. A light gauge metal stud frame and exterior gypsum board sheathing infill structure is illustrated in this detail. A wood framed wall with structural sheathing is an alternate assembly.

3. Rain water control layer

- a. A drained-screen approach to rain water control (as illustrated) is recommended.
- b. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary rain water control layer in the wall assembly. Water penetrating the exterior cladding must be directed to the exterior by this layer.

4. Air control layer

- a. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary air control layer. The membrane is fully supported by the exterior sheathing and continuous through the detail illustrated.
- b. Critical air barrier details:
 - I. **Seal around penetration:** there are two parts to the interface between the mechanical penetration and the field of the wall.
 - Step 1. DELTA®-FLEXX-BAND is used in two pieces to create an overlapping seal to the DELTA®-VENT SA air barrier.
 - Step 2. From the interior, DELTA®-THAN sealant with backer rod is used to fill the joint between the penetration and the interior and exterior sheathing.

5. Thermal control layer

- a. Continuous exterior insulation is the primary thermal control layer. Insulation may also be included in the wall cavity but exterior insulation is preferred to address thermal bridging.
- b. The amount of insulation recommended varies by climate region (see Table 3).
- c. Convection-suppressing insulation is preferred for cavity insulation to control convection in framing cavity.

6. Vapor control layer

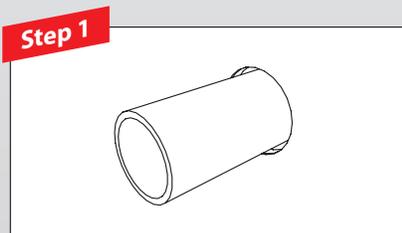
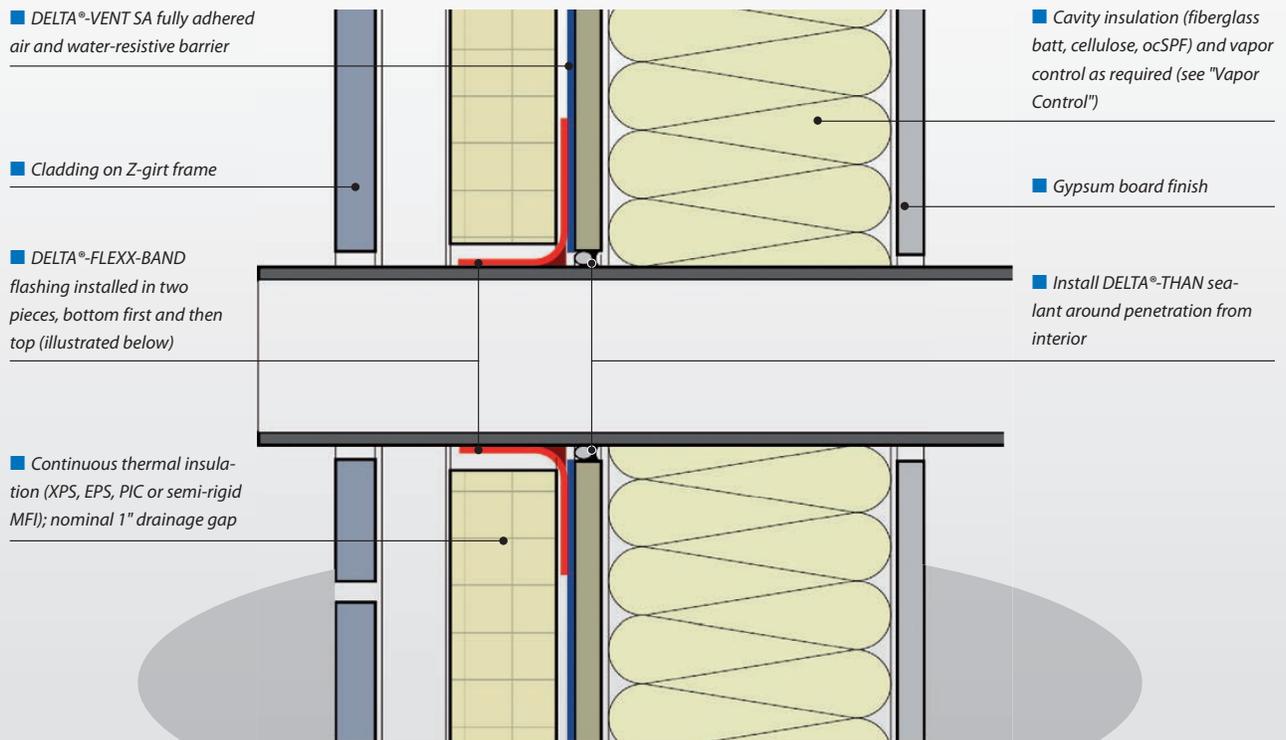
- a. Depending on climate and insulation materials, the primary vapor control layer may be located to the interior or exterior of the DELTA®-VENT SA membrane.
- b. Design the assembly as a “vapor open” assembly, meaning that there is a single line of vapor control and that drying can occur towards the interior or towards the exterior from this line. Selection of vapor-open interior finishes should be considered.

7. Exterior cladding

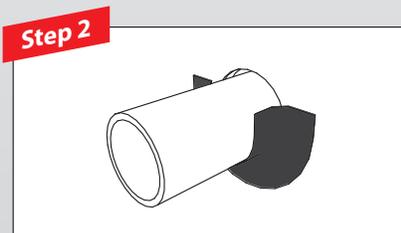
- a. Light-weight metal panel is illustrated.
- b. Material options for the exterior cladding include:
 - I. Architectural precast panels
 - II. Exterior Insulation Finish System (EIFS)
 - III. Masonry veneer

8. Quality control considerations

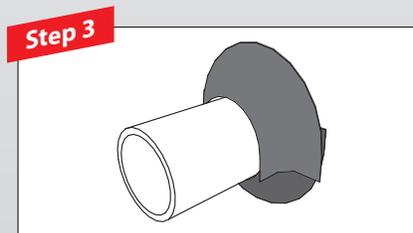
- a. Inspect the lapping of membrane pieces to ensure that pieces are installed in “shingle” fashion.
- b. Confirm installation of DELTA®-MULTI-BAND tape at vertical edges of DELTA®-VENT SA membrane sheets.
- c. Ensure tight fit of continuous exterior insulation material at mechanical penetrations.



■ Cut opening in exterior sheathing, ensuring that the penetration fits with a small gap on all sides.



■ Install DELTA®-FLEXX-BAND below penetration, forming the material tightly to the penetration.



■ Install a second piece of DELTA®-FLEXX-BAND above, overlapping the lower flashing and sealing tightly. Apply DELTA®-THAN sealant from interior.

Installation Details

4. Field of Wall – Vertical Control Joint

DELTA®-VENT SA – Building Science Notes

1. General

- a. Detail is applicable to light- and heavy-weight cladding systems (see 7.b below) for low-, mid-, and high-rise construction.

2. Structure

- a. A light gauge metal stud frame and exterior gypsum board sheathing infill structure is illustrated in this detail.

3. Rain water control layer

- a. A drained-screen approach to rain water control (as illustrated) is recommended.
- b. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary rain water control layer in the wall assembly. Water penetrating the exterior cladding must be directed to the exterior by this layer.

4. Air control layer

- a. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary air control layer. The membrane is fully supported by the exterior sheathing and continuous through the detail illustrated.
- b. Critical air barrier details:
 - I. **Movement Joint:** the vertical joint in the steel frame wall must be bridged with a metal expansion joint to prevent tearing of the DELTA®-VENT SA air barrier membrane as the structure moves.

5. Thermal control layer

- a. Continuous exterior insulation is the primary thermal control layer. Insulation may also be included in the wall cavity but exterior insulation is preferred to address thermal bridging.
- b. The amount of insulation recommended varies by climate region (see Table 3).
- c. Convection-suppressing insulation is preferred for cavity insulation to control convection in framing cavity.

6. Vapor control layer

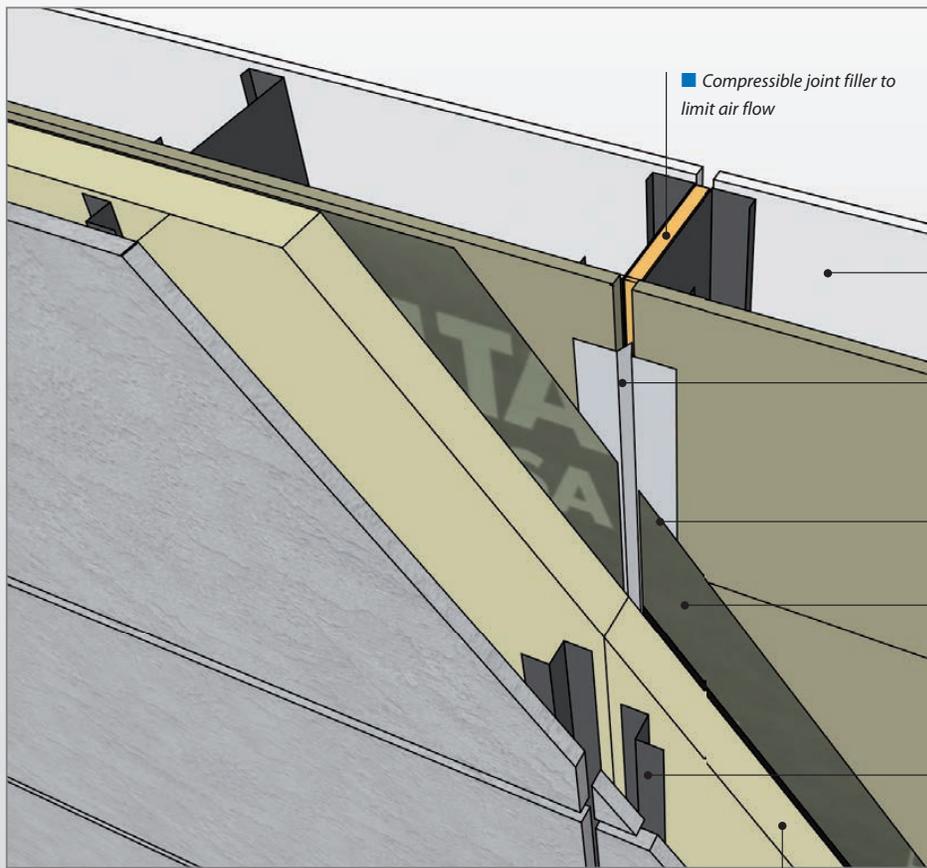
- a. Depending on climate and insulation materials, the primary vapor control layer may be located to the interior or exterior of the DELTA®-VENT SA membrane.
- b. Design the assembly as a “vapor open” assembly, meaning that there is a single line of vapor control and that drying can occur towards the interior or towards the exterior from this line. Selection of vapor-open interior finishes should be considered.

7. Exterior cladding

- a. Light-weight metal panel cladding is illustrated.
- b. Material options for the exterior cladding include:
 - I. Architectural precast panels
 - II. Exterior Insulation Finish System (EIFS)
 - III. Masonry veneer

8. Quality control considerations

- a. Inspect the lapping of membrane pieces to ensure that pieces are installed in “shingle” fashion.
- b. Confirm installation of DELTA®-MULTI-BAND tape at vertical edges of DELTA®-VENT SA membrane sheets.
- c. Ensure alignment of breaks in each material layer.
- d. Ensure tight fit of continuous exterior insulation material at structural penetrations.



■ Compressible joint filler to limit air flow

■ Optional cavity insulation (fiberglass batt, cellulose, ocSPF) and vapor control as required (see "Vapor Control")

■ Maintain free space at exterior of expansion joint

■ Install DELTA®-VENT SA membrane fully adhered to light-gauge metal expansion joint, min. 3" overlap

■ DELTA®-VENT SA fully adhered air and water-resistive barrier

■ Z-girt cladding support attached through insulation with non-continuous stand-off clips. Install clips over DELTA®-VENT SA membrane

■ Continuous thermal insulation (XPS, EPS, PIC, semi-rigid MFI)

Installation Details

5. Punched Window Opening – Flanged Window – Sill Detail

DELTA®-VENT SA – Building Science Notes

1. General

- a. Detail is applicable to heavy-weight cladding systems (see 7.b below) using vapor permeable rigid insulation for low- and mid-rise construction.

2. Structure

- a. A wood stud frame and exterior OSB or plywood sheathing infill structure is illustrated in this detail.

3. Rain water control layer

- a. A drained-screen approach to rain water control (as illustrated) is recommended.
- b. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary rain water control layer in the wall assembly. Water penetrating the exterior cladding must be directed to the exterior by this layer.

4. Air control layer

- a. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary air control layer. The membrane is fully supported by the exterior sheathing and continuous through the detail illustrated.
- b. Critical air barrier details:
 - I. **Window to Wall Joint:** the rough opening is wrapped with DELTA®-VENT SA membrane prior to installation of the window unit. Use low-expansion spray foam or caulking with backer rod (depending on the size of the space between the window and the rough opening) to make the air barrier system continuous through this detail.
 - II. **Setting blocks and shims:** When air sealing between the window frame and the rough opening, ensure that setting blocks under the window unit or shims at the jambs are effectively air sealed with low-expansion spray foam or caulking with backer rod. Best practice is to position the setting blocks or shims so that there is at least 3/4" (19 mm) of clear space between the block and the interior side edge of the window frame.

5. Thermal control layer

- a. Continuous exterior insulation is the primary thermal control layer. Insulation may also be included in the wall cavity but exterior insulation is preferred to address thermal bridging.
- b. The amount of insulation recommended varies by climate region (see Table 3).
- c. Convection-suppressing insulation is preferred for cavity insulation to control convection in framing cavity.

6. Vapor control layer

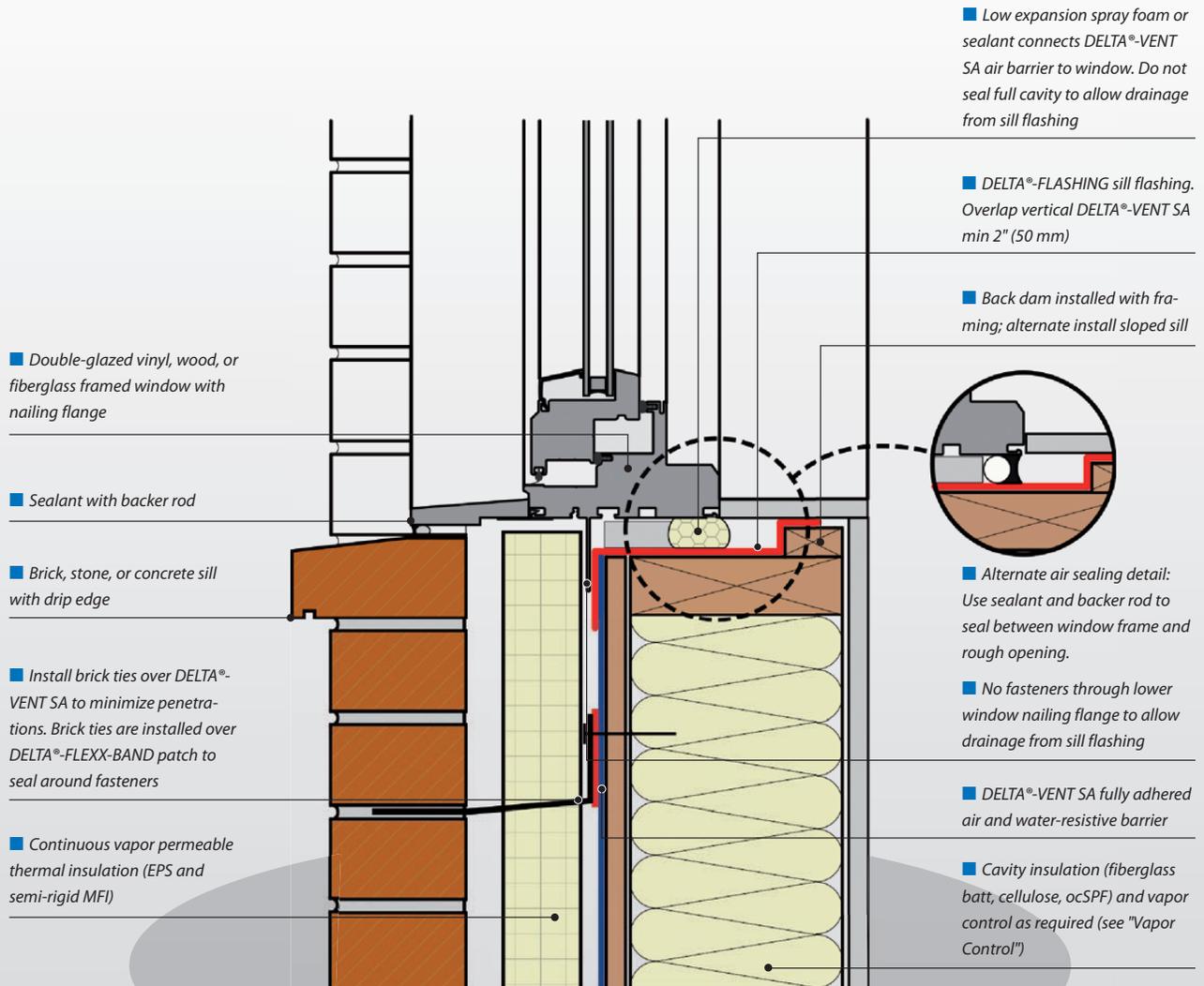
- a. Depending on climate and insulation materials, the primary vapor control layer may be located to the interior or exterior of the DELTA®-VENT SA membrane.
- b. Design the assembly as a “vapor open” assembly, if applicable, meaning that there is a single line of vapor control and that drying can occur towards the interior or towards the exterior from this line. Selection of vapor-open interior finishes should be considered.

7. Exterior cladding

- a. Clay brick masonry veneer is illustrated.
- b. Material options for the exterior cladding include:
 - I. Wood, fiber cement, vinyl or metal siding
 - II. Exterior Insulation Finish System (EIFS)
 - III. Light-weight metal panels

8. Quality control considerations

- a. Inspect the lapping of membrane pieces to ensure that pieces are installed in “shingle” fashion.
- b. Confirm installation of DELTA®-MULTI-BAND tape at vertical edges of DELTA®-VENT SA membrane sheets.
- c. Inspect the seal between the window and rough opening. Ensure that the cavity is well filled at jamb and head and the seal is continuous.
- d. Ensure tight fit of continuous exterior insulation material at structural penetrations.
- e. Ensure that the masonry veneer cavity is vented top and bottom and free of mortar droppings.



Installation Details

6. Punched Window Opening – Flanged Window – Sill Detail (Rigid Insulation Alternate)

DELTA®-VENT SA – Building Science Notes

1. General

- a. Detail is applicable to heavy-weight cladding systems (see 7.b below) using rigid exterior insulation for low- and mid-rise construction.

2. Structure

- a. A wood stud frame and exterior OSB or plywood sheathing infill structure is illustrated in this detail.

3. Rain water control layer

- a. A drained-screen approach to rain water control (as illustrated) is recommended.
- b. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary rain water control layer in the wall assembly. Water penetrating the exterior cladding must be directed to the exterior by this layer.
- c. At the window, DELTA®-FLASHING membrane over the sill flashing directs draining water over the front face of the rigid insulation.

4. Air control layer

- a. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary air control layer. The membrane is fully supported by the exterior sheathing and continuous through the detail illustrated.
- b. Critical air barrier details:
 - I. **Window to Wall Joint:** the rough opening is wrapped with DELTA®-VENT SA membrane prior to installation of the window unit. Use low-expansion spray foam or caulking with backer rod (depending on the size of the space between the window and the rough opening) to make the air barrier system continuous through this detail.
 - II. **Setting blocks and shims:** When air sealing between the window frame and the rough opening, ensure that setting blocks under the window unit or shims at the jambs are effectively air sealed with low-expansion spray foam or caulking with backer rod. Best practice is to position the setting blocks or shims so that there is at least 3/4" (19 mm) of clear space between the block and the interior side edge of the window frame.

5. Thermal control layer

- a. Continuous exterior insulation is the primary thermal control layer. Insulation may also be included in the wall cavity but exterior insulation is preferred to address thermal bridging.
- b. The amount of insulation recommended varies by climate region (see Table 3).
- c. Convection-suppressing insulation is preferred for cavity insulation to control convection in framing cavity.

6. Vapor control layer

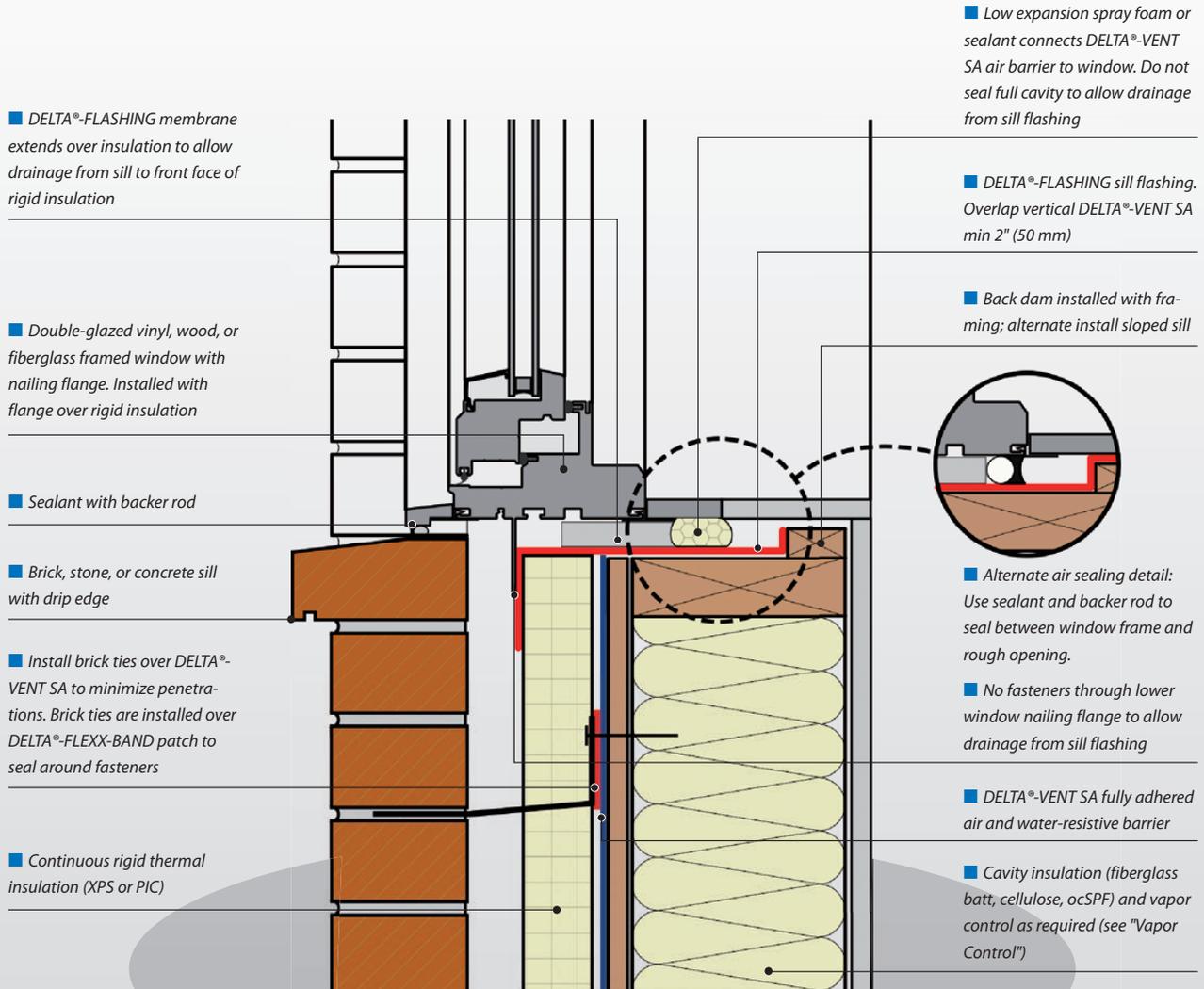
- a. Depending on climate and insulation materials, the primary vapor control layer may be located to the interior or exterior of the DELTA®-VENT SA membrane.
- b. Design the assembly as a “vapor open” assembly, if applicable, meaning that there is a single line of vapor control and that drying can occur towards the interior or towards the exterior from this line. Selection of vapor-open interior finishes should be considered.

7. Exterior cladding

- a. Clay brick masonry veneer is illustrated.
- b. Material options for the exterior cladding include:
 - I. Wood, fiber cement, vinyl or metal siding
 - II. Exterior Insulation Finish System (EIFS)
 - III. Light-weight metal panels

8. Quality control considerations

- a. Inspect the lapping of membrane pieces to ensure that pieces are installed in “shingle” fashion.
- b. Confirm installation of DELTA®-MULTI-BAND tape at vertical edges of DELTA®-VENT SA membrane sheets.
- c. Inspect the seal between the window and rough opening. Ensure that the cavity is well filled and the seal is continuous.
- d. Ensure tight fit of continuous exterior insulation material at structural penetrations.
- e. Ensure that the masonry veneer cavity is vented top and bottom and free of mortar droppings.



Installation Details

7. Punched Window Opening – Flanged Window – Jamb Detail

DELTA®-VENT SA – Building Science Notes

1. General

- a. Detail is applicable to heavy-weight cladding systems (see 7.b below) for low- and mid-rise construction.

2. Structure

- a. A wood stud frame and exterior OSB or plywood sheathing infill structure is illustrated in this detail.

3. Rain water control layer

- a. A drained-screen approach to rain water control (as illustrated) is recommended.
- b. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary rain water control layer in the wall assembly. Water penetrating the exterior cladding must be directed to the exterior by this layer.

4. Air control layer

- a. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary air control layer. The membrane is fully supported by the exterior sheathing and continuous through the detail illustrated.
- b. Critical air barrier details:
 - I. **Window to Wall Joint:** the rough opening is wrapped with DELTA®-VENT SA membrane prior to installation of the window unit. Use low-expansion spray foam or caulking with backer rod (depending on the size of the space between the window and the rough opening) to make the air barrier system continuous through this detail.
 - II. **Setting blocks and shims:** When air sealing between the window frame and the rough opening, ensure that setting blocks under the window unit or shims at the jambs are effectively air sealed with low-expansion spray foam or caulking with backer rod. Best practice is to position the setting blocks or shims so that there is at least 3/4" (19 mm) of clear space between the block and the interior side edge of the window frame.

5. Thermal control layer

- a. Continuous exterior insulation is the primary thermal control layer. Insulation may also be included in the wall cavity but exterior insulation is preferred to address thermal bridging.
- b. The amount of insulation recommended varies by climate region (see Table 3).
- c. Convection-suppressing insulation is preferred for cavity insulation to control convection in framing cavity.

6. Vapor control layer

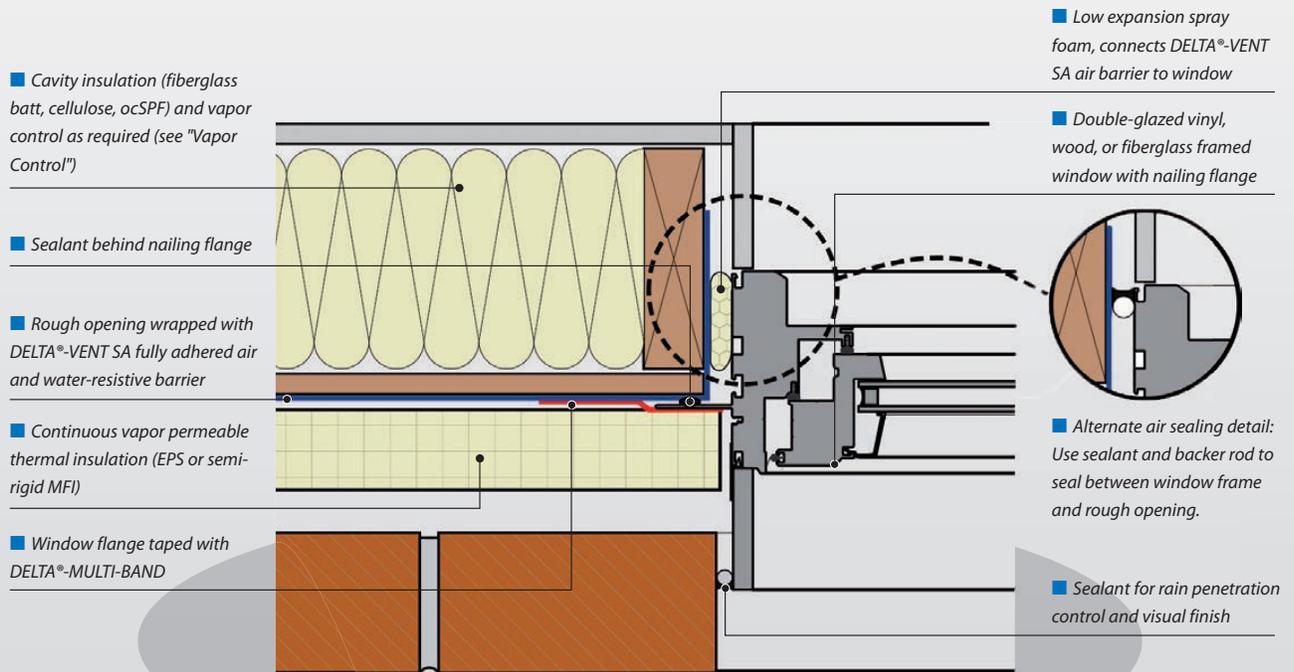
- a. Depending on climate and insulation materials, the primary vapor control layer may be located to the interior or exterior of the DELTA®-VENT SA membrane.
- b. Design the assembly as a “vapor open” assembly, meaning that there is a single line of vapor control and that drying can occur towards the interior or towards the exterior from this line. Selection of vapor-open interior finishes should be considered.

7. Exterior cladding

- a. Clay brick masonry veneer is illustrated.
- b. Material options for the exterior cladding include:
 - I. Wood, fiber cement, vinyl or metal siding
 - II. Exterior Insulation Finish System (EIFS)
 - III. Light-weight metal panels

8. Quality control considerations

- a. Inspect the lapping of membrane pieces to ensure that pieces are installed in “shingle” fashion.
- b. Confirm installation of DELTA®-MULTI-BAND tape at vertical edges of DELTA®-VENT SA membrane sheets.
- c. Inspect the seal between the window and rough opening. Ensure that the cavity is well filled.
- d. Ensure tight fit of continuous exterior insulation material at structural penetrations.
- e. Ensure that the masonry veneer cavity is vented top and bottom and free of mortar droppings.



Installation Details

8. Punched Window Opening – Flanged Window – Head Detail

DELTA®-VENT SA – Building Science Notes

1. General

- a. Detail is applicable to heavy-weight cladding systems (see 7.b below) for low- and mid-rise construction.

2. Structure

- a. A wood stud frame and exterior OSB or plywood sheathing infill structure is illustrated in this detail.

3. Rain water control layer

- a. A drained-screen approach to rain water control (as illustrated) is recommended.
- b. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary rain water control layer in the wall assembly. Water penetrating the exterior cladding must be directed to the exterior by this layer.

4. Air control layer

- a. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary air control layer. The membrane is fully supported by the exterior sheathing and continuous through the detail illustrated.
- b. Critical air barrier details:
 - I. **Window to Wall Joint:** the rough opening is wrapped with DELTA®-VENT SA membrane prior to installation of the window unit. Use low-expansion spray foam or caulking with backer rod (depending on the size of the space between the window and the rough opening) to make the air barrier system continuous through this detail.
 - II. **Setting blocks and shims:** When air sealing between the window frame and the rough opening, ensure that setting blocks under the window unit or shims at the jambs are effectively air sealed with low-expansion spray foam or caulking with backer rod. Best practice is to position the setting blocks or shims so that there is at least 3/4" (19 mm) of clear space between the block and the interior side edge of the window frame.

5. Thermal control layer

- a. Continuous exterior insulation is the primary thermal control layer. Insulation may also be included in the wall cavity but exterior insulation is preferred to address thermal bridging.
- b. The amount of insulation recommended varies by climate region (see Table 3).
- c. Convection-suppressing insulation is preferred for cavity insulation to control convection in framing cavity.

6. Vapor control layer

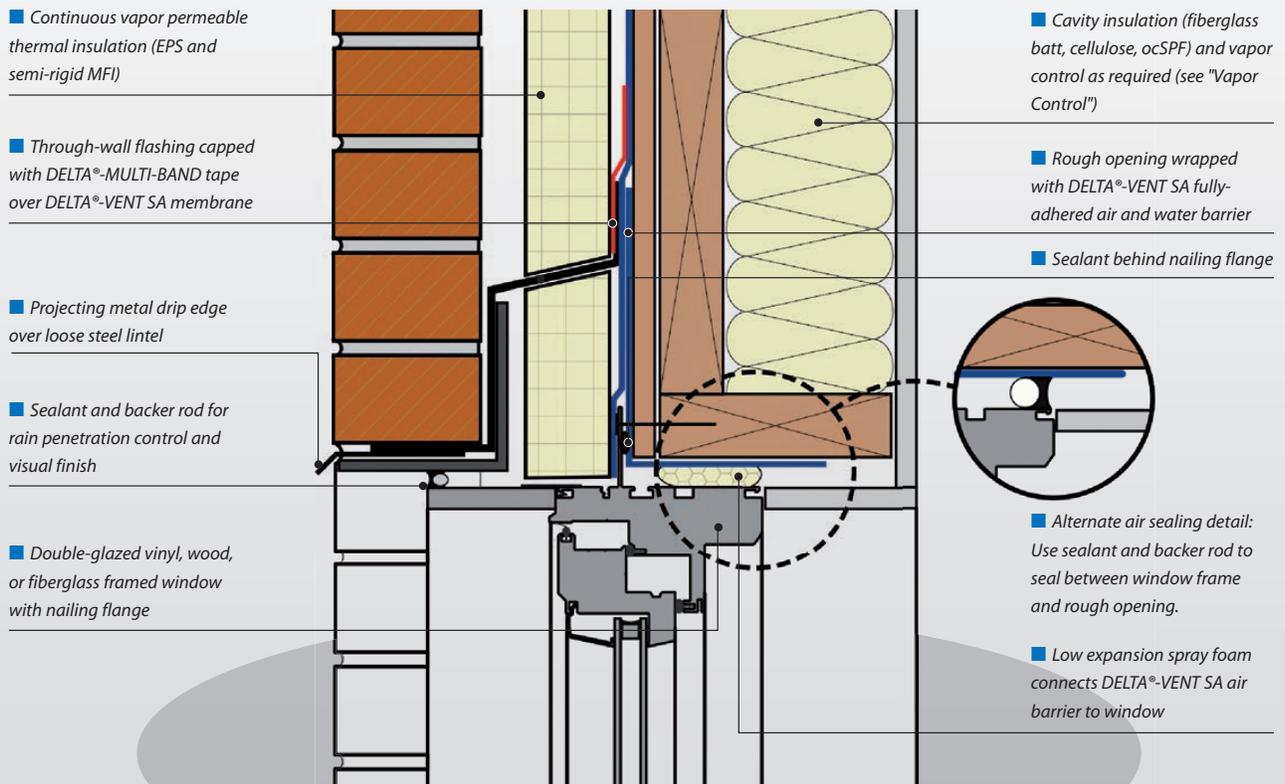
- a. Depending on climate and insulation materials, the primary vapor control layer may be located to the interior or exterior of the DELTA®-VENT SA membrane.
- b. Design the assembly as a "vapor open" assembly, meaning that there is a single line of vapor control and that drying can occur towards the interior or towards the exterior from this line. Selection of vapor-open interior finishes should be considered.

7. Exterior cladding

- a. Clay brick masonry veneer is illustrated.
- b. Material options for the exterior cladding include:
 - I. Wood, fiber cement, vinyl or metal siding
 - II. Exterior Insulation Finish System (EIFS)
 - III. Light-weight metal panels

8. Quality control considerations

- a. Inspect the lapping of membrane pieces to ensure that pieces are installed in "shingle" fashion.
- b. Confirm installation of DELTA®-MULTI-BAND tape at vertical edges of DELTA®-VENT SA membrane sheets.
- c. Inspect the seal between the window and rough opening. Ensure that the cavity is well filled and the seal is continuous.
- d. Ensure tight fit of continuous exterior insulation material at structural penetrations.
- e. Maintain angled insulation around through wall flashing (TWF) to ensure that no water gets caught in a depression in the TWF membrane.
- f. Ensure that the masonry veneer cavity is vented top and bottom and free of mortar droppings.



Installation Details

9. Punched Window Opening (strip-in method) – Installation Sequence; suitable for Climate Zones 2 - 5

For other window installation methods, please refer to DELTA®-VENT SA Window Installation Guide.



- Wood frame with OSB or plywood sheathing.
- Prime sheathing with DELTA®-ADHESIVE LVC before applying DELTA®-FAS CORNER and DELTA®-VENT SA.



- Install DELTA®-FAS CORNER in lower corners of rough opening.
- Staple on vertical leg for temporary support.



- Install DELTA®-VENT SA membrane below window with cut out minimum 8" (200 mm) above sill.



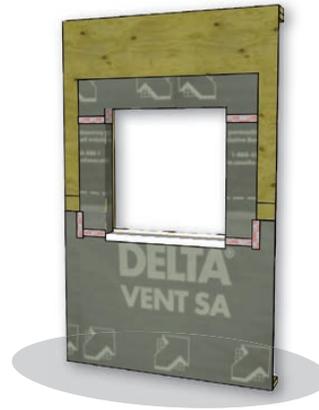
- Install DELTA®-FLASHING membrane at sill. Overlap 2" (50 mm) onto vertical DELTA®-VENT SA membrane below.

Step 5



- Install DELTA®-VENT SA membrane strip to wrap jamb. Lap 8" (200 mm) onto face of wall at jamb, minimum 3" (75 mm) at head.

Step 6



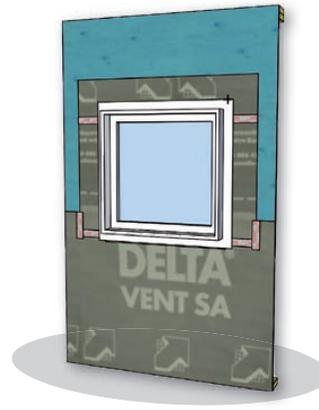
- Install DELTA®-VENT SA membrane at head of rough opening. Lap minimum 8" (200 mm) onto face of wall at head.
- Install DELTA®-MULTI-BAND tape at overlapped edges of DELTA®-VENT SA to ensure airtightness.

Step 7



- Back-caulk window as per window manufacturer's instructions.
- Apply sealant at jambs and head. Do not apply to sill to allow drainage from sill pan.
- Alternatively, caulk can be applied to window nailing flange prior to installation.
- Use non-cellulosic setting blocks; recommend vinyl or PVC material.

Step 8



- Install window plumb, level, and square as per manufacturer's instructions.
- Prime sheathing with DELTA®-ADHESIVE LVC before applying DELTA®-VENT SA.

Installation Details

Step 9



- Install DELTA®-VENT SA membrane overlapping window flange and extending minimum 3" (75 mm) above top flange.
- Tape DELTA®-VENT SA to window flange at both jambs with DELTA®-MULTI-BAND tape.

Step 10



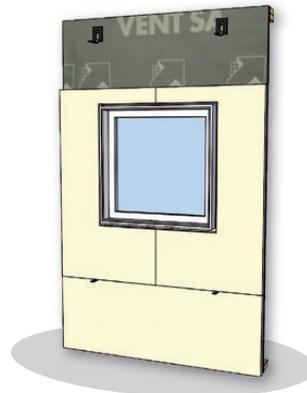
- Install DELTA®-VENT SA membrane above head of window, overlapping window flange and lower membrane sheets.

Step 11



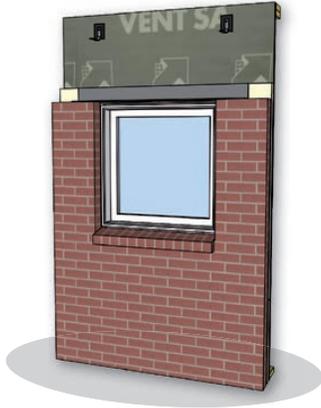
- Install DELTA®-MULTI-BAND tape at overlapped edges of DELTA®-VENT SA to ensure airtightness.
- Install brick ties over DELTA®-VENT SA to minimize penetrations. Brick ties are installed over DELTA®-FLEX-BAND patch to seal around fasteners.

Step 12



- Install continuous exterior insulation to height of loose steel lintel.
- Install insulation tightly to window frame as per manufacturer's instructions.

Step 13



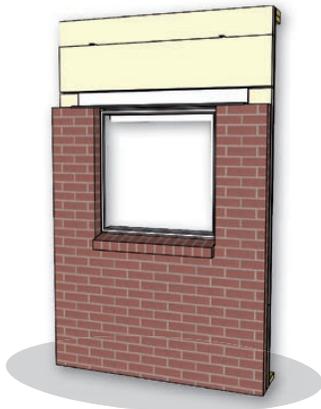
- Install brick veneer cladding and loose lintel to top of window opening.

Step 14



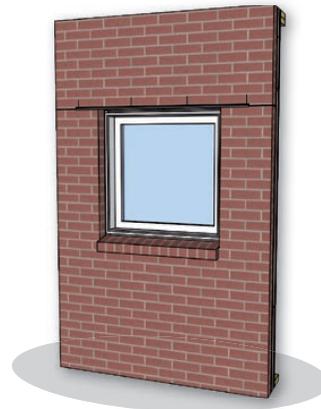
- Install metal drip edge and through-wall flashing to face of DELTA®-VENT SA.
- Terminate top edge of through-wall flashing with DELTA®-MULTI-BAND flashing tape.

Step 15



- Complete installation of exterior insulation.

Step 16



- Complete brick veneer installation with open head joints for drainage / venting at 24" (600 mm) o.c.

Installation Details

10. Intersection – Wall and Foundation with Exterior Insulation

DELTA®-VENT SA – Building Science Notes

1. General

- a. Detail is applicable to heavy-weight cladding systems (see 7.b below) for low-, mid-, and high-rise construction.

2. Structure

- a. A cast-in-place concrete structure with light gauge metal stud frame and exterior gypsum board sheathing infill structure is illustrated in this detail. A wood framed wall with structural sheathing is an alternate assembly.

3. Rain water control layer

- a. A drained-screen approach to rain water control (as illustrated) is recommended.
- b. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary rain water control layer in the wall assembly. Water penetrating the exterior cladding must be directed to the exterior by this layer.
- c. Maintain minimum 6" (150 mm) separation to grade.
- d. Slope grade away from building and choose irregular surface finish material to minimize splash-back on base of wall.

4. Air control layer

- a. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary air control layer. The membrane is fully supported by the exterior sheathing and continuous through the detail illustrated.
- b. Critical air barrier details:
 - I. **Structural Penetration:** Knife edge or tube sections are welded to cast-in plates at wide intervals (36" to 48" or 900 mm to 1200 mm o.c.) to support the continuous shelf angle. The DELTA®-VENT SA membrane must be installed around these penetrations. Ensure that:
 1. Cast-in plates are sized with min 2" (50 mm) on all sides of knife edge or tube section to allow for membrane adhesion.
 2. Lower DELTA®-VENT SA sheet must be notched at knife edge and adhered to plate.
 3. Upper sheet must be notched at penetration and lapped over the lower sheet.
 4. Seal around structural penetration with DELTA®-THAN sealant.

- II. **Connection to Below-grade Air Barrier.** The concrete foundation structure is the below-grade air control layer. The DELTA®-VENT SA membrane is fully adhered to the concrete foundation wall to maintain continuity.

5. Thermal control layer

- a. Continuous exterior insulation is the primary thermal control layer. Insulation may also be included in the wall cavity but exterior insulation is preferred to address thermal bridging.
- b. The amount of insulation recommended varies by climate region (see Table 3).
- c. Convection-suppressing insulation is preferred for cavity insulation to control convection in framing cavity.

6. Vapor control layer

- a. Depending on climate and insulation materials, the primary vapor control layer may be located to the interior or exterior of the DELTA®-VENT SA membrane.
- b. Design the assembly as a "vapor open" assembly, meaning that there is a single line of vapor control and that drying can occur towards the interior or towards the exterior from this line. Selection of vapor-open interior finishes should be considered.

7. Exterior cladding

- a. Clay brick masonry veneer is illustrated.
- b. Material options for the exterior cladding include:
 - I. Architectural precast panels
 - II. Exterior Insulation Finish System (EIFS)
 - III. Light-weight metal panels

8. Quality control considerations

- a. Inspect the lapping of membrane pieces to ensure that pieces are installed in "shingle" fashion.
- b. Confirm installation of DELTA®-MULTI-BAND tape at vertical edges of DELTA®-VENT SA membrane sheets.
- c. Ensure tight fit of continuous exterior insulation material at structural penetrations.
- d. Ensure that the masonry veneer cavity is vented top and bottom and free of mortar droppings.

■ DELTA®-VENT SA fully adhered air and water-resistive barrier

■ Continuous thermal insulation (XPS, EPS, PIC, semi-rigid MFI); nominal 1" drainage gap

■ Self-adhered through-wall flashing capped with DELTA®-FLEX-BAND over DELTA®-VENT SA membrane

■ Drain/vent opening at 24" (600 mm) o.c.

■ Projecting metal drip edge over brick shelf angle

■ Protection board or EIFS above grade. Install sealant below shelf angle

■ Slope to drain min. 2%

■ DELTA®-DRAIN over perimeter insulation and DELTA®-THENE waterproofing

■ Cavity insulation (fiberglass batt, cellulose, ocSPF) and vapor control as required (see "Vapor Control")

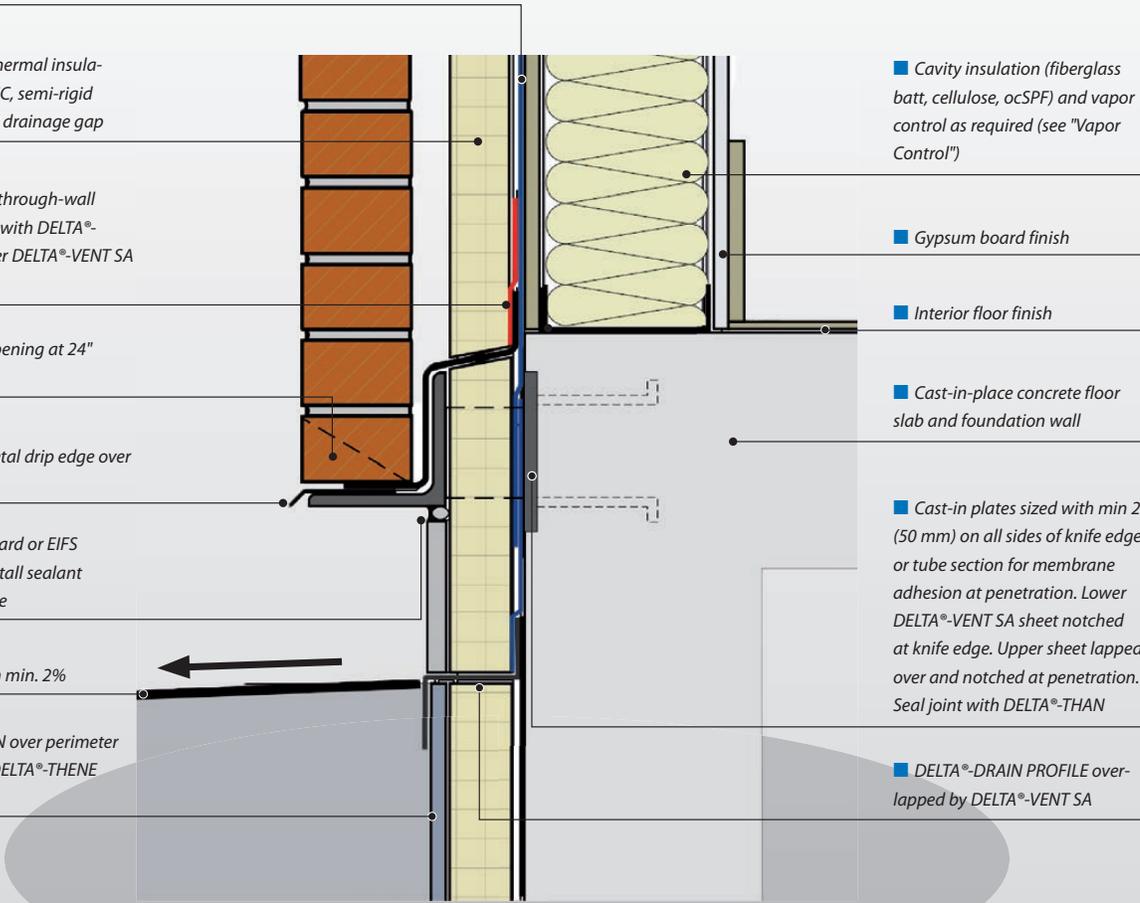
■ Gypsum board finish

■ Interior floor finish

■ Cast-in-place concrete floor slab and foundation wall

■ Cast-in plates sized with min 2" (50 mm) on all sides of knife edge or tube section for membrane adhesion at penetration. Lower DELTA®-VENT SA sheet notched at knife edge. Upper sheet lapped over and notched at penetration. Seal joint with DELTA®-THAN

■ DELTA®-DRAIN PROFILE overlapped by DELTA®-VENT SA



Installation Details

11. Intersection – Wall and Parapet (Wood Frame)

DELTA®-VENT SA – Building Science Notes

1. General

- a. Detail is applicable to light- and heavy-weight cladding systems (see 7.b below) and low-slope roof systems for low- and mid-rise construction.

2. Structure

- a. A wood stud frame and exterior OSB or plywood sheathing structure is illustrated in this detail.

3. Rain water control layer

- a. A drained-screen approach to rain water control (as illustrated) is recommended.
- b. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary rain water control layer in the wall assembly. Water penetrating the exterior cladding must be directed to the exterior by this layer.
- c. The roof membrane extends up and over the parapet structure.

4. Air control layer

- a. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary air control layer. The membrane is fully supported by the exterior sheathing and continuous through the detail illustrated.
- b. Critical air barrier details:
 - I. **Roof to Wall Interface:** the air control layer in the roof assembly is placed at the exterior, upper side of the roof deck to control air movement from the interior into the insulation layers and parapet structure. Continuity is ensured by making the connection to the wall before installation of the parapet.

5. Thermal control layer

- a. Continuous exterior insulation is the primary thermal control layer. Insulation may also be included in the wall cavity but exterior insulation is preferred to address thermal bridging.
- b. The amount of insulation recommended varies by climate region (see Table 3).
- c. Convection-suppressing insulation is preferred for cavity insulation to control convection in framing cavity.

6. Vapor control layer

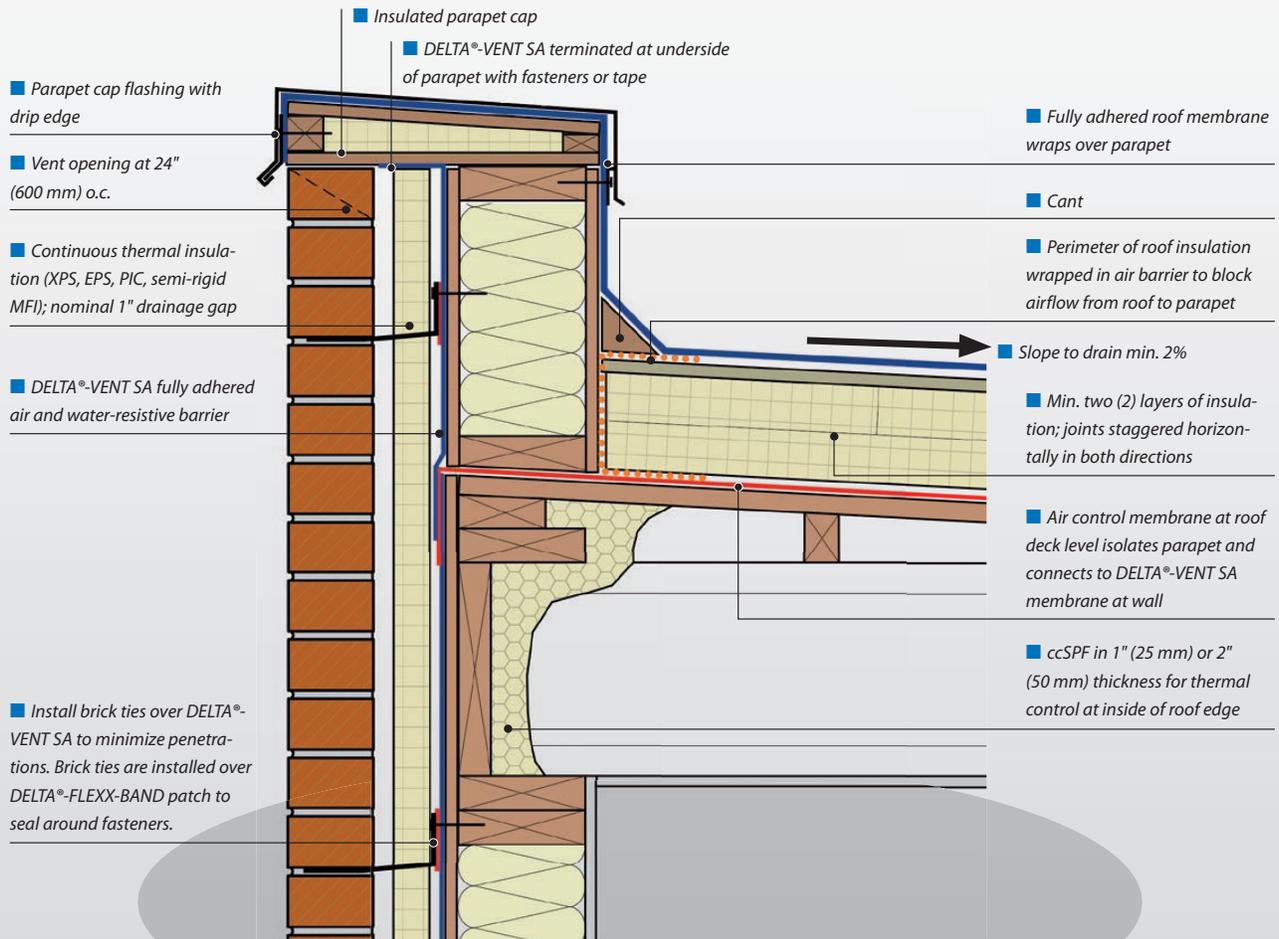
- a. Depending on climate and insulation materials, the primary vapor control layer may be located to the interior or exterior of the DELTA®-VENT SA membrane.
- b. Design the assembly as a “vapor open” assembly, meaning that there is a single line of vapor control and that drying can occur towards the interior or towards the exterior from this line. Selection of vapor-open interior finishes should be considered.

7. Exterior cladding

- a. Clay brick masonry veneer is illustrated.
- b. Material options for the exterior cladding include:
 - I. Wood, fiber cement, vinyl or metal siding
 - II. Exterior Insulation Finish System (EIFS)
 - III. Light-weight metal panels

8. Quality control considerations

- a. Inspect the lapping of membrane pieces to ensure that pieces are installed in “shingle” fashion.
- b. Confirm installation of DELTA®-MULTI-BAND tape at vertical edges of DELTA®-VENT SA membrane sheets.
- c. Ensure tight fit of continuous exterior insulation material at structural penetrations.
- d. Ensure that the masonry veneer cavity is vented top and bottom and free of mortar droppings.



Installation Details

12. Intersection – Wall and Parapet (Steel Frame)

DELTA®-VENT SA – Building Science Notes

1. General

- a. Detail is applicable to heavy-weight cladding systems (see 7.b below) for low-, mid-, and high-rise construction. With minor modifications this detail can apply to CMU infill and parapet construction.

2. Structure

- a. A cast-in-place concrete roof structure with light gauge metal stud frame and exterior gypsum board sheathing infill wall is illustrated in this detail. The parapet is a light gauge metal stud frame.

3. Rain water control layer

- a. A drained-screen approach to rain water control (as illustrated) is recommended.
- b. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary rain water control layer in the wall assembly. Water penetrating the exterior cladding must be directed to the exterior by this layer.
- c. The roof membrane extends up and over the parapet structure.

4. Air control layer

- a. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary air control layer. The membrane is fully supported by the exterior sheathing and continuous through the detail illustrated.
- b. Critical air barrier details:
 - I. **Movement Joint:** the joint below concrete slab must be constructed with a transition membrane to prevent tearing of the DELTA®-VENT SA air barrier membrane as the structure moves. A backer rod is used to fill the joint and prevent the transition membrane from bonding at this location.
 - II. **Roof to Wall Interface:** the air control layer in the roof assembly is placed at the exterior, upper side of the roof deck to control air movement from the interior into the insulation layers and parapet structure. Continuity is ensured by making the connection to the wall before installation of the parapet.

5. Thermal control layer

- a. Continuous exterior insulation on the wall and roof is the primary thermal control layer. Insulation may also be included in the wall cavity but exterior insulation is preferred to address thermal bridging.
- b. The amount of insulation recommended varies by climate region (see Table 3).
- c. Convection-suppressing insulation is preferred for cavity insulation to control convection in framing cavity.

6. Vapor control layer

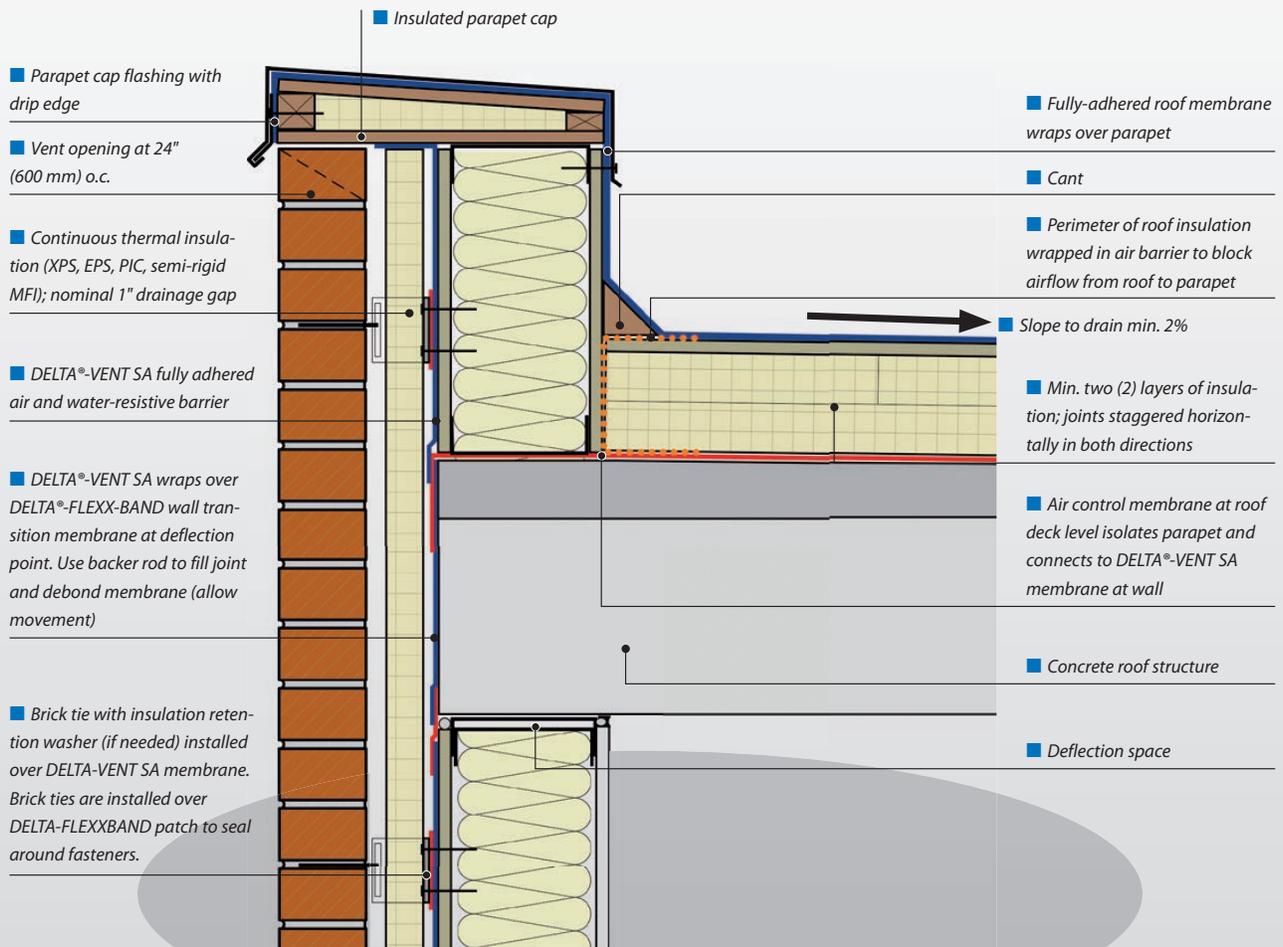
- a. Depending on climate and insulation materials, the primary vapor control layer may be located to the interior or exterior of the DELTA®-VENT SA membrane.
- b. Design the assembly as a “vapor open” assembly, meaning that there is a single line of vapor control and that drying can occur towards the interior or towards the exterior from this line. Selection of vapor-open interior finishes should be considered.

7. Exterior cladding

- a. Clay brick masonry veneer is illustrated.
- b. Material options for the exterior cladding include:
 - I. Architectural precast panels
 - II. Exterior Insulation Finish System (EIFS)
 - III. Light-weight metal panels
- c. An exposed membrane roof is illustrated.
- d. With minor modifications the same detail may be used for a protected membrane roof.

8. Quality control considerations

- a. Inspect the lapping of membrane pieces to ensure that pieces are installed in “shingle” fashion.
- b. Confirm installation of DELTA®-MULTI-BAND tape at vertical edges of DELTA®-VENT SA membrane sheets.
- c. Ensure tight fit of continuous exterior insulation material at structural penetrations.
- d. Limit fasteners penetrating the roof membrane on any horizontal surface, including the parapet.
- e. Ensure that the masonry veneer cavity is vented top and bottom and free of mortar droppings.



Installation Details

13. Intersection – Wall and Balcony – Cantilevered (Wood Frame)

DELTA®-VENT SA – Building Science Notes

1. General

- a. Detail is applicable to light- and heavy-weight cladding systems (see 7.b below) for low- and mid-rise construction.

2. Structure

- a. A wood stud frame and exterior OSB or plywood sheathing structure is illustrated in this detail. The balcony structure is cantilevered dimensional lumber or engineered wood I-joists.

3. Rain water control layer

- a. A drained-screen approach to rain water control (as illustrated) is recommended.
- b. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary rain water control layer in the wall assembly. Water penetrating the exterior cladding must be directed to the exterior by this layer.

4. Air control layer

- a. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary air control layer. The membrane is fully supported by the exterior sheathing and continuous through the detail illustrated.
- b. Critical air barrier details:
 - I. **Wall to Underside of Deck Termination:** the DELTA®-VENT SA membrane on the wall assembly is sealed to a 1x3 or equivalent block nailed to underside of cantilevered deck framing. Ensure a minimum of 2" horizontal area for adhesion of membrane.
 - II. **ccSPF at Cantilevered Floor Joists:** ccSPF insulation is used to make the air barrier continuous from the 1x3 blocking (see detail (i) above) to the underside of the deck sheathing. Solid blocking is used between cantilevered floor joists to backup ccSPF. Insulation depth to match thermal resistance requirements for wall assembly.
 - III. **Deck Sheathing to Wall:** the air barrier is made continuous from the deck sheathing to the DELTA®-VENT SA membrane on the wall assembly at the overlap of the fully adhered deck membrane at the DELTA®-VENT SA membrane. Use a fully adhered transition membrane in this location if using a loose-laid deck membrane.

5. Thermal control layer

- a. Continuous exterior insulation is the primary thermal control layer. Insulation may also be included in the wall cavity but exterior insulation is preferred to address thermal bridging.
- b. The amount of insulation recommended varies by climate region (see Table 3).
- c. ccSPF insulation is used in between cantilevered floor joists to maintain air barrier continuity.
- d. Convection-suppressing insulation is preferred for cavity insulation to control convection in framing cavity.

6. Vapor control layer

- a. Depending on climate and insulation materials, the primary vapor control layer may be located to the interior or exterior of the DELTA®-VENT SA membrane.
- b. Design the assembly as a "vapor open" assembly, meaning that there is a single line of vapor control and that drying can occur towards the interior or towards the exterior from this line. Selection of vapor-open interior finishes should be considered.

7. Exterior cladding

- a. Clay brick masonry veneer (below deck) and a fiber cement panel system (above deck) is illustrated.
- b. Material options for the exterior cladding include:
 - I. Wood, fiber cement, vinyl or metal siding
 - II. Exterior Insulation Finish System (EIFS)
 - III. Light-weight metal panels

8. Quality control considerations

- a. Inspect the lapping of membrane pieces to ensure that pieces are installed in "shingle" fashion.
- b. Confirm installation of DELTA®-MULTI-BAND tape at vertical edges of DELTA®-VENT SA membrane sheets.
- c. Ensure tight fit of continuous exterior insulation material at structural penetrations.
- d. Ensure that the masonry veneer cavity is vented top and bottom and free of mortar droppings.

■ Continuous thermal insulation (XPS, EPS, PIC, semi-rigid MFI); nominal 1" drainage gap

■ DELTA®-BUG SCREEN at base of ventilated cavity

■ Deck membrane extends min. 8" (200 mm) up wall overlapped by DELTA®-VENT SA

■ Exterior deck on 1.5" (38 mm) sleepers sloped to drain

■ 2.0 pcf ccSPF insulation to continue air barrier system through cantilevered framing

■ Vent opening at 24" (600 mm) o.c.

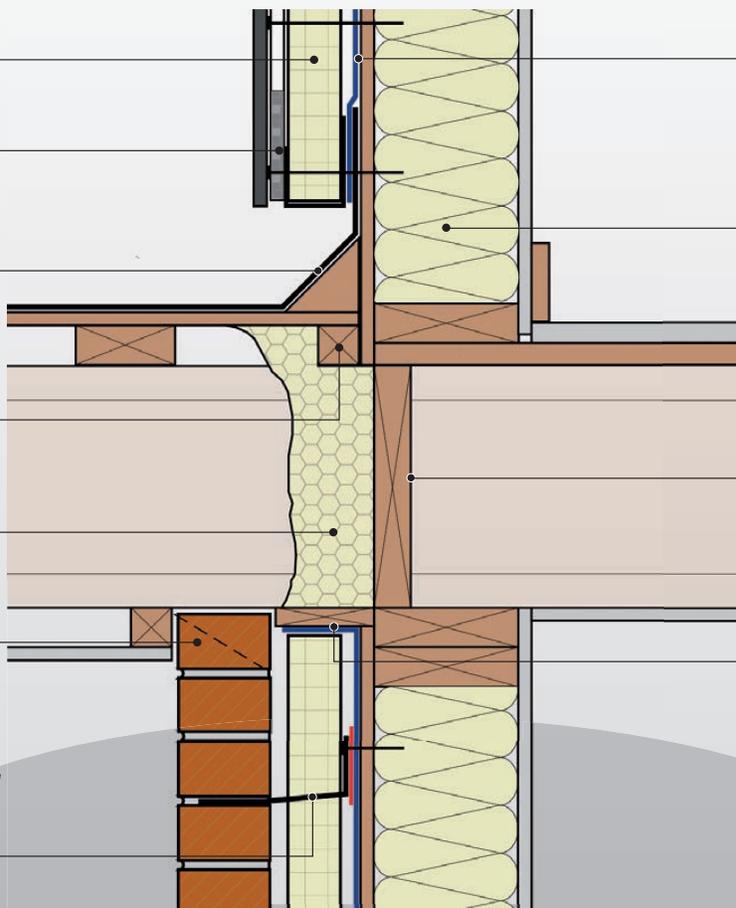
■ Brick ties installed over DELTA®-VENT SA to minimize penetrations of the air and water-resistive barrier. Brick ties are installed over DELTA®-FLEX-BAND patch to seal around fasteners.

■ DELTA®-VENT SA fully adhered air and water-resistive barrier

■ Cavity insulation (fiberglass batt, cellulose, ocSPF) and vapor control as required (see "Vapor Control")

■ Blocking between cantilevered framing

■ DELTA®-VENT SA adhered to 1x3 blocking. Terminate DELTA®-VENT SA with fastener or tape.



Installation Details

14. Intersection – Wall and Balcony – Supported Slab (Concrete Frame)

DELTA®-VENT SA – Building Science Notes

1. General

- a. Detail is applicable to heavy-weight cladding systems (see 7.b below) for low-, mid-, and high-rise construction.

2. Structure

- a. A cast-in-place concrete structure with light gauge metal stud frame and exterior gypsum board sheathing infill structure is illustrated in this detail.

3. Rain water control layer

- a. A drained-screen approach to rain water control (as illustrated) is recommended.
- b. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary rain water control layer in the wall assembly. Water penetrating the exterior cladding must be directed to the exterior by this layer.
- c. If possible, create a step down to the balcony to reduce risk of water intrusion at the through wall flashing location.

4. Air control layer

- a. The continuous, fully-adhered DELTA®-VENT SA membrane applied to the exterior surface of the exterior sheathing is the primary air control layer. The membrane is fully supported by the exterior sheathing and continuous through the detail illustrated.
- b. Critical air barrier details:
 - I. **Movement Joint:** the joint below concrete slab must be constructed with a transition membrane to prevent tearing of the DELTA®-VENT SA air barrier membrane as the structure moves. A backer rod is used to fill the joint and prevent the transition membrane from bonding at this location.
 - II. **Structural Penetration:** Knife edge or tube sections are welded to cast-in plates at wide intervals (36" to 48" or 900 mm to 1200 mm o.c.) to support the precast concrete balcony on a continuous shelf angle. The DELTA®-VENT SA membrane must be installed around these penetrations. Ensure that:
 1. Cast-in plates are sized with min 2" (50 mm) on all sides of knife edge or tube section to allow for membrane adhesion.
 2. Lower DELTA®-VENT SA sheet must be notched at knife edge and adhered to plate.

- 3. Upper sheet must be notched at penetration and lapped over the lower sheet.

- 4. Seal around structural penetration with DELTA®-THAN sealant.

5. Thermal control layer

- a. Continuous exterior insulation is the primary thermal control layer. Insulation may also be included in the wall cavity but exterior insulation is preferred to address thermal bridging.
- b. The amount of insulation recommended varies by climate region (see Table 3).
- c. Convection-suppressing insulation is preferred for cavity insulation to control convection in framing cavity.

6. Vapor control layer

- a. Depending on climate and insulation materials, the primary vapor control layer may be located to the interior or exterior of the DELTA®-VENT SA membrane.
- b. Design the assembly as a "vapor open" assembly, meaning that there is a single line of vapor control and that drying can occur towards the interior or towards the exterior from this line. Selection of vapor-open interior finishes should be considered.

7. Exterior cladding

- a. Clay brick masonry veneer is illustrated.
- b. Material options for the exterior cladding include:
 - I. Architectural precast panels
 - II. Exterior Insulation Finish System (EIFS)
 - III. Light-weight metal panels

8. Quality control considerations

- a. Inspect the lapping of membrane pieces to ensure that pieces are installed in "shingle" fashion.
- b. Confirm installation of DELTA®-MULTI-BAND tape at vertical edges of DELTA®-VENT SA membrane sheets.
- c. Ensure tight fit of continuous exterior insulation material at structural penetrations.
- d. Ensure that the masonry veneer cavity is vented top and bottom and free of mortar droppings.

■ DELTA®-VENT SA fully adhered air and water-resistive barrier

■ Continuous thermal insulation (XPS, EPS, PIC, semi-rigid MFI); nominal 1" drainage gap

■ Self-adhered through-wall flashing capped with DELTA®-FLEXX-BAND over DELTA®-VENT SA membrane

■ Drain/vent opening at 24" (600 mm) o.c.

■ Projecting metal drip flashing over upturned slab edge

■ Precast concrete balcony

■ Shelf angle supported on stand-offs attached to cast-in plates

■ Vent opening at 24" (600 mm) o.c.

■ DELTA®-VENT SA membrane wraps over transition membrane at deflection joint. Use backer rod to fill joint and debond membrane (allow movement)

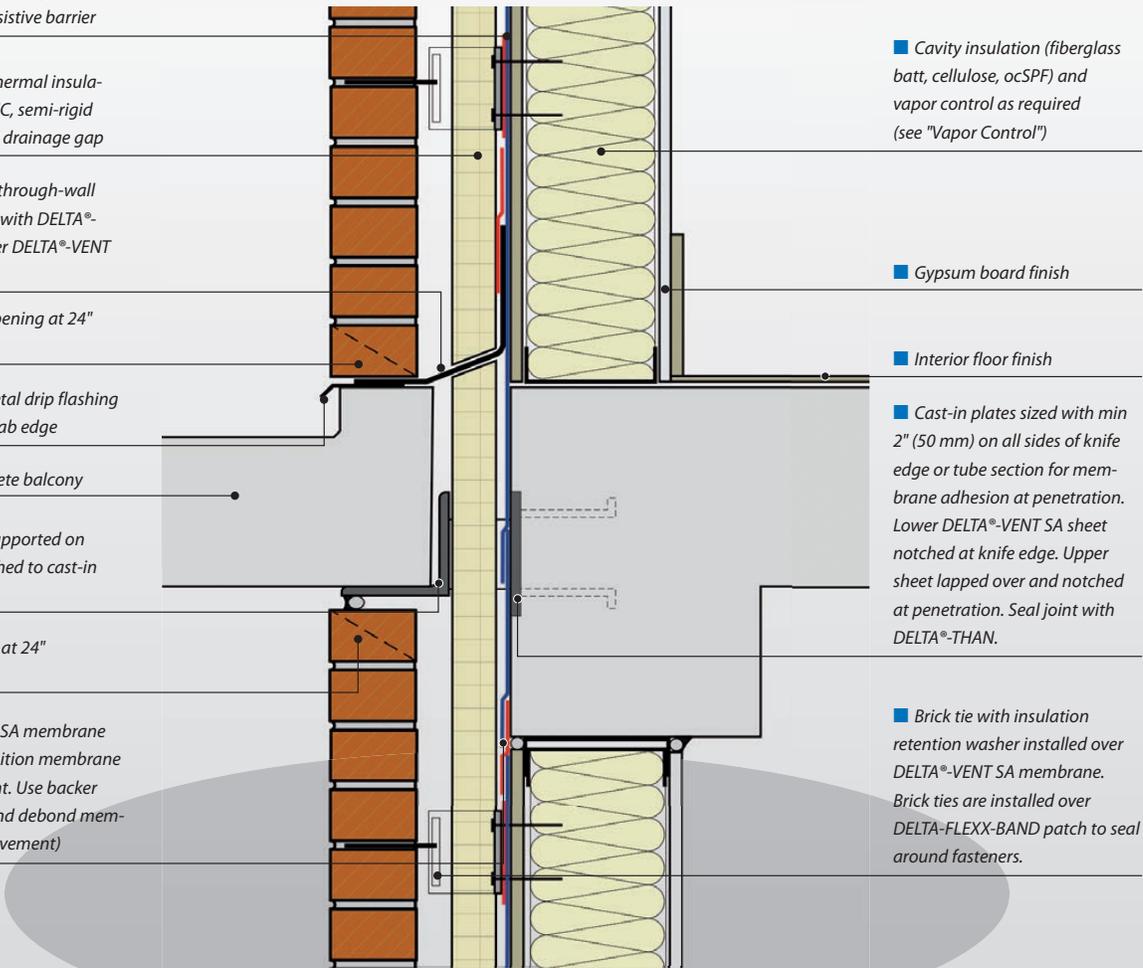
■ Cavity insulation (fiberglass batt, cellulose, ocSPF) and vapor control as required (see "Vapor Control")

■ Gypsum board finish

■ Interior floor finish

■ Cast-in plates sized with min 2" (50 mm) on all sides of knife edge or tube section for membrane adhesion at penetration. Lower DELTA®-VENT SA sheet notched at knife edge. Upper sheet lapped over and notched at penetration. Seal joint with DELTA®-THAN.

■ Brick tie with insulation retention washer installed over DELTA®-VENT SA membrane. Brick ties are installed over DELTA®-FLEXX-BAND patch to seal around fasteners.



DELTA® Accessories

DELTA® Air Barrier System Components

Assuring an air-tight building enclosure

Using DELTA®-VENT SA to create an energy-efficient and air-tight building is a great choice. Choosing premium DELTA® Air Barrier System Components will help complete the job to meet the highest standards.

The secret to ensuring the overall effectiveness of an air barrier system is in the details, such as sealing windows, doors and penetrations. Proper attention to details is critically important to achieve an air-tight assembly. All components must be interconnected to successfully resist air and water infiltration, and turn individual materials, components and assemblies into a complete Air Barrier System.

DELTA®-Accessories are exhaustively tested for compatibility. Together they assure superior performance in air-tight building enclosures.

DELTA®-FLASHING is a best-in-class self-adhering membrane used to flash around window and door openings. Cut in practical and convenient widths, it provides superior long-term protection against air and water leaks.

DELTA®-MULTI-BAND is a very tough and durable seam tape with an aggressive pure acrylic adhesive. It is suitable for use at end and side laps or other detail areas. It sticks tenaciously to DELTA®-VENT SA as well as all other common construction substrates like OSB, plywood, metal, glass, etc.

DELTA®-FLEXX-BAND is a two-ply stretchable tape with a premium butyl rubber adhesive for use at penetrations such as service pipes, arched windows, window flanges, corners and joints. It is formed easily by hand into irregularly-shaped areas, forming a tight bond to wood, vinyl, metal and other common building materials.

DELTA®-FAS CORNER is a unique preformed corner for sealing windows and doors in air- and water-tight construction. Both durable and UV resistant, it provides top performance in detailing energy-efficient enclosures. DELTA®-FAS CORNER is easy to use and saves both time and labor during installation.

DELTA®-THAN is a permanently elastic adhesive and sealant made with a special rubber compound. It is ideal for sealing around penetrations, terminations, etc.

DELTA®-TILAXX is a high quality permanently elastic adhesive and sealant for durable air-tight bonding to all common construction surfaces where moderate movement of components is expected.

DELTA®-LIQUIXX is a revolutionary fluid-applied flashing membrane with low vapor permeability. It is ideal for completing the air barrier continuity around difficult configurations and complex details. It may also be used to seal window openings.

DELTA®-ADHESIVE LVC is a low solvent surface conditioner. It consolidates surface dust on dirty construction site substrates, assuring reliable long-term air-tight adhesion for DELTA®-VENT SA.

The comprehensive line of DELTA®-Accessories by Cosella-Dörken delivers complete solutions for energy-efficient and durable building enclosures.



DELTA® Air Barrier System Components

|  |  |  |  |
|---|---|---|--|
| DELTA®-FLASHING | DELTA®-MULTI-BAND | DELTA®-FLEXX-BAND | DELTA®-FAS CORNER |
| <p>Premium self-adhesive flashing membrane with aggressive tack.</p> | <p>Universal adhesive tape that sticks tenaciously and is highly resistant to aging.</p> | <p>Stretchable butyl-rubber compound tape with special carrier membrane.</p> | <p>Flexible pre-fabricated window corner. Permanently UV resistant.</p> |
| <p>Recommended Use</p> <ul style="list-style-type: none"> For flashing of window and door openings. | <p>Recommended Use</p> <ul style="list-style-type: none"> For all DELTA® membranes to seal laps and penetrations. | <p>Recommended Use</p> <ul style="list-style-type: none"> Stretchable flashing for details and penetrations. Pre-stretch where required. | <p>Recommended Use</p> <ul style="list-style-type: none"> Provides reliable air- and water-tight window details. |
| <p>Surface temperature min. +41 °F (+5 °C) Recommended storage: room temperature</p> | <p>Surface temperature min. +41 °F (+5 °C) Recommended storage: room temperature</p> | <p>Surface temperature min. +41 °F (+5 °C) Recommended storage: room temperature</p> | <p>–</p> |
| <p>Temperature Range -40 °F to +176 °F (-40 °C to +80 °C)</p> | <p>Temperature Range -40 °F to +176 °F (-40 °C to +80 °C)</p> | <p>Temperature Range -40 °F to +176 °F (-40 °C to +80 °C)</p> | <p>Temperature Range -40 °F to +176 °F (-40 °C to +80 °C)</p> |
| <p>Size Width: 6" (15.25 cm), 9" (23 cm) Length: 75' (22.85 m)</p> | <p>Size Width: 2 3/8" (6 cm), 4" (10 cm) Length: 82' (25 m)</p> | <p>Size Width: 4" (10 cm) Length: 33' (10 m)</p> | <p>Measurements 7" x 7" x 4" (18 cm x 18 cm x 10 cm)</p> |

|  |  |  |  |
|--|--|---|---|
| DELTA-THAN | DELTA-TILAXX | DELTA-LIQUIXX | DELTA-ADHESIVE LVC |
| <p>Permanently elastic special rubber compound sealant and adhesive.</p> | <p>High quality permanently elastic adhesive and sealant that retains flexibility.</p> | <p>Viscous, pure acrylic dispersion with enclosed fabric reinforcement.</p> | <p>Low solvent surface conditioner.</p> |
| <p>Recommended Use</p> <ul style="list-style-type: none"> ■ For sealing and adhering of DELTA® membranes. ■ Provides greater security in detail areas. ■ Suitable for areas with minimal movement of components. | <p>Recommended Use</p> <ul style="list-style-type: none"> ■ For durable air-tight bonding to all common construction surfaces where moderate movement of components is expected. ■ Suitable for sealing of openings around windows (installed with backer rod). | <p>Recommended Use</p> <ul style="list-style-type: none"> ■ For air-tight connection of complex details and air barrier continuity. ■ Suitable for all common construction surfaces. | <p>Recommended Use</p> <ul style="list-style-type: none"> ■ Consolidates surface dust on dirty construction site substrates assuring reliable long-term air-tight adhesion. ■ Compliant with OTC rules for industrial adhesives and sealants and California South Coast Rule 1168. |
| <p>Application Conditions Open time: 30 minutes at min. +41 °F (+5 °C)</p> | <p>Application Conditions Open time: 30 minutes at min. +41 °F (+5 °C)</p> | <p>Application Conditions Open time: 3 - 4 hours at +70 °F (+21 °C) and 45 % RH</p> | <p>Surface temperature Application conditions: min. +25 °F (-4 °F) Recommended storage: min. 32 °F (0 °C)</p> |
| <p>Application Rate Approx. 23' (7 linear m) per cartridge</p> | <p>Application Rate Approx. 23' (7 linear m) per cartridge</p> | <p>Application Rate Approx. 2.8 fl.oz/sqft (0.9 l/sqm)</p> | <p>Application Rate Up to 250 sqft/gal (6.13 sqm/l) depending on porosity and texture of surface</p> |
| <p>Temperature Range -22 °F to +176 °F (-30 °C to +80 °C)</p> | <p>Temperature Range -22 °F to +176 °F (-30 °C to +80 °C)</p> | <p>Temperature Range -22 °F to +176 °F (-30 °C to +80 °C)</p> | <p>Temperature Range -40 °F to +176 °F (-40 °C to +80 °C)</p> |
| <p>Size 10.5 fl.oz (310 ml)</p> | <p>Size 10.5 fl.oz (310 ml)</p> | <p>Size 0.66 gal/pail (2.5 l/pail)</p> | <p>Size 4.5 gal (17 l) </p> |



07 25 00

References and Resources

For more information on DELTA®-VENT SA, please visit:

- www.cosella-dorken.com

For more information on the design of air barrier systems for commercial and residential construction:

- Building Science Insight 001: The Perfect Wall
- Building Science Digest 011: Thermal Control in Buildings
- Building Science Digest 013: Rain Control in Buildings
- Building Science Digest 014: Air Flow Control in Buildings
- Building Science Digest 163: Controlling Cold-Weather Condensation Using Insulation
- Canadian Building Digest 23: Air Leakage in Buildings
- Building Science for Building Enclosures, John Straube, PhD, Eric Burnett, PhD, Building Science Press

For general building science information:

- Canadian Building Science Digests – <http://archive.nrc-cnrc.gc.ca/eng/ibp/irc/cbd/digest-index.html>
- www.buildingscience.com



07 25 00

About Cosella-Dörken

Cosella-Dörken delivers innovative, premium quality products to the construction market. A North American manufacturer based out of Beamsville, Ontario, Cosella-Dörken Products, Inc. is a subsidiary of the Dörken Group, a leading European developer and manufacturer of moisture management systems sold worldwide. Other top-performing water-resistive barriers from Cosella-Dörken include DELTA-FASSADE S, DELTA®-MAXX, DELTA®-FOXX and DELTA®-VENT S.

For more information, call 1-888-4DELTA4 (433-5824) or visit www.cosella-dorken.com

DELTA®-branded quality products manufactured by Cosella-Dörken.

DELTA®

COSELLA DÖRKEN

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ON L0R 1B4, Canada
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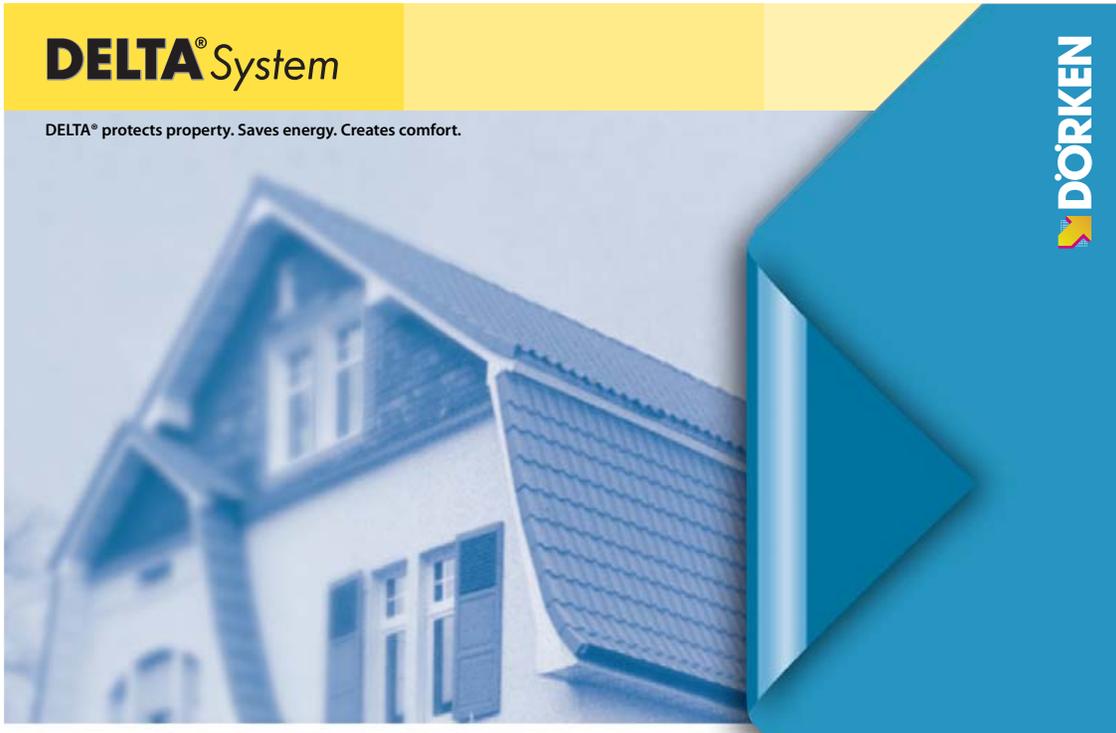
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■ Visit us on:



DELTA® is a registered trademark of Ewald Dörken AG, Heideck, Germany.





DELTA[®] System

DELTA[®] protects property. Saves energy. Creates comfort.



DELTA[®]-S_d-FLEXX

PREMIUM QUALITY

The innovative sheet that responds selectively!

Flexible S_d value varies between 5 m and 0.2 m.
Safe one-pass laying.




- Draught and vapour barrier
- For reroofing
- Rehabilitation

Saving energy at maximum efficiency? Very easy with the DELTA®-system!

Perfect rehabilitation from the word Go:

DELTA®-S_d-FLEXX

Permits humidity to escape unobstructed. For

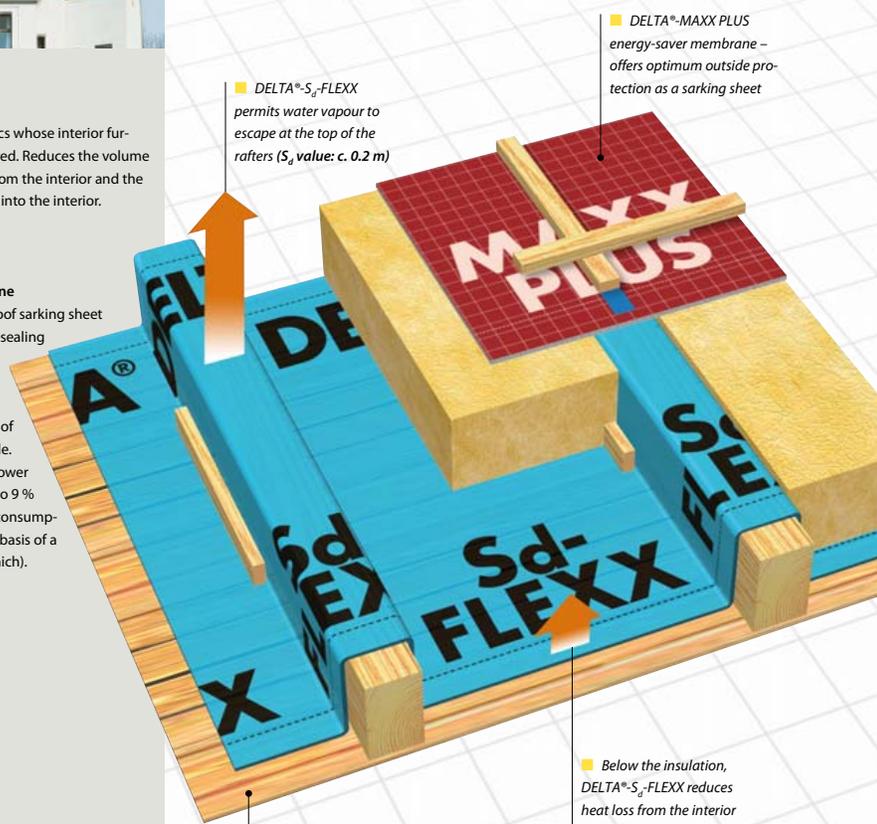


Inside:
DELTA®-S_d-FLEXX
Ideal for converted attics whose interior furnishing is to be preserved. Reduces the volume of warm air escaping from the interior and the flow of cold outside air into the interior.

Outside:
DELTA®-MAXX PLUS
Energy-saver membrane
Breathable draught-proof sarking sheet with an integrated self-sealing edge. Sealed overlaps put an end to the considerable energy losses caused by the influx of cold air from the outside. The result: up to 30 % lower air exchange rates, up to 9 % lower heating-energy consumption (calculated on the basis of a 100-m² attic flat in Munich).

PREMIUM QUALITY

DELTA® branded quality products made by Dörken. Certificates on file with ZVDH.



DELTA®-S_d-FLEXX permits water vapour to escape at the top of the rafters (S_d value: c. 0.2 m)

DELTA®-MAXX PLUS energy-saver membrane – offers optimum outside protection as a sarking sheet

Below the insulation, DELTA®-S_d-FLEXX reduces heat loss from the interior (S_d value: c. 5 m)

Interior panelling remains unchanged



Remove tiles and insulation and smoothen interior surfaces.

Install DELTA®-S_d-FLEX and seal against draughts.

Fit the insulation material in between the rafters.

ms a continuous draught-proofing layer.

DELTA®-S_d-FLEX ...

- ... makes an ideal vapour barrier for rehabilitation and reroofing.
- ... responds to fluctuations in air humidity. Any change in humidity will trigger a corresponding change in the density of the material.
- ... becomes more permeable and offers less resistance to vapour diffusion as the humidity of the air increases. In extreme cases, the original S_d value of 5 m may drop to 0.2 m generally or locally.
- ... permits water vapour to escape speedily at the rafter tops at all times.
- ... reduces the risk of condensate formation.
- ... may be laid out quickly and safely straight off the roll. Covering the surfaces of the rafters as well as the areas between them, and featuring wind-proof sealed overlaps, the material forms a continuous draught-proofing layer.
- ... saves time and money because it eliminates the need for complex sealing operations along the rafter sides.
- ... may be laid out directly on top of the interior panelling.
- ... flammability Class E, EN 13501-1, flame-retardant, Class B1 as per DIN 4102.



DELTA®-S_d-FLEX may be rolled out quickly and cost-efficiently across the rafters.



Why not benefit from the DELTA®-system?

Inside ...

... DELTA®-S_d-FLEX, the innovative draught and vapour barrier made of polyamide. As this material responds immediately to air-humidity fluctuations, its S_d value adapts to prevailing conditions.

Outside ...

... DELTA®-MAXX PLUS energy-saver membrane, a breathable wind-proof sarking sheet with a moisture storage layer. Great heat protection down to the smallest detail.



Needless to say, we have a range of perfect accessories. For detailed information about the DELTA®-system, look up the DELTA®-system guides.

DELTA®-S_d-FLEXX

Technical data overview:

| | |
|-----------------------------|--|
| Material | Polyamide |
| Application | Rehabilitation vapour barrier for reroofing; with integrated "humidity sensor" |
| Flammability | Class E, EN 13501-1, flame-retardant, Class B 1 as per DIN 1402 |
| Tear strength | c. 130/125 N/5 cm as per EN 12311-2 |
| S _d value | c. 5 m in a dry and c. 0.2 m in a humid environment |
| Operating temperature range | - 10 °C to + 80 °C |
| Weight | c. 60 g/m ² |
| Roll weight | c. 4.5 kg/c. 9 kg |
| Roll size | 50 m x 1.5 m/100 m x 1.5 m |

DELTA®-S_d-FLEXX should not be installed above swimming pools or in factory sheds with relative humidities permanently above 60 % and temperatures permanently above 25 °C.

DELTA®-accessories for DELTA®-S_d-FLEXX.

Dörken makes your life easier – systematically.

This is why you are sure to appreciate these handy DELTA® accessories:



DELTA®-MULTI-BAND
All-round adhesive tape with maximum adhesive strength. For all sheets for exterior and interior application, especially for sealing overlaps and openings and repairing tears.



DELTA®-THAN
Permanently elastic special-rubber cartridge adhesive. For outside application.



DELTA®-KOM-BAND
Pre-compressed, acrylate-dipped soft foam sealing strip with contact bar.

DELTA® is a registered trademark of Ewald Dörken AG, Herdecke, Germany.

DELTA®

DELTA®-System ...

... for owners:

"... What I get is a mature problem solution provided at a fair price by the top specialist in quality branded products!"

... for workers:

"... What I get is a complete system made by a single manufacturer that enables me to do anything to the owner's entire satisfaction. There is no safer way!"

... for planners:

"... I can be certain that both innovative and standard products will be used in implementing my roof and cellar plans in a systematic and forward-looking way."



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Fax: +49 23 30/63-355
bvfd@doerken.de
www.doerken.com

A company of the Dörken Group

■ Standard requests for tender as well as detailed installation instructions for all DELTA® products may be obtained at www.doerken.com as pdf files for you to print out and save.

SOPRAFIX



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www.soprema.ca

SOPRAFIX BASE 630

TECHNICAL DATA SHEET
150108SCAN1E
(supersedes -130321SCAN1E)

DESCRIPTION

SOPRAFIX BASE 630 is a high performance base sheet membrane composed of SBS modified bitumen and a composite reinforcement. The surface is covered with a thermofusible plastic film, while the underface is sanded.

SOPRAFIX BASE 630 is provided with **DUO SELVEDGE** technology (70 % self-adhesive/30 % thermofusible) which allows the immediate sealing of the membrane along side laps.

INSTALLATION

MECHANICALLY FASTENED

SOPRAFIX BASE 630 is installed directly to the insulating panels with **SOPRAFIX** screws and plates.

- Mechanical fasteners must be installed in the centre of the membrane side selvedge on marks at every 150 mm (6 in)* along the overlap.
- On a steel deck, fasteners must be installed on the upper part of the ribs. Install membranes perpendicular to the ribs.
- It is not required to fasten insulation boards to achieve wind uplift resistance when base sheet membranes are mechanically fastened. However, in order to prevent any warping of insulation boards, they can be fastened at a rate of one fastener per 1.2 m² (4 ft²).

*For more details about the required number of mechanical fasteners, consult the Wind Uplift Resistance Testing reports according to Canadian standard CSA A123.21-10 or publications according to FM 4470 (RoofNav Database) including recommendations for corners and perimeters listed in the PLPDS 1-29 from Factory Mutual.

DUO SELVEDGE

The first 70 % of **DUO SELVEDGE** is self-adhesive, which protects components under the base sheet when the remaining 30 % surface of the selvedge is sealed with a torch and a round nosed trowel.

FOR COMPLETE INFORMATION ON PRODUCT INSTALLATION, PLEASE CONSULT YOUR SOPREMA REPRESENTATIVE.

PACKAGING

| Specifications | SOPRAFIX BASE 630 |
|----------------|--|
| Thickness | 2.5 mm (98 mil) |
| Reinforcement | Composite |
| Dimensions | 1 m x 10 m (3.3 ft x 33 ft) 1 m x 15 m (3.3 ft x 49 ft) |
| Weight | 3.2 kg/m ² (0.7 lb/ft ²) |
| Selvedge width | 100 mm (4 in) |
| Surface | Thermofusible Plastic Film |
| Underface | Sanded |
| Roll per skids | Rolls of 10 m (33 ft): 36 Rolls of 15 m (49 ft): 25 |



E-PROD103A.indd

NOTE : SOPREMA INC. may modify the composition and/or utilization of its products without prior notice.

SOPRAFIX



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www.soprema.ca

SOPRAFIX BASE 630

TECHNICAL DATA SHEET
150108SCAN1E
(supersedes -130321SCAN1E)

PROPERTIES

SOPRAFIX BASE 630 as per ASTM D5147.

| Properties | MD | XMD |
|---|--------------------------------|--------------------------------|
| Peak Load at -18 °C ± 2 °C - Initial - 90 days at 70 °C (158 °F) | 22 kN/m 22 kN/m | 19 kN/m 19 kN/m |
| Elongation at -18 °C ± 2 °C - Initial - 90 days at 70 °C (158 °F) | 30 % 30 % | 30 % 30 % |
| Peak Load at 23 °C ± 2 °C - Initial - 90 days at 70 °C (158 °F) | 16 kN/m 16 kN/m | 14 kN/m 14 kN/m |
| Elongation at 23 °C ± 2 °C - Initial - 90 days at 70 °C (158 °F) | 60 % 35 % | 60 % 35 % |
| Ultimate elongation at 23 °C ± 2 °C - Initial - 90 days at 70 °C (158 °F) | 65 % 45 % | 65 % 45 % |
| Tear Strength at à 23 °C ± 2 °C | 500 N | 450 N |
| Low Temperature Flex - Initial - 90 days at 70 °C (158 °F) | -18 °C (0 °F) -18 °C (0 °F) | -18 °C (0 °F) -18 °C (0 °F) |
| Dimensional Stability, max | 0.5 % | 0.5 % |
| Compound Stability Temp | >107 °C (225 °F) | |

(All values are nominal)

STORAGE & HANDLING

Rolls must be stored upright, with the selvedge side on top. If the products are stored outside, cover them with an opaque protection cover after the packaging provided for delivery has been removed.



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NOTE : SOPREMA INC. may modify the composition and/or utilization of its products without prior notice.

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SOPRAFIX TRAFFIC CAP 660 SOPRAFIX TRAFFIC CAP FR 661

TECHNICAL DATA SHEET
150108SCAN3E
(supersedes -130322SCAN4E)

DESCRIPTION

SOPRAFIX TRAFFIC CAP 660 is a high performance cap sheet membrane composed of SBS modified bitumen and a composite reinforcement. The surface is protected by coloured granules, while the underface is covered with a thermofusible plastic film.

Cap sheet membrane, with fire retardant agent, is also available in FR version (**SOPRAFIX TRAFFIC CAP FR 661**).

INSTALLATION

HEAT-WELDED

SOPRAFIX TRAFFIC CAP 660 and **SOPRAFIX TRAFFIC CAP FR 661** are heat-welded with a propane torch.

FOR COMPLETE INFORMATION ON PRODUCT INSTALLATION, PLEASE CONSULT YOUR SOPREMA REPRESENTATIVE.

PACKAGING

| Specifications | SOPRAFIX TRAFFIC CAP 660 & SOPRAFIX TRAFFIC CAP FR 661 |
|----------------|--|
| Thickness | 4 mm (157 mil) |
| Reinforcement | Composite |
| Dimensions | 1 m x 8 m (3.3 ft x 26 ft) 1 m x 10 m (3.3 ft x 33 ft)* |
| Weight | 4.8 kg/m ² (1.0 lb/ft ²) |
| Selvedge width | 100 mm (4 in) |
| Surface | Granules |
| Underface | Thermofusible Plastic Film |
| Roll per skids | Rolls of 8 m (26 ft) = 30 Rolls of 10 m (33 ft) = 25* |

* On request only
(All values are nominal)



E-PROD104A.indd

NOTE : SOPREMA INC. may modify the composition and/or utilization of its products without prior notice.

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SOPRAFIX TRAFFIC CAP 660 SOPRAFIX TRAFFIC CAP 661 FR

TECHNICAL DATA SHEET
150108SCAN3E
(supersedes -130322SCAN4E)

PROPERTIES

SOPRAFIX TRAFFIC CAP 660 & SOPRAFIX TRAFFIC CAP FR 661 as per ASTM D 6162, Type I.

| Properties | MD | XMD |
|---|--------------------------------|--------------------------------|
| Peak Load at -18 °C ± 2 °C - Initial - 90 days at 70 °C (158 °F) | 22 kN/m 22 kN/m | 19 kN/m 19 kN/m |
| Elongation at -18 °C ± 2 °C - Initial - 90 days at 70 °C (158 °F) | 30 % 30 % | 30 % 30 % |
| Peak Load at 23 °C ± 2 °C - Initial - 90 days at 70 °C (158 °F) | 16 kN/m 16 kN/m | 14 kN/m 14 kN/m |
| Elongation at 23 °C ± 2 °C - Initial - 90 days at 70 °C (158 °F) | 60 % 35 % | 60 % 35 % |
| Ultimate elongation at 23 °C ± 2 °C - Initial - 90 days at 70 °C (158 °F) | 65 % 45 % | 65 % 45 % |
| Tear Strength at à 23 °C ± 2 °C | 500 N | 450 N |
| Low Temperature Flex - Initial - 90 days at 70 °C (158 °F) | -18 °C (0 °F) -18 °C (0 °F) | -18 °C (0 °F) -18 °C (0 °F) |
| Dimensional Stability, max | 0.5 % | 0.5 % |
| Compound Stability Temp | >107 °C (225 °F) | |

(Meet and exceed the requirements of CAN/CGSB-37.56-M, 9th draft).
(All values are nominal)

STORAGE & HANDLING

Rolls must be stored upright, with the selvedge side on top. If the products are stored outside, cover them with an opaque protection cover after the packaging provided for delivery has been removed.



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NOTE : SOPREMA INC. may modify the composition and/or utilization of its products without prior notice.

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SOPRAFIX BASE 640

TECHNICAL DATA SHEET
150108SCAN2E
(supersedes -130322SCAN3E)

DESCRIPTION

SOPRAFIX BASE 640 is a high performance base sheet membrane composed of SBS modified bitumen and a composite reinforcement. Both sides are sanded.

SOPRAFIX BASE 640 is provided with **DUO SELVEDGE** technology (50 % self-adhesive/50 % thermofusible) which allows the immediate sealing of the membrane along side laps.

INSTALLATION

MECHANICALLY FASTENED

SOPRAFIX BASE 640 is installed directly to the insulating panels with **SOPRAFIX** screws and plates.

- Mechanical fasteners must be installed in the centre of the membrane side selvedge on marks at every 150 mm (6 in)* along the overlap.
- On a steel deck, fasteners must be installed on the upper part of the ribs. Install membranes perpendicular to the ribs.
- It is not required to fasten insulation boards to achieve wind uplift resistance when base sheet membranes are mechanically fastened. However, in order to prevent any warping of insulation boards, they can be fastened at a rate of one fastener per 1.2 m² (4 ft²).

*For more details about the required number of mechanical fasteners, consult the Wind Uplift Resistance Testing reports according to Canadian standard CSA A123.21-14 or publications according to FM 4470 (RoofNav Database) including recommendations for corners and perimeters listed in the PLPDS 1-29 from Factory Mutual.

DUO SELVEDGE

The first 50% of **DUO SELVEDGE** is self-adhesive. The remaining 50% is sealed using an electric hot-air welder. The use of SOPRAMATIC automatic hot-air welder increase the speed and quality of the seal.

FOR COMPLETE INFORMATION ON PRODUCT INSTALLATION, PLEASE CONSULT YOUR SOPREMA REPRESENTATIVE.

PACKAGING

| Specifications | SOPRAFIX BASE 640 |
|----------------|--|
| Thickness | 2.5 mm (98 mil) |
| Reinforcement | Composite |
| Dimensions | 1 m x 10 m (3.3 ft x 33 ft) 1 m x 15 m (3.3 ft x 49 ft) |
| Weight | 3.1 kg/m ² (0.6 lb/ft ²) |
| Selvedge width | 100 mm (4 in) |
| Surface | Sanded |
| Underface | Sanded |
| Roll per skids | Rolls of 10 m (33 ft): 36 Rolls of 15 m (49 ft): 25 |



E-PROD108A.Indd

NOTE : SOPREMA INC. may modify the composition and/or utilization of its products without prior notice.

SOPRAFIX



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SOPRAFIX BASE 640

TECHNICAL DATA SHEET
150108SCAN2E
(supersedes -130322SCAN3E)

PROPERTIES

SOPRAFIX BASE 640 as per ASTM D5147.

| Properties | MD | XMD |
|---|--------------------------------|--------------------------------|
| Peak Load at -18 °C ± 2 °C - Initial - 90 days at 70 °C (158 °F) | 22 kN/m 22 kN/m | 19 kN/m 19 kN/m |
| Elongation at -18 °C ± 2 °C - Initial - 90 days at 70 °C (158 °F) | 30 % 30 % | 30 % 30 % |
| Peak Load at 23 °C ± 2 °C - Initial - 90 days at 70 °C (158 °F) | 16 kN/m 16 kN/m | 14 kN/m 14 kN/m |
| Elongation at 23 °C ± 2 °C - Initial - 90 days at 70 °C (158 °F) | 60 % 35 % | 60 % 35 % |
| Ultimate elongation at 23 °C ± 2 °C - Initial - 90 days at 70 °C (158 °F) | 65 % 45 % | 65 % 45 % |
| Tear Strength at à 23 °C ± 2 °C | 500 N | 450 N |
| Low Temperature Flex - Initial - 90 days at 70 °C (158 °F) | -18 °C (0 °F) -18 °C (0 °F) | -18 °C (0 °F) -18 °C (0 °F) |
| Dimensional Stability, max | 0.5 % | 0.5 % |
| Compound Stability Temp | >107 °C (225 °F) | |

(All values are nominal)

STORAGE & HANDLING

Rolls must be stored upright, with the selvage side on top. If the products are stored outside, cover them with an opaque protection cover after the packaging provided for delivery has been removed.



E-PROD108A.indd

NOTE : SOPREMA INC. may modify the composition and/or utilization of its products without prior notice.



DIVISION 08 OPENINGS

Home / Doors & Windows / Doors / Interior & Closet Doors / Prehung Doors

Masonite | Model # 13943 | Internet # 202505948

36 in. x 80 in. MDF Series Smooth 1-Panel Solid Core Primed Composite Single Prehung Interior Door

★★★★★ (2) | Write a Review + | Questions & Answers (4) +



Open Expanded View +

Click to Zoom



\$230.16 /each

COLOR/FINISH: White



DOOR SIZE (WXH) IN.
36 x 80



DOOR HANDING
Left-Handed



Ship to Home

Estimated Arrival: OCT 1 - OCT 8

[See Shipping Options +](#)



Ship to Store FREE

Available for Pick Up: SEP 30 - OCT 5

1

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Item cannot be shipped to the following state(s): AK, GU, HI, ME, PR, VI, WA

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PassiV Future Proof



Our PassiV Future Proof window (formerly branded Future-proof) has been certified as a Passive House suitable component by the Passivhaus Institut, Germany.

Our PassiV Future Proof range was specifically engineered to make ultra low-energy windows generally accessible to all. The Future Proof range provides U-values as low as 0.134 BTU/hr.ft².F – thermal performance that, until now, was typically available to but a privileged few. Now home owners, architects and builders can surpass building requirements and make buildings future-proof for years to come. See some examples of our products on our projects page.

Features

- Extremely efficient thermal performance
- Insulation levels to meet building energy requirements for decades to come
- Achieves Passive House window standards
- Window U-values as low as 0.134 BTU/hr.ft².F
- Excellent airtightness and watertightness ratings
- Double, triple or quadruple pane
- Argon or Krypton gas filled
- Soft coat low emissivity glass
- Warm edge spacer bar
- Available in a range of RAL colors
- Flexible design options
- Extra heavy duty stainless steel friction hinges
- Choice of hardware options
- Lockable handles with night vent position
- Restrictor available to ensure child safety
- Trickle vents to provide background ventilation
- 8 - 10 weeks manufacture & delivery



Windows

- > PassiV Future Proof
- > PassiV AluClad
- > PassiV AluP+
- > Eco-therm 58
- > PassiV Hardwood
- > High Performance PVC

Doors

- > PassiV Future Proof Door
- > PassiV AluClad Door
- > AluClad Lift and Glide Door
- > PassiV Hardwood Door
- > Ultra-Tech Door

Klearwall Industries LLC, 530 Anchor Drive, Moneta VA 24121-2309 USA

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AluClad Lift and Glide Door

The AluClad Lift and Glide Door (formerly branded Eco-clad sliding doors) allows you to create a light and airy ambience in any area of your home with a classic Scandinavian design.

Features

- Low maintenance aluminum exterior
- Warm versatile timber interior
- Lift and slide action
- Energy efficient glazing – double or triple glazed
- Argon or Krypton gas filled
- Hardware available in brass or chrome
- Available in a range of RAL colors



Windows

- > PassiV Future Proof
- > PassiV AluClad
- > PassiV AluP+
- > Eco-therm 58
- > PassiV Hardwood
- > High Performance PVC

Doors

- > PassiV Future Proof Door
- > PassiV AluClad Door
- > **AluClad Lift and Glide Door**
- > PassiV Hardwood Door
- > Ultra-Tech Door

Klearwall Industries LLC, 530 Anchor Drive, Moneta VA 24121-2309 USA

T: 203-689-5404 | E: info@klearwall.com | [Privacy](#)

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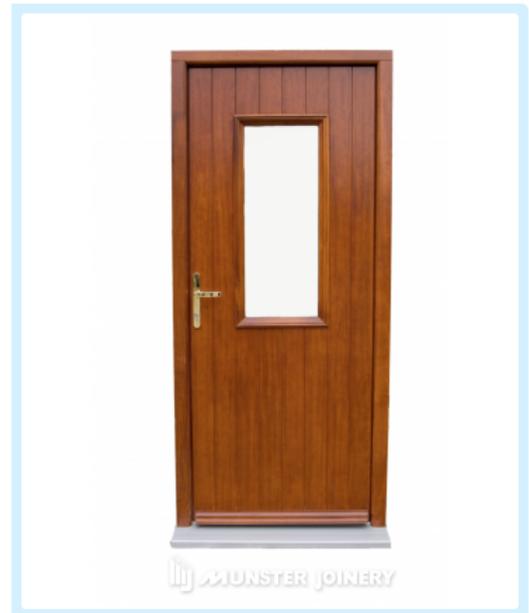
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Ultra-Tech Door

The Ultra-Tech Door is a heavy-duty door available in a range of modern designs. The engineered door panel gives the aesthetic appeal of traditional timber door with the best strength, security and thermal performance characteristics that modern technology can achieve.

Features

- 56mm thick engineered door leaf
- Comprise laminated layers of cork
- Gives a thermally excellent core, with a U-value as low as 0.190 BTU/hr.ft².F
- Argon or Krypton gas filled
- Sub surface aluminium layers to ensure stability
- Available as an FD30 fire rated door
- Range of 13 sheeted designs with varied glazing features
- Frame in hardwood or laminated pine
- Hardwearing aluminum sill at threshold level
- Available in a range of RAL colors



Windows

- > PassiV Future Proof
- > PassiV AluClad
- > PassiV AluP+
- > Eco-therm 58
- > PassiV Hardwood
- > High Performance PVC

Doors

- > PassiV Future Proof Door
- > PassiV AluClad Door
- > AluClad Lift and Glide Door
- > PassiV Hardwood Door
- > **Ultra-Tech Door**

Klearwall Industries LLC, 530 Anchor Drive, Moneta VA 24121-2309 USA

T: 203-689-5404 | E: info@klearwall.com | [Privacy](#)

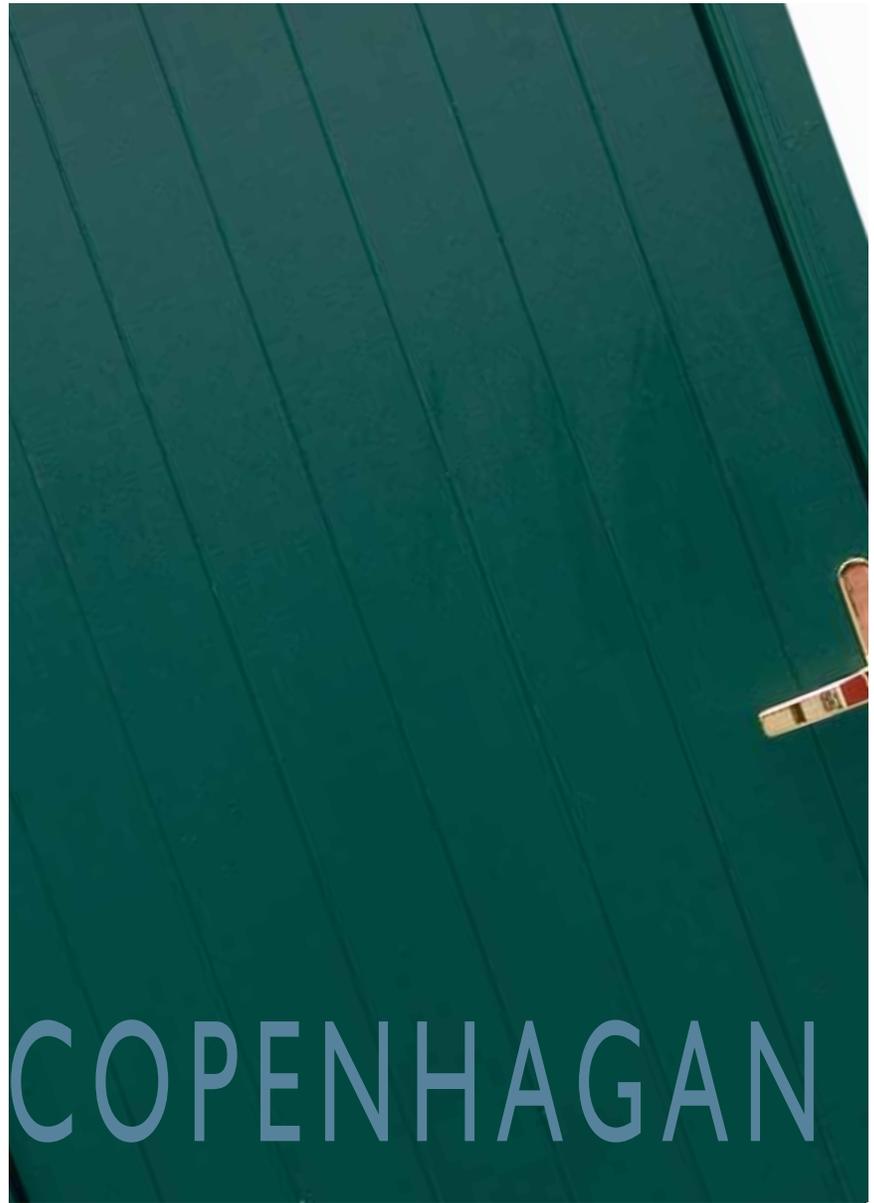
Copyright 2014 - 2015 Klearwall Industries. All Rights Reserved.



Ultra *Warm*

Ultra Tech Doors are made up of layers of insulating cork to give excellent thermal performance, low u-values, low heat loss and significant energy savings. Together with excellent draught proofing and a high watertightness rating. This contributes to an Ultra Warm interior environment.

(GREEN COPENHAGAN DOOR WITH GREEN FRAME & BRASS HANDLE)



COPENHAGAN



08 52 13

YOUR DOORS , YOUR STYLE IN YOUR COLOUR..... BE INSPIRED



Salzburg



Vienna



Munich



Copenhagan



Lisbon



Bergan



Oslo



Gothenberg



Malmo



Stockholm



Geneva- A



Geneva- B



Geneva- C

Talk to your local technical representative or see our wooden windows and doors care and maintenance leaflet.



Ultra *Certified*

Security

Tested to PAS 24

Ultra Tech attains the highest class for stability in Euro/BS stability tests.

FD30 Fire Door

Certificate no.153661

Ultra Tech Copenhagen, Oslo and Stockholm are certified. Fire Doors must be ordered specifically as FD30. Glass used is Georgian wire. Double glazing Certification applies to single doors and is not applicable to units with sidelights and fanlights. Available in hardwood only. No Letter box.

Wheelchair Access

Ultra Tech threshold detail complies to Part M- is wheelchair friendly. When building you must allow a minimum of 970mm. Our local rep will be happy to discuss this with you.

U-Value

Door leaf U value 1.1 W/m²K

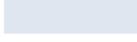
Kite Marks

Kite mark to EN1279 for double glazed units
Kite mark to BS6206 for toughened safety glass

certified

Range of Colours

Open the Door to your personal creation

| | |
|----------------|---|
| GREY |  |
| CEMENT GREY |  |
| MOUSE GREY |  |
| SILVER |  |
| WHITE |  |
| IVORY |  |
| FACTORY FINISH |  |
| CHALK |  |
| OLIVE GREEN |  |
| PURPLE |  |
| PALE GREEN |  |
| GREEN |  |
| BLUE |  |
| RED |  |
| BLACK |  |
| NAVY |  |
| BEIGE |  |
| YELLOW |  |
| PEBBLE GREY |  |



- Design the entrance to your *future*.
- Select your *personal* Door Design
- Select the *Colour* of your Door
- Select your frame or *personal* sidelight Design
- Select the colour you want your frame or sidelight

Please note: The print process does not allowed for exact reproduction of the paint colours and is only an indication as to what is available. For further details contact your sales representative.



08 52 13

Who we are

Munster Joinery is now among the largest manufacturers of energy efficient windows and doors in Europe. Founded in 1973, the company has grown year on year, with the continuous development of new products, materials and processes. With operations in Ireland, Northern Ireland and the United Kingdom, the company has a 910,000sq ft. production facility on a sixty five acre site in Ballydesmond with another 230,000 sq ft on a 20 acre site at Wellesbourne in the UK. We serve the Irish, UK and international markets.

Munster Joinery's phenomenal success is built on three unique strengths – Quality, Delivery and Service

Quality:

A complete service – we conduct a site survey to measure openings - product manufactured, delivered and installed by trained Munster Joinery personnel. All of our products are manufactured in our factory including critical operations such as uPVC extrusion, kiln-drying of timber and manufacture of glazing units. The process is controlled from beginning to end.

Delivery:

Because all aspects of the process are controlled Munster Joinery can guarantee delivery dates – on site and on time.

Aftercare

All products are fully guaranteed and there is a service engineer based in every area to deliver a reliable aftercare service

ENVIRONMENT: Munster Joinery looks to the future and is environmentally responsible at all times.

We use cutting edge technology to offer our customers eco friendly products. We provide the ultimate in thermal efficiency with several products meeting Passive House standards. Our PassiV uPVC, AluClad and Aluminium ranges have been certified as Passive House suitable components by the Passive House Institute in Germany. This is a first for an Irish window manufacturer.

At Munster Joinery we recognise the increasing importance of waste management and recycling in the joinery industry. We have a dedicated 'waste management and recycling' division. As a company we are fully self reliant in dealing with all waste and packaging products and all recyclable materials on site. We have also developed an integrated approach to resource efficiency to ensure the most effective use of natural resources.

We are conscious of the need to reduce our carbon footprint and manage our natural resources effectively. Our production facility in Ballydesmond gets much of it's day to day power needs from 2 wind turbines with an electrical output of 4.2 megawatts and a Biomass steam turbine with an electrical output of 2.8 megawatts. The wind turbines are capable of powering 2,260 homes annually. The installation will easily achieve annual savings of over 9,000 tonnes of carbon emissions showing Munster Joinery's commitment to protecting our environment.





08 52 13

FOR FURTHER INFORMATION PLEASE CONTACT US

MUNSTER JOINERY

Lacka Cross, Ballydesmond, Mallow, Co. Cork.

T. +353 (0)64 7751151 F. +353 (0)64 7751312
E. info@munsterjoinery.ie
W. www.munsterjoinery.ie

MUNSTER JOINERY

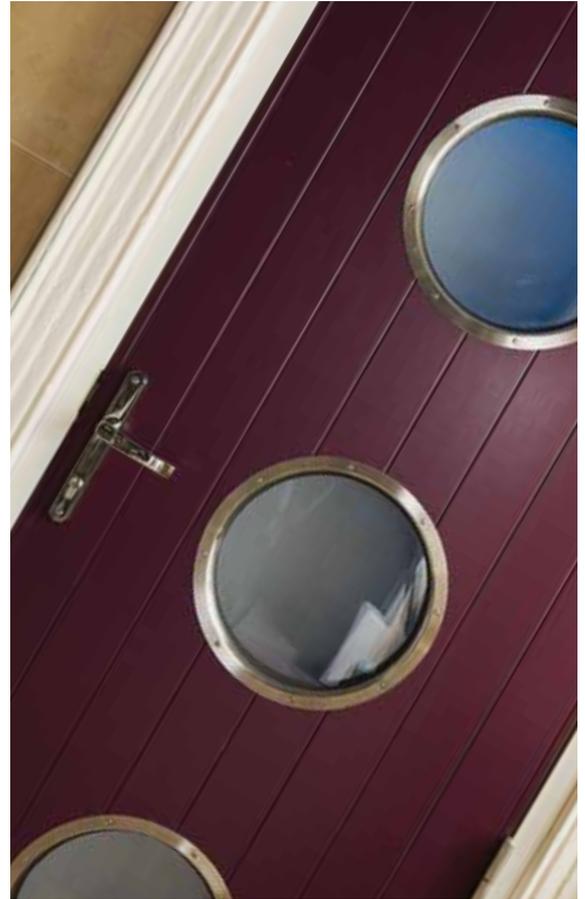
Dene Park, Stratford Rd, Wellesbourne,
Warwickshire, CV35 9RY.

T. +44 (0)845 3098007 F. +44 (0)845 3098006 E. info@munsterjoinery.co.uk
W. www.munsterjoinery.co.uk

BASKIL WINDOW SYSTEMS

62 Glenavy Road, Crumlin, BT 29 4LE.

T. +44 (0)28 90774885 F. +44 (0)28 90775242
E. info@baskilwindowsystems.co.uk
W. www.baskilwindowsystems.co.uk



LIN-PL160S-DP-PR
Linnea Stainless Steel Mortise Pocket Door Privacy Latch w/Drop Ring Turn Piece



Overview [Specifications](#) [Video](#) [360° View](#) [Reviews](#)

Item on backorder till mid December, 2014.
Configure your product below:

Color/Finish:

Thickness:

List Price: **Select**
Your Price: Option(s)
Qty **+ ADD TO CART**
[View Shopping Cart](#)

Policies
[returns](#) | [restock](#)

[Add to My Portfolio](#)

This complete pocket door privacy mortise set includes; 1 side plate with a drop ring thumb turn, 1 side plate with an emergency release turn piece, mortise lock body, faceplate, strike plate and all necessary mounting hardware.

- NOTE:** Now includes built-in edge pull, not shown. A privacy set is typically used for bathrooms or bedrooms, it can be closed from inside and in case of emergency it can be opened from the outside using a screw driver or coin.

Optional Accessories

 Linnea Stainless Steel Mortise Pocket Door Passage Set

[View Entire Collection: Linnea Door Accesories](#)

[More Products From Manufacturer: Linnea LLC](#)

Delivery Time: 1 to 3 weeks

[Click Here for Product Specifications](#)

★ Unranked ★ (0) product reviews [Printable Page](#)



DIVISION 09 FINISHES

EASY FINISH® READY MIX JOINT COMPOUND

MANUFACTURER

National Gypsum Company
2001 Rexford Road
Charlotte, NC 28211
(704) 365-7300

Technical Information:
1-800-NATIONAL
(1-800-628-4662)

Fax: 1-800-FAX NGC1
(1-800-329-6421)

Internet Home Page:
nationalgypsum.com
nationalgypsum.com/espanol
09 29 00/NGC BuyLine: 1100

DESCRIPTION

Easy Finish® Ready Mix Joint Compound is a pre-mixed vinyl base compound that may be used directly from the container.

BASIC USES

Easy Finish Joint Compound is designed for tape application, fastener spotting and complete joint finishing of gypsum board. It can also be used to repair cracks in plastered walls, to texture surfaces and to laminate gypsum board to other surfaces such as masonry or other gypsum board. It contains sufficient binder to secure the reinforcing tape and develops its strength and hardness by drying.

ADVANTAGES

- Ready to use right from the container.
- Excellent adhesion/bond.
- All finishing can be completed with one compound.
- Low VOC content - less than 2 grams/liter.

GREENGUARD CERTIFIED

Easy Finish Ready Mix Joint Compound is GREENGUARD Indoor Air Quality Certified® for indoor air quality.



LIMITATIONS

- Protect from freezing and exposure to extreme heat and direct sunlight, conditions which will cause premature aging of the product.
- Do not overthin.
- Excessive mixing with an electric drill can cause undesirable changes in viscosity and in finished surface appearance.

STORAGE

Storage life varies with climatic conditions, up to 9 months under good conditions. Store compound away from extreme cold or heat to avoid accelerated aging. Regularly check production dates and rotate inventory on a first-in, first-out plan.

If Easy Finish Joint Compound freezes, allow material to thaw at room temperature for at least 24 hours. When thawed, turn container upside-down for at least 15 minutes. Turn pail right side up, remove lid and immediately remix with an electric drill. Easy Finish Joint Compound should be lump-free and ready to use within one minute. Discard all Easy Finish Joint Compound that does not remix to a lump-free consistency.



STACKING

Easy Finish Joint Compound pails or cartons should not be stacked more than two pallets in height.

ACCESSORIES

- ProForm Joint Tape
- Cornerbead, arch cornerbead, casing beads
- Multi-Flex Tape
- E-Z Strip control joints

(Continued next page)

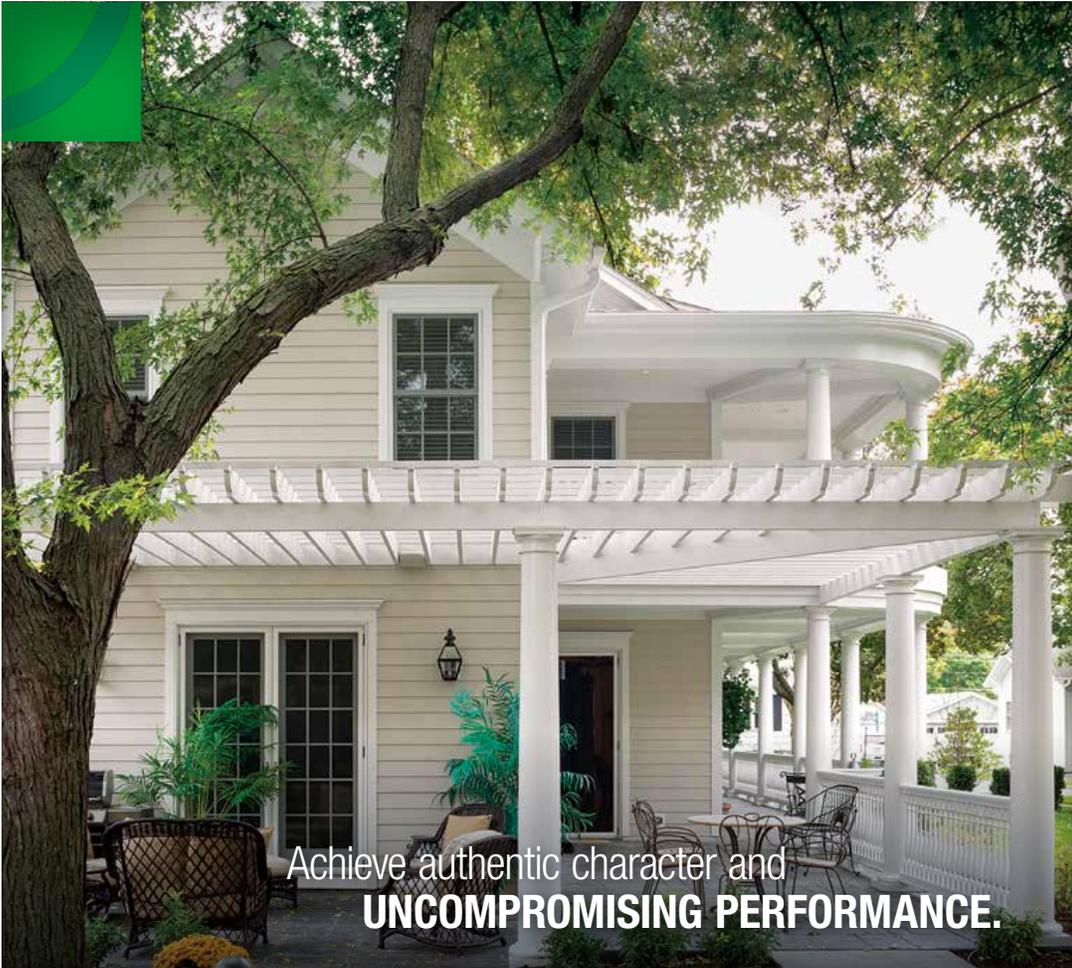
Job Name _____

Contractor _____ Date _____

Submittal Approvals: (Stamps or Signatures)



09 29 00



Achieve authentic character and
UNCOMPROMISING PERFORMANCE.



NORTHEAST
Product Catalog



Siding



Trim



Soffit



ABOUT JAMES HARDIE

PRODUCTS

COLOR



09 29 00

| | | | | | |
|--------------------|----------------------|--------------------------------|-----------------------------|----------|--------------|
| Unique Formulation | Finishing Technology | 100% HARDIE Complete Exterior™ | The James Hardie Difference | Warranty | Endorsements |
|--------------------|----------------------|--------------------------------|-----------------------------|----------|--------------|



Installed on over 5.5 million homes from coast to coast, James Hardie® fiber cement siding products are designed to resist the most extreme conditions while romancing the senses. Enjoy the warm, natural character of wood with unprecedented peace of mind. It's easy to see what makes James Hardie the market leader.

UNIQUE FORMULATION

We use the highest quality raw materials and proprietary additives for enhanced strength and moisture protection.

FINISHING TECHNOLOGY

Baked-on color delivers a beautiful finish that resists fading and makes a lasting impression.

COMPLETE EXTERIOR™

Offers homeowners an unrivaled collection of design options with exceptional warranties through a single, trusted manufacturer.

It's time to
BUILD SOMETHING TIMELESS.



ABOUT JAMES HARDIE

PRODUCTS

COLOR

| Unique Formulation | Finishing Technology | 100% HARDIE Complete Exterior™ | The James Hardie Difference | Warranty | Endorsements |
|----------------------|----------------------|--------------------------------|-----------------------------|----------|--------------|
| ● HardieZone® System | HZ5® Substrate | | | | |

HardieZone® System

Only James Hardie fiber cement products are Engineered for Climate®. In the northern U.S. and Canada, HZ5® products resist shrinking, swelling and cracking even after years of wet or freezing conditions. HZ10® products help protect homes from hot, humid conditions, blistering sun and more.

With James Hardie siding and trim, homeowners have an exterior that's tougher than the elements and easy on the eyes.

NO MATTER WHAT NATURE BRINGS



ABOUT JAMES HARDIE

PRODUCTS

COLOR

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|--------------------|----------------------|--------------------------------|-----------------------------|----------|--------------|
| Unique Formulation | Finishing Technology | 100% HARDIE Complete Exterior™ | The James Hardie Difference | Warranty | Endorsements |
|--------------------|----------------------|--------------------------------|-----------------------------|----------|--------------|

● HardieZone® System

HZ5® Substrate



Resist the elements
WITH IRRESISTIBLE CHARM.



TOUGHER THAN THE ELEMENTS



Stands up to storms and harsh weather



Resists water absorption to help protect against mold, swelling and cracking



Won't be eaten by animals or insects



Fire resistant



Reduces time and money spent on maintenance



[ABOUT JAMES HARDIE](#)

[PRODUCTS](#)

[COLOR](#)

| Unique Formulation | Finishing Technology | 100% HARDIE Complete Exterior™ | The James Hardie Difference | Warranty | Endorsements |
|--------------------|----------------------|--------------------------------|-----------------------------|----------|--------------|
| HardieZone® System | | ● HZ5® Substrate | | | |

HZ5® Substrate

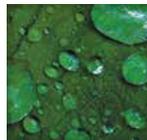
Not all fiber cement is the same. The James Hardie HZ5 product formulation contains the highest quality raw materials. Proprietary additives, combined with an innovative manufacturing process and product design, create a substrate specifically engineered to reduce moisture intrusion and resist damage from wet or freezing conditions.

PROPRIETARY ENHANCEMENTS CREATE THE MOST DURABLE JAMES HARDIE SIDING EVER MADE



Perfect balance of strength and workability

Our balance of high-quality Portland cement, sand and cellulose fiber delivers the best combination of strength and workability.



Enhanced moisture resistance for unmatched durability

Patented and proprietary additives are chemically bonded within the HZ5 substrate matrix to provide durable moisture resistance.



Increased dimensional stability

Our siding is engineered at the microscopic level to create a fiber cement composite with superior dimensional stability that helps protect against shrinking and splitting.



ABOUT JAMES HARDIE

PRODUCTS

COLOR

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|--------------------|----------------------|--------------------------------|-----------------------------|----------|--------------|
| Unique Formulation | Finishing Technology | 100% HARDIE Complete Exterior™ | The James Hardie Difference | Warranty | Endorsements |
|--------------------|----------------------|--------------------------------|-----------------------------|----------|--------------|

HardieZone® System

● HZ5® Substrate



HZ5 LAP SIDING ADVANCED DESIGN – Improved drainage from top to bottom

In addition to our HZ5 product formulation's enhanced moisture resistance, HardiePlank® HZ5 lap siding features a modified profile, with a sloped top and bullnose drip edge for improved drainage over the entire outer face of the board.



Sloped Top Positive slope at top drains moisture to outer face of lap



Profiled Drip Edge Bottom bullnose drip edge allows moisture to drain away from lap



ABOUT JAMES HARDIE

PRODUCTS

COLOR



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|--------------------|----------------------|--------------------------------|-----------------------------|----------|--------------|
| Unique Formulation | Finishing Technology | 100% HARDIE Complete Exterior™ | The James Hardie Difference | Warranty | Endorsements |
|--------------------|----------------------|--------------------------------|-----------------------------|----------|--------------|

ColorPlus® Technology

Our advanced ColorPlus Technology finishes deliver the ultimate in aesthetics and performance to your job site. Our products aren't simply painted at the factory. Multiple coats of color are baked onto the board, creating a vibrant, consistent finish for years of lasting character, adhesion and fade resistance.

GIVES HOMES A BEAUTIFUL, CONSISTENT COATING THAT PERFORMS BETTER, LASTS LONGER AND LOOKS BRIGHTER



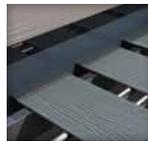
Superior finish adhesion

Multiple proprietary coatings are engineered for superior adhesion to our substrate and applied to all surfaces, edges and features for durable performance.



Superior color retention

Finish is cured onto boards after each coating step for a stronger bond, which allows for exceptional resistance to cracking, peeling and chipping.



Superior UV resistance

Multi-coat, baked-on finish retains its vibrancy longer when compared to vinyl siding and paint on other siding products in all UV conditions.



ABOUT JAMES HARDIE

PRODUCTS

COLOR

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|--------------------|----------------------|--------------------------------|-----------------------------|----------|--------------|
| Unique Formulation | Finishing Technology | 100% HARDIE Complete Exterior™ | The James Hardie Difference | Warranty | Endorsements |
|--------------------|----------------------|--------------------------------|-----------------------------|----------|--------------|



ColorPlus® Technology

OUR FINISHES ELIMINATE STRESS AND REDUCE COSTLY WEATHER DELAYS

There's no reason to stress over unplanned expenses when it's too cold or damp to paint for extended periods. And there's no reason to question whether or not sub-optimal painting conditions will negatively affect your paint job. In fact, there's no longer any need to paint on-site.

Our ColorPlus Technology finishes are fully cured in a controlled environment and arrive on your job site ready for year-round installation.

For timeless beauty
BEGIN WITH THE FINISH.



ABOUT JAMES HARDIE

PRODUCTS

COLOR

| | | | | | |
|--------------------|----------------------|--------------------------------|-----------------------------|----------|--------------|
| Unique Formulation | Finishing Technology | 100% HARDIE Complete Exterior™ | The James Hardie Difference | Warranty | Endorsements |
|--------------------|----------------------|--------------------------------|-----------------------------|----------|--------------|

100% HARDIE Complete Exterior™

Top to bottom, our exterior product line is defined by excellent performance, aesthetics and design options.

Provide protection from the elements, showcase a homeowner's individual style and install peace of mind with exceptional warranties through a single, trusted manufacturer.

Your homes mean everything
BUILD 100% HARDIE™



ABOUT JAMES HARDIE

PRODUCTS

COLOR



09 29 00

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|--------------------|----------------------|--------------------------------|-----------------------------|----------|--------------|
| Unique Formulation | Finishing Technology | 100% HARDIE Complete Exterior™ | The James Hardie Difference | Warranty | Endorsements |
|--------------------|----------------------|--------------------------------|-----------------------------|----------|--------------|



The James Hardie Difference



James Hardie invented fiber cement. Over 5.5 million installations later, we continue to set the standard in premium, high-performance exterior cladding. Our products deliver uncompromising durability and finish quality for a beautiful, lower maintenance exterior.

Our unrivaled investment in R&D and constant innovations in product design, manufacturing and distribution allow us to remain steps ahead of the competition. With the support of our people, partners and exceptional warranties, we're committed to protecting your customers' homes while helping your business grow.

As unforgettable
AS IT IS UNCOMPROMISING.



[ABOUT JAMES HARDIE](#)

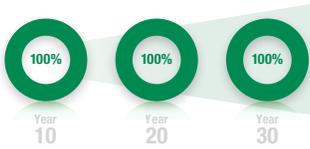
[PRODUCTS](#)

[COLOR](#)

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| Unique Formulation | Finishing Technology | 100% HARDIE Complete Exterior™ | The James Hardie Difference | Warranty | Endorsements |
|--------------------|----------------------|--------------------------------|-----------------------------|----------|--------------|

Warranty

James Hardie Non-Prorated Warranty Coverage



Protect your home with America's #1 brand of siding backed by an exceptional warranty. Unlike other brands, James Hardie doesn't prorate our siding warranty coverage.* We stand behind our siding 100% for 30 years.

*ColorPlus Technology finishes and HardieTrim boards come with 15-year limited warranties.



Make every home
AN EXPRESSION OF YOUR CHARACTER.



[ABOUT JAMES HARDIE](#)

[PRODUCTS](#)

[COLOR](#)



09 29 00

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|--------------------|----------------------|--------------------------------|-----------------------------|----------|--------------|
| Unique Formulation | Finishing Technology | 100% HARDIE Complete Exterior™ | The James Hardie Difference | Warranty | Endorsements |
|--------------------|----------------------|--------------------------------|-----------------------------|----------|--------------|

A reputation built on trust

For decades, our fiber cement products have been used to create better places to live. Each new home stands as a testament to our uncompromising quality. That proven track record has earned the loyalty of millions of homeowners and the endorsements of trusted authorities across the building industry.

BRAND LEADER
Builder
WINNER 2013

Chosen by builders as a
Brand Leader in Builder Magazine



#1 Return on Investment every year
since 2005 in **Remodeling Magazine***



Featured on the **DIY Network's Blog Cabin** in 2012, 2013 & 2014



HardiePlank lap siding is backed
by the **Good Housekeeping Seal**



NEXT SECTION

*Remodeling Magazines' Cost vs. Value Report states that re-siding a home with fiber cement siding in the mid-range or larger categories provides the #1 return on investment.



ABOUT JAMES HARDIE

PRODUCTS

COLOR

| | | | | |
|--------|------|--------|-------------|-------------------|
| Siding | Trim | Soffit | HardieWrap® | Finishing Touches |
|--------|------|--------|-------------|-------------------|

● HardiePlank® Lap Siding

HardiePanel® Vertical Siding

HardieShingle® Siding

**HardiePlank®
Lap Siding**

Sleek and strong, HardiePlank lap siding is not just our best-selling product – it's the most popular brand of siding in America.

With a full spectrum of colors and textures, homeowners can enjoy protection from the elements and the versatility to make their dream home a reality. From Victorians to Colonials, HardiePlank lap siding sets the standard in exterior cladding.

**A classic look for
THE HOME OF THEIR DREAMS.**



PREV SECTION



ABOUT JAMES HARDIE

PRODUCTS

COLOR

| Siding | Trim | Soffit | HardieWrap® | Finishing Touches |
|---------------------------|------|------------------------------|-------------|-----------------------|
| ● HardiePlank® Lap Siding | | HardiePanel® Vertical Siding | | HardieShingle® Siding |

SELECT CEDARMILL®

Khaki Brown



SMOOTH

Countrylane Red



BEADED CEDARMILL®

Light Mist



BEADED SMOOTH

Heathered Moss



Products are available primed or with ColorPlus Technology finishes. For more details, visit jameshardie.com



ABOUT JAMES HARDIE

PRODUCTS

COLOR

| | | | | |
|---------------------------|------|------------------------------|-------------|-----------------------|
| Siding | Trim | Soffit | HardieWrap® | Finishing Touches |
| ● HardiePlank® Lap Siding | | HardiePanel® Vertical Siding | | HardieShingle® Siding |



SMOOTH

Countrylane Red

| | | | | |
|-----------------------|---------------|----------|----------|----------|
| Thickness | 5/16 in. | | | |
| Length | 12 ft. planks | | | |
| Width | 5.25 in. | 6.25 in. | 7.25 in. | 8.25 in. |
| Exposure | 4 in. | 5 in. | 6 in. | 7 in. |
| ColorPlus Pcs./Pallet | 324 | 280 | 252 | 210 |
| Prime Pcs./Pallet | 360 | 308 | 252 | 230 |
| Pcs./Sq. | 25.0 | 20.0 | 16.7 | 14.3 |

Available Colors



[View all HardiePlank Lap Siding Products](#)

| | | | | |
|--------|------|--------|-------------|-------------------|
| Siding | Trim | Soffit | HardieWrap® | Finishing Touches |
|--------|------|--------|-------------|-------------------|

HardiePlank® Lap Siding

● HardiePanel® Vertical Siding

HardieShingle® Siding



HardiePanel® Vertical Siding

HardiePanel vertical siding delivers style and substance. When combined with HardieTrim® boards, it achieves the rustic board-and-batten look that defines cottage charm. The covered seams contribute to a well-insulated home.

Its crisp, clean lines make HardiePanel vertical siding a smart choice for strong, contemporary designs.

True to the tradition of
PERFORMANCE AND BEAUTY.



ABOUT JAMES HARDIE

PRODUCTS

COLOR

| Siding | Trim | Soffit | HardieWrap® | Finishing Touches |
|-------------------------|------|---|-------------|-----------------------|
| HardiePlank® Lap Siding | | <input checked="" type="radio"/> HardiePanel® Vertical Siding | | HardieShingle® Siding |

SELECT CEDARMILL®

Navajo Beige Panel & Navajo Beige Rustic Grain® Batten



SMOOTH

Evening Blue Panel & Evening Blue Smooth Batten



STUCCO

Navajo Beige Panel



SIERRA 8

Not available with ColorPlus Technology



Products are available primed or with ColorPlus Technology finishes. For more details, visit jameshardie.com



ABOUT JAMES HARDIE

PRODUCTS

COLOR

| Siding | Trim | Soffit | HardieWrap® | Finishing Touches |
|-------------------------|---|--------|-------------|-----------------------|
| HardiePlank® Lap Siding | <input checked="" type="radio"/> HardiePanel® Vertical Siding | | | HardieShingle® Siding |



SMOOTH

Evening Blue Panel & Evening Blue Smooth Batten

| | | | |
|-------------|---------------|---------------|----------------|
| Thickness | 5/16 in. | | |
| Size | 4 ft. x 8 ft. | 4 ft. x 9 ft* | 4 ft. x 10 ft. |
| Pcs./Pallet | 50 | 50 | 50 |
| Pcs./Sq. | 3.2 | 2.8 | 2.5 |

Available Colors



[View all HardiePanel Vertical Siding Products](#)

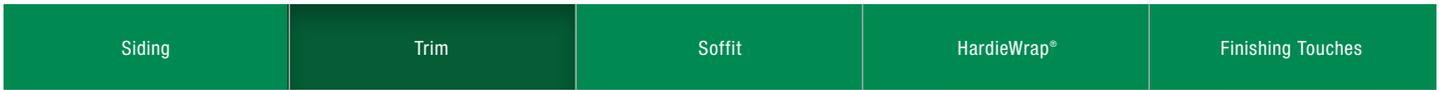
*4 ft. x 9 ft. HardiePanel vertical siding only available primed and exclusively in Washington, D.C., Baltimore and Virginia.



ABOUT JAMES HARDIE

PRODUCTS

COLOR



● HardieTrim® Boards

● HardieTrim® Batten Boards

HardieTrim® Boards

Form meets function at every angle with HardieTrim boards. With an authentic look, HardieTrim boards provide design flexibility for columns, friezes, doors, windows and other accent areas.

Unlike wood, it complements your long-lasting, lower maintenance James Hardie siding – adding punctuation to your design statement.

HardiePlank®
6.25 in. Smooth
Navajo Beige

HardieTrim®
5/4 x 3.5 in.
Khaki Brown

The performance you require
THE DISTINCTIVENESS YOU DESIRE.



ABOUT JAMES HARDIE

PRODUCTS

COLOR



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| | | | | |
|--------|------|--------|-------------|-------------------|
| Siding | Trim | Soffit | HardieWrap® | Finishing Touches |
|--------|------|--------|-------------|-------------------|

● HardieTrim® Boards

HardieTrim® Batten Boards

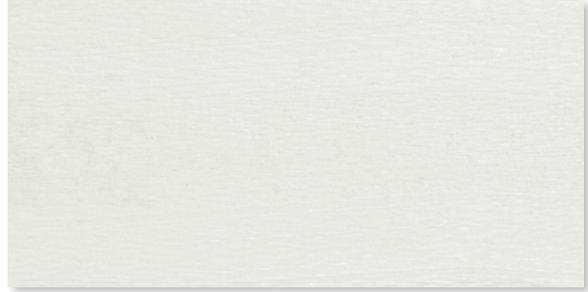
4/4 NT3° SMOOTH

Arctic White



5/4 NT3° SMOOTH

Arctic White



CROWN MOULDING

Arctic White



HardieTrim Boards are available exclusively with ColorPlus Technology. For more details, visit jameshardie.com



ABOUT JAMES HARDIE

PRODUCTS

COLOR

| | | | | |
|----------------------|------|---------------------------|-------------|-------------------|
| Siding | Trim | Soffit | HardieWrap® | Finishing Touches |
| ● HardieTrim® Boards | | HardieTrim® Batten Boards | | |



4/4 NT3® SMOOTH

Arctic White

| | | | | |
|-------------|---------------|---------|----------|-----------|
| Thickness | .75 in. | | | |
| Length | 12 ft. boards | | | |
| Width | 3.5 in. | 5.5 in. | 7.25 in. | 11.25 in. |
| Pcs./Pallet | 322 | 184 | 138 | 92 |

Available Colors



[View all HardieTrim Boards](#)



ABOUT JAMES HARDIE

PRODUCTS

COLOR



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| | | | | |
|--------|------|--------|-------------|-------------------|
| Siding | Trim | Soffit | HardieWrap® | Finishing Touches |
|--------|------|--------|-------------|-------------------|

| | |
|--------------------|--|
| HardieTrim® Boards | <input checked="" type="radio"/> HardieTrim® Batten Boards |
|--------------------|--|

RUSTIC GRAIN®

Arctic White



SMOOTH

Arctic White



HardieTrim Batten Boards are available primed or with ColorPlus Technology finishes. For more details, visit jameshardie.com



ABOUT JAMES HARDIE

PRODUCTS

COLOR

| | | | | |
|--------------------|------|-----------------------------|-------------|-------------------|
| Siding | Trim | Soffit | HardieWrap® | Finishing Touches |
| HardieTrim® Boards | | ● HardieTrim® Batten Boards | | |



SMOOTH

Arctic White

Thickness .75 in.
Length 12 ft. boards
Width 2.5 in.
Pcs./Pallet 437

Available Colors



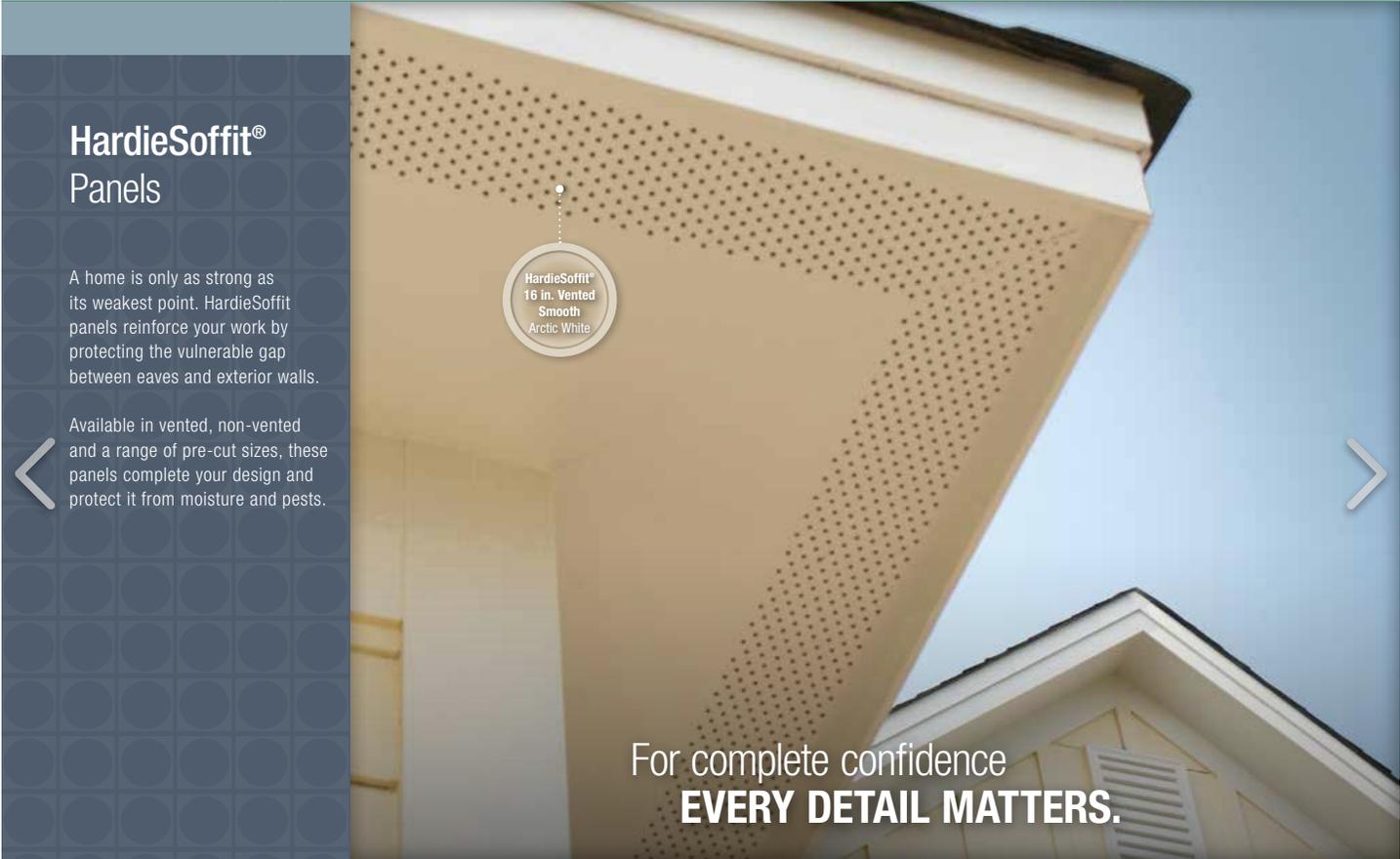
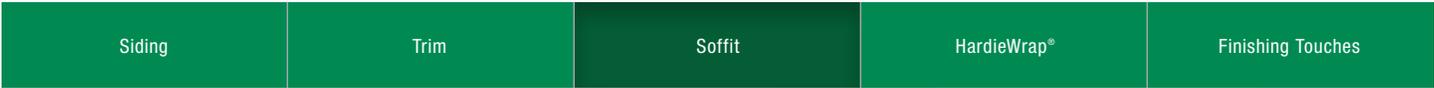
[View all HardieTrim Batten Boards](#)



ABOUT JAMES HARDIE

PRODUCTS

COLOR



HardieSoffit® Panels

A home is only as strong as its weakest point. HardieSoffit panels reinforce your work by protecting the vulnerable gap between eaves and exterior walls.

Available in vented, non-vented and a range of pre-cut sizes, these panels complete your design and protect it from moisture and pests.



For complete confidence
EVERY DETAIL MATTERS.



ABOUT JAMES HARDIE

PRODUCTS

COLOR

Siding Trim Soffit HardieWrap® Finishing Touches

VENTED CEDARMILL®*

Sail Cloth



VENTED SMOOTH

Sail Cloth



NON-VENTED CEDARMILL®*

Sail Cloth



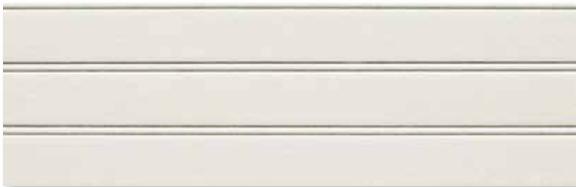
NON-VENTED SMOOTH

Sail Cloth



BEADED PORCH PANEL

Available exclusively with ColorPlus Technology



Products are available primed or with ColorPlus Technology finishes. For more details, visit jameshardie.com



ABOUT JAMES HARDIE

PRODUCTS

COLOR



VENTED SMOOTH

Sail Cloth

| | | | |
|-----------------------|---------|--------|--------|
| Thickness | 1/4 in. | | |
| Length | 12 ft. | 12 ft. | 8 ft. |
| Width | 12 in. | 16 in. | 24 in. |
| ColorPlus Pcs./Pallet | 216 | 156 | 108 |
| Prime Pcs./Pallet | 200 | 150 | 100 |

Available Colors



[View all HardieSoffit Products](#)



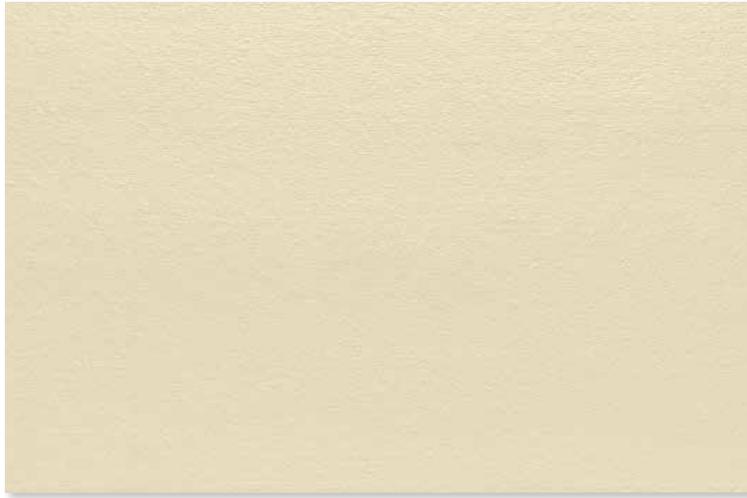
ABOUT JAMES HARDIE

PRODUCTS

COLOR



09 29 00



NON-VENTED SMOOTH

Sail Cloth

| | | | | |
|-----------------------|---------|--------|--------|--------|
| Thickness | 1/4 in. | | | |
| Length | 12 ft. | 12 ft. | 8 ft. | 8 ft* |
| Width | 12 in. | 16 in. | 24 in. | 48 in. |
| ColorPlus Pcs./Pallet | 216 | 156 | 108 | |
| Prime Pcs./Pallet | 200 | 150 | 100 | 50 |

Available Colors



[View all HardieSoffit Products](#)

*48 in. x 8 ft. panels only available primed.



ABOUT JAMES HARDIE

PRODUCTS

COLOR

TECHNICAL DATA

| PACKAGING & COVERAGE | | |
|-------------------------|---|---|
| Package | Coverage per 1,000 Sq. Ft. (100 Sq. M)* | Coverage per container Sq. Ft. (Sq. M)* |
| 47 lb. (21.3 kg) Carton | 130-140 (63-69 kg) | 410-1,025 (37-92) |
| 58 lb. (26.3 kg) Pail | 130-140 (63-69 kg) | 500-1,250 (45-112) |

*Coverage varies with number of cornerbeads and trims used.

| APPLICABLE STANDARDS AND REFERENCES |
|---|
| ASTM C 475 |
| ASTM C 840 |
| Gypsum Association GA-216 |
| Gypsum Association GA-214 |
| National Gypsum Company, <i>Gypsum Construction Guide</i> |
| ProForm BRAND, <i>Drywall Finishing Products Construction Guide</i> |

| APPROXIMATE DRYING TIMES | | | | | | | |
|--------------------------|-------------|-------|--------|--------|------|--------|------|
| R.H. | Temperature | | | | | | |
| | 32° | 40° | 50° | 60° | 70° | 80° | 100° |
| 0% | 38/H | 28/H | 19/H | 13/H | 9/H | 6/H | 3/H |
| 20% | 2/D | 34/H | 23/H | 16/H | 11/H | 8/H | 4/H |
| 40% | 2.5/D | 44/H | 29/H | 20/H | 14/H | 10/H | 5/H |
| 50% | 3/D | 2/D | 36/H | 24/H | 17/H | 12/H | 6/H |
| 60% | 3.5/D | 2.5/D | 42/H | 29/H | 20/H | 13.5/H | 8/H |
| 70% | 4.5/D | 3.5/D | 2.25/D | 38/H | 26/H | 19.5/H | 10/H |
| 80% | 7/D | 4.5/D | 3.25/D | 2.25/D | 38/H | 27/H | 14/H |
| 90% | 13/D | 9/D | 6/D | 4.5/D | 3/D | 49/H | 26/H |
| 98% | 53/D | 37/D | 26/D | 18/D | 12/D | 9/D | 5/D |

Note: R.H. = Relative Humidity D = Days (24 hour period) H = Hours
The chart above is a helpful guide in determining approximate drying times for joint compounds under a variety of humidity/temperature conditions. Shaded area is below the minimum application temperature requirement of 50° and is not recommended for the application of joint compound.

COMPOSITION & MATERIALS

May contain any of the following:

| Component | CAS No. |
|------------------|------------|
| Limestone | 1317-65-3 |
| Plaster of Paris | 10034-76-1 |
| Gypsum | 13397-24-5 |
| Perlite | 93763-70-3 |
| Talc | 14807-96-6 |
| Mica | 12001-26-2 |
| Clay | 1302-78-9 |
| | 1332-58-7 |
| | 66402-68-4 |
| | 8031-18-3 |
| Water | 7732-18-5 |
| Latex | |

VOC Content: <2g/L
Contains No Asbestos

INSTALLATION

RECOMMENDATIONS

Installation of Easy Finish Joint Compound should be consistent with methods described in the noted standards and references and as indicated below.

Easy Finish Joint Compound may need a slight amount of mixing before use, and in any case should be lightly mixed before any water is added. Mixing may be done with a potato-masher-type tool or by use of a low-speed drill. Use directly from the container for treating fasteners and cornerbeads. Care should be taken when water is added to thin to a desired consistency.

A uniformly thin layer of Easy Finish Joint Compound should be applied over the joint approximately 4" wide. The tape is then centered over the joint and embedded into the compound, leaving sufficient joint compound under the tape to provide proper bond. A thin coat of compound should cover the tape to minimize wrinkling or curling. Ceiling, wall angles and inside corner angles are reinforced with the tape folded to conform to the angle and embedded into the compound.

After the compound is thoroughly dry (approximately 24 hours), the tape is covered with a coat of all-purpose or topping compound spread over the tape approximately 3" on each edge. After this coat is thoroughly dry, another coat of all-purpose or topping compound is applied with a slight, uniform crown over the joint. This coat should be smooth and the edges feathered approximately 3" beyond the preceding coat.

All inside corners are coated with at least two coats of compound with the edges feathered out.

All nail or screw head dimples should receive three coats. These coats may be applied as each coat is applied to the joints.

Allow each application of Easy Finish Joint Compound to dry thoroughly, then wet sand if necessary. If dry sanding is preferred, ventilate, using an approved respirator, and wear eye protection.

Flanges of gypsum board cornerbead should be concealed by at least two coats of compound. The first coat should be all-purpose compound and the second coat can be all-purpose or topping compound feathered out approximately 9" on both sides of the exposed metal nose.

In cold weather (outside temperature below 50°F [10°C]), temperatures within the building should be maintained at a minimum 50°F (10°C), both day and night, during joint finishing. Adequate ventilation should be provided to eliminate excess moisture.

Wet/damp conditions slow the drying process. Subsequently, 24 hours drying time between coats may not be sufficient. Adequate drying time is essential to prevent unwanted conditions such as cracks from delayed shrinkage.

DECORATION

Before paint, wallcovering or other decorating materials are applied, all areas must be thoroughly dry, dust-free and treated with a coat of good-quality, high solids, flat latex primer.

The selection of a paint to give the specified or desired finished characteristics is the responsibility of the architect or contractor.

Gypsum Association GA-214, *Recommended Specification for Levels of Gypsum Board Finish*, should be referred to in order to determine the level of finishing needed to assure a surface properly prepared to accept the desired decoration.



110775 Rev. 12/11

GOLD BOND® BRAND XP® GYPSUM BOARD

MANUFACTURER

National Gypsum Company
2001 Rexford Road
Charlotte, NC 28211
(704) 365-7300

Technical Information:
1-800-NATIONAL
(1-800-628-4662)

Fax: 1-800-FAX NGC1
(1-800-329-6421)

Internet Home Page:
nationalgypsum.com
nationalgypsum.com/espanol
09 29 00/NGC BuyLine: 1100

DESCRIPTION

Gold Bond® BRAND XP® Gypsum Board with Sporgard™* was developed as an improved moisture resistant board, offering the same advantages of a traditional moisture resistant board with added mold resistance in the core and paper. XP Gypsum Board panels consist of a specially treated, fire-resistant, gypsum core encased in a heavy mold/mildew/moisture resistant, 100% recycled, National Gypsum's original PURPLE® paper on the face side and a heavy, mold/mildew/moisture resistant, 100% recycled gray paper on the back side.

XP Gypsum Board was designed to provide extra protection against mold and mildew compared to standard gypsum board products. The face paper is folded around the long edges to reinforce and protect the core, and the ends are square-cut and finished smooth. Long edges of the panels are tapered.

Tapered edges allow joints to be reinforced with ProForm® BRAND Joint Tape and concealed with ProForm® BRAND Ready Mix or ProForm® BRAND Quick Set Setting Compounds. For optimum mold and mildew performance, ProForm® BRAND XP® Ready Mix is recommended for use.

BASIC USES

XP Gypsum Board may be used in all wall and ceiling applications and is ideally suited where enhanced moisture and mold resistance is desired.

*Sporgard is a trademark of LANXESS Corporation

ADVANTAGES

- Resists the growth of mold per ASTM G 21 with a score of 0, the best possible score.
- Resists the growth of mold per ASTM D 3273 with a score of 10, the best possible score.
- XP Gypsum Board is moisture resistant and can be used as a tile backer board in dry areas or areas with limited water exposure such as toilet/sink areas and wall and ceiling areas above tile in tubs and showers.
- The gypsum core will not support combustion or transmit temperatures greatly in excess of 212°F (100°C) until completely calcined, a slow process.
- Scores and snaps easily, no special handling requirements.
- Less than 5% water absorption per ASTM C 473.

GREENGUARD CERTIFIED

XP Gypsum Board is GREENGUARD Children & Schools™ Certified for indoor air quality.



MOLD AND MILDEW RESISTANCE

XP Gypsum Board products were designed to provide extra protection against mold and mildew compared to standard gypsum board products. When tested by an independent laboratory, XP Gypsum Board products received the highest possible ratings on ASTM G 21 and ASTM D 3273.

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, XP Gypsum Board products 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.

LIMITATIONS

- For interior use only.
- Exposure to excessive or continuous moisture and

extreme temperatures should be avoided.

- XP Gypsum Board is not recommended where it will be exposed to temperatures exceeding 125°F (52°C) for extended periods of time
- XP Gypsum Board should not be used as a backer board directly behind tile and wall panels in tub and shower areas.
- Maximum framing spacing for ceiling applications not to exceed 16" o.c. for installation parallel to framing and maximum 24" o.c. for installation perpendicular to framing. On ceilings to receive hand- or spray-applied water-based texture material, XP Gypsum Board products are to be installed perpendicular to framing.
- XP Gypsum Board should not be used in areas subject to constant and/or excessive moisture and high humidity such as gang showers, saunas, steam rooms and swimming pool enclosures. PermaBase® BRAND Cement Board is recommended for these areas.

09 29 00

Job Name _____

Contractor _____ Date _____

Submittal Approvals: (Stamps or Signatures)

- Installing XP Gypsum Board panels over an insulating blanket, installed continuously across the face of the framing members, is not recommended. Blankets should be recessed and flanges attached to the sides of the studs or joists.
- XP Gypsum Board must be stored off the ground and under cover. Sufficient risers must be used to assure support for the entire length of the gypsum board to prevent sagging.
- XP Gypsum Board must be kept dry to minimize the potential for mold growth. Adequate care should be taken while transporting, storing, applying and maintaining gypsum board. For additional information, refer to the Gypsum Association publication, "Guidelines for the Prevention of Mold Growth on Gypsum Board" (GA-238-03), which is available at www.gypsum.org under the "Download Free Gypsum Association Publications" section.

COMPOSITION & MATERIALS

XP Gypsum Board is a manufactured panel with a gypsum core encased with paper. XP Gypsum Board contains no asbestos.

ACCESSORIES

- Fasteners: drywall screws
- ProForm Joint Tape
- ProForm Ready Mix or ProForm Quick Set/Quick Set Lite Setting Compound
- Cornerbead, trims, casing beads
- Furring Channels
- E-Z Strip control joints or .093 zinc control joints

TECHNICAL DATA

| PHYSICAL PROPERTIES | |
|---|--|
| Thickness, nominal | 1/2" Regular (12.7 mm) |
| Width, nominal | 4' (1219 mm) |
| Length, standard | 8' through 12' (2438-3657 mm) |
| Weight, lbs./sq.ft., nominal | 1/2" Regular - 1.5 - 1.6 |
| Edges | Square or Tapered |
| Surface Burning Characteristics (per ASTM E 84) | Flame Spread: 15 Smoke Developed: 0 |
| Water Absorption (per ASTM C 473) | <5% |
| Mold Resistance (per ASTM D 3273) | 10 |
| Mold Resistance (per ASTM G 21) | 0 |
| Permeability (per ASTM E 96) | 37* |
| *Not classified a vapor barrier | |
| APPLICABLE STANDARDS AND REFERENCES | |
| ASTM C 1396 | |
| ASTM C 840 | |
| ASTM D 3273 | |
| ASTM G 21 | |
| ASTM G 473 | |
| Gypsum Association GA-216 | |
| Gypsum Association GA-214 | |
| Gypsum Association GA-801 | |
| Federal Specification SS-L-30D Type VII (Grade R) | |
| National Gypsum Company, <i>Gypsum Construction Guide</i> | |

INSTALLATION

RECOMMENDATIONS

Installation of XP Gypsum Board should be consistent with methods described in the standards and references noted.

GridMarX® XP Gypsum Board comes standard with GridMarX guide marks printed on the paper surface. These guide marks align with standard building dimensions and help to quickly identify fastener lines for stud and joist framing. Using GridMarX, accurate cuts can be made without having to draw lines. The use of GridMarX also provides quick identification and uniform nail/screw patterns.

GridMarX guide marks run the machine direction of the board at five points in 4" increments. Marks run along

the edge in both tapers and at 16", 24" and 32" in the field of the board. The marks cover easily with no bleed-through using standard paint products.

Vertical Application -

In a vertical application, GridMarX serve as a **guide mark** to help identify the exact location of framing members behind the gypsum board, eliminating the need for field-applied vertical lines.

Horizontal Application -

In a horizontal application, GridMarX serve as a **reference mark** to help identify the location of framing members behind the gypsum board. (If framing member is located 2" to the right of the GridMarX at the top edge of the board, it will be located 2" to the right down the face of the board.)

DECORATION

For best painting results, all surfaces, including joint compound, should be clean, dust-free and not glossy. To improve fastener and joint concealment, a coat of high quality drywall primer is recommended to equalize the absorption between surface paper and joint compound.

The selection of a paint to give the specified or desired finished characteristics is the responsibility of the architect or contractor.

XP Gypsum Board that is to have a wall covering applied to it should be prepared and primed as described for painting.

Gypsum Association GA-214, *Recommended Specification for Levels of Gypsum Board Finish*, should be referred to in order to determine the level of finishing needed to assure a surface properly prepared to accept the desired decoration.



Home / Building materials / Drywall / Drywall Joint Tape

FibaTape | Model # FDW8249-U | Internet # 100401004 | Store SKU # 496707

500 ft. White Self Adhesive Mesh Drywall Joint Tape

★★★★★ (4) | Write a Review + | Questions & Answers (1) +

\$9.98 / roll



Pick Up In Store **FREE**
Available for Pick Up: Today

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Brooklyn, NY #1225
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1

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[PRODUCT OVERVIEW](#) ▾ | [SPECIFICATIONS](#) ▾ | [RECOMMENDED ITEMS](#) ▾ | [CUSTOMER REVIEWS](#) ▾ | [SHIPPING & DELIVERY](#) ▾

PRODUCT OVERVIEW Model # FDW8249-U | Internet # 100401004 | Store SKU # 496707

Tremendous texture and performance combine to make Solano perfect for your home. Enjoy the soft loops and soothing neutral shades of Solano, and the assurance that comes with a quality product. Expect superior performance with this gem.

- Style: loop
- Warranty: deluxe
- Color: cherokee
- Fiber: bcf - polyester
- Number of colors in collection: 20
- Color number: lp 20
- Collection: solano



09 30 00



WALL

ELEVARE™
GLAZED CERAMIC





Above photo and cover photo features Sand 4 x 16 field tile on the wall.

Take Your Style to the Next Level

Elevare combines simple, monochromatic color schemes to create a fashion-forward look inspired by the latest European trends. This collection's bold colors and range of sizes add a dramatic flair to your room. From backsplashes and showers to accent walls, Elevare gives you the versatility and style you need to take your designs to new heights.

- MINIMALISTIC BEAUTY
 - Offers a refined look that's available in a wide array of monochromatic colors
 - Mix and match bold colors to create unique designs
- ELEVATED CONVENIENCE
 - Available in large, linear formats, including 4 x 16 and 6 x 18
 - Perfect for walls, backsplashes, showers and other spaces

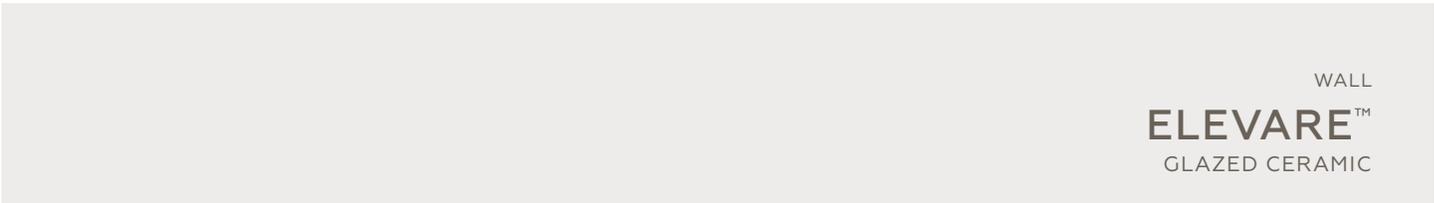
 POST CONSUMER RECYCLED MATERIALS

 PRE CONSUMER RECYCLED MATERIALS



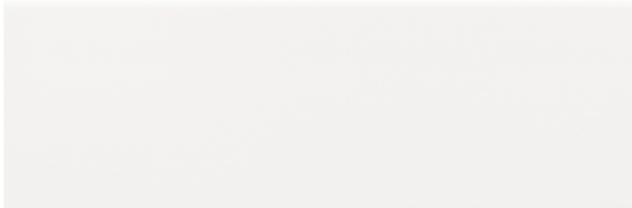


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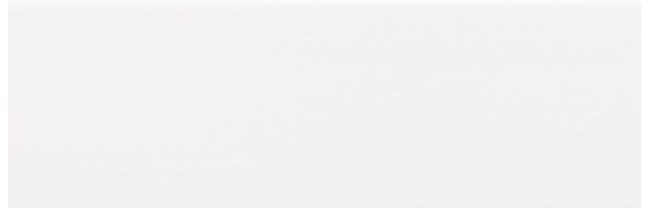


WALL
ELEVARE™
GLAZED CERAMIC

WALL TILE



Lunar EL40



Matte Lunar EL47



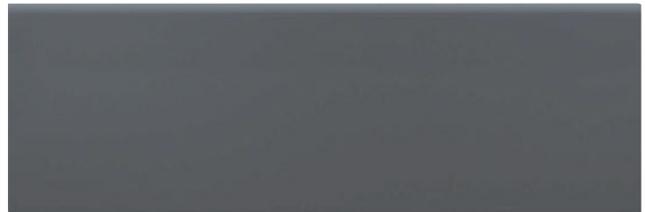
Crater EL41



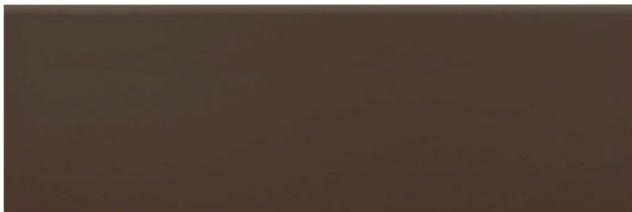
Sand EL42



Element EL43



Carbon EL44



Cacao EL45



Coal EL46





09 30 00

WALL

ELEVARE™
GLAZED CERAMIC

SIZES

| | | | Thickness | Sq. Ft. per Carton | Pieces Per Carton |
|---|------------------|-------------------------------------|-----------|--------------------|-------------------|
|  | 6 x 18 Wall Tile | (6" x 18") (15.25 cm x 45.76 cm) | 5/16" | 11.25 | 15 |
|  | 4 x 16 Wall Tile | (4" x 16") (10.17 cm x 40.68 cm) | 5/16" | 13.20 | 30 |

APPLICATIONS

| | Suitable |
|--------------------|----------|
| Floors | |
| Walls/Backsplashes | ✓ |
| Countertops | |
| Pool Linings | |

Suitable for exterior applications in non-freezing climates only, when proper installation methods are followed.

TRIM

| | Type | Number | Size | Pieces Per Carton |
|--|-----------|----------------------|----------------|-------------------|
|  | 12" Jolly | S1/212J | 1/2 x 11-15/16 | 12 |
|  | Bullnose | S-44D9 (16" Side) | 4 x 16 | 24 |
|  | Bullnose | S-4D49 (4" Side) | 4 x 16 | 24 |

INSTALLATION

| Grout Joint Recommendation | Shade Variation |
|---|--|
| (4 x 16) 1/16" (when rectangular size is used in a staggered brick-joint pattern, overlap should not exceed 33%) |  Low (V1) |
| (6 x 18) 1/16" (1/8" when rectangular size is installed in a staggered brick-joint pattern; overlap should not exceed 33%) | |

TEST RESULTS

| | ASTM# | Result |
|---------------------|-------|----------------|
| Water Absorption | C373 | < 20% |
| Breaking Strength | C648 | 120 – 230 lbs. |
| Scratch Hardness | MOHS | 4.0 – 6.0 |
| Chemical Resistance | C650 | Resistant |

NOTES

Since there are variations in all fired ceramic products, tile and trim supplied for your particular installation may not match these samples. Final color selection should be made from actual tiles and trim and not from tile samples or color reproductions. Manufactured in accordance with ANSI A137.1 standards.

For additional information refer to "Factors to Consider" at daltile.com/Factors.



SCAN QR CODE FOR PRODUCT INFORMATION
Get a QR Code reader at: GET.DAL TILE.COM



7834 C. F. Hawn Freeway,
Dallas, Texas 75217 | 1.800.933.TILE

To view the complete collection of Daltile® products and information, visit our website at daltile.com.





May contain Recycled
and/or Reclaimed Materials
www.daltile.com/leed

SAFETY DATA SHEET CERAMIC TILE

Tile Series: Elevare

1. PRODUCT IDENTIFICATION

Common Name: Ceramic Tile (For purposes of this SDS, the term “ceramic” encompasses all types of tile products manufactured/sourced by Dal-Tile Corporation.)

Synonyms: Ceramic Tile and Wares

Manufacturer Name: Dal-Tile Corporation

Address: Headquarters Office
7834 C.F. Hawn Freeway, Dallas, TX 75217

Emergency Assistance: Environmental, Health and Safety Department
Richard Ray - (214) 309-4295
1-800-933-TILE; (214) 398-1411 (24-hour number)

Recommended Use: Building Material - Tile products manufactured/sourced by Dal-Tile Corporation are environmentally preferable building materials when compared to other floor/wall coverings. As defined by guidelines issued by the Environmental Protection Agency, the American Society for Testing & Materials, and the Federal Trade Commission, Tile is one of the most environmentally friendly building materials you can buy today. Should you desire additional information, please direct your inquiry to the address above.

This document has been prepared in accordance with the Occupational Safety and Health Administration (OSHA) Hazard Communication standard, 29 Code of Federal Regulations (CFR) 1910.1200(g), Safety Data Sheets.

2. HAZARDS IDENTIFICATION

Tile products are mixtures of predominantly clays, silica sand, and other natural occurring minerals that have been mixed with water and fired in a high temperature kiln. The finished, fired tiles are odorless, stable, non-flammable, and pose no immediate hazard to health. Respiratory, hand and eye protection may be needed to prevent excess exposure to airborne particulates if dust is produced by cutting tiles during installation or if dust is produced by any other operations, including demolition/removal projects.

Emergency Overview: Danger! Lung injury and Cancer Hazard

GHS Classification (Global Harmonized Standard Classification):
Carcinogenicity Category 1A (H350)
Specific target organ toxicity, single exposure; Respiratory tract irritation - Category 3 (H335)
Specific target organ toxicity, repeated exposure - Category 1A (H372)

GHS Label, Hazards and Precautionary Statements
GHS Pictogram:

| | | |
|---------------------|---|--|
| Crystalline Silica: |  | Category 3 (Respiratory tract irritation) (H335) |
| |  | Categories 1A(Carcinogenicity)(H372) |

Label Signal Word: Danger

Hazard Statements:
(H350) May cause CANCER (inhalation)
(H335) May cause respiratory irritation
(H372) Causes damage to organs (lung/respiratory) through prolonged or repeated exposure (inhalation)

2. HAZARDS IDENTIFICATION (CONT)

Precautionary Statements:

- Do not handle until all safety precautions have been read and understood. (P202)
- Do not breathe dust/spray. (P260 + P261)
- Wash skin thoroughly after handling. (P264)
- Do not eat, drink or smoke when using this product. (P270)
- Wear protective gloves, protective clothing, eye protection, face protection. (P280)

Potential Health Effects:

Inhalation: Do not breathe dust. See "Health Hazards" in Section 11 for more details.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Tile products are mixtures of predominately Clays, Silica Sand and other naturally-occurring minerals, that have been mixed with water and fired in a high temperature kiln.

Tiles are manufactured in various shapes, sizes, and colors.

These products do not contain asbestos.

Under normal conditions these products do not release hazardous materials after installation and are not considered hazardous waste should disposal be necessary.

| Composition | CAS# / EINECS# | Estimated % by Wt. | EU Class |
|------------------------------|--------------------------------------|--------------------|------------------------------|
| Crystalline silica as quartz | CAS: 14808-60-7 EINECS: 238-878-4 | 0-30 | (67/548/EEC) Xn R48/20 |
| Clays | CAS: 1332-58-7 EINECS: 265-064-6 | 20-55 | (67/548/EEC) Xi R36/37/38 |
| Nepheline syenite | CAS: 37244-96-5 EINECS: N/A | 0-50 | (67/548/EEC) Xi R36/37/38 |
| Talc | CAS: 14807-96-6 EINECS: 238-877-9 | 0-40 | (67/548/EEC) Xi R36/37/38 |
| Feldspar | CAS: 68476-25-5 EINECS: 270-666-7 | 0-15 | (67/548/EEC) Xi R36/37/38 |
| Biotite | CAS: 12001-26-2 EINECS: 215-479-3 | 0-5 | (67/548/EEC) Xi R36/37/38 |

4. FIRST AID MEASURES

- Eyes: Immediately flush eyes with large amounts of water for at least 15 minutes if dust gets in eyes. Get medical attention if irritation persists.
- Skin: Wash thoroughly after working with tiles.
- Inhalation: Remove to fresh air if exposed to large amounts of tile dust. Administer artificial respiration if breathing has stopped. Keep victim at rest. Call for prompt medical attention.
- Ingestion: Not applicable for intact tiles.

Have emergency eyewash station available in area where tiles are cut.

5. FIRE-FIGHTING MEASURES AND INFORMATION

- Flash Point (Method Used): Not applicable
- Autoignition Temperature: Not applicable
- Flammable Limits (% by Volume in Air): LEL - not applicable
UEL - not applicable
- Fire Extinguishing Media: None required Non-flammable
- Special Fire Fighting Procedures: None required
- Fire and Explosion Hazards: None

6. ACCIDENTAL RELEASE MEASURES

Avoid creating excessive dust. Clean up dust with a vacuum system with a High-efficiency particulate (HEPA) air filter vacuum or damp sweeping. See Section 8 of this SDS concerning PPE information for clean-up.

7. HANDLING AND STORAGE

When cutting, grinding or removing, use equipment with integral dust collection and/or use local exhaust ventilation. Use wet cutting methods to reduce generation of dust. Use respiratory protection in the absence of effective engineering controls.

Do not store near acids. If tiles contact some acids, damage/discoloration to the surface may occur.

Shelf life is unlimited.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Exposure Table

| Composition | OSHA PEL | NIOSH IDLH | ACGIH TLV* | Units |
|--|----------------------------|---------------|---------------|-------------------|
| Crystalline silica as quartz -respirable fraction | 10 %SiO ₂ +2 | 0.05 | 0.025 | mg/m ³ |
| -total dust | 30 %SiO ₂ +2 | N.E. | N.E. | mg/m ³ |
| Clays | | | | |
| -respirable fraction | 5 | N.E. | 2 | mg/m ³ |
| -total dust** | 15 | N.E. | 10 | mg/m ³ |
| Nepheline syenite | | | | |
| -respirable fraction** | 5 | N.E. | N.E. | mg/m ³ |
| -total dust** | 15 | N.E. | N.E. | mg/m ³ |
| Talc | | | | |
| -respirable fraction | 2 | 2 | 2 | mg/m ³ |
| -total dust** | 15 | 10 | 10 | mg/m ³ |
| Feldspar | | | | |
| -respirable fraction | N.E. | N.E. | N.E. | mg/m ³ |
| -total dust** | 15 | N.E. | N.E. | mg/m ³ |
| Biotite | | | | |
| -respirable fraction** | 5 | 15 | 3 | mg/m ³ |
| -total dust** | 15 | N.E. | N.E. | mg/m ³ |

* 2006 Edition, respirable fraction to be determined as per Appendix D of ACGIH TLV.

** Covered as particles not otherwise regulated per OSHA and particles not otherwise classified per ACGIH.

N.D. - Not determined

N.E. - Not established

8.2 EXPOSURE CONTROLS/PERSONAL PROTECTION

Ventilation: Use adequate ventilation to keep exposure to dust below recommended exposure levels. Avoid inhalation of dust. The highest probability of silica exposure occurs during installation using dry cutting methods or during removal of installed tile. Wet cutting methods are recommended.

Respiratory Protection: Use of a properly fitted NIOSH/MSHA approved particulate respirator is recommended when cutting tiles for installation or during the removal of installed tile.

Eye Protection: Use dust-proof goggles or safety glasses with side shields. Contact lenses may absorb irritants. Do not wear contact lenses in work areas.

Skin Protection: Cotton or leather work gloves should be worn when cutting this product to minimize skin exposure to dust and/or cuts. Wash hands prior to eating, drinking, or smoking, and at the end of the work shift, after cutting operations are conducted.

NOTE: Personal protection information in Section 8 is based on general information for normal uses and conditions. Where special or unusual uses or conditions exist, it is suggested that the assistance of an industrial hygienist or other qualified professional be obtained.

9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|--|---|
| Appearance: | Brittle solid; color may vary |
| Odor: | Odorless |
| Melting Point: | Not Available (>2200 °F) |
| Boiling Point: | Not applicable |
| Vapor Pressure: | Not applicable |
| Vapor Density (Air = 1): | Not applicable |
| Solubility in Water: | Insoluble |
| Specific Gravity (H ₂ O = 1): | 1.6 to 2.1 |
| Percent Volatile by Volume: | Not applicable |
| Evaporation Rate (Ethyl Ether = 1): | Not applicable |
| Viscosity: | Not applicable |
| Volatility: | 0 g/L Volatile Organic Compounds (VOCs) |

10. STABILITY AND REACTIVITY

| | |
|---------------------------------------|---|
| Stability: | Stable in current form. |
| Conditions to Avoid: | Avoid contact with acids (e.g., acetic, hydrofluoric, etc.) |
| Incompatibility (Materials to Avoid): | Avoid contact with acids (e.g., acetic, hydrofluoric, etc.) |
| Hazardous Polymerization: | Will not occur. |
| Hazardous Decomposition Products: | None. |

11. TOXICOLOGICAL INFORMATION

Potential Health Effects

Primary Routes of Exposure

None for intact tile. Inhalation and potential exposure to eyes, hands, or other body parts if contact is made with broken tile, and/or during procedures involving the cutting of tiles, and/or for operations involving the removal of installed tiles.

Acute Effects

No acute effects from exposure to intact tile are known. Working with broken or cut tile produces a potential for cuts to the hands and exposed body parts. Acute effects such as eye irritation may occur if associated with high dust operations such as dry cutting tile or during the removal of installed tile. In very rare cases, symptoms of acute silicosis, a form of silicosis (a nodular pulmonary fibrosis) associated with exposure to respirable crystalline silica, may develop following acute exposure to extremely dusty environments caused by generation of tile dust. Signs such as labored breathing and early fatigue may indicate silicosis; however, these same symptoms can arise from many other causes.

Chronic Effects

No chronic effects are known for exposure to intact tile. Long-term, continual exposure to respirable crystalline silica at or above established permissible occupational exposure limits may lead to the development of silicosis, a nodular pulmonary fibrosis (NPF). NPFs are also associated with pulmonary tuberculosis, bronchitis, emphysema, and other airway diseases. This type of chronic exposure to silica dust may also result in the development of autoimmune disorders, chronic renal disease, and other adverse health effects. Recent epidemiologic studies demonstrate that workers exposed to elevated silica concentrations have a significant risk of developing chronic silicosis. Signs such as labored breathing and early fatigue may indicate silicosis; however, these same symptoms can also arise from many other causes.

Potential Adverse Interactions

Silicosis may be complicated by severe mycobacterial or fungal infections and result in tuberculosis (TB). Epidemiologic studies have established that silicosis is a risk factor for developing TB. Any existing respiratory or pulmonary diseases may be complicated by exposure to respirable crystalline silica. Smoking may increase the risk of adverse effects if done in conjunction with occupational exposure to silica dust at or above permissible exposure limits.

Carcinogen Status

Respirable crystalline silica is classified by the International Agency for Research on Cancer (IARC) as a Group I Carcinogen (carcinogenic to humans). The National Toxicology Program (9th Report) lists respirable crystalline silica as "Known to be a Human Carcinogen". USDOL/OSHA and NIOSH have recommended that crystalline silica be considered a potential occupational carcinogen.

Overview of Animal Testing

Short term experimental studies of rats have found that intratracheal instillation of quartz particles leads to the formation of discrete silicotic nodules in rats, mice and hamsters.

Oral (silica) Lethality

| | |
|-----------------|---------------------------|
| LD50 Rat oral | >22,500 mg/kg |
| LD50 Mouse oral | >15,000 mg/kg |
| LC50 Carp | >10,000 mg/l (per 72 hr.) |



12. ECOLOGICAL INFORMATION

No information available at this time.

13. DISPOSAL CONSIDERATIONS

Waste should be disposed of in a landfill certified to accept such materials in accordance with federal, state, and local regulations.

14. TRANSPORTATION INFORMATION

D.O.T Shipping Name: Not applicable
Hazard Class: Non-regulated (for disposal purposes material is non-hazardous Class III regulated material)
ID Number: Not applicable
Marking: Not applicable
Label: None
Placard: None
Hazardous Substance/RQ: Not applicable
Shipping Description: Porcelain/Ceramic Tiles
Packaging References: None

15. REGULATORY INFORMATION

This product and/or its components have been previously introduced into U.S. commerce and is listed in the Toxic Substances Control Act (TSCA) Inventory of Chemicals in Commerce. Hence, it is subject to all applicable provisions and restrictions under TSCA 40 CFR Section 721 and 723.250.

This tile contains <1 percent by weight each of the following elements, which are SARA 313 Recordable: Antimony, Arsenic, Barium, Beryllium, Cadmium, Cobalt, Chromium, Copper, Manganese, Mercury, Nickel, Lead, Silver, Thallium, Tin, Titanium, Vanadium, and Zinc.

Title 22 Division 2, California Code of Regulation Chapter 3 (Proposition 65): This product contains a chemical or chemicals known to the State of California to cause cancer and/or birth defects or other reproductive harm.

This product or its components meets the following hazard definition(s) as defined by the Occupational Safety and Health Hazard Communication Standard (29 CFR Section 1910.1200):

| | | |
|---|---|---|
| <input type="checkbox"/> Combustible Liquid | <input type="checkbox"/> Flammable Aerosol | <input type="checkbox"/> Oxidizer |
| <input type="checkbox"/> Compressed Gas | <input type="checkbox"/> Explosive | <input type="checkbox"/> Pyrophoric |
| <input type="checkbox"/> Flammable Gas | <input checked="" type="checkbox"/> Health Hazard (Sections 3 & 11) | <input type="checkbox"/> Unstable |
| <input type="checkbox"/> Flammable Liquid | <input type="checkbox"/> Organic Peroxide | <input type="checkbox"/> Water Reactive |
| <input type="checkbox"/> Flammable Solid | | |

Based on information presently available, this product does not meet any of the hazard definitions of 29 CFR Section 1910.1200.

Note: The information in this data sheet provides information related to the potential hazards associated with dusts which may be produced during cutting or otherwise changing the shape of the tile during installation and/or removal.

16. ADDITIONAL INFORMATION

Global Harmonization Identification System

GHIS: Health: 3 Fire: 4 Reactivity: 4

Hazardous Material Identification System

HMIS: Health: 0 Fire: 0 Reactivity: 0

National Fire Protection Association

NFPA: Health: 0 Fire: 0 Reactivity: 0



floor • wall • countertop

COLORBODY™ PORCELAIN FABRIQUE™

Fabrique combines the detail of fine fabrics with porcelain flooring that creates an atmosphere as rich and intricate as handcrafted brick. Taking cues from different textures and colors, the Fabrique collection draws inspiration from the way fabric moves and allows you to bring a delicate elegance to any space.

COLORBODY™ PORCELAIN FABRIQUE™

| SIZES | | SQFT. PER CARTON | PIECES PER CARTON |
|--|--|------------------|-------------------|
| NOMINAL | ACTUAL | | |
| 24" x 24" Field Tile | 23 1/8" x 23 1/8" (592 mm x 592 mm) | 15.49 | 4 |
| 12" x 24" Field Tile (Double Rectified & Polished) | 11 3/8" x 23 1/8" (292 mm x 592 mm) | 15.49 | 8 |
| 12" x 12" Field Tile (Double Rectified) | 11 3/8" x 11 3/8" (292 mm x 292 mm) | 15.45 | 11 |
| 2" x 24" Profile (Double Rectified) | 1 1/2" x 23 1/8" (38 mm x 592 mm) (Profile Length 24") | 15.45 | 11 |

| LINEAR OPTIONS* SIZES* | | SQFT. PER CARTON | PIECES PER CARTON |
|------------------------|-----------------------------------|------------------|-------------------|
| NOMINAL | ACTUAL | | |
| 4" x 24" Field Tile | 3 7/8" x 23 1/8" (98 mm x 592 mm) | 15.45 | 11 |
| 4" x 12" Field Tile | 3 7/8" x 11 3/8" (98 mm x 292 mm) | 6.46 | 15 |
| 2" x 24" Field Tile | 1 7/8" x 23 1/8" (48 mm x 592 mm) | 4.44 | 35 |

*Additional linear and rectangular sizes available through Linear Options™. Dalton's Linear Options™ allow you to mix and match different sizes and colors for doors and other applications.

RESIDENTIAL

RESIDENTIAL USAGE

| FLOOR | WALL | COUNTERTOP | EXTERIOR PATIO | EXTERIOR POOL DECK |
|----------|----------|------------|----------------|--------------------|
| F | W | C | EP | EP |

COMMERCIAL

COMMERCIAL APPLICATION

| | LIGHT COMMERCIAL | COMMERCIAL | COMMERCIAL EXTERIOR |
|-----------------|------------------|------------|---------------------|
| Flurry™ | • | • | • |
| Water Resistant | • | • | • |
| Commercial | • | • | • |
| Pool Decking | • | • | • |
| Pool Coping | • | • | • |

*Suitable for exterior walls in freezing and non-freezing climates when proper installation methods are followed.

*Residential only.

Professional Tile & Stone
daltille greenworks
Wood Sources
daltille

7834 C. F. House Parkway | Dallas, TX 75217 | 214.398.6411 | 800.933.862
For more information about Daltille products and services, visit our website at daltilleproducts.com

TRIM

| TYPE | SIZE | PIECES PER CARTON |
|---|----------|-------------------|
| Rectified 3/8" x 1/2" x 1/2" (9.5 mm x 12.5 mm x 12.5 mm) | 7" x 12" | 33 |

*Substrate also available in horizontal design in Light, Neutral & Dark shades of color or Special Order.

SHADE VARIATION

MEDIUM (V2)
Color variations within each tile.

INSTALLATION

THICKNESS 1/2" (12.5 mm) minimum, unless as specified in a regional code, local authority, where the specific code is indicated.

SLIP RESISTANCE (WET) 3-5
The higher the rating, the higher the slip resistance.

TEST RESULTS

| TEST | ASTM | RESULTS |
|-------------------------------------|-------|-----------------|
| Water Absorption | C155 | < 0.5% |
| Flexural Strength | C493 | > 6,000 psi |
| Scratch Hardness | FDH30 | 6-5 |
| Chemical Resistance | C672 | Resistant |
| Colorfast to Fumes (Unbleached) | C155 | Wet & Dry > 500 |
| Colorfast to Fumes (Light Bleached) | C155 | Wet & Dry > 500 |

NOTES

Special care should be taken when grouting with dark pigmented colors. A proof test is recommended to prevent any grout-related problems from being on the surface. Use of a latex modified thin set is recommended for the above.

Some stone or concrete or other substrate products, like all other substrates for your tile and grout, may not meet the standards for your substrate. Your substrate should be tested for moisture, pH, and other factors to ensure proper adhesion. Products listed in accordance with ANSI A 137.1 standards.

For additional information, refer to "Factors to Consider" at www.daltille.com/ or call 800.933.862.

Water, oil, grease, etc. create slippery conditions. Floor applications which require slip-resistance require extra caution in product selection. See our slip ratings.



COLORBODY™ PORCELAIN FABRIQUE™

Professional Tile & Stone | T&E | daltille



May contain Recycled
and/or Reclaimed Materials
www.daltile.com/leed

SAFETY DATA SHEET

CERAMIC TILE

Tile Series: **Fabrique**

1. PRODUCT IDENTIFICATION

Common Name: Ceramic Tile (For purposes of this SDS, the term “ceramic” encompasses all types of tile products manufactured/sourced by Dal-Tile Corporation.)

Synonyms: Ceramic Tile and Wares

Manufacturer Name: Dal-Tile Corporation

Address: Headquarters Office
7834 C.F. Hawn Freeway, Dallas, TX 75217

Emergency Assistance: Environmental, Health and Safety Department
Richard Ray - (214) 309-4295
1-800-933-TILE; (214) 398-1411 (24-hour number)

Recommended Use: Building Material - Tile products manufactured/sourced by Dal-Tile Corporation are environmentally preferable building materials when compared to other floor/wall coverings. As defined by guidelines issued by the Environmental Protection Agency, the American Society for Testing & Materials, and the Federal Trade Commission, Tile is one of the most environmentally friendly building materials you can buy today. Should you desire additional information, please direct your inquiry to the address above.

This document has been prepared in accordance with the Occupational Safety and Health Administration (OSHA) Hazard Communication standard, 29 Code of Federal Regulations (CFR) 1910.1200(g), Safety Data Sheets.

2. HAZARDS IDENTIFICATION

Tile products are mixtures of predominantly clays, silica sand, and other natural occurring minerals that have been mixed with water and fired in a high temperature kiln. The finished, fired tiles are odorless, stable, non-flammable, and pose no immediate hazard to health. Respiratory, hand and eye protection may be needed to prevent excess exposure to airborne particulates if dust is produced by cutting tiles during installation or if dust is produced by any other operations, including demolition/removal projects.

Emergency Overview: Danger! Lung injury and Cancer Hazard

GHS Classification (Global Harmonized Standard Classification):

Carcinogenicity Category 1A (H350)

Specific target organ toxicity, single exposure; Respiratory tract irritation - Category 3 (H335)

Specific target organ toxicity, repeated exposure - Category 1A (H372)

GHS Label, Hazards and Precautionary Statements

GHS Pictogram:

Crystalline Silica:  Category 3 (Respiratory tract irritation) (H335)

 Categories 1A(Carcinogenicity)(H372)

Label Signal Word: Danger

Hazard Statements:

(H350) May cause CANCER (inhalation)

(H335) May cause respiratory irritation

(H372) Causes damage to organs (lung/respiratory) through prolonged or repeated exposure (inhalation)



2. HAZARDS IDENTIFICATION (CONT)

Precautionary Statements:

- Do not handle until all safety precautions have been read and understood. (P202)
- Do not breathe dust/spray. (P260 + P261)
- Wash skin thoroughly after handling. (P264)
- Do not eat, drink or smoke when using this product. (P270)
- Wear protective gloves, protective clothing, eye protection, face protection. (P280)

Potential Health Effects:

Inhalation: Do not breathe dust. See "Health Hazards" in Section 11 for more details.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Tile products are mixtures of predominately Clays, Silica Sand and other naturally-occurring minerals, that have been mixed with water and fired in a high temperature kiln.

Tiles are manufactured in various shapes, sizes, and colors.

These products do not contain asbestos.

Under normal conditions these products do not release hazardous materials after installation and are not considered hazardous waste should disposal be necessary.

| Composition | CAS# / EINECS# | Estimated % by Wt. | EU Class |
|------------------------------|--------------------------------------|--------------------|------------------------------|
| Crystalline silica as quartz | CAS: 14808-60-7 EINECS: 238-878-4 | 0-30 | (67/548/EEC) Xn R48/20 |
| Clays | CAS: 1332-58-7 EINECS: 265-064-6 | 20-55 | (67/548/EEC) Xi R36/37/38 |
| Nepheline syenite | CAS: 37244-96-5 EINECS: N/A | 0-50 | (67/548/EEC) Xi R36/37/38 |
| Talc | CAS: 14807-96-6 EINECS: 238-877-9 | 0-40 | (67/548/EEC) Xi R36/37/38 |
| Feldspar | CAS: 68476-25-5 EINECS: 270-666-7 | 0-15 | (67/548/EEC) Xi R36/37/38 |
| Biotite | CAS: 12001-26-2 EINECS: 215-479-3 | 0-5 | (67/548/EEC) Xi R36/37/38 |

4. FIRST AID MEASURES

- Eyes: Immediately flush eyes with large amounts of water for at least 15 minutes if dust gets in eyes. Get medical attention if irritation persists.
- Skin: Wash thoroughly after working with tiles.
- Inhalation: Remove to fresh air if exposed to large amounts of tile dust. Administer artificial respiration if breathing has stopped. Keep victim at rest. Call for prompt medical attention.
- Ingestion: Not applicable for intact tiles.

Have emergency eyewash station available in area where tiles are cut.

5. FIRE-FIGHTING MEASURES AND INFORMATION

- Flash Point (Method Used): Not applicable
- Autoignition Temperature: Not applicable
- Flammable Limits (% by Volume in Air): LEL - not applicable
UEL - not applicable
- Fire Extinguishing Media: None required Non-flammable
- Special Fire Fighting Procedures: None required
- Fire and Explosion Hazards: None

6. ACCIDENTAL RELEASE MEASURES

Avoid creating excessive dust. Clean up dust with a vacuum system with a High-efficiency particulate (HEPA) air filter vacuum or damp sweeping. See Section 8 of this SDS concerning PPE information for clean-up.

7. HANDLING AND STORAGE

When cutting, grinding or removing, use equipment with integral dust collection and/or use local exhaust ventilation. Use wet cutting methods to reduce generation of dust. Use respiratory protection in the absence of effective engineering controls.

Do not store near acids. If tiles contact some acids, damage/discoloration to the surface may occur.

Shelf life is unlimited.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Exposure Table

| Composition | OSHA PEL | NIOSH IDLH | ACGIH TLV* | Units |
|--|----------------------------|---------------|---------------|-------------------|
| Crystalline silica as quartz -respirable fraction | 10 %SiO ₂ +2 | 0.05 | 0.025 | mg/m ³ |
| -total dust | 30 %SiO ₂ +2 | N.E. | N.E. | mg/m ³ |
| Clays -respirable fraction | 5 | N.E. | 2 | mg/m ³ |
| -total dust** | 15 | N.E. | 10 | mg/m ³ |
| Nepheline syenite -respirable fraction** | 5 | N.E. | N.E. | mg/m ³ |
| -total dust** | 15 | N.E. | N.E. | mg/m ³ |
| Talc -respirable fraction | 2 | 2 | 2 | mg/m ³ |
| -total dust** | 15 | 10 | 10 | mg/m ³ |
| Feldspar -respirable fraction | N.E. | N.E. | N.E. | mg/m ³ |
| -total dust** | 15 | N.E. | N.E. | mg/m ³ |
| Biotite -respirable fraction** | 5 | 15 | 3 | mg/m ³ |
| -total dust** | 15 | N.E. | N.E. | mg/m ³ |

* 2006 Edition, respirable fraction to be determined as per Appendix D of ACGIH TLV.

** Covered as particles not otherwise regulated per OSHA and particles not otherwise classified per ACGIH.

N.D. - Not determined

N.E. - Not established

8.2 EXPOSURE CONTROLS/PERSONAL PROTECTION

Ventilation: Use adequate ventilation to keep exposure to dust below recommended exposure levels. Avoid inhalation of dust. The highest probability of silica exposure occurs during installation using dry cutting methods or during removal of installed tile. Wet cutting methods are recommended.

Respiratory Protection: Use of a properly fitted NIOSH/MSHA approved particulate respirator is recommended when cutting tiles for installation or during the removal of installed tile.

Eye Protection: Use dust-proof goggles or safety glasses with side shields. Contact lenses may absorb irritants. Do not wear contact lenses in work areas.

Skin Protection: Cotton or leather work gloves should be worn when cutting this product to minimize skin exposure to dust and/or cuts. Wash hands prior to eating, drinking, or smoking, and at the end of the work shift, after cutting operations are conducted.

NOTE: Personal protection information in Section 8 is based on general information for normal uses and conditions. Where special or unusual uses or conditions exist, it is suggested that the assistance of an industrial hygienist or other qualified professional be obtained.

9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|--|---|
| Appearance: | Brittle solid; color may vary |
| Odor: | Odorless |
| Melting Point: | Not Available (>2200 °F) |
| Boiling Point: | Not applicable |
| Vapor Pressure: | Not applicable |
| Vapor Density (Air = 1): | Not applicable |
| Solubility in Water: | Insoluble |
| Specific Gravity (H ₂ O = 1): | 1.6 to 2.1 |
| Percent Volatile by Volume: | Not applicable |
| Evaporation Rate (Ethyl Ether = 1): | Not applicable |
| Viscosity: | Not applicable |
| Volatility: | 0 g/L Volatile Organic Compounds (VOCs) |

10. STABILITY AND REACTIVITY

| | |
|---------------------------------------|---|
| Stability: | Stable in current form. |
| Conditions to Avoid: | Avoid contact with acids (e.g., acetic, hydrofluoric, etc.) |
| Incompatibility (Materials to Avoid): | Avoid contact with acids (e.g., acetic, hydrofluoric, etc.) |
| Hazardous Polymerization: | Will not occur. |
| Hazardous Decomposition Products: | None. |

11. TOXICOLOGICAL INFORMATION

Potential Health Effects

Primary Routes of Exposure

None for intact tile. Inhalation and potential exposure to eyes, hands, or other body parts if contact is made with broken tile, and/or during procedures involving the cutting of tiles, and/or for operations involving the removal of installed tiles.

Acute Effects

No acute effects from exposure to intact tile are known. Working with broken or cut tile produces a potential for cuts to the hands and exposed body parts. Acute effects such as eye irritation may occur if associated with high dust operations such as dry cutting tile or during the removal of installed tile. In very rare cases, symptoms of acute silicosis, a form of silicosis (a nodular pulmonary fibrosis) associated with exposure to respirable crystalline silica, may develop following acute exposure to extremely dusty environments caused by generation of tile dust. Signs such as labored breathing and early fatigue may indicate silicosis; however, these same symptoms can arise from many other causes.

Chronic Effects

No chronic effects are known for exposure to intact tile. Long-term, continual exposure to respirable crystalline silica at or above established permissible occupational exposure limits may lead to the development of silicosis, a nodular pulmonary fibrosis (NPF). NPFs are also associated with pulmonary tuberculosis, bronchitis, emphysema, and other airway diseases. This type of chronic exposure to silica dust may also result in the development of autoimmune disorders, chronic renal disease, and other adverse health effects. Recent epidemiologic studies demonstrate that workers exposed to elevated silica concentrations have a significant risk of developing chronic silicosis. Signs such as labored breathing and early fatigue may indicate silicosis; however, these same symptoms can also arise from many other causes.

Potential Adverse Interactions

Silicosis may be complicated by severe mycobacterial or fungal infections and result in tuberculosis (TB). Epidemiologic studies have established that silicosis is a risk factor for developing TB. Any existing respiratory or pulmonary diseases may be complicated by exposure to respirable crystalline silica. Smoking may increase the risk of adverse effects if done in conjunction with occupational exposure to silica dust at or above permissible exposure limits.

Carcinogen Status

Respirable crystalline silica is classified by the International Agency for Research on Cancer (IARC) as a Group I Carcinogen (carcinogenic to humans). The National Toxicology Program (9th Report) lists respirable crystalline silica as "Known to be a Human Carcinogen". USDOL/OSHA and NIOSH have recommended that crystalline silica be considered a potential occupational carcinogen.

Overview of Animal Testing

Short term experimental studies of rats have found that intratracheal instillation of quartz particles leads to the formation of discrete silicotic nodules in rats, mice and hamsters.

Oral (silica) Lethality

| | |
|-----------------|---------------------------|
| LD50 Rat oral | >22,500 mg/kg |
| LD50 Mouse oral | >15,000 mg/kg |
| LC50 Carp | >10,000 mg/l (per 72 hr.) |



12. ECOLOGICAL INFORMATION

No information available at this time.

13. DISPOSAL CONSIDERATIONS

Waste should be disposed of in a landfill certified to accept such materials in accordance with federal, state, and local regulations.

14. TRANSPORTATION INFORMATION

D.O.T Shipping Name: Not applicable
 Hazard Class: Non-regulated (for disposal purposes material is non-hazardous Class III regulated material)
 ID Number: Not applicable
 Marking: Not applicable
 Label: None
 Placard: None
 Hazardous Substance/RQ: Not applicable
 Shipping Description: Porcelain/Ceramic Tiles
 Packaging References: None

15. REGULATORY INFORMATION

This product and/or its components have been previously introduced into U.S. commerce and is listed in the Toxic Substances Control Act (TSCA) Inventory of Chemicals in Commerce. Hence, it is subject to all applicable provisions and restrictions under TSCA 40 CFR Section 721 and 723.250.

This tile contains <1 percent by weight each of the following elements, which are SARA 313 Recordable: Antimony, Arsenic, Barium, Beryllium, Cadmium, Cobalt, Chromium, Copper, Manganese, Mercury, Nickel, Lead, Silver, Thallium, Tin, Titanium, Vanadium, and Zinc.

Title 22 Division 2, California Code of Regulation Chapter 3 (Proposition 65): This product contains a chemical or chemicals known to the State of California to cause cancer and/or birth defects or other reproductive harm.

This product or its components meets the following hazard definition(s) as defined by the Occupational Safety and Health Hazard Communication Standard (29 CFR Section 1910.1200):

- Combustible Liquid Flammable Aerosol Oxidizer
- Compressed Gas Explosive Pyrophoric
- Flammable Gas Health Hazard (Sections 3 & 11) Unstable
- Flammable Liquid Organic Peroxide Water Reactive
- Flammable Solid
- Based on information presently available, this product does not meet any of the hazard definitions of 29 CFR Section 1910.1200.

Note: The information in this data sheet provides information related to the potential hazards associated with dusts which may be produced during cutting or otherwise changing the shape of the tile during installation and/or removal.

16. ADDITIONAL INFORMATION

Global Harmonization Identification System
 GHIS: Health: 3 Fire: 4 Reactivity: 4

Hazardous Material Identification System
 HMIS: Health: 0 Fire: 0 Reactivity: 0

National Fire Protection Association
 NFPA: Health: 0 Fire: 0 Reactivity: 0

STILETTO

- Wide Planks: 5 1/8" x 72 3/8" x 3/16"
- 3500 psi Janka Ball Hardness Rating
- Brushed Texture
- Multi-Wash Color System
- Luxe Matte Finish
- Can contribute to LEED credits EQ 4.4, MR7, and MR6



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FL-P5872SG/CL-NAUF/FSC



Cerused Eclipse
FL-P5872EPD/CL-NAUF/FSC



Cerused Espresso
FL-P5872DBM/CL-NAUF/FSC

Stiletto Performance Bamboo was developed with the most heel stomping, high traffic applications in mind. Offering neutral colors that slip into any palette, it proves itself with an impressive 3500 janka ball rating, three times the hardness of Red Oak. Stiletto is ideal for environments where natural beauty is desired and durability is a must. Stiletto is available in 5 1/8" x 72 3/8" click lock planks and may be floated or glued. As with all Plyboo products, Stiletto does not contain Urea Formaldehyde and may contribute toward LEED creditS EQ 4.4, MR7, and MR6.

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STILETTO

- Wide Planks: 5 1/8" x 72 5/8" x 3/16"
- 3500 psi Janka Ball Hardness Rating
- Brushed Texture
- Multi-Wash Color System
- Luxe Matte Finish
- Can contribute to LEED credit EQ 4.4, MR7, and MR6

Stiletto was developed in collaboration with Robin Reigi, Inc. in New York



Cerused Pearl
FL-P5872WPH/CL-NAUF/FSC



Brushed Sahara
FL-P5872PHA/CL-NAUF/FSC



Brushed Havana
FL-P5872PDA/CL-NAUF/FSC

Stiletto

Size: 5 1/8" x 72 5/8" x 3/16"

22.68 ft²/box

FL-P5872WPH/CL-NAUF/FSC
FL-P5872PHA/CL-NAUF/FSC
FL-P5872SG/CL-NAUF/FSC
FL-P5872PDA/CL-NAUF/FSC
FL-P5872EPD/CL-NAUF/FSC
FL-P5872DBM/CL-NAUF/FSC

Cerused Pearl
Brushed Sahara
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Brushed Havana
Cerused Eclipse
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BEHR PREMIUM PLUS® Interior Flat

- Low Odor, Zero VOC
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- Easy-Clean Flat
- Non-Reflective Appearance
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- No. 1050 Ultra Pure White®
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- No. 1052 White
- No. 1300 Deep Base
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1 Hr Dry Time
2 Hr Recoat Time



250-400 Sq. Ft.
Coverage per Gallon



Soap & Water
Clean-Up



Protect
from Freezing

FOR TINT BASES – DO NOT USE WITHOUT THE ADDITION OF TINTING COLORANTS

WHERE TO USE

For low traffic areas. Ideal for Family Rooms, Living Rooms, Dining Rooms, Bedrooms and Ceilings.

PREPARATION

All surfaces should be properly prepared and cleaned. Remove loose paint, wash off dirt and grease with detergent, rinse and allow to dry. Remove mildew stains with a mildew stain removing product. Scuff sand glossy surfaces and repair imperfections. Remove all dust with a damp cloth, allow to dry. Allow new stucco, plaster and masonry to cure for 30 days before painting.

PRIME

BEHR PREMIUM PLUS paint is self priming over properly prepared uncoated and previously painted Interior surfaces. On stains, over oil-based coatings or glossy surfaces, use a product such as BEHR PREMIUM PLUS All-In-One Primer & Sealer No. 75. For optimal color development, better hide, and to reduce the number of topcoats with deep colors denoted with a dagger (†) on the color chip, apply a custom tinted primer.

APPLICATION

Apply when air and surface temperatures are between 50-90° F (10-32° C). Stir paint occasionally. Intermix containers of same product to ensure color and sheen uniformity. Use a high quality 3/8-1/2" nap roller cover, nylon/polyester brush or airless sprayer (.015-.019" spray tip, 60 mesh filter). Do not thin if using a roller or brush; however, if using a sprayer and thinning is required, thin with water at a rate of no more than 1/2 pint

per gallon. Certain colors may require more than one coat for complete hide. Darker colors may require additional dry time between coats. Cooler temperatures or higher humidity may prolong drying time. After 4 weeks, cured paint film may be cleaned with a mild, non-abrasive liquid detergent. Dry paint film is mildew resistant.

DISPOSAL

For disposal of empty containers, unused paint and soiled rags, contact your household refuse collection service.

Visit behr.com for painting tips, expert project advice and the perfect color coordination with **COLORSMART BY BEHR®**.

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.

***LIMITED LIFETIME GUARANTEE** Behr Process Corporation guarantees your satisfaction with the performance of this paint when applied to a properly prepared surface and cared for according to the label directions. This guarantee shall be effective for so long as you reside in your home and is made to the original residential consumer paint purchaser. This guarantee is not transferable. If you are not satisfied with this paint's performance, Behr Process Corporation will, at its option and upon proof-of-purchase (the original receipt), either furnish an equivalent amount of paint or refund the purchase price of this paint to you. **This guarantee excludes (1) labor and costs of labor for the application or removal of any product and (2) any incidental or consequential damages, whether based on breach of express or implied warranty, negligence, strict liability or any other legal theory.** Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This guarantee gives you specific legal rights and you may also have other rights, which vary from state to state.

To consult with a Behr Certified Coatings Professional, call 1-800-854-0133 Ext. 2 (U.S.A. only).



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WARNING! This product contains chemicals known to the state of California to cause cancer and birth defects or other reproductive harm.

CAUTION! IRRITANT! HARMFUL IF SWALLOWED. MAY CAUSE EYE, NOSE AND THROAT IRRITATION. AVOID CONTACT WITH SKIN AND EYES AND AVOID BREATHING OF VAPORS AND SPRAY MIST. WEAR EYE PROTECTION AND PROTECTIVE CLOTHING. USE ONLY WITH ADEQUATE VENTILATION. To avoid breathing vapors and spray mist, open windows and doors or use other means to ensure fresh air entry during application and drying. If you experience eye watering, headaches or dizziness, increase fresh air. If properly used, a respirator (NIOSH approved for organic vapor with P series particulate pre-filter) may offer additional protection; obtain professional advice before using. A dust mask does not provide protection against vapors. Avoid contact with eyes and skin. Wash thoroughly after handling. Close container after each use. **FIRST AID:** If you experience difficulty in breathing, leave the area to obtain fresh air. If continued difficulty is experienced, get medical assistance immediately. In case of eye contact, flush immediately with plenty of water for at least 15 minutes and get medical attention; for skin, wash thoroughly with soap and water. If swallowed, get medical attention immediately.

CAUTION: KEEP OUT OF REACH OF CHILDREN - DO NOT TAKE INTERNALLY.



DIVISION 10 SPECIALTIES

Safety Bar Installation Instructions

WARNING

GRAB BAR MAY NOT PROVIDE DESIGNED AMOUNT OF SUPPORT UNLESS THESE INSTALLATION INSTRUCTIONS ARE STRICTLY FOLLOWED.

For proper installation, at least one end of Grab Bar MUST be positioned over a wall stud. For solid support, at least two (2) of the three (3) screws on the end of the Grab Bar MUST go through the wallboard or tile and be tightly secured into the wall stud. Given standard stud sizes, only two (2) of the three (3) screws may screw into the wall stud. Grab Bar may be installed vertically, horizontally or at an angle, so long as at least two (2) of the three (3) mounting screws on one end of the Grab Bar are secured into a wall stud (see Figure 1). Locate the wall stud(s) behind the wall before beginning installation (a stud finder can be obtained from a hardware store).

THE FOLLOWING STEPS REQUIRE DRILLING INTO THE WALL. When drilling into the wall, exercise care to avoid any electrical wiring or plumbing that may be located behind the wall. Damaged electrical wiring can cause electrical shock and/or fire. Since older homes do not always fall in line with current housing codes and requirements, know where internal wall wiring is located so that no wires will interfere with your installation. PROPER INSTALLATION IS EXTREMELY IMPORTANT. IF IN DOUBT, INSTALLATION SHOULD BE DONE BY A QUALIFIED PROFESSIONAL.

CAUTION AND SAFETY WARNINGS:

- DO NOT install this product without first reading and understanding this instruction sheet. If you are unable to understand these Warnings and Instructions, contact a professional or technical personnel for assistance before attempting to install this product - otherwise, injury may occur.
- After ANY adjustments, repair or service and BEFORE use, make sure that all attaching hardware is tightened securely.
- Assist Bars add security for bath and commode areas if attached as instructed. Location, size, and angle of bars should be determined by a qualified professional to provide optimum safety and function.
- Use EXTREME caution on wet tub or floor surfaces.
- Users with limited physical capabilities should be supervised or assisted in bath and commode areas, even when using Assist Bars.
- This Assist Bar can provide support and increased stability for an individual weighing up to 300 pounds. Assist Bars are NOT designed to support the total weight of an individual. Use the bar for assistance ONLY.
- Be sure Assist Bars are correctly and securely installed. NEVER use Assist Bars if any looseness is noted.
- (For Anchor Mount) DO NOT install supplied wall anchors into wallboard less than 1/2" or greater than 2 1/2" thick.
- (For Anchor Mount) DO NOT install supplied wall anchors into wallboard that has been subjected to water damage or decay.
- (For Anchor Mount) DO NOT install supplied wall anchors into a wood stud.
- Locate studs prior to drilling. Determine if plumbing, electrical or other obstructions, i.e. beads of adhesive ribbing, as in some tub surrounds, are contained behind the wall.
- If mounting to an uneven surface, use silicone to fill any gaps between surface and mounting plate.
- Apply a bead of silicone sealant designed for wet applicators to the back face of both assist bar mounting flanges. This will prevent water from bleeding through the mounting holes potentially damaging the wall board.

ANCHOR REQUIREMENTS:

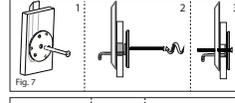
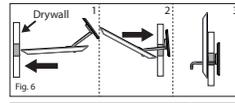
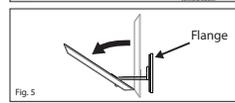
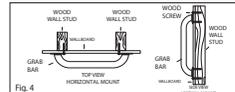
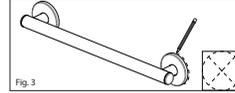
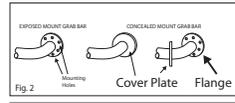
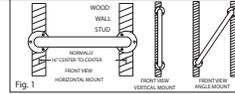
- Requires a 3 1/2" space behind the wall and works in the following substrates:
- 1/2" or 5/8" Drywall (ONLY use on 5/8" drywall for commercial applications)
- 1/2" or 5/8" Drywall with Tile
- 1/2" or 5/8" Drywall with Marble/Stone

TOOLS REQUIRED:

- 3/8-inch Power Drill
- 1-inch drill bit or hole saw (carbide tip bit for hard surfaces like Ceramic Tile)
- 3/16-inch Drill Bit (to drill pilot hole for installation of Lag screw into wood wall stud)
- 5/16-inch Carbide Tip Drill Bit (if drilling through ceramic tile)
- 7/16-inch HEX Socket with 3/8-inch Drive Ratchet
- #2 Phillips screwdriver
- Stud finder
- Pencil
- Safety glasses

PARTS SUPPLIED:

- WOOD SCREW (6)
- 1/4-20 x 3" Machine Screw (1)
- 10-24 x 6mm Machine Screws(3)
- Wall Anchor (1)



- BEFORE INSTALLING:**
- Remove the parts and products from package. If concealed mount Grab Bar is used, move cover plates away from mounting holes. (Fig. 2)
 - Determine the location of the product and where you want to install it.
 - Place product on the wall at desired location. If mounted horizontally, check that the product is level.
 - Use a pencil and mark the centers on each side of the product for the mounting locations. (Fig. 3)
 - Location: A stud finder should be used to verify if there are any studs behind the marked locations. Install the product using stud-mounting directions if a stud is available. If a stud is not located within the area where the supplied anchor will be installed then use the non-stud mounting directions.
- STUD-MOUNTING DIRECTIONS:**
- Put on safety glasses before starting.
 - Use the 3/8-inch power drill and 7/64-inch drill bit to drill all holes into the wall and wood wall stud(s) at the marked positions. NOTE: If installing Grab Bar over ceramic tiles, the 1/4-inch carbide tip drill bit will be needed for drilling through the tile, in order to prevent damage to the tiles. Drill pilot holes through the tiles by using a 1/4-inch carbide tip drill bit. Once a hole has been drilled through the ceramic tiles, use the 7/64-inch drill bit to drill a pilot hole in the wood wall stud itself.
 - Repeat Step 7 for opposite end of the Grab Bar.
 - Place Grab Bar on wall, aligning mounting holes with the holes in the wall.
 - Insert the wood screws provided into one end of the Grab Bar. Screw into wall and wall stud (HAND TIGHTEN ONLY). (Fig. 4)
 - Securely tighten all mounting wood screws with a screw driver.
 - If concealed mount Grab Bar is used, move cover plates over mounting holes and firmly press against the wall. (Fig. 2)
- NON-STUD MOUNTING DIRECTIONS:**
- Put on safety glasses before starting.
 - Use the 3/8-inch power drill and the 1-inch drill bit or hole saw to drill a one-inch hole precisely at each of the marked center positions from the previous step. NOTE: If installing the product over ceramic tile or other hard surface the carbide tip drill bit or hole saw will be needed.
 - Clean the wall surface of any dust or debris.
 - Place the flange plate on the wall and rotate to the correct angle to align the holes on the grab bar at the desired position. Once the location and angle is aligned, place a mark at the top of the flange plate to note the upward direction. Next, peel and remove (1) piece of protective strips from the circle piece of tape. Place the tape on the end of the arm and adhere the arm with the bar in the upward direction to the back side of the flange plate. The arm should sit inside ring. "It is important the arm always be upright."
 - Peel and remove (1) piece of protective strips from tape on the supplied wall anchor brace bar. The tape is necessary to allow the supplied wall anchor brace bar to adhere to the back side of the wall for placement. (This will ensure that the bar will stay upright during installation.)
 - Get supplied anchor, flip the bar downward at the end of the arm. The bar should be tilted up only slightly. (Fig. 5)
 - Hold the flange of the supplied anchor and insert the bar into the wall. The bar should have the "UP" arrow pointing upward when installing into the wall.
 - Once the bar is completely inside the wall, pull outward/back on the flange and ensure the bar tilts upward behind the wall and straightens upright. The bar should be resting on the back side of the wall and pointing upward with the longest side at the top. (Fig. 6)
 - Hold on tightly to the flange and keep pressure on the bar behind the wall to ensure that the bar stays upright with the longest part of the bar pointing upward. The bar behind the wall must always be upright and the longest part must be pointing upward for the anchor to perform properly.
 - As you hold the flange and apply pressure to the bar by pulling outward, insert a 3" machine screw into the center hole of the flange. Then align the machine screw with the threaded insert in the bar and tighten. (Fig. 7)
 - Turn and tighten the screw while applying pressure on the bar to keep it upright. Tighten the screw till the flange plate is flush against the wall and is secure.
 - Tighten the flange with the #2 Phillips screw driver. Ensure the flange is tight and secure against the wall without any movement.
 - On opposing side use the STUD-MOUNTING DIRECTIONS 7-9 listed above.
 - Align the adapter with the installed anchor, then take the product and align the product with the adapter/installed wall anchor and ensure holes align.
 - Use the 10-24 machine screws that are supplied with the wall anchor to fasten the product to each wall anchor. Three (3) machine screws are needed to fasten the product to the wall anchor and they need to be securely fastened with a #2 Phillips screwdriver. (Fig. 8)

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CP11538
8.07.13

Instructions d'installation de la barre de sécurité

ATTENTION

LA BARRE D'APPUI POUR RÉSIDENCE POURRAIT NE PAS FOURNIR LE SOUTIEN POUR LEQUEL ELLE A ÉTÉ CONÇUE SI CES INSTRUCTIONS D'INSTALLATION NE SONT PAS STRICTEMENT SUIVIES.
Pour une installation correcte, au moins une des extrémités de la barre d'assistance DOIT être positionnée sur un poteau d'ossature murale. Pour un appui solide, au moins deux (2) des trois (3) vis à l'extrémité de la barre DOIVENT passer au travers du panneau mural ou des carreaux et être solidement fixés au montant de cloison. Étant donné la taille normale des montants, seulement deux (2) des trois (3) vis peuvent être vissées sur le montant mural. La barre d'appui peut être installée verticalement, horizontalement ou obliquement, tant qu'au moins deux (2) des trois (3) vis de montage d'une extrémité de la barre d'appui sont fixées dans un poteau d'ossature murale (Fig. 1). Localisez les montants de cloison avant de commencer l'installation (vous pouvez acheter un localisateur de montant dans une quincaillerie).

LES ÉTAPES SUIVANTES NÉCESSITENT DE PERCER DES TROU DANS LE MUR. Lorsque vous percez le mur, faites attention d'éviter tout conduit électrique ou plomberie qui pourraient se trouver derrière le mur. Des fils électriques endommagés peuvent provoquer un choc électrique et/ou un incendie. Puisque les maisons anciennes ne respectent pas toujours les exigences et les codes d'habitation actuels, sachez où passent les fils électriques à l'intérieur du mur de sorte qu'ils n'interfèrent pas avec votre installation. **UNE INSTALLATION CORRECTE EST EXTREMEMENT IMPORTANTE. SI VOUS AVEZ DES DOUTES, L'INSTALLATION DEVRAIT ÊTRE FAITE PAR UN PROFESSIONNEL QUALIFIÉ.**

MISES EN GARDE ET AVERTISSEMENTS DE SÉCURITÉ :

- NE PAS installer ce produit avant d'avoir lu et compris cette fiche d'instructions au préalable. Si vous ne comprenez pas ces avertissements et instructions, contactez un professionnel ou un technicien pour obtenir de l'aide avant d'essayer d'installer ce produit, afin d'éviter tout risque de blessure.
- Après TOUT réglage, réparation ou entretien et AVANT utilisation, assurez-vous que toutes les pièces de fixation sont bien serrées.
- Les barres d'appui ajoutées de la sécurité dans la salle de bain et à la toilette si elles sont installées conformément aux instructions. L'emplacement, la taille et l'angle des barres devaient être déterminés par un professionnel qualifié pour offrir une sécurité et une fonctionnalité optimales.
- Soyez TRÈS PRUDENT dans une baignoire ou sur un parterre mouillé.
- Les utilisateurs avec des capacités physiques limitées devraient être surveillés ou aidés lorsqu'ils utilisent la baignoire ou la toilette même avec des barres d'appui pour résidence.
- Cette barre d'appui pour résidence peut offrir un soutien et une plus grande stabilité à une personne pesant un maximum de 136 kg (300 lb). Les barres d'appui NE sont PAS conçues pour supporter tout le poids d'une personne. N'utilisez la barre d'appui QUE pour vous aider.
- Assurez-vous que les barres d'appui sont installées correctement et solidement fixées. NE JAMAIS utiliser une barre d'appui si vous remarquez un mou.
- (Pour le montage des ancrages) NE PAS installer les ancrages muraux fournis dans des panneaux muraux d'épaisseur inférieure à 1/2 po (1,25 cm) ou supérieure à 2-1/2 po (6,35 cm).
- (Pour le montage des ancrages) NE PAS installer les ancrages muraux fournis dans des panneaux muraux ayant subi un dégat des eaux ou des dégradations.
- (Pour le montage des ancrages) NE PAS installer les ancrages muraux fournis dans un poteau en bois.
- Localisez les montants avant de commencer à percer. Vérifiez si l'arrière du mur contient de la plomberie, des obstacles électriques ou d'autre nature, tels que par exemple des bandes d'adhésif ou des joints comme ceux qui entourent les baignoires.
- Si le montage a lieu sur une surface inégale, comblez les trous entre la surface et la plaque de montage à l'aide de silicone.
- Appliquez une perle de scellant silicone spécial lieux humides au dos de chaque colerette de montage de la barre d'assistance. Cela empêchera l'eau de s'infiltrer dans les trous de montage, ce qui pourrait endommager le panneau mural.

RECOMMANDATIONS POUR LES ANCRAGES :
Requiert un espace de 3/8 po (9,5 mm) à l'arrière du mur et convient aux supports suivants:

- cloison sèche de 1/2 ou 5/8 po (1,27 ou 1,59 cm) montez UNIQUEMENT sur des cloisons sèches de 5/8 po dans les locaux commerciaux)
- cloison sèche de 1/2 ou 5/8 po (1,27 ou 1,59 cm) recouverte de carreaux
- cloison sèche de 1/2 ou 5/8 po (1,27 ou 1,59 cm) recouverte de marbre ou de pierre

OUTILS REQUIS :

- Perceuse électrique de 3/8 po
- Foret de 1 po ou scie cylindrique (foret à pointe de carbure pour surfaces dures comme les carreaux de céramique)
- Foret de 3/16 po (pour percer un avant-trou pour un tire-fond dans un montant de cloison en bois)
- Foret à pointe de carbure de 5/16 po (si vous percez dans des carreaux de céramique)
- Douille hexagonale de 7/16 po avec une clé à cliquet de 3/8 po
- Tournevis cruciforme n°2
- Détecteur de montants
- Crayon
- Lunettes de sécurité

PIÈCES FOURNIES :

MONTAGE SUR POTEAU :

Vis à BOIS (6)

MONTAGE HORS POTEAU :

Vis à métaux 1/4-20 de 3 po (7,62 cm) de longueur (1)

Vis à métaux 10-24 x 6 mm (3)

Ancrage mural (1)

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8

AVANT L'INSTALLATION :

- Retirez les produits et les pièces de l'emballage. Si vous utilisez une barre d'appui avec des fixations dissimulées, retirez les couvre-plaques des trous de montage. (Fig. 2)
- Munissez-vous du produit et déterminez l'emplacement où vous voulez l'installer.
- Placez le produit à l'emplacement désiré sur le mur. S'il est monté horizontalement, vérifiez que le produit est à niveau.
- À l'aide d'un crayon, marquez le centre des emplacements de montage de chaque côté du produit. (Fig. 3)
- Emplacement : À l'aide d'un détecteur de montants, vérifiez qu'il n'y a aucun montant derrière les emplacements marqués. Si vous trouvez un montant installez le produit à l'aide des instructions de montage sur montant. S'il n'y a pas de montants dans la zone où l'ancrage fourni doit être installé, suivez les instructions de montage hors poteau.

INSTRUCTIONS DE MONTAGE SUR POTEAU :

- Mettez des lunettes de sécurité avant de commencer.
- Utilisez la perceuse électrique de 0,95 cm (3/8") et un foret de 0,28 cm (7/64") pour faire tous les trous dans le mur et les montants de cloison aux emplacements marqués. REMARQUE: Si vous installez la barre d'appui sur des carreaux de céramique, le foret à pointe de carbure de 0,64 cm (1/4") seront nécessaires pour trous les carreaux sans les endommager. Faire des avant-trous dans les carreaux de céramique à l'aide d'un foret à pointe de carbure de 0,64 cm (1/4"). Une fois que le trou a été percé dans le carreau de céramique, utilisez le foret de 0,28 cm (7/64") pour faire un avant-trou dans le montant de cloison en bois.
- Répétez l'étape 7 pour l'autre extrémité de la barre d'appui.
- Placez la barre d'appui au mur, en alignant les trous de montage avec les trous dans le mur.
- Insérez les vis à bois fournies à l'une des extrémités de la barre d'appui. Vissez dans le mur et le montant de cloison (SERRÉZ FERMEMENT À LA MAIN SEULEMENT). (Fig. 4)
- Serez fermement toutes les vis à bois avec un tournevis.
- Si vous utilisez une barre d'appui avec des fixations dissimulées, retirez les couvre-plaques des trous de montage. (Fig. 2)

INSTRUCTIONS DE MONTAGE HORS POTEAU :

- Mettez des lunettes de sécurité avant de commencer.
- À l'aide d'une perceuse de 3/8 po équipée d'un foret de 1 po ou d'une scie cylindrique, percez un trou de 1 po précisément au centre de chacun des emplacements marqués à l'étape précédente. REMARQUE: Si vous installez le produit sur des carreaux de céramique ou sur une autre surface dure, vous aurez besoin d'un foret à pointe de carbure ou de la scie cylindrique.
- Placez la plaque de la colerette sur le mur et tournez-la à l'angle correct afin d'aligner les trous de la barre d'appui dans la position désirée. Une fois l'emplacement et l'angle alignés, placez une marque en haut de la plaque de la colerette pour indiquer la direction du haut. Ensuite, détachez et retirez (1) deux pellicules de protection de la pièce d'adhésif ronde. Placez l'adhésif au bout du bras et faites adhérer le bras à l'arrière de la plaque de la colerette en maintenant la pièce en position verticale. Le bras doit reposer à l'intérieur de l'anneau. Il est important que le bras soit toujours à la verticale.
- Détachez et retirez les (1) protections de chacun des deux morceaux de ruban adhésif situés sur la barre de support de l'ancrage mural. L'adhésif est nécessaire pour permettre à la barre de support de l'ancrage mural d'adhérer à l'arrière du mur, assurant ainsi un placement correct. (Cela permettra à la barre de rester droite pendant l'installation.)
- Prenez l'ancrage fourni, inclinez la barre vers le bas à l'extrémité du bras. La barre doit être très légèrement inclinée vers le haut (Fig. 5)
- Maintenez la colerette de l'ancrage installé et insérez la barre dans le mur. La flèche indiquant le «HAUT» de la barre doit être dirigée vers le haut lors de l'installation sur le mur.
- Une fois la barre complètement insérée dans le mur, tirez la colerette vers l'extérieur/l'arrière et assurez-vous que la barre se redresse puis se stabilise à la verticale derrière le mur. La barre doit s'appuyer à l'arrière du mur en pointant vers le haut, sa partie la plus longue au sommet. (Fig. 6)
- Tenez fermement la colerette et maintenez la pression à l'arrière du mur pour vous assurer que la barre reste à la verticale, sa partie la plus longue au sommet. La barre placée à l'arrière du mur doit toujours être à la verticale et sa partie la plus longue doit pointer vers le haut, pour que l'ancrage fonctionne correctement.
- Alors que vous tenez la colerette et faites pression sur la barre en tirant vers l'extérieur, insérez une vis de 3 po (7,62 cm) dans le trou central de la colerette. Ensuite, insérez la vis à métaux dans le trou fileté de la barre et serrez. (Fig. 7)
- Tournez et serrez la vis tout en exerçant une pression sur la barre pour la maintenir à la verticale. Serez la vis jusqu'à ce que la plaque de la colerette soit fermement placée à fleur du mur.
- Serez la colerette avec le tournevis cruciforme n°2. Assurez-vous que la colerette est bien serrée et placée contre le mur, sans aucun jeu.
- Pour le côté opposé, utilisez les INSTRUCTIONS DE MONTAGE SUR POTEAU 7 à 9-10 énumérées ci-dessus.
- Alignez l'adaptateur avec l'ancrage installé, puis prenez le produit et alignez le produit avec l'adaptateur/l'ancrage mural installé et assurez-vous que les trous sont alignés.
- Utilisez les vis à métaux 10-24 fournies avec l'ancrage mural pour fixer le produit à chaque ancrage mural. Trois (3) vis à métaux sont nécessaires pour fixer le produit à l'ancrage mural et elles doivent être solidement fixées à l'aide d'un tournevis cruciforme n°2. (Fig. 8)

Instrucciones de instalación de la barra de seguridad

ADVERTENCIA

LA BARRA DE SOPORTE PODRÍA NO PROVEER LA CANTIDAD DE APOYO PARA LA QUE ESTÁ DISEÑADA. AL MENOS QUE ESTAS INSTRUCCIONES DE INSTALACIÓN SEAN SEGUIDAS ESCRITAMENTE.

Para su instalación adecuada, por lo menos un extremo de la Barra de Apoyo DEBE estar posicionado sobre un montante en la pared. Para un apoyo sólido, por lo menos dos (2) de los tres (3) tornillos en el extremo de la barra de soporte DEBEN atravesar el panel o la baldosa y estar fuertemente sujetos al montante de pared. Dados los tamaños estándar de los montantes, solo dos (2) de los tres (3) tornillos podrán atornillarse en el montante de pared. La Barra de Soporte puede instalarse verticalmente, horizontalmente o en ángulo, siempre y cuando por lo menos dos (2) de los tres (3) tornillos de montaje en un extremo de la Barra de Soporte estén asegurados en un montante de pared (Fig. 1). Ubique los montantes de pared detrás de la pared antes de iniciar la instalación (un detector de vigas puede conseguirse en una ferretería).

LOS SIGUIENTES PASOS REQUIEREN TALADRO EN LA PARED.

Cuando taladre en la pared, tenga el cuidado de evitar cualquier cableado eléctrico dañado puede causar choque eléctrico y/o incendio. Ya que las casas más viejas no siempre están construidas conforme a los códigos y requerimientos para viviendas actuales, averigüe dónde está localizado el cableado interno para que ningún cable interfiera con su instalación.

LA INSTALACIÓN ADECUADA ES EXTREMADAMENTE IMPORTANTE. EN CASO DE DUDA, LA INSTALACIÓN DEBERÍA SER HECHA POR UN PROFESIONAL CALIFICADO.

ADVERTENCIAS DE SEGURIDAD:

- NO instale este equip sin antes leer y entender la hoja de instrucciones. Si usted no puede entender estas advertencias e instrucciones, contacte a un profesional de la salud, a un vendedor, o al personal técnico para asistencia antes de intentar instalar este equipo - de otra manera, podrían ocurrir lesiones.
- Luego de CUALESQUIERA ajustes, reparaciones o servicios y ANTES de usar, asegúrese de que todos los accesorios de acoplamiento estén apretados firmemente.
- Las barras de apoyo aumentan la seguridad en áreas de tinajas, duchas e inodoros si se acoplan como se instruye. La ubicación, el tamaño y el ángulo de las barras deben ser determinados por un profesional calificado para proveer óptima seguridad y funcionalidad.
- Tome precauciones EXTREMAS en tinajas o pisos mojados.
- Usuarios con capacidades físicas limitadas deben ser supervisados o ayudados en las áreas de tinajas, duchas e inodoros, aun cuando están usando barras de apoyo.
- Esta barra de apoyo puede proveer apoyo y mayor estabilidad para un individuo que pese hasta 300 libras (136 Kg). Las barras de apoyo NO están diseñadas para apoyar todo el peso de un individuo. Use la barra para apoyo ÚNICAMENTE.
- Asegúrese de que las barras de apoyo estén correcta y firmemente instaladas. NUNCA use las barras de soporte si nota que están flojas.
- (Para Montaje con Anclaje) NO instale los anclajes proporcionados en un tablero de pared de grosor menor a 1/2" o mayor a 2-1/2" (1,3cm-6,35cm).
- (Para Montaje con Anclaje) NO instale los anclajes de pared proporcionados en un tablero que haya sufrido daños por agua o que esté deteriorado.
- Ubique los montantes antes de taladrar. Determine si detrás de la pared hay tuberías, cableado eléctrico o cualquier otra obstrucción (como gotas de adhesivo o corrugado como ocurre en algunas aplicaciones de tinajas).
- Si va a realizar la instalación en una superficie desigual, utilice silicona para rellenar cualquier espacio que quede entre la superficie y la placa de instalación.
- Aplique una gota de sellador de silicona diseñado para aplicaciones en zonas húmedas a la cara posterior de las dos bridas para el montaje de la barra de apoyo. Esto evitará que el agua se filtre por las perforaciones del montaje, lo que puede ser perjudicial para el tablero de la pared.

REQUERIMIENTOS DEL ANCLAJE:

Requiere un espacio de 8,9 cm (3 1/2 pulgadas) detrás de la pared y se puede utilizar con los siguientes materiales:

- 1/2" or 5/8" Drywall (ONLY use on 5/8" drywall for commercial applications)
- 1/2" or 5/8" Drywall with Tile
- 1/2" or 5/8" Drywall with Marble/Stone

HERRAMIENTAS REQUERIDAS:

- Taladro eléctrico de 3/8 in
- Broca de 1 in
- Broca de 3/16 in (para taladrar el agujero guía para instalar el tirafondo en el montante de madera de la pared)
- Broca de carburo 5/16 in (si taladra a través de baldosa de cerámica)
- Casquillo hexagonal de 7/16 in con llave de trinquete de 3/8 in.
- Destornillador Phillips #2
- Detector de vigas
- Lápiz
- Gafas de seguridad

PIEZAS SUMINISTRADAS:

MONTAJE EN MONTANTE DE PARED:

TORNILLO PARA MADERA (6)

MONTAJE SIN MONTANTE DE PARED:

tornillos maquinados de 1/4-20 de 3" de largo (1)
Tornillo para metales 10-24 x 6 mm (3)
Anclaje de pared (1)

Fig. 1

ANTES DE INSTALAR LA BARRA DE APOYO:

1. Saque la barra de soporte y las piezas del paquete. Si se usa la barra de soporte de montaje oculto, quite las placas de cubierta de los agujeros de montaje. (Fig. 2)
2. Determine la ubicación del producto y dónde lo desea instalar.
3. Coloque el producto sobre la pared en la ubicación deseada. Si el montaje es horizontal, verifique que el producto esté a nivel.
4. Use un lápiz y marque los centros en cada extremo del producto para las ubicaciones de montaje. (Fig. 3)
5. Ubicación: utilice un localizador de montantes para verificar que no haya montantes detrás de las ubicaciones marcadas. Si hay un montante disponible, instale el producto usando las instrucciones de instalación con montante. Si no se ubica un montante de pared ubicada en el área donde se instalará el anclaje proporcionado, entonces use las instrucciones para el montaje sin montante de pared.

INSTRUCCIONES PARA MONTAJE EN MONTANTE DE PARED:

6. Póngase gafas de seguridad antes de empezar.
7. Use el taladro eléctrico de 0,96 cm (3/8") y la broca de 0,28 cm (7/64") para taladrar todos los agujeros en la pared y en los montantes de madera de la pared en las posiciones marcadas. NOTA: Si instala la barra de soporte sobre baldosas de cerámica, la broca con punta de carburo de 0,64 cm (1/4") serán necesarias para taladrar a través de las baldosas, para prevenir que se dañen. Taladre agujeros guía a través de las baldosas de cerámica usando una broca con punta de carburo de 0,64 cm (1/4"). Una vez un agujero ha sido taladrado a través de la baldosa, use la broca de 0,28 cm (7/64") para taladrar un agujero guía en el propio montante de pared.
8. Repita el paso 7 para el lado opuesto de la barra de soporte.
9. Coloque la barra de soporte en la pared, alineando los agujeros de montaje con los agujeros en la pared.
10. Inserte los tornillos para madera provistos dentro de un extremo de la barra de soporte. Atornille en la pared y en el montante de pared (APRIETE A MANO ÚNICAMENTE). (Fig. 4)
11. Apriete firmemente todos los tornillos de montaje para madera con un destornillador.
12. Si usa la barra de soporte de montaje oculto, mueva las placas de cubierta sobre los agujeros de montaje y presione firmemente contra la pared. (Fig. 2)

INSTRUCCIONES PARA MONTAJE SIN MONTANTE DE PARED:

7. Use un taladro eléctrico de 3/8 in y una broca de 1 in para taladrar todos los agujeros en el tablero en las posiciones marcadas. NOTA: Si se instala la Barra de Apoyo en azulejos de cerámica, se necesitará una broca de punta de carburo de 5/16" para perforar el azulejo.
8. Limpie cualquier suciedad o polvo de la superficie de la pared.
9. Coloque la brida sobre la pared y gírela el ángulo correcto para alinear los agujeros de la barra de apoyo en la posición deseada. Una vez estén alineados la ubicación y el ángulo, ponga una marca en la parte superior de la brida para indicar la dirección hacia arriba. Después pégale y retire dos (1) pedacitos de las bandas protectoras de la pieza circular de cinta. Coloque la cinta en el extremo del brazo y pegue el brazo con la barra en la dirección hacia arriba en la parte posterior de la brida. El brazo debe encajar en el anillo. Es importante que el brazo siempre esté en posición vertical.
10. Pele y retire las (1) capas de protección de arambas piezas de cinta adhesiva ubicadas en la barra de soporte del anclaje de pared. La cinta adhesiva es necesaria para permitir que la barra de soporte del anclaje de pared se adhiera a la cara interior de la pared para facilitar su colocación. (Esto asegura que la barra permanecerá en posición vertical durante la instalación).
11. Tome el anclaje proporcionado, gírela la barra hacia abajo al extremo del brazo. La barra debe estar levemente inclinada hacia arriba. (Fig. 5)
12. Sostenga la brida del anclaje proporcionado e inserte la barra en la pared. La barra debe mostrar la flecha "UP" (arriba) orientada hacia arriba cuando instale el producto en la pared.
13. Una vez que haya introducido la barra completamente en la pared, tire del reborde hacia atrás/afuera y asegúrese de que la barra se incline hacia arriba detrás de la pared y que quede en posición vertical. La barra debe descansar sobre la superficie interior de la pared y estar orientada hacia arriba con el extremo más largo en el extremo superior. (Fig. 6)
14. Sostenga firmemente el reborde y mantenga la presión sobre la barra detrás de la pared para asegurarse de que la barra permanezca en posición vertical con la sección más larga orientada hacia arriba. La barra detrás de la pared siempre debe estar en posición vertical y la sección más larga debe estar orientada hacia arriba para que el anclaje funcione correctamente.
15. Mientras sostiene el reborde y aplica presión a la barra tirando de ella hacia afuera, introduzca un tornillo maquinado de 3" en el agujero central del reborde. Luego alinee el tornillo maquinado con el inserto roscado de la barra y apriételo. (Fig. 7)
16. Enrosque y apriete el tornillo mientras aplica presión sobre la barra para mantenerla en posición vertical. Apriete el tornillo hasta que la placa quede plana contra la pared y esté firmemente asegurada.
17. Apriete la brida con el destornillador Phillips #2. Cerciórese de que la brida esté apretada y fija contra la pared, sin ningún movimiento.
18. Para el otro extremo siga los pasos 7 a 9-10 de las INSTRUCCIONES PARA MONTAJE EN MONTANTE DE PARED que se relacionan arriba.
19. Alinee el adaptador con el anclaje instalado; luego sostenga el producto y alínelo con el adaptador o anclaje de pared instalado y asegúrese de que los agujeros concuerden.
20. Utilice los tornillos maquinados 1/4-24 proporcionados con los anclajes de pared para fijar el producto a cada anclaje. Se requieren tres (3) tornillos maquinados para fijar el producto a cada anclaje de pared y deben ser apretados firmemente con un destornillador Phillips #2. (Fig. 8)

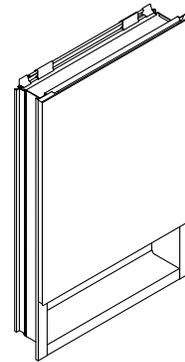
KOHLER®

VERDERA™

MIRRORED CABINET K-99005-L ALSO K-99005-R

Features

- Rust-free anodized aluminum cabinet box and door
- For recessed or surface-mount installation
- Left-hand (-L) or right-hand (-R) door hinge
- Side mirror kit sold separately
- External quick storage shelf
- Two adjustable glass shelves
- Adjustable magnifying mirror
- Internal fixed accessory tray
- 108° slow-close hinges
- Triple-mirror design - front of door, back of door, and interior back of cabinet
- Hang-and-secure mounting system for easier surface-mount installation
- 20" (508 mm) width x 30" (762 mm) height x 4-3/4" (121 mm) depth



Codes/Standards Applicable

Specified model meets or exceeds the following:

- None applicable

Colors/Finishes

- NA: None applicable

Accessories

- NA: None applicable

Specified Model

| Model | Description | Colors/Finishes |
|----------------------|--|-----------------------------|
| K-99005-L | Mirrored cabinet - left hinge | <input type="checkbox"/> NA |
| K-99005-R | Mirrored cabinet - right hinge (shown) | <input type="checkbox"/> NA |
| Optional Accessories | | |
| K-99012 | Side mirror kit for surface-mount installation | <input type="checkbox"/> NA |

Product Specification

The mirrored cabinet shall be 20" (508 mm) in width, 30" (762 mm) in height, and 4-3/4" (121 mm) in depth. Cabinet shall have a rust-free anodized aluminum cabinet box and door. Cabinet shall be for recessed or surface-mount installation. Cabinet shall feature hang-and-secure mounting system for easier surface-mount installation. Cabinet shall feature a triple-mirror design with a mirror on the front of door, back of door, and interior back of cabinet. Cabinet shall include an external quick storage shelf, internal fixed accessory tray, two adjustable glass shelves, and adjustable magnifying mirror. Side mirror kit shall be sold separately. Cabinet shall feature a left-hand (-L) or right-hand (-R) door hinge with 108° slow-close hinges. Mirrored cabinet shall be Kohler model K-99005-____-NA.

VERDERA™

Technical Information

| |
|---|
| Cutout for recess-mount installations: |
| 18-1/2" (470 mm) width x 28-1/4" (718 mm) height x 3-11/16" (94 mm) depth |

Installation Notes

Install this product according to the installation guide.



CAUTION: Risk of electric shock. Electrical wiring may need to be relocated.

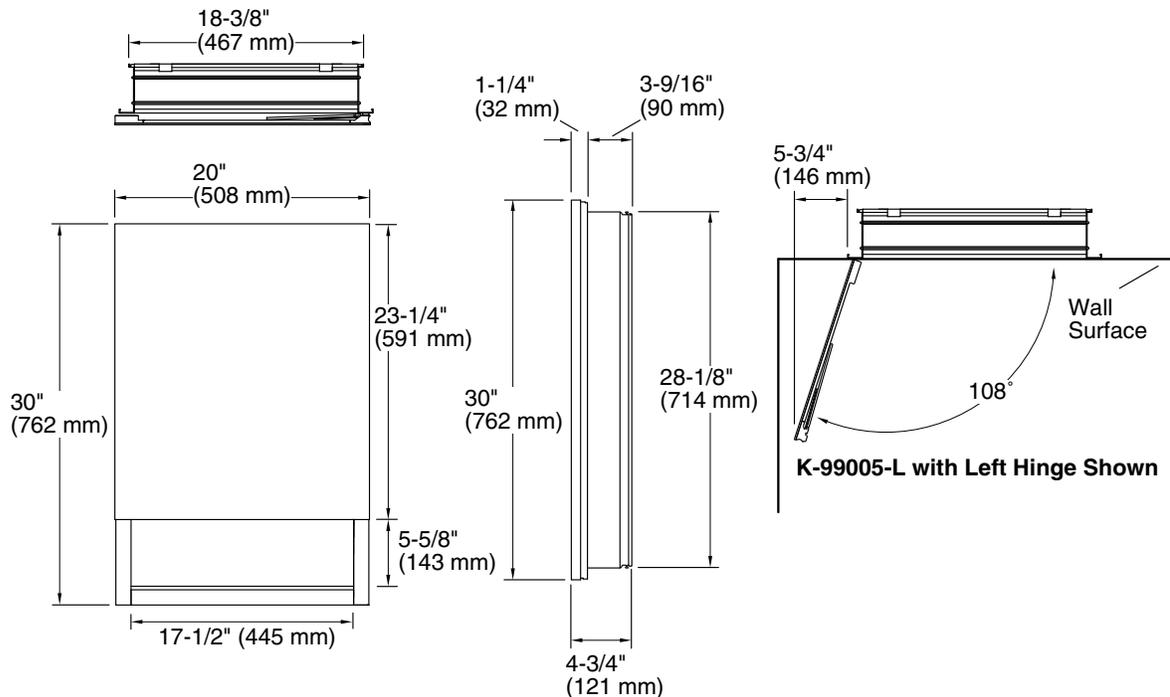
IMPORTANT! For recess mounting, the wall cavity must be framed and cabinet secured to framing studs. Reroute any electrical wires or water supply piping from the wall cavity. If you encounter drain or vent piping, or if your wall is load-bearing, consult a professional before proceeding.



CAUTION: Risk of property damage. For surface mounting, use anchors (not provided) rated for the loaded weight of this product. Refer to the anchor manufacturer's instructions.

When determining the height of the cabinet, ensure the mirrored door will clear all obstacles (such as a faucet). A minimum distance of 3" (76 mm) is required.

This cabinet is designed for either right or left door swing. Check for obstructions.



Product Diagram

VERDERA™ MIRRORED CABINET
Page 2 of 2
1212282-4-A

THE BOLD LOOK
OF **KOHLER**®

KOHLER®

FAIRFAX™ ACCESSORIES K-12150

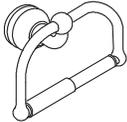
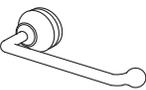
Features

- Metal construction
- Classic styling
- Includes installation hardware
- Complements Fairfax faucet line

Colors/Finishes

- CP: Polished Chrome
- Other: Refer to Price Book for additional colors/finishes

Specified Model

| Model/Description | | Model/Description | |
|--|---|--|---|
| K-12150 18" (457 mm) Towel bar <input type="checkbox"/> CP <input type="checkbox"/> Other_____ |  | K-12157 Toilet tissue holder, horizontal <input type="checkbox"/> CP <input type="checkbox"/> Other_____ |  |
| K-12151 24" (610 mm) Towel bar <input type="checkbox"/> CP <input type="checkbox"/> Other_____ |  | K-12158 Glass shelf <input type="checkbox"/> CP <input type="checkbox"/> Other_____ |  |
| K-12152 30" (762 mm) Towel bar <input type="checkbox"/> CP <input type="checkbox"/> Other_____ |  | K-12161 Tumbler/toothbrush holder <input type="checkbox"/> CP <input type="checkbox"/> Other_____ |  |
| K-12153 Double robe hook <input type="checkbox"/> CP <input type="checkbox"/> Other_____ |  | K-12162 Soap dish <input type="checkbox"/> CP <input type="checkbox"/> Other_____ |  |
| K-12155 Towel arm <input type="checkbox"/> CP <input type="checkbox"/> Other_____ |  | K-12165 Towel ring <input type="checkbox"/> CP <input type="checkbox"/> Other_____ |  |
| K-12156 Single robe hook <input type="checkbox"/> CP <input type="checkbox"/> Other_____ |  | | |

Product Specification

The accessories with classic styling shall be of metal construction. Accessories shall include installation hardware and complement the Fairfax faucet line. The accessories shall be Kohler Model K-_____-_____-.

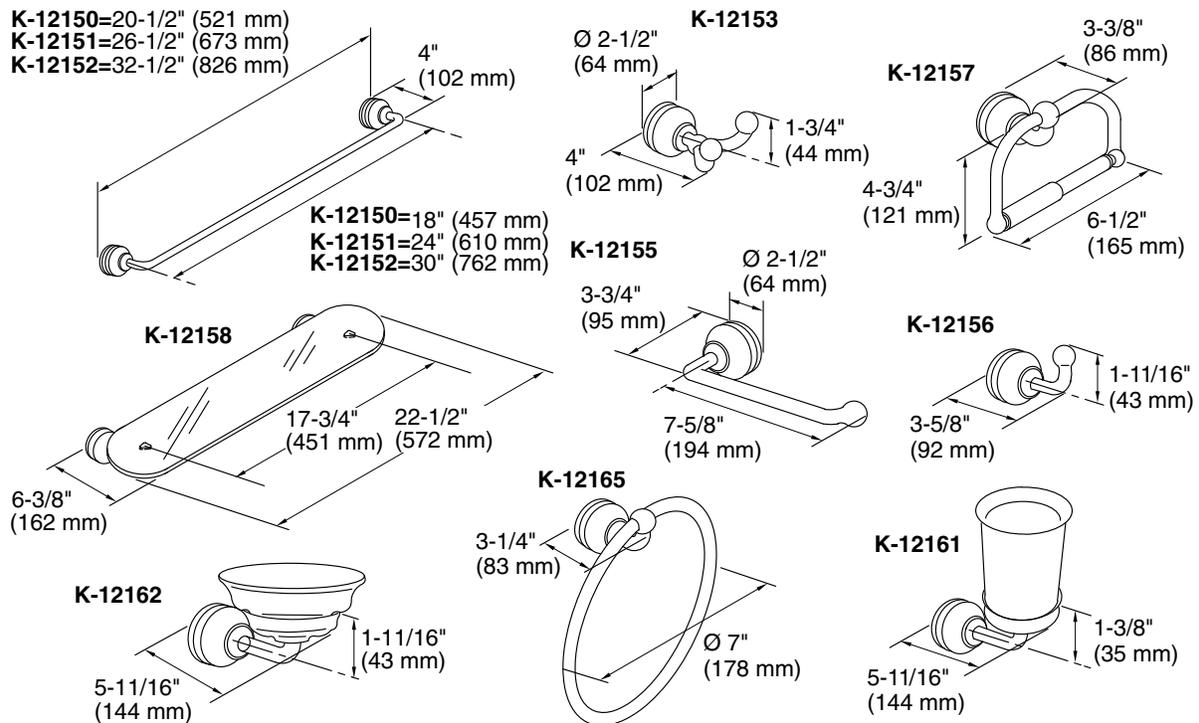
FAIRFAX™

Installation Notes



CAUTION: Risk of personal injury. Do not install these products in any area where they are likely to be used inadvertently as a grab bar or support bar. These products are not designed or intended for use as a grab bar or support bar.

Install this product according to the installation guide.



Product Diagram

KOHLER®

Features

- Metal construction
- Includes installation hardware
- ADA compliant when located and mounted into a structural support per ADA guidelines
- Available with traditional, transitional, or contemporary styling

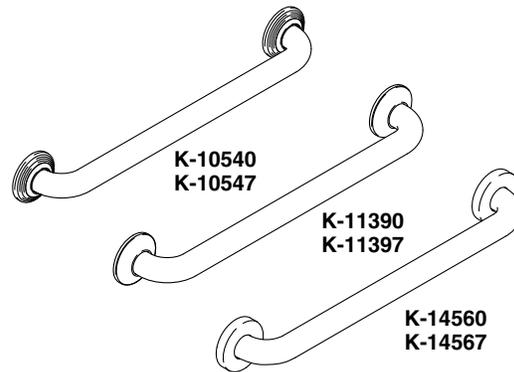
Codes/Standards Applicable

Specified model meets or exceeds the following:

- ADA
- ICC/ANSI A117.1
- ASTM F446

GRAB BAR K-10540

ADA



Colors/Finishes

- S: Polished Stainless Steel
- Other: Refer to Price Book for additional colors/finishes

Specified Model

| Model | Description | Colors/Finishes | |
|--|------------------------|----------------------------|--------------------------------------|
| Traditional Styling | | | |
| K-10540 | 12" (305 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| K-10541 | 18" (457 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| K-10542 | 24" (610 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| K-10543 | 32" (813 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| K-10544 | 36" (914 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| K-10545 | 42" (1067 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| K-10546 | 48" (1219 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| K-10547 | 54" (1372 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| Transitional Styling | | | |
| K-11390 | 12" (305 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| K-11391 | 18" (457 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| K-11392 | 24" (610 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| K-11393 | 32" (813 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| K-11394 | 36" (914 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| K-11395 | 42" (1067 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| Additional models listed on Page 2. | | | |

Product Specification

Grab bar shall be made of metal construction. Product shall include installation hardware. Product shall be ADA compliant when located and mounted into a structural support per ADA guidelines. Product shall be available with traditional, transitional, or contemporary styling. Product shall be Kohler Model K-_____-_____.



| Transitional Styling (continued) | | | |
|----------------------------------|------------------------|----------------------------|--------------------------------------|
| K-11396 | 48" (1219 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| K-11397 | 54" (1372 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| Contemporary Styling | | | |
| K-14560 | 12" (305 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| K-14561 | 18" (457 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| K-14562 | 24" (610 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| K-14563 | 32" (813 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| K-14564 | 36" (914 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| K-14565 | 42" (1067 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| K-14566 | 48" (1219 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |
| K-14567 | 54" (1372 mm) grab bar | <input type="checkbox"/> S | <input type="checkbox"/> Other _____ |

Installation Notes

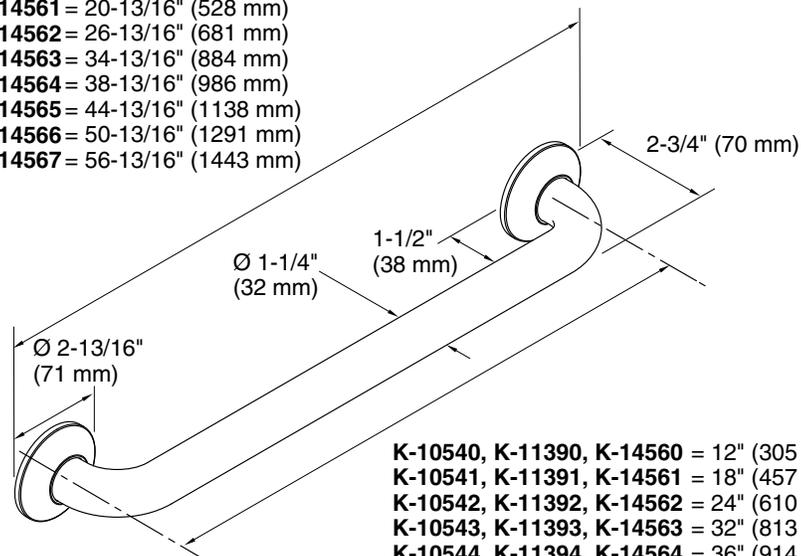


WARNING: Risk of personal injury. The wall plates on the grab bar must be mounted to a brace between the wall studs. Doing so will ensure that the weight of the user is adequately supported.

Install this product according to the installation guide.

The appearance of the product may differ from the product diagram. The dimensions still apply.

- K-10540, K-11390, K-14560 = 14-13/16" (376 mm)
- K-10541, K-11391, K-14561 = 20-13/16" (528 mm)
- K-10542, K-11392, K-14562 = 26-13/16" (681 mm)
- K-10543, K-11393, K-14563 = 34-13/16" (884 mm)
- K-10544, K-11394, K-14564 = 38-13/16" (986 mm)
- K-10545, K-11395, K-14565 = 44-13/16" (1138 mm)
- K-10546, K-11396, K-14566 = 50-13/16" (1291 mm)
- K-10547, K-11397, K-14567 = 56-13/16" (1443 mm)



- K-10540, K-11390, K-14560 = 12" (305 mm)
- K-10541, K-11391, K-14561 = 18" (457 mm)
- K-10542, K-11392, K-14562 = 24" (610 mm)
- K-10543, K-11393, K-14563 = 32" (813 mm)
- K-10544, K-11394, K-14564 = 36" (914 mm)
- K-10545, K-11395, K-14565 = 42" (1067 mm)
- K-10546, K-11396, K-14566 = 48" (1219 mm)
- K-10547, K-11397, K-14567 = 54" (1372 mm)

Product Diagram

GRAB BAR
Page 2 of 2
1051224-4-G

THE BOLD LOOK
OF **KOHLER**



DIVISION 11 EQUIPMENT

PDT760SIFII

GE Profile™ Stainless Steel Interior Dishwasher with Hidden Controls

Dimensions and Installation Information (in inches)

Electrical Rating

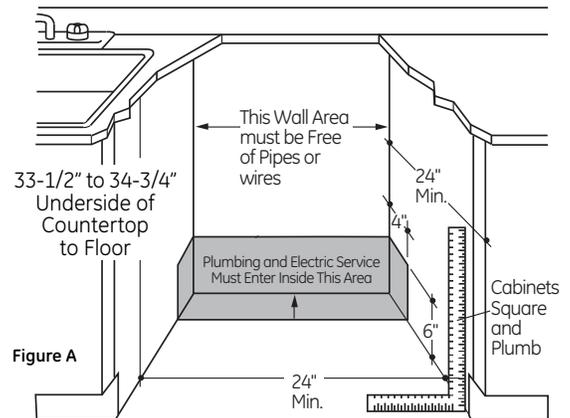
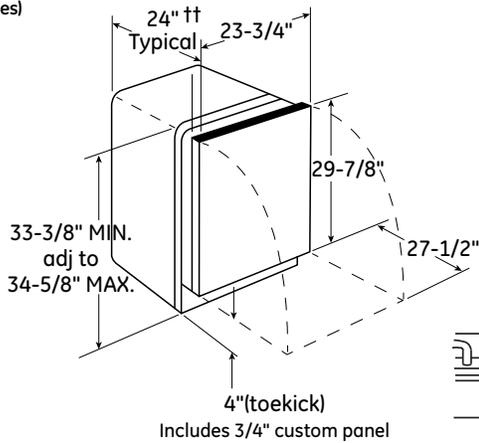
| | |
|------------------------------------|------|
| Voltage AC..... | 120 |
| Hertz..... | 60 |
| Total connected load amperage..... | 9.0 |
| Calrod® heater watts max..... | 1000 |

For use on adequately wired 120-volt, 15-amp circuit having 2-wire service with a separate ground wire. This appliance must be grounded for safe operation.

Installation Information: Before installing, consult installation instructions packed with product for current dimensional data.

†† Add 3/4" for custom panel and additional room for custom handle

An installation template is packed with these models and may be obtained in advance.



For answers to your Monogram® Profile™ Series or GE® appliance questions, visit our website at geappliances.com or call GE Answer Center® service, 800.626.2000.



As an ENERGY STAR® partner, GE has determined that this product meets the ENERGY STAR guidelines for energy efficiency.

Specification Created 3/14

350215

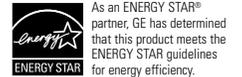
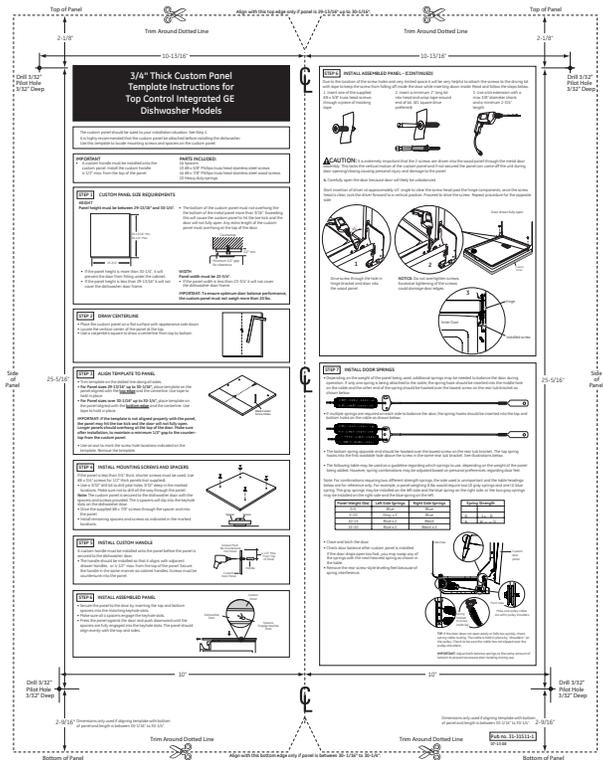
PDT760SIFII
GE Profile™ Stainless Steel Interior Dishwasher with Hidden Controls

Custom Dishwasher Door Panel Template

**For Reference Only
Not to Scale**

Call 1-800-626-2000
For a full-size panel template with complete panel installation instructions.

For answers to your Monogram,® Profile™ Series or GE® appliance questions, visit our website at geappliances.com or call GE Answer Center® service, 800.626.2000.



Specification Created 3/14

350215



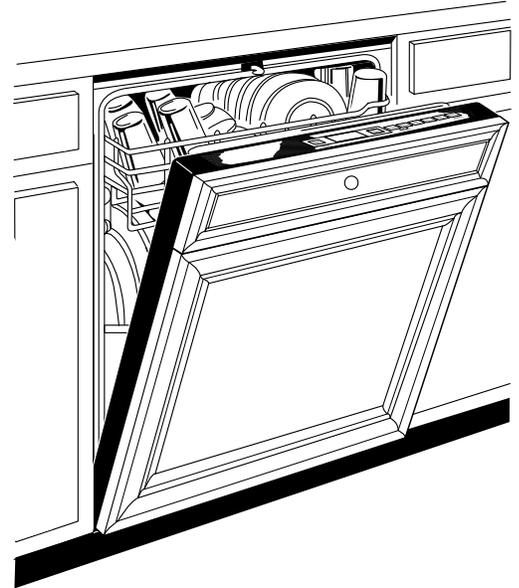
11 30 00

PDT760SIFII

GE Profile™ Stainless Steel Interior Dishwasher with Hidden Controls

Features and Benefits

- Full stainless steel interior - Enjoy an attractive appearance and long-lasting durability
- GE's most advanced wash system with 102 cleaning jets - Achieve the ultimate clean from an industry-leading number of jets that deliver complete washing coverage to every corner of the dishwasher
- Reversing Quad Blade Wash Arm - Dishes come out impressively clean thanks to this revolutionary lower wash arm, with 25 spray jets reversing direction to hit items from every angle
- Bottle Wash Jets - Hard-to-reach areas inside tall items get completely clean with four dedicated jets integrated into the upper rack that shower water deep inside for the ultimate clean
- Side Jets - Cascading water fills the dishwasher while hydrating soils
- Full-extension, Smooth-Glide, Adjustable Third Rack - Functions as a utensil drawer for cleaning of an entire flatware collection, along with carving knives, soup ladles, tongs and other cooking/serving tools
- Model PDT760SIFII - Custom panel



imagination at work

Specification Created 3/14

350215

DCCH480EK/485EK

GE® 4.0 Cu. Ft. Stainless Steel Capacity 24" Ventless Condenser Frontload Electric Dryer

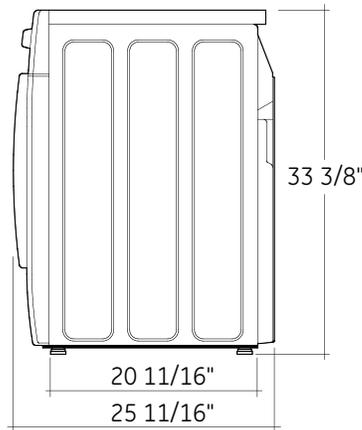
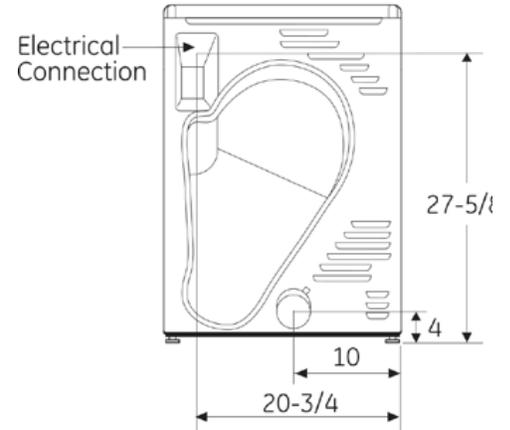
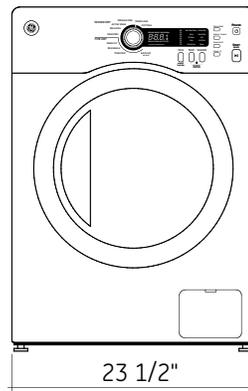
Dimensions and Installation Information (in inches)

| Electric Dryer Rating | |
|-----------------------|------------------|
| 240V | 2200W, 24A, 60Hz |

Circuit Requirements: An individual, properly grounded branch circuit, protected by a 30-amp circuit breaker or a time-delay fuse, is required.

Note: Dryer wall outlet must be located within 36" of service cord entry and accessible when dryer is mounted in position.

Installation Information: For complete information, see installation instructions packed with your dryer.



For answers to your Monogram,® Profile Series or GE appliance questions, visit our website at geappliances.com or call GE Answer Center® service, 800.626.2000.



Specification Revised 1/14

360480

DCCH480EK/485EK

GE® 4.0 Cu. Ft. Stainless Steel Capacity 24" Ventless Condenser Frontload Electric Dryer

Special Installation Requirements:

Alcove or Closet Installation:

- Stacking Kit - GE24STACK (not included)
- If your dryer is approved for installation in an alcove or closet, it will be stated on a label on the dryer back.
- Minimum clearances between dryer cabinet and adjacent walls or other surfaces are: 0" either side, 3" front and rear
- Minimum vertical space from floor to overhead cabinets, ceilings, etc. is 52".
- Closet doors must be louvered or otherwise ventilated and must contain a minimum of 60 sq. in. of open area equally distributed. If this closet contains both a washer and a dryer, doors must contain a minimum of 120 sq. in. of open area equally distributed.
- No other fuel-burning appliance shall be installed in the same closet with a gas dryer.

Bathroom or Bedroom Installation:

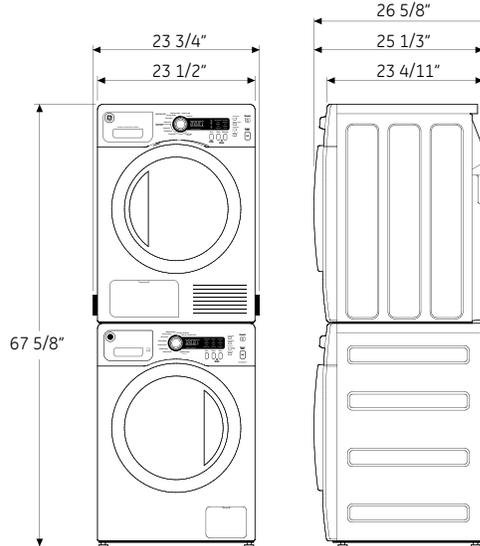
- The installation must conform with the local codes, or in the absence of local codes, with the National Electric Code and National Fuel Gas Code, ANSI Z223 for gas dryers.

Minimum Clearance other than Alcove or Closet Installations:

- Minimum clearances to combustible surfaces 0" both sides, 3" rear.

For more information on venting kits and accessories, please call 1-800-GE-CARES.

Stacked Dimensions (in inches)



For answers to your Monogram,® Profile Series or GE appliance questions, visit our website at geappliances.com or call GE Answer Center® service, 800.626.2000.



Specification Revised 1/14

360480



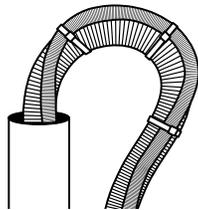
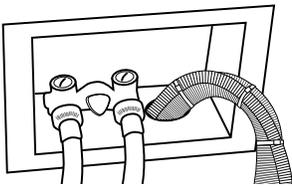
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DCCH480EK/485EK

GE® 4.0 Cu. Ft. Stainless Steel Capacity 24" Ventless Condenser Frontload Electric Dryer

Draining water out of the dryer

- Two options are available to drain the water out.
 - Pump to a removeable water tank in the dryer.
 - Drain directly out of unit into a standpipe or washstand through the included drain hose.
- The dryer drain hose and wire ties are included.
- You must have a standpipe available to drain into.
- Your standpipe or washstand cannot exceed a height of 35-1/2" above the ground.
- The dryer drain hose can drain alongside the washer hose.
- For complete information, see the installation instructions packed with your dryer.



imagination at work

Specification Revised 1/14

360480



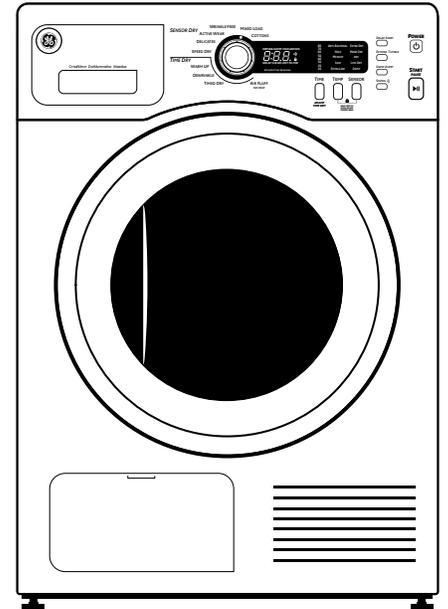
113000

DCCH480EK/485EK

GE® 4.0 Cu. Ft. Stainless Steel Capacity 24" Ventless Condenser Frontload Electric Dryer

Features and Benefits

- Ventless condenser dryer - Can be installed conveniently in a closet, placed under a counter or stacked in a corner without the need to vent externally
- 4.0 Cu. Ft. Large Stainless Steel Basket - Handles a king-size comforter or 24 full-size bath towels with ease
- 5 Heat Selections - Offer enhanced drying performance and fabric care
- Sensor Dry™ - Continually monitors moisture content to help prevent clothing wear and tear
- Stainless Steel Drum Interior - Smooth stainless interior helps prevent rust and protect clothes
- Multiple Dry Cycles - Deliver optimal drying results
- Delay Start - Lets you do the laundry on your terms
- Antibacterial Option - Certified by the NSF® to reduce up to 99.9% of certain types of bacteria
- Extended Tumble Plus - Tumble clothes without heat to help prevent creasing and wrinkling
- Speed Dry - Delivers ready-to-go results in minutes
- Model DCCH480EKWW - White on white
- Model DCCH485EKMS - Metallic silver



Specification Revised 1/14

360480



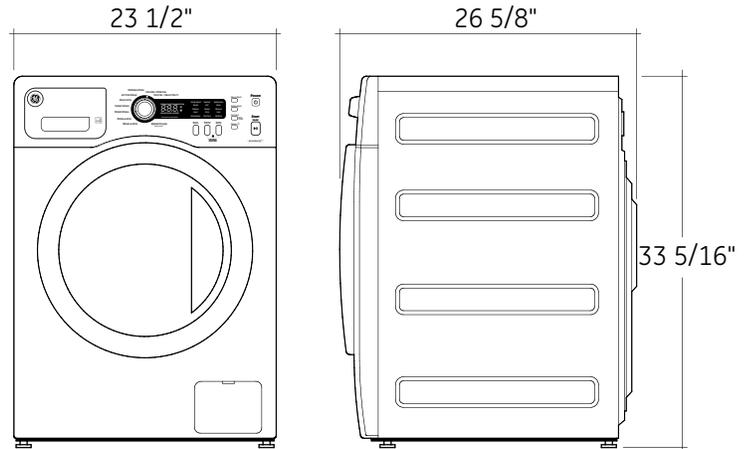
113000

WCVH4800K

GE® 2.2 DOE Cu. Ft. Capacity Frontload Washer with Stainless Steel Basket

Dimensions and Installation Information (in inches)

Installation Information: For complete information, see installation instructions packed with your washer.



For answers to your Monogram,® Profile™ Series or GE® appliance questions, visit our website at geappliances.com or call GE Answer Center® service, 800.626.2000.



Specification Revised 1/14

360422

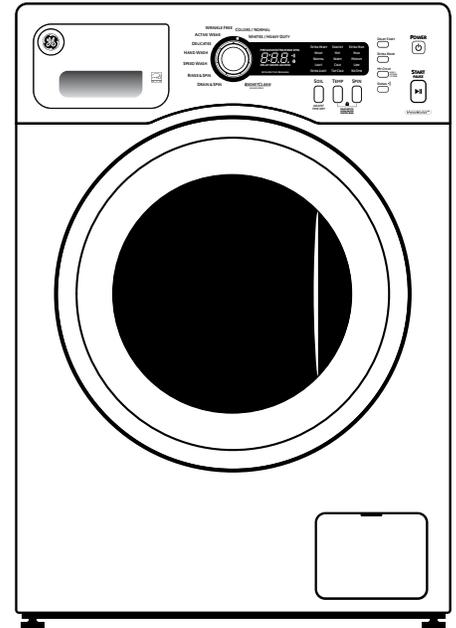


113000

WCVH4800K GE® 2.2 DOE Cu. Ft. Capacity Frontload Washer with Stainless Steel Basket

Features and Benefits

- Stainless steel wash basket - Resists rust and won't snag clothes
- Internal Water Heater - Increases wash temperature to reduce bacteria and provide better cleaning for the really tough stains
- 1400 RPM Spin Speed - Fast spin speeds remove water efficiently and minimize dry time
- 5 Wash/Spin Speed Combinations - Washer alternates speeds for great clothes care
- ENERGY STAR® Qualified and CEE Tier II - Meets or exceeds federal guidelines for energy efficiency for year-round energy and money savings
- Delay Start Up To 18 Hours - Set the washer or dryer to begin cycles anytime in the next 18 hours
- Model WCVH4800KWW - White on white



| | |
|------------------------------|------|
| Modified Energy Factor (MEF) | 2.30 |
| Water Factor (WF) | 4.33 |



Specification Revised 1/14

360422

WCVH4800K GE® 2.2 DOE Cu. Ft. Capacity Frontload Washer with Stainless Steel Basket

Stacked Installation:

- Kit for stacking dryer over washer are is not included with the washer.
Order part no. GE24STACK.

Alcove or Closet Installation:

- If your dryer is approved for installation in an alcove or closet, it will be stated on a label on the dryer back.
- The dryer MUST be exhausted to the outside with the exception of the condensing dryer.
- Minimum clearances between dryer cabinet and adjacent walls or other surfaces are: 0" either side, 3" front and rear
- Minimum vertical space from floor to overhead cabinets, ceilings, etc. is 52".
- Closet doors must be louvered or otherwise ventilated and must contain a minimum of 60 sq. in. of open area equally distributed. If this closet contains both a washer and a dryer, doors must contain a minimum of 120 sq. in. of open area equally distributed.
- No other fuel-burning appliance shall be installed in the same closet with a gas dryer.

Bathroom or Bedroom Installation:

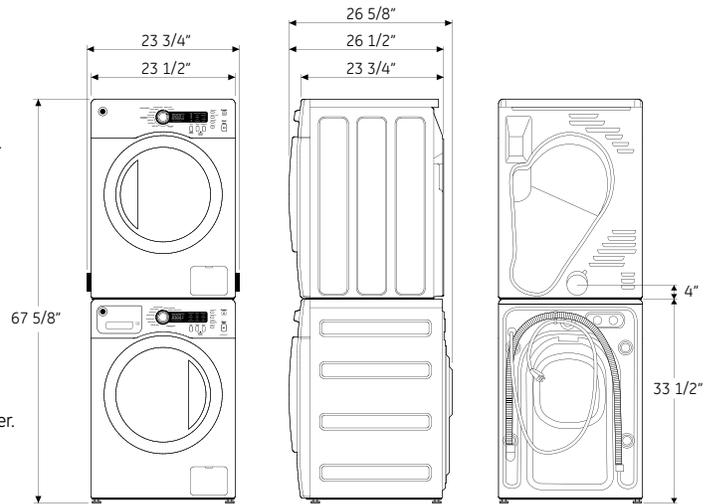
- The dryer MUST be exhausted to the outdoors with the exception of the condensing dryer.
- The installation must conform with the local codes, or in the absence of local codes, with the National Electric Code and National Fuel Gas Code, ANSI Z223 for gas dryers.

Minimum Clearance other than Alcove or Closet Installations:

- Minimum clearances to combustible surfaces 0" both sides, 3" rear.

For more information on venting kits and accessories, please call 1-800-GE-CARES.

Stacked Dimensions (in inches)



For answers to your Monogram,® Profile™ Series or GE® appliance questions, visit our website at geappliances.com or call GE Answer Center® service, 800.626.2000.



Specification Revised 1/14

360422

JS750SF/EF GE® 30" Slide-In Electric Convection Range

Dimensions and Installation Information (in inches)

Receptacle Locations: Locally approved flexible service cord or conduit must be used because terminals are not accessible after range installation. See shaded area in drawing for location of electrical outlet box. Recommended outlet locations allow range to be installed directly against rear wall.

Note: This appliance has been approved for 0" spacing to adjacent surfaces above the cooktop. However, a 6" minimum spacing to surfaces less than 15" above the cooktop and adjacent cabinet is recommended to reduce exposure to steam, grease splatter and heat.

Installation Information: Before installing, consult installation instructions for current dimensional data and additional requirements

Optional Kits For Slide-In Electric Ranges
(Available At Additional Cost)

Accessory Backguards
(Attaches to the back of range as a backguard when unit is installed in 30" free-standing cutout)

JXS32SS (Stainless) - 4" High
JXS32BB (Black) - 4" High

Optional Lower Trim Kits
(If counter height is greater than 36.5", a lower trim kit is recommended to extend the useful height to 38" maximum)

JXS56BB - Black

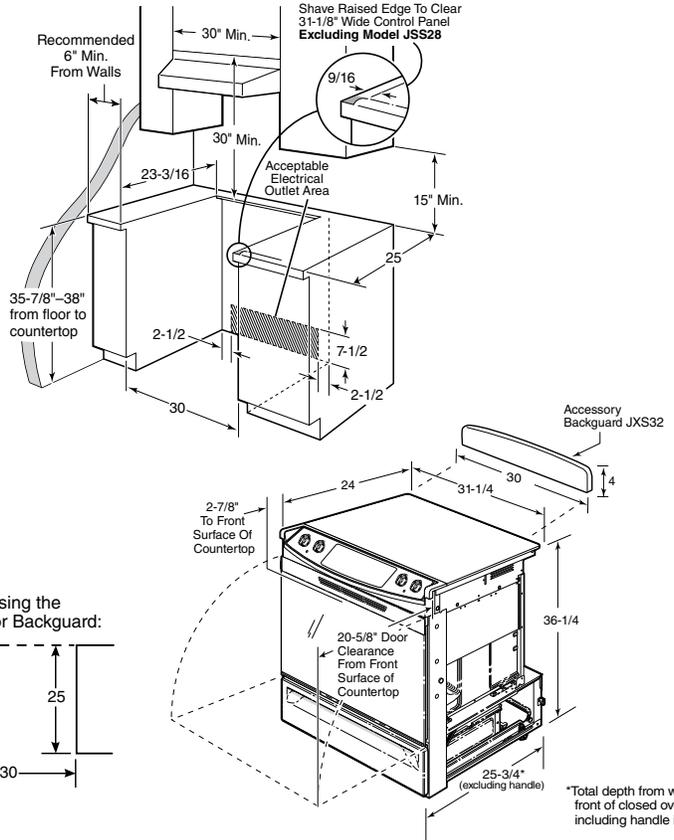
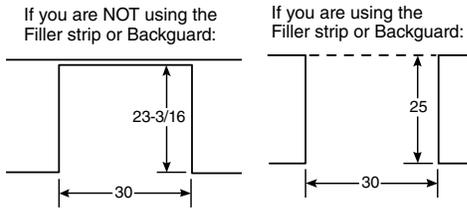
| KW Rating | |
|--------------|----------|
| 240V | 13.5 |
| 208V | 10.1 |
| Breaker Size | |
| 240V | 40 Amps* |
| 208V | 40 Amps* |

*Note: Check local codes for required breaker size.

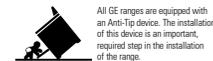
Body Sides
(Slide-in ranges are sold without sides installed. Can be installed on either left or right when unit has one exposed side [no cabinet adjacent]. Kit contains 1 body side)

JXS77BB (Black)

Rear Filler Strip
WB07T10680 - Black Filler Strip Assembly



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 Revised 8/14



11 30 00

JS750SF/EF GE® 30" Slide-In Electric Convection Range

Features and Benefits

- True European Convection with Precise Air - Enjoy perfectly even results without turning the pan
- 6"/9"/12" 3600W power boil - Pots and pans fit perfectly on the flexible heating element
- Bridge zone - Cook griddle favorites from the convenience of your range
- Fifth element warming zone - Provides low heat capability for foods
- Self-clean with steam clean option - Clean your oven the way you want
- Fast preheat - Make hot meals in a hurry with less time preheating
- Hidden bake - Make cleanup easy by eliminating hard-to-reach areas
- Black gloss oven interior - Enjoy a clean and sleek appearance
- Model JS750SFSS - Stainless steel
- Model JS750EFES - Slate



imagination at work

Specification Revised 8/14

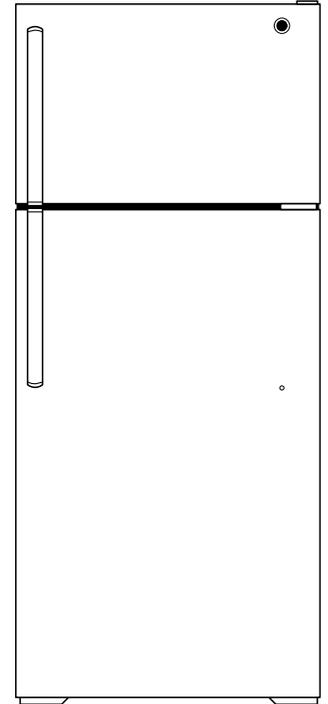


113000

GTE15CTH GE® ENERGY STAR® 14.6 Cu. Ft. Top-Freezer Refrigerator

Features and Benefits

- 2014 ENERGY STAR® qualified
- Upfront temperature controls - Easy-to-use controls regulate both fresh food and freezer sections
- Adjustable wire shelves - Moveable racks can handle a variety of foods
- Equipped for optional icemaker - Easily accommodates the installation of an icemaker
- Clear drawers - Transparent drawers make finding your favorite items quick and easy
- Gallon door storage - Larger items are easily accommodated in the door
- Adjustable wire freezer shelf - Easily adjusts between two positions to accommodate items of all shapes and sizes
- Spillproof freezer floor - Seamless design of the freezer floor wipes up easily for quick cleanup
- Model GTE15CTHLWW - White
- Model GTE15CTHRWW - White
- Model GTE15CTHRBB - Black
- Model GTE15CTHRCC - Bisque



imagination at work



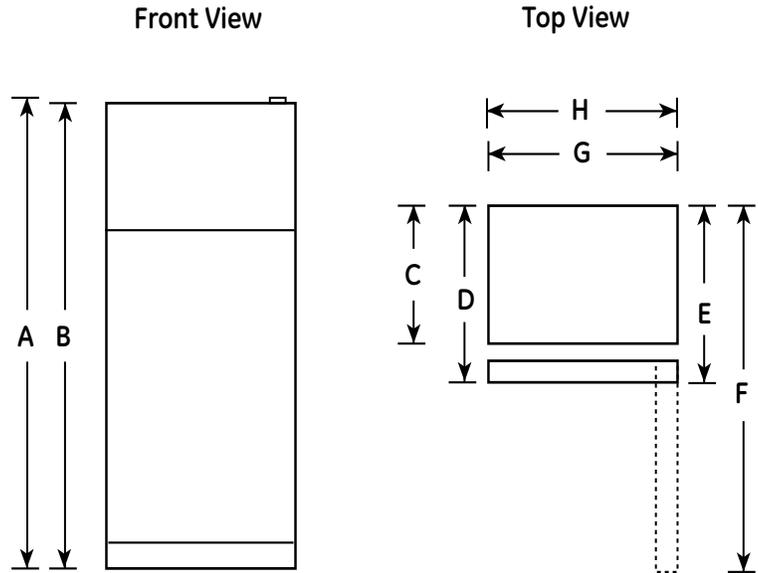
Specification Revised 8/14

GTE15CTH
GE® ENERGY STAR® 14.6 Cu. Ft. Top-Freezer Refrigerator

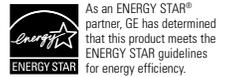
Dimensions and Installation Information (in inches)

| | | |
|--------------------|---|--------|
| Overall Dimensions | Height to top of hinge (in.) A | 61-3/4 |
| | Height to top of case (in.) B | 61-1/4 |
| | Case depth without door (in.) C | 25-3/4 |
| | Case depth less door handle (in.) D | 29-1/2 |
| | Case depth with door handle (in.) E | 31-5/8 |
| | Depth with fresh food door open 90° (in.) F | 55-7/8 |
| | Width (in.) G | 28 |
| | Width with door open 90° inc. door handle (in.) H | 30-5/8 |
| Air Clearances | Each side (in.) | 3/4 |
| | Top (in.) | 1 |
| | Back (in.) | 2 |

*Height to mid-freezer (in.): 51-3/8



For answers to your Monogram® Cafe™ Series, Profile™ Series or GE® appliance questions, visit our website at geappliances.com or call GE Answer Center® service, 800.626.2000.

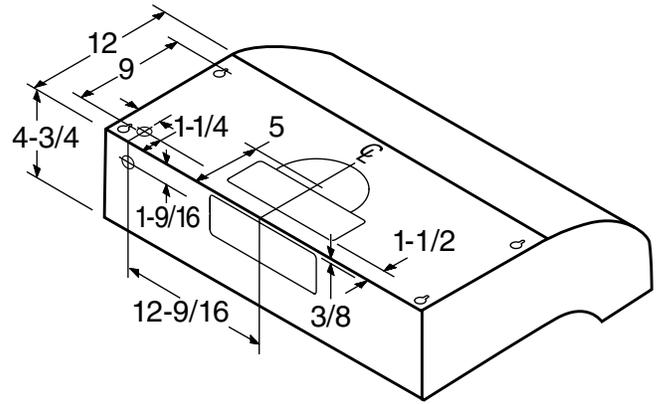
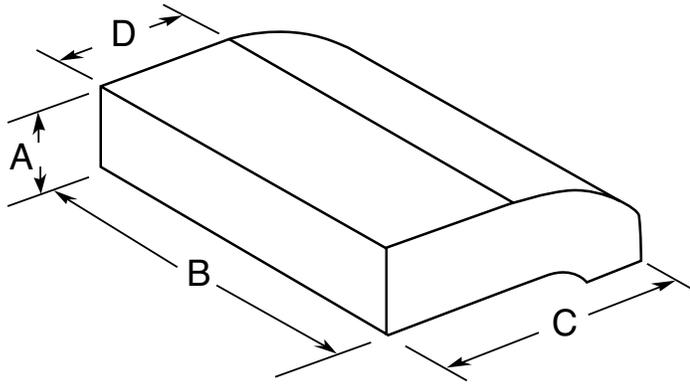


Specification Revised 8/14

11 30 00

JV636H – GE Profile™ Series 30" High Performance Range Hood

Dimensions (in inches)



| Model | A | B | C | D |
|-------|-------|--------|----|----|
| JV636 | 4-3/4 | 29-7/8 | 20 | 12 |

| Amp Rating | |
|------------|-----|
| 120V | 2.5 |

Installation Information: Before installing, consult installation instructions packed with product for current dimensional data. Light bulb(s) not included.

Exhaust outlet connects to 3-1/4" x 10" duct (vertically or horizontally) and 7" round (vertically). Includes rectangular damper and 7" round damper adapter.

Round damper accessory, JXDA22 available at additional cost.

JXHC1 Cord Kit – Allows a receptacle in the cabinet over the range to accommodate either an over-the-range microwave oven or a standard hood.

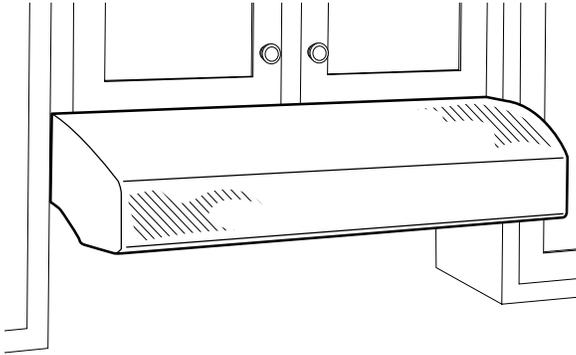


Specification Revised 3/13
220939



For answers to your Monogram® or GE® appliance questions, visit our website at GEAppliances.com or call GE Answer Center® service, 800.626.2000.

JV636H – GE Profile™ Series 30" High Performance Range Hood



Features and Benefits

- Vented – Effectively pulls smoke and vapors out of the cooking area and vents them outside through an external wall.
- Vertical and rear exhaust – Provides the option of connecting duct work to either the rear or the top of the hood.
- Four speed fan control – Powerful variable speed exhaust system effectively pulls smoke and vapors out of your kitchen.
- Halogen light – Provides bright light that illuminates the cooking surface below hood.
- Nightlight – Ideal light setting to use as nightlight for the kitchen.
- Removable grease filter – Durable filters can be removed for easy cleaning and maintenance.
- Round and rectangular ducting – Hood is designed to fit either standard round or rectangular duct work.
- Damper included.
- Model JV636HSS – Stainless Steel
- Model JV635HWW – White on white
- Model JV635HCC – Bisque on bisque
- Model JV635HBB – Black on black



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Specification Revised 3/13
220939



DIVISION 12 FURNISHINGS

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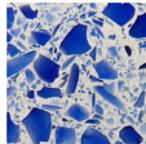


HOME > PRODUCT > COLOR PALETTE

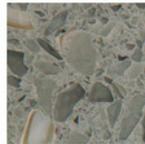
Color Palette

IceStone Collection

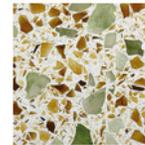
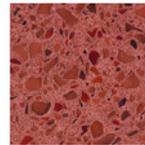
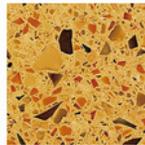
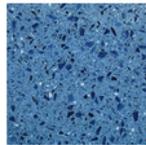
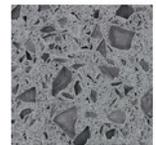
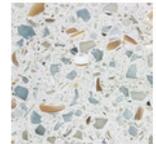
Click each swatch to view larger version. Please note: internet browser properties may cause color variation in the sample swatches. Order samples and brochures [here](#).



New!

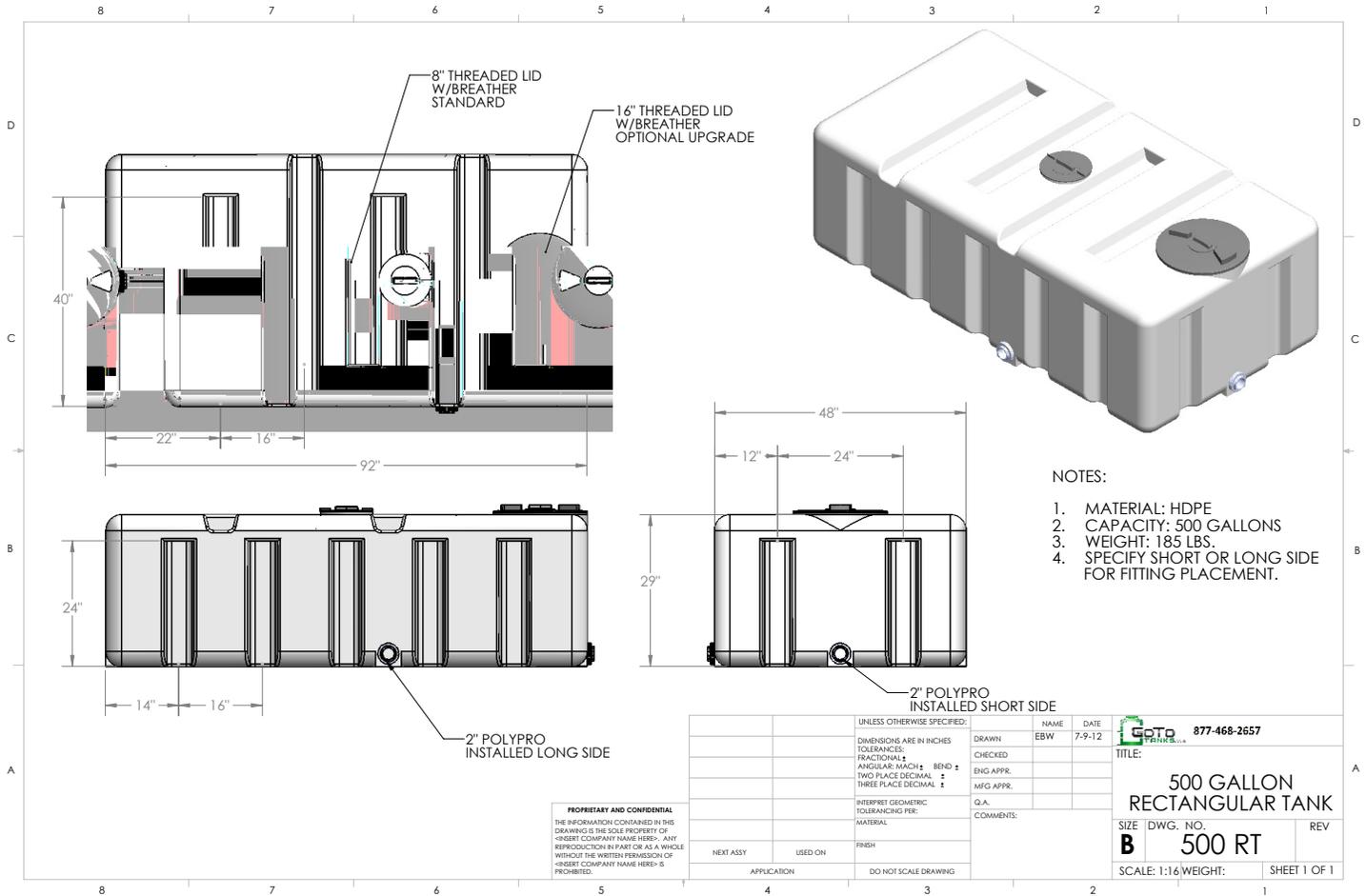


New!



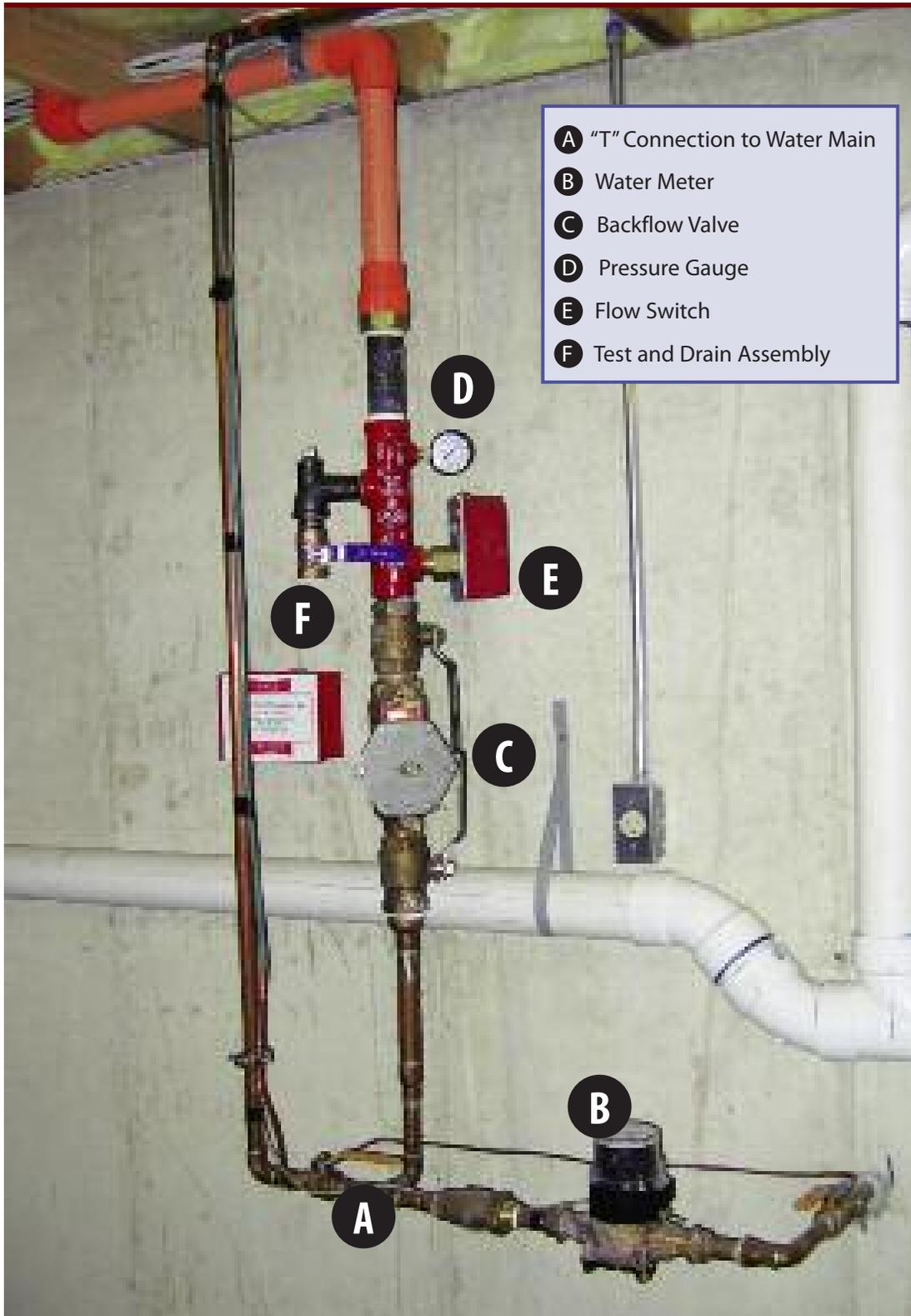


DIVISION 13 SPECIAL CONSTRUCTION





DIVISION 21 FIRE SUPPRESSION







Technical Services 800-381-9312 | +1-401-781-8220
www.tyco-fire.com

Installation Handbook (IH-1900) Addendum CPVC Fire Sprinkler Products Residential Dry Pipe Systems

General Description

This addendum revises the content of the Underwriters Laboratories Inc. (UL) listing under the "Listings and Approvals" section of the TYCO CPVC Fire Sprinkler Products Installation Instructions & Technical Handbook (IH-1900) dated June 2008. The revision now provides a new subsection for "Residential Dry Pipe Systems".

For more information on the TYCO Residential Dry Pipe System, refer to technical data sheet TFP485.

Listings and Approvals

Residential Dry Pipe Systems (UL)

In accordance with the Underwriters Laboratories Inc. (UL) Listing, TYCO CPVC Fire Sprinkler Pipe and Fittings made with BlazeMaster® Compound may be installed in Dry Pipe Systems for Residential Occupancies when subject to the additional limitations listed in this section.

- Acceptable Residential Occupancies are defined as follows:
 - ◊ Concealed (protected) installations in residential sprinkler systems for one- and two- family dwellings and manufactured homes per NFPA 13D.
 - ◊ Residential sprinkler systems for residential occupancies up to and including four stories in height per NFPA 13R.
 - ◊ Residential portions of any occupancy per NFPA 13 where calculations for Dry Pipe System water delivery are based on the hazard shown in Table 1 using a calculation

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program listed by a nationally recognized laboratory or obtained where the system design specifies that water is delivered to the system test connection in not more than 15 seconds for Residential Occupancies, starting at normal air pressure on the system.

- Residential sprinklers used in conjunction with TYCO CPVC Fire Sprinkler Pipe and Fittings in Dry Pipe Systems shall be specifically listed for such use.
- The TYCO CPVC Sprinkler Head Adapter Tee (P/N 80259) is to be used with dry-type residential pendent sprinklers in dry pipe system installations.
- Dry Pipe Systems in areas subject to freezing shall be pitched at least 1/4 or 1/2 inch per 10 feet (2 mm/m) in accordance with the appropriate NFPA standard being utilized.
- Upon completion of the assembly and cure, the system shall be hydrostatically tested in accordance with the procedures described in the CPVC Installation Handbook (IH-1900).
- TYCO CPVC Fire Sprinkler pipe and fittings used in Dry Pipe Systems may not be used in combination with other thermoplastic piping systems unless specifically listed for use in Dry Pipe Systems. Combining with steel or copper piping systems is permitted, where applicable.
- The pipe and fittings shall be protected (concealed) in accordance with the specifications outlined in the CPVC Installation Handbook (IH-1900).
- Exposed pipe and fittings have not been evaluated.
- Minimum use temperature shall be -20°F (-29°C).
- 3/4 to 3 inch pipe and fittings are listed for these applications and are to be assembled with TFP-500 One Step Solvent Cement.



- In-service system Air Pressure shall be maintained at a maximum of 15 psi (1 bar).
- Pipe friction loss shall be calculated in accordance with the Hazen-Williams formula using a C value of 150.
- Air supply to the TYCO CPVC Pipe and Fittings shall be free of oil and oil vapor. Automatic air compressors shall be of an oil-less type or the air shall be treated to assure oil or oil vapor is not introduced into the piping.

| Hazard | Residential |
|--|-------------|
| Number of Most Remote Sprinklers Initially Open | 1 |
| Maximum Time of Water Delivery | 15 Seconds |
| TABLE 1 RESIDENTIAL DRY PIPE SYSTEM WATER DELIVERY | |

| | |
|---|---|
|  |  |
| <p>Technical Services: Tel: (800) 381-9312 / Fax: (800) 791-5500</p> | |

BlazeMaster® CPVC Fire Sprinkler Pipe & Fittings Submittal Sheet

General Description

Tyco® CPVC Pipe and Fittings produced by Tyco Fire & Building Products (TFBP) are designed exclusively for use in wet pipe automatic fire sprinkler systems. The Tyco CPVC Pipe and Fittings are produced from BlazeMaster® CPVC compound that is a specially developed thermoplastic compound composed of post chlorinated polyvinyl chloride (CPVC) resin and state of the art additives. Tyco CPVC Pipe and Fittings are easier to install than traditional steel pipe systems, and at the same time, provide superior heat resistance and strength as compared to traditional CPVC and PVC piping materials used in the plumbing trade. Various adapters are available to connect CPVC pipe to metallic piping. All female pipe thread adapters have brass inserts for durability. Grooved adapters connect directly to grooved end valves and metallic pipe, with flexible grooved end couplings.

NOTICE

Tyco® CPVC Pipe and Fittings produced with BlazeMaster® CPVC compound described herein must be installed and maintained in compliance with this document and with the applicable standards of the National Fire Protection Association, in addition to the standards of any authorities having jurisdiction. Failure to do so may impair the performance of these devices.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or sprinkler manufacturer should be contacted with any questions.

Technical Data

Sizes
3/4" to 3"

Maximum Working Pressure
175 psi

Approvals
UL, FM, C-UL, NSF, LPCB, MEA, and the City of Los Angeles. (Refer to Installation Handbook IH-1900 dated June 2008 for exact listing/approval information.)

Manufacture Source
U.S.A.

Material

- Pipe: ASTM F442, SDR 13.5
- Fittings: ASTM F438 (Sch. 40) and ASTM F439 (Sch. 80), ASTM F1970

Color
Orange



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Technical Services: Tel: (800) 381-9312 / Fax: (800) 791-5500

Model 513 (13) Riser Manifold 1-1/2 thru 6 Inch (DN40 thru DN150) For NFPA 13 Sprinkler Systems

General Description

The Figure 513 (13) Riser Manifolds described in this technical data sheet provide the necessary waterflow alarm, pressure gauge, alarm test orifice, drain, and sight glass equipment in a single assembly for use in NFPA 13 sprinkler systems as follows:

NFPA 13*

- 1-1/2 Inch (DN40)
Male Thread x Female Thread
- 1-1/2 thru 6 Inch (DN40 thru DN150)
Groove x Groove

*Although the Riser Manifold described in this data sheet is intended for NFPA 13 sprinkler systems, it may be used for NFPA 13D or 13R residential sprinkler systems, where a test orifice of 5.6K (80K) is acceptable.

The variety of sizes and grooved end connections allow cost effective and easy transition to check valves, control valves, and system piping. The Riser Manifolds may be installed in either the horizontal (flow switch on top) or vertical (flow going up) for both single sprinkler rises and floor control in high rises.

WARNING

The Riser Manifolds described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the National Fire Protection Association, in addition to the standards of any other authorities having jurisdiction. Failure to do so may impair the performance of these devices.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or sprinkler manufacturer should be contacted with any questions.

Technical Data

Approvals

The Figure 513 (13) Riser Manifolds with a cover tamper switch for the waterflow alarm switch are UL Listed, ULC Listed, and FM Approved.

The Figure 513 (13) Riser Manifolds without a cover tamper switch for the waterflow alarm switch are UL Listed and FM Approved.

Maximum Working Pressure
175 psi (12,1 bar)

Test Orifice
5.6K (80K)

Assembly

The manifold body of the Figure 513 is ductile iron, whereas the manifold body of the Figure 13 is cast iron. The two assemblies are completely interchangeable in function, application, and end-to-end laying length.

Finish

Red painted.

Installation

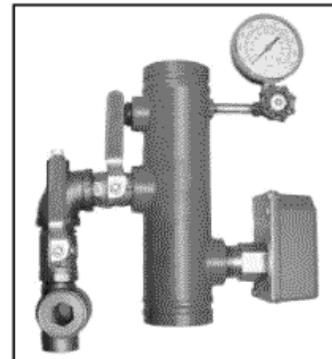
The Riser Manifolds may be installed in either the horizontal (flow switch on top) or vertical (flow going up). The inlet of the Riser Manifold may be directly connected to a shut-off control valve.

NOTES

Where applicable pipe thread sealant is to be applied sparingly. Use of a non-hardening pipe thread sealant is recommended.

Never remove any piping component nor correct or modify any piping deficiencies without first depressurizing and draining the system.

Step 1. Install the manifold body with the flow arrow pointing in the downstream position using threaded con-



nections and/or listed mechanical grooved connections, as applicable

Step 2. Connect the drain line, and then close the drain valve.

Step 3. Refer to Figure 3 for wiring guidance. All wiring must be performed in accordance with the Authority Having Jurisdiction and/or the National Electrical Code.

Step 4. Refer to Figure 4 for optional relief valve.

Step 5. Place the system in service by filling the system with water. When filling the system, partially open the control valve to slowly fill the system. *Filling the system slowly will help avoid damaging the waterflow alarm switch.*

After the system is fully pressurized, completely open the control valve.

Step 6. Secure all supply valves open.



Worldwide
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RAPID RESPONSE Model RSV-1 Residential Shut-Off Valve, 1 Inch and 2 Inch (DN25 and DN50) for Dual-Purpose Residential Water Supply

General Description

The TYCO RAPID RESPONSE Model RSV-1 Residential Shut-Off Valves are intended for use in dual-purpose residential water supply piping that serves both domestic and residential fire protection sprinkler system needs. The 1 Inch (DN25) Valve is intended for NFPA 13D system needs, whereas the 2 Inch (DN50) Valve is intended for systems designed in accordance with either NFPA 13, 13D, or 13R.

When a fire sprinkler operates, the Model RSV-1 Residential Shut-Off Valve automatically diverts the available water supply to the fire sprinkler system. Consequently, when the Model RSV-1 Valve is utilized, the system designer does not need to add the domestic flow demand to the fire sprinkler system flow demand, as would otherwise be required by NFPA 13 or 13R.

Consider use of the Model RSV-1 Residential Shut-Off Valve when either the water supply cannot adequately provide for both the domestic design demand and the fire sprinkler flow demand, or it is necessary to increase the effectiveness of the fire sprinkler system by automatically diverting the domestic flow.

The Model RSV-1 Residential Shut-Off Valve maximizes the effective use of an existing water supply. Therefore, in areas with limited water supplies, it may eliminate the need to add costly pumps, pressurized reservoirs, or electrically operated domestic shut-off valves. The Model RSV-1 Valve has a built-in check valve in the fire sprinkler system outlet that eliminates the need for a separate check valve. Also, the Model RSV-1 Valve automatically resets, thereby eliminating the need for valve disassembly after a fire sprinkler system test or operation.

NOTICE

The Model RSV-1 Residential Shut-Off Valves described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the National Fire Protection Association, in addition to the standards of any authorities having jurisdiction. Failure to do so may impair the integrity of this device.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or sprinkler manufacturer should be contacted relative to any questions.

Technical Data

Approvals

- The 1 Inch (DN25) Model RSV-1 Residential Shut-Off Valve is UL and C-UL Listed and NSF-61 Annex G Approved. It is suitable for use in water supply arrangements for residential fire sprinkler systems designed per NFPA 13D.
- The 2 Inch (DN50) Model RSV-1 Residential Shut-Off Valve is UL and C-UL Listed and NSF-61 Annex G Approved. It is suitable for use in water supply arrangements for residential fire sprinkler systems designed per NFPA 13, 13D, or 13R.

Maximum Pressure
175 psi (12,1 bar)

Weight
1 Inch (DN25): 11 lbs. (5 kg)
2 Inch (DN50): 29 lbs. (11 kg)

Pressure Loss
Refer to Figures 4 and 5.

Patents
2 Inch (DN50) Model RSV-1 Valve:
Patent Pending



Physical Characteristics

Refer to Figures 2 and 3.

- 1 Inch (DN25) Valve**
 - BodyCopper Alloy
 - Top and Bottom CoverCopper Alloy
 - Upper Cap Brass
 - Bottom Seal Brass
 - Piston Glass Reinforced Polyphenylene Oxide
 - Differential Ring Glass Reinforced Polyphenylene Oxide
 - Sleeve Glass Reinforced Polyphenylene Oxide
 - Upper and Lower Seals EPDM
 - O-Rings Buna-N
 - Piston Spring Stainless Steel
 - Piston Screws Stainless Steel
 - Cap Screw Stainless Steel
- 2 Inch (DN50) Valve**
 - Body and CoverCopper Alloy
 - Piston InsertCopper Alloy
 - Bottom SealCopper Alloy
 - Piston Cover Glass Reinforced Polyphenylene Oxide
 - Insert Sleeve Glass Reinforced Polyphenylene Oxide
 - Piston Seal EPDM
 - O-Rings EPDM
 - Piston Spring Stainless Steel
 - Piston Nut Stainless Steel
 - Retainer Ring Stainless Steel

| | |
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|  | Worldwide Contacts www.tyco-fire.com |
|---|---|

CPVC Hangers Head Set Model SHB1

General Description

The TYCO CPVC Hanger Head Set Model SHB1 offers a time saving installation method for proper placement of an automatic sprinkler before the ceiling is installed.

The CPVC Hanger Head Set Model SHB1 is a re-designation for the Central Model SHB1 Head Set Hanger.

The CPVC Hanger Head Set in a side-mount position (Ref. Figure 2) provides accurate vertical positioning of the sprinkler thereby assuring a desirable uniform sprinkler deflector-to-ceiling positioning of the sprinklers. Due to the unique design of the Head Set Hanger, "blocking" is not required to offset the centerline of piping to accommodate the sprinkler escutcheon from the side of the joist. With the fasteners provided, the Head Set Hanger is intended to be attached directly to the side of a solid wood framing member or the side of a structural composite wood joist of minimum 3/8 inch thickness OSB (Oriented Strand Board) web member or equivalent.

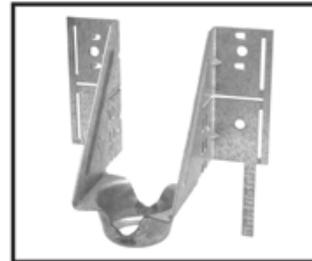
Note: The Head Set Hanger is designed for use with TFP "West Coast" style Sprinkler Head Adapters:

- P/N 80175W (3/4" x 1/2" NPT)
- P/N 80176W (1" x 1/2" NPT)

NOTICE

The Head Set Hanger described herein must be installed and maintained in compliance with this document and the applicable standards of the National Fire Protection Association (NFPA), in addition to the standards of any authorities having jurisdiction. Failure to do so may impair the performance of these devices.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or sprinkler manufacturer should be contacted with any questions.



Technical Data

Approvals

UL Listed for use with CPVC pipe as follows: Side-mount Head Set Hanger (Ref. Figure 2) to provide accurate vertical positioning of a sprinkler.

Material

Galvanized aluminum, 20 gauge

Weight

0.26 lb. (0,12 kg)

Nest | Model # S2001LW | Internet # 205374394 | Store SKU # 1000385393

Protect Wired 120V Smoke and Carbon Monoxide Alarm

★★★★★ (20) | [Write a Review +](#) | [Questions & Answers \(3\) +](#)



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1

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RAPID RESPONSE Series LFII Residential 4.9 K-factor Concealed Pendent Sprinklers, Flat Plate Wet Pipe and Dry Pipe Systems

General Description

The TYCO RAPID RESPONSE Series LFII Residential 4.9 K-factor Concealed Pendent Sprinklers (TY3596) are decorative, fast response, fusible solder sprinklers designed for use in residential occupancies such as homes, apartments, dormitories, and hotels.

The cover plate assembly conceals the sprinkler operating components above the ceiling. The flat profile of the cover plate provides the optimum aesthetically appealing sprinkler design. In addition, the concealed design of the Series LFII Residential Concealed Pendent Sprinklers (TY3596) provides 1/2 inch (12,7 mm) vertical adjustment. This adjustment provides a measure of flexibility when cutting fixed sprinkler drops.

The Series LFII Residential Concealed Sprinklers are intended for use in the following scenarios:

- wet and dry pipe residential sprinkler systems for one- and two-family dwellings and mobile homes per NFPA 13D
- wet and dry pipe residential sprinkler systems for residential occupancies up to and including four stories in height per NFPA 13R
- wet and dry pipe sprinkler systems for the residential portions of any occupancy per NFPA 13

IMPORTANT

Always refer to Technical Data Sheet TFP700 for the "INSTALLER WARNING" that provides cautions with respect to handling and installation of sprinkler systems and components. Improper handling and installation can permanently damage a sprinkler system or its components and cause the sprinkler to fail to operate in a fire situation or cause it to operate prematurely.

The Series LFII Residential Concealed Pendent Sprinklers (TY3596) has been designed with heat sensitivity and water distribution characteristics proven to help in the control of residential fires and to improve the chance for occupants to escape or be evacuated.

The Series LFII Residential Concealed Pendent Sprinklers (TY3596) are shipped with a Disposable Protective Cap. The Protective Cap is temporarily removed for installation, and then it can be replaced to help protect the sprinkler while the ceiling is being installed or finished. The tip of the Protective Cap can also be used to mark the center of the ceiling hole into plaster board, ceiling tiles, etc. by gently pushing the ceiling product against the Protective Cap. When the ceiling installation is complete the Protective Cap is removed and the Cover Plate Assembly installed.

Dry Pipe System Application

The Series LFII Residential Concealed Pendent Sprinklers offers a laboratory approved option for designing dry pipe residential sprinkler systems, whereas, most residential sprinklers are laboratory approved for wet systems only.

Through extensive testing, it has been determined that the number of design sprinklers (hydraulic design area) for the Series LFII Residential Concealed Pendent Sprinklers (TY3596) need not be increased over the number of design sprinklers (hydraulic design area) as specified for wet pipe sprinkler systems, as is accustomed for density/area sprinkler systems designed per NFPA 13.

Consequently, the Series LFII Residential Concealed Pendent Sprinklers offer the features of non-water filled pipe in addition to not having to increase the number of design sprinklers (hydraulic design area) for systems designed to NFPA 13, 13D, or 13R.



NOTICE

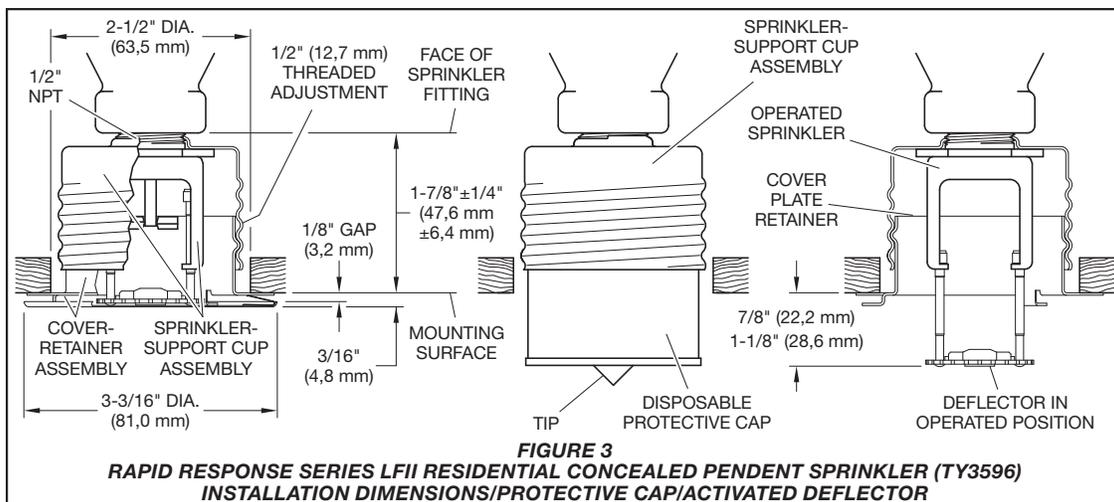
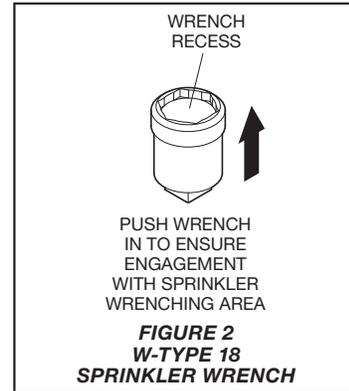
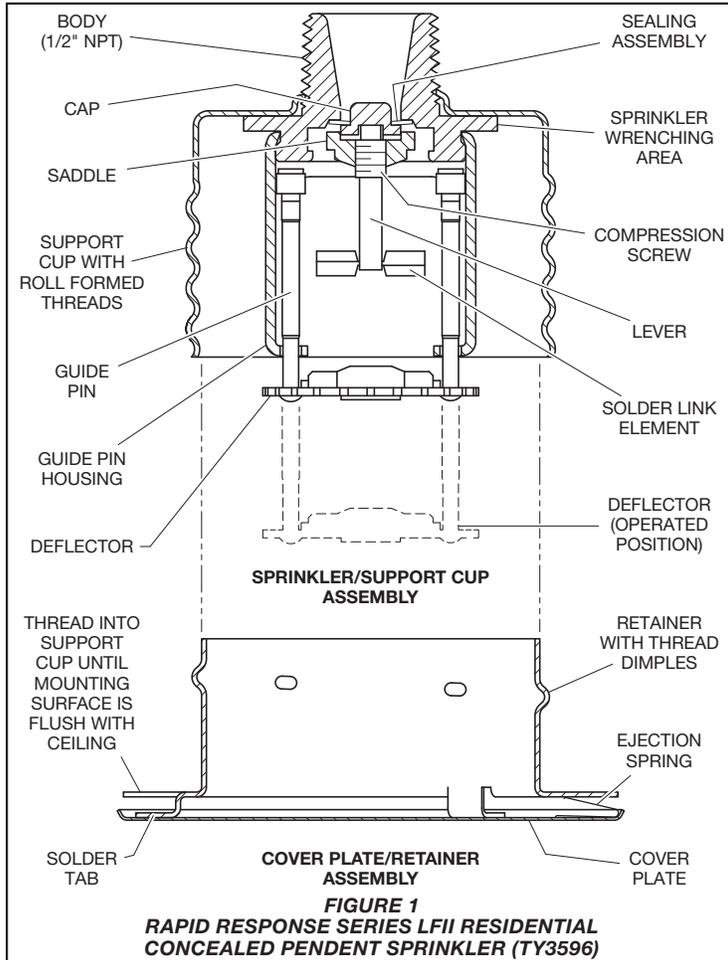
The Series LFII Residential Concealed Pendent Sprinklers (TY3596) described herein must be installed and maintained in compliance with this document and with the applicable standards of the National Fire Protection Association, in addition to the standards of any authorities having jurisdiction. Failure to do so may impair the performance of these devices.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or sprinkler manufacturer should be contacted with any questions.

Sprinkler Identification Number

TY3596

TFP442
Page 2 of 6





2110 00

Technical Data

Approvals

UL and C-UL Listed. NYC Approved under MEA 44-03-E-2NSF. Certified to NSF/ANSI 61.

The TYCO RAPID RESPONSE Series LFII Residential Concealed Pendent Sprinklers are only listed with the Series LFII Concealed Cover Plates having a factory-applied finish.

These Cover Plates and their part numbers can be found in the Ordering Procedure section at the end of this data sheet.

Maximum Working Pressure

175 psi (12,1 bar)

Discharge Coefficient

K = 4.9 GPM/psi^{1/2} (70,6 LPM/bar^{1/2})

Temperature Rating

160°F (71°C) Sprinkler with 139°F (59°C) Cover Plate

Vertical Adjustment

1/2 inch (12,7 mm)

Finishes

Refer to Ordering Procedure section

Physical Characteristics

| | |
|----------------------------------|-------------------------------|
| Body..... | Brass |
| Cap..... | Bronze |
| Saddle..... | Brass |
| Sealing Assembly..... | Beryllium Nickel w/ TEFLON |
| Soldered Link Halves..... | Nickel |
| Lever..... | Bronze |
| Compression Screw..... | Brass |
| Deflector..... | Copper or Brass |
| Guide Pin Housing..... | Bronze |
| Guide Pins..... | Stainless Steel or Bronze |
| Support Cup..... | Steel |
| Cover Plate..... | Copper |
| Retainer..... | Brass |
| Cover Plate Ejection Spring..... | Stainless Steel |

Operation

When exposed to heat from a fire, the Cover Plate, which is normally soldered to the Support Cup at three points, falls away to expose the Sprinkler Assembly. At this point the Deflector supported by the Arms drops down to its operated position. The fusible link of the Sprinkler Assembly is comprised of two link halves that are soldered together with a thin layer of solder. When the rated temperature is reached, the solder melts and the two link halves separate allowing the sprinkler to activate and flow water.

Design Criteria

The TYCO RAPID RESPONSE Series LFII Residential Concealed Pendent Sprinklers (TY3596) are UL and C-UL Listed for installation in accordance with this section.

Note: When conditions exist that are outside the scope of the provided criteria, refer to the Residential Sprinkler Design Guide TFP490 for the manufacturer's recommendations that may be acceptable to the authority having jurisdiction.

System Types

Per the UL Listing, wet pipe and dry pipe systems may be utilized. Per the C-UL Listing, only wet pipe systems may be utilized.

Refer to Technical Data Sheet TFP485 about the use of residential sprinklers in residential dry pipe systems.

Ceiling Types

Smooth flat horizontal, or beamed, or sloped, in accordance with the 2013 Edition of NFPA 13D, 13R, or 13 as applicable.

Hydraulic Design

(NFPA 13D and 13R)

For systems designed to NFPA 13D or NFPA 13R, the minimum required sprinkler flow rates are given in Tables A and B as a function of temperature rating and the maximum allowable coverage areas. The sprinkler flow rate is the minimum required discharge from each of the total number of "design sprinklers" as specified in NFPA 13D or NFPA 13R. The number of "design sprinklers" specified in NFPA 13D and 13R for wet pipe systems is to be applied when designing dry pipe systems.

Hydraulic Design

(NFPA 13)

For systems designed to NFPA 13, the number of design sprinklers is to be the four most hydraulically demanding sprinklers. The minimum required discharge from each of the four sprinklers is to be the greater of the following:

- The flow rates given in Tables A and B as a function of temperature rating and the maximum allowable coverage area.
- A minimum discharge of 0.1 gpm/ft² over the "design area" comprised of the four most hydraulically demanding sprinklers for actual coverage areas protected by the four sprinklers.

The number of "design sprinklers" specified in NFPA 13 for wet pipe systems is to be applied when designing dry pipe systems.

Dry Pipe System Water Delivery

When using the Series LFII Residential Concealed Pendent Sprinklers (TY3596) in dry pipe sprinkler systems, the time for water delivery must not exceed 15 seconds for the most remote operating sprinkler.

Obstruction to Water Distribution

Sprinklers are to be located in accordance with the obstruction rules of NFPA 13D, 13R, and 13 as applicable for residential sprinklers as well as with the obstruction criteria described within the Technical Data Sheet TFP490.

Operational Sensitivity

The sprinklers are to be installed relative to the ceiling mounting surface as shown in Figure 3.

Sprinkler Spacing

The minimum spacing between sprinklers is 8 feet (2,4 m). The maximum spacing between sprinklers cannot exceed the length of the coverage area (Ref. Table A or B) being hydraulically calculated (e.g., maximum 12 feet for a 12 ft. x 12 ft. coverage area, or 20 feet for a 20 ft. x 20 ft. coverage area).

The Series LFII must not be used in applications where the air pressure above the ceiling is greater than that below. Down drafts through the Support Cup could delay sprinkler operation in a fire situation.

TFP442
Page 4 of 6

| Maximum Coverage Area ^(a) Ft. x Ft. (m x m) | Maximum Spacing Ft. (m) | WET PIPE SYSTEM Minimum Flow and Residual Pressure ^(b, c) | | | | |
|--|----------------------------|---|-----------------------|---|-------------------|----------------------------|
| | | Ordinary Temp. Rating 160°F (71°C) | | Deflector to Ceiling | Installation Type | Minimum Spacing Ft. (m) |
| | | Flow GPM (L/min) | Pressure PSI (bar) | | | |
| 12 x 12 (3,7 x 3,7) | 12 (3,7) | 13 (49,2) | 7.0 (0,48) | Smooth Ceilings 7/8 to 1-1/8 inches Beamed Ceilings per NFPA 13D or 13R, or 13. Installed in beam 7/8 to 1-1/8 inches below bottom of beam | Concealed | 8 (2,4) |
| 14 x 14 (4,3 x 4,3) | 14 (4,3) | 13 (49,2) | 7.0 (0,48) | | | |
| 16 x 16 (4,9 x 4,9) | 16 (4,9) | 13 (49,2) | 7.0 (0,48) | | | |
| 18 x 18 (5,5 x 5,5) | 18 (5,5) | 17 (64,3) | 12.0 (0,83) | | | |
| 20 x 20 (6,1 x 6,1) | 20 (6,1) | 20 (75,7) | 16.7 (1,15) | | | |

(a) For coverage area dimensions less than or between those indicated, use the minimum required flow for the next highest coverage area for which hydraulic design criteria are stated.

(b) Requirement is based on minimum flow in GPM (LPM) from each sprinkler. The associated residual pressures are calculated using the nominal K-factor. Refer to Hydraulic Design under the Design Criteria section.

(c) For NFPA 13 residential applications, the greater of 0.1 gpm/ft² over the design area of the flow in accordance with the criteria in this table must be used.

TABLE A
WET PIPE SYSTEM
SERIES LFII RESIDENTIAL 4.9 K-FACTOR FLAT-PLATE CONCEALED PENDENT SPRINKLER (TY3596)
NFPA 13D, 13R, AND 13 HYDRAULIC DESIGN CRITERIA

| Maximum Coverage Area ^(a) Ft. x Ft. (m x m) | Maximum Spacing Ft. (m) | DRY PIPE SYSTEM Minimum Flow and Residual Pressure ^(b, c) | | | | |
|--|----------------------------|---|-----------------------|---|-------------------|----------------------------|
| | | Ordinary Temp. Rating 160°F (71°C) | | Deflector to Ceiling | Installation Type | Minimum Spacing Ft. (m) |
| | | Flow GPM (L/min) | Pressure PSI (bar) | | | |
| 12 x 12 (3,7 x 3,7) | 12 (3,7) | 13 (49,2) | 7.0 (0,48) | Smooth Ceilings 7/8 to 1-1/8 inches Beamed Ceilings per NFPA 13D or 13R, or 13. Installed in beam 7/8 to 1-1/8 inches below bottom of beam | Concealed | 8 (2,4) |
| 14 x 14 (4,3 x 4,3) | 14 (4,3) | 14 (53,0) | 8.2 (0,57) | | | |
| 16 x 16 (4,9 x 4,9) | 16 (4,9) | 15 (56,8) | 9.4 (0,65) | | | |
| 18 x 18 (5,5 x 5,5) | 18 (5,5) | 18 (68,1) | 13.5 (0,93) | | | |
| 20 x 20 (6,1 x 6,1) | 20 (6,1) | 21 (79,5) | 18.4 (1,27) | | | |

(a) For coverage area dimensions less than or between those indicated, use the minimum required flow for the next highest coverage area for which hydraulic design criteria are stated.

(b) Requirement is based on minimum flow in GPM (LPM) from each sprinkler. The associated residual pressures are calculated using the nominal K-factor. Refer to Hydraulic Design under the Design Criteria section.

(c) For NFPA 13 residential applications, the greater of 0.1 gpm/ft² over the design area of the flow in accordance with the criteria in this table must be used.

TABLE B
DRY PIPE SYSTEM
RAPID RESPONSE SERIES LFII RESIDENTIAL 4.9 K-FACTOR FLAT-PLATE CONCEALED PENDENT (TY3596)
NFPA 13D, 13R, AND 13 HYDRAULIC DESIGN CRITERIA

Installation

The TYCO RAPID RESPONSE Series LFII Residential Concealed Pendent Sprinklers (TY3596) must be installed in accordance with this section.

General Instructions

Damage to the fusible Link Assembly during installation can be avoided by handling the sprinkler by the support cup only (i.e., do not apply pressure to the fusible Link Assembly).

A 1/2 inch NPT sprinkler joint should be obtained with a minimum to maximum torque of 7 to 14 ft.-lbs. (9,5 to 19,0 Nm). Higher levels of torque may distort the sprinkler inlet with consequent leakage or impairment of the sprinkler.

Do not attempt to compensate for insufficient adjustment in the Cover Plate/Retainer Assembly by under- or over-tightening the Sprinkler. Readjust the position of the sprinkler fitting to suit.

Step 1. The sprinkler must only be installed in the pendent position and with the centerline of the sprinkler perpendicular to the mounting surface.

Step 2. Remove the Protective Cap.

Step 3. With pipe thread sealant applied to the pipe threads, and using the W-Type 18 Wrench shown in Figure 2, install and tighten the Sprinkler/Support Cup Assembly into the fitting. The W-Type 18 Wrench will accept a 1/2 inch ratchet drive.

Step 4. Replace the Protective Cap by pushing it upwards until it bottoms out against the Support Cup. The Protective Cap helps prevent damage to the Deflector and Guide Pins during ceiling installation and/or during application of the finish coating of the ceiling. It may also be used to locate the center of the clearance hole by gently pushing the ceiling material against the center point of the Cap.

Note: *As long as the protective Cap remains in place, the system is considered to be "Out Of Service".*

Step 5. After the ceiling has been completed with the 2-1/2 inch (63 mm) diameter clearance hole and in preparation for installing the Cover Plate Assembly, remove and discard the Protective Cap, and verify that the Deflector moves up and down freely.

If the Sprinkler has been damaged and the Deflector does not move up and down freely, replace the entire Sprinkler assembly. Do not attempt to modify or repair a damaged sprinkler.

Step 6. Screw on the Cover Plate Assembly until its flange comes in contact with the ceiling.

Do not continue to screw on the Cover Plate Assembly such that it lifts a ceiling panel out of its normal position.

If the Cover Plate Assembly cannot be engaged with the Mounting Cup or the Cover Plate Assembly cannot be engaged sufficiently to contact the ceiling, the Sprinkler Fitting must be repositioned.

Care and Maintenance

The TYCO RAPID RESPONSE Series LFII Residential Concealed Pendent Sprinklers (TY3596) must be maintained and serviced in accordance with this section.

Before closing a fire protection system main control valve for maintenance work on the fire protection system which it controls, permission to shut down the affected fire protection system must be obtained from the proper authorities and all personnel who may be affected by this action must be notified.

Absence of a Cover Plate may delay the sprinkler operation in a fire situation.

When properly installed, there is a nominal 1/8 inch (3,2 mm) air gap between the lip of the Cover Plate and the ceiling, as shown in Figure 3. This air gap is necessary for proper operation of the sprinkler by allowing heat flow from a fire to pass below and above the Cover Plate to help assure appropriate release of the Cover Plate in a fire situation. If the ceiling is to be repainted after the installation of the Sprinkler, care must be exercised to ensure that the new paint does not seal off any of the air gap.

Factory painted Cover Plates must not be repainted. They should be replaced, if necessary, by factory painted units. Non-factory applied paint may adversely delay or prevent sprinkler operation in the event of a fire.

Do not pull the Cover Plate relative to the Enclosure. Separation may result.

Sprinklers which are found to be leaking or exhibiting visible signs of corrosion must be replaced.

Automatic sprinklers must never be painted, plated, coated, or otherwise altered after leaving the factory. Modified or over heated sprinklers must be replaced.

Care must be exercised to avoid damage -before, during, and after installation. Sprinklers damaged by dropping, striking, wrench twist/slippage, or the like, must be replaced.

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of the National Fire Protection Association (e.g., NFPA 25), in addition to the standards of any other authorities having jurisdiction. The installing contractor or sprinkler manufacturer should be contacted relative to any questions.

The owner must assure that the sprinklers are not used for hanging any objects and that the sprinklers are only cleaned by means of gently dusting with a feather duster; otherwise, non-operation in the event of a fire or inadvertent operation may result.

Automatic sprinkler systems should be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.



2110 00

TFP442
Page 6 of 6

Limited Warranty

For warranty terms and conditions, visit www.tyco-fire.com.

Ordering Procedure

When placing an order, indicate the full product name. Contact your local distributor for availability.

Sprinkler Assembly

Specify: Series LFII (TY3596), K = 4.9, Residential Concealed Pendent Sprinkler without Cover Plate Assembly, P/N 51-112-1-160

Cover Plate Assembly

Specify: Cover Plate Assembly having a (specify) finish for the Series LFII (TY3596), K = 4.9, Residential Concealed Pendent Sprinkler, P/N (specify):

| | |
|--------------------------------------|------------------|
| Ivory (RAL1015) | P/N 56-202-0-135 |
| Beige (RAL1001) | P/N 56-202-2-135 |
| Pure White (b) (RAL9010) | P/N 56-202-3-135 |
| Signal White (a) (RAL9003) | P/N 56-202-4-135 |
| Grey White (RAL9002) | P/N 56-202-5-135 |
| Brown (RAL8028) | P/N 56-202-6-135 |
| Black (RAL9005) | P/N 56-202-7-135 |
| Brushed Brass | P/N 56-202-8-135 |
| Brushed Chrome | P/N 56-202-9-135 |
| Custom Paint | P/N 56-202-X-135 |

(a) Previously known as Bright White.
(b) Eastern Hemisphere sales only.

Note: All Custom Cover Plates are painted using Sherwin Williams Interior Latex Paint. Contact TYCO Customer Service with any questions related to custom orders.

Sprinkler Wrench

Specify: W-Type 18 Sprinkler Wrench, P/N 56-000-1-265

GLOBAL HEADQUARTERS | 1400 Pennbrook Parkway, Lansdale, PA 19446 | Telephone +1-215-362-0700

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DIVISION 22 PLUMBING

KOHLER
FAUCETS®

RITE-TEMP®

Features

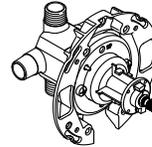
- Brass valve bodies
- High-temperature limit setting for added safety
- Mixing valve cycles from "cold" to "hot"
- Rite-Temp pressure-balancing diaphragm design valve
- One-piece diaphragm cartridge design for ease of maintenance
- Available with or without screwdriver stops

Codes/Standards Applicable

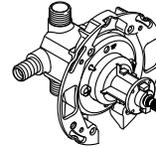
Specified model meets or exceeds the following:

- ASME A112.18.1/CSA B125.1
- ASSE 1016

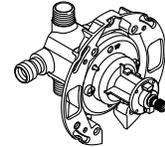
**PRESSURE-BALANCING VALVE
K-304**



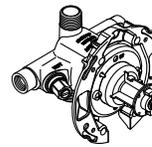
K-304-K



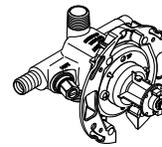
K-304-PX



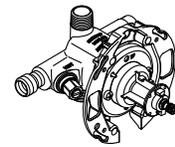
K-304-UX



K-304-KS



K-304-PS



K-304-US

Colors/Finishes

- NA: None applicable

Specified Model

| Model | Description | Colors/Finishes |
|----------|--|-----------------------------|
| K-304-K | Pressure-balancing valve without screwdriver stops – universal inlets | <input type="checkbox"/> NA |
| K-304-KS | Pressure-balancing valve with screwdriver stops – universal inlets | <input type="checkbox"/> NA |
| K-304-PX | Pressure-balancing valve without screwdriver stops – PEX inlets (crimp) | <input type="checkbox"/> NA |
| K-304-PS | Pressure-balancing valve with screwdriver stops – PEX inlets (crimp) | <input type="checkbox"/> NA |
| K-304-UX | Pressure-balancing valve without screwdriver stops – PEX inlets (cold expansion) | <input type="checkbox"/> NA |
| K-304-US | Pressure-balancing valve with screwdriver stops – PEX inlets (cold expansion) | <input type="checkbox"/> NA |
| K-304-CX | Pressure-balancing valve without screwdriver stops – 1/2" CPVC inlets | <input type="checkbox"/> NA |
| K-304-CS | Pressure-balancing valve with screwdriver stops – 1/2" CPVC inlets | <input type="checkbox"/> NA |

The K-304-CX and K-304-CS are K-304-K and K-304-KS with CPVC adapters installed on the inlets.

Optional Accessories

Deep rough-in kits are available (refer to the trim set Specification Sheet).

Product Specification

Rite-Temp pressure-balancing single-control valve shall have a brass valve body. Valve shall include a Rite-Temp pressure-balancing diaphragm design valve with a one-piece diaphragm cartridge design for ease of maintenance. Valve shall have mixing valve cycles from "cold" to "hot" and a high-temperature limit stop for added safety. Valve shall be available without or with screwdriver stops. Rite-Temp pressure-balancing valve shall be Kohler Model K-304-____-NA.



TOOBI™ RITE-TEMP®

Features

- Metal construction
- Front seal plate assembly
- Handle assembly
- Available with push-button diverter [K-T8979-4]
- Requires a Rite-Temp® valve
- Complements Toobi™ Suite

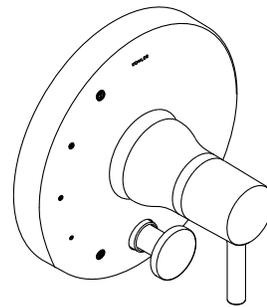
VALVE TRIM
K-T8979
ALSO K-T8981,

ADA

Codes/Standards Applicable

Specified model meets or exceeds the following:

- ADA
- ICC/ANSI A117.1
- ASME A112.18.1/CSA B125.1
- ASSE 1016



Colors/Finishes

- CP: Polished Chrome
- Other: Refer to Price Book for additional colors/finishes

Specified Model

| Model | Description | Colors/Finishes | |
|---|---|-----------------------------|-------------------------------------|
| K-T8979-4 | Valve trim with diverter button (shown) | <input type="checkbox"/> CP | <input type="checkbox"/> Other ____ |
| K-T8981-4 | Valve trim less diverter button | <input type="checkbox"/> CP | <input type="checkbox"/> Other ____ |
| Required Accessories | | | |
| K-304-* | Rite-Temp® pressure-balancing valve OR | <input type="checkbox"/> NA | |
| K-2971-KS | HiFlow Rite-Temp valve with stops OR | <input type="checkbox"/> NA | |
| K-11748-* | Rite-Temp valve with push-button diverter | <input type="checkbox"/> NA | |
| * For a complete listing of all the Rite-Temp valves, refer to the individual valve Specification Sheet or Roughing-In Sheet. | | | |
| Optional Accessories | | | |
| 1151968 | Deep roughing-in kit for Rite-Temp valve | <input type="checkbox"/> CP | <input type="checkbox"/> Other ____ |

Product Specification

The valve trim shall be made of metal construction. Trim shall be available with push-button diverter [K-T8979-4]. Trim shall include front seal plate assembly and handle assembly. Trim shall require a Rite-Temp® valve. Trim shall complete the Toobi Suite. Trim shall be Kohler Model K-T____-4-____ and required Rite-Temp valve shall be K-____-____-NA.

TOOBI™ RITE-TEMP®

Installation Notes

Install the product according to the installation guide.

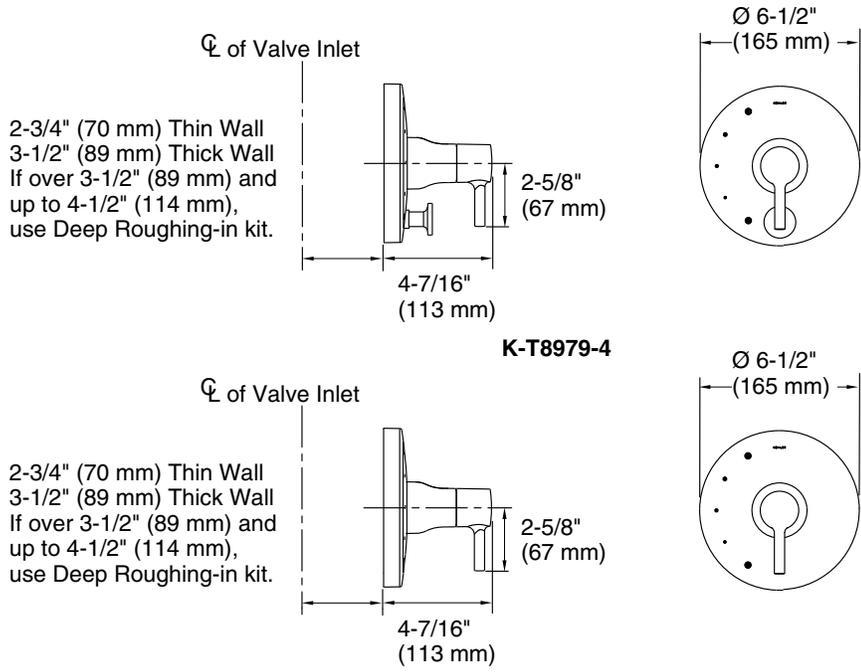
Install the Rite-Temp valve according to the installation guide.

NOTICE: Risk of product damage. For K-2971-KS valve:
1-5/8" (41 mm) screws (included) must be used. 2-3/8" (60 mm) screws will damage the valve.

Avoid cross-flow conditions. Do not install a shut-off device on either valve outlet.

Cap the shower outlet if the deck-mounted spout, diverter, or handshower is connected to the spout outlet.

Install a 7" (178 mm) to 18" (457 mm) straight pipe or straight tube with single elbow between the valve and the wall-mount spout.



Product Diagram

KOHLER® Faucets

Features

- Column lets you customize your shower with a rainhead and handshower.
- For use in bath and shower installations with beam showerarm for reduced ceiling height.
- Patent-pending technology allows for an easy bath/shower installation.
- Slidebar bracket allows you to adjust height and angle of handshower.
- Diverter at the base of the column makes for easy toggling between handshower and rainhead.
- Includes column, bracket, hose, slidebar, and diverter.
- Rainhead and handshower sold separately to allow for customized decor.
- Developed and optimized for use with KOHLER handshowers and KOHLER Katalyst™ rainheads K-13688, K-13689, K-13692, and K-13695 (sold separately).

Material

- Premium metal construction.
- KOHLER finishes resist corrosion and tarnishing.

Installation

- Wall-mount
- Installs in less than 60 minutes without changes to in-wall plumbing (subject to condition of existing installation).

Optional Accessories

13688
13689
13692
13695
K-8593
K-9514
K-45981 Shower Hose
K-45982 Shower Hose
1194630
1187917
1194302

Hydrorail®-R Bath/Shower Column K-45210



ADA

Codes/Standards

ASME A112.18.1/CSA B125.1
ADA
ICC/ANSI A117.1

Kohler Faucet Lifetime Limited Warranty

See website for detailed warranty information.

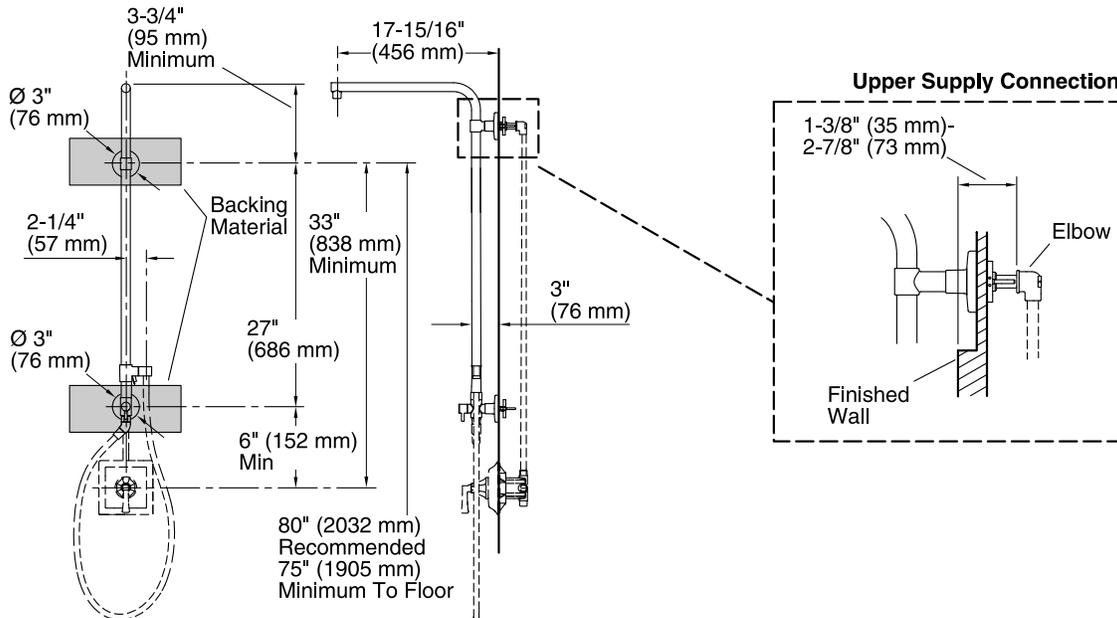
Available Color/Finishes

Color tiles intended for reference only.

| Color | Code | Description |
|-------|------|-------------------------|
| | CP | Polished Chrome |
| | BN | Vibrant® Brushed Nickel |
| | BV | Vibrant® Brushed Bronze |
| | 2BZ | Oil-Rubbed Bronze |

KOHLER Faucets

Hydrorail®-R
Bath/Shower Column
K-45210



NOTE: Valve trim and hose illustrated for dimensioning only, not included in the product.

Technical Information

All product dimensions are nominal.

Notes

Install this product according to the installation guide.

Order deep roughing-in kit 1194630 if the distance from the elbow to the finished wall surface is between 2-7/8" (73 mm) to 4" (102 mm).

Order shallow roughing-in kit 1187917 if the distance from the elbow to the finished wall surface is less than 1-3/8" (35 mm).

A 3" (76 mm) escutcheon/mounting collar is supplied to fit a 1" (25 mm) to 1-1/4" (32 mm) supply connection hole diameter. Order 1194302 large escutcheon/mounting collar kit if the supply connection hole diameter is between 1-1/4" (32 mm) to 2-1/4" (57 mm).

ADA compliant when installed to the specific requirements of these regulations.

KOHLER Faucets

Features

- 60-inch hose length.
- Swivel base helps reach target areas.
- For use with a handshower (sold separately)

Material

- Durable metal construction.
- KOHLER finishes resist corrosion and tarnishing.

MasterShower®
60" Metal Shower Hose
K-9514



Codes/Standards

None Applicable

KOHLER® Faucet Lifetime Limited Warranty

See website for detailed warranty information.

Available Color/Finishes

Color tiles intended for reference only.

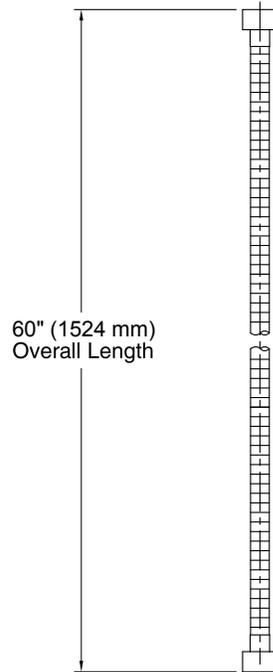
| Color | Code | Description |
|-------|------|--------------------------|
| | CP | Polished Chrome |
| | SN | Vibrant® Polished Nickel |
| | AF | Vibrant® French Gold |
| | PB | Vibrant® Polished Brass |
| | G | Brushed Chrome |
| | BN | Vibrant® Brushed Nickel |
| | BV | Vibrant® Brushed Bronze |
| | 2BZ | Oil-Rubbed Bronze |



22 00 00

KOHLER® Faucets

MasterShower® 60" Metal Shower Hose K-9514



Technical Information
All product dimensions are nominal.

Notes
Install this product according to the installation guide.

KOHLER
FAUCETS®

SHIFT™

Features

- Adjustable sprayface rotates to select wide-coverage or forceful utility spray options
- MasterClean™ sprayface resists hard water buildup for easy cleaning
- Handshower contains flow regulating check valve for backflow prevention

**ELLIPSE HANDSHOWER
K-10257
ALSO K-45415**



Codes/Standards Applicable

Specified model meets or exceeds the following:

- ASME A112.18.1/CSA B125.1
- Energy Policy Act of 2005

Colors/Finishes

- CP: Polished Chrome
- Other: Refer to Price Book for additional colors/finishes

Accessories

- CP: Polished Chrome

Specified Model

| Model | Description | Colors/Finishes | |
|----------------------|---|-----------------------------|-------------------------------------|
| K-10257 | Ellipse handshower – black handle, 2.5 gpm (9.5 lpm) | <input type="checkbox"/> CP | <input type="checkbox"/> Other ____ |
| K-10257-A | Ellipse handshower – metallic handle, 2.5 gpm (9.5 lpm) | <input type="checkbox"/> CP | <input type="checkbox"/> Other ____ |
| K-10257-GR | Ellipse handshower – grey handle, 2.5 gpm (9.5 lpm) | <input type="checkbox"/> CP | <input type="checkbox"/> Other ____ |
| K-45415 | Ellipse handshower – black handle, 2.0 gpm (7.6 lpm) | <input type="checkbox"/> CP | <input type="checkbox"/> Other ____ |
| K-45415-A | Ellipse handshower – metallic handle, 2.0 gpm (7.6 lpm) | <input type="checkbox"/> CP | <input type="checkbox"/> Other ____ |
| K-45415-GR | Ellipse handshower – grey handle, 2.0 gpm (7.6 lpm) | <input type="checkbox"/> CP | <input type="checkbox"/> Other ____ |
| Required Accessories | | | |
| K-8593 | 72" (1829 mm) metal shower hose OR | | <input type="checkbox"/> CP |
| K-9514 | 60" (1524 mm) metal shower hose | | <input type="checkbox"/> CP |

Product Specification

The multi-function ellipse handshower shall feature adjustable sprayface that rotates to select wide-coverage or forceful utility spray options. Handshower shall feature a MasterClean sprayface which resists hard water buildup for easy cleaning. Handshower shall contain flow regulating check valve for backflow prevention. Handshower shall be Kohler Model K-10257-____-____ or K-45415-____-____.



22 00 00

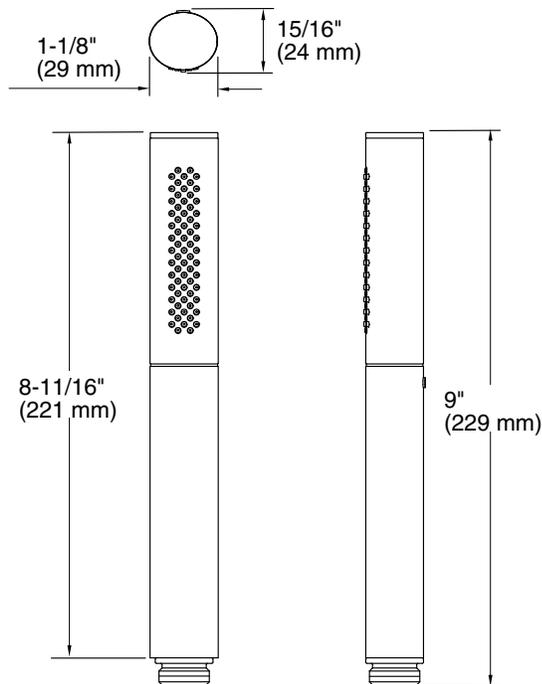
SHIFT™

Installation Notes

Install this product according to the installation guide.

Plumbing codes require an atmospheric vacuum breaker (such as Kohler Model K-9660) be installed in-line with handshowers. Please consult with local plumbing officials.

NOTE: Handshower contains flow regulating check valve for backflow prevention.



Product Diagram

SHIFT™ ELLIPSE HANDSHOWER
Page 2 of 2
1085896-4-D

THE BOLD LOOK
OF **KOHLER**®

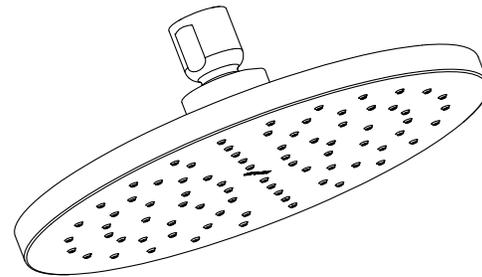


CONTEMPORARY ROUND

**RAIN SHOWERHEAD
K-45201**

Features

- Single-function Rain showerhead
- 2.0 gal/min (7.6 l/min) flow rate
- Katalyst™ Spray Technology with air induction ball joint (patent pending)
- Optimized sprayface for maximum performance
- MasterClean™ spray nozzles prohibit mineral buildup for easy cleaning
- Solid brass construction
- 1/2"-14 NPT connection



Codes/Standards Applicable

Specified model meets or exceeds the following:

- ASME A112.18.1/CSA B125.1
- Energy Policy Act of 1992

Colors/Finishes

- CP: Polished Chrome
- Other: Refer to Price Book for additional colors/finishes

Accessories

- CP: Polished Chrome
- Other: Refer to Price Book for additional colors/finishes

Specified Model

| Model | Description | Size | Nozzles | Colors/Finishes | |
|-----------------------------|---|-------------|---------|-----------------------------|------------------------------------|
| K-45201 | Rain showerhead | 8" (203 mm) | 78 | <input type="checkbox"/> CP | <input type="checkbox"/> Other____ |
| Optional Accessories | | | | | |
| K-7392 | 12" (305 mm) straight ceiling-mount shower arm and flange | | | <input type="checkbox"/> CP | <input type="checkbox"/> Other____ |
| K-7394 | 6" (152 mm) straight ceiling-mount shower arm and flange | | | <input type="checkbox"/> CP | <input type="checkbox"/> Other____ |
| K-7396 | 3" (76 mm) straight ceiling-mount shower arm and flange | | | <input type="checkbox"/> CP | <input type="checkbox"/> Other____ |
| K-10124 | Right-angle shower arm and flange | | | <input type="checkbox"/> CP | <input type="checkbox"/> Other____ |

Product Specification

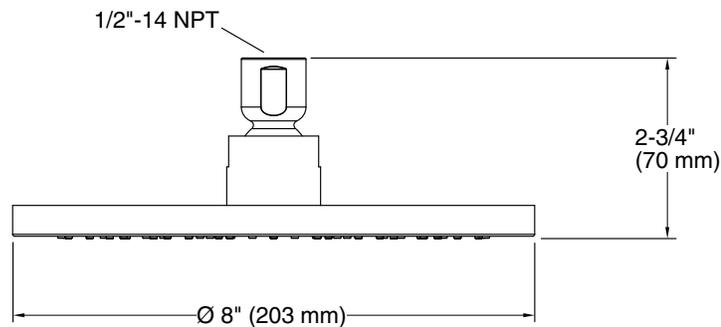
The single-function Rain showerhead shall have a 2.0 gal/min (7.6 l/min) flow rate. Showerhead shall have Katalyst Spray Technology with air induction ball joint (patent pending) and optimized sprayface for maximum performance. Showerhead shall have MasterClean spray nozzles to prohibit mineral buildup for easy cleaning and shall be made of solid brass construction. Showerhead shall have a 1/2"-14 NPT connection. Showerhead shall be Kohler Model K-45201-_____.

CONTEMPORARY ROUND

Installation Notes

Install this product according to the installation guide.

NOTICE: To ensure your valve will provide safety at the lowest flow rates, choose an automatic compensating valve with the appropriate minimum flow rating. For a showerhead rated at 2.0 gal/min (7.6 l/min) maximum, use with an automatic compensating valve rated at 1.6 gal/min (6.1 l/min) or less.



Product Diagram

CONTEMPORARY ROUND RAIN SHOWERHEAD

Page 2 of 2
1208210-4-B

THE BOLD LOOK
OF **KOHLER**®

KOHLER
FAUCETS

Features

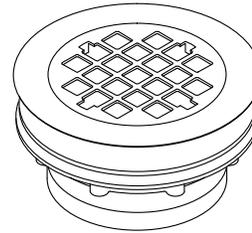
- Brass construction
- Intended for installations with 2" (51 mm) caulk connection
- Perforated strainer
- Includes connection gasket

**SHOWER DRAIN
K-9132**

Codes/Standards Applicable

Specified model meets or exceeds the following:

- ASME A112.18.2/CSA B125.2
- IAPMO/cUPC



Colors/Finishes

- CP: Polished Chrome
- PB: Vibrant® Polished Brass
- Other: Refer to Price Book for additional colors/finishes

Specified Model

| Model | Description | Colors/Finishes | | |
|--------|--------------|-----------------------------|-----------------------------|--------------------------------------|
| | | <input type="checkbox"/> CP | <input type="checkbox"/> PB | <input type="checkbox"/> Other _____ |
| K-9132 | Shower drain | | | |

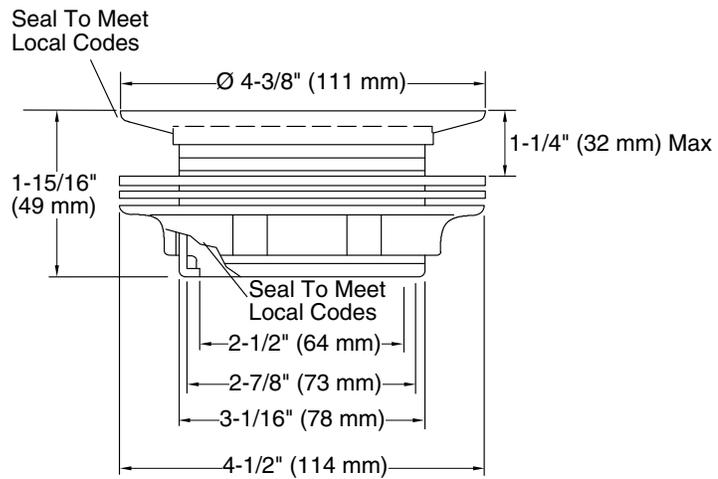
Product Specification

Shower drain shall be of brass construction. Product is intended for installations with 2" (51 mm) caulk connection. Drain shall be less stopper, body, and tailpiece. Product shall include housing, connection gasket, and perforated strainer. Drain shall be Kohler Model K-9132-_____.



Installation Notes

Install this product according to the installation guide.



K-9132

Product Diagram

SHOWER DRAIN
 Page 2 of 2
 105266-4-DC

THE BOLD LOOK
 OF **KOHLER**®

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)

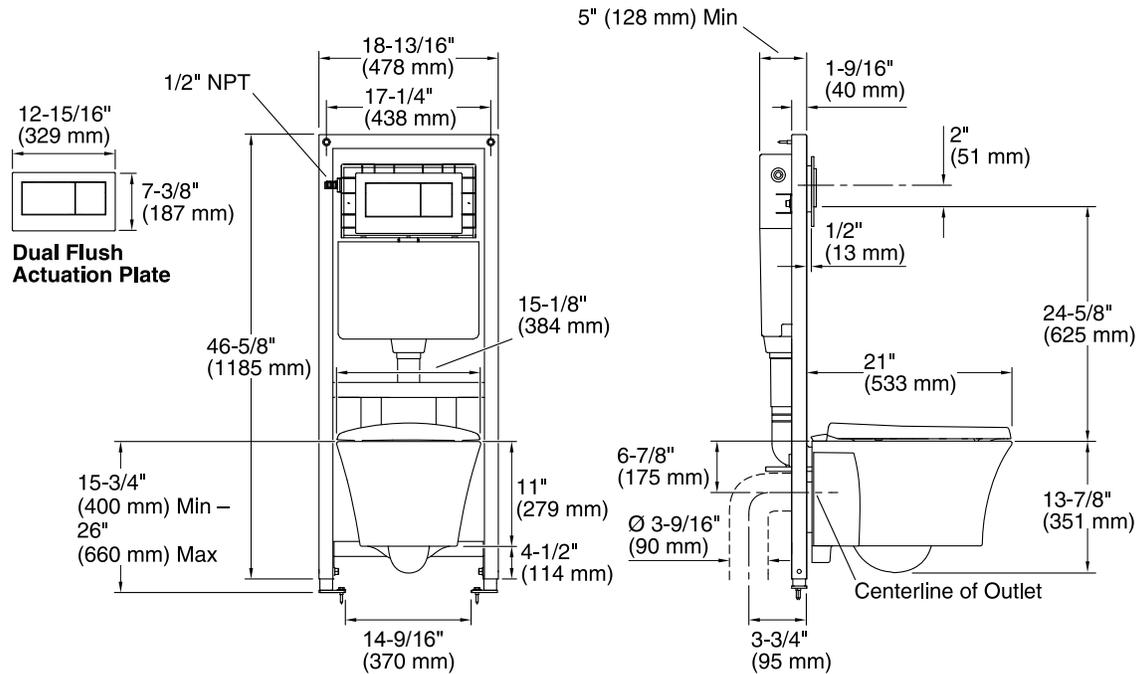
www.kohler.com

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THE BOLD LOOK
OF KOHLER®

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.

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.



22 00 00

KOHLER®

Veil™ Flush Actuator Plate K-6298

Features

- For use with the K-6303 or K-6304 Veil toilet.
- Available in a variety of colors and finishes to match the toilet or faucet finish.
- Dual flush actuator offers a choice of 0.8 or 1.6 gallons per flush (gpf).
- Large flush actuator plate opening can be removed for easy access to inner tank.

Installation

- 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.



Codes/Standards

None Applicable

KOHLER® One-Year Limited Warranty

See website for detailed warranty information.

Available Color/Finishes

Color tiles intended for reference only.

| Color | Code | Description |
|-------|------|--------------------------|
| | CP | Polished Chrome |
| | SN | Vibrant® Polished Nickel |
| | G | Brushed Chrome |
| | BN | Vibrant® Brushed Nickel |
| | BV | Vibrant® Brushed Bronze |
| | 2BZ | Oil-Rubbed Bronze |
| | 0 | White |
| | 96 | Biscuit |
| | 47 | Almond |
| | NY | Dune |
| | 7 | Black Black™ |

USA/Canada: 1-800-4KOHLER (1-800-456-4537)

www.kohler.com

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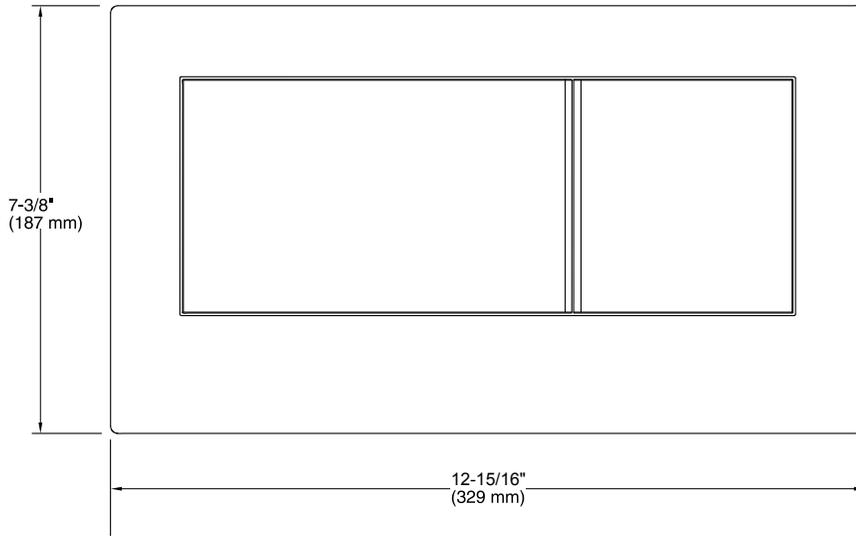
THE BOLD LOOK
OF **KOHLER**®



22 00 00

KOHLER[®]

Veil™
Flush Actuator Plate
K-6298



Technical Information
All product dimensions are nominal.

USA/Canada: 1-800-4KOHLER (1-800-456-4537)
www.kohler.com
1-23-2015 02:14

THE BOLD LOOK
OF **KOHLER**[®]

KOHLER®

SOHO®

WALL-MOUNT BATHROOM SINK K-2053

ADA CSA B651 OBC

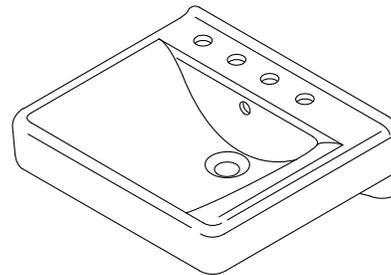
Features

- Vitreous china
- Wall-mount
- With overflow
- Drilled for concealed arm carrier
- Optional soap dispenser hole on left (-L) or right (-R)
- 20" (508 mm) x 18" (457 mm)
- 8" (203 mm) centers

Codes/Standards Applicable

Specified model meets or exceeds the following:

- ADA
- ICC/ANSI A117.1
- CSA B651
- OBC
- ASME A112.19.2/CSA B45.1



Colors/Finishes

- 0: White
- Other: Refer to Price Book for additional colors/finishes

Accessories

- CP: Polished Chrome
- Other: Refer to Price Book for additional colors/finishes

Specified Model

| Model | Description | Colors/Finishes | |
|--------------------------------|---|-----------------------------|-------------------------------------|
| K-2053 | 8" (203 mm) centers bathroom sink less soap dispenser hole | <input type="checkbox"/> 0 | <input type="checkbox"/> Other_____ |
| K-2053-L | 8" (203 mm) centers bathroom sink with soap dispenser hole on left | <input type="checkbox"/> 0 | <input type="checkbox"/> Other_____ |
| K-2053-R | 8" (203 mm) centers bathroom sink with soap dispenser hole on right | <input type="checkbox"/> 0 | <input type="checkbox"/> Other_____ |
| K-2053-N | 8" (203 mm) centers bathroom sink less overflow | <input type="checkbox"/> 0 | <input type="checkbox"/> Other_____ |
| K-2053-NL | 8" (203 mm) centers bathroom sink with soap dispenser hole on left less overflow | <input type="checkbox"/> 0 | <input type="checkbox"/> Other_____ |
| K-2053-NR | 8" (203 mm) centers bathroom sink with soap dispenser hole on right less overflow | <input type="checkbox"/> 0 | <input type="checkbox"/> Other_____ |
| Recommended Accessories | | | |
| K-8998 | Trap | <input type="checkbox"/> CP | <input type="checkbox"/> Other_____ |

Product Specification

Bathroom sink shall be made of vitreous china. The wall-mount bathroom sink shall be 20" (508 mm) in length, and 18" (457 mm) in width. Bathroom sink shall have 8" (203 mm) centers drilling. Bathroom sink shall have overflow. Bathroom sink shall be drilled for concealed arm carrier. Bathroom sink shall have optional soap dispenser hole on left (-L) or right (-R). Bathroom sink shall be Kohler Model K-2053-__.

SOHO®

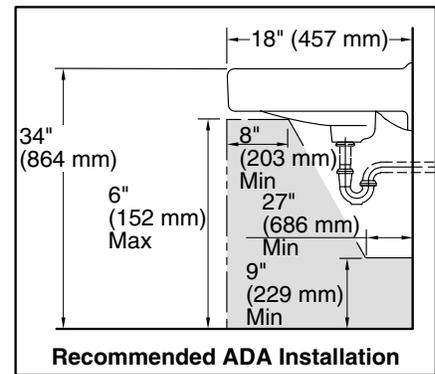
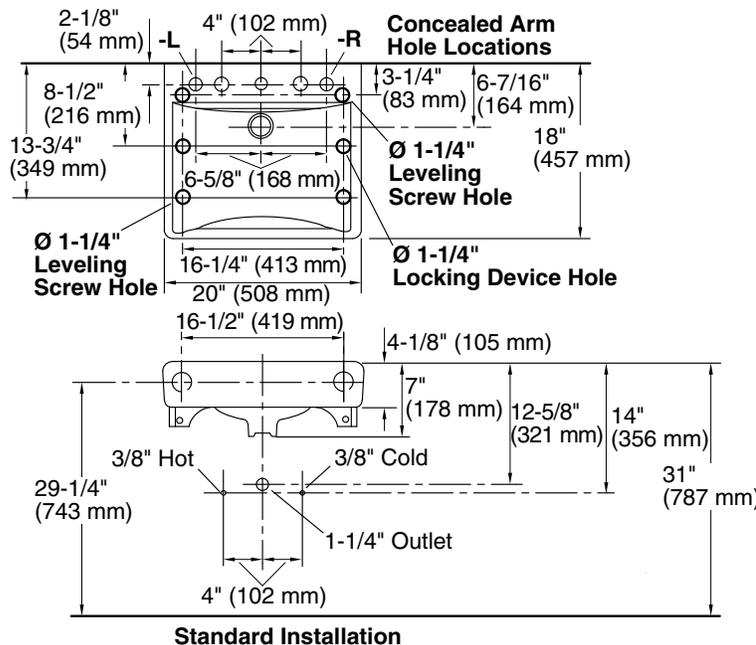
Technical Information

| | |
|---|-----------------------------|
| Fixture*: | |
| Basin area | 18" (457 mm) x 13" (330 mm) |
| Water depth | 4-7/8" (124 mm) |
| Drain hole | Ø 1-3/4" (44 mm) |
| * Approximate measurements for comparison only. | |

| Spout hole | Faucet hole | Soap dispenser hole |
|------------------|------------------|---------------------|
| Ø 1-3/8" (35 mm) | Ø 1-3/8" (35 mm) | Ø 1-1/4" (32 mm) |

Installation Notes

Install this product according to the installation guide.
Will comply with **ADA** when installed per Section 606 Lavatories of the Act.
Will comply with **CSA B651** when installed per Clause 4.3.3 of the standard.
Will comply with **OBC** when installed per Clause 3.8.3.11.



Product Diagram

SOHO® WALL-MOUNT BATHROOM SINK
Page 2 of 2
117066-4-CH

THE BOLD LOOK
OF **KOHLER®**

KOHLER® Faucets

Features

- Brass construction.
- Brass valve bodies.
- Quarter-turn washerless ceramic disc valves.
- Lever handles are ADA compliant.
- For 8" (203 mm) or 16" (406 mm) centers.
- Stationary spout.
- 3-7/8" (98 mm) spout reach.
- Pop-up drain with lift rod and tailpiece.
- 1.5 gal/min (5.7 l/min) maximum flow rate [max at 60 psi (4.14 bar)].

Loure® Widespread Bathroom Sink Faucet K-14661-4



ADA

Codes/Standards

ASME A112.18.1/CSA B125.1
NSF 61
NSF 372
DOE - Energy Policy Act 1992
EPA WaterSense®
ADA
ICC/ANSI A117.1
All applicable US Federal and State material regulations

KOHLER® Faucet Lifetime Limited Warranty

See website for detailed warranty information.

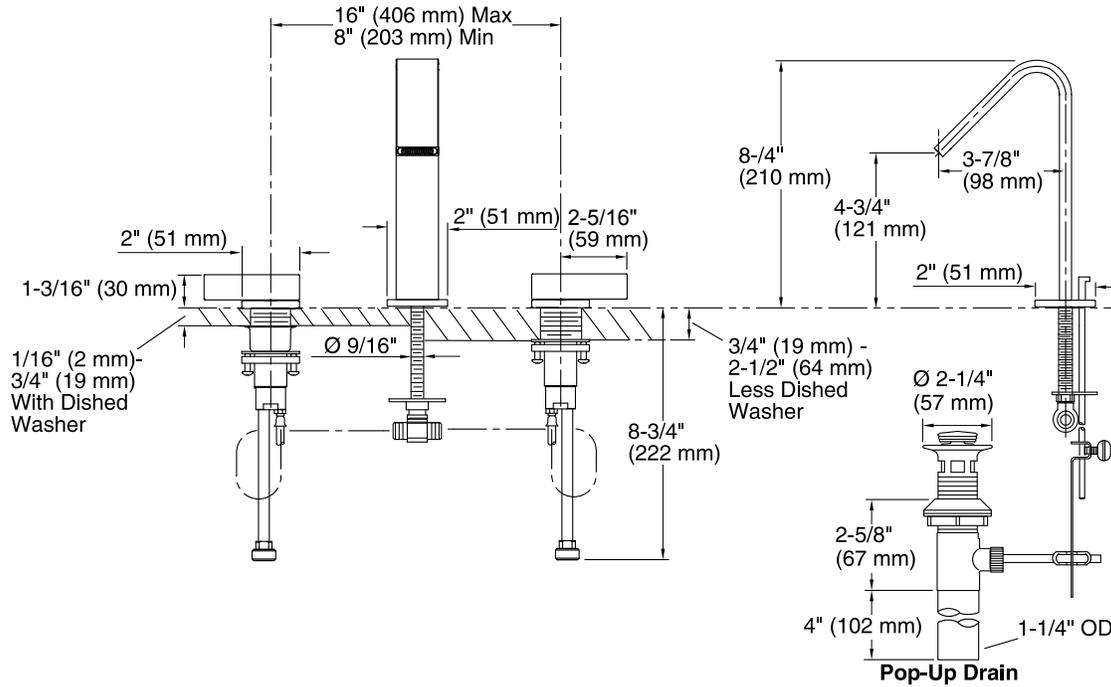
Available Color/Finishes

Color tiles intended for reference only.

| Color | Code | Description |
|---|------|--------------------------|
|  | CP | Polished Chrome |
|  | SN | Vibrant® Polished Nickel |
|  | BN | Vibrant® Brushed Nickel |

KOHLER Faucets

Loure®
Widespread Bathroom Sink Faucet
K-14661-4



Technical Information

All product dimensions are nominal.

Spout reach: 3-7/8" (98 mm)

Drain included: YES

Drain tailpiece included: YES

Faucet:

Flow rate: 1.5 gal/min (5.7 l/min)

Pressure: 60 psi (4.1 bar)

Notes

Install this product according to the installation guide.

ADA compliant when installed to the specific requirements of these regulations.

KOHLER
FAUCETS

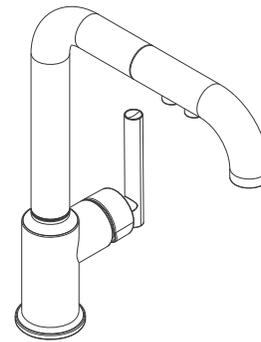
PURIST®

**PULL-OUT KITCHEN SINK FAUCET
K-7505
ALSO K-7506**

ADA

Features

- Metal construction
- One-piece, self-contained ceramic disc valve allows both volume and temperature control
- Temperature memory allows faucet to be turned on and off at any temperature setting
- Promotion™ technology with nylon hose and ball joint for easy operation
- Contemporary styling
- Three-function sprayhead with spray, laminar flow, and pause settings
- 360° spout rotation
- 8" (203 mm) or 7" (178 mm) spout reach
- 1.8 gallons (6.8 L) per minute maximum flow rate at 60 psi (4.1 bar)
- Meets CalGreen requirements for kitchen faucets



Codes/Standards Applicable

Specified model meets or exceeds the following:

- ADA
- ASME A112.18.1/CSA B125.1
- ICC/ANSI A117.1
- Energy Policy Act of 2005
- NSF 61
- All applicable US Federal and State material regulations

Colors/Finishes

- CP: Polished Chrome
- Other: Refer to Price Book for additional colors/finishes

Accessories

- NA: None applicable

Specified Model

| Model | Description | Colors/Finishes | |
|--------|--|-----------------------------|--------------------------------------|
| K-7505 | Pull-out kitchen sink faucet – 8" (203 mm) spout reach | <input type="checkbox"/> CP | <input type="checkbox"/> Other _____ |
| K-7506 | Pull-out kitchen sink faucet – 7" (178 mm) spout reach | <input type="checkbox"/> CP | <input type="checkbox"/> Other _____ |

| Optional Accessories | | |
|----------------------|--|-----------------------------|
| 1012715 | Deep rough-in kit | <input type="checkbox"/> NA |
| 1055715 | Low flow kit – reduces maximum flow to 1.5 gpm (5.7 L) at 60 psi (4.1 bar) | <input type="checkbox"/> NA |

Product Specification

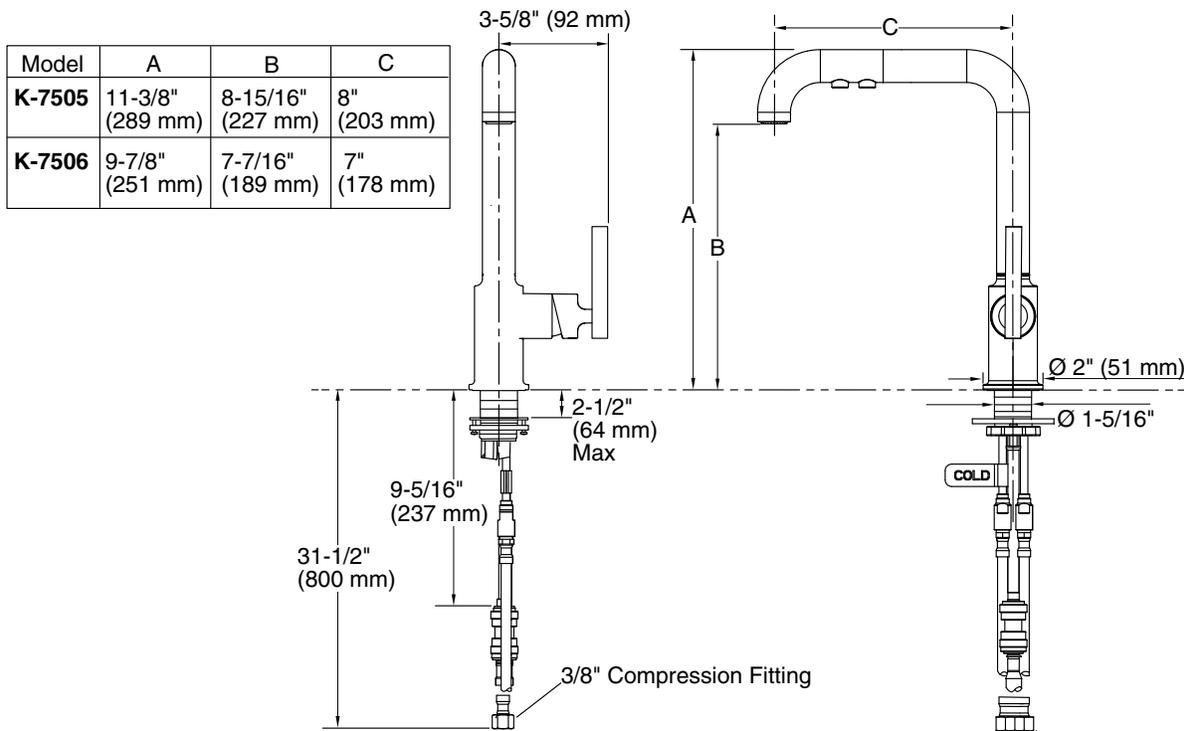
The contemporary pull-out kitchen sink faucet shall be of metal construction. Product shall have a maximum flow rate of 1.8 gallons (6.8 L) per minute with lower flow aerator options available (refer to the Kohler Price Book). Product shall feature a one-piece, self-contained ceramic disc valve, allowing volume and temperature control. Product shall feature temperature memory, allowing the faucet to be turned on and off at any temperature setting. Product shall feature a 360° spout rotation. Product shall feature a three-function sprayhead with spray, laminar flow, and pause settings. Product shall feature Promotion technology with nylon hose and ball joint for easy operation. Product shall be available with a 8" (203 mm) or 7" (178 mm) spout reach. Product shall meet CalGreen requirements for kitchen faucets. Pull-out kitchen faucet shall be Kohler Model K-_____-_____.

PURIST®

Installation Notes

Install this product according to the installation guide.

ADA compliant when installed to the specific requirements of these regulations.



Product Diagram

PURIST® PULL-OUT KITCHEN SINK FAUCET

Page 2 of 2
1140936-4-E

THE BOLD LOOK
OF **KOHLER®**

KOHLER®

VAULT™

UNDER-MOUNT APRON FRONT KITCHEN SINK K-3936

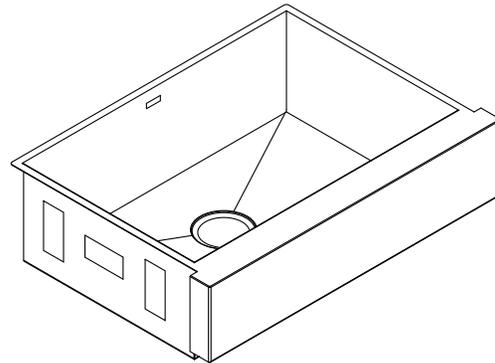
Features

- 18-gauge stainless steel
- Under-mount
- Medium single bowl
- Includes bottom bowl rack
- Includes installation hardware
- Use for standard 30" (762 mm) cabinet
- 29-1/2" (749 mm) x 21-1/4" (540 mm)

Codes/Standards Applicable

Specified model meets or exceeds the following:

- ASME A112.19.3/CSA B45.4



Colors/Finishes

- NA: None applicable

Accessories

- CP: Polished Chrome
- ST: Stainless Steel
- Other: Refer to Price Book for additional colors/finishes

Specified Model

| Model | Description | Colors/Finishes |
|-----------------------------|--------------------------------------|--|
| K-3936 | Under-mount apron front kitchen sink | <input type="checkbox"/> NA |
| Included Accessories | | |
| K-6466 | Bottom bowl rack | <input type="checkbox"/> ST |
| Optional Accessories | | |
| K-8801 | Duostrainer® sink strainer | <input type="checkbox"/> CP <input type="checkbox"/> Other _____ |

Product Specification

The under-mount apron front sink shall be made of 18-gauge stainless steel. Sink shall have medium single bowl. Sink shall include bottom bowl rack and installation hardware. Sink shall be 29-1/2" (749 mm) in length, 21-1/4" (540 mm) in width. Sink shall be used for standard 30" (762 mm) cabinet. Sink shall be Kohler Model K-3936-NA.

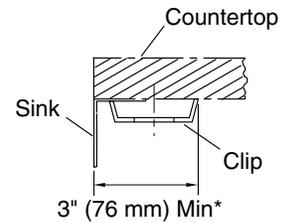
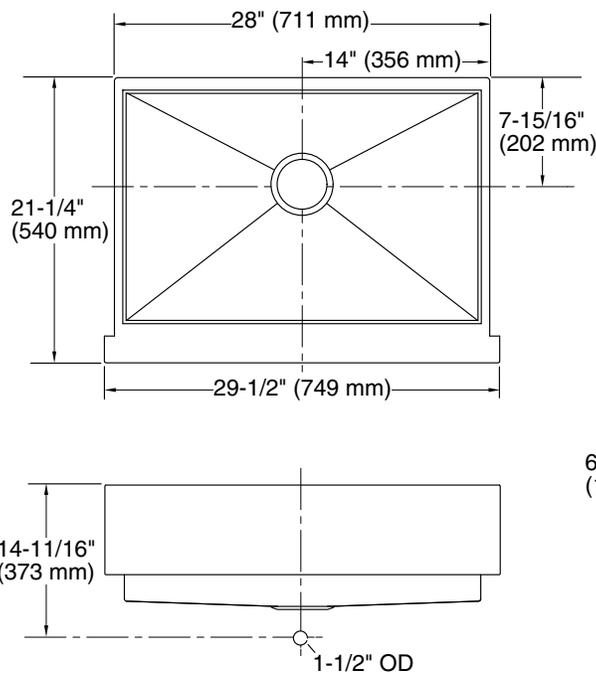
VAULT™

Technical Information

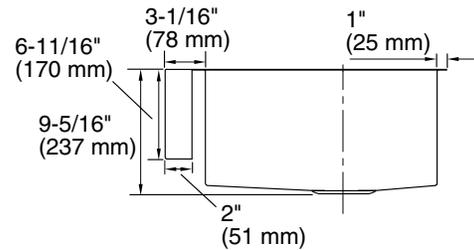
| | |
|---|--------------------------------------|
| Fixture*: | |
| Bowl area | 26-1/2" (673 mm) x 17-3/16" (437 mm) |
| Water depth | 9" (229 mm) |
| Drain hole | Ø 3-11/16" (94 mm) |
| * Approximate measurements for comparison only. | |
| Included components: | |
| Hardware kit (4 required) | 91915 |
| Cut-out template | 1166718-7 |

Installation Notes

Install this product according to the installation guide.
 Allow a minimum of 3" (76 mm) clearance for the back 1" (25 mm) sink rim flange for clip attachment.
 The 3/4" (19 mm) side rim flanges are supported without using the clip attachment. See the installation guide for further instructions.



*Allow clearance around the back sink rim for clip attachment.



Product Diagram

VAULT™ UNDER-MOUMENT APRON FRONT KITCHEN SINK
 Page 2 of 2
 1166713-4-C

THE BOLD LOOK
 OF **KOHLER**®

KOHLER
FAUCETS

DUOSTRAINER®

Features

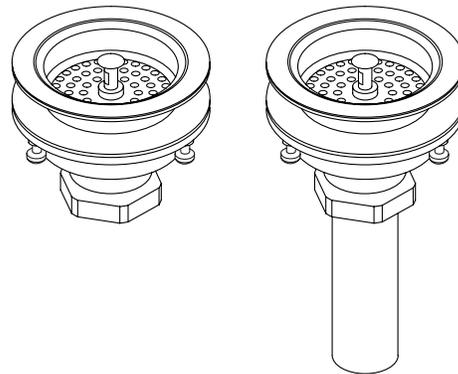
- Brass construction
- For sink installations with 3-1/2" (8.9 cm) or 4" (10.2 cm) outlet
- Removable basket strainer with open/close stopper
- 1-1/2" connection

Codes/Standards Applicable

Specified model meets or exceeds the following:

- ASME A112.18.1
- CSA B125
- IAPMO/UPC

SINK STRAINER
K-8801
ALSO K-8799



Colors/Finishes

- CP: Polished Chrome
- PB: Polished Brass
- Other: Refer to Price Book for additional colors/finishes

Specified Model:

| Model | Description | Colors/Finishes | | |
|--------|------------------------------|-----------------------------|-----------------------------|-------------------------------------|
| K-8799 | Sink strainer less tailpiece | <input type="checkbox"/> CP | <input type="checkbox"/> PB | |
| K-8801 | Sink strainer with tailpiece | <input type="checkbox"/> CP | <input type="checkbox"/> PB | <input type="checkbox"/> Other ____ |

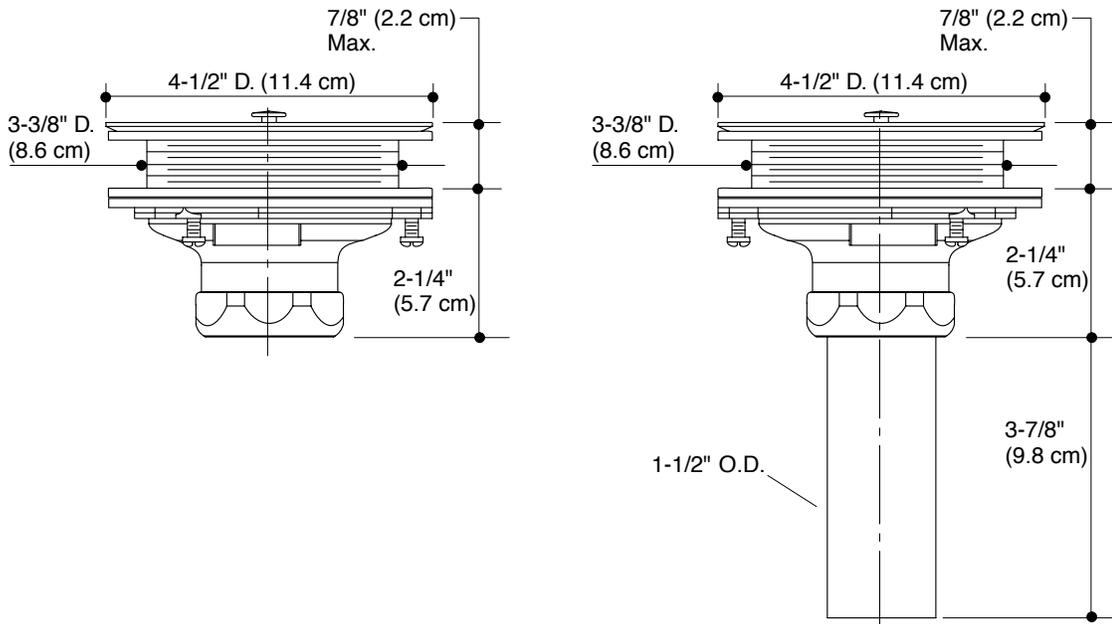
PRODUCT SPECIFICATION

Duostrainer sink strainer shall be of brass construction. Product shall feature removable basket strainer with an open/close stopper, and 1-1/2" connection. Product is intended for sink installations with 3-1/2" (8.9 cm) or 4" (10.2 cm) outlet. Optional feature shall be a brass tailpiece. Strainer shall be Kohler Model K-_____-_____.

DUOSTRAINER®

Installation Notes

Install this product in accordance with the installation instructions.



Product Diagram

DUOSTRAINER® SINK STRAINER
Page 2 of 2
105248-4-BB



RITE-TEMP®

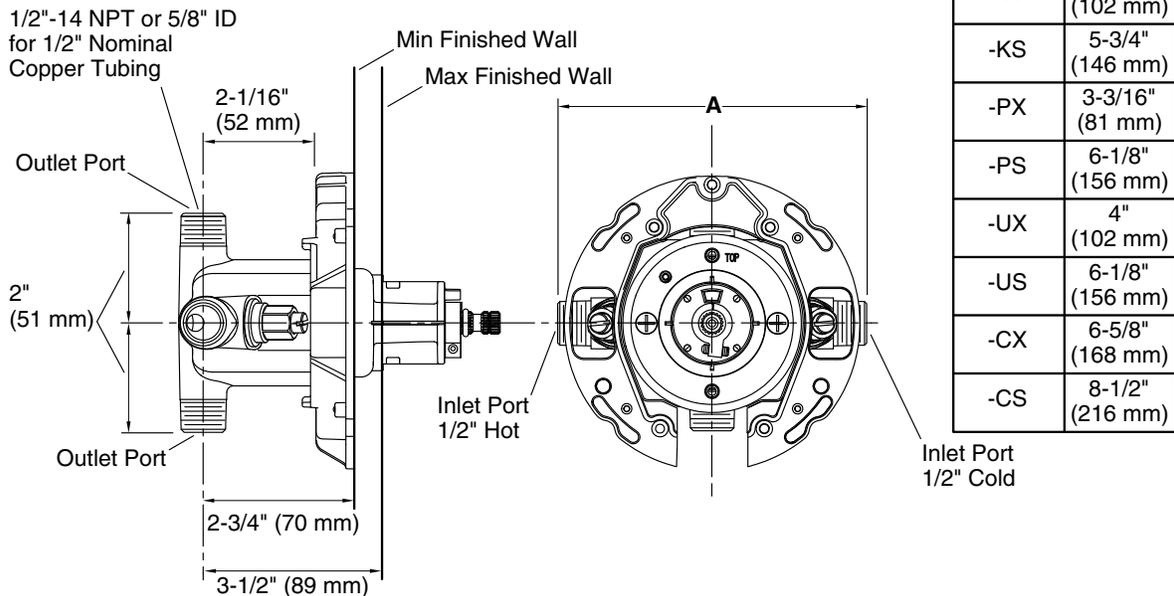
Installation Notes

Install this product according to the installation guide.

Avoid cross-flow conditions. Do not install a shut-off device on either valve outlet.

Cap the shower outlet if a deck-mount spout, diverter, or handshower is connected to a spout outlet.

Install straight pipe or tube drop of 7" (178 mm) to 18" (457 mm) with single elbow between valve and wall-mount spout. Refer to the installation instructions for proper configuration of the connection between the valve and bath spout.



Product Diagram

RITE-TEMP® PRESSURE-BALANCING VALVE
Page 2 of 2
1110626-4-F

THE BOLD LOOK
OF **KOHLER**®

InSinkErator | Model # Badger 900 | Internet # 203144513 | Store SKU # 797467

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RELATED ITEMS | PRODUCT OVERVIEW | SPECIFICATIONS | RECOMMENDED ITEMS | CUSTOMER REVIEWS | SHIPPING & DELIVERY



Stainless Steel Braided Water Connectors For Dishwasher (EF-DC-Series)

Reliable braided water connectors for dishwasher installation. Easyflex flexible braided water connectors provide protection from vibration and bursting under extreme pressure surge. Various end connections make jobs easier and reinforced PVC hose braided with stainless steel are durable and all lead-free certified.

FEATURES

- Durable, flexible water connector with reinforced PVC inner hose, braided with stainless steel.
- Chrome plated brass hex nuts for corrosion resistance.
- Reliable nut-to-hose connection with sturdy pneumatic crimp.
- EPDM washer provides safe and reliable water tight sealing.

MATERIALS

| | |
|----------------|------------------------------------|
| Braided Jacket | Stainless Steel 304 (ASTM A240) |
| Inner Hose | Reinforced durable PVC |
| Fittings | Anti-corrosion Chrome-Plated Brass |
| Washer | EPDM |
| Ferrule | Zinc plated steel |
| Elbow | Brass |

SPECIFICATIONS

| | |
|--------------------------|------------------|
| Max. Working Temperature | 180°F (82°C) |
| Max. Working Pressure | 125psi (8.6 bar) |

DESIGN CERTIFICATIONS AND APPROVALS

- cUPC/ NSF 61 Compliant for safe drinking water
- NSF 372 Compliant : Lead-Free
- ASME A 112.18.6-2009 / CSA B 125.6-2009



| | |
|------------------|------------------------|
| Job Name : | Engineer / Architect : |
| Job Location : | Wholesaler : |
| Submittal Date : | Contractor : |



Easyflex 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 modification on Easyflex products previously or subsequently sold.

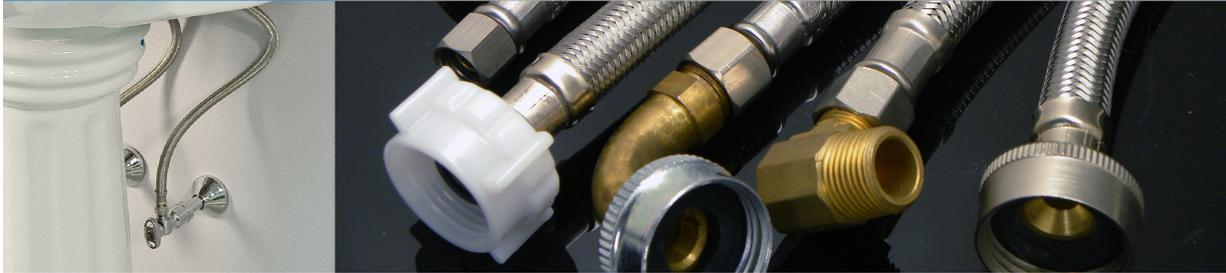
EASYFLEX TECHNICAL SPECIFICATIONS

Stainless Steel Braided Water Connectors for Dishwasher (EF-DC-Series)

| Image | Part # | Description | | Qty / Box |
|---|-----------------|--|--------|-----------|
| | | Hose & Fittings | Length | |
|  | EF-DC-38C38L-48 | DC SS Braided Dishwasher Connector 3/8" Compression x 3/8" Elbow | 48" | 50 |
| | EF-DC-38C38L-60 | | 60" | 50 |
| | EF-DC-38C38L-72 | | 72" | 50 |
| | EF-DC-38C38L-96 | | 96" | 50 |
|  | EF-DC-12C38L-60 | DC Dishwasher Connector 3/8" Compression x 3/8" Compression | 60" | 50 |
|  | EF-DC-38CHBL-48 | DC Dishwasher Connector 3/8" Compression x 3/8" Compression | 48" | 50 |
| | EF-DC-38CHBL-60 | | 60" | 50 |
| | EF-DC-38CHBL-72 | | 72" | 50 |

EASYFLEX
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TECHNICAL SPECIFICATIONS



Stainless Steel Braided Water Connectors

For Faucets (EF-FC-Series)

Reliable braided water connectors for faucets connection. Easyflex flexible braided water connectors provide protection from vibration and bursting under extreme pressure surge. Various end connections make jobs easier and reinforced PVC hose braided with stainless steel are durable and all lead-free certified.

FEATURES

- Durable, flexible water connector with reinforced PVC inner hose, braided with stainless steel.
- Chrome plated brass hex nuts for corrosion resistance.
- Reliable nut-to-hose connection with sturdy pneumatic crimp.
- EPDM washer provides safe and reliable water tight sealing.

MATERIALS

| | |
|----------------|------------------------------------|
| Braided Jacket | Stainless Steel 304 (ASTM A240) |
| Inner Hose | Reinforced durable PVC |
| Fittings | Anti-corrosion Chrome-Plated Brass |
| Washer | EPDM |
| Ferrule | Zinc-plated steel |

SPECIFICATIONS

| | |
|--------------------------|------------------|
| Max. Working Temperature | 180°F (82°C) |
| Max. Working Pressure | 125psi (8.6 bar) |

DESIGN CERTIFICATIONS AND APPROVALS

- cUPC/ NSF61 Compliant for safe drinking water
- NSF 372 Compliant : Lead-Free
- ASME A 112.18.6-2009 / CSA B 125.6-2009



| | |
|------------------|------------------------|
| Job Name : | Engineer / Architect : |
| Job Location : | Wholesaler : |
| Submittal Date : | Contractor : |

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EASYFLEX TECHNICAL SPECIFICATIONS

Stainless Steel Braided Water Connectors for Faucet (EF-FC-Series)

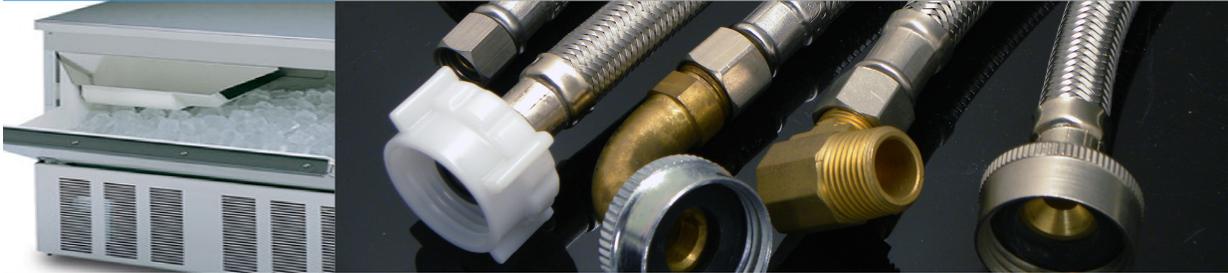
| Image | Part # | Description | | Qty / Box |
|-------|-----------------|--|--------|-----------|
| | | Hose & Fittings | Length | |
| | EF-FC-12F12F-12 | SS Braided Faucet Connector 1/2" FIP x 1/2" FIP | 12" | 50 |
| | EF-FC-12F12F-16 | | 16" | 50 |
| | EF-FC-12F12F-20 | | 20" | 50 |
| | EF-FC-12C12F-12 | SS Braided Faucet Connector 1/2" Compression x 1/2" FIP | 12" | 50 |
| | EF-FC-12C12F-16 | | 16" | 50 |
| | EF-FC-12C12F-20 | | 20" | 50 |
| | EF-FC-38C38C-12 | SS Braided Faucet Connector 3/8" Compression x 3/8" Compression | 12" | 50 |
| | EF-FC-38C38C-16 | | 16" | 50 |
| | EF-FC-38C38C-20 | | 20" | 50 |
| | EF-FC-38C38C-24 | | 24" | 50 |
| | EF-FC-38C38C-30 | | 30" | 50 |
| | EF-FC-38DT-12 | SS Braided Faucet Connector 3/8" Compression x Delta Type | 12" | 50 |
| | EF-FC-38DT-16 | | 16" | 50 |
| | EF-FC-38DT-20 | | 20" | 50 |
| | EF-FC-38C12F-9 | SS Braided Faucet Connector 3/8" Compression x 1/2" FIP | 9" | 50 |
| | EF-FC-38C12F-12 | | 12" | 50 |
| | EF-FC-38C12F-16 | | 16" | 50 |
| | EF-FC-38C12F-20 | | 20" | 50 |
| | EF-FC-38C12F-24 | | 24" | 50 |
| | EF-FC-38C12F-30 | | 30" | 50 |
| | EF-FC-38C12F-36 | | 36" | 50 |

WEST OFFICE Toll Free (888) 577-8999 • info@easyflexusa.com

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EASYFLEX
www.easyflexusa.com

TECHNICAL SPECIFICATIONS



Stainless Steel Braided Water Connectors

For Ice Maker (EF-IC-Series)

Reliable braided water connectors for Ice Maker installation. Easyflex flexible braided water connectors provide protection from vibration and bursting under extreme pressure surge. Reinforced PVC hose braided with stainless steel are durable and all lead-free certified.

FEATURES

- Durable, flexible water connector with reinforced PVC inner hose, braided with stainless steel.
- Chrome plated brass hex nuts for corrosion resistance.
- Reliable nut-to-hose connection with sturdy pneumatic crimp.
- EPDM washer provides safe and reliable water tight sealing.

MATERIALS

| | |
|----------------|------------------------------------|
| Braided Jacket | Stainless Steel 304 (ASTM A240) |
| Inner Hose | Reinforced durable PVC |
| Fittings | Anti-corrosion Chrome-Plated Brass |
| Washer | EPDM |
| Ferrule | Zinc-plated steel |

SPECIFICATIONS

| | |
|--------------------------|------------------|
| Max. Working Temperature | 180°F (82°C) |
| Max. Working Pressure | 125psi (8.6 bar) |

DESIGN CERTIFICATIONS AND APPROVALS

- NSF 372 Compliant : Lead-Free
- ASME A 112.18.6-2009 / CSA B 125.6-2009



| | |
|------------------|------------------------|
| Job Name : | Engineer / Architect : |
| Job Location : | Wholesaler : |
| Submittal Date : | Contractor : |

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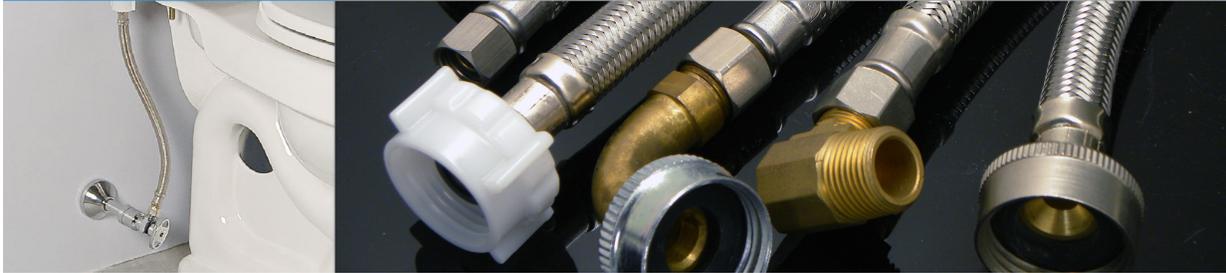
EASYFLEX TECHNICAL SPECIFICATIONS

Stainless Steel Braided Water Connectors for Ice Maker (EF-IC-Series)

| Image | Part # | Description | | Qty / Box |
|---|-----------------|---|--------|-----------|
| | | Hose & Fittings | Length | |
|  | EF-IC-14C14C-5 | SS SS Braided Ice Maker Connector 1/4" Compression x 1/4" Compression | 5" | 50 |
| | EF-IC-14C14C-6 | | 6" | 50 |
| | EF-IC-14C14C-10 | | 10" | 25 |

EASYFLEX
www.easyflexusa.com

TECHNICAL SPECIFICATIONS



Stainless Steel Braided Water Connectors For Toilet (EF-TC-Series)

Reliable braided water connectors for Toilet connection. Easyflex flexible braided water connectors provide protection from vibration and bursting under extreme pressure surge. Reinforced PVC hose braided with stainless steel are durable and all lead-free certified.

FEATURES

- Durable, flexible water connector with reinforced PVC inner hose, braided with stainless steel.
- Chrome plated brass hex nuts for corrosion resistance.
- Reliable nut-to-hose connection with sturdy pneumatic crimp.
- EPDM washer provides safe and reliable water tight sealing.

MATERIALS

| | |
|----------------|------------------------------------|
| Braided Jacket | Stainless Steel 304 (ASTM A240) |
| Inner Hose | Reinforced durable PVC |
| Fittings | Anti-corrosion Chrome-Plated Brass |
| Washer | EPDM |
| Ferrule | Zinc-plated steel |

SPECIFICATIONS

| | |
|--------------------------|------------------|
| Max. Working Temperature | 180°F (82°C) |
| Max. Working Pressure | 125psi (8.6 bar) |

DESIGN CERTIFICATIONS AND APPROVALS

- NSF 372 Compliant : Lead-Free
- ASME A 112.18.6-2009 / CSA B 125.6-2009



| | |
|------------------|------------------------|
| Job Name : | Engineer / Architect : |
| Job Location : | Wholesaler : |
| Submittal Date : | Contractor : |

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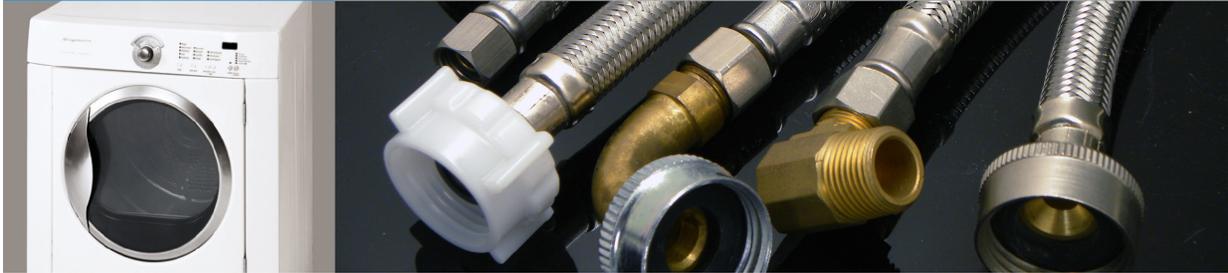
TECHNICAL SPECIFICATIONS

Stainless Steel Braided Water Connectors for Toilet (EF-TC-Series)

| Image | Part # | Description | | Qty / Box |
|---|-----------------|---|--------|-----------|
| | | Hose & Fittings | Length | |
|  | EF-TC-38CBC-9 | SS Braided Toilet Connector 3/8" Compression x 7/8" Ballcock | 9" | 50 |
| | EF-TC-38CBC-12 | | 12" | 50 |
| | EF-TC-38CBC-16 | | 16" | 50 |
| | EF-TC-38CBC-20 | | 20" | 50 |
|  | EF-TC-38CMBC-12 | SS Braided Toilet Connector 3/8" Compression x 7/8" Metal Ballcock | 12" | 50 |
| | EF-TC-38CMBC-16 | | 16" | 50 |
| | EF-TC-38CMBC-20 | | 20" | 50 |
|  | EF-TC-12FBC-12 | SS Braided Toilet Connector 1/2" FIP x 7/8" Ballcock | 12" | 50 |
| | EF-TC-12FBC-16 | | 16" | 50 |
| | EF-TC-12FBC-20 | | 20" | 50 |

EASYFLEX
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TECHNICAL SPECIFICATIONS



Stainless Steel Braided Water Connectors

For Washing Machine (EF-WM-Series)

Reliable braided water connectors for washing machine installation. Easyflex flexible braided water connectors provide protection from vibration and bursting under extreme pressure surge. Reinforced PVC hose braided with stainless steel are durable and all lead-free certified.

FEATURES

- Durable, flexible water connector with reinforced PVC inner hose, braided with stainless steel.
- Chrome plated brass hex nuts for corrosion resistance.
- Reliable nut-to-hose connection with sturdy pneumatic crimp.
- EPDM washer provides safe and reliable water tight sealing.

MATERIALS

| | |
|----------------|------------------------------------|
| Braided Jacket | Stainless Steel 304 (ASTM A240) |
| Inner Hose | Reinforced durable PVC |
| Fittings | Anti-corrosion Chrome-Plated Brass |
| Washer | EPDM |
| Ferrule | Zinc-plated steel |

SPECIFICATIONS

| | |
|--------------------------|------------------|
| Max. Working Temperature | 180°F (82°C) |
| Max. Working Pressure | 125psi (8.6 bar) |

DESIGN CERTIFICATIONS AND APPROVALS

- NSF 372 Compliant : Lead-Free
- ASME A 112.18.6-2009 / CSA B 125.6-2009



| | |
|------------------|------------------------|
| Job Name : | Engineer / Architect : |
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| Submittal Date : | Contractor : |

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EASYFLEX TECHNICAL SPECIFICATIONS

Stainless Steel Braided Water Connectors for Washing Machine (EF-WM-Series)

| Image | Part # | Description | | Qty / Box |
|---|---------------|--|--------|-----------|
| | | Hose & Fittings | Length | |
|  | EF-WM-34HB-48 | SS SS Braided Washing Machine Connector 3/4" HB | 48" | 25 |
| | EF-WM-34HB-60 | | 60" | 25 |
| | EF-WM-34HB-72 | | 72" | 25 |



INSTRUCTION MANUAL
P58671H



NRF/NBF/SSF Circulator

INSTALLER: PLEASE LEAVE THIS MANUAL FOR THE OWNER'S USE.

NOTE: Bell & Gossett recommends Bronze or Stainless Steel Booster Pumps be used for pumping potable water.

This pump is for indoor use only.



This safety alert symbol will be used in this manual and on the pump Safety Instruction decal to draw attention to safety related instructions. When used, the safety alert symbol means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!** FAILURE TO FOLLOW THE INSTRUCTIONS MAY RESULT IN A SAFETY HAZARD.

Your NRF/NBF/SSF Booster Pump should have the warning/caution label and nonsubmersible warning label displayed to the right (Fig. 1) on the pump conduit box. If this warning and caution label is missing or illegible, contact your local B&G Representative for a replacement.

WARNING

BEFORE INSTALLING, USING OR SERVICING THIS PRODUCT, READ THE INSTRUCTIONS. TO REDUCE RISK OF ELECTRICAL SHOCK SEE INSTRUCTIONS FOR PROPER INSTALLATION.

CAUTION

FOR SUPPLY CONNECTIONS USE WIRE SUITABLE FOR AT LEAST 90°C. USE COPPER CONDUCTORS ONLY. EMPLOYER DES FILS D'ALIMENTATION ADEQUATS POUR 90°C. FOR INDOOR USE ONLY. EMPLOYER UNIQUEMENT A L'INTERIEUR.

WARNING

RISK OF ELECTRIC SHOCK; THIS PUMP HAS NOT BEEN INVESTIGATED FOR USE IN SWIMMING POOL AND MARINE AREAS. -NONSUBMERSIBLE PUMP-

FIG. 1

DESCRIPTION

The Model NRF/NBF/SSF Circulator Pump features system liquid lubricated bearings, non-overloading permanent split capacitor motor with impedance protection and quiet operation.

PUMP APPLICATION

The Model NRF/NBF/SSF Booster Pump may be used for water circulating applications in hydronic and solar systems. This pump is nonsubmersible, for indoor use only. It has not been investigated for use in swimming pool and marine areas.

OPERATIONAL LIMITS

These pumps are designed to pump liquids compatible with their iron, bronze or stainless steel body constructions.

Maximum Operating Pressure: 150 PSI (10 bars)

Maximum Operating Temperature:

- NRF-22 & NRF-9F/LW, 240°F (115° C)
- NBF Pumps (except NBF-33), 230°F (110°C)
- NRF-33 & NBF-33, 225°F (107°C)
- SSF Pumps, 230°F (110°C)

Electrical Rating: 115V, 60Hz, 1Ø; 220V, 60Hz, 1Ø;
220V, 50Hz, 1Ø; 230V, 60Hz, 1Ø

If your NBF pump is equipped with a sweat connected pump body, the maximum operating pressure is limited to 150 PSI (10 bars) or a lower value determined by the type of solder used and pressure/temperature limitations listed below:

Do not exceed these values.

(Solder type limits per ASTM STD. B16.18-1978)

| PUMP BODY | TYPE OF SOLDER | MAXIMUM LIMITATIONS | |
|-----------|----------------|---------------------|----------------|
| | | PRESSURE PSI | TEMPERATURE °F |
| SWEAT | 95-5 | 300 | 200 |
| | TIN- | 250 | 225 |
| | ANTIMONY | 200 | 250 |

WARNING: Damage to the pump or failure of solder sealing joints may occur if these operational limits are exceeded. This can result in water leakage. Failure to follow this instruction could cause serious personal injury and/or property damage.

SAFETY REQUIREMENTS

MECHANICAL SAFETY

WARNING: EXCESSIVE SYSTEM PRESSURE HAZARD
The maximum working pressure of the pump is listed on the nameplate – DO NOT EXCEED THIS PRESSURE. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

WARNING: EXCESSIVE PRESSURE HAZARD VOLUMETRIC EXPANSION
The heating of water and other fluids causes volumetric expansion. The associated forces may cause failure of system components and the release of high temperature fluids. This can be prevented by installing properly sized and located compression tanks and pressure relief valves. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

THERMAL SAFETY

WARNING: EXTREME TEMPERATURE HAZARD
If the pump, motor or piping are operating at extremely high or low temperature, guarding or insulation is required. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

ELECTRICAL SAFETY

WARNING: ELECTRICAL SHOCK HAZARD
Electrical connections are to be made by a qualified electrician in accordance with all applicable codes, ordinances and good practices. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

WARNING: ELECTRICAL GROUNDING HAZARD
Adequate electrical grounding is required for the safe operation of B&G Pumps. The use of grounded metal conduit assures this requirement. If the means of connection to the supply – connection box (wiring compartment) is other than grounded metal conduit, ground the pump back to the service. Use a copper conductor at least the size of the circuit connectors supplying the pump. Connect the ground wire to the green grounding screw in the wiring compartment. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

WARNING: RISK OF ELECTRIC SHOCK
Do not install this pump in swimming pool or marine areas. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

WARNING: California Proposition 65 warning! This product contains chemicals known to the state of California to cause cancer and birth defects of other reproductive harm.

REMOVAL OF PUMP FROM EXISTING SYSTEM FOR REPLACEMENT

WARNING: ELECTRICAL SHOCK HAZARD
Disconnect and lockout the power before servicing. Failure to follow these instructions could result in serious personal injury or death.

1. Close the valves on the suction and discharge sides of the pump. (If no valves have been installed, it may be necessary to drain the system.)

WARNING: HOT WATER HAZARD
Before draining the system, allow water to cool to at least 100°F, open the drain valve (take precautions against water damage) and leave the drain valve open until servicing is complete. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

⚠ WARNING: ELECTRICAL SHOCK HAZARD
Be certain the electrical power is not present at the motor leads before continuing. Failure to follow these instructions could result in serious personal injury or death

2. Loosen the conduit box cover screw and remove the cover.
3. Disconnect the electrical supply lines to the pump.

⚠ WARNING: HIGH PRESSURE HAZARD
Pressure may be present in the pump body. This pressure can be relieved by loosening the flange bolts and shifting the pump assembly slightly to allow the pressurized water to escape. Failure to follow these instructions could result in serious personal injury or death.

4. Remove the flange nuts and bolts or loosen the union ring nuts. Then remove the pump from the piping.

PUMP INSTALLATION

⚠ CAUTION: PROPERTY DAMAGE HAZARD
It is not advisable to install circulators in an attic or upper floor over finished living space. If the circulator must be installed over head, or over expensive equipment, provide adequate drainage in the event of leakage. Failure to follow these instructions could result in property damage.

Locate the pump so there is sufficient room for inspection, maintenance and service. Bell & Gossett recommends the installation of service valves on the suction and discharge of all circulators to facilitate servicing or replacement of the circulator without draining the system.

⚠ CAUTION: The use of PTFE impregnated pipe compound and PTFE tape on pipe threads provides lubricity which can lead to overtightening and breakage. Do not overtighten. Failure to follow this instruction can result in moderate personal injury from hot water and/or property damage.

Install suction and discharge flanges or union connectors on the pipe ends. The use of PTFE tape sealer or a high quality thread sealant is recommended.

Be sure to minimize any pipe-strain on the pump. Support the suction and discharge piping by the use of pipe hangers near the pump. Line up the vertical and horizontal piping so that the bolt-holes in the pump flanges match the bolt-holes in the pipe flanges. If union connections are used, line up the pump threads with union tail pieces. **DO NOT ATTEMPT TO SPRING THE SUCTION OR DISCHARGE LINES IN POSITION. THIS MAY RESULT IN UNWANTED STRESS IN THE PUMP BODY, FLANGE CONNECTIONS AND PIPING.** The code for Pressure Piping (ANSI B31.1) lists many types of supports available for various applications.

Bell & Gossett flange/union gaskets must be installed between the NRF/NBF/SSF pump body flanges and the suction and discharge pipe flanges/union tail pieces. Use 7/16" diameter x 1 1/2" long cap screw and matching nut to connect the pump to the flanges.

⚠ WARNING: HOT WATER HAZARD
When disassembling a gasketed joint, always use a new gasket upon reassembly. NEVER RE-USE OLD GASKETS. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

⚠ WARNING: HOT WATER HAZARD
Make sure that each flange gasket remains seated in the flange groove during and after installation. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

Apply torque in even increments to both flange bolts until a value of 115 in-lbs. is reached. Both the suction and discharge flange bolts must be torqued in this manner.

If your NBF pump is equipped with a sweat connected pump body, see the following instructions:

⚠ CAUTION:
Heat associated with the use of silver solder may damage a pump voiding the warranty. Do not use silver solder. Failure to follow these instructions could result in property damage and/or moderate personal injury.

⚠ CAUTION:
Excessive use of solder in a vertical installation may result in damage to the pump impeller. Do not use excessive flux. Failure to follow these instructions could result in property damage and/or moderate personal injury.

1. Use a torch with a sharp pointed flame.
2. Clean tube ends and pump connections thoroughly.
3. Use 95-5 (Tin-Antimony); and a good grade of flux.
4. When sweating the joints, first wrap the pump body with a cool wet rag, then direct the flame with care to avoid subjecting the pump to excessive heat.
5. Check soldered connections for leaks. If resoldering is required, take care to avoid subjecting the pump to excessive heat.

⚠ WARNING: WATER LEAKAGE HAZARD
To prevent leakage, make certain that the flange bolts or ring nuts have been adequately tightened and that the solder connections do not leak. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

MODE OF DISCHARGE

The Model NRF/NBF/SSF Circulator can be installed to discharge up or down, horizontally, left or right, but the motor shaft must remain in the horizontal position, the arrow on the body must point in the direction of the flow, the conduit box must be positioned on the top or to the side of the motor housing (see figure 2). If the conduit box position must be changed, it is best to do so before installation. However, if the pump is already installed, see the section titled "REMOVAL OF PUMP FROM EXISTING SYSTEM FOR REPLACEMENT" before proceeding.

⚠ CAUTION:
Make sure the power is turned off before placing anything inside the discharge opening to move the impeller.

TO CHANGE THE CONDUIT POSITION

1. Remove the four (4) 1/4-20 Allen screws (3/16 wrench) while supporting the motor assembly.
2. Remove the motor assembly from the pump body and rotate it to the desired position (see figure 2).
3. Replace the Allen screws and tighten evenly in a diagonal method to 60 in-lbs.
4. Check to see that the impeller turns freely. Insert your finger in the discharge port of the pump body (the arrow on the pump body points in the direction of the discharge) until you can feel the impeller and rotate it with your fingertip. If the impeller does not turn easily, repeat the disassembly/reassembly process.

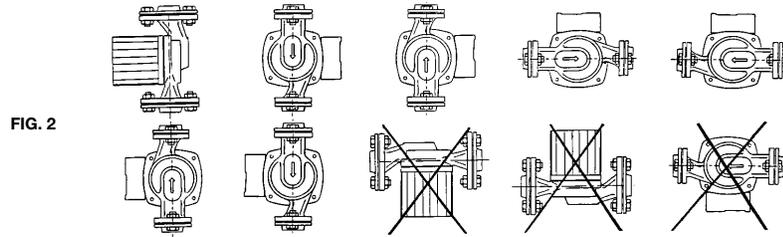


FIG. 2

WARNING: ELECTRICAL SHOCK HAZARD
Disconnect and lock out the power before making electrical connections. Failure to follow these instructions could result in serious personal injury or death.

WARNING: ELECTRICAL SHOCK HAZARD
Be certain that all connections are secure and the conduit box cover is closed before electrical power is connected. Failure to follow these instructions could result in serious personal injury, death and/or property damage.

WIRING INSTRUCTIONS

- A. Loosen the screw securing the conduit box cover (wiring compartment), and remove the screw & cover.
- B. Attach the appropriate size connector to the hole in the side of the conduit box.
- C. Using a minimum size of 14 AWG copper electrical wire (refer to your local code for wiring restrictions), wire the motor to a single phase power source that matches the electrical rating on the pump nameplate. See Fig. 3. Use the size of electrical wire as dictated by local code.
- D. Connect the ground wire to the inside of the conduit box with one of the green screws provided inside the box. See Fig. 4.

NOTE: Electrical supply and grounding wires must be suitable for at least 90°C (194°F).

NOTE: Model NRF/NBF/SSF Circulators are impedance protected and do not require external overload protection.

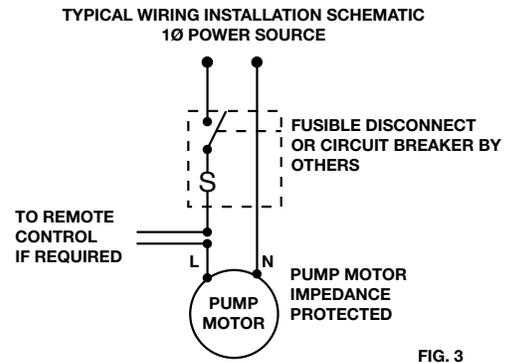


FIG. 3

CONDUIT BOX WIRING DETAIL

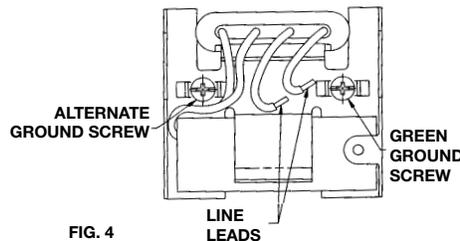


FIG. 4

SYSTEM PREPARATION

Prior to pump start-up, closed heating and cooling systems should be cleaned, drained, and refilled with clean water. The system fluid pH must be maintained between 7 and 9.

START-UP

Do not start pump until the system has been filled and vented. Air should be vented from the system by means of an air vent located at a high point in the system. The system must be completely vented prior to pump operation. Do not run NRF/NBF/SSF circulators dry. Pump operation without water circulation could result in pump and motor damage.

WARNING: HOT WATER LEAKAGE HAZARD
Pressurize the body slowly while checking for leaks at all joints with gaskets or solder connections. Failure to follow these instructions could result in serious personal injury and/or property damage.

PERIODIC INSPECTION

Bell & Gossett NRF/NBF/SSF Circulators are designed to provide years of trouble free service. It is recommended that periodic inspections be made to check for potential problems with the pump. If any leakage or evidence of leakage is present, repair or replace the unit.



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Operating Instructions & Parts Manual

4HFA6A, 4HFA7A and 4HFA8A

Please read and save these instructions. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage! Retain instructions for future reference.

Dayton® Automatic Booster Pump

Description

Dayton Automatic Booster pumps (models: 4HFA6A, 4HFA7A and 4HFA8A) are tankless pump systems that boost water pressure in a home water system. The pumps have a stainless steel body and thermoplastic impellers for a durable, corrosion resistant pump, 5.5 feet SJTW cable with 3-prong plug included. The two-stage impeller design increases performance while the control panel shows the pump status.

Unpacking and Inspection

Handle with care. Check items received against packing list to be sure that all equipment has been received. Inspect for shipping damage. If found, file claim with carrier immediately.

General Safety Information

IMPORTANT SAFETY INSTRUCTIONS

Always follow basic safety precautions with this equipment, including the following:

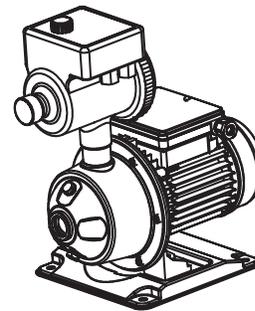
⚠ WARNING To reduce the risk of injury, do not permit children to use this product unless they are closely supervised at all times.

⚠ WARNING DO NOT use this pump with an inlet pressure greater than 50 PSI.

NOTE: A booster pump increases pressure but does NOT noticeably increase flow. Pressure will increase most at restricted flow rates, and increase least at high flow rates. Boost in a typical household will average 25-35 psi. Maximum flow through the pump is 26 gallons per minute. Minimum flow is 2 gallons per minute.

SAVE THESE INSTRUCTIONS READ AND FOLLOW SAFETY INSTRUCTIONS!

⚠ This is the safety alert symbol.
When you see this symbol on your system or in this manual, look for one of the following signal words and be alert to the potential for personal injury.



Listed 247091

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Specifications

| Model | Motor | | | | | | | NPT Inlet Outlet (In.) | Material | | | No of Stage (F) |
|--------|-------|-------|----|-----|------|------|-------|------------------------|----------|----------|----------|-----------------|
| | (HP) | Volt. | Hz | Ph. | Amps | RPM | Encl. | | Housing | Impeller | Diffuser | |
| 4HFA6A | 1/2 | 115 | 60 | 1 | 4.9 | 3450 | TEFC | 1 | SS* | RTP* | RTP* | 2 |
| 4HFA7A | 3/4 | 115 | 60 | 1 | 6.1 | 3450 | TEFC | 1 | SS | RTP | RTP | 2 |
| 4HFA8A | 1 | 115 | 60 | 1 | 7.7 | 3450 | TEFC | 1 | SS | RTP | RTP | 2 |

(* Note: SS: Stainless steel; RTP: Reinforced Thermoplastic.

Performance Chart

| Model | HP | GPM of Water @ PSI | | | | | | Max Pressure PSI |
|--------|-----|--------------------|------|------|------|------|-----|------------------|
| | | 15 | 20 | 25 | 30 | 35 | 40 | |
| 4HFA6A | 1/2 | 15.5 | 13.2 | 9.8 | 5.7 | - | - | 34.8 |
| 4HFA7A | 3/4 | 18.1 | 15.9 | 12.0 | 8.8 | 3.5 | - | 39.2 |
| 4HFA8A | 1 | 21.4 | 20.4 | 18.7 | 15.2 | 11.8 | 7.7 | 47.1 |

Form 5S6407

Printed in China
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Version 1

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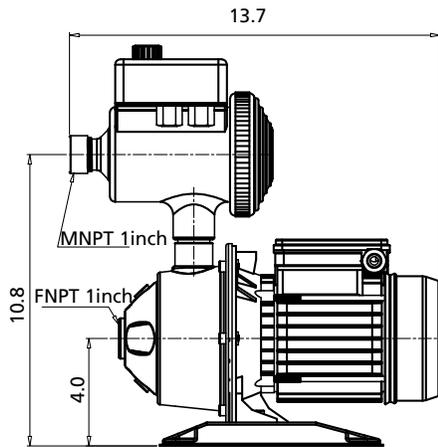


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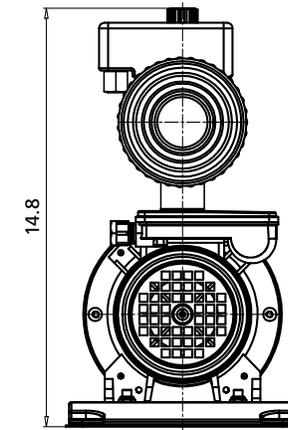
Dayton® Automatic Booster Pump

Figure 0-Dimensions: 4HFA6A,4HFA7A,4HFA8A Unit: Inch

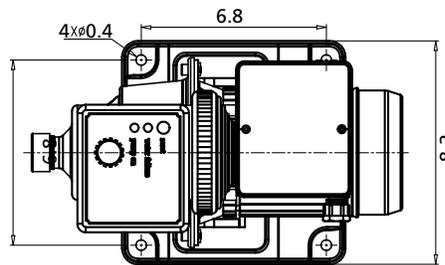
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Side View



Back View



Top View

Models 4HFA6A, 4HFA7A and 4HFA8A

⚠ DANGER Warns about hazards that will cause death, serious personal injury, or major property damage if ignored.

⚠ WARNING Warns about hazards that can cause death, serious personal injury, or major property damage if ignored.

⚠ CAUTION Warns about hazards that will or can cause minor personal injury or property damage if ignored.

NOTE: Indicates special instructions not related to hazards.

Carefully read and follow all safety instructions in this manual and on equipment. Keep safety labels in good condition; replace if missing or damaged.

To avoid risk of serious bodily injury and property damage, read the safety instructions carefully before installing this pump.

Follow local and/or national plumbing, building and electrical codes when installing the pump. Use rigid pipe when installing this pump.

General Safety Information (Continued)

⚠ WARNING **Hazardous Pressure.** The pump body may explode if used to boost pressure above 100 psi (689 kPa). Do not use this pump with inlet pressure greater than 50 psi (345 kPa). If not already in the plumbing system, install a pressure relief valve in the pump discharge line capable of passing the full pump flow at 100 psi (689 kPa). If local code requires installation of a pressure relief valve capable of handling the full pump flow at a pressure less than 100 psi (689 kPa), follow the code requirements.

A low pressure safety cutoff switch is recommended to shut off power to the pump in case of low discharge pressure due to interruption of the incoming water supply, broken pipe, etc.

Never run the pump dry. To do so can damage internal parts, overheat pump (which can cause burns to people handling or servicing pump), and will void warranty.

⚠ WARNING Risk of fire or explosion. To avoid risk of fire and explosion, Pump Water Only with this pump. Do not pump flammable liquids or chemicals. Do not use the pump near gas pilot lights or where chemical or gas fumes are present. Use of an electric pump with liquids other than water or in an atmosphere containing chemical or gas fumes may ignite those liquids or gases and cause injury or death due to an explosion and/or fire.

⚠ WARNING Burn Hazard. If water is trapped in the pump during operation it may turn to steam. Trapped steam can lead to an explosion and burns. Never run the pump with the outlet closed or obstructed.

⚠ CAUTION Do not touch an operating motor. Modern motors can operate at high temperatures. To avoid burns when servicing the pump, allow it to cool for 20 minutes after shut-down before handling.

⚠ CAUTION These pumps are designed for clean water applications only. They cannot be used for pumping dirty water or water with solid impurities greater than 3/8" (1mm) in diameter.

Electrical Safety

⚠ WARNING The pump is supplied with a 3-conductor grounding type cord. Connect only to a properly grounded, GFCI protected outlet. Do not lift the pump by the electrical cord.

⚠ WARNING Hazardous voltage. Can shock, burn or cause death. Ground the pump before connecting to a power supply. Disconnect the power before working on the pump, motor or tank.

⚠ WARNING The pump and controller are nonsubmersible. Keep the motor dry at all times. Do not wash the motor. Do not immerse. Protect the motor from wet weather.

⚠ WARNING If using an extension cord, use only an approved indoor/outdoor, 3-wire, grounding type cord. Do not allow any part of the cord or the receptacle ends to sit in water or in damp locations.

⚠ WARNING Unplug the pump before servicing. To avoid fatal shock, proceed as follows if the pump needs servicing:

Disconnect the power to the pump outlet box before unplugging the pump. After the plug is pulled, let the pump cool for 20 minutes before attempting to work on it.

Take extreme care when changing fuses. To reduce the chance of fatal electrical shock, DO NOT stand in water or put your finger in the fuse socket.

Ground the electrical outlet box.

Plug the pump and the controller into a Ground Fault Circuit Interrupter (GFCI) protected grounded outlet only.

Installation

Pump only clean water with your Dayton Booster Pump. To avoid clogging the pump and damaging the shaft seal, do not pump water containing solids, foreign material, sand, silt, or abrasives.

If you are boosting the pressure from a well pump, be sure that the system check valves are tight. If the system pressure drops when the well pump is not running, the pump may start and cycle. Excessive or rapid cycling may damage the motor and will void the warranty.

Do not use pipe joint compound on pump ports; use only PTFE tape to seal the threads. Pipe joint compound will damage the controller materials.

NOTE: The priming plug has an O-ring already installed and does not require sealing.

Dayton® Automatic Booster Pump

ENGLISH

Installation (Continued)

Tighten all the piping joints to the pump hand tight plus 1½ turns (not more).

Overtightening may break the pump and will void the warranty.

Pipe and fittings to the pump should be at least nominal 1" diameter. Pipe or fittings less than 1" in diameter will reduce performance and may damage the pump through cavitation.

The pump mount should be level, solid, as near as possible to the water source, and protected against excess moisture and flooding.

Use the shortest possible run for piping and the smallest possible number of fittings. Long pipe runs and numerous fittings increase friction and reduce the flow of water.

Support the weight of the piping and pump.

Do not allow the pump, pressure controller, or any system components to freeze. Freezing will damage the pump and void the warranty.

Periodically inspect the pump, pressure controller, and system components.

NOTE: Local code may require a pressure relief valve or pressure regulator.

CAUTION *Risk of leaks and flooding. Do not use this pump with inlet pressure greater than 50 psi (345 kPa).*

WARNING *Pressure hazard and risk of explosion. This pump can develop high pressure when operated with the discharge shut off or obstructed. For safe operation, we recommend the following:*

If not already in the plumbing system, install a pressure relief valve in the pump discharge line capable of passing the full pump flow at 100 psi (689 kPa) (See Figure 2, page 5). If local code requires installation of a pressure relief valve capable of handling the full pump

flow at a pressure less than 100 psi (689 kPa), follow the code requirements. Run the relief valve discharge to a floor drain or other drain that will give adequate runoff.

CAUTION *Risk of flooding. Be sure that all plumbing and fittings are rated to withstand the system pressure which you expect the pump to generate.*

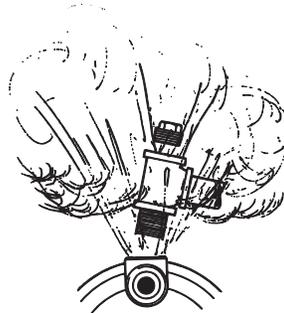


Figure 1 – Do Not Run the Pump With Inlet Shut Off

DANGER *Hazardous pressure. If using a garden hose as a discharge line, never use the pump with the hose outlet or nozzle closed. The hose or nozzle may burst from too much pressure.*

1. Decide where's the best place to install the pump. Think about these things:

- it must be near the main water supply line
- the pump must be accessible
- the power cord must reach a power outlet
- the controller's LED lights must be visible
- ease of plumbing
- space saving

NOTE: Installation of a low pressure safety cutoff switch on the pump discharge is recommended (and may be required by your local code) to shut off the power in case of low discharge pressure (caused by broken pipe, etc.).

2. Mount the pump on a solid base in the location you have decided on.
3. Choose a time that will allow you to shut off the water to the household while you install the pump.
4. Shutoff the main water supply valve to the household.
5. Open any faucet to relieve water pressure in the plumbing. Once the water pressure is relieved, close the faucet.

6. READ THIS STEP (STEP 6) COMPLETELY BEFORE PROCEEDING. You must remove a length of pipe from the main water supply line to allow installation of elbows for the pump. The locations of the cuts must take into consideration the size of the elbows being used, the length of the threads in threaded joints or the overlap in glued or soldered joints, etc. Position the elbows in line with the pump suction and discharge threads. There may be slight water leakage while cutting the pipe. Remove any burrs or shavings caused by the cutting tool.

NOTE: Galvanized pipe may not need to be cut. If there is a union close to the pump location, disassemble the union and remove (unscrew) pipe back past the pump location. Have new lengths of pipe cut and threaded to allow for the pump installation.

NOTE: Both female suction and male discharge ports have 1" NPT threads. Depending on your type of connection and the size of your home's piping, you may need to install adapters on the ports.

7. Once the short piece of pipe is removed, the piping above the cut can be drained to prevent water leakage. Place a pail or bucket under the pipe opening to the household. Open a faucet at the highest level in the plumbing system to allow water in system to drain completely. Once the system is drained, close the faucet.

Models 4HFA6A, 4HFA7A and 4HFA8A

Installation (Continued)

8. Install the elbows in the main water supply line. See Figure 4.

⚠ WARNING *Risk of burst hose and flooding. Do not install with flexible hoses. Use only rigid piping that meets code.*

9. Install piping from elbows to pump including a union in each line and a check valve in the pump discharge line. The arrow on the check valve must point away from the pump discharge (see Figure 2). If not already in the plumbing system, install a pressure relief valve in the pump discharge line capable of passing the full pump flow at 100 psi (689 kPa). If local code requires installation of a pressure relief valve capable of handling the full pump flow at a pressure less than 100 psi

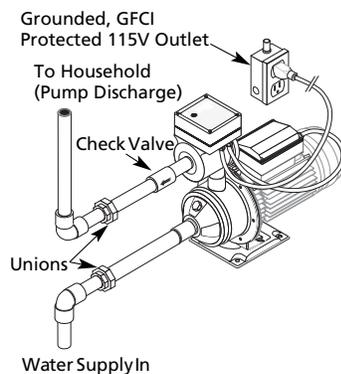


Figure 2 – Typical household booster installation. Purchase plumbing fittings separately. Consult code for relief valve/pressure regulator requirements

(689 kPa), follow the code requirements. A low pressure safety cutoff switch should also be installed in the discharge line, and may be required by your local codes.

10. With all pipe and fittings installed and sealed, turn on the main water supply slowly to pressurize the system and check for leaks. If any leaks appear, turn the main valve off, open a faucet to relieve the pressure, and repair the leak. Repeat this step until there are no leaks in the system.
11. Open a faucet to release the air from the pipes and allow water to flow. When a steady stream of water flows out of the faucet, the pump is full of water and fully primed. Close the faucet.
12. Turn the controller knob to the desired pressure for the pump to turn on. The pump comes factory preset at 30 psi (207 kPa), and we recommend starting there and adjusting it later according to your experience with the system.
13. Before continuing with the installation, see the sections of this manual titled “Electrical Connections”, “Automatic Pressure Controller”, “Normal Operation”, and “When Does The Pump Stop Operating” for detailed information on how the system functions.
14. At this point, you can plug in the pump for the first time. When you plug in the power cord, the pump will start and run for 15 seconds regardless of the controller setting. If the inlet pressure is above the set point, the pump will stop after 15 seconds.

15. When the pump is running and after it shuts off automatically, the system is at the boosted pressures. Inspect the pipe and fittings again for water leaks. If any leaks appear, unplug the pump, turn the water main valve off, open a faucet to relieve the pressure and repair the leak. Repeat this step until there are no leaks in the system.

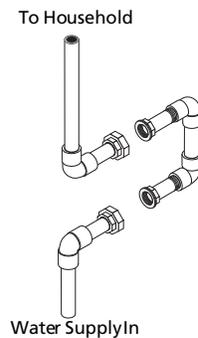


Figure 3 – Typical bypass piping needed to allow removal of pump for repair without shutting down household water system

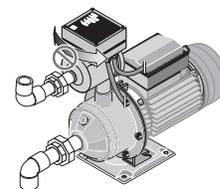


Figure 4 – DO NOT try to turn the Automatic Pressure Controller. It is aligned at the factory and twisting it will break the glue joint and cause a leak

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Dayton® Automatic Booster Pump

Installation (Continued)

ELECTRICAL CONNECTION

⚠ WARNING *Hazardous voltage. Risk of dangerous or fatal electric shock. Plug the pump into a 115 Volt, 60 Cycle, Ground Fault Circuit Interrupter (GFCI) protected grounded outlet only. The pump is equipped with a 3-wire grounded cord and plug. Do not modify or remove the plug. Make sure the outlet meets the National Electric Code or the Canadian Electrical Code, as applicable. To avoid dangerous electrical shock hazard, keep the cord dry at all times. See Figure 2, page 5.*

AUTOMATIC PRESSURE CONTROLLER

(See Figure 5)

The Automatic Pressure Controller mounts on the pump. It protects against:

- Run-dry operation;
- Overheating;
- Frequent starts caused by small water losses in the system;
- Pressure drop.

The Automatic Pressure Controller features the following LEDs and controls:

“POWER ON” LED: indicates that the unit is electrically connected and that voltage is present. The pump is ready to operate.

“PUMP ON” LED: indicates that the pump is running and actually pumping water.

“WATER FAILURE” LED: indicates that no water is detected coming into the pump.

“TEMPERATURE FAILURE” LED:

indicates that the temperature inside the pump has reached 158°F (70°C).

“Starting Pressure” dial: allows you to set the system pressure at 15 to 45 psi (103 to 310 kPa). The pump will start automatically when the system pressure drops below the pressure point which you have set on the “Starting Pressure” dial.

“Reset” button: resets any safeties which have tripped and allows the pump to restart.

NOTE: The unit will not respond if the “RESET” button is held down. It must be pressed and released to activate the reset function.

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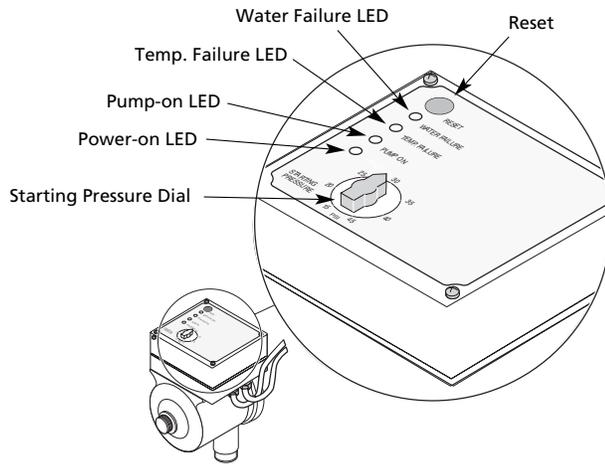


Figure 5 – Control Panel

Models 4HFA6A, 4HFA7A and 4HFA8A

Operation

NORMAL OPERATION OF THE PUMP

⚠ CAUTION *Burn Hazard. NEVER run the pump dry. Running the pump without water may cause pump to overheat and cause burns to persons handling the pump. It may also damage the impeller and may damage the seal, causing leaking or flooding, and will void the warranty. Fill the pump with water before starting it.*

Make sure that the pump has been properly installed and primed (see pages 3-6), and that the inlet pipe is unobstructed and open.

Turn the "STARTING PRESSURE" dial to the minimum desired system pressure.

Plug in the pump. The "POWER ON" and "PUMP ON" lights will come on indicating, respectively, that voltage is present and that the pump is ready to operate.

The pump will start and will continue to operate until 15 seconds after the system pressure has risen above the setpoint on the "STARTING PRESSURE" dial and flow has stopped.

WHEN DOES THE PUMP STOP OPERATING?

Pressure Set-Point/No Flow: The pump will stop operating and the "PUMP ON" LED will go off 15 seconds after:

- The system pressure is above the point set by the STARTING PRESSURE dial, and the flow has stopped.

This is normal operation.

Restart: A water flow in the system greater than 1 GPM or a drop in pressure below the STARTING PRESSURE set-point will cause the pump to restart and the "PUMP ON" LED to light up. The pump will continue to operate until 15 seconds after:

- It reaches the set pressure, and
- The flow stops.

NOTE: The 15-second delay in shutting off the pump prevents rapid cycling when water faucets are being turned on and off quickly (for example, when brushing teeth, etc.).

Pressure Drop/No Flow: Normally, when the pump starts, it will very quickly generate pressure and sense flow. If there is no flow and the pressure does not rise, it senses a "no water" condition. It can also sense this during operation if the water supply to the pump fails. To protect the pump from running dry:

- 15 seconds after it detects "no water", the pump will stop operating,
- The "PUMP ON" LED will go out, and
- The "WATER FAILURE" LED will begin flashing.

Restart: Make sure that the suction line is not obstructed, and that it is connected to a water source.

- Press and release the "RESET" button.
- The "PUMP ON" LED should light up, and
- The "WATER FAILURE" LED should stop flashing.

If flow is adequate, the pump will operate until it reaches the set-point pressure and the flow stops.

High Temperature: When the water temperature inside the pump reaches 158°F (70°C).

- The pump will stop operating,
- The "PUMP ON" LED will go out, and
- The "TEMPERATURE FAILURE" LED will begin flashing.

Restart: Wait 20 minutes to let the water temperature drop below 104°F (40°C):

- Make sure that the pump is supplied with water and that the flow is unobstructed.
- Press and release the "RESET" button.
- The "PUMP ON" LED should light up, and
- The "TEMPERATURE FAILURE" LED should stop flashing.
- If not, let it cool some more and retry.

NOTE: If the pump continues to run hot, shut it off.

Chart A – Wiring and Fuse Sizes

| Motor HP | Volts | Max. Load Amp | Branch Fuse Rating Wire Size | | |
|----------|-------|---------------|------------------------------|---------|---------|
| | | | 14 | 12 | 10 |
| 1/2 | 115 | 4.9 | 20A/15A | 20A/15A | 20A/15A |
| 3/4 | 115 | 6.1 | 20A/15A | 20A/15A | 20A/15A |
| 1 | 115 | 7.7 | 20A/15A | 20A/15A | 20A/15A |

Dayton® Automatic Booster Pump

Maintenance

LUBRICATION

The motor is lubricated at the factory for the life of the bearings. The pump seal is water cooled and self lubricating.

PUMP SERVICE

⚠ WARNING *Hazardous voltage. Can shock, burn, or cause death. Unplug the pump and controller before servicing them. Do not handle the pump or controller or*

attempt to work on the pump with wet hands or while standing on a wet or damp floor.

The motor has an auto-reset thermal overload protector. If the motor overheats, the overload will cut off the power to prevent damage and will reset after the motor cools. If the overload trips repeatedly, check the pump for the cause (low voltage, a clogged impeller, etc.).

⚠ WARNING *Read and understand safety and operating instructions in the manual before doing any work on pump!*

⚠ WARNING *Only qualified personnel should electrically test pump motor!*

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Troubleshooting Chart

| Symptom | Possible Cause(s) | Corrective Action |
|---|--|---|
| Motor will not run | 1. Fuse is blown or circuit breaker tripped | 1. DISCONNECT POWER; Replace fuse or reset circuit breaker |
| | 2. Power cord not plugged in | 2. Plug into 115 Volt grounded outlet |
| Motor runs hot and overload kicks off or motor does not run and only hums | 1. Voltage is too low | 1. Check voltage being supplied to pump |
| | 2. Impeller not moving freely | 2. Check that impeller moves freely and is not clogged |
| Motor runs but no water is delivered* | 1. Improper priming | 1. Re-prime according to instructions |
| | 2. Clogged water filter | 2. Stop pump, shut off water, and change filter cartridge. Filter should be installed on discharge side of pump |
| | 3. Discharge valve closed | 3. Open valve |
| | 4. Pipe size too small | 4. Re-pipe using pipe of the same size as suction and discharge ports on pump |
| | 5. Impeller is plugged | 5. Clean impeller |
| | 6. Pipes are frozen | 6. Thaw pipes |
| Pump does not deliver water to full capacity | 1. Corroded pipes | 1. Replace with plastic or new steel pipes |
| | 2. Piping is too small in size | 2. Re-pipe using pipe the same size as suction and discharge ports on pump |
| | 3. Pump not being supplied with enough water | 3. Enlarge inlet pipe; check well pump system |
| | 4. Low voltage | 4. Make sure outlet is at 115 Volts |

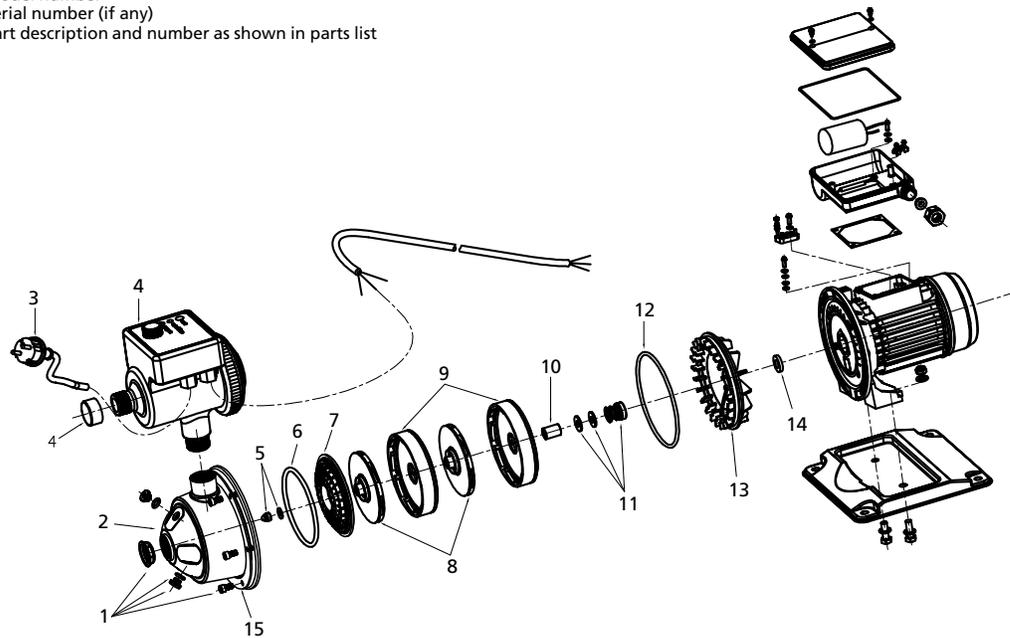
(*) **NOTE:** Unplug pump; then open faucets and see if water is flowing through system.

For Repair Parts, call 1-800-323-0620

24 hours a day – 365 days a year

Please provide following information:

- Model number
- Serial number (if any)
- Part description and number as shown in parts list



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Figure 6 – Repair Parts Illustration for Automatic Booster Pump

Repair Parts List for Automatic Booster Pump

| Reference Number | Description | Part Number for Models: | | | Qty. |
|------------------|----------------------------|-------------------------|------------------|------------------|------|
| | | 4HFA6A | 4HFA7A | 4HFA8A | |
| 1 | Hardware Kit for Pump Body | PP271730101014G | PP271730101014G | PP271730101014G | 1 |
| 2 | Pump Body | PP22053AM01G | PP22053AM01G | PP22053AM01G | 1 |
| 3 | Power Cable | PP170316Ax21002G | PP170316Ax21002G | PP170316Ax21002G | 1 |
| 4 | Pressure Switch Kit | PP2114DSK1501G | PP2114DSK1501G | PP2114DSK1501G | 1 |
| 5 | Shim and Nut Kit | PP20003AM0903G | PP20003AM0903G | PP20003AM0903G | 1 |
| 6 | O-Ring | PP21101000002G | PP21101000002G | PP21101000002G | 1 |
| 7 | Front Seal Plate | PP27183AM0405G | PP27183AM0405G | PP27183AM0405G | 1 |
| 8 | Impeller | PP27133AL02G | - | - | 1 |
| 8 | Impeller | - | PP20003AM02G | - | 1 |
| 8 | Impeller | - | - | PP27133AN02G | 1 |
| 9 | Diffuser | PP22133AM04G | PP22133AM04G | PP22133AM04G | 1 |
| 10 | Spacer | PP24053AM0901G | PP24053AM0901G | PP24053AM0901G | 1 |
| 11 | Mechanical Seal Kit | PP211030112G | PP211030112G | PP211030112G | 1 |
| 12 | O-Ring | PP21101246001G | PP21101246001G | PP21101246001G | 1 |
| 13 | Rear Seal Plate | PP27183AM0406G | PP27183AM0406G | PP27183AM0406G | 1 |
| 14 | Water Slinger | PP211030101001G | PP211030101001G | PP211030101001G | 1 |
| 15 | Pump Body Flange | PP26050B0901G | PP26050B0901G | PP26050B0901G | 1 |





Dayton® Automatic Booster Pump

LIMITED WARRANTY

DAYTON ONE-YEAR LIMITED WARRANTY. DAYTON® AUTOMATIC BOOSTER PUMP, MODELS COVERED IN THIS MANUAL, ARE WARRANTED BY DAYTON ELECTRIC MFG. CO. (DAYTON) TO THE ORIGINAL USER AGAINST DEFECTS IN WORKMANSHIP OR MATERIALS UNDER NORMAL USE FOR ONE YEAR AFTER DATE OF PURCHASE. ANY PART WHICH IS DETERMINED TO BE DEFECTIVE IN MATERIAL OR WORKMANSHIP AND RETURNED TO AN AUTHORIZED SERVICE LOCATION, AS DAYTON DESIGNATES, SHIPPING COSTS PREPAID, WILL BE, AS THE EXCLUSIVE REMEDY, REPAIRED OR REPLACED AT DAYTON'S OPTION. FOR LIMITED WARRANTY CLAIM PROCEDURES, SEE "PROMPT DISPOSITION" BELOW. THIS LIMITED WARRANTY GIVES PURCHASERS SPECIFIC LEGAL RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION.

LIMITATION OF LIABILITY. TO THE EXTENT ALLOWABLE UNDER APPLICABLE LAW, DAYTON'S LIABILITY FOR CONSEQUENTIAL AND INCIDENTAL DAMAGES IS EXPRESSLY DISCLAIMED. DAYTON'S LIABILITY IN ALL EVENTS IS LIMITED TO AND SHALL NOT EXCEED THE PURCHASE PRICE PAID.

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Certain aspects of disclaimers are not applicable to consumer products; e.g., (a) some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you; (b) also, some jurisdictions do not allow a limitation on how long an implied warranty lasts, consequently the above limitation may not apply to you; and (c) by law, during the period of this Limited Warranty, any implied warranties of implied merchantability or fitness for a particular purpose applicable to consumer products purchased by consumers, may not be excluded or otherwise disclaimed.

Prompt Disposition. A good faith effort will be made for prompt correction or other adjustment with respect to any product which proves to be defective within limited warranty. For any product believed to be defective within limited warranty, first write or call dealer from whom the product was purchased. Dealer will give additional directions. If unable to resolve satisfactorily, write to Dayton at address below, giving dealer's name, address, date, and number of dealer's invoice, and describing the nature of the defect. Title and risk of loss pass to buyer on delivery to common carrier. If product was damaged in transit to you, file claim with carrier.

Manufactured for Dayton Electric Mfg. Co., 100 Grainger Parkway, Lake Forest, Illinois 60045-5201 U.S.A.

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Lake Forest, Illinois 60045 U.S.A**

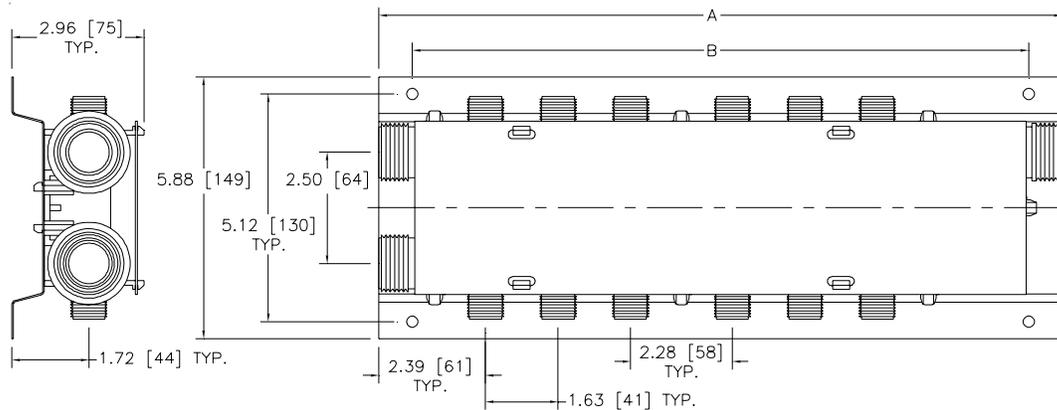




QickPort® Preassembled Manifold – QPPM_H_C Specification Sheet

Tag _____

Dimensional Data: Inches and [mm] are subject to manufacturing tolerances and change without notice.



Engineering Specification: ZurnPEX® 1" diameter polysulfone QickPort® Preassembled Manifold. Comprised of hot and cold 1/2" male straight pipe thread outlets and 1" male straight pipe thread inlets. Manifold is rated at a maximum pressure of 100 PSI at 73°F with valves, and a maximum pressure of 160 PSI at 73°F without valves. Optional shut off valves can be added for individual on/off control of each distribution line. NSF listed.

| Part Number | A Dim. | B Dim. | No. of Hot Ports | No. of Cold Ports |
|-------------|-------------|-------------|------------------|-------------------|
| QPPM3H9C | 15.31 [389] | 13.81 [351] | 3 | 9 |
| QPPM6H12C | 20.84 [529] | 19.34 [491] | 6 | 12 |
| QPPM9H15C | 26.37 [670] | 24.87 [632] | 9 | 15 |
| QPPM12H18C | 31.90 [810] | 30.40 [772] | 12 | 18 |
| QPPM15H21C | 37.43 [951] | 35.93 [913] | 15 | 21 |

Manifold Accessories

| | | | |
|-----------------|--|---------------|---|
| ___ QQSFC55X | 1" Swivel x 1" Barb Adapter | ___ QAFA33FQP | 1/2" FPT x 1/2" Nom Tube |
| ___ QQSFC45X | 1" Swivel x 3/4" Barb Adapter | ___ QQSFC23XP | 3/8" Barb x 1/2" FPT Swivel Cone Conn (Plastic Nut) |
| ___ QQTFC45X | 1" Swivel x 3/4" MIP Adapter | ___ QQSFC33XP | 1/2" Barb x 1/2" FPT Swivel Cone Conn (Plastic Nut) |
| ___ QTC5FB | 1" Cap | ___ QQSFC23X | 3/8" Barb x 1/2" FPT Swivel Cone Conn (Brass Nut) |
| ___ QFNCR4QP | 1" x 3/4" Nom Tube Nut-Ring-Cone | ___ QQSFC33X | 1/2" Barb x 1/2" FPT Swivel Cone Conn (Brass Nut) |
| ___ QT555TQP | 1" x 1" x 1" Tee | ___ QTC3FQP | 1/2" Cap |
| ___ QT553TQP | 1" x 1" x 1/2" Tee | ___ QKLABELS | Indicator Labels |
| ___ QE55TQP | 1" x 1" Elbow | ___ QKPANEL29 | Access Panel 14" x 29" |
| ___ QE53TQP | 1" x 1/2" Elbow | ___ QKPANEL38 | Access Panel 14" x 38" |
| ___ QE65TQP | 1-1/4" x 1" Elbow | ___ QKPANEL54 | Access Panel 14" x 54" |
| ___ QC55FQP | 1" Female Coupling | ___ QPMB | Mounting Bracket |
| ___ MANCOUPLING | 1" Double Swivel Coupling | ___ QPBV2X | 1/2" Swivel x 3/8" Barb Plastic Ball Valve |
| ___ QPBV2XB | 1/2" Swivel x 3/8" Barb Brass Ball Valve | ___ QPBV3X | 1/2" Swivel x 1/2" Barb Plastic Ball Valve |
| ___ QPBV3XB | 1/2" Swivel x 1/2" Barb Brass Ball Valve | | |
| ___ QFNCR2QP | 1/2" FPT x 3/8" Nom Tube | | |

| | | |
|---------------|----------------|----------------|
| Rev. A | Date: 06/18/08 | C.N. No. 98635 |
| Dwg. No 82698 | | Prod. No. QPPM |

ZURN PEX® PLUMBING AND RADIANT HEATING SYSTEMS HWY 11 EAST, COMMERCE, TX, U.S.A. 75429 PHONE: 800/872-7277 FAX: 800/209-2148 WEBSITE: www.zurn.com
IN CANADA: ZURN INDUSTRIES LIMITED 3544 NASHUA DRIVE, MISSISSAUGA, ONTARIO L4V 1L2 PHONE: 905/405-8272 FAX: 905/405-1292

Specifications: HD002 • Issue Date December 2008



SharkBite® PEX Tubing Without Oxygen Barrier

DESCRIPTION

SharkBite® tubing is a cross-linked polyethylene tubing used for potable water application. The tubing is printed with a SharkBite® imprint pattern that provides a visual aid to determine if the tube has been inserted all the way into the SharkBite® push-fit fitting. This feature only works if the tubing is cut between the SharkBite® imprint pattern.

FEATURES AND BENEFITS

Tubing printed with SharkBite® imprint pattern:
Allows for easy assembly with SharkBite® push-fit fittings without use of elaborate and costly tools.

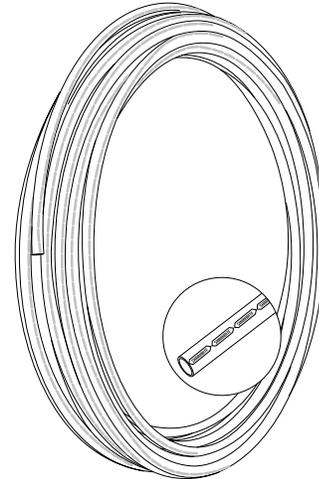
SharkBite® tubing:
Strong, flexible, resilient tubing that provides superior temperature performance.

Complete connection system:
System provides a wide selection of fittings and tubing to ensure a trouble-free rough-in.

Listed to NSF 14 and CSA B137.5 for use in potable water systems:
Inspector friendly, peace of mind!

Manufactured and tested to meet or exceed the requirements of the ASTM F-876, ASTM F-877, ASTM F-2023 and CSA B137.5:
Specify and install with confidence!

Variety of connections options, SharkBite® PEX can be connected with SharkBite® push-fit fittings, or Cash Acme barbed fittings:
Flexible installation options.



SPECIFICATION

System shall be plumbed using SharkBite® Tubing cross-linked polyethylene pipe and all joints shall be made using SharkBite® push-fit fittings or brass Cash Acme barbed fittings with clamps. Tubing and fittings shall be installed as outlined in the SharkBite® PEX installation manual.

SPECIFICATION DATA

Performance:
Maximum Working Pressure:
160 psi @ 73.4°F (23°C)
100 psi @ 180°F (82°C)
80 psi @ 200° F (93°C)

Materials:
TubingPEX-B cross-linked polyethylene

CERTIFICATIONS

The SharkBite® tubing is approved for use in all model codes in the US and Canada for use in hydronic and potable water systems and is certified to the following standards: NSF 14/61, NSF P171, ASTM F-876, ASTM F-877, CSA B137.5 and AWWA C904.

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08-CAC-304 12.04.08 Printed in USA



Specifications: HD002 • Issue Date December 2008



SharkBite® PEX Tubing Without Oxygen Barrier

SPECIFICATION DATA

| Model | Nominal Tubing Size | | | | Length | | Bend Radius | | Fluid Capacity Per 100' | | Package Weight | |
|--|---------------------|----|--------|----|--------|--------|-------------|-----|-------------------------|-------|----------------|------|
| | ID | | OD | | ft | M | in | mm | gal | ltrs | lbs | kgs |
| | in | mm | in | mm | | | | | | | | |
| Natural PEX w/Black Text (Coil) | | | | | | | | | | | | |
| U855N100 | 3/8" | 10 | 1/2" | 15 | 100 | 30.48 | 4 | 102 | 0.53 | 2.01 | 4.5 | 2.0 |
| U855N300 | 3/8" | 10 | 1/2" | 15 | 300 | 91.44 | 4 | 102 | 0.53 | 2.01 | 13.5 | 6 |
| U855N500 | 3/8" | 10 | 1/2" | 15 | 500 | 152.40 | 4 | 102 | 0.53 | 2.01 | 23 | 10.4 |
| Natural PEX w/Red Text (Coil) | | | | | | | | | | | | |
| U855NR100 | 3/8" | 10 | 1/2" | 15 | 100 | 30.48 | 4 | 102 | 0.53 | 2.01 | 4.5 | 2.0 |
| U855NR300 | 3/8" | 10 | 1/2" | 15 | 300 | 91.44 | 4 | 102 | 0.53 | 2.01 | 13.5 | 6 |
| U855NR500 | 3/8" | 10 | 1/2" | 15 | 500 | 152.40 | 4 | 102 | 0.53 | 2.01 | 23 | 10.4 |
| Blue PEX (Coil) | | | | | | | | | | | | |
| U860B100 | 1/2" | 13 | 5/8" | 16 | 100 | 30.48 | 5 | 127 | 0.96 | 3.63 | 5.5 | 2.5 |
| U860B300 | 1/2" | 13 | 5/8" | 16 | 300 | 91.44 | 5 | 127 | 0.96 | 3.63 | 14.5 | 6.6 |
| U860B500 | 1/2" | 13 | 5/8" | 16 | 500 | 152.40 | 5 | 127 | 0.96 | 3.63 | 24 | 10.9 |
| U870B100 | 3/4" | 19 | 7/8" | 22 | 100 | 30.48 | 7 | 178 | 1.9 | 7.19 | 10.5 | 4.8 |
| U870B300 | 3/4" | 19 | 7/8" | 22 | 300 | 91.44 | 7 | 178 | 1.9 | 7.19 | 31.5 | 14.4 |
| U870B500 | 3/4" | 19 | 7/8" | 22 | 500 | 152.40 | 7 | 178 | 1.9 | 7.19 | 45 | 20.4 |
| U880B100 | 1" | 25 | 1-1/8" | 29 | 100 | 30.48 | 10 | 254 | 3.1 | 11.73 | 18 | 8.2 |
| U880B300 | 1" | 25 | 1-1/8" | 29 | 300 | 91.44 | 10 | 254 | 3.1 | 11.73 | 54 | 24.6 |
| U880B500 | 1" | 25 | 1-1/8" | 29 | 500 | 152.40 | 10 | 254 | 3.1 | 11.73 | 90 | 40.8 |
| Red PEX (Coil) | | | | | | | | | | | | |
| U860R100 | 1/2" | 13 | 5/8" | 16 | 100 | 30.48 | 5 | 127 | 0.96 | 3.63 | 5.5 | 2.5 |
| U860R300 | 1/2" | 13 | 5/8" | 16 | 300 | 91.44 | 5 | 127 | 0.96 | 3.63 | 14.5 | 6.6 |
| U860R500 | 1/2" | 13 | 5/8" | 16 | 500 | 152.40 | 5 | 127 | 0.96 | 3.63 | 24 | 10.9 |
| U870R100 | 3/4" | 19 | 7/8" | 22 | 100 | 30.48 | 7 | 178 | 1.9 | 7.19 | 10.5 | 4.8 |
| U870R300 | 3/4" | 19 | 7/8" | 22 | 300 | 91.44 | 7 | 178 | 1.9 | 7.19 | 31.5 | 14.4 |
| U870R500 | 3/4" | 19 | 7/8" | 22 | 500 | 152.40 | 7 | 178 | 1.9 | 7.19 | 45 | 20.4 |
| U880R100 | 1" | 25 | 1-1/8" | 29 | 100 | 30.48 | 10 | 254 | 3.1 | 11.73 | 18 | 8.2 |
| U880R300 | 1" | 25 | 1-1/8" | 29 | 300 | 91.44 | 10 | 254 | 3.1 | 11.73 | 54 | 24.6 |
| U880R500 | 1" | 25 | 1-1/8" | 29 | 500 | 152.40 | 10 | 254 | 3.1 | 11.73 | 90 | 40.8 |
| White PEX (Coil) | | | | | | | | | | | | |
| U860W100 | 1/2" | 13 | 5/8" | 16 | 100 | 30.48 | 5 | 127 | 0.96 | 3.63 | 5.5 | 2.5 |
| U860W300 | 1/2" | 13 | 5/8" | 16 | 300 | 91.44 | 5 | 127 | 0.96 | 3.63 | 14.5 | 6.6 |
| U860W500 | 1/2" | 13 | 5/8" | 16 | 500 | 152.40 | 5 | 127 | 0.96 | 3.63 | 24 | 10.9 |
| U870W100 | 3/4" | 19 | 7/8" | 22 | 100 | 30.48 | 7 | 178 | 1.9 | 7.19 | 10.5 | 4.8 |
| U870W300 | 3/4" | 19 | 7/8" | 22 | 300 | 91.44 | 7 | 178 | 1.9 | 7.19 | 31.5 | 14.4 |
| U870W500 | 3/4" | 19 | 7/8" | 22 | 500 | 152.40 | 7 | 178 | 1.9 | 7.19 | 45 | 20.4 |
| U880W100 | 1" | 25 | 1-1/8" | 29 | 100 | 30.48 | 10 | 254 | 3.1 | 11.73 | 18 | 8.2 |
| U880W300 | 1" | 25 | 1-1/8" | 29 | 300 | 91.44 | 10 | 254 | 3.1 | 11.73 | 54 | 24.6 |
| U880W500 | 1" | 25 | 1-1/8" | 29 | 500 | 152.40 | 10 | 254 | 3.1 | 11.73 | 90 | 40.8 |
| Blue PEX (Straight Lengths) | | | | | | | | | | | | |
| U860B5 | 1/2" | 13 | 5/8" | 16 | 5' | 1.52 | 5 | 127 | 0.96 | 3.63 | 3.00 | 1.4 |
| U860B10 | 1/2" | 13 | 5/8" | 16 | 10' | 3.04 | 5 | 127 | 0.96 | 3.63 | 6.00 | 2.7 |
| U860B20 | 1/2" | 13 | 5/8" | 16 | 20' | 6.09 | 5 | 127 | 0.96 | 3.63 | 12.0 | 5.5 |
| U870B5 | 3/4" | 19 | 7/8" | 22 | 5' | 1.52 | 7 | 178 | 1.9 | 7.19 | 5.25 | 2.5 |
| U870B10 | 3/4" | 19 | 7/8" | 22 | 10' | 3.04 | 7 | 178 | 1.9 | 7.19 | 10.5 | 4.8 |
| U870B20 | 3/4" | 19 | 7/8" | 22 | 20' | 6.09 | 7 | 178 | 1.9 | 7.19 | 21 | 9.5 |
| U880B5 | 1" | 25 | 1-1/8" | 29 | 5' | 1.52 | 10 | 254 | 3.1 | 11.73 | TBD | TBD |
| U880B10 | 1" | 25 | 1-1/8" | 29 | 10' | 3.04 | 10 | 254 | 3.1 | 11.73 | TBD | TBD |
| U880B20 | 1" | 25 | 1-1/8" | 29 | 20' | 6.09 | 10 | 254 | 3.1 | 11.73 | TBD | TBD |
| Red PEX (Straight Lengths) | | | | | | | | | | | | |
| U860R5 | 1/2" | 13 | 5/8" | 16 | 5' | 1.52 | 5 | 127 | 0.96 | 3.63 | 3.00 | 1.4 |
| U860R10 | 1/2" | 13 | 5/8" | 16 | 10' | 3.04 | 5 | 127 | 0.96 | 3.63 | 6.00 | 2.7 |
| U860R20 | 1/2" | 13 | 5/8" | 16 | 20' | 6.09 | 5 | 127 | 0.96 | 3.63 | 12.0 | 5.5 |
| U870R5 | 3/4" | 19 | 7/8" | 22 | 5' | 1.52 | 7 | 178 | 1.9 | 7.19 | 5.25 | 2.5 |
| U870R10 | 3/4" | 19 | 7/8" | 22 | 10' | 3.04 | 7 | 178 | 1.9 | 7.19 | 10.5 | 4.8 |
| U870R20 | 3/4" | 19 | 7/8" | 22 | 20' | 6.09 | 7 | 178 | 1.9 | 7.19 | 21 | 9.5 |
| U880R5 | 1" | 25 | 1-1/8" | 29 | 5' | 1.52 | 10 | 254 | 3.1 | 11.73 | TBD | TBD |
| U880R10 | 1" | 25 | 1-1/8" | 29 | 10' | 3.04 | 10 | 254 | 3.1 | 11.73 | TBD | TBD |
| U880R20 | 1" | 25 | 1-1/8" | 29 | 20' | 6.09 | 10 | 254 | 3.1 | 11.73 | TBD | TBD |
| White PEX (Straight Lengths) | | | | | | | | | | | | |
| U860W5 | 1/2" | 13 | 5/8" | 16 | 5' | 1.52 | 5 | 127 | 0.96 | 3.63 | 3.00 | 1.4 |
| U860W10 | 1/2" | 13 | 5/8" | 16 | 10' | 3.04 | 5 | 127 | 0.96 | 3.63 | 6.00 | 2.7 |
| U860W20 | 1/2" | 13 | 5/8" | 16 | 20' | 6.09 | 5 | 127 | 0.96 | 3.63 | 12.0 | 5.5 |
| U870W5 | 3/4" | 19 | 7/8" | 22 | 5' | 1.52 | 7 | 178 | 1.9 | 7.19 | 5.25 | 2.5 |
| U870W10 | 3/4" | 19 | 7/8" | 22 | 10' | 3.04 | 7 | 178 | 1.9 | 7.19 | 10.5 | 4.8 |
| U870W20 | 3/4" | 19 | 7/8" | 22 | 20' | 6.09 | 7 | 178 | 1.9 | 7.19 | 21 | 9.5 |
| U880W5 | 1" | 25 | 1-1/8" | 29 | 5' | 1.52 | 10 | 254 | 3.1 | 11.73 | TBD | TBD |
| U880W10 | 1" | 25 | 1-1/8" | 29 | 10' | 3.04 | 10 | 254 | 3.1 | 11.73 | TBD | TBD |
| U880W20 | 1" | 25 | 1-1/8" | 29 | 20' | 6.09 | 10 | 254 | 3.1 | 11.73 | TBD | TBD |

Specifications: HB001 • Issue Date May 2009



SharkBite® Push-Fit Fittings

For Copper, CPVC or PEX Pipe

DESCRIPTION

The SharkBite® push-fit fittings allow the user to connect pipe in seconds with relative ease.

FEATURES AND BENEFITS

Instant push-fit connection for increased ease-of-use:
No soldering, clamps, unions, or glue required.

Fittings certified to 200 PSI and 200°F (93°C):
Proven durability and quality.

Fits copper tubing, and CTS CPVC and PEX:
Connects all three types in any combination.

Integral tube liner for PEX installations:
Integrated design means no loose components, ensures secure, reliable connection.

Design certified and agency listed:
Inspector friendly, peace of mind!

Compact, robust DZR brass body:
Foundation of a strong, corrosion resistant, durable fitting.

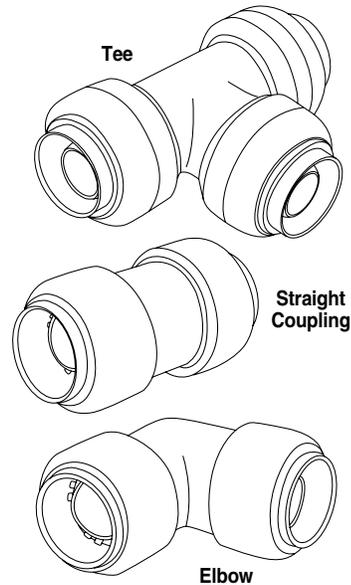
Design certified to ANSI/NSF-61 and ASSE 1061 product standard for use in potable water and hydronic heating water distribution:
Quality engineered and manufactured.

Approved to be used underground and behind walls without access panels.

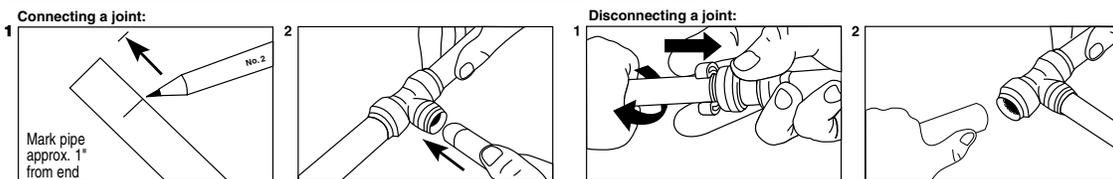
Designed for hydronic heating as well as potable water distribution.

SPECIFICATION

The tube shall be inserted into the SharkBite® push-fit fitting in the first stage through a release collar and then through a stainless steel grab ring. The grab ring has teeth that open out and grip onto the tube. At the second stage the tube shall be pushed through an O-ring protector which aligns the tube. A specially formulated EPDM O-ring shall be compressed between the wall of the fitting and the tube before the end of the tube reaches the tube stop. Only when the tube has passed through the O-ring and reached the tube stop shall a secure joint be created. The fitting shall be a SharkBite® push-fit fitting.



TYPICAL INSTALLATION



Push the pipe and fitting together firmly with a twisting action until it clicks. Allow at least 1" clearance between fittings for disconnection.

(Please consult with local plumbing codes concerning specific water heater piping requirements.)

Push the disconnect clip against the release collar and pull the pipe with a twisting action.

SPECIFICATION DATA

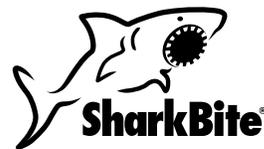
Performance:
Maximum working pressure 200 psi
Maximum temperature 200°F (93°C)
Service Potable water

Materials:
Body DZR brass
O-ring EPDM
Grab ring Stainless steel
Tube support liner Polysulfone

Finish:
Natural Brass or Chrome Plated

CERTIFICATIONS

The SharkBite® push-fit fittings have been design certified and listed to ASSE 1061/NSF 61. The SharkBite® push-fit fittings are listed by IAPMO and are certified for potable and hydronic heating water distribution (note: Glycol mixture for hydronics is not to exceed 50% concentration). The SharkBite® push-fit fittings have been certified for underground applications and as a manufactured joint without access panels and they meet UPC, IPC and cUPC requirements.



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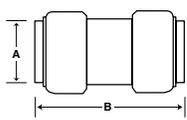


Specifications: HB001 • Issue Date May 2009



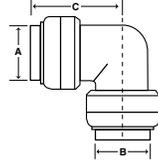
SharkBite® Push-Fit Fittings

For Copper, CPVC or PEX Pipe



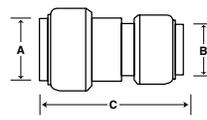
Straight Coupling Dimensions

| P/N | A | B |
|------|------|-------|
| U004 | 1/4" | 1.59" |
| U006 | 3/8" | 1.84" |
| U008 | 1/2" | 2" |
| U016 | 3/4" | 2.36" |
| U020 | 1" | 2.72" |



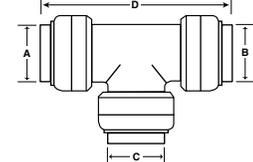
Elbow Dimensions

| P/N | A | B | C |
|------|------|-----------|--------|
| U244 | 1/4" | 1/4" | 1.16" |
| U276 | 1/4" | 3/8" MIP | 1.16" |
| U246 | 3/8" | 3/8" | 1.28" |
| U272 | 1/2" | 3/8" | 1.43" |
| U248 | 1/2" | 1/2" | 1.36" |
| U256 | 3/4" | 3/4" | 1.64" |
| U260 | 1" | 1" | 1.933" |
| U274 | 3/4" | 1/2" | 1.373" |
| U280 | 1/2" | 1/2" MNPT | 1.21" |
| U308 | 1/2" | 1/2" FNPT | 1.21" |



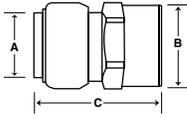
Reducing Coupling Dimensions

| P/N | A | B | C |
|------|------|------|-------|
| U009 | 3/8" | 1/2" | 2.0" |
| U058 | 3/4" | 1/2" | 2.2" |
| U060 | 1" | 3/4" | 2.51" |



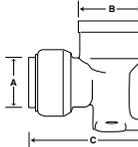
Tee Dimensions

| P/N | A | B | C | D |
|------|------|------|------|-------|
| U358 | 1/4" | 1/4" | 1/4" | 2.30" |
| U360 | 3/8" | 3/8" | 3/8" | 2.77" |
| U362 | 1/2" | 1/2" | 1/2" | 2.72" |
| U363 | 1/2" | 1/2" | 3/8" | 2.85" |
| U364 | 3/8" | 3/8" | 1/2" | 2.77" |
| U370 | 3/4" | 3/4" | 3/4" | 3.24" |
| U374 | 1" | 1" | 1" | 3.84" |
| U412 | 3/4" | 3/4" | 1/2" | 3.04" |
| U416 | 1" | 1" | 3/4" | 3.63" |
| U444 | 3/4" | 1/2" | 3/4" | 3.08" |
| U454 | 3/4" | 1/2" | 1/2" | 2.92" |



Connector Dimensions

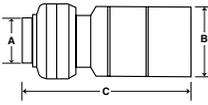
| P/N | A | B | C |
|------|------|-----------|-------|
| U066 | 1/4" | 1/2" FNPT | 1.61" |
| U068 | 1/2" | 3/4" FNPT | 1.75" |
| U070 | 3/8" | 1/2" FNPT | 1.73" |
| U072 | 1/2" | 1/2" FNPT | 1.64" |
| U092 | 3/4" | 1/2" FNPT | 1.83" |
| U088 | 3/4" | 3/4" FNPT | 1.88" |
| U094 | 1" | 1" FNPT | 2.17" |
| U110 | 1/4" | 1/2" MNPT | 1.64" |
| U118 | 3/8" | 1/2" MNPT | 1.77" |
| U120 | 1/2" | 1/2" MNPT | 1.64" |
| U116 | 1/2" | 3/4" MNPT | 1.75" |
| U134 | 3/4" | 3/4" MNPT | 1.89" |
| U138 | 3/4" | 1/2" MNPT | 1.90" |
| U140 | 1" | 1" MNPT | 2.48" |
| U142 | 1" | 3/4" MNPT | 2.11" |



Drop Ear Elbow Dimensions

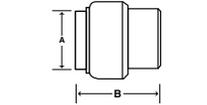
| P/N | A | B | C |
|------|------|-----------|-------|
| U249 | 1/2" | 1/2" | 2.20" |
| U332 | 3/8" | 1/2" FNPT | 1.83" |
| U334 | 1/2" | 1/2" FNPT | 1.77" |
| U335 | 1/2" | 1/2" FNPT | 2.0" |
| U340 | 3/4" | 3/4" FNPT | 2.5" |

*Hy-Ear Elbow



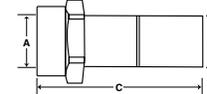
Fitting Reducer Dimensions

| P/N | A | B | C |
|------|------|------|-------|
| U719 | 3/8" | 1/2" | 2.08" |
| U721 | 3/8" | 3/4" | 2.27" |
| U722 | 1/2" | 1" | 3" |
| U724 | 3/4" | 1" | 2.5" |



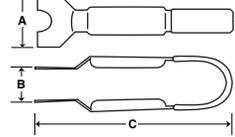
End Stop Dimensions

| P/N | A | B |
|------|------|-------|
| U512 | 3/8" | 1.11" |
| U514 | 1/2" | 1.08" |
| U518 | 3/4" | 1.32" |
| U520 | 1" | 1.52" |



Fitting Adapter Dimensions

| P/N | A | B | C |
|------|-----------|------|-------|
| U766 | 3/4" FNPT | 3/4" | 2.83" |
| U772 | 1" FNPT | 1" | 2.83" |



Disconnect Tong Dimensions

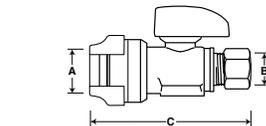
| P/N | Fits SharkBite | A | B | C |
|------|----------------|------|----|------|
| U711 | 1/2" | 1.7" | 2" | 6.5" |
| U713 | 3/4" | 1.7" | 2" | 6.5" |
| U715 | 1" | 1.7" | 2" | 6.5" |



Disconnect Clip Dimensions

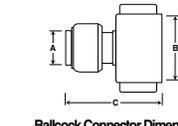
| P/N | Size | A | B |
|------|------|-------|------|
| U706 | 1/4" | 1.19" | 0.3" |
| U708 | 3/8" | 1.22" | 0.3" |
| U710 | 1/2" | 1.22" | 0.3" |
| U712 | 3/4" | 1.72" | 0.4" |
| U714 | 1" | 2" | 0.4" |

Note: Disconnect Clips sold separately



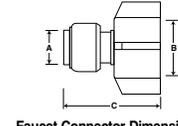
Straight Stop (Chrome Plated) Dimensions

| P/N | A | B | C |
|------------|------|------------------|-------|
| 23037-0000 | 1/2" | 3/8" compression | 2.68" |



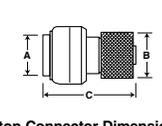
Ballcock Connector Dimensions (Chrome Plated)

| P/N | A | B | C |
|-------|------|---------------|-------|
| U3531 | 1/4" | 7/8" ballcock | 1.58" |



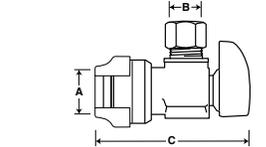
Faucet Connector Dimensions (Chrome Plated)

| P/N | A | B | C |
|-------|------|----------|-------|
| U3525 | 1/4" | 1/2" NPS | 1.58" |



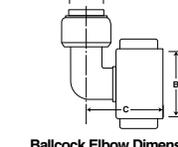
Stop Connector Dimensions (Chrome Plated)

| P/N | A | B | C |
|-------|------|-----------------|-------|
| U3523 | 1/4" | 9/16" X 24 UNEF | 1.61" |



Angle Stop (Chrome Plated) Dimensions

| P/N | A | B | C |
|------------|------|------------------|-------|
| 23036-0000 | 1/2" | 3/8" compression | 2.58" |



Ballcock Elbow Dimensions (Chrome Plated)

| P/N | A | B | C |
|-------|------|---------------|-------|
| U3537 | 1/4" | 7/8" ballcock | 1.05" |

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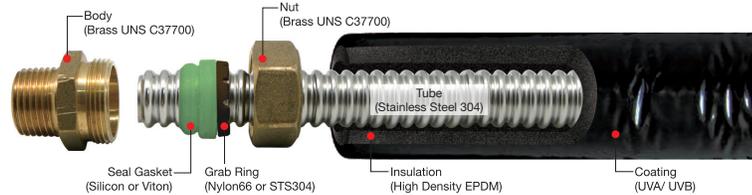
09-CAC-133 5.14.09 Printed in USA



TECHNICAL SPECIFICATIONS

Solar Line System

SOLAR TUBING SYSTEM for Solar thermal water heater systems.



SPECIFICATIONS

| | | | |
|-------------------------------------|---------------------------------|----------|----------|
| CSST Tubing Material | Stainless Steel 304 (ASTM A240) | | |
| Insulation | High Density EPDM | | |
| Coating | UVA / UVB | | |
| Size Available | 1/2" | 3/4" | 1" |
| Inner Dia. | 0.55 in | 0.83 in | 1.03 in |
| CSST Tubing Thickness | 0.012" | | |
| Insulation Thickness | 1/2", 3/4", 1" | | |
| Lengths Available | 50ft/ Roll | | |
| Size | 1/2" | 3/4" | 1" |
| Operating Temperature | 300 °F @ 147 psi | | |
| Intermittent Hi-Temp Exposure Limit | 350 °F | | |
| Insulation External Exposure Limit | -74 °F ~ 300 °F | | |
| Max. Operating Pressure | 220 psi | 176 psi | 147 psi |
| Min. Bend Radius (Recommended) | 3 inches | 3 inches | 5 inches |
| Max. Surface Temperature | 300 °F (148 °C) | | |
| Min. Surface Temperature | -74 °F | | |

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EAST OFFICE Toll Free (855) 388-2600 • info@easyflexny.com



TECHNICAL SPECIFICATIONS

MATERIALS & SPECIFICATIONS

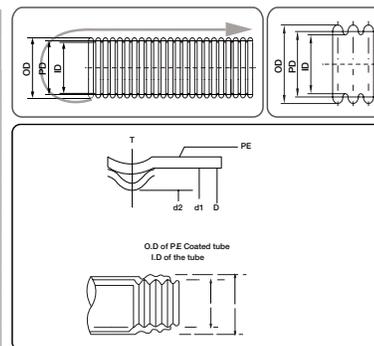
| | |
|--------------------------------|--|
| Fitting Nut and Body | Brass UNS C37700 (ASTM DS-561) |
| Lead-Free Fitting Nut and Body | Brass UNS C37700 (ASTM B171) |
| Sealing Ring | Silicone |
| Isolation Ring | Nylon 66 (Fiberglass High-Temperature) |
| Push-Fit Fitting Nut and Body | Brass UNS C37700 (ASTM DS-561) |
| Push-Fit Sealing Ring | EPDM |
| Push-Fit Isolation Ring | Nylon 66 |
| Push-Fit Nut | Nylon 66 |
| Push-Fit Grab Ring | Stainless Steel 304 |
| Burst Pressure | 1420 psi |



FRICITION LOSS DATA

Friction loss of tubing calculated in pounds per square inch (PSI) of pressure lost per foot of tubing with a friction constant = 70 and no bends. Sharp bends are calculated the same as for fittings and gradual bends calculated the same as straight pipe.

| GPM | Nominal Size (ID) | | | |
|-----|-------------------|-------|-------|--------|
| | 1/2" | 3/4" | 1" | 1-1/4" |
| 1 | 0.032 | 0.004 | 0.002 | 0.001 |
| 2 | 0.114 | 0.015 | 0.005 | 0.002 |
| 3 | 0.241 | 0.032 | 0.012 | 0.004 |
| 4 | 0.41 | 0.055 | 0.02 | 0.008 |
| 5 | 0.619 | 0.083 | 0.03 | 0.011 |
| 6 | 0.867 | 0.117 | 0.042 | 0.016 |
| 7 | 1.153 | 0.153 | 0.055 | 0.021 |
| 8 | 1.476 | 0.199 | 0.071 | 0.027 |
| 9 | 1.836 | 0.248 | 0.088 | 0.034 |
| 10 | 2.231 | 0.301 | 0.107 | 0.041 |



1. Table is based on the Hazen-Williams formula.
2. Fluid velocities in excess of 5-8 ft./sec are not recommended.
3. Friction loss values shown are for the flow rates that do not exceed a velocity of 8 ft./sec.

$$P = \frac{4.52Q^{1.85}}{C^{1.85} D^{4.85}}$$

Where : P= friction loss, psi per linear foot
Q= flow, gpm
D= average, I.D., in inches
C= 70, friction constant



TECHNICAL SPECIFICATIONS

STANDARDS AND LISTINGS (CSST & FITTINGS)

| | |
|------------------|--|
| NSF/ ANSI 61 | Drinking water system components-health effects. Tested and certified by IAPMO. |
| ASTM A 312/ 312M | Specification for Seamless, welded and heavily cold worked austenitic stainless steel pipes. |
| ASME B1.20.1 | NPT pipe threads, general purpose. |
| IAPMO IGC-233 | 1. Materials 2. Performance 3. Product Standards and Listings |

TESTING (CSST & FITTINGS)

| | |
|------------------------|---|
| Hydrostatic Test | Filled with water and intrnal pressure incured to 220 ±7psi, at a temperature of 68° F ± 5° F for a period of 5 minutes. |
| Hydrostatic Burst Test | At 68° F filled with water and the internal pressure increased to 588 ±7 psi, at a temperature of 68° F ± 5° F for a period of 5 minutes. |
| Bending Test | Bending motion being applied uniformly at the rate of 5-6 cycles per minute. |
| Hydraulic Shock Test | Subjected to a hydraulic shock for 2,000 cycles at 68° F ± 5° F. |
| Vibration Test | Filled with water. The amplitude of vibration was 0.2 inches and the frequency was 25Hz for 3 hours. |
| Flattening Test | Pressed to 2/3 D height of the outer diameter until the tube was flat. |
| Impact Test | An impact force was applied of 9.76 to 15.19 lb/ft to varied sizes of fittings using a hammer. |
| Pressure Test | Pressure rating at 212° F of 147 psi. |
| Toxicity Test | Water outflow was tested in hot and cold conditions with a PH rang of 5-10. |

DESIGN CERTIFICATIONS AND APPROVALS

- NSF / ANSI 61 Compliant
- ASTM A 312 / 312M
- ASME B1. 20. 1
- IAPMO IGC-233



| | |
|----------------|----------------|
| Job Name : | Job Location : |
| Submitted By : | Date : |
| Approved By : | Date : |



TECHNICAL SPECIFICATIONS

Stainless Steel Water Line System

WATER LINE SYSTEM for General plumbing, Water distribution systems, Tankless water heating, Heat exchanger, Fancoil units.

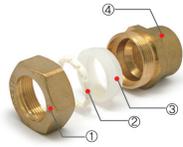
TUBING SPECIFICATIONS

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|-----------------|---------------------------------|----------|----------|----------|--------|----|----------------------------|---------------------------|--|--|--|--|--|----------------|---------------------|--|--|--|--|--|-------------------------|---------|------|----|--------|--------|----|--------------------------------|----------|----------|----------|----------|----------|----------|----------------------|----------|----------|----------|----------|----------|----------|------------------|-------|--|--------|--|--------|--------|-------------------|-------|--|--|--|--|--|-------------------|--|--|--|--|--|--|
| <p>Tube Type</p>  <p>Uncoated</p> | <table border="1"> <tr> <td>Tubing Material</td> <td colspan="6">Stainless Steel 304 (ASTM A240)</td> </tr> <tr> <td>Coating (Optional)</td> <td colspan="6">Polyethylene (ASTM D 335)</td> </tr> <tr> <td>Coating Types</td> <td colspan="6">Uncoated, Blue, Red</td> </tr> <tr> <td>Size Available</td> <td>1/2"</td> <td>3/4"</td> <td>1"</td> <td>1-1/4"</td> <td>1-1/2"</td> <td>2"</td> </tr> <tr> <td>Inner Dia. (± 0.2)</td> <td>0.56" in</td> <td>0.83" in</td> <td>1.06" in</td> <td>1.30" in</td> <td>1.66" in</td> <td>2.14" in</td> </tr> <tr> <td>Outer Dia. (± 0.2)</td> <td>0.71" in</td> <td>1.01" in</td> <td>1.30" in</td> <td>1.50" in</td> <td>1.87" in</td> <td>2.37" in</td> </tr> <tr> <td>Tubing Thickness</td> <td colspan="2">0.01"</td> <td colspan="2">0.012"</td> <td>0.014"</td> <td>0.014"</td> </tr> <tr> <td>Coating Thickness</td> <td colspan="6">0.02"</td> </tr> <tr> <td>Lengths Available</td> <td colspan="6">50, 100, 150 ft/ Roll (Custom lengths are available)</td> </tr> </table> | Tubing Material | Stainless Steel 304 (ASTM A240) | | | | | | Coating (Optional) | Polyethylene (ASTM D 335) | | | | | | Coating Types | Uncoated, Blue, Red | | | | | | Size Available | 1/2" | 3/4" | 1" | 1-1/4" | 1-1/2" | 2" | Inner Dia. (± 0.2) | 0.56" in | 0.83" in | 1.06" in | 1.30" in | 1.66" in | 2.14" in | Outer Dia. (± 0.2) | 0.71" in | 1.01" in | 1.30" in | 1.50" in | 1.87" in | 2.37" in | Tubing Thickness | 0.01" | | 0.012" | | 0.014" | 0.014" | Coating Thickness | 0.02" | | | | | | Lengths Available | 50, 100, 150 ft/ Roll (Custom lengths are available) | | | | | |
| Tubing Material | Stainless Steel 304 (ASTM A240) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Coating (Optional) | Polyethylene (ASTM D 335) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Coating Types | Uncoated, Blue, Red | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Size Available | 1/2" | 3/4" | 1" | 1-1/4" | 1-1/2" | 2" | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Inner Dia. (± 0.2) | 0.56" in | 0.83" in | 1.06" in | 1.30" in | 1.66" in | 2.14" in | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Outer Dia. (± 0.2) | 0.71" in | 1.01" in | 1.30" in | 1.50" in | 1.87" in | 2.37" in | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tubing Thickness | 0.01" | | 0.012" | | 0.014" | 0.014" | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Coating Thickness | 0.02" | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lengths Available | 50, 100, 150 ft/ Roll (Custom lengths are available) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  <p>Blue PE Jacket</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  <p>Red PE Jacket</p> | <table border="1"> <tr> <td>Size</td> <td>1/2"</td> <td>3/4"</td> <td>1"</td> <td>1-1/4"</td> <td>1-1/2"</td> <td>2"</td> </tr> <tr> <td>Max. Operating Temperature</td> <td colspan="6">Rated 147 psi at 212° F</td> </tr> <tr> <td>Burst Pressure</td> <td colspan="6">1420 psi</td> </tr> <tr> <td>Max. Operating Pressure</td> <td colspan="6">147 psi</td> </tr> <tr> <td>Min. Bend Radius (Recommended)</td> <td>3 inches</td> <td>3 inches</td> <td>3 inches</td> <td>5 inches</td> <td>6 inches</td> <td>8 inches</td> </tr> </table> | Size | 1/2" | 3/4" | 1" | 1-1/4" | 1-1/2" | 2" | Max. Operating Temperature | Rated 147 psi at 212° F | | | | | | Burst Pressure | 1420 psi | | | | | | Max. Operating Pressure | 147 psi | | | | | | Min. Bend Radius (Recommended) | 3 inches | 3 inches | 3 inches | 5 inches | 6 inches | 8 inches | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Size | 1/2" | 3/4" | 1" | 1-1/4" | 1-1/2" | 2" | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Max. Operating Temperature | Rated 147 psi at 212° F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Burst Pressure | 1420 psi | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Max. Operating Pressure | 147 psi | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Min. Bend Radius (Recommended) | 3 inches | 3 inches | 3 inches | 5 inches | 6 inches | 8 inches | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

EASYFLEX TECHNICAL SPECIFICATIONS

FITTINGS SPECIFICATIONS

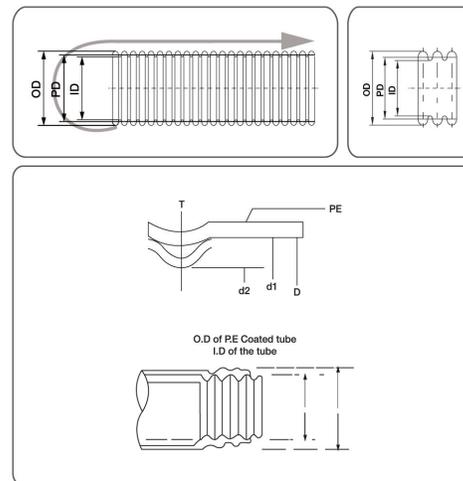
| | |
|--------------------------------|--------------------------------|
| Nut and Body | Brass UNS C37700 (ASTM DS-561) |
| Lead-Free Fitting Nut and Body | Brass UNS C37700 (ASTM B171) |
| Sealing Ring | Silicon |
| Isolation Ring | Nylon 66 |
| Push-Fit Sealing Ring | EPDM |
| Push-Fit Isolation Ring | Nylon 66 |
| Push-Fit Nut | Nylon 66 |
| Push-Fit Grab Ring | Stainless Steel 304 |
| Burst Pressure | 1420 psi |

| Fitting | Push-Fit Fitting |
|---|--|
|  |  |
| <ul style="list-style-type: none"> ① Fitting Nut ② Isolation Ring ③ Sealing Ring ④ Fitting Body | <ul style="list-style-type: none"> ① Push-Fit Nut ② Push-Fit Sealing Ring ③ Push-Fit Isolation Ring ④ Push-Fit Grab Ring ⑤ Fitting Body ⑥ Sealing Ring ⑦ Isolation Ring |

FRICTION LOSS DATA

Friction loss of tubing calculated in pounds per square inch (PSI) of pressure lost per foot of tubing with a friction constant = 70 and no bends. Sharp bends are calculated the same as for fittings and gradual bends calculated the same as straight pipe.

| GPM | Nominal Size (ID) | | | | | |
|-----|-------------------|-------|-------|--------|--------|-------|
| | 1/2" | 3/4" | 1" | 1-1/4" | 1-1/2" | 2" |
| 1 | 0.032 | 0.004 | 0.002 | 0.001 | 0.000 | 0.000 |
| 2 | 0.114 | 0.015 | 0.005 | 0.002 | 0.001 | 0.000 |
| 3 | 0.241 | 0.032 | 0.012 | 0.004 | 0.001 | 0.000 |
| 4 | 0.410 | 0.055 | 0.020 | 0.008 | 0.002 | 0.001 |
| 5 | 0.619 | 0.083 | 0.030 | 0.011 | 0.003 | 0.001 |
| 6 | 0.867 | 0.117 | 0.042 | 0.016 | 0.004 | 0.001 |
| 7 | 1.153 | 0.155 | 0.055 | 0.021 | 0.005 | 0.002 |
| 8 | 1.476 | 0.199 | 0.071 | 0.027 | 0.007 | 0.002 |
| 9 | | 0.247 | 0.088 | 0.034 | 0.009 | 0.002 |
| 10 | | 0.301 | 0.107 | 0.041 | 0.010 | 0.003 |
| 15 | | 0.637 | 0.226 | 0.087 | 0.022 | 0.006 |
| 20 | | 1.084 | 0.386 | 0.147 | 0.038 | 0.011 |
| 25 | | 1.638 | 0.583 | 0.223 | 0.057 | 0.016 |
| 30 | | | 0.816 | 0.312 | 0.080 | 0.023 |
| 35 | | | 1.086 | 0.415 | 0.106 | 0.030 |
| 40 | | | | 0.531 | 0.136 | 0.039 |
| 45 | | | | 0.660 | 0.169 | 0.048 |
| 50 | | | | | 0.206 | 0.059 |
| 60 | | | | | 0.288 | 0.082 |
| 70 | | | | | 0.383 | 0.110 |



1. Table is based on the Hazen-Williams formula.
2. Fluid velocities in excess of 5-8 ft/ sec are not recommended.
3. Highlighted friction loss values indicate flow rates that are over 8 ft/ sec.

$$P = \frac{4.52Q^{1.85}}{C^{1.85} D^{1.85}}$$

Where : P= friction loss, psi per linear foot
Q= flow, gpm
D= average, I.D., in inches
C= 70, friction constant

EASYFLEX TECHNICAL SPECIFICATIONS

STANDARDS AND LISTINGS

| | |
|---------------|--|
| NSF/ ANSI 61 | Drinking water system components-health effects. Tested and certified by IAPMO. |
| ASTM A 240 | Specification for chromium and chromium-nickel stainless steel plate, sheet and strip for pressure vessels and for general applications. |
| ASTM D 335 | Specifications for Polyethylen plastic pipe and fittings materials. |
| ASTM DS-561 | Metals and alloys in the unified numbering system. |
| ASME B1.20.1 | NPT pipe threads, general purpose. |
| IAPMO IGC-233 | 1. Materials 2. Performance 3. Marking and identification |

TESTING

| | |
|------------------------|---|
| Hydrostatic Test | Filled with water and intrnal pressure incured to 220 ±7psi, at a temperature of 68° F ± 5° F for a period of 5 minutes. |
| Hydrostatic Burst Test | At 68° F filled with water and the internal pressure increased to 588 ±7 psi, at a temperature of 68° F ± 5° F for a period of 5 minutes. |
| Bending Test | Bending motion being applied uniformly at the rate of 5-6 cycles per minute. |
| Hydraulic Shock Test | Subjected to a hydraulic shock for 2,000 cycles at 68° F ± 5° F. |
| Vibration Test | Filled with water. The amplitude of vibration was 0.2 inches and the frequency was 25Hz for 3 hours. |
| Flattening Test | Pressed to 2/3 D height of the outer diameter until the tube was flat. |
| Impact Test | An impact force was applied of 9.76 to 15.19 lb/ft to varied sizes of fittings using a hammer. |
| Pressure Test | Pressure rating at 212° F of 147 psi. |
| Toxicity Test | Water outflow was tested in hot and cold conditions with a PH rang of 5-10. |

DESIGN CERTIFICATIONS AND APPROVALS

- CSA
- cUPC/ NSF 61 Compliant for safe drinking water
- NSF 372 Compliant : Lead-Free
- 1-1/2" & 2" Easyflex Stainless Steel Water Line System - Certifications and Approvals in Process



| | |
|----------------|----------------|
| Job Name : | Job Location : |
| Submitted By : | Date : |
| Approved By : | Date : |

WEST OFFICE Toll Free (888) 577-8999 • info@easyflexusa.com EAST OFFICE Toll Free (855) 388-2600 • info@easyflexeast.com



Stainless Steel Water Heater Connectors (EFCW-Series)

Flexible water heater connectors with optimized corrugation shape for maximum flow and enhanced strength. Anti corrosive stainless steel tube is durable and compatible with the most water heaters and water softeners with various fitting options.

FEATURES

- Maximum flow with engineered and optimized corrugation design
- Built-in Di-electric sleeve to prevent possible galvanic corrosion
- Lead-Free certified
- Push-fit fitting option for copper, PEX or CPVC tubing
- SWEAT connection option for copper tubing
- Chrome-plated brass nut and high-quality EPDM washer
- 100% Leak tested

MATERIALS

| | |
|--------|---------------------------------|
| Tubing | Stainless Steel 304 (ASTM A240) |
| Nut | Chrome-Plated Brass 3771 |
| Gasket | High-Quality EPDM |

SPECIFICATIONS

| | |
|-------------------------------|--------------------------------|
| Operation Temperature | -40°F to 180°F (-42°C to 80°C) |
| Intermittent Impulse Pressure | Up to 180 psig |
| Operation Pressure | 20 to 125 psi (8.6 bar) |

DESIGN CERTIFICATIONS AND APPROVALS

- ASME A 112.18.6-2002
- CSA Standard B125.3-05
- IAPMO Approved and Tested
- NSF 61 Compliant
- NSF 372 Compliant : Lead-Free



| | |
|------------------|------------------------|
| Job Name : | Engineer / Architect : |
| Job Location : | Wholesaler : |
| Submittal Date : | Contractor : |

 WEST OFFICE
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EAST OFFICE
(855) 388-2600

Easyflex 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 modification on Easyflex products previously or subsequently sold.

EASYFLEX TECHNICAL SPECIFICATIONS

Stainless Steel Water Heater Connectors (EFWC-Series)

| Image | Tube ID | Part # | Description | | Qty / Box |
|-------|---------|---------------------|--|--------|-----------|
| | | | Hose & Fittings | Length | |
| | 3/4" | EFWC-034-SS-1010-12 | WC SS Water Connector 3/4" FIP x 3/4" FIP | 12" | 25 |
| | | EFWC-034-SS-1010-15 | | 15" | 25 |
| | | EFWC-034-SS-1010-18 | | 18" | 25 |
| | | EFWC-034-SS-1010-24 | | 24" | 25 |
| | | EFWC-034-SS-1010-36 | | 36" | 25 |
| | | EFWC-034-SS-1010-48 | | 48" | 25 |
| | 3/4" | EFWC-034-SS-1011-15 | WC SS Water Connector 3/4" FIP x 3/4" MIP | 15" | 25 |
| | | EFWC-034-SS-1011-18 | | 18" | 25 |
| | | EFWC-034-SS-1011-24 | | 24" | 25 |
| | 3/4" | EFWC-034-SS-1012-18 | WC SS Water Connector 3/4" FIP x 1" FIP | 18" | 25 |
| | | EFWC-034-SS-1012-24 | | 24" | 25 |
| | 3/4" | EFWC-034-SS-1050-15 | WC SS Water Connector 3/4" FIP x 3/4" Push-fit | 15" | 25 |
| | | EFWC-034-SS-1050-18 | | 18" | 25 |
| | | EFWC-034-SS-1050-24 | | 24" | 25 |
| | 3/4" | EFWC-034-SS-1060-18 | WC SS Water Connector 3/4" FIP x 3/4" Sweat | 18" | 25 |
| | | EFWC-034-SS-1060-24 | | 24" | 25 |



TECHNICAL SPECIFICATIONS

Stainless Steel Water Heater Connectors (EFCW-Series)

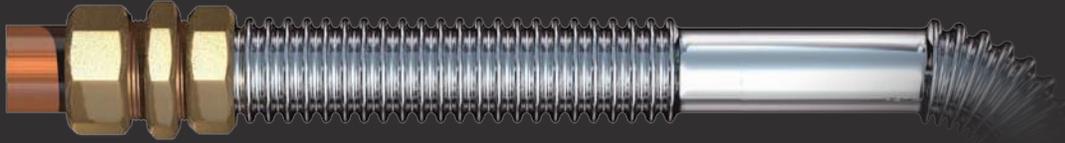
| Image | Tube ID | Part # | Description | | Qty / Box |
|-------|---------|---------------------|---|--------|-----------|
| | | | Hose & Fittings | Length | |
| | 1" | EFCW-100-SS-1212-12 | WC SS Water Connector 1" FIP x 1" FIP | 12" | 12 |
| | | EFCW-100-SS-1212-18 | | 18" | 12 |
| | | EFCW-100-SS-1212-24 | | 24" | 12 |
| | 1" | EFCW-100-SS-1213-12 | WC SS Water Connector 1" FIP x 1-1/4" FIP | 12" | 12 |
| | | EFCW-100-SS-1213-15 | | 15" | 12 |
| | | EFCW-100-SS-1213-18 | | 18" | 12 |
| | | EFCW-100-SS-1213-24 | | 24" | 12 |
| | 1-1/4" | EFCW-114-SS-1313-18 | WC SS Water Connector 1-1/4" FIP x 1-1/4" FIP | 18" | 12 |
| | | EFCW-114-SS-1313-24 | | 24" | 12 |
| | 1-1/2" | EFCW-112-SS-1414-18 | WC SS Water Connector 1-1/2" FIP x 1-1/2" FIP | 18" | 12 |
| | | EFCW-112-SS-1414-24 | | 24" | 12 |
| | 2" | EFCW-200-SS-1515-18 | WC SS Water Connector 2" FIP x 2" FIP | 18" | 9 |
| | | EFCW-200-SS-1515-24 | | 24" | 9 |

EASYFLEX®



WATER LINE SYSTEM

Flexible Corrugated Stainless Steel Tubing



Originally utilized to protect from earthquake damage, corrugated stainless steel pipes by design and material are able to withstand vibrations, wide fluctuations in temperature, and various other harsh environmental conditions.

Flexible lines are rapidly replacing rigid pipes in new construction because of its flexibility and cost saving installations. They are widely used to retrofit in tenant improvement projects.

The greatest advantage of using flexible lines in place of rigid piping is the incredible time saving benefits in installation. Rather than cutting the tube to exact length and making 90° connections with bulky fittings every time you need a bend, flexible lines offer the ease of simply bending the tubing without any extra connections.

In addition to the flexible benefits of the corrugated design, the inner diameter of our tubing is larger than the inner diameter of rigid piping for uncompromising flow restriction and optimal performance.

It's a hassle-free, simple, and easy installation of one seamless line for an entire system.

Why should you choose EASYFLEX?

It's easy.

Can you imagine installing an entire water line system with just one connection at each end? You don't have to imagine. No more mid-line connections, cuts, angles, and bulky fittings, just one clean line that gives you the freedom to make bends—by hand—wherever and whenever you need it.

It's fast.

It's perhaps the greatest advantage of using Easyflex flexible CSST. By eliminating all the countless steps measuring and cutting to account for those rigid 90° angles, you save valuable time on installation.

It's durable.

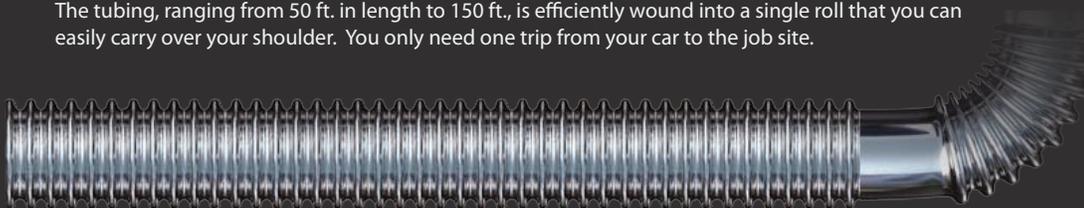
Stainless steel 304 is strong, corrosion-resistant, and withstands natural wear and tear better over time than rigid piping alternatives. When it comes to the lifespan of the material, there's no comparison to stainless steel.

It's flexible.

Annular corrugations of the tubing create flexibility by working with the strength of the stainless steel.

It's lightweight.

The tubing, ranging from 50 ft. in length to 150 ft., is efficiently wound into a single roll that you can easily carry over your shoulder. You only need one trip from your car to the job site.

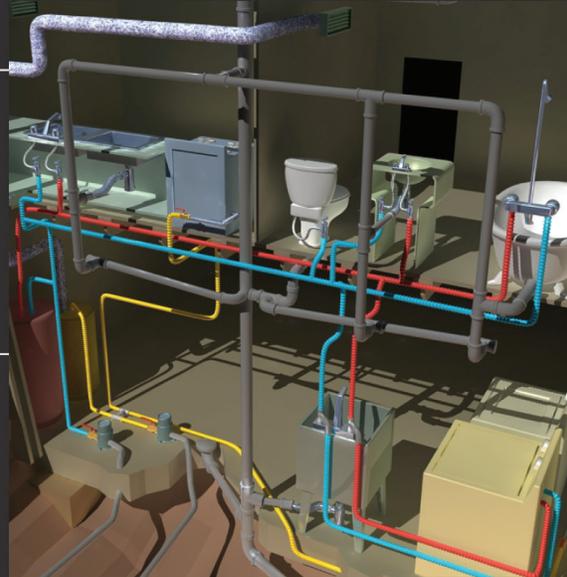


APPLICATIONS

- General Plumbing
- Water Distribution Systems
- Water Heating Systems
- Tankless Water Heating
- Heat Exchanger
- Fan Coil Units

ADVANTAGES

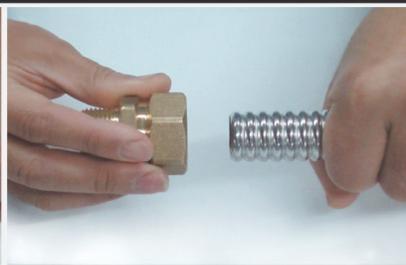
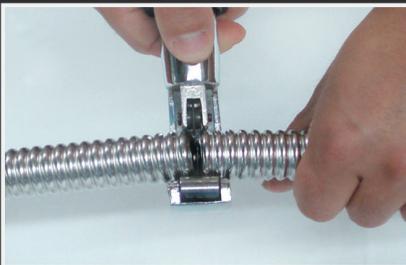
- Flexible
- Lightweight
- Pure and non-toxic
- Corrosion resistant
- Biostatic
- Easy installation



INSTALLATION

| Required Tools | Optional Tools | Tube Size (ID) | Torque Value (ft/lb) |
|--|--|----------------|----------------------|
| Metal tube cutter | Open end wrench (for assembly of fittings) | 1/2" | 40~44 |
| Utility knife (for PE coated tubing) | Pipe wrench (connection of tubing to fittings) | 3/4" | 44~48 |
| PTFE tape or pipe sealant (fitting to another fitting, main line, or fixed position fitting) | Pliers | 1" | 72~76 |
| | Gloves | 1-1/4" | 120~140 |

Be careful when handling edges of tubing. Edges, particularly cut edges, are sharp. Please see full installation instructions before assembling product.



1 CUT

Determine the proper length of tubing needed and cut to desired length. Cut a straight section that has not been bent.

 **Cut must be a clean cut.**
A rough cut can perforate the silicone ring and cause leakage.

2 CONNECT

Remove nut and check the internal components. Replace loosened nut and insert tube completely into fitting until it meets internal wall (about 4-5 corrugations into the fitting).

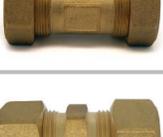
 **Do NOT use PTFE tape or sealant** between pipe-to-nut connections.

3 TIGHTEN

Tighten the nut and fitting using appropriate torque (see table above). If done properly, resistance should increase greatly or nut will not turn after 1.5 turns.

 **If tubing buckles or deforms,** excessive torque has been applied.

PARTS LIST

| | | | | | | | | | | |
|--|---|---------------------|---------------|---------------------|--|-----------------|--------------------|--|-----------------|--|
| <p>Straight Male</p> <p>EFW-012-ST 1/2" MIP EFW-034-ST 3/4" MIP EFW-010-ST 1" MIP EFW-114-ST 1-1/4" MIP</p>  | <p>Copper Sweat</p> <p>EFW-012-SW 1/2" Sweat Adaptor EFW-034-SW 3/4" Sweat Adaptor EFW-010-SW 1" Sweat Adaptor EFW-114-SW 1-1/4" Sweat Adaptor</p>  | | | | | | | | | |
| <p>Straight Female</p> <p>EFW-012-SF 1/2" FIP EFW-034-SF 3/4" FIP EFW-010-SF 1" FIP EFW-114-SF 1-1/4" FIP</p>  | <p>Push-Fit</p> <p>EFW-012-EC-CP 1/2" Push-fit EFW-034-EC-CP 3/4" Push-fit EFW-010-EC-CP 1" Push-fit</p>  | | | | | | | | | |
| <p>Elbow</p> <p>EFW-012-EL 1/2" Elbow EFW-034-EL 3/4" Elbow EFW-010-EL 1" Elbow</p>  | <p>High-Temp Gasket</p> <p>EW-HG-012 1/2" Gasket EW-HG-034 3/4" Gasket EW-HG-010 1" Gasket EW-HG-114 1-1/4" Gasket</p>  | | | | | | | | | |
| <p>Tee</p> <p>EFW-012-T 1/2" Tee EFW-034-T 3/4" Tee EFW-010-T 1" Tee</p>  | <p>Tubing Saddles</p> <p>EW-WB-012 1/2" Saddle EW-WB-034 3/4" Saddle EW-WB-010 1" Saddle</p>  | | | | | | | | | |
| <p>Female Tee</p> <p>EFW-012-FT 1/2" Female Tee EFW-034-FT 3/4" Female Tee EFW-010-FT 1" Female Tee</p>  | <p>Flexible Corrugated Stainless Steel Tubing</p>  | | | | | | | | | |
| <p>Tee Reducing</p> <p>EFW-034-RT-012 3/4"x3/4"x1/2" EFW-010-RT-012 1"x1"x1/2" EFW-010-RT-034 1"x1"x3/4"</p>  | | | | | | | | | | |
| <p>Female Tee Reducing</p> <p>EFW-034-FRT-012 3/4"x1/2" EFW-010-FRT-012 1"x1/2" EFW-010-FRT-034 1"x3/4"</p>  | | | | | | | | | | |
| <p>Coupling/Union</p> <p>EFW-012-CP 1/2" Coupling EFW-034-CP 3/4" Coupling EFW-010-CP 1" Coupling EFW-114-CP 1-1/4" Coupling</p>  | | | | | | | | | | |
| <p>Reducing Coupling</p> <p>EFW-034-RCP-012 3/4" x 1/2" EFW-010-RCP-012 1" x 1/2" EFW-010-RCP-034 1" x 3/4"</p>  | | | | | | | | | | |
| <p>1/2" ID (3/4" OD)</p> <table border="1"> <tbody> <tr> <td>EW-012-</td> <td>50 (50' CSST)</td> <td>BL (Blue PE Jacket)</td> </tr> <tr> <td></td> <td>100 (100' CSST)</td> <td>RD (Red PE Jacket)</td> </tr> <tr> <td></td> <td>150 (150' CSST)</td> <td></td> </tr> </tbody> </table> | | EW-012- | 50 (50' CSST) | BL (Blue PE Jacket) | | 100 (100' CSST) | RD (Red PE Jacket) | | 150 (150' CSST) | |
| EW-012- | 50 (50' CSST) | BL (Blue PE Jacket) | | | | | | | | |
| | 100 (100' CSST) | RD (Red PE Jacket) | | | | | | | | |
| | 150 (150' CSST) | | | | | | | | | |
| <p>3/4" ID (1" OD)</p> <table border="1"> <tbody> <tr> <td>EW-034-</td> <td>50 (50' CSST)</td> <td>BL (Blue PE Jacket)</td> </tr> <tr> <td></td> <td>100 (100' CSST)</td> <td>RD (Red PE Jacket)</td> </tr> <tr> <td></td> <td>150 (150' CSST)</td> <td></td> </tr> </tbody> </table> | | EW-034- | 50 (50' CSST) | BL (Blue PE Jacket) | | 100 (100' CSST) | RD (Red PE Jacket) | | 150 (150' CSST) | |
| EW-034- | 50 (50' CSST) | BL (Blue PE Jacket) | | | | | | | | |
| | 100 (100' CSST) | RD (Red PE Jacket) | | | | | | | | |
| | 150 (150' CSST) | | | | | | | | | |
| <p>1" ID (1-1/4" OD)</p> <table border="1"> <tbody> <tr> <td>EW-010-</td> <td>50 (50' CSST)</td> <td>BL (Blue PE Jacket)</td> </tr> <tr> <td></td> <td>100 (100' CSST)</td> <td>RD (Red PE Jacket)</td> </tr> <tr> <td></td> <td>150 (150' CSST)</td> <td></td> </tr> </tbody> </table> | | EW-010- | 50 (50' CSST) | BL (Blue PE Jacket) | | 100 (100' CSST) | RD (Red PE Jacket) | | 150 (150' CSST) | |
| EW-010- | 50 (50' CSST) | BL (Blue PE Jacket) | | | | | | | | |
| | 100 (100' CSST) | RD (Red PE Jacket) | | | | | | | | |
| | 150 (150' CSST) | | | | | | | | | |
| <p>1-1/4" ID (1-1/2" OD)</p> <table border="1"> <tbody> <tr> <td>EW-114-</td> <td>50 (50' CSST)</td> <td>BL (Blue PE Jacket)</td> </tr> <tr> <td></td> <td>100 (100' CSST)</td> <td>RD (Red PE Jacket)</td> </tr> <tr> <td></td> <td>150 (150' CSST)</td> <td></td> </tr> </tbody> </table> | | EW-114- | 50 (50' CSST) | BL (Blue PE Jacket) | | 100 (100' CSST) | RD (Red PE Jacket) | | 150 (150' CSST) | |
| EW-114- | 50 (50' CSST) | BL (Blue PE Jacket) | | | | | | | | |
| | 100 (100' CSST) | RD (Red PE Jacket) | | | | | | | | |
| | 150 (150' CSST) | | | | | | | | | |

TUBING

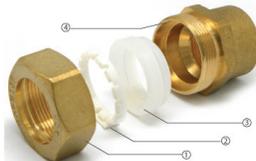
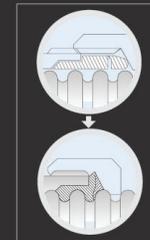
| | |
|------------------------------|---|
| CSST Material: | Stainless Steel 304 (ASTM A 240) |
| Coating (Optional): | Polyethylene (ASTM D 335) |
| Types: | Uncoated, Blue PE, and Red PE |
| Sizes (Inner Diameter): | 1/2" (0.55 in) 3/4" (0.83 in) 1" (1.03 in) 1-1/4" (1.26 in) |
| CSST Thickness: | 0.012" |
| PE Coating Thickness: | 0.02" |
| Lengths: | 50 ft. 100 ft. 150 ft. Customs lengths available |
| Burst Pressure: | 588 psi with fittings attached |
| Velocity: | 8 fps |
| Maximum Working Temperature: | 212° F @ 147 psi |
| Maximum Working Pressure: | 1/2": 220 psi 3/4": 176 1": 147 psi |

| Minimum Bend Radius | |
|---------------------|------------------|
| Size | Recommended Min. |
| 1/2" | 3 inches |
| 3/4" | 3 inches |
| 1" | 5 inches |

| Surface Area | | |
|--------------|---|-----------------------------------|
| Size | Surface Area per ft. (in ²) | Volume per ft. (ft ³) |
| 1/2" | 32.7 | 0.00306 |
| 3/4" | 48.0 | 0.00672 |
| 1" | 64.8 | 0.01145 |
| 1-1/4" | 72.3 | 0.01499 |

FITTINGS

| | |
|--------------------------|--------------------------------|
| Fitting Nut & Body: | Brass UNS C37700 (ASTM DS-561) |
| Sealing Ring: | Silicone |
| Isolation Ring: | Nylon 66 |
| Push-Fit Fitting Body: | Brass UNS C37700 (ASTM DS-561) |
| Push-Fit Sealing Ring: | EPDM |
| Push-Fit Isolation Ring: | Nylon 66 |
| Push-Fit Nut: | Nylon 66 |
| Push-Fit Grab Ring: | Stainless Steel 304 |
| Burst Pressure: | 1420 psi |



1. Fitting Nut
2. Isolation Ring
3. Sealing Ring
4. Fitting Body



1. Push-Fit Nut
2. Push-Fit Sealing Ring
3. Push-Fit Isolation Ring
4. Push-Fit Grab Ring
5. Fitting Body
6. Sealing Ring
7. Isolation Ring

FRICION LOSS DATA

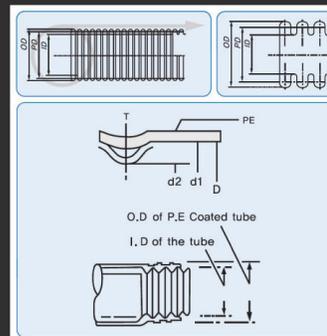
Friction loss of tubing calculated in pounds per square inch (PSI) of pressure lost per foot of tubing with a friction constant = 70 and no bends. Sharp bends are calculated the same as for fittings and gradual bends calculated the same as straight pipe.

| GPM | Nominal Size (ID) | | | |
|-----|-------------------|-------|-------|--------|
| | 1/2" | 3/4" | 1" | 1-1/4" |
| 1 | 0.032 | 0.004 | 0.002 | 0.001 |
| 2 | 0.114 | 0.015 | 0.005 | 0.002 |
| 3 | 0.241 | 0.032 | 0.012 | 0.004 |
| 4 | 0.41 | 0.055 | 0.02 | 0.008 |
| 5 | 0.619 | 0.083 | 0.03 | 0.011 |
| 6 | 0.867 | 0.117 | 0.042 | 0.016 |
| 7 | 1.153 | 0.153 | 0.055 | 0.021 |
| 8 | 1.476 | 0.199 | 0.071 | 0.027 |
| 9 | 1.836 | 0.248 | 0.088 | 0.034 |
| 10 | 2.231 | 0.301 | 0.107 | 0.041 |

1. Table is based on the *Hazen-Williams formula.
2. Fluid velocities in excess of 5-8 ft/sec are not recommended.
3. Friction loss values shown are for the flow rates that do not exceed a velocity of 8 ft/sec.

$$*P = \frac{4.52Q^{1.85}}{C^{1.85}D^{4.87}}$$

Where: P = friction loss, psi per linear foot
Q = flow, gpm
D = nominal ID, in inches
C = 70, friction constant





PRODUCT STANDARDS AND LISTINGS

| | |
|----------------------|---|
| NSF / ANSI 61 | Drinking Water System Components - Health Effects. Tested and certified by IAPMO. |
| ASTM A 240 | Specification for Chromium and Chromium-Nickel stainless steel plate, sheet, and strip for pressure vessels and for general applications. |
| ASTM D 335 | Specifications for Polyethylene plastic pipe and fittings materials. |
| ASTM DS-561 | Metals and alloys in the unified numbering system. |
| ASME B1.20.1 | NPT pipe threads, general purpose. |
| IAPMO IGC-233 | <ol style="list-style-type: none"> 1. Materials 2. Performance 3. Marking and Identification |

TESTING

| | |
|-------------------------------|---|
| Hydrostatic Test | Filled with water and internal pressure incurred to 220 ± 7 psi, at a temperature of $68^{\circ}\text{F} \pm 5^{\circ}\text{F}$ for a period of 5 minutes. |
| Hydrostatic Burst Test | At 68°F filled with water and the internal pressure increased to 588 ± 7 psi, at a temperature of $68^{\circ}\text{F} \pm 5^{\circ}\text{F}$ for a period of 5 minutes. |
| Bending Test | Bending motion being applied uniformly at the rate of 5-6 cycles per minute. |
| Hydraulic Shock Test | Subjected to a hydraulic shock for 2,000 cycles at $68^{\circ}\text{F} \pm 5^{\circ}\text{F}$. |
| Vibration Test | Filled with water. The amplitude of vibration was 0.2 inches and the frequency was 25 Hz for 3 hours. |
| Flattening Test | Pressed to $2/3$ D height of the outer diameter until the tube was flat. |
| Impact Test | An impact force was applied of 9.76 to 15.19 lb/ft to varied sizes of fittings using a hammer. |
| Pressure Test | Pressure rating at 212°F of 147 psi. |
| Toxicity Test | Water outflow was tested in hot and cold conditions with a PH range of 5-10. |



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Tustin, CA 92780 | info@easyflexusa.com



ISO 9001-2008
QC-023-D(1)

www.easyflexusa.com

ENGINEERING SPECIFICATION SHEET

STIEBEL ELTRON

Simply the Best

Tempra® Series Tankless Electric Water Heaters

› For whole house or multiple point-of-use

Features

- › On-demand, continuous and unlimited supply of hot water
- › High limit switch with manual reset
- › All models equipped with exclusive Electronic Temperature Control that ensures steady output temperature even with varying flow rates
- › Exclusive design prevents dry firing
- › Electronic switch activated for virtually silent operation
- › 7 year leakage/3 year parts warranty
- › Copper sheathed heating element housed in copper cylinder
- › 99% efficiency
- › Cold water only line needed to be run to lavatory
- › Seismic proof construction
- › Tankless design prevents Legionella bacteria growth
- › No standby heat loss with tankless design
- › Easy installation 3/4" NPT connections
- › No T & P relief valve needed (Check local code)



Tempra® Plus models are equipped with Tempra Advanced Flow Control™, which was invented by Stiebel Eltron. No other manufacturer of tankless electric water heaters has anything like it. If the demand is greater than the unit can handle, Tempra Advanced Flow Control™ slightly reduces the flow of water to maintain delivery of hot water at the set point. Regular Tempra® units ("B" models) do not have this feature.

Model Specifications

| Model | Voltage | Phase | kW | Amps | Circuit Breaker | Wire Size | Temperature Rise °F (GPM = kW x 6.83 / Δt) | | | |
|-------------------------------------|---|------------------------------|---------------------|---------------------|---------------------|---------------------|--|----------|---------|---------|
| | | | | | | | 1.5 GPM | 2.25 GPM | 3.0 GPM | 4.5 GPM |
| Tempra® 12/12 Plus | 240V | single | 12 | 50 | 60 | 6 AWG | 54 | 36 | 27 | - |
| | 208V | single or unbalanced 3-phase | 9 | 44 | 60 | 6 AWG | 41 | 27 | 20 | - |
| Tempra® 15/15 Plus | 240V | single | 14.4 | 2 x 30 | 2 x 40 | 8 AWG | 65 | 43 | 33 | - |
| | 208V | single or unbalanced 3-phase | 10.8 | 2 x 26 | 2 x 40 | 8 AWG | 49 | 33 | 25 | - |
| Tempra® 20/20 Plus | 240V | single | 19.2 | 2 x 40 | 2 x 50 | 8 AWG | 88 | 58 | 44 | 29 |
| | 208V | single or unbalanced 3-phase | 14.4 | 2 x 35 | 2 x 50 | 8 AWG | 65 | 43 | 33 | 22 |
| Tempra® 24/24 Plus | 240V | single | 24 | 2 x 50 | 2 x 60 | 6 AWG | 92 | 73 | 54 | 37 |
| | 208V | single or unbalanced 3-phase | 18 | 2 x 44 | 2 x 60 | 6 AWG | 82 | 54 | 41 | 27 |
| Tempra® 29/29 Plus | 240V | single | 28.8 | 3 x 40 | 3 x 50 | 8 AWG | 92 | 87 | 66 | 44 |
| | 208V | single or balanced 3-phase | 21.6 | 3 x 35 | 3 x 50 | 8 AWG | 92 | 66 | 49 | 33 |
| Tempra® 36/36 Plus | 240V | single | 36 | 3 x 50 | 3 x 60 | 6 AWG | 92 | 92 | 82 | 55 |
| | 208V | single or balanced 3-phase | 27 | 3 x 44 | 3 x 60 | 6 AWG | 92 | 82 | 61 | 41 |
| Tempra® Model | | 12 / 12 Plus | 15 / 15 Plus | 20 / 20 Plus | 24 / 24 Plus | 29 / 29 Plus | 36 / 36 Plus | | | |
| Part number | | 223420 / 224196 | 223421 / 224197 | 223422 / 224198 | 223424 / 224199 | 232885 / 223425 | 232886 / 223426 | | | |
| Weight (lbs / kg) | | 13.5 / 6.1 | 16.1 / 7.3 | 16.1 / 7.3 | 16.1 / 7.3 | 19.0 / 8.6 | 19.0 / 8.6 | | | |
| Min. flow to activate (gpm / l/min) | | 0.37 / 1.4 | 0.50 / 1.9 | 0.50 / 1.9 | 0.50 / 1.9 | 0.77 / 2.9 | 0.77 / 2.9 | | | |
| Operating Pressure | Min. 30 psi, Max. 150 psi | | | | | | | | | |
| Dimensions (in. / cm) | WIDTH 16 1/2" / 42.0 cm x HEIGHT 14 1/2" / 36.9 cm x DEPTH 4 5/8" / 11.7 cm | | | | | | | | | |
| Cover Material and Color | Gray Metal | | | | | | | | | |

rev. 2014.1 Due to our continuous process of engineering and technological advancement, specifications may change without notice.

STIEBEL ELTRON 17 West St., W. Hatfield, MA 01088 | 800.582.8423 | 413.247.3380 | fax 413.247.3369 | info@stiebel-eltron-usa.com | www.stiebel-eltron-usa.com



DIVISION 23

HEATING, VENTILATING,

AND AIR CONDITIONING

(HVAC)



Ventilation Unit Zehnder ComfoAir 200

Use
The ComfoAir 200 ventilation unit was developed for residential and small commercial buildings. It combines maximum comfort, simple operation and very high efficiency. The CA200 moves up to 116 cfm of air at 0.80" wc

Efficiency
The integrated cross-counterflow heat exchanger achieves efficiencies of up to 92% (according to testing by the Passive House Institute). For user comfort this means no unpleasant cold drafts, because the supply air is heated nearly to room temperature, even when external temperatures are very low.

Fans
The supply fan and extract fan are driven by efficient DC motors. Differential pressures in the supply and extract air distribution systems can be adjusted thanks to individual control. The especially quiet fans can be adjusted to the required volumetric flow in 1% increments. The air volumes of the selectable stages can be set to between 29 cfm and 116 cfm.

Filters
The CA200 is equipped with two class G4 filters (MERV 7/8). An optional class F7 pollen filter (MERV 13) is available for fresh air intake.

Installation
The CA200 can be wall-mounted (vertically) or ceiling-mounted (horizontally). Connections for air and wiring are on the top of the unit. The insulated, sound-absorbing pipe connections can be rotated to optimize the location of the ventilation tubes while acoustically decoupling the CA200 from the air distribution system. The condensate drain is located on the bottom of the unit.

Operation
The CA200 is controlled by the ComfoSense control unit, typically installed in the living area. Optional, wireless remote control units are installed in bathrooms for timed boost mode.

Maintenance
Maintenance of the CA200 is limited to periodic cleaning or replacement of the filters accessible from the front of the unit. The exchanger core should be inspected and cleaned annually (depending on outside air quality). Please see the unit manual for additional servicing tasks.

Frost protection
If the ventilation unit is operated without an optional geothermal heat exchanger, condensate in the extract air may freeze. The frost protection setting prevents this by variably reducing the supply air volume. An optional, integrated electric preheater warms incoming fresh air to prevent the heat exchanger from freezing even at very low temperatures.



Filter G4



Filter F7



ComfoSense controller



Remote Control Timer



238100

always
around you **zehnder**®

Ventilation Unit

Zehnder ComfoAir 200

Bypass

During summer nights and in the “shoulder” seasons of spring and fall with strong sunshine, the house can become too warm, while the outside temperature remains pleasantly cool. In such cases, heat removal by what is known as “free cooling” helps: The CA200 is equipped with a standard automatic bypass for just this purpose, and diverts 100% of the relatively warm extract air from the heat exchanger, introducing cool supply air to the space.

Options

- **Humidity recovery with the Zehnder enthalpy exchanger**

When the CA200 is fitted with an enthalpy exchanger core, the humidity from the extracted air is partly transferred to the fresh supply air. In this case, the process of drying out the house in dry winter months is delayed. Additionally, there is no condensate that must be drained from the ComfoAir. Therefore a condensation drain is not necessary with an enthalpy exchanger.

The Zehnder enthalpy exchanger provides the ideal hygienic solution. Supply and extract air flows are kept completely separate so there is no transfer of odors or bacteria.

- **Pollen filter (F7/MERV 13)**

A pollen filter installed in the intake air line (upstream of the heat exchanger) keeps the inside of the house pollen-free and reduces particulates, spores and germs so occupants can breathe freely in times of increasing allergies.

- **Wireless remote control**

With the Zehnder wireless remote control, the CA200 can be controlled from locations throughout the house, apartment, classroom, etc. Typically, one is installed in each bathroom to provide a boost function.

- **Open fire program**

The ventilation system can be installed in a home with a fireplace, wood stove, etc. but must be accounted for in the control unit. By indicating in the ComfoSense control unit the presence of a fireplace, negative pressure and possible back-drafting of unpleasant fumes and/or harmful gases can be avoided.



238100



Ventilation Unit **Zehnder ComfoAir 200**

Benefits

- Comfort ventilation up to 116 cfm
- Heat recovery with an efficiency of 92% (according to PHI)
- Moisture recovery with optional Zehnder enthalpy exchanger
- Low power consumption DC motors
- Automatic summer bypass
- Frost protection function
- Quick, safe installation, maintenance and servicing
- Simple operation
- Optional, integrated electric pre-heater
- Wireless remote control/boost switch
- Filter replacement indicator
- Electric and hydronic post-heater integration possible
- CO2 control (optional)
- Relative humidity control (optional)

Article Numbers

L = supply air left

R= supply air right

VV = integrated electric pre-heater

| Product | Article Number | Reference Number |
|----------------|----------------|------------------|
| CA200 HRV-L | 471 236 710 | 9280 |
| CA200 HRV-R | 471 236 715 | 9276 |
| CA200 HRV-VV-L | 471 236 730 | 9281 |
| CA200 HRV-VV-R | 471 236 735 | 9338 |
| CA200 ERV-L | 471 236 840 | 9357 |
| CA200 ERV-R | 471 236 845 | 9364 |
| CA200 ERV-VV-L | 471 238 540 | 9422 |
| CA200 ERV-VV-R | 471 238 545 | 9423 |

| Accessories | Article Number | Reference Number |
|-------------------------|----------------|------------------|
| ComfoSense control unit | 655 010 215 | 9257 |
| Wireless remote control | 655 000 755 | 9238 |
| Waterless P-Trap | 990 201 330 | 9362 |

| Filters | Article Number | Reference Number |
|-------------------|----------------|------------------|
| G4 (MERV 7/8) 1pc | 400 100 014 | 9282 |
| F7 (MERV 13) 1pc | 400 100 013 | 9283 |

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2015.03.23



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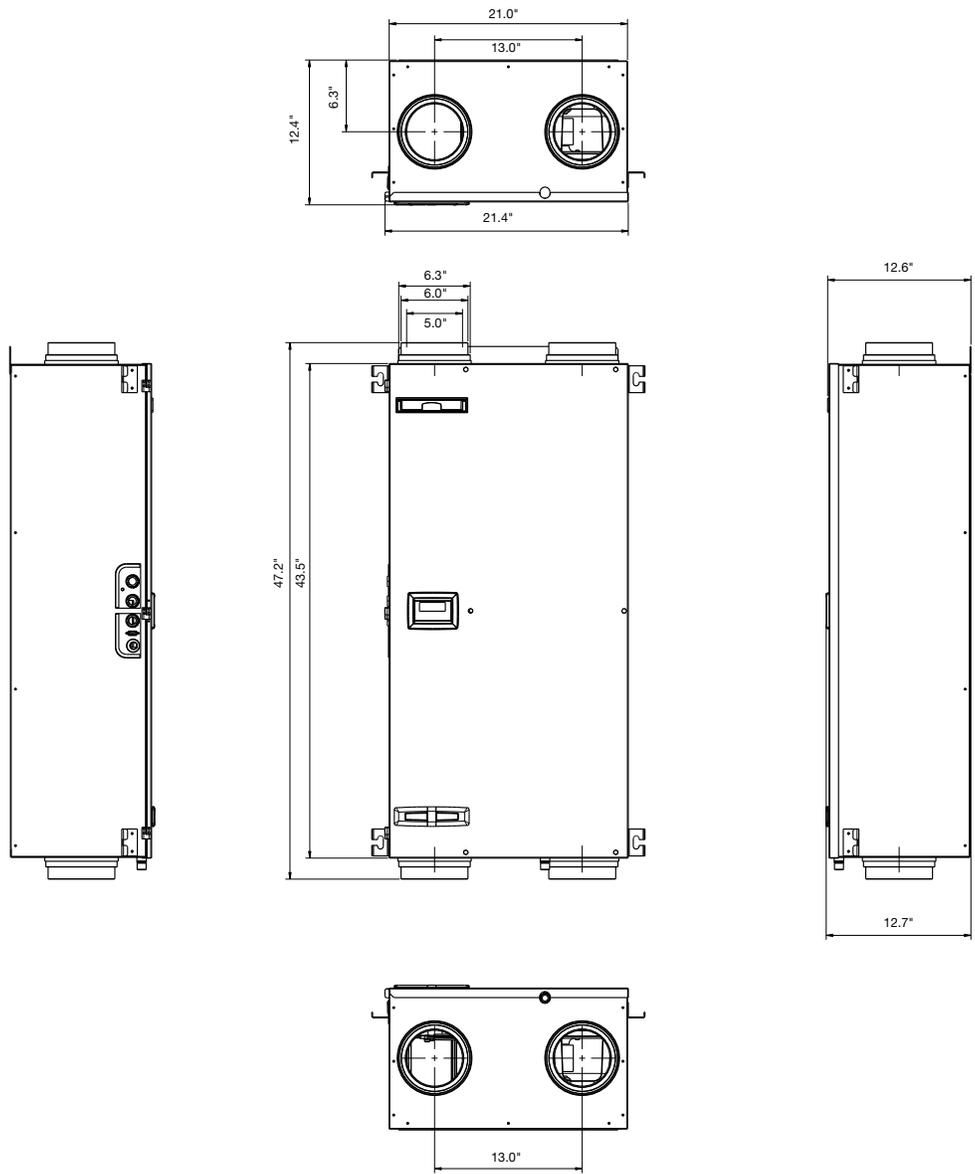
Ventilation Unit **Zehnder ComfoAir 200**

Technical Specifications

| | |
|------------------------|--|
| Heat Exchanger: | Polystyrene |
| Fans: | ECM direct current, radial fans |
| Filters: | (2) Class G4 (MERV 7/8), F7 (MERV 13) optional |
| Condensate Connection: | 20mm |
| Air Duct Connections: | 5" ID (nominal), 6" OD (nominal); (2) top; (2) bottom. |
| Electrical Connection: | 230v, 50-60Hz |
| Temperature Range: | 44.6°F - 104°F (7°C - 40°C) |
| Acoustic Performance: | Extract air (min – max): 30 - 57 dB(A) Supply air (min – max): 36 - 73 dB(A) |
| Heat Recovery: | 92% (according to PHI) |
| Volumetric Flow: | 29cfm - 118cfm |
| Power Consumption: | 9W – 143W |
| Dimensions: | Height: 47.2" Width: 21" Depth: 12.6" |
| Weight: | 66.2 pounds (30kg) |
| Versions: | ComfoAir 200 HRV L ComfoAir 200 HRV R ComfoAir 200 HRV VV L ComfoAir 200 HRV VV R ComfoAir 200 ERV L ComfoAir 200 ERV R ComfoAir 200 ERV VV L ComfoAir 200 ERV VV R |
| Manufacturer: | Zehnder Group Nederland B.V. Lingenstraat 2 8028 PM Zwolle NETHERLANDS |

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around you **zehnder**®

Ventilation Unit **Zehnder ComfoAir 200**



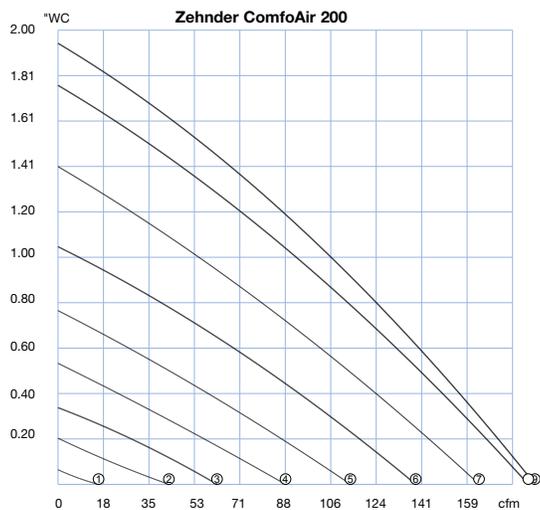
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2015.03.23

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around you **zehnder**®

Ventilation Unit **Zehnder ComfoAir 200**

| Stage | Setting | Capacity | Pressure | Power consumption | Current consumption | COS ϕ | Installed noise level | | Weight |
|----------------------|---------|----------|-----------------|-------------------|---------------------|------------|-----------------------|------------|--------|
| | Percent | Qv | ΔP_{st} | W | A | | Extract air | Supply air | |
| Zehnder ComfoAir 200 | | | | | | | | | |
| (1) | 15% | 12 | 0.012 | 9 | 0.08 | 0.48 | 30 | 36 | 66.2 |
| (2) | 30% | 35 | 0.028 | 14 | 0.11 | 0.54 | 35 | 46 | |
| (3) Low | 40% | 53 | 0.060 | 20 | 0.16 | 0.55 | 37 | 53 | |
| (4) | 50% | 71 | 0.120 | 30 | 0.25 | 0.52 | 43 | 59 | |
| (5) | 60% | 91 | 0.180 | 46 | 0.37 | 0.55 | 47 | 63 | |
| (6) Medium | 70% | 109 | 0.281 | 68 | 0.55 | 0.54 | 51 | 66 | |
| (7) | 80% | 127 | 0.402 | 98 | 0.77 | 0.55 | 54 | 69 | |
| (8) High | 90% | 144 | 0.482 | 128 | 0.99 | 0.56 | 56 | 72 | |
| (9) Maximum | 100% | 150 | 0.502 | 143 | 1.1 | 0.57 | 57 | 73 | |





Ventilation Unit Zehnder ComfoAir 200

Sound, supply air

| Ventilation unit Type | Speed | Acoustic performance | | | | | | |
|-----------------------|-------|----------------------|--------|--------|---------|---------|---------|---------|
| | | 125 Hz | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | 4000 Hz | 8000 Hz |
| ComfoAir 200 | 1 | 41.1 | 39.6 | 35.2 | 30 | 20.8 | 12.9 | 8.7 |
| ComfoAir 200 | 2 | 50.3 | 48.8 | 44.4 | 39.2 | 30 | 22.1 | 17.9 |
| ComfoAir 200 | 3 | 56 | 54.8 | 50.7 | 48.3 | 39.4 | 33.7 | 24.6 |
| ComfoAir 200 | 4 | 61.3 | 60.4 | 54.7 | 54.9 | 46.1 | 42.2 | 35.7 |
| ComfoAir 200 | 5 | 66.5 | 65.4 | 58.1 | 58.6 | 51.8 | 48.1 | 43.5 |
| ComfoAir 200 | 6 | 69.4 | 69.3 | 61.1 | 61.1 | 56.5 | 52.5 | 49 |
| ComfoAir 200 | 7 | 73.2 | 72.2 | 63.8 | 63.4 | 60.9 | 56.4 | 53.6 |
| ComfoAir 200 | 8 | 74.9 | 75.2 | 66.2 | 64.9 | 64 | 59.1 | 57 |
| ComfoAir 200 | 9 | 75.9 | 75.9 | 67.5 | 65.7 | 64.8 | 60.1 | 58.1 |

Sound, extract air

| Ventilation unit Type | Speed | Acoustic performance | | | | | | |
|-----------------------|-------|----------------------|--------|--------|---------|---------|---------|---------|
| | | 125 Hz | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | 4000 Hz | 8000 Hz |
| ComfoAir 200 | 1 | 43.4 | 35.2 | 18.4 | 12.8 | 3.2 | 7.3 | 14.9 |
| ComfoAir 200 | 2 | 47.6 | 39.4 | 22.6 | 17 | 7.4 | 11.5 | 19.1 |
| ComfoAir 200 | 3 | 47.5 | 43.6 | 28.2 | 24.7 | 11.5 | 11.5 | 19 |
| ComfoAir 200 | 4 | 52 | 50.1 | 33.1 | 31.2 | 17.4 | 12.4 | 18.7 |
| ComfoAir 200 | 5 | 57 | 53.4 | 39.9 | 34.4 | 22.8 | 14.5 | 18.8 |
| ComfoAir 200 | 6 | 60.1 | 58 | 40.6 | 37 | 27.3 | 18.4 | 19.2 |
| ComfoAir 200 | 7 | 63.1 | 60.8 | 41.7 | 38.5 | 30.5 | 22.2 | 19.6 |
| ComfoAir 200 | 8 | 65.1 | 62.8 | 44.9 | 40.4 | 33.3 | 25.9 | 20.3 |
| ComfoAir 200 | 9 | 65.2 | 63.9 | 46.3 | 41.3 | 34.3 | 27.3 | 21 |

Sound, unit emission

| Ventilation unit Type | Speed | Acoustic performance | | | | | |
|-----------------------|-------|----------------------|--------|--------|---------|---------|-------|
| | | 125 Hz | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | db(A) |
| ComfoAir 200 | 2 | 28.5 | 35.2 | 23.1 | 14.5 | 10.5 | 23.9 |
| ComfoAir 200 | 3 | 34.6 | 39.4 | 27.3 | 19.8 | 11.8 | 29.1 |
| ComfoAir 200 | 4 | 40.3 | 43.6 | 32.4 | 24.9 | 18.9 | 34.6 |
| ComfoAir 200 | 5 | 45.3 | 50.1 | 35.6 | 28.7 | 24.5 | 39 |
| ComfoAir 200 | 6 | 46.8 | 53.4 | 43.5 | 31.9 | 28.5 | 43.3 |
| ComfoAir 200 | 7 | 49.7 | 58 | 41.4 | 34.1 | 31.9 | 44.3 |
| ComfoAir 200 | 8 | 52.3 | 60.8 | 43.6 | 36 | 34.6 | 46.7 |
| ComfoAir 200 | 9 | 53.8 | 62.8 | 44.7 | 36.7 | 35.5 | 47.9 |



Ventilation Unit Zehnder ComfoAir 200

Certificate

Certified Passive House Component
For cool, temperate climates, valid until 31 December 2014

Category: **Heat recovery unit**

Manufacturer: **Zehnder Group Nederland B.V.
8028 PM Zwolle, NETHERLANDS**

Product name: **ComfoAir 200, ComfoD250, WHR920**

Passive House Institute
Dr. Wolfgang Feist
64283 Darmstadt
GERMANY

This certificate was awarded based on the following criteria:

| | |
|------------------------------|---|
| Thermal comfort | $\theta_{\text{supply air}} \geq 16.5 \text{ }^\circ\text{C}$ at $\theta_{\text{outdoor air}} = -10 \text{ }^\circ\text{C}$ |
| Effective heat recovery rate | $\eta_{\text{HR,eff}} \geq 75 \%$ |
| Electric power consumption | $P_{\text{el}} \leq 0.45 \text{ Wh/m}^3$ |
| Airtightness | Interior and exterior air leakage rates less than 3 % of nominal air flow rate |
| Balancing and adjustability | Air flow balancing possible: yes Automated air flow balancing: no |
| Sound insulation | Sound level $L_w \leq 35 \text{ dB(A)}$ not met Here $L_w = 49.0 \text{ dB(A)}$ Unit should be installed so that it is acoustically separated from living areas |
| Indoor air quality | Outdoor air filter F7 Extract air filter G4 |
| Frostprotection | Frost protection for the heat exchanger with continuous fresh air supply down to $\theta_{\text{outdoor air}} = -15 \text{ }^\circ\text{C}$ |

Further information can be found in the appendix of this certificate.

Certified for air flow rates of

60 – 150 m³/h

$\eta_{\text{HR,eff}}$

92 %

Electric power consumption

0.42 Wh/m³

www.passivehouse.com

0327vs03

CERTIFIED COMPONENT

Passive House Institute



Attenuator and Distribution System **Zehnder ComfoWell 220**

Benefits

- All air treatment functions available: attenuator, fine filter, active carbon filter, manifold box
- Modular design
- Compact dimensions
- Easy to clean
- Components connected with sliding profiles for easy mounting
- Pipes connected by end pieces with sleeves
- Directly connected to all components of the ComfoWell system
- Very good sound attenuation
- Two attenuators can be used in series for maximum sound reduction
- Mounting set available for vertical mounting of attenuator on ComfoAir 200
- High-efficiency fine filters up to filter class MERV15 available
- Odour neutralisation by active carbon filter
- Components available in width of 8.7" to connect 4 ComfoTubes 3" (75)



ComfoWell as silencer



ComfoWell as manifold box



ComfoWell as filter housing

Article number

| Designation | Art. no. | Reference No |
|-------------------------|-------------|--------------|
| Attenuator CW-S 220 | 990 323 500 | 9318 |
| Manifold box CW-D 220 | 990 323 530 | 9363 |
| Filter housing CW-F 220 | 990 323 550 | 9300 |



238100



Attenuator and Distribution System

Zehnder ComfoWell 220

Description

Attenuator Zehnder ComfoWell Attenuator CW-S 220. Compact rectangular attenuator with high-efficiency special sound absorbing foam and low pressure losses. The attenuator can be used on its own or in combination with any add-on from the ComfoWell system. It is connected to all add-ons with a folded joint and clamping rail to create an airtight seal. The sound absorbing element can be removed for inspection and cleaning. The attenuator is mounted on a wall or ceiling with height-adjustable mounting brackets. Mounting accessories are supplied with the unit.

Technical data:

Insertion loss: 12.8 dB / 250 Hz
Housing: Galvanised sheet steel
Sound absorbing element: Special foam with hygienic coating

Dimensions:
Length: 19.7"
Depth: 8.7"
Height: 9.0"

Manifold box

Zehnder ComfoWell Manifold Box CW-D 220. Compact sound-absorbing manifold box with closed-cell inner lining, fits mounting plate for ComfoTube 4 x 3" (75) ventilation pipes. The mounting plate connection can be moved from the front to the side. The manifold box can be used on its own or in combination with any add-on. It is connected to all add-ons with a folded joint and clamping rail to create an airtight seal. The manifold box features an access panel for easy cleaning and adjustment of the ComfoTube ventilation pipes. Mounting accessories are supplied with the unit.

Material: Galvanised sheet steel

Dimensions:
Length: 9.0"
Width: 8.7"
Height: 9.0"

Filter housing

Zehnder ComfoWell Filter Housing CW-F 220. Compact filter housing for mounting in supply line, to accommodate pollen filter MERV13 or active carbon filter element. Filter elements are not supplied with the unit. The manifold box can be used on its own or in combination with any add-on from the ComfoWell system. It is connected to all add-ons with a folded joint and clamping rail to create an airtight seal. It is mounted with adjustable mounting brackets; mounting accessories are included.

Material: Galvanised sheet steel

Dimensions:
Length: 11.8"
Width: 8.7"
Height: 9.0"

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Attenuator and Distribution System **Zehnder ComfoWell 220**

Specifications

Material:

Housing: Galvanised steel
 Inner lining: Closed-cell melamine resin foam
 Permissible operating temperature range: -13°F to 140°F
 Maximum airflow: 94 cfm at normal ventilation level

Accessories

| Designation | Art. no. | Reference No |
|--------------------------------|-------------|--------------|
| Mounting plate CW-M 220-4 x 75 | 990 323 520 | 9359 |
| End plate CW-P 220 – 5" (125) | 990 323 510 | 9353 |
| Fine dust filter CW-MERV13 220 | 990 323 600 | 9301 |
| Fine dust filter CW-MERV15 220 | 990 323 601 | 9342 |
| Fine dust filter CW-FC 220 | 990 323 602 | ???? |

Description of accessories

Mounting plate:
 Zehnder ComfoWell Mounting Plate CW-M220-4 x 3" (75) for connecting 4x Zehnder ComfoTube 3" (75) flexible ducts. Supplied with guard and clamping rails. Mounting plate can also be used for mounting in concrete.

End plate:
 Zehnder ComfoWell End Plate CW-P 220 - DN125 (with central support) for connecting the ComfoWell attenuator and distribution system to a DN125 round duct. Clamping rails included.

Filter:
 Filter for mounting in filter housing CW-F 220. Available filter classes include MERV13, MERV15 and an active carbon filter for odour neutralisation.



Mounting plate



End plate



Fine dust filter MERV13



Fine dust filter MERV15



Active carbon filter FC

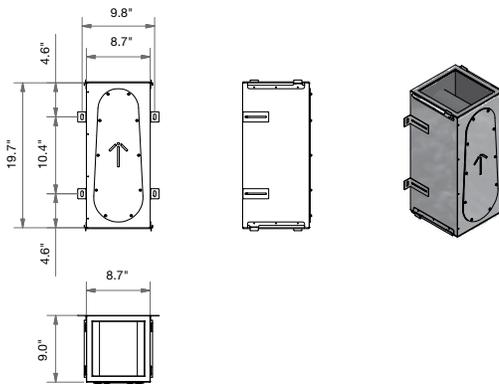


Attenuator and Distribution System

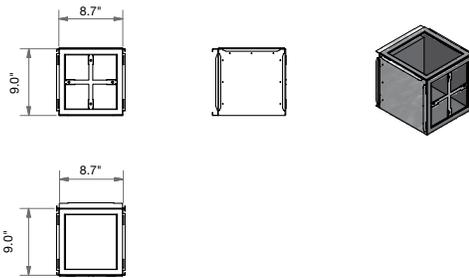
Zehnder ComfoWell 220

Dimensional drawings

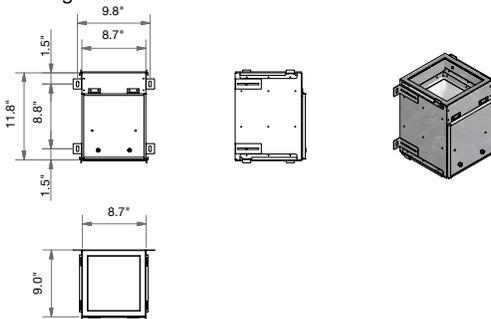
Attenuator



Manifold box



Filter housing

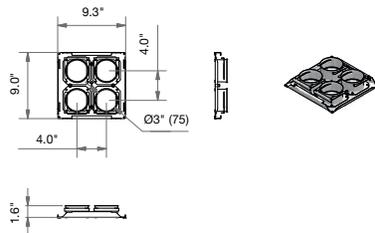


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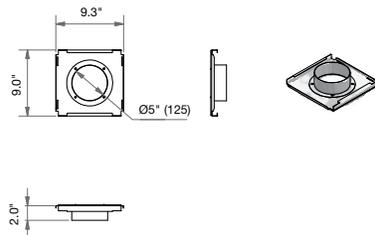


Attenuator and Distribution System **Zehnder ComfoWell 220**

Mounting plates



End plate

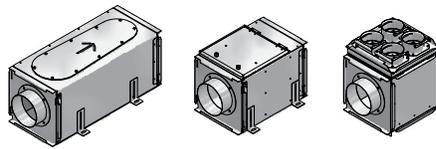




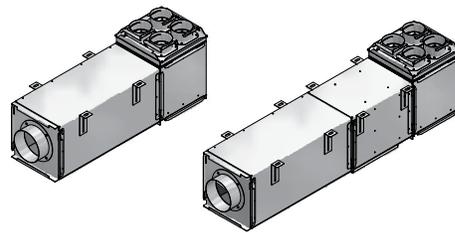
Attenuator and Distribution System **Zehnder ComfoWell 220**

Usage scenarios

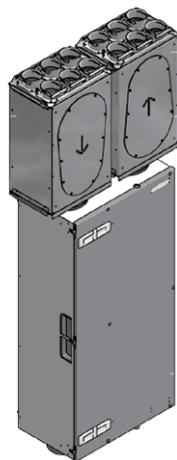
Standalone



Combined



Compact with ventilation unit

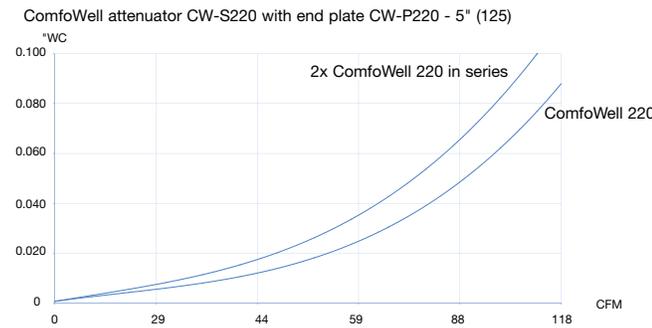


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Attenuator and Distribution System **Zehnder ComfoWell 220**

Pressure losses



Insertion loss

1x end plate CW-P220 - 5" (125) + 1x attenuator CW-S220 +
1x end plate CW-P220 - 5" (125)

| Frequency Hz | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
|------------------------|-----|------|------|------|------|------|------|------|
| Connection DN 125 [dB] | 5.3 | 17.6 | 12.8 | 14.6 | 17.5 | 32.3 | 36.6 | 37.8 |

1x end plate CW-P220 - 5" (125) + 2x attenuators CW-S220 +
1x end plate CW-P220 - 5" (125)

| Frequency Hz | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
|------------------------|-----|------|------|------|------|------|------|------|
| Connection DN 125 [dB] | 8.8 | 23.9 | 23.1 | 25.7 | 32.4 | 53.3 | 57.6 | 56.6 |

1x end plate CW-P220 - 5" (125) + 1x attenuator CW-S220 +
1x mounting plate CW-M220- 4 x 3" (75)

| Frequency Hz | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
|------------------------|------|------|------|------|------|------|------|------|
| Connection DN 125 [dB] | 18.7 | 14.4 | 19.8 | 18.3 | 22.1 | 34.7 | 34.4 | 37.8 |

1x end plate CW-P220 - 5" (125) + 2x attenuators CW-S220 +
1x mounting plate CW-M220- 4 x 3" (75)

| Frequency Hz | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
|-----------------------------|------|------|------|------|------|------|------|------|
| Connection DN 5" (125) [dB] | 19.9 | 19.6 | 29.3 | 29.8 | 37.8 | 53.5 | 56.8 | 56.4 |

ZA-CSY-FLVERTS221, V1211, en_us, subject to changes

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Now You Have a Choice:

COOL AND HEAT YOUR ENTIRE HOME OR JUST ONE ROOM AT A TIME

AMERICA'S #1 SELLING BRAND OF DUCTLESS

mitsubishicomfort.com

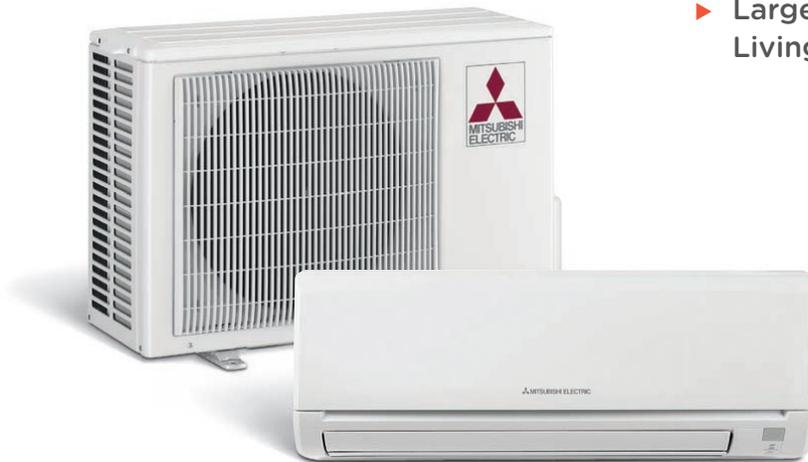
VERSION | CONBRO | ©2014 MITSUBISHI ELECTRIC US, INC.

THE FUTURE OF HOME COMFORT



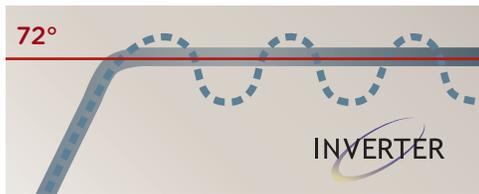
Mitsubishi Electric ductless cooling and heating technology offers a welcome alternative to the traditional systems we all grew up with. Because it focuses on individual rooms and living spaces rather than on a central air system, it's more energy-efficient, more flexible, and easier to install — as proven by decades of successful use in Europe, Asia, and across the globe. It is not surprising that ductless is the fastest growing segment of the American air conditioning and heating market. Our products reduce energy costs and easily solve problems such as:

- ▶ Hot and Cold Rooms
- ▶ Additions/Renovations
- ▶ Enclosed Patios
- ▶ Homes Without Space For Ductwork
- ▶ Larger, Multi-Zone Living Spaces



ADVANCED FEATURES FOR GREATER COMFORT, EFFICIENCY AND CONVENIENCE

Put Your Comfort on Cruise Control



Thanks to our advanced INVERTER-driven compressor technology, you can achieve consistent temperatures throughout your space while saving energy during both the summer and winter months. The compressor speed is controlled to maximize efficiency, changing speeds according to the cooling or heating needs of your room(s). Like a car's cruise control, the system varies the compressor speed, which reduces power consumption for energy savings. This is different from conventional systems, which start and stop repetitively, wasting energy.

Detect and Control Temperature Fluctuations



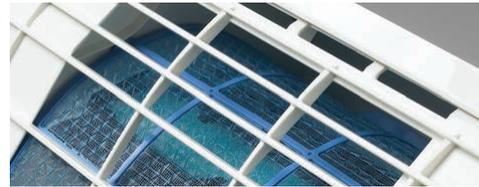
Select M-Series indoor units feature our i-see™ Sensor which automatically detects the temperature of troublesome regions closer to the ceiling and the floor. It scans the room and makes adjustments based on the ambient temperature readings. This process ensures that you always enjoy ultimate comfort.

Heat and Lots of It

The advances in the heating performance of our units are unmatched in the industry. Our available H2i® technology can heat your space effectively even when temperatures outside are down to -13° F. Our Hot Start technology provides hot air from the start with no drafts.



Multiple Filters for Cleaner, Healthier Air



All indoor models use a sophisticated multi-part filtration system to reduce contaminants such as allergens, viruses and bacteria from the air. This combination of filters provides a healthier breathing environment for the home.

Quiet as a Whisper



Both the outdoor and indoor units operate quietly. The indoor units can operate as low as 19dB – that's quieter than a human whisper.

THE PERFECT SOLUTION TO YOUR

High Energy Costs

Why pay to cool/heat your home all year long when you only live in a few rooms at a time? With Mitsubishi Electric, you can actively condition the rooms you live in while dialing back energy costs in the rooms you don't use. Plus, Mitsubishi Electric's inverter-driven compressors automatically adjust to changing conditions to deliver ideal comfort while only using the energy that is needed.

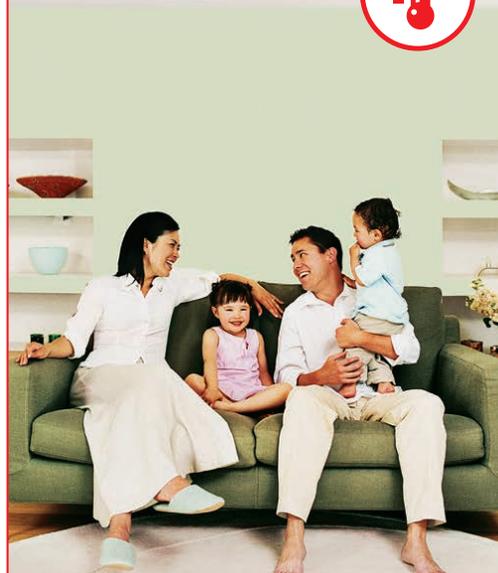
- ▶ Inverter heating performance is far more efficient than traditional heat pumps.
- ▶ Cooling is up to 40% more efficient than standard systems.
- ▶ Single and multi-zone systems available to fit any room or your entire home.
- ▶ Options include more than 25 ENERGY STAR® qualified models and 9 ENERGY STAR® Most Efficient models.



Hot or Cold Problem Rooms

An American Home Comfort Study (AHCS) reports that 67 percent of homes in the U.S. have a room that's too hot in the summer or too cold in the winter. It's a common problem with ducted forced air systems — one that can be solved quite simply with a Mitsubishi Electric system.

- ▶ Wireless control unit senses the temperature throughout the room and makes automatic adjustments.
- ▶ Installation is as simple as mounting units, connecting the refrigerant lines and making a few electrical connections.
- ▶ No ductwork required, so installation is fast and doesn't require any messy renovation.
- ▶ Options for single rooms, multiple rooms or your entire home.

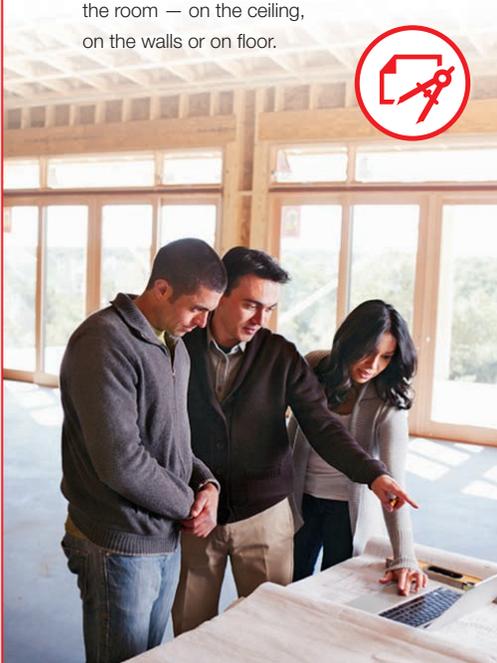


COOLING AND HEATING PROBLEMS

Renovations and New Homes

You don't have to install ductwork to make a living space comfortable. Mitsubishi Electric ductless solutions require only a 3" opening for two refrigerant lines, control wiring and electrical connections. Mitsubishi Electric ductless is the perfect solution for new additions, for renovated bedrooms and office spaces, for garage and basement workshops or studios. And it's a lifesaver for any home that can't accommodate ductwork.

- ▶ Outdoor units come in a wide variety of capacities, are compact, lightweight and easy to install and camouflage.
- ▶ Attractive enclosures are available to beautify and protect outside refrigerant and electric lines.
- ▶ Indoor units can be installed anywhere in the room — on the ceiling, on the walls or on floor.



Allergens and Odors

A room isn't really comfortable unless the air breathes comfortable. That's why Mitsubishi Electric cooling and heating systems use a sophisticated multi-part filter system to reduce odors, allergens, viruses and bacteria from the air as it circulates within a room.

- ▶ Hybrid filter absorbs odor-causing gases.
- ▶ Blue-enzyme, anti-allergen filter on select models reduces germs, bacteria and viruses and helps trap dust, pollens, mites and other particles that plague allergy sufferers.
- ▶ With regular cleaning, filters can last up to 10 years.
- ▶ Filters are easy to clean and maintain — you can do it in a matter of minutes.



INDOOR UNITS



SLZ

Perfect for bedrooms, offices, basements, sunrooms and additions.

Ceiling-Recessed

Wider airflow pattern for better air distribution in a less obtrusive style.



SEZ

Perfect for master bedrooms and baths, additions, rooms with attics, soffit or crawl space available.

Horizontal-Ducted

Provides comfort and efficiency while staying hidden in ceiling or floor.



MFZ

Perfect for attics, sunrooms and rooms with low walls.

Floor-Mounted

Ideal for areas that are smaller or don't have as much wall space. (Multi-zone applications only).



OUTDOOR UNITS



Single and Multi-Zone
Outdoor Units

12 models ranging from 2,800 to 34,600 BTUs. Each specifically designed to power a single-indoor unit for single room applications – or up to 8 indoor units for multiple-room applications. More than 25 ENERGY STAR® qualified models including efficiency ratings as high as 30.5 SEER. Talk to your authorized Mitsubishi Electric contractor about which combination will best fit your cooling and heating needs.

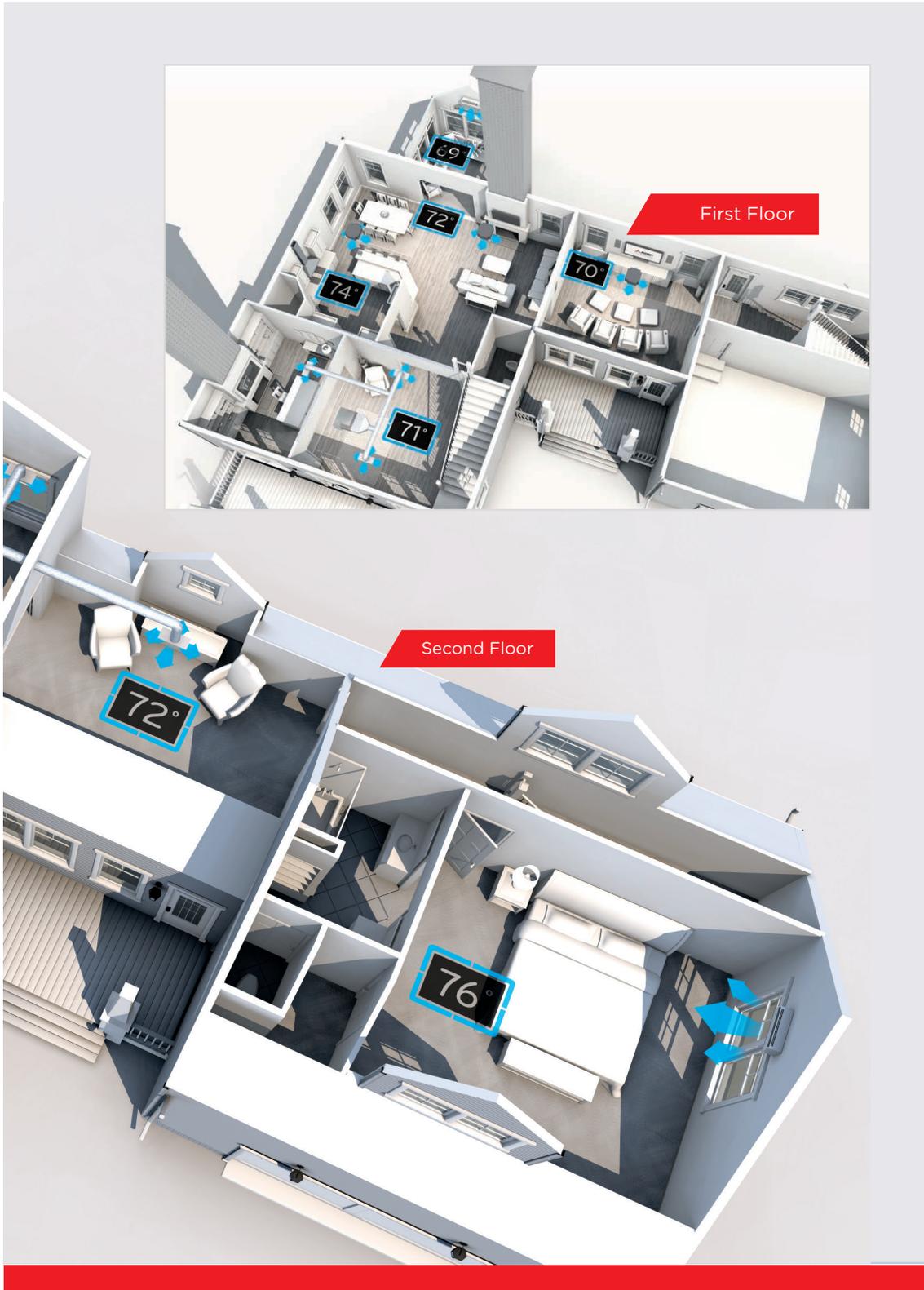


MULTI-ZONE APPLICATIONS

Multi-zone units allow you to create an oasis of comfort throughout your whole house in the rooms you use most.

Each room (zone) operates independently with its own wireless/wired remote control, so people in different rooms can choose the temperature that makes them most comfortable.





WIRELESSLY CONTROL HOME COMFORT FROM ANY PLACE, AT ANY TIME

Energy-efficient comfort control is truly at your fingertips with RedLINK™ Technology. No matter where you are in your home... or where you are in the world.



MHK1 Wireless Wall-Mounted Remote Controller and Wireless Receiver

Installs anywhere with simple wall-mounted design. Backlit display makes it easy to fine-tune temperature, fan speed, airflow direction and more.



Optional MCCH1 Portable Central Controller

Full control of up to 16 RedLINK™ devices from anywhere in your home. Does not interfere with other wireless devices.



Optional MOST1 Outside Air Sensor

Monitors outside air temperature and humidity for display on MHK1 Remote Controller and MCCH1 Portable Central Controller.



Optional RedLINK Internet Gateway

Remotely monitors and controls your cooling and heating system at any time, from any place via PC, smartphone or tablet. No monthly fee, free app download.



RED LINK
Wireless Technology

WHY MITSUBISHI ELECTRIC?

Mitsubishi Electric is a world leader in ductless cooling and heating technology for both residential and commercial installations — and **we're # 1 in Ductless in the United States**. So, with Mitsubishi Electric, you can be sure that you're getting:

- ▶ **The latest, most efficient technology**, including the most advanced, inverter-driven heat pump systems in the world.
- ▶ **Mitsubishi Electric Diamond Contractors**: a nationwide network of local HVAC pros who will provide skilled installation and service.
- ▶ **One of the best warranties in the business**: 7 years on parts and 7 years on the compressor when installed and registered by a Mitsubishi Electric Diamond Contractor.

Start enjoying ultimate comfort.

Visit mitsubishicomfort.com to find a contractor in your area.



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DIVISION 25 INTEGRATED AUTOMATION

2/11/2015

100FT FLEXboot Series 24AWG Cat5e 350MHz UTP Bare Copper Ethernet Network Cable - Blue - Monoprice.com

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Products

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HOME > Cables > Cat 5e Ethernet Cables > Cat5e Straight Cables - 100ft



100FT FLEXboot Series 24AWG Cat5e 350MHz UTP Bare Copper Ethernet Network Cable - Blue

Product Number: 11222

★★★★★ 1 reviews

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QTY: 1 \$11.28

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Description Customer Reviews Write a Review

Description

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100FT FLEXboot Series 24AWG Cat5e 350MHz UTP Bare Copper Ethernet Network Cable - Blue

Monoprice Cat5e fixed length network cables are the perfect combination of value and performance. Available in a large assortment of colors and lengths, we have a cable to fit every situation. Each cable is made of 24AWG stranded pure bare copper conductor pairs with 50µm gold plated contacts (short body). Most budget cables skimp with only 10µm. Each cable features color matched, snagless strain relief boots.

Monoprice Cat5e and Cat6 cables are made of 100% pure bare copper wire, as opposed to copper clad aluminum (CCA) wire, and are therefore fully compliant with UL Code 44 and National Electrical Code TIA-568-C.2 fire and safety standards, which require pure bare copper wire in Cat5e and Cat6 communications cables.

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GE 45613 - Z-Wave 3-Way Dimmer Kit

Manufacturer:
GE Z-Wave

MSRP: ~~\$79.99~~

Model: 45613

Transform any home into a smart home with the GE Z-Wave Wireless Lighting Control Three-Way Dimmer Kit. Enables wireless control of on/off and dim functions of hardwired incandescent lighting, and includes a primary dimmer switch and auxiliary switch for control of one light from two locations.

now only
\$64.99

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1

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DESCRIPTION

SPECS

DOCUMENTATION

REVIEWS

Specifications

- Power: 120 VAC, 60 Hz.
- Frequency: 908.42 MHz.
- Minimum Load: 40W, incandescent lamps only.
- Maximum Load: 500W, incandescent lamps only.
- Range: Up to 65 feet line of sight between the Wireless Controller and the closest Z-Wave receiver module.
- Operating Temperature Range: 32-104° F (0-40° C)
- For indoor use only

Alternate views:



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2/11/2015

5-Port Gigabit Desktop Switch TL-SG1005D - Welcome to TP-LINK

United States [Change]

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Home » Products » Switches » Unmanaged Switches » TL-SG1005D



5-Port Gigabit Desktop Switch TL-SG1005D



Highlights:

- 5 Gigabit Auto-Negotiation RJ45 ports, Supports Auto MDI / MDIX
- Green Ethernet technology saves the power up to 85%
- IEEE 802.3x flow control provides reliable data transfer
- Plastic case, desktop or wall-mounting design
- Plug and play, no configuration required



| Overview | Features | Specifications | Download |
|--------------------------|--|----------------|----------|
| HARDWARE FEATURES | | | |
| Interface | 5 10/100/1000Mbps RJ45 Ports AUTO Negotiation/AUTO MDI/MDIX | | |
| External Power Supply | 100~240VAC, 50/60Hz | | |
| Dimensions (W X D X H) | 5.5*3.5*0.9 in. (140*88*23 mm) | | |
| Fan Quantity | Fanless | | |
| Power Consumption | Maximum: 3W (220V/50Hz) | | |
| SOFTWARE FEATURES | | | |
| Transmission Method | Store and Forward | | |
| Advanced Functions | Green Technology, saving power up to 85% 802.3X Flow Control, Back Pressure Auto-Uplink Every Port | | |
| OTHERS | | | |
| Certification | FCC, CE, RoHs | | |
| Package Contents | 5-Port Gigabit Desktop Switch TL-SG1005D Power Adapter Installation Guide | | |
| System Requirements | Microsoft® Windows® 98SE, NT, 2000, XP, Vista™ or Windows 8 / 7, MAC® OS, NetWare®, UNIX® or Linux. | | |
| Environment | Operating Temperature: 0°C~40°C (32°F~104°F); Storage Temperature: -40°C~70°C (-40°F~158°F); Operating Humidity: 10%~90% non- | | |

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Related Product

8-Port Gigabit Desktop Switch
TL-SG1008D

N150 Wireless Desktop Access Point
TL-WA701ND

<http://www.tp-link.us/products/details/?categoryid=224&model=TL-SG1005D#spec>

1/2

2/11/2015

5-Port Gigabit Desktop Switch TL-SG1005D - Welcome to TP-LINK

| | |
|----------|--|
| | condensing; Storage Humidity: 5%~90% non-condensing |
| Warranty | 2 years limited warranty. Advanced replacement service is available. |



N150 Wireless Router with 5dBi Detachable Antenna
TL-WR741ND

FAQ

Troubleshooting information
for your product

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ASUS
ASUS X551MAV-EB01-B 15.6" Laptop Computer - Black
With Intel UMA GPU, SonicMaster audio system

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~~\$249.99~~ SAVE \$50.00

\$199⁹⁹

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OVERVIEW SPECS ADD-ONS REVIEWS Q & A MORE INFO WARRANTY & SUPPORT

Specifications

PRODUCT INFORMATION

| | |
|-----------|----------------|
| SKU | 443481 |
| Mfr Part# | X551MAV-EB01-B |
| UPC | 886227797417 |

GENERAL INFORMATION

| | |
|------------------|--------------------------------|
| Model Number | X551MAV-EB01-B |
| Lifestyle | Home & Student Thin & Light |
| Color - Lid | Black |
| Color - Base | Black |
| Color - Keyboard | Black |
| Platform | Notebook PC |

OPERATING SYSTEM

| | |
|------------------|-------------------------|
| Operating System | Windows 8.1 64-bit+Bing |
|------------------|-------------------------|

PROCESSOR

| | |
|-------------------|--|
| CPU Brand | Intel |
| CPU Core | Dual-Core |
| CPU Type | Celeron Dual-Core |
| CPU Speed | N2830 (2.16GHz) |
| CPU Main Features | Virtualization Technology Intel 64 Enhanced Intel SpeedStep Technology Idle States Execute Disable Bit Intel Secure Key Intel Smart Connect Technology |

MEMORY

| | |
|--------------------------|-----|
| Total Memory | 4GB |
| Maximum Memory Supported | 4GB |

HARD DRIVE

| | |
|------------------|-----------|
| HD Interface | SATA |
| HD RPM | 5,400 RPM |
| HD Capacity | 500GB |
| HD Configuration | 1 x 500GB |

DISPLAY

| | |
|----------------|----------|
| Screen Size | 15.6" |
| Display Type | HD LCD |
| Display Finish | Glossy |
| Resolution | 1366x768 |

Support Resources

Return Policy:
May be returned within 15 days of purchase

Vendor Warranty:
Parts: 1 Year Limited
Labor: 1 Year Limited

Vendor Support:
Main Website:
usa.asus.com/index.aspx

Support Website:
support.asus.com/

888-678-3688



25 00 00

| | |
|-------------------------------------|--|
| Webcam | Yes |
| Webcam Features | VGA |
| VIDEO | |
| Video Memory | Shared |
| Video Connectors | 1 x VGA 1 x HDMI |
| GPU Type | Intel UMA |
| AUDIO | |
| Audio System | SonicMaster |
| COMMUNICATIONS | |
| LAN | Ethernet LAN |
| LAN Data Transfer Rate | 10/100Mbps |
| WLAN | Wireless LAN |
| Wireless Technology | 802.11b 802.11g 802.11n |
| CARD READER | |
| Media Supported | Secure Digital MMC |
| Memory Card Reader | Memory Card Reader |
| PORTS AND CONNECTORS | |
| VGA 15-pin | 1 |
| HDMI | 1 |
| USB 2.0 | 1 |
| USB 3.0 | 1 |
| LAN RJ-45 | 1 |
| Audio | 1 |
| KEYBOARD & MOUSE | |
| Keyboard | Chiclet Keyboard with 10-Keypad |
| Mouse Type | Touchpad Wide |
| POWER | |
| Battery | 3-Cell Lithium-Ion |
| Battery Life | Up to 4 Hours (Stated battery life is estimated based on manufacturers engineering testing for a new battery. Actual performance will vary based on notebook settings, environmental conditions, and usage. Battery capacity decreases over time and use.) |
| ENVIRONMENTAL SPECIFICATIONS | |
| Energy Star Compliant | Yes |
| PHYSICAL SPECIFICATIONS | |
| Width | 15" |
| Depth | 9.9" |
| Height | 1.2" |
| Weight | 4.7 lbs. |
| Box Size | 19.1" x 2.6" x 11.8" |
| Shipping Weight | 8.2 lbs. |
| MANUFACTURER WARRANTY | |
| Parts | 1 Year Limited |
| Labor | 1 Year Limited |

Home » Things » Aeon Labs Multi-Sensor



Aeon Labs Multi-Sensor

\$55.00

Qty:

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Free shipping in U.S. | We ship to Canada

With this multi-sensor, you can monitor motion, brightness, temperature, and humidity inside or outside your home or office. [Read full description...](#)



Questions? Contact us. We're here to help.

Email an expert



Description

Specs

- Manufacturer's SKU: DSB05-ZWJUS
- Communication protocol: Z-Wave
- Dimensions: 3.0 x 3.0 x 2.5"
- Weight: 4 ounces
- Battery: 4 AAA (included)
- Range: 50-100 feet indoors and up to 300 feet outdoors (depending on your home's construction)

2/11/2015

Apple iPad Air with WiFi 16GB Multi MD785LLA - Best Buy



[Enlarge](#)

Apple® - iPad® Air with Wi-Fi - 16GB - Space Gray/Black

Model: MD785LL/A | SKU: 1780284 | Customer Rating: **4.8** (5,270 customer reviews)

New from **\$399.99**
Open-Box from **\$371.99**

\$399.99
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on orders \$35 and up

| | | | | | |
|-----------------|----------------|-------------------|-------------|----------------|-----------------------|
| Overview | Specifications | Ratings & Reviews | Accessories | Buying Options | Protection & Services |
|-----------------|----------------|-------------------|-------------|----------------|-----------------------|

Specifications

| Specs: | Details: | Description: |
|----------------------------|---|--|
| Warranty Terms - Parts | 1 year | |
| Warranty Terms - Labor | 1 year | |
| Height | 9.4 inches | |
| Width | 6.6 inches | |
| Weight | 16 ounces | |
| Color Category | Multi | |
| Battery Life | 10 hours | Battery life will vary depending on the product configuration, product model, applications loaded on the product, power management setting of the product and the product features used by the customer. As with all batteries, the maximum capacity of this battery will decrease with time and usage |
| Display Type | Digital | |
| Included Software | iPhoto, iMovie, GarageBand, Pages, Numbers, and Keynote apps included | |
| Model Family | Apple iPad Air | |
| Number Of USB Port(s) | 0 | |
| Screen Size | 9.7 inches | |
| Touch Screen | Yes | |
| Internal Memory | 16 gigabytes | |
| Operating System | Apple iOS 7 | |
| Internet Connectivity | Wi-Fi | |
| Bluetooth Enabled | Yes | Bluetooth is a technology that allows data to be shared wirelessly between two or more Bluetooth-compatible devices. |
| Processor Brand | Apple | |
| Processor Model | A7 | |
| Processor Speed | 1.3 gigahertz | |
| Video Recording Capability | Yes | |
| Wi-Fi Enabled | Yes | |

<http://www.bestbuy.com/site/apple-ipad-air-with-wi-fi-16gb-space-gray-black/1780284.p?id=1219063718828&skuId=1780284>

1/2



2/11/2015

Apple iPad Air with WiFi 16GB Multi MD785LLA - Best Buy

| | |
|--------------------------------|----------------|
| Wireless Display | Yes |
| Embedded Mobile Broadband | None |
| Front-Facing Camera | Yes |
| Rear-Facing Camera | Yes |
| Screen Resolution | 2048 x 1536 |
| Storage Capacity | 16 gigabytes |
| Front Facing Camera Megapixels | 1.2 megapixels |
| Rear Facing Camera Megapixels | 5 megapixels |
| UPC | 888462098236 |

Product images, including color, may differ from actual product appearance.

2/11/2015

Apple, Inc MGEM2LLA - Best Buy



Enlarge

Apple® - Mac mini - 4GB Memory - 500GB Hard Drive

Model: MGEM2LLA | SKU: 7814097 |
Customer Rating: **4.5** (100 customer reviews)

New from
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|-----------------|----------------|-------------------|-------------|----------------|-----------------------|
| Overview | Specifications | Ratings & Reviews | Accessories | Buying Options | Protection & Services |
|-----------------|----------------|-------------------|-------------|----------------|-----------------------|

Specifications

| Specs: | Details: | Description: |
|-----------------------------------|---|--|
| Warranty Terms - Parts | 1 year limited | |
| Warranty Terms - Labor | 1 year limited | |
| Height | 1.4 inches | |
| Width | 7.7 inches | |
| Depth | 7.7 inches | |
| Weight | 2.6 pounds | |
| Assembly Required | false | |
| Processor Brand | Intel® | |
| Processor | Intel® 4th Generation Core™ i5 | (Also known as the <i>CPU</i>). The part of the computer that interprets and executes instructions. Think of it as the brain of the computer. |
| Processor Speed | 1.4GHz (with Turbo Boost up to 2.7GHz) | How fast a computer processor carries out instructions. In general, faster is better, but processor speeds across brands may not be equivalent (i.e., a 3.0GHz AMD processor may not be the same speed as a 3.0GHz Intel processor). |
| Cache Memory | 3MB | A small segment of memory that stores frequently used information for fast access by the processor, improving response time. |
| System Memory (RAM) | 4GB | The memory a computer uses to run its operating system, applications and active data files. Greater amounts of RAM improve speed and enable more applications to run at once. |
| System Memory (RAM) Expandable To | 16GB | Maximum amount of memory a computer can support (as opposed to the amount that comes preinstalled). |
| Type of Memory (RAM) | LPDDR3 | |
| Graphics | Intel® HD Graphics 5000 | Type of graphics (video) adapter (usually built into the motherboard), identified by manufacturer and model. |
| Network Card | Gigabit Ethernet LAN | Allows a computer to connect to a network either by using cables (Ethernet) or wireless technology (IEEE 802.11). |
| Wireless Networking | Built-in 802.11ac wireless LAN | |
| DVD-ROM/CD-RW Combo Drive | No | Drive that reads DVDs and CDs, writes to CD-Rs and rewrites to CD-RWs. |
| Available Expansion Slots | Secure Digital Extended Capacity (SDXC) | For digital cameras and digital audio players: Slots that allow the addition of a removable memory card, such as Secure Digital |

<http://www.bestbuy.com/site/apple-mac-mini-4gb-memory-500gb-hard-drive/7814097.p?id=1218861012264&skuId=7814097>

1/3

2/11/2015

Apple, Inc MGEM2LLA - Best Buy

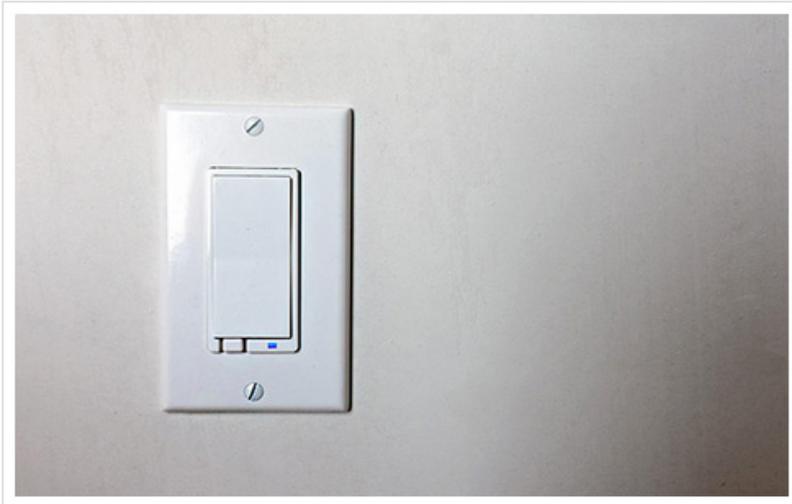
or CompactFlash, to increase storage capacity.
For computers: Slots on the motherboard that accept sound cards, video cards, memory and other upgrade cards.

| | | |
|----------------------------------|---|---|
| USB 2.0 Ports | 4 USB 3.0 | Ports that allow high-speed (up to 480 Mbps) data transfer between compatible devices. |
| IEEE 1394 Ports | Yes | (Also known as <i>FireWire</i> , Apple Computer's trademarked name for IEEE 1394.) High-speed connection that supports data transfer rates of up to 400 Mbps or 800 Mbps (depending on port version). |
| Operating System Platform | Mac | |
| Operating System | Mac OS X 10.10 Yosemite | The master software that controls hardware functions and provides a platform on top of which any software applications will run. Commonly used systems include Microsoft Windows, Mac OS and Chrome OS for computers; Android, Apple iOS, BlackBerry and Windows Phone for cell phones; and Android, Apple iOS and Windows for tablets. |
| Software Included | <ul style="list-style-type: none"> • AirDrop • AirPlay • Dictation • Gatekeeper • Notification Center • Facebook Integration • Twitter Integration • Multiple Display Support • Finder Tabs and Tags • iCloud • iCloud Keychain • iCloud Drive • Family Sharing • Dashboard • Mission Control • Spotlight Search • Safari Power Saver • App Nap • Power Nap • Compressed Memory | |
| ENERGY STAR Certified | No | ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy helping us all save money and protect the environment through energy efficient products and practices. |
| HDMI Output | Yes | |
| Graphics Chip | Intel | |
| Green Compliance | ENERGY STAR 6.1 | |
| Drive Capacity | 500GB | |
| Hard Drive Size | 500GB | Capacity for storing programs, photos, video, music and other electronic information. Hard drive capacities range from a few gigabytes to several hundred. |
| Hard Drive Type | SATA (5400 rpm) | Hard drives are classified based on the interface they use to connect to a computer. Common interfaces for <i>internal</i> hard drives include EIDE, PATA (also known as, ATA and IDE), SATA and SCSI. Common interfaces for <i>external</i> hard drives include USB 2.0, FireWire and eSATA. |

<http://www.bestbuy.com/site/apple-mac-mini-4gb-memory-500gb-hard-drive/7814097.p?id=1218861012264&skuId=7814097>

2/3

Home » Things » GE In-Wall Paddle Switch (Dimmer)



GE In-Wall Paddle Switch (Dimmer)

\$50.00

Quantity:
Single Unit

Add to Cart

Free shipping in U.S. | We ship to Canada

Use your smartphone to remotely dim, brighten, and turn on/off your hard-wired lights—wherever you are. This switch now supports dimmable LED/CFL bulbs and includes interchangeable paddles in White and Light Almond. [Read full description...](#)

Questions? Contact us. We're here to help.
[Email an expert](#)

Installation by licensed technician available. [Learn More](#)

Description Specs

- Manufacturer's SKU: 12724
- Communication protocol: Z-Wave
- Dimensions: 8.2 x 7.3 x 2.3"
- Weight: 6.4 ounces
- Minimum Incandescent Load: 40 Watts
- Max Incandescent Load: 600 Watts
- Range: 50-100 feet (depending on your home's construction)

Home » Things » SmartSense Moisture Sensor



SmartSense Moisture Sensor

\$49.00

Quantity: Single Unit

Add to Cart >

Free shipping in U.S. | We ship to Canada

Prevent small leaks from becoming costly disasters with this ZigBee device by getting instant alerts on your smartphone when moisture is detected in areas where it doesn't belong. [Read full description...](#)



Questions? Contact us. We're here to help.

Email an expert



Description Specs

- Communication protocol: ZigBee
- Dimensions: 1.5 x 2.4 x .85"
- Weight: 1.5 ounces (with battery)
- Battery: 1 CR-2 battery included
- Can detect as little as 0.5 ounces of moisture
- Range: 50-150 feet (depending on your home's construction)

2/11/2015

N600 Wireless Dual Band Router TL-WDR3500 - Welcome to TP-LINK

Worldwide [Change]

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N600 Wireless Dual Band Router TL-WDR3500

Highlights:

- Simultaneous 2.4GHz 300Mbps and 5GHz 300Mbps connections for 600Mbps of total available bandwidth
- 1 USB Port - Easily share a printer locally and files & media with networked devices or remotely via FTP server
- Wireless on/off switch- Green wireless lets you simply turn the wireless radio on or off
- Guest Network Access provides secure Wi-Fi access for guests sharing your home or office network*

| Overview | Features | Specifications | Download |
|--------------------------|--|----------------|----------|
| HARDWARE FEATURES | | | |
| Interface | 4 10/100Mbps LAN Ports 1 10/100Mbps WAN Port 1 USB 2.0 Port | | |
| Button | WPS/Reset Button Wireless On/Off Switch Power On/Off Button | | |
| External Power Supply | 12VDC / 1.0A | | |
| Dimensions (W X D X H) | 8.9x5.5x1.3 in.(225x140x32.5mm) | | |
| Antenna | 2 external detachable dual band antennas (RP-SMA) | | |
| WIRELESS FEATURES | | | |
| Wireless Standards | IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, IEEE 802.11n | | |
| Frequency | 2.4GHz & 5GHz | | |
| Signal Rate | 5GHz: Up to 300Mbps 2.4GHz: Up to 300Mbps | | |
| Reception Sensitivity | 270M_2.4G: -70dBm 195M_2.4G: -71dBm 130M_2.4G: -74dBm 54M_2.4G: -79dBm 6M_2.4G: -94dBm 270M_5G: -67dBm 195M_5G: -70dBm 130M_5G: -73dBm 54M_5G: -79dBm 6M_5G: -92dBm | | |

TP-LINK Tether

Available on the App Store and Google Play

Flexible USB Sharing
How to set-up?

IPv6 Support

FAQ

<http://www.tp-link.com/en/products/details/?model=TL-WDR3500#spec>

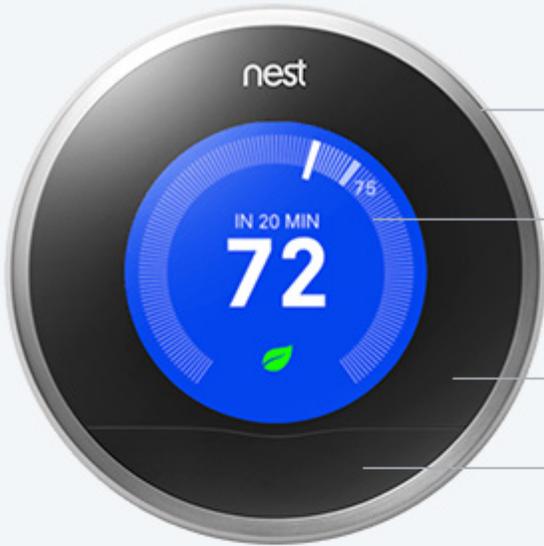
1/2

2/11/2015

N600 Wireless Dual Band Router TL-WDR3500 - Welcome to TP-LINK

| | | |
|--------------------------|--|---|
| Transmit Power | CE: <20dBm(2.4GHz) <23dBm(5GHz) FCC: <30dBm | Troubleshooting information for your product |
| Wireless Functions | Enable/Disable Wireless Radio, WDS Bridge, WMM, Wireless Statistics | |
| Wireless Security | 64/128-bit WEP,WPA / WPA2,WPA-PSK/ WPA2-PSK encryption | |
| Guest Network | 2.4GHz guest network × 1 5GHz guest network × 1 | |
| SOFTWARE FEATURES | | |
| WAN Type | Dynamic IP/Static IP/PPPoE/ PPTP (Dual Access)/L2TP (Dual Access)/BigPond | |
| DHCP | Server, Client, DHCP Client List, Address Reservation | |
| Quality of Service | WMM, Bandwidth Control | |
| Port Forwarding | Virtual Server, Port Triggering, UPnP, DMZ | |
| Dynamic DNS | DynDns, Comexe, NO-IP | |
| VPN Pass-Through | PPTP, L2TP, IPSec | |
| Access Control | Parental Control, Local Management Control, Host List, Access Schedule, Rule Management | |
| Firewall Security | DoS, SPI Firewall IP Address Filter/MAC Address Filter/Domain Filter IP and MAC Address Binding | |
| USB Sharing | Support Samba(Storage)/FTP Server/Media Server/Printer Server | |
| Management | Management Access Control Local Management Remote Management | |
| OTHERS | | |
| Certification | CE, FCC,IC, RoHS | |
| Package Contents | TL-WDR3500 2 detachable dual band antennas Power supply unit Resource CD Quick Installation Guide | |
| System Requirements | Microsoft® Windows® 98SE, NT, 2000, XP, Vista™ or Windows 7, MAC® OS, NetWare®, UNIX® or Linux. | |
| Environment | Operating Temperature: 0°C~40°C (32°F~104°F) Storage Temperature: -40°C~70°C (-40°F~158°F) Operating Humidity: 10%~90% non-condensing Storage Humidity: 5%~90% non-condensing | |

Tech Specs



Solid stainless steel ring

Bright LCD screen: 320x320px display; 1.75" diameter

Built-in rechargeable lithium ion battery

Sensor window

3.27"



1.26"

Display

Height: 28.0mm / 1.10"

Mass: 254 g / 9.0 oz

Diameter: 83mm / 3.27"

Wireless

Wifi - 802.11b/g/n @ 2.4GHz

Nest Weave - 802.15.4 @ 2.4GHz

[Hide detailed specs -](#)



25 00 00

2/11/2015

Samsung 48" 720p LEDLCD TV 16:9 HDTV Black UN48H4005AF - Best Buy



[Enlarge](#)

Samsung - 48" 720p LED-LCD TV - 16:9 - HDTV - Black

New from
\$467.99

Marketplace

\$467.99

FREE SHIPPING

Model: UN48H4005AF | SKU: 1311399838 |
Customer Rating: [Be the first to write a review.](#)

Sold & Shipped by: [Buy.com](#) Seller Rating: 4.26 out of 5
[Seller Information](#) | [Return Policy](#) | [Shop this seller](#)

| | | | |
|-----------------|----------------|-------------------|----------------|
| Overview | Specifications | Ratings & Reviews | Buying Options |
|-----------------|----------------|-------------------|----------------|

Specifications

| Specs: | Details: | Description: |
|----------------------------------|-------------------------|--|
| Warranty Terms - Parts | 1 years | |
| Warranty Terms - Labor | 1 years | |
| Width | 42.6 inches | |
| Color Category | Black | |
| 3D Technology | No | |
| Cable(s) Included | Not Applicable | |
| Curved Screen | No | |
| Digital Tuner | Yes | Also known as an ATSC (Advanced Television Systems Committee) tuner; this is a type of television tuner that allows reception of digital television (DTV) channels transmitted by television stations that use ATSC standards. |
| ENERGY STAR Certified | Yes | Devices carrying the Energy Star service mark, such as computer products and peripherals, kitchen appliances, buildings and other products, generally use 20% to 30% less energy than required by federal standards. |
| Estimated Annual Electricity Use | 71 kilowatt hours | |
| Estimated Annual Operating Cost | 8 United States dollars | |
| Headphone Jack | No | |
| Media Card Slot | No | |
| Number Of Component Video Inputs | 1 | Component video typically offers the best analog video signals available in consumer electronics. This uses no compression and offers no real limit in color depth or resolution. |
| Number Of Composite Video Inputs | 1 | Composite video relays standard-definition signals, but is frequently included on HDTVs, as the interface's audio jack can be shared with a component video input. |
| Number Of DVI Inputs | 0 | Digital Visual Interface (DVI) is a video interface standard designed to maximize the visual quality of digital display devices and is designed primarily for carrying uncompressed digital video data to a display. |
| Number Of HDMI Inputs | 2 | The High-Definition Multimedia Interface (HDMI) is an all-digital audio/video interface capable of transmitting uncompressed streams. |

<http://www.bestbuy.com/site/samsung-48-720p-led-lcd-tv-169-hdtv-black/1311399838.p?id=mp1311399838&skuId=1311399838>

1/3



| 2/11/2015 | | Samsung 48" 720p LEDLCD TV 16:9 HDTV Black UN48H4005AF - Best Buy |
|--------------------------------|--|--|
| Number Of HDMI Outputs | 0 | The High-Definition Multimedia Interface (HDMI) is an all-digital audio/video interface capable of transmitting uncompressed streams. |
| Number Of Speakers | 2 | |
| Number Of USB Port(s) | 1 | Universal Serial Bus (USB) is a serial bus standard to interface devices. |
| PC Input | No | |
| Product Depth With Stand | 8 inches | |
| Product Depth Without Stand | 3.6 inches | |
| Product Height With Stand | 26.70 inches | |
| Product Height Without Stand | 25.1 inches | |
| Product Weight With Stand | 21.80 pounds | |
| Product Weight Without Stand | 20.1 pounds | |
| Remote Control Type | Standard | |
| Maximum Resolution | 1366 x 768 | Resolution is defined by the number of individual dots (pixels) that a display uses to create an image. The total number of pixels in a display is expressed as the number of horizontal pixels by the number of vertical pixels. |
| Screen Size | 48 inches | |
| Screen Size Class | 48 inches | The group size measurement of a screen. This differs from a screen size measured diagonally from corner to corner. |
| Smart Capable | No | |
| Instant Content Supported | Other | |
| Display Type | LED | |
| Vertical Resolution | 768 | |
| VESA Wall Mount Standard | 400mm x 400mm | A series of industry-wide interface standards, created by the Video Electronics Standards Association and designed to promote uniformity and intercompatibility among video displays and mounting hardware. The standards define approved hole patterns and hardware specifications, ensuring that VESA-compliant "universal" mounting brackets will accommodate TVs across multiple brands. |
| Video Input(s) | Composite video Component video USB HDMI | |
| Video Output(s) | Not Applicable | |
| Wall Mountable | No | |
| Closed Captioning | Yes | |
| EPEAT Qualified | No | EPEAT is the definitive global rating system for greener electronics. It is an easy to use resource for purchasers, manufacturers, resellers and others to identify environmentally preferable devices. The EPEAT system combines strict, comprehensive criteria for design, production, energy use and recycling with ongoing independent verification of manufacturer claims. |
| TV/DVD Combo | No | |
| Network Compatibility | None | |
| Number Of Analog Audio Outputs | 0 | |

<http://www.bestbuy.com/site/samsung-48-720p-led-lcd-tv-169-hdtv-black/1311399838.p?id=mp1311399838&skuId=1311399838>

2/3

| | | | |
|--|------------------|---|--|
| 2/11/2015 | | Samsung 48" 720p LEDLCD TV 16:9 HDTV Black UN48H4005AF - Best Buy | |
| Number Of Digital Optical Audio Outputs | 1 | | |
| Speaker Output | 20 watts | | |
| Surround Sound Supported | DTS Studio Sound | | |
| V-Chip | Yes | This blocks the display of television programs based on their rating. Broadcasters are required to encode an electronic signal in TV programs indicating the level of violence, language, and sexual content. Parents can program the TV with a rating so that when the V-Chip reads a show's signal, it will prevent it from displaying if it is above the rating. | |
| UPC | 887276048864 | | |

Product images, including color, may differ from actual product appearance.

Home » Things » SmartThings Hub



SmartThings Hub

\$99.00

Qty:

Add to Cart >

Free shipping in U.S. | We ship to Canada

The "brain" of the SmartThings platform, the Hub connects all of the different sensors around your home or office so that you can receive notifications about what is going on and use your smartphone to remotely control your home's security, energy usage, lighting, and more. [Read full description...](#)



Questions? Contact us. We're here to help.

[Email an expert](#)



Description Specs

- Communication protocol: ZigBee, Z-Wave, IP, and other wireless protocols
- Dimensions: 4.3 x 5.6 x 1.3"
- Weight: 5.6 ounces
- Power source: micro-USB (6' cable and power adapter included)
- Range: 100-150 feet (depending on your home's construction)

Home » Things » SmartSense Multi Sensor



SmartSense Multi Sensor

\$54.00

Quantity:

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The SmartSense Multi Sensor is the most versatile and dynamic member of the SmartThings family. The Multi can detect movement as in open/close, vibration, orientation or angle, and temperature all in one. [Read full description...](#)

Questions? Contact us. We're here to help.
 Email an expert



Description Specs

- Communication protocol: ZigBee
- Dimensions: 2.2 x 1.8 x 2.9"
- Weight: 2.4 ounces
- Battery: 2 AAAA (included)
- Range: 50-150 feet (depending on your home's construction)



Schlage Century Touchscreen Deadbolt

\$215.00

Qty: Type:

1 -- Choose Lock Finish --

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Don't ever worry about carrying, hiding, or losing your keys again with this contemporary lock design: Secure and unlock your door from anywhere in the world, set your door to lock itself when you leave the house, and check to see whether or not your door is locked or unlocked using your smartphone with this touchscreen lock. [Read full description...](#)



Questions? Contact us. We're here to help.

Email an expert



Installation by licensed technician available.

Learn More >

Description Specs

- Manufacturer's SKU: BE469NXCEN619 (Satin Nickel), BE469NXCEN716 (Aged Bronze)
- Communication protocol: Z-Wave
- Dimensions: 9.2 x 5.1 x 4.5"
- Battery: 4 AA (included)
- Range: 50-65 feet (depending on your home's construction)

2/11/2015

Vizia RF + 4-Button Remote Zone Controller, VRCZ4-M0Z : Z-Wave

0 item(s) in My Cart

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For large or tax exempt orders, [click here](#)



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Home [Energy Efficient](#) [Z-Wave](#) **Vizia RF + 4-Button Remote Zone Controller, VRCZ4-M0Z**



Click the image to zoom.

Vizia RF + 4-Button Remote Zone Controller, VRCZ4-M0Z

Not yet rated. Be the first to [write a review](#)

Have a question about this product?

Price: \$152.57

Get free ground shipping on all orders over \$100! Here's how (restrictions apply)

Offer Det:

**Need help?
Have questions?**

Quantif

Availab

add to

A live representative
is available.

Chat Now >>



Produc

The Vizia RF + fami... [Start chat](#) [No thanks](#) control with its embedded Z-Wave radio frequency technology and stylish form factor that is compatible with Leviton-Foots hallmark Decora design. Robust features like Zone Control, Scene Control and Timed Events give you one-touch control of your home-Foots lighting and any Z-Wave enabled device. Zone Control is your key to controlling multiple light sources in many rooms or areas of your home with one push of a button on a zone controller. Scene Control lets you vary the light levels in a room for any activity or change the ambiance with one touch on a scene controller. Using Timed Events, you can schedule lights to turn on and off or activate any network device at preset times to enhance security or enjoy a more convenient lifestyle. The Vizia RF + line includes dimmers, switches, remotes and fan speed controls that all work together to create a wireless mesh network of automated lighting control in one room or your entire home. This scene controller is ideal for remote control of up to four different scenes of Vizia RF + scene capable devices as well as ON/OFF function of a single pole application. It allows you to preset lighting levels on multiple fixtures for four different activities that will respond to a single button push. The top four buttons provide ON/OFF switching of four scenes while one button provides ON/OFF function of the local single pole load. The bottom button transmits DIM/BRIGHT commands to the most recently switched-ON scene. Vizia RF + 4-Button Remote Zone Controller.

*Ideal for remote control of up to four different zones (areas)

*Each button on a RF controller can be associated with up to 32 select Z-Wave compatible devices in a system area

*LED illuminates when the controlled scene is active or when one load is on in any zone (area)

*High gloss finish complements a wide range of décors

*Z-Wave compatible

For California residents, click [here](#) for Proposition 65 Warning.

Customer Reviews

No reviews yet. Be the first to [write a review](#)

Best Sellers

http://store.leviton.com/Vizia-4-Button-Remote-Controller-VRCZ4-M0Z/dp/B00K5646WW?field_availability=-1&field_browse=2934190011&id=Vizia+4-Button+... 1/2



DIVISION 26 ELECTRICAL

[View Product Family](#)



Box, Square, 4 X 1.5 In

RACO

Clearance Price: ⓘ

\$0.65 / each

Price: \$7.99 / each

1

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Limited Quantity Available ⓘ



Be the first to write a review | [Ask & Answer](#)

Item # **6XC63**

Mfr. Model # **220**

UNSPSC # **39121303**

Catalog Page # **N/A**

Shipping Weight **0.01 lbs.**

Country of Origin **Mexico** | *Country of Origin is subject to change.*



🗨️ How can we improve our **Product Images?**

Compare

Technical Specs

| | | | |
|--------------------------|------------------------------|-------------------------------|--------------|
| Item | Square Box | Number of 1/2" Back Knockouts | 1 |
| Box Type | Welded (Corner Edges) | Number of 1/2" Side Knockouts | 3 |
| Bracket Type | FH | Clamp Type | NM-B |
| Capacity (Cu.-In.) | 21.0 | Number of 3/4" Side Knockouts | 1 |
| Material of Construction | Galvanized zinc | Depth (In.) | 1-1/2 |



26 05 00

| Compare / Item # | Mfr. Model # | Depth (In.) | Availability ⓘ | Price | Qty |
|--------------------------------|--------------|-------------|--------------------|---------------|----------------------|
| <input type="checkbox"/> 6XC56 | 650 | 1-1/2 | Check Availability | \$3.05 / each | <input type="text"/> |





RACO
Handy Box, 11.5 Cu In
Item # 6XC56
Mfr. Model # 650

Catalog Page # 581
Price:
\$3.05 / each

Technical Specs

| | | | |
|--------------------------|---------------------------|--------------|--------------|
| Box Type | Handy, For Conduit | Depth (In.) | 1-1/2 |
| Number of Gangs | 1 | Length (In.) | 4 |
| Material of Construction | Galvanized zinc | Width (In.) | 2 |



Comparison of MC, AC & HCF Cables

| PRODUCT FAMILY | TYPE MC CABLE | | | TYPE AC CABLE | |
|------------------------------|---|---|---|---|---|
| | MC TUFF® & MC LITE® | MC-Quik® & MC-Quik® Lite | MC Stat® & MC Stat® Lite | AC-90® & AC-LITE® | HCF-90® & HCF-LITE® |
| MAXIMUM NUMBER OF CONDUCTORS | No Limit | No Limit | No Limit | 4 circuit conductors | 4 circuit conductors plus grounds |
| SIZE OF COPPER CONDUCTORS | 18 AWG to 2000 kcmil | 14 AWG to 6 AWG | 14 AWG to 6 AWG | 14 AWG to 1 AWG | 14 AWG to 1 AWG |
| GROUNDING | Insulated equipment grounding conductor | Full sized bare aluminum bond/ground conductor and armor combination | Full size bare aluminum bond/ground wire and armor combination, plus a green insulated equipment grounding conductor. | 16 AWG bare aluminum bond wire and armor combination | 16 AWG bare aluminum bond wire and armor combination, plus a green insulated equipment grounding conductor. |
| CONDUCTOR WRAPPING | Conductors have an overall polypropylene assembly tape. | Individual conductors have an extruded protective covering. No overall assembly tape. | Individual conductors have an extruded protective covering. No overall assembly tape. | Individual conductors are wrapped in a moisture resistant, fire retardant paper | Individual conductors are wrapped in a moisture resistant, fire retardant paper |
| TESTED TO UL STANDARD | UL 1569 | UL 1569 | UL 1569 | UL 4 | UL 4 |
| 12-2 EXAMPLES | | | | | |

Installation Instructions for Traditional Type AC & MC Cables

Armored cable (Type AC) and metal clad cable (Type MC) provide a fast and efficient way of wiring both new construction and remodeling work. Their flexible metal armor provides mechanical protection of the electrical conductors while enabling them to bend around corners. The cables are pre-wired at the factory eliminating the need to pull conductors into a raceway, which in turn greatly reduces the possibility of conductor damage.

The National Electrical Code® has accepted AC and MC cables for decades, with statistics showing that they have an excellent fire safety record.

Because AC & MC cable can be fished for long distances, it is quick and easy to install. Its own weight can carry it between partitions and it can be run without concern for its contact with pipes or other obstructions.

Wire pullers, fish ropes or tapes, dispensers and lubricants are eliminated. AC & MC cable does the job in less space, with fewer bending restrictions as well as less cutting and connecting than most other wiring products.

Armored cable (Type AC) and Metal Clad cable (Type MC) have a flexible metal armor of similar outward appearance, but that is where the similarity ends. There are major differences in construction and uses permitted.

Armored (Type AC) Cable Construction

As described by the National Electrical Code® Article 320, armored cable Type AC is a “fabricated assembly of insulated conductors in a flexible metallic enclosure.”

Type AC cable is manufactured to UL Standard 4. It consists of 2 to 4 copper conductors in sizes 14 AWG to 1 AWG inside an interlocked metal armor of steel or aluminum construction. Type AC cable can have no more than four insulated conductors plus a grounding conductor (for a total of 5 conductors only) and cannot be manufactured larger than 1 AWG per UL 4.

A 16 AWG aluminum bonding wire is inside of, and in physical contact with, the metal armor providing a low-impedance fault-return path required for the operation of overcurrent protection devices. The bonding wire is unique to AC cable and allows the outer metal armor in conjunction with the bonding wire to be used as an equipment ground.

It is important to remember that the bare bond wire is not an equipment grounding conductor. It is the bond wire that, in combination with the interlocked metal armor, provides a low impedance equipment grounding path.

Each of the copper conductors is covered with a thermoplastic insulation (THHN with a 90°C rating) and are individually wrapped in a moisture resistant, fire retardant paper.

According to NEC® Article 320.40, an insulated (anti-short) bushing is required when installing Type AC cable. It is installed at the time of termination and designed to protect the conductors from damage. AFC provides bushings in bags packaged with the cable.

Metal Clad (Type MC) Cable Construction

As described by NEC® Article 330, Metal Clad Type MC cable is a “factory assembly of one or more insulated circuit conductors with or without optical fiber members enclosed in an armor of interlocking metal tape or a smooth or corrugated metallic sheath.”

Traditional Type MC cable is manufactured to UL Standard 1569. MC cables have 2 or more solid or stranded conductors in sizes 18 AWG and larger. The number of conductors allowed in an MC cable is not restricted by UL. The conductors may be of copper, aluminum or copper-clad aluminum.

The metal armor may be a smooth tube, a corrugated tube, or an interlocked metal armor. AFC Cable Systems manufactures MC cable with interlocked metal armor and copper conductors. The make-up of AFC Cable Systems’ 600 volt interlocked armor traditional MC cable consists of:

- Copper circuit and grounding conductors covered with thermoplastic insulation
- An overall polypropylene cable assembly tape
- An outer galvanized steel or aluminum interlocked armor

Unlike Type AC cable, the armor of interlocked Type MC cable is not an equipment grounding means and traditional Type MC cable requires a bare or green grounding conductor.

Differences between AC and traditional MC cables.

| | TYPE AC CABLE | TYPE MC CABLE |
|-----------------------------|--|---|
| NUMBER OF CONDUCTORS | Limited to a maximum of 4 conductors plus a grounding conductor. | Not limited to the number of conductors. |
| SIZE OF CONDUCTORS | 14 AWG to 1 AWG | 18 AWG or larger |
| GROUNDING | Contains a 16 AWG bond wire in constant contact with the metal armor allowing the armor and bond wire combination to be used as an equipment ground. | Does not contain a bonding wire and the armor is not an equipment ground, but supplements the internal grounding conductor equaling one grounding path. |
| CONDUCTOR WRAPPING | Individual conductors are wrapped in a moisture resistant, fire retardant paper. | Individual conductors are not wrapped in fire Retardant paper but do have an overall polypropylene assembly tape. |

Along with these differences in construction, there are also differences in the uses permitted for these cables as discussed previously. (See pages 14 and 15 for installation details on new MCI-A type MC cables.)

Green Hospital Grade Type Cable

This additional ground allows HCF cables to be used in patient care areas of health care facilities (other than hazardous locations) including hospitals, nursing homes, dental offices, outpatient facilities and medical centers per NEC® 517.13.

The separate green grounding conductor satisfies the requirement of Article 517 that:

“In an area used for patient care, the grounding terminals of all receptacles and all non-current-carrying conductive surfaces of fixed electric equipment likely to become energized that are subject to personal contact, operating at over 100 volts, shall be grounded by an insulated copper conductor.”

The armor and bonding strip combination satisfies the requirement that:

“...all branch circuits serving patient care areas shall be provided with a ground path for fault current by installation in a metal raceway system or cable assembly. The metal raceway system, or cable armor or sheath assembly, shall itself qualify as an equipment grounding return path in accordance with Section 250.118.”

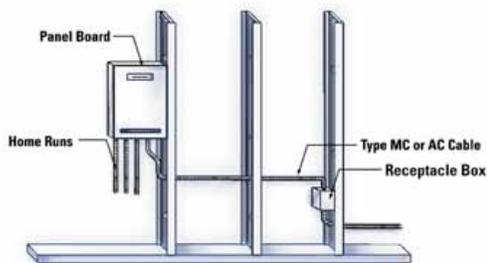
(NOTE: Read NEC 517.30(C)(3)(3) for complete details on wiring of emergency healthcare circuits.)

Installing AC & MC Cable

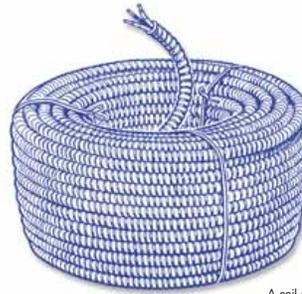
Type AC & MC cable is installed after the rough-in phase of locating and setting all boxes and enclosures. Rough-in occurs when all the interior and exterior walls are framed but before the sheet rock is installed.

The first step in the rough-in phase is to determine the number of home run circuits and from where the wiring will originate. Once this is done, time should be taken to determine the best and shortest routes for each cable run. Long runs of spider web type routing not only require more cable, but also increase voltage drop. This is very important to consider when locating boxes for receptacles, lights and switches. If long runs are required, oversizing the circuit conductors is recommended to limit voltage drop.

MC or AC Cable Installation



AC & MC cable is available on reels and in coils. If using a reel, simply draw the cable from the end of the reel. If using a coil, draw the cable from the center of the coil to prevent kinking.



A coil of MC cable

Bridging Cable Across Open Spaces

In general, AC and MC cable must hug the surface it is wired over. The NEC prohibits bridging across open spaces with the following five exceptions:

- 1) When the cable is fished.
- 2) When flexibility is required, a box may be installed near a motor or appliance using a short piece of free AC cable up to 24 inches long, between the box and motor or appliance.
- 3) Lengths of not more than 6 feet from the last point of support for connections within an accessible ceiling to lighting fixtures or equipment.
- 4) Where installed in cable trays.
- 5a) For **Type AC** cable in other than vertical runs through holes or notches in framing members where distance between members does not exceed 4½ feet and is securely fastened in place by an approved means within 12 inches of each box, cabinet, conduit body or other cable termination.
- 5b) For **Type MC** cable in other than vertical runs through holes or notches in framing members where the distance between members does not exceed 6 feet. Cables containing four or fewer conductors sized no larger than AWG 10 must be secured within 12 inches of each box, cabinet, fitting or other cable termination.

Bending Radius

Care should be taken not to exceed the bending radius of the cables when routing around corners. According to NEC Article 320.24, for AC cable, the radius of the curve of the inner edge of any bend shall not be less than 5 times the diameter of the cable. NEC Article 330.24(B) states that for MC Cable, the radius shall not be less than 7 times the external diameter of the cable.

Terminating AC & traditional MC Cables

When terminating or splicing at a junction, outlet or switch box, cut the cable so that 6 inches of free conductor is left for connections or splices.

Use an approved connector and insure a proper bond by firmly tightening the connectors to both the box and the cable.

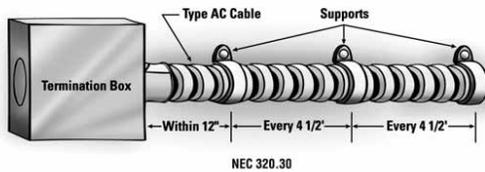
Please note: set screw connectors cannot be used with aluminum armor Type AC cable. To terminate an AC cable, insert an anti-short bushing and bend back the exposed length of bonding wire. The bonding wire can be bent back before or after the bushing is inserted. There are several techniques used for this procedure as pictured on the next page.



Supporting AC & MC Cables

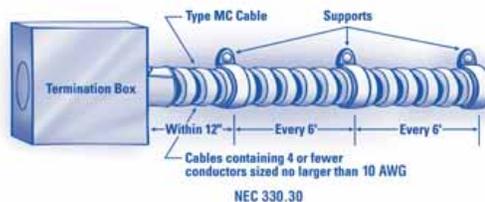
All cable runs must be continuous from outlet to outlet. According to NEC® Article 320.30, AC cable must be supported and secured at intervals of 4½ feet or less (unless routed through a framing member) and within 12 inches of every termination.

Supporting Type AC Cable



According to NEC Article 330.30, MC cable must be supported and secured at intervals of 6 feet or less (unless routed through a framing member) and cables containing four or fewer conductors sized no larger than 10 AWG must be secured within 12 inches of every termination.

Supporting Type MC Cable



As noted, AC and MC cable support requirements are waived when the cable is fished. This is a major advantage of AC and MC cable in remodeling work over other wiring products that cannot be fished.

AC and MC cable may also be installed in cable tray, per NEC Article 392. Cable is only required to be secured in this installation for vertical runs.

AFC Cable Systems®

Terminating AC & traditional MC Cables

When terminating or splicing at a junction, outlet or switch box, cut the cable so that 6 inches of free conductor is left for connections or splices. Use an approved connector and insure a proper bond by firmly tightening the connectors to both the box and the cable.

Please note, set screw connectors cannot be used with aluminum armor Type AC cable.

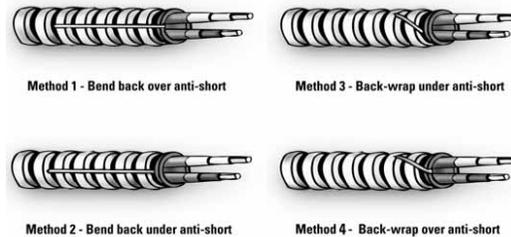
To terminate an AC cable, insert an anti-short bushing and bend back the exposed length of bonding wire.

The bonding wire can be bent back before or after the bushing is inserted. There are several techniques used for this procedure as pictured on this page.



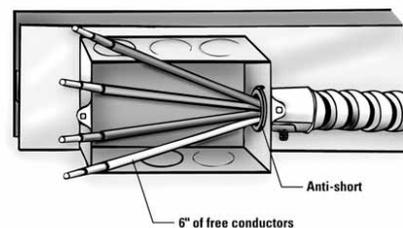
Insert the cable into the connector and secure the connector into the box. Be sure that the anti-short bushing is plainly visible in the connector for easy inspection. The same procedure is followed for traditional MC cable with the exception that there is no bonding wire. Although anti-short bushings are only required by the NEC® for AC cable, some manufacturers supply them for both cable types in the event that local codes override the NEC®.

Preparing AC Cable for Termination



(Bond wire may also be cut off at the end of the armor)

Terminating AC & traditional MC Cables

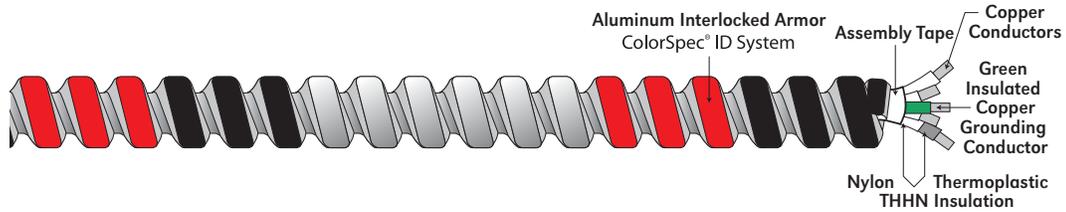


MC cable installed in a box with 6 inches of free conductors left for connections or splices.

800-757-6996 www.afcweb.com 45

MC

MC Lite[®] Aluminum Armored Cable
Traditional Type MC (120/208V) Technical Specifications



Specification Description

| | |
|----------------------------|--|
| Specification | MC Lite[®] ColorSpec[®] ID System |
| Armor | Interlocking Aluminum Strip |
| Conductors | Solid/Stranded Copper |
| Conductor Insulation | THHN/THWN |
| Assembly Covering | Polypropylene Tape |
| Maximum Temperature Rating | 90°C (dry) |
| Grounding | One grounding means - Insulated Green Grounding Conductor |
| Neutral Conductor | White 120/208V |
| Maximum Voltage Rating | 600V |

References & Ratings

- UL 83, 1479, 1569, 1581, 2556, File Reference E80042
- NEC[®] 230.43, 300.22(C), 392, 396, 330, 501, 502, 503, 530, 504, 505, 518, 520, 530, 645
- Federal Specification A-A-59544 (formerly J-C-30B)
- Meets all applicable OSHA and HUD Requirements
- May be surface mounted, fished and/or embedded in plaster
- Cable tray rated, install per NEC[®]
- UL Classified 1, 2, and 3 hour through (Fire) penetration product, R-14141
- Environmental Air-Handling Space Installation per NEC[®] 300.22(C)
- Aluminum armored cables are RoHS Compliant
- Made in USA of US and/or imported materials

Product Codes, Trade Sizes, Conductors, Packaging & Weights

| Product Code Coil | Product Code Reel | Trade Size | Grounding Conductor AWG | Length (feet) | | Approx. Weight/1000 Feet (lbs.) | Armor Minimum O.D. (inches) |
|--------------------------------|----------------------|---|-------------------------------|---------------|-------|---------------------------------------|-----------------------------------|
| | | | | Coil | Reel | | |
| 2101S42-00 | 2101S60-00 | 14-2 Solid (black, white) | 14 (solid green) | 250' | 1000' | 80 | 0.470 |
| 2102S42-00 | 2102S60-00 | 14-3 Solid (black, red, white) | 14 (solid green) | 250' | 1000' | 100 | 0.480 |
| 2103S42-00 | 2103S60-00 | 14-4 Solid (black, red, blue, white) | 14 (solid green) | 250' | 1000' | 120 | 0.510 |
| 2104S42-00 | 2104S60-00 | 12-2 Solid (black, white) | 12 (solid green) | 250' | 1000' | 110 | 0.495 |
| 2105S42-00 | 2105S60-00 | 12-3 Solid (black, red, white) | 12 (solid green) | 250' | 1000' | 135 | 0.530 |
| 2106S42-00 | 2106S60-00 | 12-4 Solid (black, red, blue, white) | 12 (solid green) | 250' | 1000' | 170 | 0.565 |
| Special 120/208V Colors | | | | | | | |
| 2104S42-04 | 2104S60-04 | 12-2 Solid (red, white) | 12 (solid green) | 250' | 1000' | 110 | 0.495 |
| 2104S42-05 | 2104S60-05 | 12-2 Solid (blue, white) | 12 (solid green) | 250' | 1000' | 110 | 0.495 |
| 2105S42-04 | 2105S60-04 | 12-3 Solid (red, blue, white) | 12 (solid green) | 250' | 1000' | 135 | 0.530 |
| 2105S42-05 | 2105S60-05 | 12-3 Solid (black, blue, white) | 12 (solid green) | 250' | 1000' | 135 | 0.530 |
| Stranded Conductor | | | | | | | |
| 2158S42-00 | 2158S60-00 | 12-2 Stranded (black, white) | 12 (stranded green) | 250' | 1000' | 110 | 0.495 |
| 2159S42-00 | 2159S60-00 | 12-3 Stranded (black, red, white) | 12 (stranded green) | 250' | 1000' | 135 | 0.530 |
| 2160S42-00 | 2160S60-00 | 12-4 Stranded (black, red, blue, white) | 12 (stranded green) | 250' | 1000' | 170 | 0.565 |

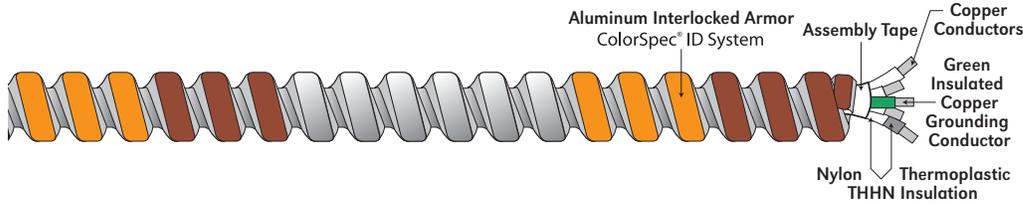
MC Lite[®] is also available in 10 AWG and larger, see page 21.

NOTE: All dimensions and weights are subject to normal manufacturing tolerances. Other conductor colors available by special order.



MC Lite[®] Aluminum Armored Cable

Traditional Type MC (480Y/277V) Technical Specifications



Specification Description

| Specification | MC Lite [®] ColorSpec [®] ID System |
|----------------------------|---|
| Armor | Interlocking Aluminum Strip |
| Conductors | Solid/Stranded Copper |
| Conductor Insulation | THHN/THWN |
| Assembly Covering | Polypropylene Tape |
| Maximum Temperature Rating | 90°C (dry) |
| Grounding | One grounding means - Insulated Green Grounding Conductor |
| Neutral Conductor | Grey for 480Y/277V circuits |
| Maximum Voltage Rating | 600V |

References & Ratings

- UL 83, 1479, 1569, 1581, 2556, File Reference E80042
- NEC[®] 230.43, 300.22(C), 392, 396, 330, 501, 502, 503, 530, 504, 505, 518, 520, 530, 645
- Federal Specification A-A-59544 (formerly J-C-30B)
- Meets all applicable OSHA and HUD Requirements
- May be surface mounted, fished and/or embedded in plaster
- Cable Tray Rated, install per NEC[®]
- UL Classified 1, 2, and 3 hour through (Fire) penetration product, R-14141
- Environmental Air-Handling Space Installation per NEC[®] 300.22(C)
- Aluminum armored cables are RoHS Compliant
- Made in USA of US and/or imported materials

Product Codes, Trade Sizes, Conductors, Packaging & Weights

| Product Code | | Trade Size | Grounding Conductor AWG | Length (feet) | | Approx. Weight/1000 Feet (lbs.) | Armor Minimum O.D. (inches) |
|--------------|------------|---|-------------------------|---------------|-------|---------------------------------|-----------------------------|
| Coil | Reel | | | Coil | Reel | | |
| 2104S42-01 | 2104S60-01 | 12-2 Solid (brown, gray) | 12 (solid green) | 250' | 1000' | 110 | 0.495 |
| 2104S42-02 | 2104S60-02 | 12-2 Solid (orange, gray) | 12 (solid green) | 250' | 1000' | 110 | 0.495 |
| 2104S42-03 | 2104S60-03 | 12-2 Solid (yellow, gray) | 12 (solid green) | 250' | 1000' | 110 | 0.495 |
| 2104S42-07 | 2104S60-07 | 12-2 Solid (purple, gray) | 12 (solid green) | 250' | 1000' | 110 | 0.495 |
| 2105S42-01 | 2105S60-01 | 12-3 Solid (brown, orange, gray) | 12 (solid green) | 250' | 1000' | 135 | 0.530 |
| 2105S42-02 | 2105S60-02 | 12-3 Solid (orange, yellow, gray) | 12 (solid green) | 250' | 1000' | 135 | 0.530 |
| 2105S42-03 | 2105S60-03 | 12-3 Solid (brown, yellow, gray) | 12 (solid green) | 250' | 1000' | 135 | 0.530 |
| 2105S42-07 | 2105S60-07 | 12-3 Solid (brown, purple, gray) | 12 (solid green) | 250' | 1000' | 135 | 0.530 |
| 2106S42-01 | 2106S60-01 | 12-4 Solid (brown, orange, yellow, gray) | 12 (solid green) | 250' | 1000' | 170 | 0.565 |
| 2158S42-01 | 2158S60-01 | 12-2 Stranded (brown, gray) | 12 (stranded green) | 250' | 1000' | 110 | 0.495 |
| 2158S42-02 | 2158S60-02 | 12-2 Stranded (orange, gray) | 12 (stranded green) | 250' | 1000' | 110 | 0.495 |
| 2158S42-03 | 2158S60-03 | 12-2 Stranded (yellow, gray) | 12 (stranded green) | 250' | 1000' | 110 | 0.495 |
| 2159S42-01 | 2159S60-01 | 12-3 Stranded (brown, orange, gray) | 12 (stranded green) | 250' | 1000' | 135 | 0.530 |
| 2160S42-01 | 2160S60-01 | 12-4 Stranded (brown, orange, yellow, gray) | 12 (stranded green) | 250' | 1000' | 170 | 0.565 |

MC Lite[®] is also available in 10 AWG and larger, see page 21.

NOTE: All dimensions and weights are subject to normal manufacturing tolerances. Other conductor colors available by special order.



26 05 00



AFC
CABLE SYSTEMS

SINCE 1926

272 Duchaine Boulevard, New Bedford, MA 02745
Telephone: 508-998-1131 / 800-757-6996 / Fax: 508-998-1447 / www.afcweb.com

Subject: **Material Safety Data Sheets (MSDS)**
AFC Cable Products

An official notice from OSHA confirms that the electrical products (cables, conduits, fittings, modular wiring, etc.) manufactured by AFC come under the classification of "Articles" under the Hazard Communication Standard. By definition, an article is defined as a product that does not "release or otherwise result in exposure to hazardous chemicals under normal conditions of use." Consequently, the electrical products manufactured by AFC do not require Material Safety Data Sheets.

The lubricants used in the manufacturing of conduits and cables are also covered by OSHA as non-hazardous and are primarily vegetable based materials.

Please contact us if you have any additional questions.

1.1 Switching Devices

Safety Switches



600 Vac Heavy-Duty, Fusible, Single-Throw, 277/480-600V – NEMA 1, 3R

| System | Ampere Rating | Fuse Class Provision | Maximum Horsepower Ratings with Time Delay Fuses | | | | | | NEMA 1 Enclosure Indoor Catalog Number | NEMA 3R Enclosure Rainproof Catalog Number |
|---|---------------|----------------------|--|-----------------|----------------|------|------|------|--|--|
| | | | Single-Phase AC | | Three-Phase AC | | DC | | | |
| | | | 480V | 600V | 480V | 600V | 250V | 600V | | |
| Two-Pole—480 Vac—600 Vac or Vdc^① (Suitable for Service Entrance Use with a Neutral Kit Installed) | | | | | | | | | | |
| | 30 | H | 7-1/2 | 10 | — | — | — | 15 | DH261FGK | DH261FRK |
| | 60 | H | 20 | 25 | — | — | — | 25 | DH262FGK | DH262FRK |
| | 100 | H | 30 | 40 | — | — | 20 | 25 | DH263FGK | DH263FRK |
| | 200 | H | 50 | 50 | — | — | 40 | 50 | DH264FGK | DH264FRK |
| | 400 | H | — | — | — | — | 50 | — | DH265FGK | DH265FRK |
| | 600 | H | — | — | — | — | 50 | — | DH266FGK | DH266FRK |
| | 800 | L | — | — | — | — | — | — | DH267FGK | DH267FRK |
| | 1200 | L | — | — | — | — | — | — | ② | — |
| Three-Pole—480 Vac—600 Vac, 250 Vdc (Suitable for Service Entrance Use with a Neutral Kit Installed) | | | | | | | | | | |
| | 30 | H | 7-1/2 | 10 | 15 | 20 | — | — | DH361FGK | DH361FRK |
| | 60 | H | 20 | 25 | 30 | 50 | — | — | DH362FGK | DH362FRK |
| | 100 | H | 30 | 40 | 60 | 75 | — | — | DH363FGK | DH363FRK |
| | 200 | H | 50 | 50 | 125 | 150 | — | — | DH364FGK | DH364FRK |
| | 400 | H | — | — | 250 | 350 | — | — | DH365FGK | DH365FRK |
| | 600 | H | — | — | 400 | 500 | — | — | DH366FGK | DH366FRK |
| | 800 | L | — | — | 500 | 500 | — | — | DH367FGK | DH367FRK |
| | 1200 | L | — | — | 500 | 500 | — | — | DH368FGK | DH368FRK |
| Four-Wire (Three Blades, Three Fuses, S/N) 480 Vac—600 Vac, 250 Vdc | | | | | | | | | | |
| | 30 | H | 7-1/2 | 10 | 15 | 20 | — | — | DH361NGK | DH361NRK |
| | 60 | H | 20 | 25 | 30 | 50 | — | — | DH362NGK | DH362NRK |
| | 100 | H | 30 | 40 | 60 | 75 | — | — | DH363NGK | DH363NRK |
| | 200 | H | 50 | 50 | 125 | 150 | — | — | DH364NGK | DH364NRK |
| | 400 | H | — | — | 250 | 350 | — | — | DH365NGK | DH365NRK |
| | 600 | H | — | — | 400 | 500 | — | — | DH366NGK | DH366NRK |
| | 800 | L | — | — | 500 | 500 | — | — | DH367NGK | DH367NRK |
| | 1200 | L | — | — | 500 | 500 | — | — | DH368NGK | DH368NRK |
| Four-Pole—480 Vac—600 Vac, 250 Vdc | | | | | | | | | | |
| | 30 | H | 20 ^③ | 25 ^③ | 15 | 20 | — | — | DH461FGK | ④ |
| | 60 | H | 40 ^③ | 50 ^③ | 30 | 50 | — | — | DH462FGK | ④ |
| | 100 | H | 50 ^③ | 50 ^③ | 60 | 75 | — | — | DH463FGK | ④ |
| | 200 | H | — | — | 125 | 150 | 40 | — | DH464FGK | ④ |
| | 400 | H | — | — | 250 | 350 | 50 | — | DH465FGK | ②④ |
| | 600 | H | — | — | 400 | 500 | — | — | DH466FGK | ②④ |
| | 800 | L | — | — | — | — | — | — | ② | ②④ |

Notes
^① DC rating for 800A switches is 250V.
^② Contact the Safety Switch Flex Center (1-888-329-9272 or FlexSwitches@eaton.com) for availability of this product.
^③ Ratings are for two-phase AC.
^④ Use NEMA 12. NEMA 12 enclosures (30–1200A) can be field modified to meet NEMA 3R rainproof requirements when a factory provided drain hole is opened.
 30A heavy-duty switches with Type J fuse provisions are available from the factory only. See table on Page V2-T1-18 for catalog numbers.
 Suitable for service entrance use, except 1200A on 480Y/277 or 600Y/347 grounded wye systems, per NEC 215.10 and 230.95, and four-pole switches.

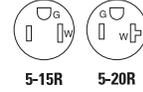
Modular Receptacles

| | |
|-----------------|--------------|
| Project Name: | Prepared By: |
| Project Number: | Date: |
| Catalog Number: | Type: |



Ground Fault Circuit Interrupter Receptacles

2-Pole, 3-Wire Grounding
15A 125V/AC
20A 125V/AC



Specification Grade GFCIs

FEATURES

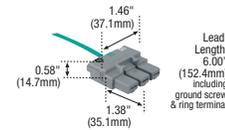
- ArrowLink modular plug and connector incorporate a first make/last break grounding design.
- Wire leads (where applicable) are crimped and resistance welded to plug and connector terminals.
- Audible “click” when mating plug and connector indicates proper assembly.
- Pre-wired plugs provide 100% inspected and consistent torque settings.
- Exclusive screw terminal guards insulate conductive surfaces.
- Tamper Resistant models comply with 2008 NEC® Article 406.11 for all dwelling units.
- ShockSentry™ lock-out function prevents miswired line-load connections and GFCI circuitry damage.

| Back Wire & Side Wire | 15A, 125V NEMA 5-15R | 20A, 125V NEMA 5-20R |
|--|---|---|
| Description | Catalog No. Color Suffix | Catalog No. Color Suffix |
| Duplex GFCI | <input type="checkbox"/> VGF15__MOD A, B, BK, GY, LA, RD, V, W | <input type="checkbox"/> VGF20__MOD A, B, BK, GY, LA, RD, V, W |
| Duplex GFCI NAFTA Compliant | <input type="checkbox"/> VGF15F__MOD B, BK, GY, LA, RD, V, W | <input type="checkbox"/> VGF20F__MOD B, BK, GY, LA, RD, V, W |
| Tamper Resistant Duplex GFCI | <input type="checkbox"/> TRVGF15__MOD A, B, BK, GY, LA, RD, V, W | <input type="checkbox"/> TRVGF20__MOD A, B, BK, GY, LA, RD, V, W |
| Tamper Resistant Duplex GFCI NAFTA Compliant | <input type="checkbox"/> TRVGF15F__MOD B, BK, GY, LA, RD, V, W | <input type="checkbox"/> TRVGF20F__MOD B, BK, GY, LA, RD, V, W |
| Weather Resistant Duplex GFCI | <input type="checkbox"/> WRVGF15__MOD B, GY, V, W | <input type="checkbox"/> WRVGF20__MOD B, GY, V, W |
| Tamper & Weather Resistant Duplex GFCI | <input type="checkbox"/> TWRVGF15__MOD B, GY, LA, V, W | <input type="checkbox"/> TWRVGF20__MOD B, GY, LA, V, W |

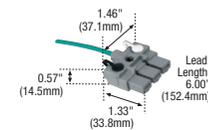
Includes standard size unbreakable wallplate unless otherwise noted
Consult factory customer service representative for additional packaging options



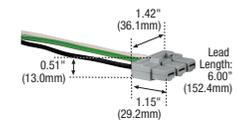
TRVGF15_MOD



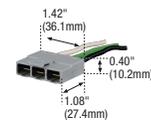
Receptacle SPD Push-In Connector



Receptacle SPD Screw Terminal Connector



Leaded Receptacle Connector



Receptacle Plug

ArrowLink Receptacle Connectors

| Type | Description | Catalog No. |
|---------------|---|---------------------------------------|
| ArrowLink SPD | Push-In Building Wire Connector | <input type="checkbox"/> MCR300FTPI |
| | Push-In Building Wire Connector, No Ground Conductor | <input type="checkbox"/> MCR300FTPING |
| ArrowLink SPD | Screw Terminal Building Wire Connector | <input type="checkbox"/> MCR300FTST |
| | Screw Terminal Building Wire Connector, No Ground Conductor | <input type="checkbox"/> MCR300FTSTNG |
| ArrowLink | 125V Solid Wire Building Wire Connector | <input type="checkbox"/> MCR125SOL |
| | 125V Stranded Wire Building Wire Connector | <input type="checkbox"/> MCR125STR |
| | 250V Solid Wire Building Wire Connector | <input type="checkbox"/> MCR250SOL |
| | 250V Stranded Wire Building Wire Connector | <input type="checkbox"/> MCR250STR |

Patent Pending

Icon Key

- Build-To-Spec Customizable Devices
- NAFTA Compliant, see Arrow Hart Buyer's Guide pg O-30 for more information

TESTING & CODE COMPLIANCE

- Base Device: cULus Listed to UL 498 and UL 943, file no. E60120; meets all UL 943 (GFCI) and UL 498 (Receptacles) and applicable CSA requirements
- ArrowLink: Plug & connector cULus Listed to UL 2459 file no. E325188
- Combined: cULus Listed wiring assembly, UL file no. E326691

MATERIAL CHARACTERISTICS

- Nylon with PVC terminal guards, except single: adhesive terminal barrier
- Environmental, Base Device: Flammability meets UL 94 requirements; V2 rated; temperature rating: -20°C to 90°C (-4°F to 194°F), except single: -20°C to 60°C (-4°F to 140°F)
- Environmental, ArrowLink: Flammability meets UL 94 requirements; V2 rated; temperature rating: -20°C to 90°C (-4°F to 194°F) max.



www.cooperwiringdevices.com



26 05 00

Modular Receptacles Specification & Performance Data

| | |
|-----------------|--------------|
| Project Name: | Prepared By: |
| Project Number: | Date: |
| Catalog Number: | Type: |



Specification Grade Ground Fault Circuit Interrupter Receptacles

2-Pole, 3-Wire Grounding
15A, 125V/AC; 20A, 125V/AC
NEMA 5-15, 5-20

| | Device Type | Specification Grade GFCI 15A & 20A: VGF_MOD and VGF_F_MOD Series ArrowLink: MCR125_, MCR250_, MCR300_Series | Specification Grade Tamper Resistant & Weather Resistant Duplex GFCI 15A & 20A: TRVGF_MOD, TRVGF_F_MOD, WRVGF_MOD, TWRVGF_MOD Series ArrowLink: MCR125_, MCR250_, MCR300_Series | |
|---------------------------------------|--------------------------|--|--|--|
| Wiring Type | Base Device | Back & side wire | Back & side wire | |
| | ArrowLink | Integral wire leads, crimped & resistance welded | Integral wire leads, crimped & resistance welded | |
| | ArrowLink SPD | Backwire feed through | Backwire feed through | |
| Testing & Code Compliance | Base Device | <ul style="list-style-type: none"> cULus Listed to UL 498 and UL 943, file no. E60120 Meets all UL 943 (GFCI), UL 498 (Receptacles) and applicable CSA requirements NOM certified | <ul style="list-style-type: none"> cULus Listed to UL 498 and UL 943, file no. E60120 Meets all UL 943 (GFCI), UL 498 (Receptacles) and applicable CSA requirements NOM certified | |
| | ArrowLink | <ul style="list-style-type: none"> Plug & connector cULus Listed to UL 2459, file no. E325188 | <ul style="list-style-type: none"> Plug & connector cULus Listed to UL 2459, file no. E325188 | |
| | Combined | <ul style="list-style-type: none"> cULus Listed wiring assembly, UL file no. E326691 | <ul style="list-style-type: none"> cULus Listed wiring assembly, UL file no. E326691 | |
| Specifications: Environmental | Base Device | Flammability | Meets UL 94 requirements; V2 rated | Meets UL 94 requirements; V2 rated |
| | | Temperature Rating | -35°C to 66°C (-31°F to 150.8°F) | -35°C to 66°C (-31°F to 150.8°F) |
| | ArrowLink | Flammability | Meets UL 94 requirements; V2 rated | Meets UL 94 requirements; V2 rated |
| | | Temperature Rating | -35°C to 66°C (-31°F to 150.8°F) | -35°C to 66°C (-31°F to 150.8°F) |
| Specifications: Electrical | Base Device | Dielectric Voltage | Withstands 2000V per UL 498 | Voltage: withstands 2000V per UL 498 |
| | | Current Interrupting | Yes, at full-rated current | Yes, at full-rated current |
| | | Temperature Rise | Temperature Rise: max. 30°C (86°F) after 100 cycles of overload @ 150% of rated current (DC) | Max. 30°C (86°F) after 100 cycles of overload @ 150% of rated current (DC) |
| | | Trip Time | 0.025 seconds (Class A) | 0.025 seconds (Class A) |
| | | Frequency | 60 Hz; Voltage: 125V; Amperage: 15A/20A 20A Feed Through | 60 Hz; Voltage: 125V; Amperage: 15A/20A 20A Feed Through |
| | ArrowLink | Short Circuit Testing | Meets and exceeds 10 kA | Meets and exceeds 10 kA |
| | | Maximum Interrupting Capacity | 20 Amps | 20 Amps |
| | | Max. Working Voltage | 300V/AC | 300V/AC |
| | | Max. Continuous Current | 20A | 20A |
| | | Overload | 52.5A/AC for 10 cycles | 52.5A/AC for 10 cycles |
| Specifications: Mechanical | Base Device | Dielectric Voltage | Withstands 1600V per UL 2459 | Withstands 1600V per UL 2459 |
| | | Current Interrupting | Limited cycles at full-rated current | Limited cycles at full-rated current |
| | | Temperature Rise | Max. 50°C (122°F) while conducting 35A after 10 cycles of overload @ 52.5A/AC | Max. 50°C (122°F) while conducting 35A after 10 cycles of overload @ 52.5A/AC |
| | | Overload | 52.5A/AC for 10 cycles | 52.5A/AC for 10 cycles |
| Specifications: Screw Terminal Guards | Base Device | Dielectric Voltage | Withstands 1600V per UL 2459 | Withstands 1600V per UL 2459 |
| | | Current Interrupting | Limited cycles at full-rated current | Limited cycles at full-rated current |
| | | Temperature Rise | Max. 50°C (122°F) while conducting 35A after 10 cycles of overload @ 52.5A/AC | Max. 50°C (122°F) while conducting 35A after 10 cycles of overload @ 52.5A/AC |
| | | Overload | 52.5A/AC for 10 cycles | 52.5A/AC for 10 cycles |
| | | Dielectric Voltage | Withstands 1600V per UL 2459 | Withstands 1600V per UL 2459 |
| Materials: | Base Device | Base Device Terminal Accommodation | #14 - #10 AWG | #14 - #10 AWG |
| | | ArrowLink Wire Leads | #12 AWG | #12 AWG |
| | | ArrowLink SPD Screw Terminals | Accepts #12-#14 stranded and solid wire | Accepts #12-#14 stranded and solid wire |
| | | ArrowLink SPD Ground | Integral THHN #12 AWG 6" lead with ring terminal and #10 ground screw | Integral THHN #12 AWG 6" lead with ring terminal and #10 ground screw |
| | | Voltage Ratings | Permanently marked on device | Permanently marked on device |
| | ArrowLink | Material: UL recognized insulating material Dielectric Strength: 2,000V min HWI Rating: 4 min. Relative temperature index, electrical: 80°C (176°F) Flammability: V0 (UL 94) | Material: UL recognized insulating material Dielectric Strength: 2,000V min HWI Rating: 4 min. Relative temperature index, electrical: 80°C (176°F) Flammability: V0 (UL 94) | Material: UL recognized insulating material Dielectric Strength: 2,000V min HWI Rating: 4 min. Relative temperature index, electrical: 80°C (176°F) Flammability: V0 (UL 94) |
| | | Top Housing | Thermoplastic, nylon | Thermoplastic, nylon; except WR: nylon 6/6 |
| | | Bottom Housing | PVC | PVC |
| | | Strap | 0.047" thick steel, zinc plated | 0.047" thick steel, zinc plated; WR & TWR: nickel-plated |
| | | Line Contacts | 0.030" thick brass | 0.030" thick brass |
| ArrowLink SPD | Terminal & Ground Screws | #8-32 steel, brass plated; neutral screw nickel plated, ground screw green | Terminal: Brass/nickel-plated steel; WR & TWR brass/nickel-plated stainless steel; Ground: ground screw green on all models, WR and TWR stainless steel | |
| | Terminal Clamps | 0.070" thick steel | Brass-plated steel; WR & TWR nickel-plated steel | |
| | Housing | Polycarbonate | Polycarbonate | |
| | Contacts | Copper alloy | Copper alloy | |
| | Wire Leads | Solid or stranded THHN #12 AWG | Solid or stranded THHN #12 AWG | |

Specifications subject to change without notice.
2-ALMSPSH8-0311

www.cooperwiringdevices.com



Technical Data PIMS0141

CH 3/4-inch Main Loadcenter

CH42B200V



General Description

CH 3/4-inch Main Loadcenter, single-phase, 42 circuits, #2-300 kcmil wire, 200A, NEMA 1 enclosure

Warranty

Limited lifetime

Product Specifications

Package: 4.25 x 39 x 15.75 in.

Package Weight: 41.18 lbs.

Product Dimensions: 3.88 x 37 x 14.31 in.

- Certification: UL 67, UL 50
- Amperage rating: 200A
- Enclosure: Metallic NEMA 1
- Interrupt Rating: 25 kAIC
- Main circuit breaker: CSR
- Three-wire
- Single-phase
- Wire size: #2-300 kcmil
- 42 circuits
- 42 spaces
- Box size: K
- Copper bus
- Value pack includes (5) CH120 and (1) CH230 breakers



Eaton
1000 Eaton Boulevard
Cleveland, OH 44122
United States
Eaton.com

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Printed in USA
August 2014

Eaton is a registered trademark.
All other trademarks are property
of their respective owners.

8/16/2015 Eaton 200-Amp 8-Space/Circuit EUSERC BR Type Main Breaker Meter Breaker-MBE88B200BTS - The Home Depot



More saving.
More doing.

Your Store: **Brooklyn, NY #1225**
Use [Current Location](#) or [find store](#)

Eaton | Model # MBE88B200BTS | Internet # 202275998

200-Amp 8-Space/Circuit EUSERC BR Type Main Breaker Meter Breaker

★★★★★ | [Write the First Review](#) + | [Ask the first question](#) +



\$156.00 /each

NEARBY STORES MAY HAVE THIS ITEM

[Check Nearby Stores](#)

[Open Expanded View](#) +

[Click to Zoom](#)



PRODUCT OVERVIEW | Model # MBE88B200BTS | Internet # 202275998

The Eaton cutler-hammer 200-Amp 8-Space 8-Circuit Type BR Meter Breaker is intended for surface-mount applications and provides for top or bottom feed. The ANSI-certified and UL-listed meter breaker is designed for use as a combination main breaker load center and meter socket and features a commercial-grade main breaker and an aluminum buss.

- For use as a combination main breaker load center and meter socket
- Aluminum buss bar
- Commercial-grade main breaker
- Top or bottom feed
- Single phase
- 120/240-Volt
- Surface mount
- For outdoor use
- ANSI certified and UL listed
- Meets NEC wire-bending space requirements
- Meets requirements of the electric utility service equipment requirements committee (EUSERC)
- Raised interior with built-in wire-way for easier installation
- Meets wire bending space requirements
- Commercial grade main breaker
- Raised interior with built-in wire way for easier installation

<http://www.homedepot.com/p/Eaton-200-Amp-8-Space-Circuit-EUSERC-BR-Type-Main-Breaker-Meter-Breaker-MBE88B200BTS/202275998>

1/2



8/16/2015

Eaton 200-Amp 8-Space/Circuit EUSERC BR Type Main Breaker Meter Breaker-MBE88B200BTS - The Home Depot

SPECIFICATIONS

DIMENSIONS

| | | | |
|--------------------------|-------|-------------------------|-------|
| Load center depth (in.) | 5.38 | Load center width (in.) | 14.44 |
| Load center height (in.) | 23.88 | | |

DETAILS

| | | | |
|-------------------------|-------------|----------------------|---------|
| Electrical Product Type | Load Center | Number of Phases | 1 |
| Indoor/Outdoor | Outdoor | Number of Spaces | 8 |
| Load Center Type | Combination | Product Weight (lb.) | 35 lb |
| Maximum Amperage (amps) | 200 | Returnable | 90-Day |
| Mounting type | Plug In | Voltage (volts) | 120/240 |

WARRANTY / CERTIFICATIONS

| | | | |
|-----------------------------|----------------------------|-----------------------|----------|
| Certifications and Listings | 1-UL Listed,ANSI Certified | Manufacturer Warranty | 10 Years |
|-----------------------------|----------------------------|-----------------------|----------|

SHIPPING AND DELIVERY OPTIONS

Standard Shipping includes delivery by small parcel service. Processing time varies by product.

Orders for this item may be expedited for an additional fee.

Other Delivery Options:

Express and **Expedited** shipping options are also available. Estimated arrival times are available in checkout.

If product is eligible for shipping to AK, HI and US Territories additional transit time and remote surcharges may apply.

Technical Data

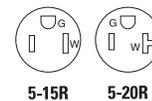
Effective July 2015

Arrow Hart combination USB charger with tamper resistant duplex receptacle

| | |
|-----------------|--------------|
| Project Name: | Prepared By: |
| Project Number: | Date: |
| Catalog Number: | Type: |

Description

2-pole, 3-wire grounding
15A, 125V/AC, 5V/DC, 3.1A
20A, 125V/AC, 5V/DC, 3.1A
NEMA 5-15R, 5-20R



TR7755W



TR7756



Design features

- Standard AC duplex receptacle with two USB charging ports rated at 3.1A
- Dual USB charging ports charge most compatible electronic devices that charge via a 5V charger adapter
- Three (3) pre-stripped 6" wire leads for line, neutral and ground for quick and easy installation
- Tamper resistant shutters provide compliance with 2014 NEC® Article 406.12 that states that all 15A and 20A, 125V receptacles installed in dwelling units must be tamper resistant
- Replaces a standard duplex receptacle
- Automatic grounding system eliminates need for bonding jumper in grounded metal enclosure, provides redundant measure of ground continuity where jumper is used
- Thermoplastic top and back-body are virtually unbreakable to deliver years of durable performance
- Steel mounting strap is zinc plated for added corrosion resistance
- Convenient patented built-in wire strippers speed installation
- Triple wipe blade contacts and double wipe ground contacts to insure long-term blade retention

Table 1. USB charger with tamper resistant duplex receptacles, pre-stripped wire leads

| Catalog no. | Description | Rating | | USB rating | | Color suffix |
|-------------|---|--------|------|------------|------|------------------------|
| | | A | V/AC | Amp | V/DC | |
| □ TR7755__ | USB charger with tamper resistant duplex receptacle | 15 | 125 | 3.1 | 5 | A, B, BK, GY, LA, V, W |
| □ TR7756__ | USB charger with tamper resistant duplex receptacle | 20 | 125 | 3.1 | 5 | A, B, BK, GY, LA, V, W |

Compliances, specifications and availability are subject to change without notice.



Powering Business Worldwide

Technical Data
Effective July 2015

Combination USB charger with
tamper resistant duplex receptacle

| | |
|-----------------|--------------|
| Project Name: | Prepared By: |
| Project Number: | Date: |
| Catalog Number: | Type: |

Applications

The Arrow Hart USB duplex receptacle provides quick and convenient access to charge virtually any electronic component including smart phones, tablets, e-readers, cameras and MP3 players. The specification grade device is built to withstand the tough demands of the commercial environment while also providing code compliance with 2014 NEC® article 406.12 that requires tamper resistant receptacles in dwelling units.

Table 2. Specifications

| Catalog no. | TR7755 & TR7756 series |
|---|---|
| Device type | USB combination charger with tamper resistant duplex receptacle |
| Wiring type | Wire leads |
| Testing & code compliance | cULus Listed to UL498 and UL1310, File no. E15058 |
| Environmental specifications | Flammability: Meets UL94 requirements; V2 rated Temperature rating: -20°C to 60°C (-4°F to 140°F) |
| Electrical specifications: AC output | Dielectric voltage: Receptacle withstands 2000V per UL498 Temperature rise: Receptacle - max. 30°C (86°F) after 100 cycles of overload @ 150% of rated current (DC) |
| Electrical specifications: DC output | Switching frequency: Typical 140 kHz Output voltage: Nominal 5V (+/- 10%) Protection: Current limiting and thermal shutdown protection Output current: Constant current maximum 3.1A |
| Mechanical specifications | Terminations: Device can be wired using #14 or #12 AWG wires, three 6" pre-stripped wire leads for line, neutral and ground, #14 AWG for TR7755 and #12 AWG for TR7756 |

Table 3. Materials

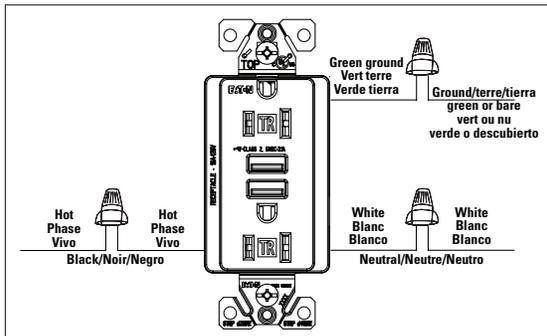
| Catalog no. | TR7755 & TR7756 series |
|-------------------------|-----------------------------------|
| Top housing | PC |
| Bottom housing | PC |
| Strap | 0.045" thick steel, zinc plated |
| Auto ground clip | Phosphor bronze |
| Line contacts | 0.030" thick brass |
| Ground contact | 0.014" thick brass |
| Terminal screws | N/A (wire leads) |
| Ground screw | N/A (wire leads) |
| Tamper resistant | Reliable Delrin® shutter assembly |

Table 4. Color ordering information

For ordering devices, include Cat. no. followed by the color code: A (Almond), B (Brown), BK (Black), GY (Gray), LA (Light Almond), V (Ivory), W (White)



Wiring diagram



Combination USB charger with
tamper resistant duplex receptacle

Technical Data
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| | |
|-----------------|--------------|
| Project Name: | Prepared By: |
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Product dimensions

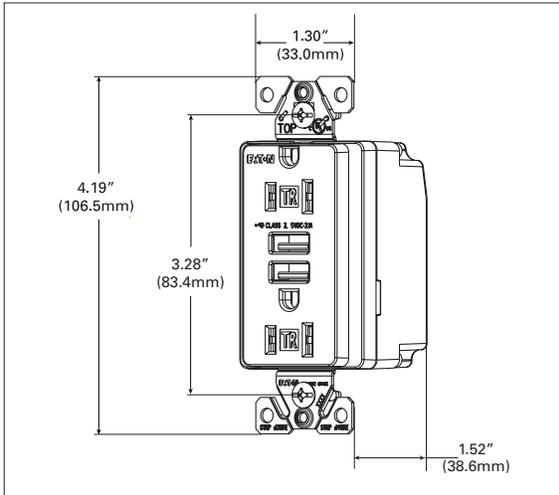


Figure 1. TR7755 Line art with dimensions

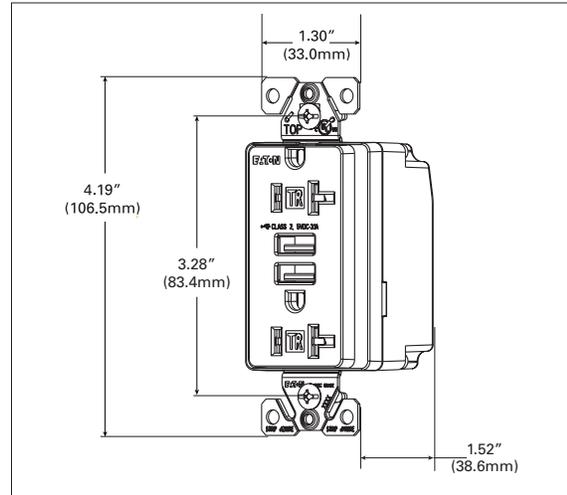


Figure 2. TR7756 Line art with dimensions

Certifications & compliances

| Catalog no. | cULus | NOM 426 |
|-------------|-------|---------|
| TR7755 | • | • |
| TR7756 | • | • |

KEY: cULus cULus NOM 426 NOM

Electrical Sector
203 Cooper Circle
Peachtree City, GA 30269
United States
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Cooperwiringdevices.com

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Mississauga, Ontario, L5R 1B8
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Cooperwiringdevices.com

Electrical Sector
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Cuautitlán Km 17.8 s/n
Col. Villa Jardín esq.
Cerrada 8 de Mayo
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[View detailed images \(3\)](#)



Details

SKU: White Oak Quarter-Sawn

Our price: **\$10.95**

Options

Step 1: NEW FEATURE! Choose all the quantities of the configurations in one step, then scroll down to choose Edge Profiles, Screw color, Metal Backing, Stain or Poly, then click the Add to Cart button, it's easy!

| | | |
|--------|---|---------------------|
| Qty. 0 |  | A. (TS1) \$10.95 |
| Qty. 0 |  | B. (DR1) \$10.95 |
| Qty. 0 |  | C. (TS2) \$15.95 |
| Qty. 0 |  | D. (DR1TS1) \$15.95 |
| Qty. 0 |  | E. (TS3) \$19.95 |
| Qty. 0 |  | F. (GF1) \$10.95 |
| Qty. 0 |  | G. (DR1TS2) \$19.95 |
| Qty. 0 |  | H. (GF1TS1) \$15.95 |
| Qty. 0 |  | I. (DR2) \$15.95 |
| Qty. 0 |  | J. (GF3) \$19.95 |
| Qty. 0 |  | K. (GF2) \$15.95 |
| Qty. 0 |  | L. (TS4) \$23.95 |
| Qty. 0 |  | M. (DR1GF1) \$15.95 |
| Qty. 0 |  | N. (GF4) \$23.95 |
| Qty. 0 |  | O. (DR1TS3) \$23.95 |
| Qty. 0 |  | P. (GF1TS3) \$23.95 |
| Qty. 0 |  | Q. (GF1TS2) \$19.95 |
| Qty. 0 |  | R. (GF2TS1) \$19.95 |
| Qty. 0 |  | S. (DR2TS1) \$19.95 |
| Qty. 0 |  | T. (TS5) \$36.95 |
| Qty. 0 |  | U. (TS6) \$41.95 |
| Qty. 0 |  | V. (TS7) \$46.95 |
| Qty. 0 |  | W. (TS8) \$51.95 |

SUNPOWER®

BENEFITS

Highest Efficiency

Panel efficiency of 18.7% is higher than any commercially available competitor panel

More Power

SunPower 305 delivers 50% more power per unit area than conventional solar panels and 100% more than thin film solar panels

Reduces Installation Cost

More power per panel means fewer panels per install. This saves both time and money

Reliable and Robust Design

Proven materials, tempered front glass, and a sturdy anodized frame allow panel to operate reliably in multiple mounting configurations



SPR-305-WHT

305 SOLAR PANEL

EXCEPTIONAL EFFICIENCY AND PERFORMANCE



The SunPower 305 Solar Panel provides today's highest efficiency and performance. Utilizing 96 next generation SunPower all-back contact solar cells, the SunPower 305 delivers an unprecedented total panel conversion efficiency of 18.7%. The 305 panel's reduced voltage-temperature coefficient and exceptional low-light performance attributes provide outstanding energy delivery per peak power watt.

SunPower's High Efficiency Advantage - Up to Twice the Power

| Comparable systems covering 1000 m ² / 10,750 ft ² | | | |
|--|-----------|--------------|----------|
| | Thin Film | Conventional | SunPower |
| Watts / Panel | 65 | 165 | 305 |
| Efficiency | 9.0% | 12.0% | 18.7% |
| kWs | 90 | 120 | 187 |



SUNPOWER

305 SOLAR PANEL

EXCEPTIONAL EFFICIENCY AND PERFORMANCE

Electrical Data

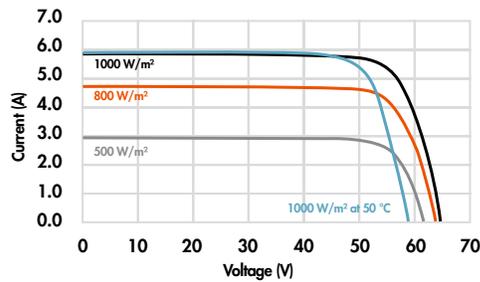
Measured at Standard Test Conditions (STC): irradiance of 1000/m², air mass 1.5 g, and cell temperature 25° C

| | | |
|--------------------------|---------------|---|
| Peak Power (+/-5%) | Pmax | 305 W |
| Rated Voltage | Vmp | 54.7 V |
| Rated Current | Imp | 5.58 A |
| Open Circuit Voltage | Voc | 64.2 V |
| Short Circuit Current | Isc | 5.96 A |
| Maximum System Voltage | IEC, UL | 1000 V, 600 V |
| Temperature Coefficients | | |
| | Power | -0.38% / °C |
| | Voltage (Voc) | -1.76.6 mV/°C |
| | Current (Isc) | 3.5 mA/°C |
| Series Fuse Rating | | 15 A |
| Peak Power per Unit Area | | 187 W/m ² , 17.4 W/ft ² |
| CEC PTC Rating | | 282.1 W |

Mechanical Data

| | |
|---------------|---|
| Solar Cells | 96 SunPower all-back contact monocrystalline |
| Front Glass | 4.0 mm (5/32 in) tempered |
| Junction Box | IP-65 rated with 3 bypass diodes |
| Output Cables | 900 mm length cables / Multi-Contact connectors |
| Frame | Clear anodized aluminum alloy type 6063 |
| Weight | 24 kg, 53 lbs |

IV Curve



Current/voltage characteristics with dependence on irradiance and module temperature.

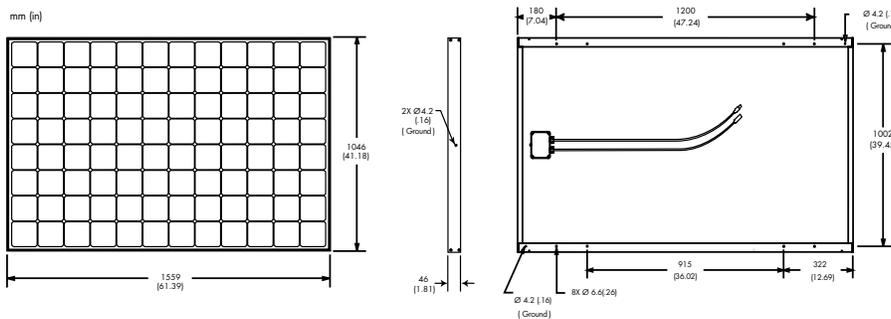
Tested Operating Conditions

| | |
|-------------------|---------------------------------------|
| Temperature | -40° C to +85° C (-40° F to +185° F) |
| Max load | 50 psf (2400 Pascals) front and back |
| Impact Resistance | Hail - 25mm (1 in) at 23 m/s (52 mph) |

Warranty and Certifications

| | |
|----------------|--|
| Warranty | 25 year limited power warranty 10 year limited product warranty |
| Certifications | IEC 61215 , Safety tested IEC 61730; UL listed (UL 1703), Class C Fire Rating |

Dimensions



CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT. Go to www.sunpowercorp.com/panels for details

About SunPower

SunPower designs, manufactures and delivers high-performance solar electric technology worldwide. Our high-efficiency solar cells generate up to 50 percent more power than conventional solar cells. Our high-performance solar panels, roof tiles and trackers deliver significantly more energy than competing systems.

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Document #001-42209 Rev*A



www.sunpowercorp.com

SDM100 Collector

Products

SDM100 collector which Triples Panel Efficiency by cooling the PV panel for improved efficiency and collecting thermal energy.



SDM100 Collector



Supported PV Panels

- Evergreen Solar – Spruce , ESA
- Sanyo – Sanyo HIP-xxxBA19, Type N
- Sharp – NE170-U1, NT175-U1, NE198-U1F
- Suntech – STP-160-180 24Ab; STP190, 200, 210-18Ud, STP260, 270, 280-24Vd
- Sunpower – Commercial+ Residential
- BP – BP 230
- Solon – Solon 270
- SCHOTT POLY™ – 220, 225, 230, 235
- Canadian Solar – CSP-210, 220, 230, 240
- Schuco – MPE 170 – 180, MPE 220 - 230
- Trina – PA05
- Mage – All models >180W
- Astronergy – All models >180W
- Perlight – All models >180W
- Solar World – V2.5 Frame models only
- Eclipsall – 230 - 250W NRG 60

Check with Tech support if not present.

[System Kits](#)

[Hybrid Monitor](#)

Document Links

[Performance Data](#)

Solar inverters

ABB micro inverter system
MICRO-0.25/0.3/0.3HV-I-OUTD
0.25kW to 0.3kW



ABB's MICRO inverter enables individual panel output control when flexibility and modularity are required.

This ABB MICRO inverter enables individual panel output control.

Individual panel output control can reduce shading and mismatching effect. ABB's MICRO is the best alternative to the traditional string inverters that ABB is famous for.

The individual panels can be installed in different orientations which reduce the efficiency losses in a variety of challenging conditions.

The Maximum Power Point Tracking (MPPT) algorithm maximizes energy and flexibility.

The proprietary MPPT algorithm works at the level of each solar panel in any light condition offering more energy output. This inverter has a maximum efficiency of 96.5%.

The electrolyte-free power converter further increases the life expectancy. The compatible and proprietary wireless communication hub, Concentrator Data Device (CDD), simplifies installation.

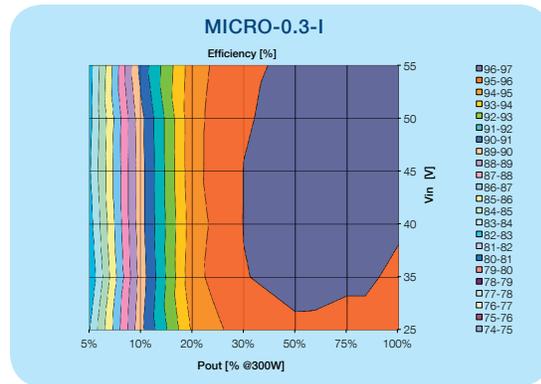
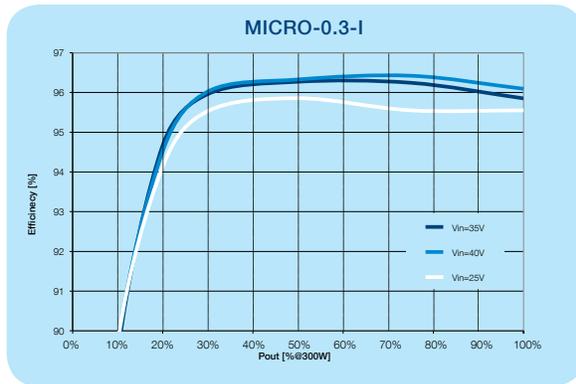
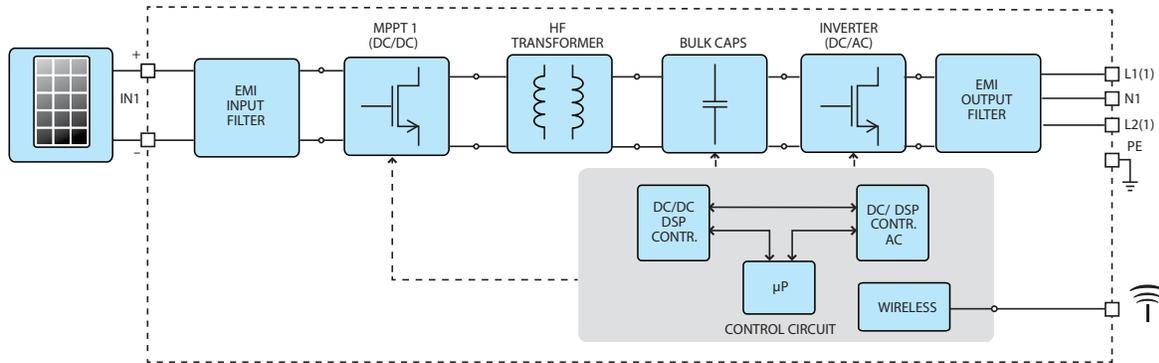
Highlights:

- The high speed and precise MPPT algorithm offers real time power tracking and improved energy harvesting.
- HF isolation to fit any application that requires the positive grounding of DC input terminals
- Reduced susceptibility to fault. In case of a component failure only the energy produced from one PV module will be lost.
- Outdoor enclosure for unrestricted use under any environmental conditions.

Power and productivity
for a better world™

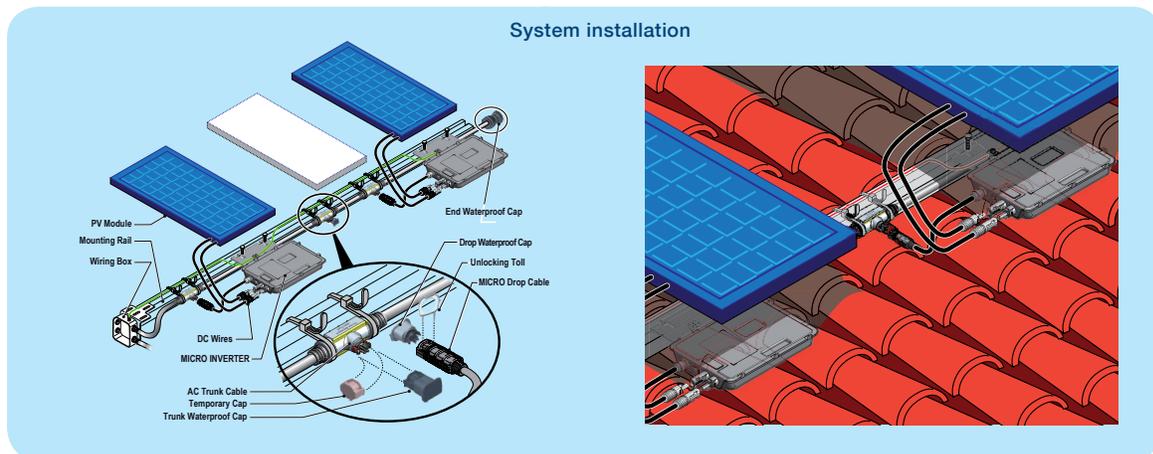


Block diagram of MICRO-0.25/0.3/0.3HV-I-OUTD



MICRO inverter system installation:

- The ABB MICRO inverter offers ease of installation with AC trunk and drop cable configuration.
- The mounting bracket on the MICRO inverter ensures simple and durable mounting on commercially available racking solutions.
- AC cabling compatible with 60, 72 and 96 cell modules in both portrait and landscape orientation.
- Locking connectors and weatherproof accessories ensure long term reliable operation of the plant.



Additional highlights:

- Used with the ABB Concentrator Data Device (CDD), ABB's MICRO inverter offers proprietary wireless monitoring of real-time system monitoring, troubleshooting and plant feedback.
- Only product in the market compatible with majority of PV modules.
- Comes with a 10-year system warranty covering the entire system, including MICRO, CDD and cabling.

Available models:

- 250W: MICRO-0.25-I
- 300W: MICRO-0.3-I
- 300W: MICRO-0.3HV-I



Technical data and types

| Type code | MICRO-0.25-I-OUTD | | MICRO-0.3-I-OUTD | | MICRO-0.3HV-I-OUTD | |
|---|--|------------|---------------------------------|------------|-----------------------------------|------------|
| Nominal output power | 250W | | 300W ¹ | | 300W ¹ | |
| Rated grid AC voltage | 208V | 240V | 208V | 240V | 208V | 240V |
| Maximum output power | 260W | | 310W | | 310W | |
| Input side (DC) | | | | | | |
| Maximum usable DC input power | 265 ² Wp | | 320 ² Wp | | 320 ² Wp | |
| Maximum PV panel rating (STC) | 300W | | 360W | | 360W | |
| Absolute maximum voltage (Vmax) | 65V | | 65V | | 79V | |
| Start-Up voltage (Vstart) | 25V | | 25V | | 25V | |
| Full power MPPT voltage range | 25-60V | | 30-60V | | 30-75V | |
| Operating voltage range | 12-60V ³ | | 12-60V ³ | | 19-75V ³ | |
| Maximum usable current (Idcmax) | 10.5A | | 10.5A | | 10.5A | |
| Maximum short circuit current limit | 12.5A ³ | | 12.5A ³ | | 12.5A ³ | |
| DC connection type | Amphenol H4 PV connector | | Amphenol H4 PV connector | | Amphenol H4 PV connector | |
| Output side (AC) | | | | | | |
| Grid connection type | 1Ø/2W | Split-Ø/3W | 1Ø/2W | Split-Ø/3W | 1Ø/2W | Split-Ø/3W |
| Adjustable voltage range | 183V-228V | 211V-264V | 183V-228V | 211V-264V | 183V-228V | 211V-264V |
| Nominal grid frequency | 60Hz | | 60Hz | | 60Hz | |
| Adjustable grid frequency range | 57-60.5 Hz | | 57-60.5 Hz | | 57-60.5 Hz | |
| Maximum output current | 1.20A | 1.04A | 1.44A | 1.25A | 1.44A | 1.25A |
| Power factor | >0.95 | | | | | |
| Maximum number of inverters per string | 13 | | 11 | | 11 | |
| Grid wiring termination type | 18AWG drop cable from inverter to 10AWG AC trunk cable | | | | | |
| Input protection devices | | | | | | |
| Reverse polarity protection | Yes; polarized PV connectors (Amphenol H4) | | | | | |
| Output protection devices | | | | | | |
| Anti-islanding protection | Meets UL 1741/IEEE1547 requirements | | | | | |
| Over-voltage protection type | Varistor | | Varistor | | Varistor | |
| Maximum AC OCPD rating | 20A | | 20A | | 20A | |
| Efficiency | | | | | | |
| Maximum efficiency | 96.5% | | 96.5% | | 96.5% | |
| CEC efficiency | 96% | | 96% | | 96% | |
| Operating performance | | | | | | |
| Stand-by consumption | <50mW | | <50mW | | <50mW | |
| Communication | | | | | | |
| Monitoring system | Wireless and web-based monitoring through AURORA CDD (CDD required for compliance to UL1741) | | | | | |
| Environmental | | | | | | |
| Ambient air operating temperature range | -40°F to +167°F (-40°C to +75°C) Derating above +149°F (+65°C) | | | | | |
| Ambient air storage temperature range | -40°F to +167°F (-40°C to +80°C) | | | | | |
| Relative humidity | 0-100% RH condensing | | | | | |
| Acoustic noise emission level | < 30 db (A) @1m | | | | | |
| Maximum operating altitude without derating | 6560 ft (2000 m) | | | | | |
| Mechanical specifications | | | | | | |
| Enclosure rating | NEMA 4X | | | | | |
| Cooling | Natural convection | | | | | |
| Dimensions (H x W x D) | 10.5 x 9.7 x 1.37in (266 x 246 x 35mm) | | | | | |
| Weight | <3.5lbs (1.65kg) | | | | | |
| Mounting system | Rack mounting with M8, 1/4" or 5/16" bolt | | | | | |
| Safety | | | | | | |
| Isolation level | HF transformer | | | | | |
| Safety and EMC standard | UL1741, CSA C22.2 N. 107.1-01, EN61000-6-2, EN61000-6-3, FCC Part 15 | | | | | |
| Safety approval | cCSA _{US} | | | | | |
| Warranty | | | | | | |
| Standard warranty | 10 years | | | | | |
| Available models | | | | | | |
| Standard | MICRO-0.25-I-OUTD -US-208/240 | | MICRO-0.3-I-OUTD- US-208/240 | | MICRO-0.3HV-I-OUTD- US-208/240 | |

¹. With derating below 200V for 208Vac operation
². This is the maximum input power that the inverter will utilize
³. Only use PV modules that satisfy these parameters under all operating conditions.

Additional highlights:

- Wireless data monitoring.
 - Remote monitoring through Aurora Vision.
 - Easy configuration.
 - Up to 30 MICRO Inverters directly monitored by a single CDD.
 - 24-hours 7-days web-based monitoring on web or mobile devices.
 - Mesh network topology ensures redundancy in communications and the highest design flexibility.
- Homeowners can create their own private monitoring portal or share their data with their installer.
 - Free panel level monitoring standard on every system.

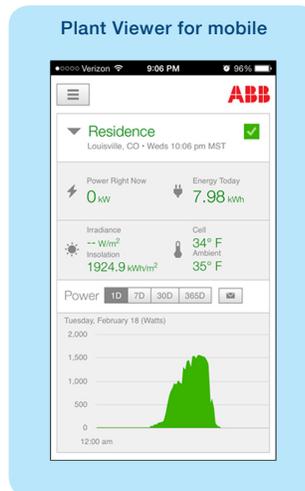
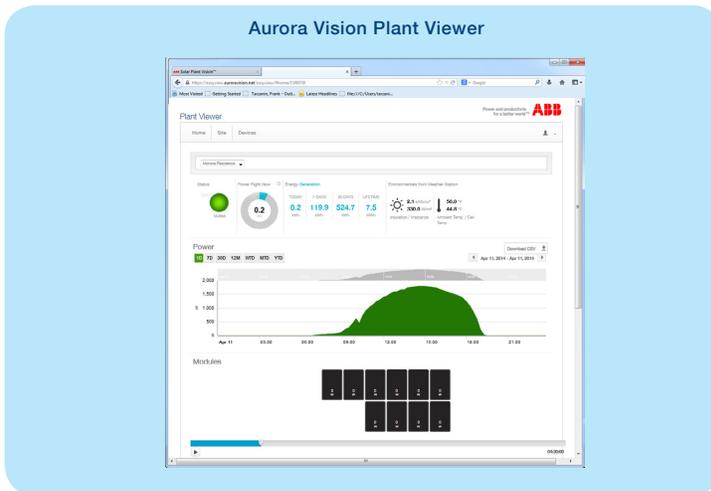
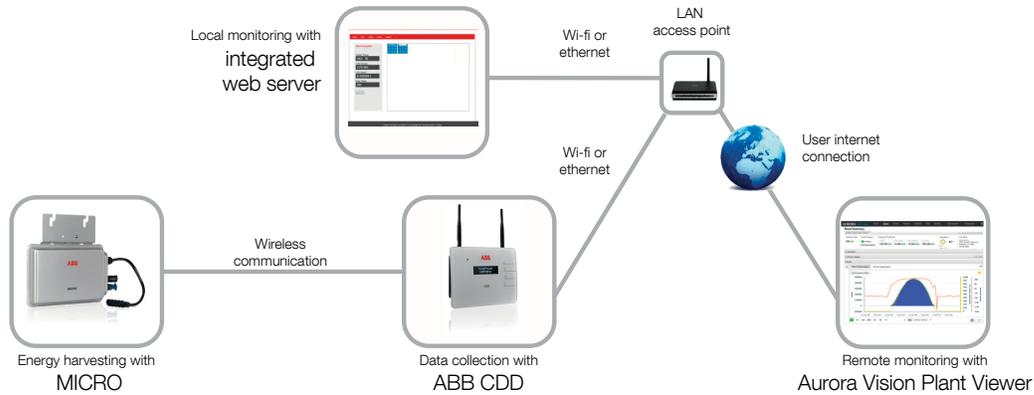


Technical data and types

| Type code | CDD |
|----------------------------------|--|
| Communication to inverter | |
| Type | Radio IEEE 802.15.4 |
| Sample rate | 1 min. |
| Max. distance (free space) | 164ft (50m ¹) |
| Max. number of devices | 30 |
| Communication to modem/PC | |
| Wireless communication | Radio IEEE 802.11/b - 2.4GHz/10Mbps |
| Wired communication | Ethernet RJ45 10/100Mbps |
| Connectivity | |
| Wired ports | 1x RJ45 Ethernet |
| Features | |
| Operation | Integrated web server |
| Power supply | |
| Type | External plug-in adapter |
| Adaptor input | 100 to 240Vac : 50/60Hz |
| Adaptor output | 5Vdc -1A |
| Power consumption | typ. 2.5W/max. 5W |
| Environmental | |
| IP degree | IP20/NEMA 1 |
| Ambient temperature | -4°F to 131°F (-20°C to +55°C) |
| Relative humidity | < 90% non condensing |
| Physical | |
| Dimensions (H x W x D) | 5.9 x 7 x 1in (150 x 180 x 25mm) |
| Weight | 1.32lbs (0.6kg) |
| Mounting | Wall mounting (screws provided) |
| Interface | |
| Display | 16 characters x 2 lines OLED |
| Display language | EN-ES-IT-DE-FR |
| LED | Bicolor (red and green) |
| Safety | |
| Marking | CE, CSA, FCC |
| Safety and EMC standard | EN 62311, EN60950-1, EN 301489-1 V1.8 1, EN 301489-17 V2.1.1, EN 55022, EN 55024, FCC part 15 Class B/ Class C, RTTE 1999/5/EC |
| Accessories | |
| Antenna extension cable | Optional |
| Plug-in power adaptor | Included |

¹. Actual distance is function of environmental condition. Please refer to dedicated technical note for further information
Remark: features not specially listed in the present datasheet are not included in the product.

Monitoring solutions



Aurora Vision Plant Viewer:

- Easy monitoring solution for homeowners on web or mobile devices.
- Complete reporting, analytics and diagnostic view for installers with complete control of installation process and access security.
- Tightly integrated micro-inverter and monitoring solution.

Instruction Manual **IM00401002E** Effective October 2014
Supersedes September 2012

Installation and Service Manual for Residential Series EVSE (Electric Vehicle Supply Equipment)



Contents

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Instruction Manual IM00401002E
Effective October 2014

Installation and Service Manual
for Residential Series EVSE
(Electric Vehicle Supply Equipment)

Installation guide

Important safety instructions—please read

⚠ WARNING ELECTRICAL

THIS EQUIPMENT SHOULD BE INSTALLED, ADJUSTED, AND SERVICED BY QUALIFIED ELECTRICAL PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS TYPE OF EQUIPMENT AND THE HAZARDS INVOLVED. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN DEATH OR SEVERE INJURY.

READ THIS MANUAL THOROUGHLY AND MAKE SURE YOU UNDERSTAND THE PROCEDURES BEFORE YOU ATTEMPT TO OPERATE THIS EQUIPMENT. THE PURPOSE OF THIS MANUAL IS TO PROVIDE YOU WITH INFORMATION NECESSARY TO SAFELY OPERATE, MAINTAIN, AND TROUBLESHOOT THIS EQUIPMENT. KEEP THIS MANUAL FOR FUTURE REFERENCE.

DO NOT USE THIS PRODUCT IF THE EV CABLE IS FRAYED, HAS DAMAGED INSULATION, OR ANY OTHER SIGN OF DAMAGE.

DO NOT USE THIS PRODUCT IF THE ENCLOSURE OR THE EV CONNECTOR IS BROKEN, CRACKED, OPEN, OR SHOWS ANY OTHER INDICATION OF DAMAGE.

INTENDED FOR USE WITH PLUG-IN ELECTRIC VEHICLES ONLY. PREMISE VENTILATION NOT REQUIRED.

THE INFORMATION CONTAINED IN THIS MANUAL IS SUBJECT TO CHANGE WITHOUT NOTICE.

Symbols and definitions

⚠ WARNING ELECTRICAL

THIS SYMBOL INDICATES HIGH VOLTAGE. IT CALLS YOUR ATTENTION TO ITEMS OR OPERATIONS THAT COULD BE DANGEROUS TO YOU AND OTHER PERSONS OPERATING THIS EQUIPMENT. READ THE MESSAGE AND FOLLOW THE INSTRUCTIONS CAREFULLY.

⚠ CAUTION

INDICATES A POTENTIAL HAZARDOUS SITUATION THAT, IF NOT AVOIDED, CAN RESULT IN MINOR TO MODERATE INJURY, OR SERIOUS DAMAGE TO THE EQUIPMENT. THE SITUATION DESCRIBED IN THE CAUTION MAY, IF NOT AVOIDED, LEAD TO SERIOUS RESULTS. IMPORTANT SAFETY MEASURES ARE DESCRIBED IN CAUTION (AS WELL AS WARNING).

⚠ IMPORTANT

INDICATES A PARTICULAR ITEM OR INSTRUCTION THAT IS IMPORTANT TO CONSIDER.

Save these instructions.

Definitions

AC—Alternating current. The type of power available in most buildings and on utility poles. The EVSE charging station protects users and vehicles by allowing AC power to flow through it to the vehicle. The vehicle then converts the AC to DC (direct current) to charge the traction battery.

ALC—Available line current. The EVSE charging station tells the vehicle through the J1772™ connector’s pilot pin how much current (in amperes) it is allowed to pull on the circuit. This allows the car to not exceed the circuit’s maximum current rating.

EVSE—Electric Vehicle Supply Equipment. EVSE is a general term used for all of the equipment used to supply electricity to the car, such as the Eaton EVSE charging station.

GFCI—Ground fault circuit interrupter. GFCI protects users from faults involving leakage currents going to ground, rather than the proper return path of the circuit.

J1772—The SAE Recommended Practice for conductive charging of hybrid and electric vehicles. This standard spells out the physical dimensions of the J1772 connector and the pilot communication between the plug-in vehicle and the EVSE.

Pilot—The signal through the J1772 connector. This signal tells both the vehicle and the EVSE when both are ready to charge and how much current it is allowed to pull. This signal is a SAE standard.

Plug session—The time during which the EVSE is plugged into a vehicle. It starts when the J1772 connector is plugged in and ends when the same connector is unplugged.

SAE—Society of Automotive Engineers. The group that organizes and leads committees of transportation experts to create standards, such as J1772, for the transportation industry.

Traction battery—The large battery on a plug-in electric vehicle that is used to store and release energy for propulsion. This is different from the 12 V battery that is used to start the vehicle initially and run accessories such as the radio.

UI—User Interface. The user interface part of the unit.

TB—Terminal Block. The point at which the incoming field power will be terminated in the EVSE unit.

ADA—Americans with Disabilities Act.

About the charging station

Eaton’s Electric Vehicle Supply Equipment (EVSE) charging station is compatible with the Society of Automotive Engineers J1772 standard for charging plug-in hybrid and all-electric vehicles.

The charging station has several safety features:

- Protects users with interlocked power; the cable and pins have no power on them until the connector is safely plugged into a vehicle
- Protects users from temporary faults and automatically resets so no user interaction is needed

Note: Automatic Reset feature must be enabled during installation—see **page 10** for more information.

- Instructs the vehicle on how much current to draw and keeps the upstream circuit protection from “nuisance tripping”
- See “Specifications” on **page 17** for more details



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Moving, transporting, and storage instructions

Store this unit indoors and in its original packaging until it is ready to be installed. Storage temperature should be between -30 °C and 80 °C. When moving or lifting the unit, always grasp the unit enclosure. Never attempt to lift, move, or carry the unit by the EV cable. Do not carry the unit by the cable hook assembly.

Improper storage or handling may cause damage to the unit.

Before you begin

⚠ WARNING ELECTRICAL

ONLY QUALIFIED PERSONNEL FAMILIAR WITH THE OPERATION AND CONSTRUCTION OF THIS EQUIPMENT SHOULD INSTALL, ADJUST, MODIFY, AND SERVICE THIS EQUIPMENT. FAILURE TO FOLLOW THE INSTRUCTIONS COULD RESULT IN SEVERE BODILY INJURY OR DEATH.

⚠ IMPORTANT

THE USER IS RESPONSIBLE FOR CONFORMING TO ALL LOCAL AND NATIONAL ELECTRICAL CODES AND STANDARDS APPLICABLE IN THE JURISDICTION IN WHICH THIS EQUIPMENT IS INSTALLED.

Table 1. Replacement Parts

| Part | Part Number |
|---|--------------|
| Connector, 25-foot cable, and strain relief kit (16 A) | EV2516CCKIT |
| Connector, 25-foot cable, and strain relief kit (16 A resi) | EV2520CCKIT |
| Connector, 25-foot cable, and strain relief kit (30 A resi) | EV2530CCKIT |
| EVSE Level 1 and Level 2 advanced cord management | EVADVCORDMGT |
| EVSE Level 1 and Level 2 basic cord management | EVBASCORDMGT |
| EVSE Level 1 and Level 2 residential polycarbonate bottoms (2 pieces) | EVCAPBB |
| EVSE Level 1 and Level 2 residential polycarbonate top | EVCAPT |
| Level 1 120 V contactor (16 A and 30 A) | EVCNTR30120 |
| Level 2 240 V contactor (16 A and 30 A) | EVCNTR30240 |
| LED light | EVLED |
| LED ON/OFF pushbutton | EVLEDPB |
| Level 1 120 V protection and control board (resi 20 MA hardwired) | EVPCB12020M |
| Level 1 120 V protection and control board (resi 5 MA cord con) | EVPCB1205M |
| Level 2 240 V protection and control board (resi 20 MA hardwired) | EVPCB24020M |
| Level 2 240 V protection and control board (resi 5 MA cord con) | EVPCB2405M |
| Pilot light: green | EVPLGREEN |
| Pilot light: red | EVPLRED |
| Receptacle (20 A single) | EVREC20 |
| User interface (residential) | EVUIB |
| LED light | MPLLEDCR |
| 20 A, 5 MA GFI cable in/out breaker | QCG1020 |

ADA standards for accessible design

It is very important to consider all standards for accessible design for Americans with disabilities when choosing the location and placement of all Electric Vehicle Supply Equipment. The following is a direct excerpt from the 2010 ADA Standards for Accessible Design (<http://www.ada.gov/regs2010/2010ADASTandards/2010ADAstandards.htm#c3>):

The Department of Justice published revised regulations for Titles II and III of the Americans with Disabilities Act of 1990 ("ADA") in the Federal Register on September 15, 2010. These regulations adopted revised, enforceable accessibility standards called the 2010 ADA Standards for Accessible Design ("2010 Standards") or ("Standards"). The 2010 Standards set minimum requirements—both scoping and technical—for newly designed and constructed or altered state and local government facilities, public accommodations, and commercial facilities to be readily accessible to and usable by individuals with disabilities. Adoption of the 2010 Standards also establishes a revised reference point for Title II entities that choose to make structural changes to existing facilities to meet their program accessibility requirements; and it establishes a similar reference for Title III entities undertaking readily achievable barrier removal. The Department has assembled this online version of the official 2010 Standards to increase its ease of use. This version includes:

2010 Standards for State and Local Government Facilities Title II and 2010 Standards for Public Accommodations and Commercial Facilities Title III.

The Department has assembled into a separate publication the revised regulation guidance that applies to the Standards. The Department included guidance in its revised ADA regulations published on September 15, 2010. This guidance provides detailed information about the Department's adoption of the 2010 Standards, including changes to the Standards, the reasoning behind those changes, and responses to public comments received on these topics. The document, Guidance on the 2010 ADA Standards for Accessible Design, can be downloaded from:

<http://www.ada.gov>

For information about the ADA, including the revised 2010 ADA regulations, please visit the Department's website: www.ADA.gov; or, for answers to specific questions, call the toll-free ADA Information line at 800-514-0301 (voice) or 800-514-0383 (TTY).

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Installation

Choosing a location

⚠ IMPORTANT

- THINGS TO CONSIDER BEFORE CHOOSING A LOCATION TO MOUNT THE UNIT:**
- 1. LOCATION OF AN AVAILABLE MOUNTING SUPPORT—THE WALLMOUNT UNIT MUST BE ANCHORED INTO A MOUNTING SUPPORT SUCH AS A 2 X 4 STUD OR A SOLID CONCRETE WALL, USING MOUNTING HARDWARE THAT IS APPROPRIATE FOR THE SURFACE ON WHICH YOU ARE MOUNTING. DO NOT MOUNT THIS UNIT DIRECTLY TO A STUCCO/DRYWALL/WALLBOARD. SEE PAGE 6.**
 - 2. LOCATION OF AN AVAILABLE ELECTRICAL SOURCE—POWER WIRES MUST BE RUN THROUGH AN APPROVED CONDUIT OR JACKET FROM THE CIRCUIT PANEL TO THE UNIT.**
 - 3. LOCATION OF THE VEHICLE'S CHARGING INLET WHILE PARKED—THE UNIT MUST BE LOCATED SO THAT ITS RESPECTIVE CABLE LENGTH IS RIGHT-SIZED TO WHERE THE VEHICLE'S INLET IS FOR PLUG-IN WITHOUT UNDUE MANEUVERING.**

Note: These installation location recommendations are based upon general-purpose parking, trying to serve the most likely plug-in vehicle drivers. For specific parking, such as at home or in a captive fleet scenario where the user knows where the vehicle's inlet will be, locate the charging station appropriately.

Each plug-in electric vehicle manufacturer has a different location for where the charging inlet is located on the vehicle.

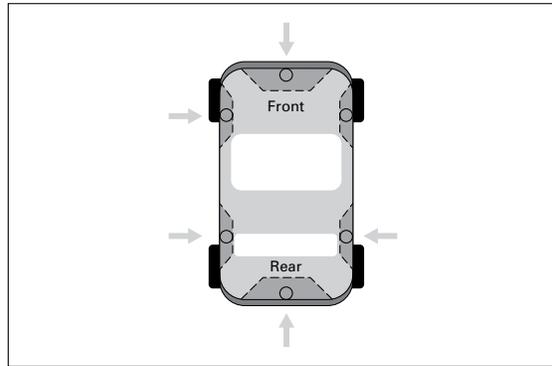


Figure 1. Vehicle Inlet Locations Differ by Manufacturer

In North America, it is recommended to install the charging station with a high focus on orienting the station toward the front and driver side of parking spaces. Suggestions for different types of parking layouts are illustrated below.

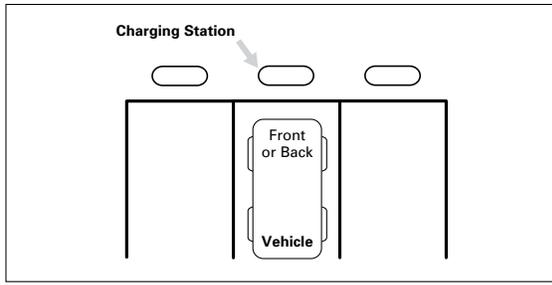


Figure 2. 90-Degree Parking

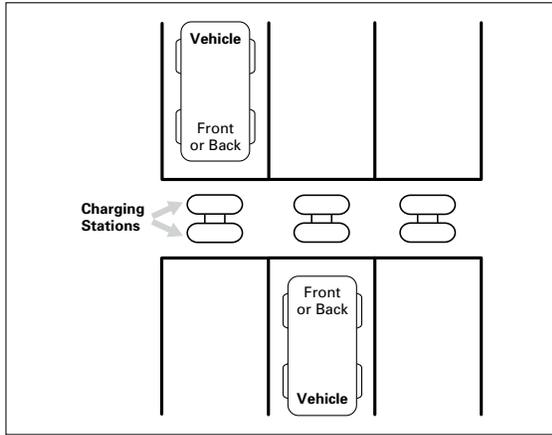


Figure 3. Back-to-Back Dual 90-Degree Parking

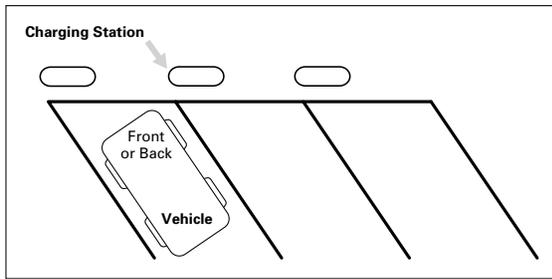


Figure 4. 45-Degree Parking

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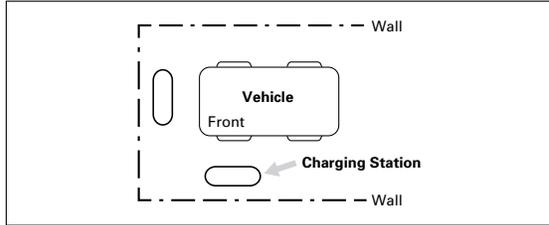


Figure 5. Parking Bay/Garage

Note: The wallmount style of charging station can come with a much longer cord, so in parking bays and garages, length of the cord is less of a problem for maintenance.

Protecting the location

For outdoor installations, creative use of protective bollards and wheel stops are necessary. Vehicles can and will damage the units if left unprotected.

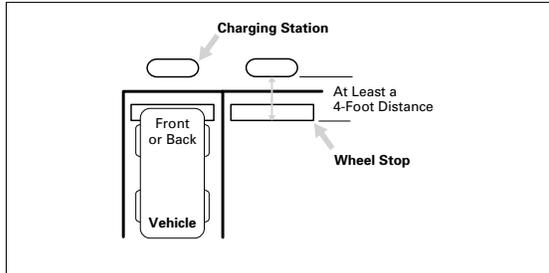


Figure 6. Protecting the Charging Station with Wheel Stops for General-Purpose Parking

Wheel stops are recommended to be installed at a minimum distance of 4 feet from the front of the charging station to the vehicle side of the wheel stop for general-purpose parking. This distance takes into account when larger vehicles, like the backing up of a pickup truck with a trailer hitch, back into such a space. For fleet customers with specific vehicles or for parking restricted to plug-in vehicles only, the wheel stop installation distance may be different.

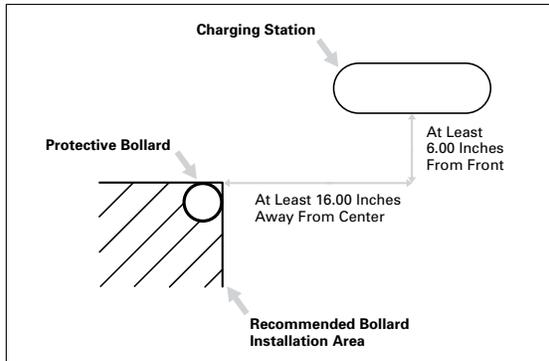


Figure 7. Protecting the Charging Station with Bollards

Protective bollards are recommended to be installed in the area defined by a distance of 16.00 inches from the front center of the charging station and 6.00 inches from the front of the unit. **See local jurisdiction requirements for actual specifications.**

Installing the electrical service

Checking the electrical requirements

The National Electrical Code®, Article 625.21, states “Overcurrent protection for feeders and branch circuits supplying electric vehicle supply equipment shall be sized for continuous duty and shall have a rating of not less than 125 percent of the maximum load of the electric vehicle supply equipment.” A load study of the location’s electrical service may be needed to determine the availability of adequate electrical service. Take the nameplate amperage rating of the charging station, and multiply by 125 percent for the minimum upstream circuit protection needed.

Check in the installed jurisdiction for any other electrical requirements.

Running the wires

Once the proper electrical overcurrent device has been installed, wire needs to be run from it to the charging station. For a typical installation, the only field wires will be for the incoming electrical service. If the EVSE unit has a remote management option, a standard CAT5/6 network cable or three-wire shielded cable typical for an RS485-type network could also need to be run to the unit.

⚠ WARNING ELECTRICAL

LOCKOUT/TAGOUT ALL ELECTRICAL SOURCE CIRCUITS FEEDING THE UNIT(S) IN THE OPEN POSITION BEFORE BEGINNING WIRING OR TERMINATIONS. FAILURE TO FOLLOW THE INSTRUCTIONS COULD RESULT IN SEVERE BODILY INJURY OR DEATH.

⚠ WARNING

THIS UNIT IS RATED FOR INDOOR OR OUTDOOR INSTALLATION. IF THIS UNIT IS MOUNTED OUTDOORS, THE HARDWARE FOR CONNECTING THE CONDUITS TO THE UNIT MUST BE RATED FOR OUTDOOR INSTALLATION AND BE INSTALLED PROPERLY TO MAINTAIN THE PROPER “RAINTIGHT” RATING ON THE UNIT.

⚠ IMPORTANT

CONFIRM WITH THE LOCAL ELECTRICAL REQUIREMENTS FOR THE GAUGE, TEMPERATURE RATING, AND TYPE OF WIRE MATERIAL USED FOR THE OVERCURRENT RATING FOUND BELOW.

⚠ IMPORTANT

THE 30 A LEVEL 2 EVSE REQUIRES A DEDICATED 208/240 VAC, 40 A UPSTREAM TWO-POLE BREAKER.

THE 16 A LEVEL 2 EVSE REQUIRES A DEDICATED 208/240 VAC, 20 A UPSTREAM TWO-POLE BREAKER.

THE 16 A LEVEL 1 EVSE REQUIRES A DEDICATED 120 VAC, 20 A UPSTREAM SINGLE-POLE BREAKER.

DO NOT USE GFCI BREAKERS. GFCI EXISTS IN EVSE.

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Table 2. EVSE Overcurrent Ratings

| Style | Overcurrent Rating | Suggested Wire Gauge | Suggested Wire Type | Suggested Wire Temp Rating |
|------------------------------|--------------------|----------------------|---------------------|----------------------------|
| Wallmount or Pedestal | | | | |
| EVSE Level 2 16 A | 20 A | 12 AWG | Copper | 75 °C |
| EVSE Level 2 30 A | 40 A | 8 AWG | Copper | 75 °C |
| EVSE Level 1 16 A | 20 A | 12 AWG | Copper | 75 °C |

EVSE wire installation

Level 2 208/240 V with LED light

- (2) Hot
- (1) Neutral
- (1) Ground

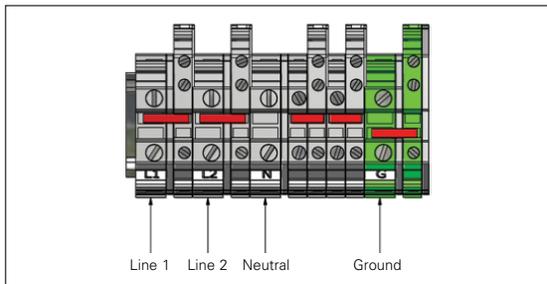


Figure 8. 208/240 V with Optional LED Light

Level 2 240 V without light

- (2) Hot
- (1) Ground

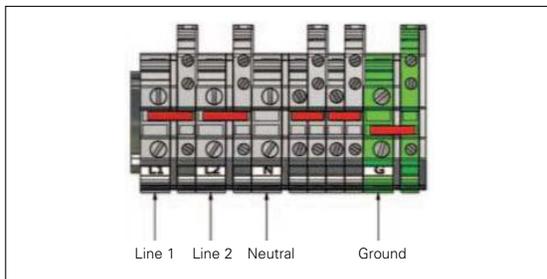


Figure 9. 208/240 V without Optional LED Light

Level 1 120 V with or without light

- (1) Hot
- (1) Neutral
- (1) Ground

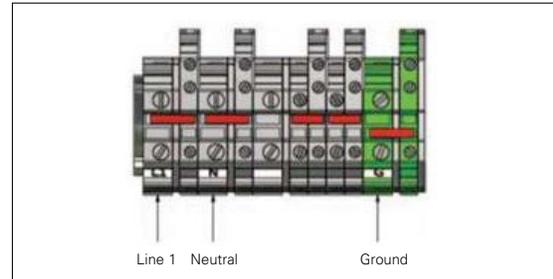


Figure 10. 120 V

Installing to the premise

There are two options available for feeding electricity to the EVSE—both methods require installing the EVSE onto a wall. One method of providing power to the EVSE is by hardwiring directly to the terminal; the other is by wiring a receptacle for the factory-installed plug from the EVSE (feed options must be configured at the time of purchase).

Mounting to a wall—plug-and-cord connected

Preparing the site

When a proper site has been chosen and the electrical service has been run to the location, you can begin installation.

CAUTION

DO NOT MOUNT UNIT TO ONLY STUCCO/DRYWALL/WALLBOARD. DO NOT USE TOGGLE BOLTS, ZIP ANCHORS, NOR PLASTIC WALL ANCHORS MEANT FOR THESE SUBSTANCES BECAUSE THEY AND THE MATERIAL DO NOT HAVE THE STRENGTH NEEDED TO SUPPORT THE UNIT. THE UNIT MUST BE MOUNTED TO A SOLID WOOD SUPPORT, CONCRETE WALL, CONCRETE BLOCK WALL, OR EQUIVALENT.

Installation of receptacle pre-wire kit

Step 1: Using the mounting plate as a template, mark the holes to be used for mounting. Make sure the mounting plate is level.

Step 2: Pre-drill mounting holes if mounting into a wood stud, or drill appropriate-sized holes into a solid wall for the type of anchor you will be using.

Step 3: Attach the mounting plate to the wall as shown in **Figure 11 on page 7**. If installing on a wood stud, use 1/4 x 3.00-inch long lag screws and washers, and ensure that the plate is mounted on the centerline of the stud. These should be galvanized or stainless steel for weather protection if mounting outdoors. If mounting onto a concrete, block, or brick wall, use an appropriate anchor for the type of wall on which you are installing the unit. Again, these should be appropriate for weather conditions if mounting outside.

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Step 4: Mount the full charging station assembly by sliding the unit onto the wall plate. Once mounted, locate the cord and create a loop in order to find location for 30 A receptacle mounting. When the mounting location is determined, remove the charging station aside. Ensure that the NEMA® 6–50R receptacle is at least 48.00 inches from the finished floor. It is strongly advised to install a lockable “while in use” cover over the receptacle (not included).

Step 5: Mount the receptacle onto the wall inside the appropriate junction box for receptacle or mount externally on the outside surface of the wall. Use **Table 3** to determine the receptacle needed for your particular charging station.

Step 6: Plug the unit into the EVSETESTB unit to ensure proper function. Follow instruction on faceplate of test unit.

Table 3. Receptacle Reference

| EVSE Type | Current | NEMA Receptacle Type Needed | Receptacle Description |
|-------------------------|---------|-----------------------------|------------------------|
| Level 2 (without light) | 16 A | 6–20R | 20 A, 250 V |
| Level 2 (without light) | 30 A | 6–50R | 30 A, 250 V |
| Level 2 (with light) | 16 A | 14–20R | 20 A, 125/250 V |
| Level 2 (with light) | 30 A | 14–50R | 30 A, 125/250 V |



Figure 11. Unit and Mounting Plate

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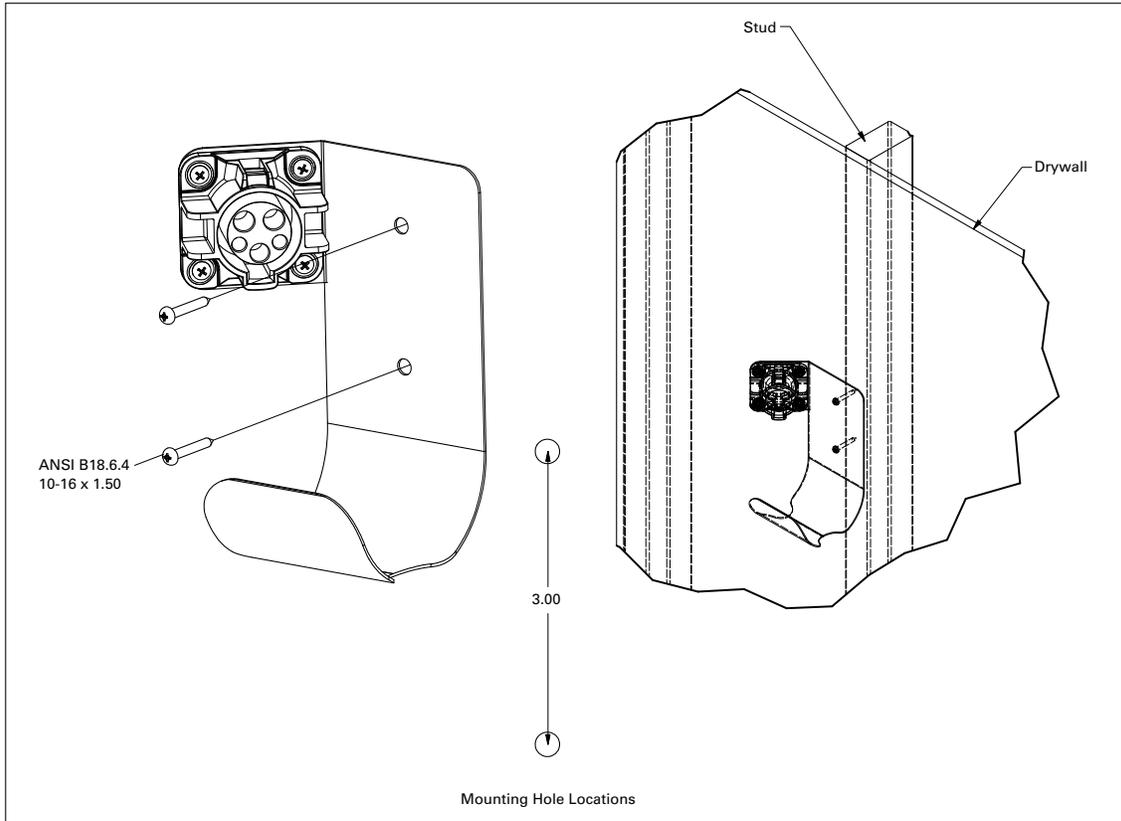


Figure 12. Advanced Cord Management

Cord management bracket installation instructions

If mounting bracket to a drywall surface:

1. Locate the center of the stud where you wish to install the bracket.
2. Using the cord management bracket as a template, precisely align the bracket along the center line of the stud and mark each of the four mounting holes.
Note: Inserting a long screw through the mounting hole and pressing firmly into the drywall will create an adequate mark.
3. Using the marks made in Step 2 above, pre-drill a 1/8-inch hole at each of the four hole locations to a depth of 5/8-inch.
4. Attach the cord management bracket to the wall using four #10 x 1-1/2-inch Phillips pan head screws.

If mounting bracket to a plywood or similar surface:

1. Determine where you wish to install the bracket.
2. Mark screw hole locations (four locations on 1.00-inch centers).
3. Using the marks made in Step 2 above, pre-drill a 1/8-inch hole at each of the four hole locations to a depth of 5/8-inch.
4. Attach the cord management bracket to the wall using four #10 x 1-1/2-inch Phillips pan head screws.

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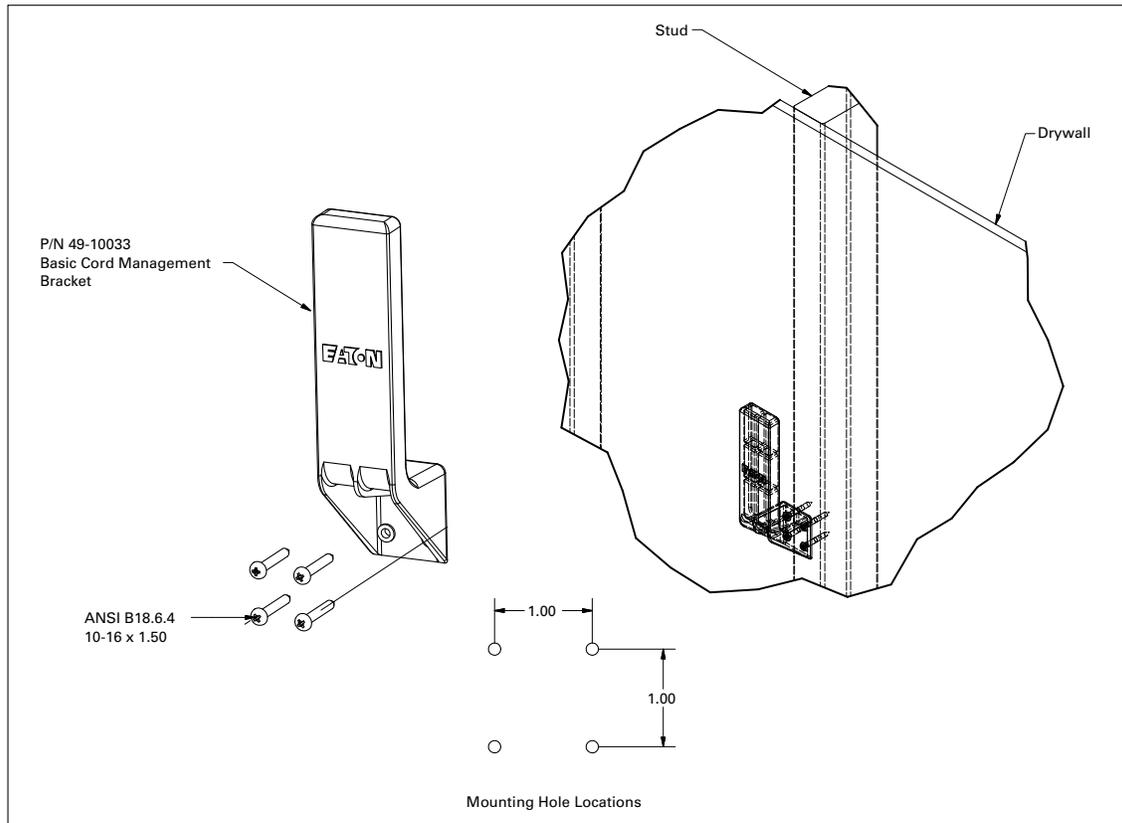


Figure 13. Basic Cord Management

Cord management bracket installation instructions

If mounting bracket to a drywall surface:

1. Locate the center of the stud where you wish to install the bracket.
2. Using the cord management bracket as a template, precisely align the bracket along the center line of the stud and mark each of the four mounting holes.

Note: Inserting a long screw through the mounting hole and pressing firmly into the drywall will create an adequate mark.

3. Using the marks made in Step 2 above, pre-drill a 1/8-inch hole at each of the four hole locations to a depth of 5/8-inch.
4. Attach the cord management bracket to the wall using four #10 x 1-1/2-inch Phillips pan head screws.

If mounting bracket to a plywood or similar surface:

1. Determine where you wish to install the bracket.
2. Mark screw hole locations (four locations on 1-inch centers).
3. Using the marks made in Step 2 above, pre-drill a 1/8-inch hole at each of the four hole locations to a depth of 5/8-inch.
4. Attach the cord management bracket to the wall using four #10 x 1-1/2-inch Phillips pan head screws.

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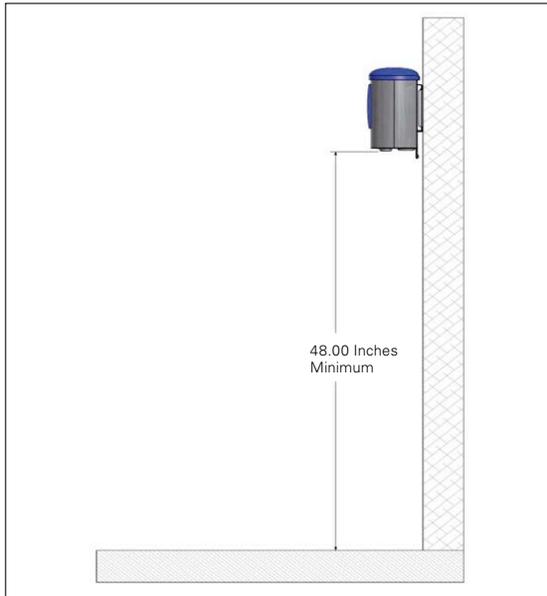


Figure 14. EVSE Recommended Wall Mounting Height

Mounting to a wall—hardwired

Once a proper site has been chosen and the electrical service has been run to the location, you can begin installation.

Step 1: Using the wallmount bracket template (not included), mark the holes to be used for mounting as well as the feeder conductor entry location. Make sure the template is level.

Step 2: Attach the wallmount bracket to the wall as shown in **Figure 15**. If installing on a wood stud, use 1/4 x 3.00-inch long lag screws and washers, and ensure that the plate is mounted on the centerline of the stud. These should be galvanized or stainless steel for weather protection if mounting outdoors. If mounting onto a concrete, block, or brick wall, use an appropriate anchor for the type of wall on which you are installing the unit. Again, these should be appropriate for weather conditions if mounting outside.

Step 3: Pull the incoming feed conductors through the wall to the appropriate location for entry through the charging station.

Step 4: Remove four #10–32 screws from the bottom of internal tray and slide stainless steel housing up to expose mounting flanges. Feed incoming conductors through bushing in internal tray, and place the charging station assembly onto the wallmount bracket over threaded studs. Secure the charging station to the wallmount bracket with #10 washers and nuts.

Step 5: Slide the EVSE housing down and secure with the #10–32 screws that were removed in Step 4.

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Mounting to a wall—hardwired, bottom conduit entry

Once a proper site has been chosen and the electrical service has been run to the location, you can begin installation.

Step 1: Mark the holes to be used for mounting. Make sure the template is level.

Step 2: Attach the wallmount bracket to the wall as shown below. If installing on a wood stud, use 1/4 x 3.00-inch long lag screws and washers, insure plate is mounted on centerline of stud. These should be galvanized or stainless steel for weather protection if mounting outdoors. If mounting onto a concrete, block, or brick wall, use an appropriate anchor for the type of wall on which you are installing the unit. Again, these should be appropriate for weather conditions if mounting outside.

Step 3: Install conduit with feeder conductors to terminate into bottom of EVSE assembly (conduit entry location noted on template).

Step 4: Remove four #10–32 screws from the bottom of internal tray and slide stainless steel housing up to expose mounting flanges. Feed incoming conductors through bushing in internal tray and place EVSE assembly onto wallmount bracket over threaded studs. Secure EVSE to wallmount bracket with #10 washers and nuts.

Step 5: Make all electrical connections as marked on supplied terminal terminal blocks.

Step 6: Slide EVSE housing down and secure with the #10–32 screws that were removed in Step 4.

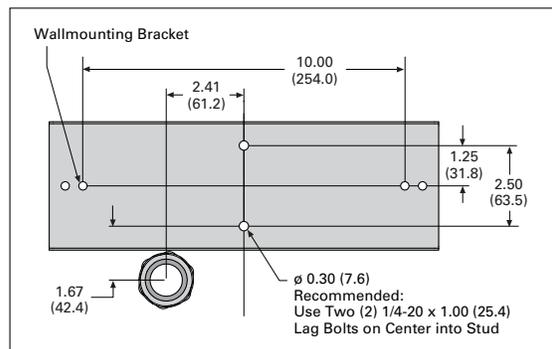


Figure 15. Wallmount Bracket Layout—Back Wire and Bottom Conduit Entry

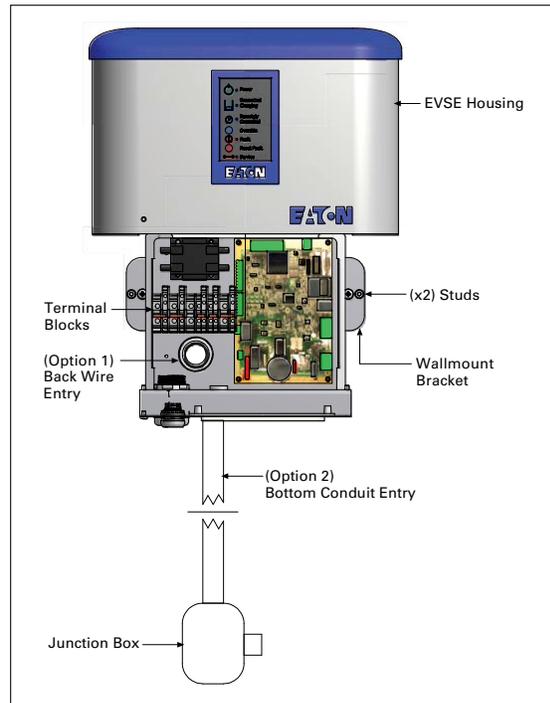


Figure 16. EVSE Housing Removed from Internal Tray

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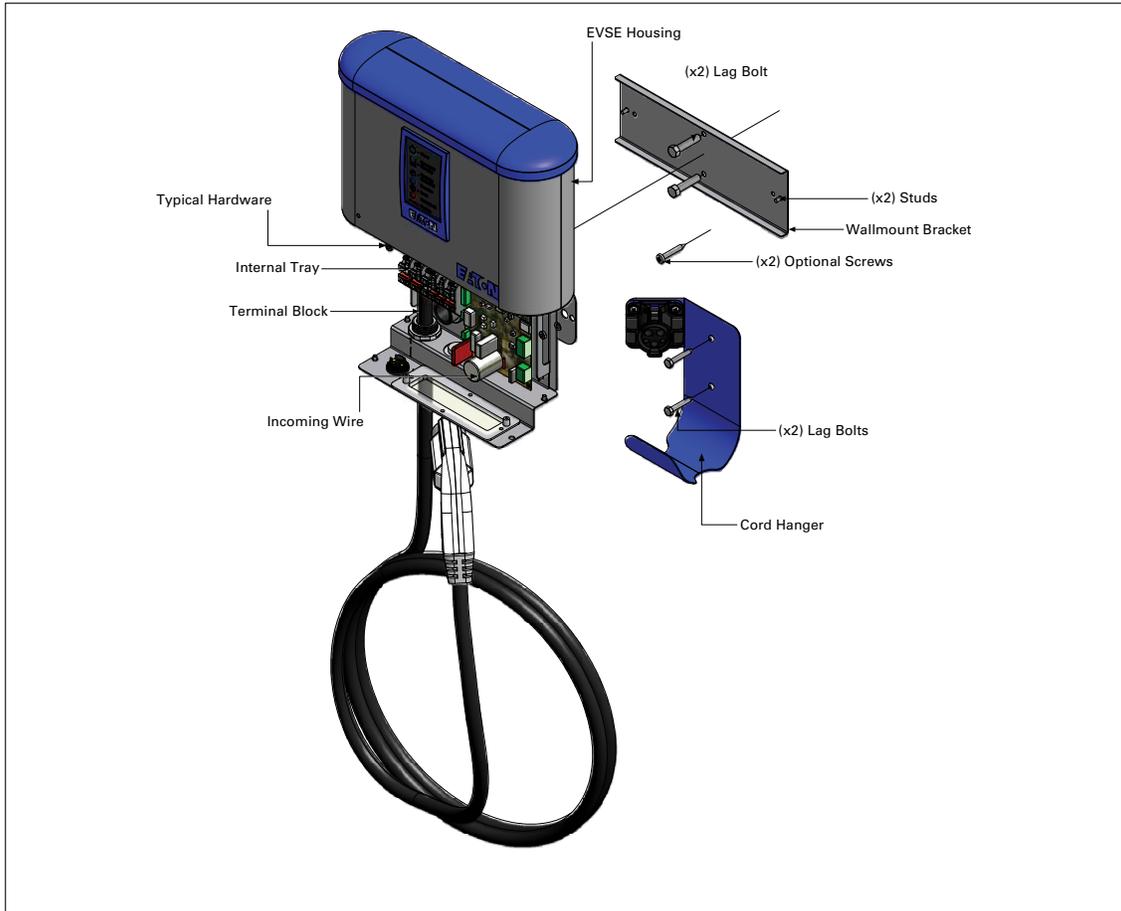


Figure 17. Hardwired Wallmount EVSE

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Pedestal installation

Once a proper site has been chosen and the electrical service has been run to the location, you can begin installation.

The EVSE pedestal ships from the factory pre-wired from the busbar to the EVSE(s).

Step 1: Using the mounting stud location diagram (pedestal base bolt pattern) in **Figure 18** as a guide, pour a concrete pad at least 24.00 inches wide x 16.00 inches deep x 10.00 inches thick with six 3/8–16.00-inch studs in locations as shown. The mounting studs shall be installed with 3/4-inch of thread above the finished concrete surface.

Note: Careful attention should be paid to the orientation of the stud locations. The vehicle side is noted on the drawing. Incoming and outgoing conduits shall be centrally located between the mounting studs.

Step 2: Remove the pedestal rear bus assembly cover from the EVSE pedestal assembly.

Step 3: Install the pedestal front cover onto the 3/8–16.00-inch studs as shown in the pedestal installation diagram in **Figure 19**, ensuring that feeder conductors are fed up through and out of the bus assembly opening. Insert a flat washer, a lock washer, and a nut onto each stud, and torque to 18 lb-ft.

Step 4: Make all electrical connections to the busbar assembly. Torque mechanical lugs to 8 lb-ft and compression-type terminal connections to 5 lb-ft.

Step 5: Replace the pedestal rear bus assembly cover and secure using four #8–32 screws.

Step 6: Install the hardware cover plates onto the base of the pedestal to cover the mounting studs. Secure the covers with two #8–32 screws each.

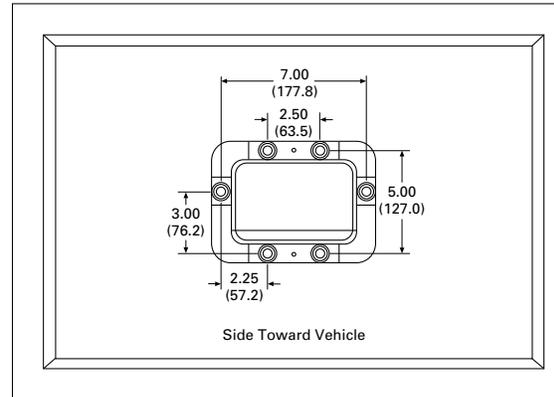


Figure 18. Pedestal Base Bolt Pattern

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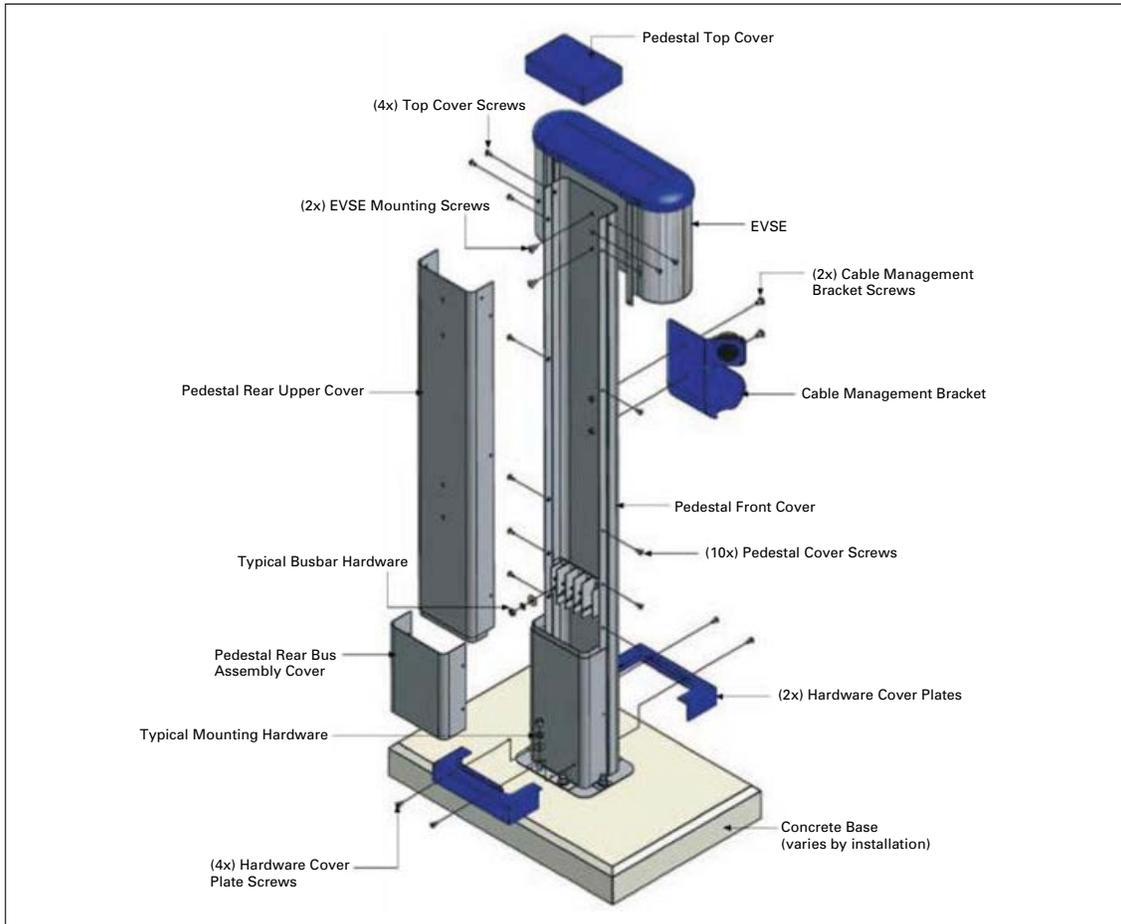


Figure 19. Single Pedestal Illustration

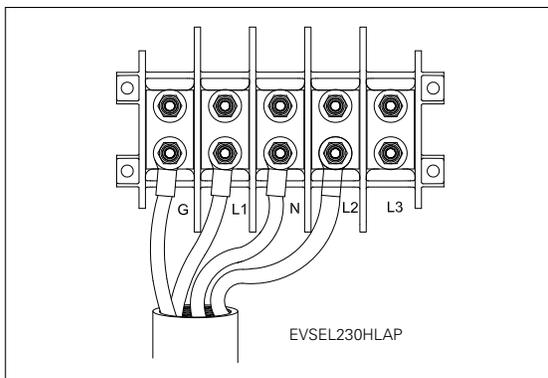


Figure 20. Level 2 Single Pedestal Terminal Block with Light

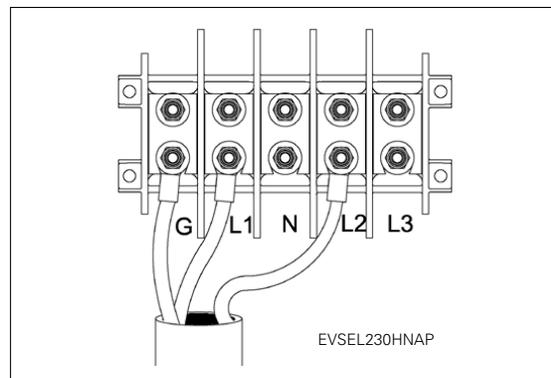


Figure 21. Level 2 Single Pedestal Terminal Block without Light

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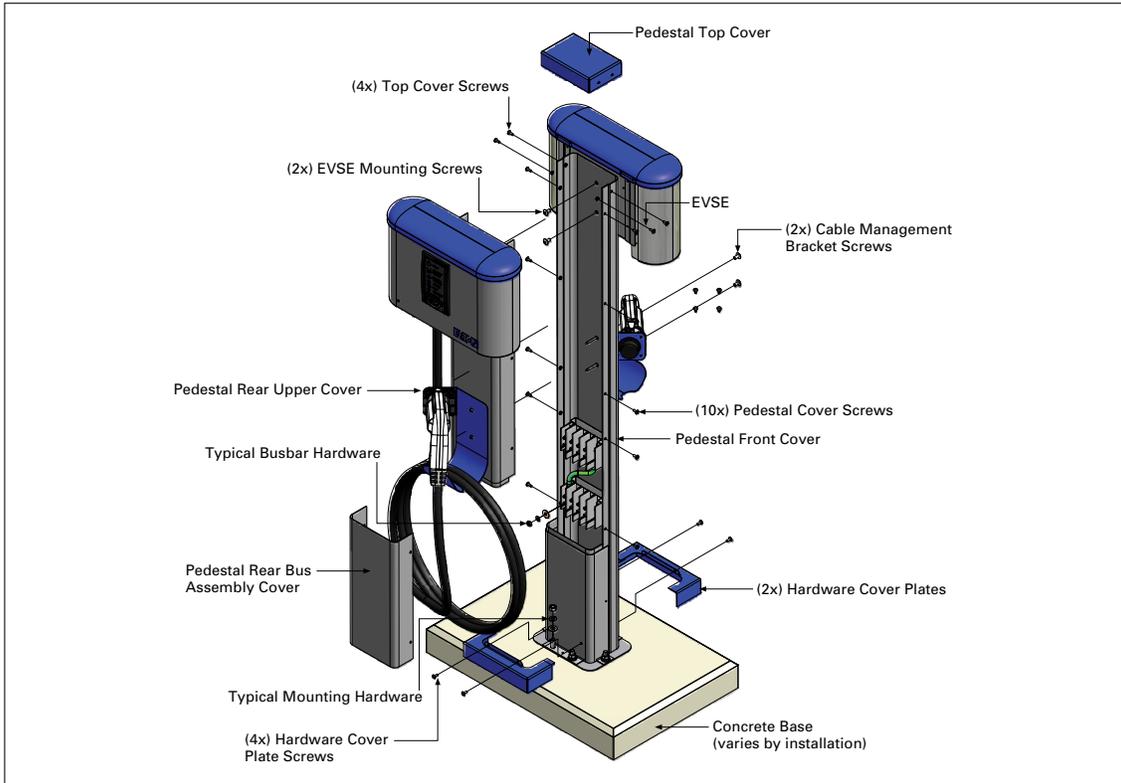


Figure 22. Dual Pedestal Illustration

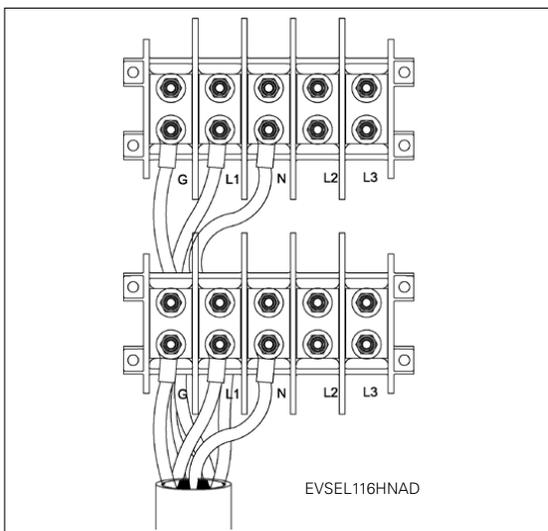


Figure 23. Level 1 Dual Pedestal Terminal Block

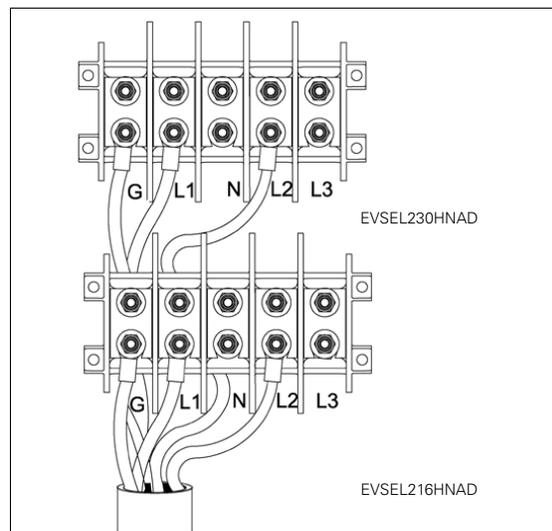


Figure 24. Level 2 Dual Pedestal Terminal Block without Light

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Termination and configuration

⚠ WARNING ELECTRICAL

LOCKOUT/TAGOUT ALL ELECTRICAL SOURCE CIRCUITS FEEDING THE UNIT(S) IN THE OPEN POSITION BEFORE BEGINNING WIRING OR TERMINATIONS. FAILURE TO FOLLOW THE INSTRUCTIONS COULD RESULT IN SEVERE BODILY INJURY OR DEATH. ONLY CERTIFIED PERSONNEL FAMILIAR WITH THE OPERATION AND CONSTRUCTION OF THIS EQUIPMENT SHOULD INSTALL, ADJUST, MODIFY, AND SERVICE THIS EQUIPMENT. FAILURE TO FOLLOW THE INSTRUCTIONS COULD RESULT IN SEVERE BODILY INJURY OR DEATH.

Wire terminations

For a typical installation, the only field wire terminations will be the incoming electrical service wires.

Electrical service wires

Terminate the incoming electrical service wires to the charging station's provided terminal block, following the designations for each wire: L1 (Line 1), L2 (Line 2), N (Neutral), and G (Ground). Care must be taken when terminating incoming conductors to ensure proper phasing and grounding. If service light is present when testing EVSE, phase change of incoming conductors should correct the service light issue.

Grounding instructions

This product must be connected to a grounded, metal, permanent wiring system, or an equipment-grounding conductor must be run with the circuit conductors and connected to the equipment grounding terminal.

Once all terminations are made, close the unit's service door, confirm that the unit is securely mounted, and turn on the feeding circuit to the unit.

Confirming installation and first use

Boot-up and first use test

Table 4. Main Icon Descriptions

| Icon | Icon Status | |
|---------------------|---|---|
| | Blink | Steady |
| Power | N/A | Unit ready for charge session |
| Connected Charging | Vehicle connected, EVSE ready, waiting on vehicle | Vehicle charging |
| Remotely Controlled | Rate of charge controlled remotely and charging set to INACTIVE | Rate if charge controlled remotely and charging set to ACTIVE |

Step 1: Ensure that the electrical service wires are landed correctly, according to this manual. Make sure that the station access door is closed.

Step 2: Power ON the distribution breaker.

Step 3: During initial EVSE boot-up, the user interface will cycle all icons.

Step 4: After boot-up, the POWER icon will be STEADY per the above table. If this is not the case, please verify that all incoming service connections are landed appropriately and that the distribution breaker is intact. If the POWER icon still does not appear, please call technical support.

Step 5: If an SAE J1772-compliant electric vehicle is available, please connect the EV connector to the vehicle inlet. You may also use an Eaton vehicle simulator.

Step 6: The CHARGING indicator will begin to blink.

Step 7: Almost immediately, the vehicle will engage a charge session (the contactor will close, and power will be supplied to the vehicle).

Step 8: When power is being supplied to the vehicle, the CHARGING indicator will move from a BLINK status to STEADY status, signifying that current is flowing to the vehicle.

Step 9: You may now remove the connector from the vehicle at your leisure.

Ground fault test

The ground fault detection feature is self-tested every time the unit starts a plug session to charge a vehicle. A user can manually test the ground fault feature at any time by pressing and holding the Reset button (right button) for seven seconds.

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(Electric Vehicle Supply Equipment)

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If the test passed successfully, the Fault light will flash once. If it detects a problem, the POWER icon will turn off, and the Services light (wrench icon) will have a medium single blink until power is cycled to the unit. See the troubleshooting section on **page 18** for more details.

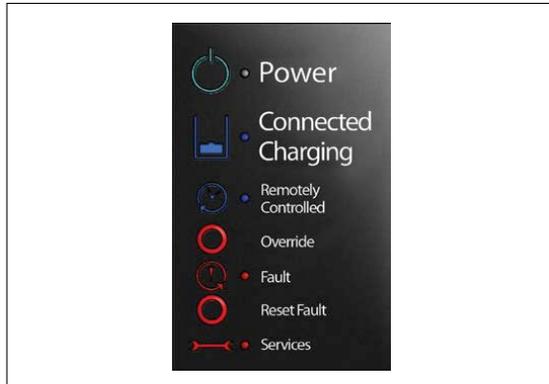


Figure 25. Full User Interface

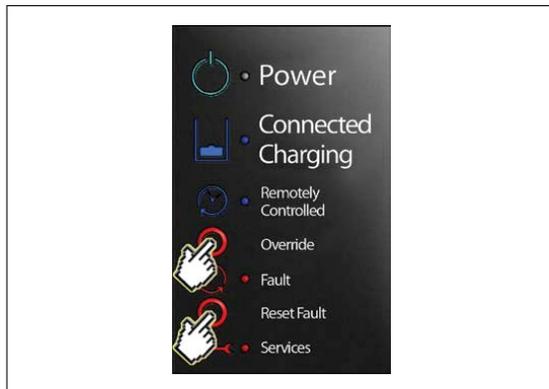


Figure 26. Ground Fault Reset

For ground fault reset, press and hold the Override button and the Reset Fault button until all operation lights flash on momentarily.

Specifications

The Eaton residential EVSE charging station is compliant with the following standards:

- Society of Automotive Engineers (SAE) J1772 2010 EV Conductive Charge Coupler and Station
- NFPA® 70 National Electrical Code, Article 625, Electric Vehicle Charging System
- UL® 2231 Personnel Protection Systems for EV Charging Circuits
- UL 2594 EV Supply Equipment (Outline of Investigation)
- UL 1998 Software in Programmable Components
- FCC compliant, Part 15

Table 5. Electrical and Mechanical Specifications

| Model Level | Eaton | |
|---|--|--|
| | L116 Level 1 | L216 and L230 Level 2 |
| Electrical Input | | |
| Input power | 1.9 kW | 7.2 kW (L230 style) 3.8 kW (L216 style) |
| Input voltage | 110/120 Vac | 208/240 Vac |
| Input (amperage) current | 16 A (L116 style) | 30A (L230 style) 16A (L216 style) |
| Breaker size (non-GFCI) on dedicated circuit | 20 A | 20 A/40 A |
| Electrical Output | | |
| Power output | 1.9 kW | 7.2 kW (L230 style) 3.8 kW (L216 style) |
| Output voltage | 110/120 Vac | 208/240 Vac |
| Output amperage | 16A (L116 style) | 30A (L230 style) 16A (L216 style) |
| Connector | SAE J1772 | SAE J1772 |
| Installation | Hardwire/cord-and-plug connected | Hardwire/cord-and-plug connected |
| Cable length (in feet) | 24 | 24 |
| Safety | ETL | ETL |
| Certifications | ETL listed to UL 2594/2231/1998 CETL listed | UL listed to UL 2594/2231/1998 CETL listed |
| Interlocked power protection | Yes | Yes |
| Ground fault protection | 20 mA (hardwired style) 5 mA (cord-and-plug connected style) | 20 mA (hardwired style) 5 mA (cord-and-plug connected style) |
| Overcurrent protection | Yes | Yes |
| Physical/Environmental Dimensions | | |
| Wallmount dimensions (in inches) H x W x D | 10.00 x 15.00 x 5.00 | 10.00 x 15.00 x 5.00 |
| Pedestal dimensions (in inches) H x W x D | 55.00 x 15.00 x 9.00 | 55.00 x 15.00 x 9.00 |
| Operating temperature | -30 °C to 50 °C | -30 °C to 50 °C |
| Enclosure | | |
| Type rating | NEMA 3R | NEMA 3R |
| Enclosure material | Stainless steel | Stainless steel |
| Status indicator | 5 LEDs: 2 bottoms | 5 LEDs: 2 bottoms |
| Weight | 23 lbs | 23 lbs |
| Operating humidity | 90% RH, noncondensing | 90% RH, noncondensing |
| Automatic reset after nuisance trip feature | Yes | Yes |
| Randomized restart on power failure (delay before charging resumes after a power failure) | Yes | Yes |
| Mechanical operations | 10,000 cycles (EV connector, replaceable) 100,000 cycles (contactor, replaceable) | 10,000 cycles (EV connector, replaceable) 100,000 cycles (contactor, replaceable) |
| LED Light | Yes | Yes |

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Table 6. Single and Dual Pedestal Information

| Description | Single | Dual |
|---|-----------------------------|-----------------------------|
| Physical/Environmental | | |
| EVSE pedestal— H x W x D (in inches) | 54.00 x 15.20 x 9.70 | 54.00 x 15.20 x 13.30 |
| Weight | | |
| EVSE-mount pedestal | 42 lbs | 65 lbs |
| Enclosure | | |
| Rating/material | NEMA 3R/ stainless steel | NEMA 3R/ stainless steel |

Troubleshooting

Many of the potential issues that a user may experience are shown in **Table 7**. Match what is happening on the interface to the pictures and then follow the corresponding instructions in the Recommendation column.

⚠ WARNING ELECTRICAL

ONLY QUALIFIED PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS EQUIPMENT AND THE HAZARDS INVOLVED SHOULD OPEN THE UNIT, WHETHER IT IS TO ADJUST AND/OR SERVICE EQUIPMENT. FAILURE TO USE A TRAINED SERVICE TECHNICIAN COULD RESULT IN BODILY INJURY OR DEATH.

Table 7. Troubleshooting Interface

| What is Happening? | Pattern | Cause | Recommendation |
|--|--|--|--|
| All indicator lights are off | N/A | No electricity to unit | Turn on circuit feeding the unit with the breaker or fuse in electrical panel |
| | | Secondary overcurrent device has detected a problem and tripped | Service technician should inspect unit and reset internal overcurrent device |
| | | User interface cable unplugged | Service technician should plug in user interface |
| | | Control board damage from overcurrent or surge | Call service technician |
| Only wrench indicator is lit | Slow ① single blink ② | Lockout error—the same temporary fault has occurred three consecutive times or a more serious fault was detected | Cycle power to the unit by turning off/on the breaker or fuse. Inspect the unit for damage to the cable, connector |
| | Medium ③ single blink ② | Ground fault detection failed self-test | Cycle power to the unit, but if continues, call a service technician |
| | Steady on | Permanent error—installation wiring. Internal contactor or control board has failed | Call a service technician. Confirm 120 V between L1 and N. Replace contactor or control board |
| Exclamation point and charging | Exclamation point—slow ① single flash ④ and charge—slow ① single flash ④ | Detected an overcurrent, currently not charging | Press Reset button (to right) —or— Wait for unit to automatically reset ⑤ |
| | Exclamation point—fast ④ double flash ④ and charge—slow ① single flash ④ | Pilot signal error from a dirty connector or damaged cable or from a dirty vehicle inlet | Unplug and try again. If continues, call a service technician to clean or replace cable/connector and/or bring the vehicle in for service. |
| | Exclamation point—steady ON and blue charge—slow ① single flash ④ | Detected a ground fault, currently not charging | Press Reset button (to right) —or— Wait for unit to automatically reset ⑤ |
| Wrench and charging is blinking | Service wrench—slow ① single flash ④ and blue charge—slow ① single flash ④ | Vehicle's pilot signal has a diode malfunction | Unplug and try again. If continues, bring the vehicle in for service. |

① "Slow" equals a duration of about 1.5 seconds.

② A Blink indicates that the light is instantly ON then OFF.

③ "Medium" equals a duration of about 1/4 of a second.

④ A Flash indicates that the light fades to ON and fades to OFF.

⑤ Automatic Reset feature must be enabled during installation—see the installation leaflet.

⑥ "Fast" equals a duration of about 1/8 of a second.



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Service manual

Opening unit

⚠ WARNING ELECTRICAL

ONLY QUALIFIED PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS EQUIPMENT AND THE HAZARDS INVOLVED SHOULD OPEN THE UNIT, WHETHER IT IS TO ADJUST AND/OR SERVICE EQUIPMENT. FAILURE TO USE A TRAINED SERVICE TECHNICIAN COULD RESULT IN BODILY INJURY OR DEATH.

To open the unit, use a snake-eye screwdriver to remove the four tamper-resistant screws at bottom of unit on either side of light lens. One Phillips head screw will need to be removed at bottom right corner of unit. This will allow you to slide the shell off of the wall bracket.



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For more information,
visit www.eaton.com/plugin,
call 1-855-ETN-EVSE (1-855-386-3873),
or call your local Eaton sales office.



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Residential Electric Vehicle Charging

Charging Stations

1.3

Charging Stations



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| Electric Vehicle Charging Station Pedestal | V15-T1-21 |

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Charging Stations

Product Description

Eaton's established excellence in both the automotive and electrical distribution/control industries have created a perfect platform for all electrical vehicle charging needs. Whether it's a residential system, a commercial endeavor or a system to support fleet electric vehicles, Eaton has the products and the depth of experience to support, install and service electric vehicle chargers.

Features

- Eaton has been managing power systems (electrical, fluid, and air) for over 100 years
- Eaton is a Tier 1 Automotive Supplier. This connectivity with the major automotives enables Eaton to be on the forefront of emerging vehicle technologies
- Turnkey installation solutions through Eaton Engineering Services (EES) and Eaton Certified Contractor Network (ECCN) throughout the United States and Canada
- Eaton is the only provider of a full family of electric vehicle charging products
- Eaton provides a one stop solution for all your electrical distribution needs
- Restricted accessibility options such as credit card and radio frequency identification (RFID)

1.3 Residential Electric Vehicle Charging

Charging Stations

1 Product Overview

Vehicle Chargers



| Description | Level 1 Universal Receptacle | Level 1 Charging Station | Level 2 Charging Station | Electric Vehicle Simulator |
|-----------------------------|--|---|--|----------------------------|
| Input voltage | 110/120 Vac | 110/120 Vac | 208/240 Vac | — |
| Input amperage | 20A, 40A or 80A (1–4 vehicles) | 16A | 16A or 30A | — |
| Max power | Up to 1.9W at 16A per connection | 1.9 kW (L116 style) | 3.8 kW (L216 style) 7.2 kW (L230 style) | — |
| Mount | Pedestal/bollard | Wallmount or pedestal | Wallmount or pedestal | — |
| Safety specifications | UL 2594 for EV use cUL 2594 for EV use | ETL Listed to UL 2594/2231/1998 cETL Listed | ETL Listed to UL 2594/2231/1998 cETL Listed | — |
| Enclosure | NEMA 3R stainless steel | NEMA 3R stainless steel | NEMA 3R stainless steel | — |
| Quick and easy installation | Yes | Yes | Yes | — |
| Ground fault protection | Yes | Yes | Yes | — |
| Overcurrent protection | Yes | Yes | Yes | — |
| Features | 1-4 multi-vehicle support Integrated high-efficiency LED lighting Build-to-order customization available | SAE J1772™ compliant Permanent or cord-and-plug wallmount Quick and easy installation Build-to-order customization available | SAE J1772 compliant Permanent or cord-and-plug wallmount Quick and easy installation Build-to-order customization available | — |
| Options | Utility grade, sub-metering, access control | High-efficiency, LED site-lighting, sub-metering | High-efficiency, LED site-lighting, sub-metering | — |
| Applications/markets | Single and multi-family homes, parking garages, university campuses, truck stops, restaurants, airports, municipalities, shopping centers, corporate offices, hotels | Single and multi-family homes, real estate developers, builders, military bases, government city centers, schools, small offices | Single and multi-family homes, real estate developers, builders, government city centers, schools, small offices | — |
| Charge time | | | | — |

Residential Electric Vehicle Charging

Level 1 Universal Receptacle

1.3

Level 1 Universal Receptacle



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| Electric Vehicle Simulator | V15-T1-19 |
| Electric Vehicle Charging Station Pedestal | V15-T1-21 |

Level 1 Universal Receptacle

Product Description

Eaton's 120 Vac Level 1 Universal Receptacle Charging Station provides a safe, reliable means for charging up to four vehicles at a time. It is the perfect solution for buildings that require multiple-vehicle charging, such as apartments and offices.

This innovative charging station provides a universal receptacle for up to four EVs. It's perfect for charging electric cars, e-bikes, NEVs, electric service vehicles and golf carts, simultaneously. For applications that require more than four vehicles to be charged, Eaton's Level 1 Universal Receptacle Charging Stations can be connected in a series with optional utility-grade sub-metering.

Features

- Perfect for charging electric vehicles (with their respective cordsets), e-bikes, NEVs, electric service vehicles, and golf carts
- 110/120 Vac
- 20, 40, and 80A units available
- Charge up to four vehicles
- Pedestal and bollard styles available
- Locking provision to prevent cordset theft
- Support hook to prevent unintentional unplugging with heavier EV cordsets

- Charging stations can be connected in series
- NEMA 5-20 T-slot receptacles
- Rugged stainless steel construction
- Indoor/outdoor rated
- Optional LED lighting available
- Optional utility grade sub-metering
- Customization available

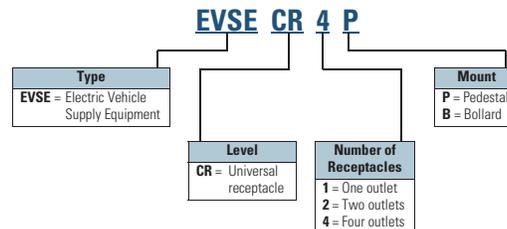
Standards and Certifications

- NEC 625 compliant
- UL Listed to UL 2594 for EV use



Catalog Number Selection

Level 1 Universal Receptacle



1.3 Residential Electric Vehicle Charging

Level 1 Universal Receptacle

1

Product Selection

Level 1 Universal Receptacle



Level 1 Universal Receptacle

| Description | |
|-----------------------------|--|
| Input voltage | 110/120 Vac |
| Input amperage | 20A, 40A or 80A (1-4 vehicles) |
| Max power | Up to 1.9W at 16A per connection |
| Mount | Pedestal/bollard |
| Safety specifications | UL 2594 for EV use cUL 2594 for EV use |
| Enclosure | NEMA 3R stainless steel |
| Quick and easy installation | Yes |
| Ground fault protection | Yes |
| Overcurrent protection | Yes |
| Features | 1-4 multi-vehicle support Integrated high-efficiency LED lighting Build-to-order customization available |
| Options | Utility grade, sub-metering, access control |
| Applications/markets | Single and multi-family homes, parking garages, university campuses, truck stops, restaurants, airports, municipalities, shopping centers, corporate offices, hotels |
| Charge time | |

Technical Data and Specifications

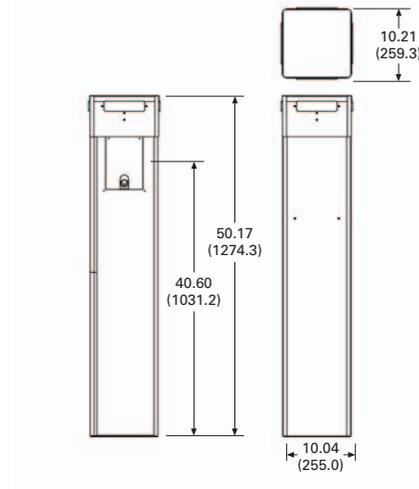
Level 1 Universal Receptacle

| Description | Specification |
|-------------------------------|---|
| Electrical Input | |
| Voltage | 110/120 Vac |
| Amperage | 20A, 40A, 80A (pedestal for 1-4 vehicles) |
| Electrical Output | |
| Power | Up to 1.9 kW at 16A per connection |
| Connection | 1-4 NEMA 5-20T receptacles (pedestal mount) |
| Physical/Environmental | |
| Weight | 50 lbs |
| Operating temperature | -30° to 50°C |
| Enclosure rating | NEMA Type 3R |
| Safety | |
| Listed to UL 2594 for EV use | ✓ |
| Listed to cUL for EV use | ✓ |
| Ground fault protection | ✓ |
| Overcurrent protection | ✓ |

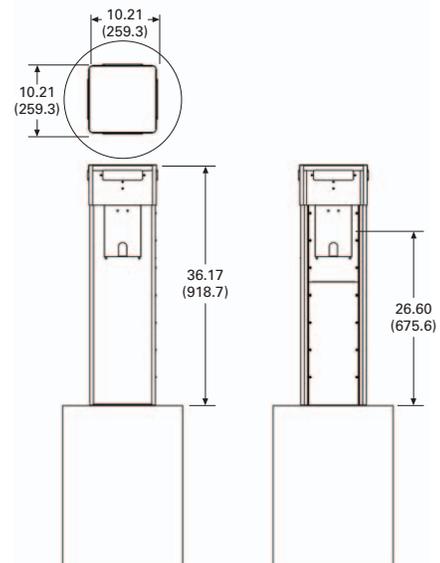
Dimensions

Approximate Dimensions in Inches (mm)

Pedestal



Bollard



Residential Electric Vehicle Charging

Level 1 Charging Station

1.3

Level 1 Charging Station



Level 1 Charging Station

Product Description

Eaton offers a full family of reliable, responsible electric vehicle (EV) chargers for residential applications. Our established excellence in the automotive and electrical distribution and control industries allows us to provide a wide range of innovative EV charging solutions to suit your individual needs. In addition, the Eaton Certified Contractor Network (ECCN) can provide turnkey services, from design to installation.

This 120 Vac charging station provides an economical and versatile EV charging solution.

Features

- Provides an economical and versatile solution for charging electric vehicles
- 110/120 Vac
- 16A units available
- Wallmount and pedestal styles
- Quick and easy installation
- Rugged stainless steel construction
- Indoor/outdoor rated
- Auto-reset feature
- Hardwire connected
- Optional advanced cord management to protect SAE J1772 connector
- Standard 24 foot cord
- Optional LED lighting available
- Optional utility grade sub-metering
- Customization available

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Intuitive User Interface



Optional LED Lighting



Standards and Certifications

- SAE J1772 compliant connector
- ETL listed to UL 2594/2231/1998

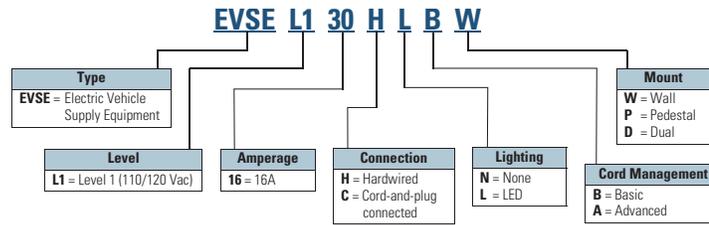


1.3 Residential Electric Vehicle Charging

Level 1 Charging Station

1 Catalog Number Selection

Level 1 Charging Station



Product Selection

Level 1 Charging Station



Level 1 Charging Station

| Description | |
|-----------------------------|--|
| Input voltage | 110/120 Vac |
| Input amperage | 16A |
| Max power | 1.9 kW (L116 style) |
| Mount | Wallmount or pedestal |
| Safety specifications | UL 2594 for EV Use cUL 2594 for EV Use |
| Enclosure | NEMA 3R stainless steel |
| Quick and easy installation | Yes |
| Ground fault protection | Yes |
| Overcurrent protection | Yes |
| Features | SAE J1772 compliant Permanent or cord-and-plug wallmount Quick and easy installation Build-to-order customization available |
| Options | High-efficiency, LED site-lighting, sub-metering |
| Applications/markets | Single and multi-family homes, real estate developers, builders, military bases, government city centers, schools, small offices |
| Charge time | |

Technical Data and Specifications

Level 1 Charging Station

| Description | Specification |
|---------------------------------|---|
| Electrical Input | |
| Voltage | 110/120 Vac |
| Amperage | 16A (L116 Style) |
| Connection | Hardwired connected |
| Electrical Output | |
| Power | 1.9 kW (L116 Style) |
| Connector | SAE J1772 |
| Cable length | 24 feet |
| Physical/Environmental | |
| Weight | 23 lbs |
| Operating temperature | -30° to 50°C |
| Status indicators | 5 LEDs: "Power/Ready", "Connected/Charging", "Remotely Controlled", "Fault" and "Service" |
| Push buttons | Two buttons: "Override" and "Reset Fault" |
| Enclosure rating | NEMA Type 3R—stainless steel |
| Safety | |
| ETL Listed to UL 2594/2231/1998 | ✓ |
| cETL Listed | ✓ |
| Interlocked power protection | ✓ |
| Ground fault protection | ✓ |
| Overcurrent protection | ✓ |

Residential Electric Vehicle Charging

Level 1 Charging Station

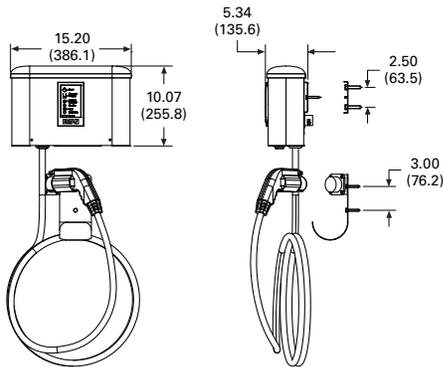
1.3

1

Dimensions

Approximate Dimensions in Inches (mm)
(Advanced cord management)

Level 1 Charging Station



1.3 Residential Electric Vehicle Charging

Level 2 Charging Station

1

Level 2 Charging Station



Level 2 Charging Station

Product Description

Using an industry standard J1772 30A or 70A connector, the Level 2 charging station will easily fill a depleted all-electric vehicle battery in three to four hours while the owner is working, shopping or sleeping. The Level 2 charging station is ideal for residential or commercial EV charging applications.

Features

- Charge electric vehicles up to 5 times faster than with a vehicle's cordset
- 208/240 Vac
- 16 and 30A units available
- Wallmount and pedestal styles
- Quick and easy installation
- Rugged stainless steel construction
- Indoor/outdoor rated
- Auto-reset feature
- Hardwire connected
- Optional advanced cord management to protect SAE J1772 connector
- Standard 24 foot cord
- Optional LED lighting available
- Optional utility grade sub-metering
- Customization available

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| Electric Vehicle Charging Station Pedestal | V15-T1-21 |

Intuitive User Interface



Optional LED Lighting



Standards and Certifications

- SAE J1772 compliant connector
- ETL listed to UL 2594/2231/1998



Residential Electric Vehicle Charging

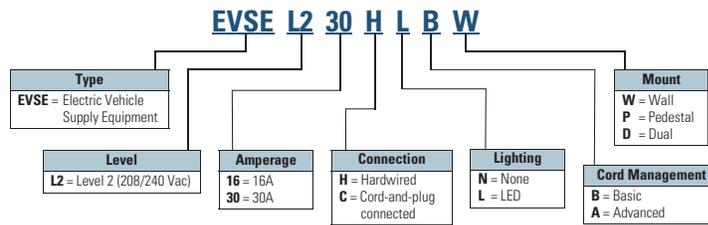
Level 2 Charging Station

1.3

Catalog Number Selection

1

Level 2 Charging Station



Product Selection

Level 2 Charging Station



Level 2 Charging Station

| Description | Specification |
|-----------------------------|--|
| Input voltage | 208/240 Vac |
| Input amperage | 16A or 30A |
| Max power | 3.8 kW (L216 style) 7.2 kW (L230 style) |
| Mount | Wallmount or pedestal |
| Safety specifications | ETL Listed to UL 2594/2231/1998 cETL Listed |
| Enclosure | NEMA 3R stainless steel |
| Quick and easy installation | Yes |
| Ground fault protection | Yes |
| Overcurrent protection | Yes |
| Features | SAE J1772 compliant Permanent or cord-and-plug wallmount Quick and easy installation Build-to-order customization available |
| Options | High-efficiency, LED site-lighting, sub-metering |
| Applications/markets | Single and multi-family homes, real estate developers, builders, government city centers, schools, small offices |
| Charge time | |

Technical Data and Specifications

Level 2 Charging Station

| Description | Specification |
|---------------------------------|--|
| Electrical Input | |
| Voltage | 208/240 Vac |
| Amperage | 16A (L116 Style) 30A (L230 Style) |
| Connection | Hardwired connected |
| Electrical Output | |
| Power | 3.8 kW (L216 Style) 7.2 kW (L230 Style) |
| Connector | SAE J1772 |
| Cable length | 24 feet |
| Physical/Environmental | |
| Weight | 23 lbs |
| Operating temperature | -30° to 50°C |
| Status indicators | 5 LEDs: "Power/Ready", "Connected/Charging", "Remotely Controlled", "Fault" and "Service" |
| Push buttons | Two buttons: "Override" and "Reset Fault" |
| Enclosure rating | NEMA Type 3R—stainless steel |
| Safety | |
| ETL Listed to UL 2594/2231/1998 | ✓ |
| cETL Listed | ✓ |
| Interlocked power protection | ✓ |
| Ground fault protection | ✓ |
| Overcurrent protection | ✓ |

1.3 Residential Electric Vehicle Charging

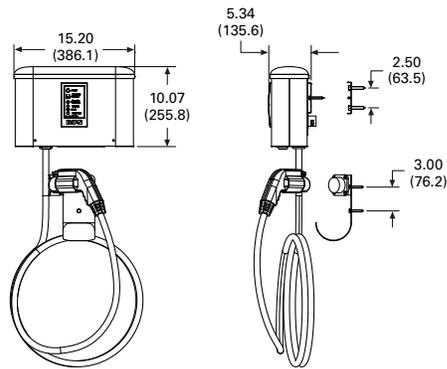
Level 2 Charging Station

1

Dimensions

Approximate Dimensions in Inches (mm)
(Advanced cord management)

Level 2 Charging Station



Residential Electric Vehicle Charging

Electric Vehicle Simulator

1.3

Electric Vehicle Simulator



Electric Vehicle Simulator

Product Description

To ensure correct installation of Electric Vehicle Chargers, Eaton introduces the EVSE Electric Vehicle Simulator. Eaton's EV Simulator allows installers to immediately test the functionality of the EVSE on-site during installation.

Features

- Confirm proper operation of any J1772 compliant EVSE without the need of an actual electric vehicle
- Rugged case is perfect for service personnel
- Easy-to-follow testing instructions printed on unit
- Ready to charge
- Ground fault simulation
- Charging indicator
- Pilot signal test points for oscilloscopes

Easy to Follow Test Instructions



Contents

Description

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| Level 1 Universal Receptacle | V15-T1-11 |
| Level 1 Charging Station | V15-T1-13 |
| Level 2 Charging Station | V15-T1-16 |
| Electric Vehicle Simulator | |
| Catalog Number Selection | V15-T1-20 |
| Technical Data and Specifications | V15-T1-20 |
| Dimensions | V15-T1-20 |
| Electric Vehicle Charging Station Pedestal | V15-T1-21 |

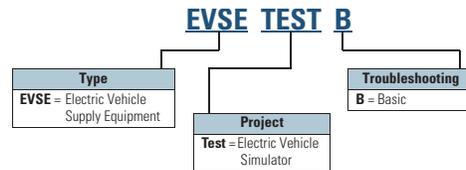
1.3 Residential Electric Vehicle Charging

Electric Vehicle Simulator

1

Catalog Number Selection

Electric Vehicle Simulator



Technical Data and Specifications

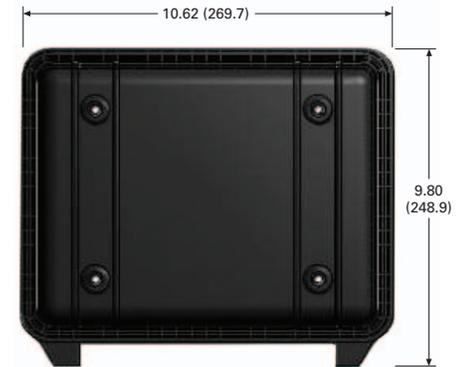
Electric Vehicle Simulator

| Description | Specification |
|--|---------------------------------|
| Electrical Input | |
| Voltage | 120/208/240 Vac |
| Connection | J1772 inlet |
| Physical/Environmental | |
| Operating temperature | -30° to 50°C |
| Status indicator | One light: "Charging" |
| Push buttons | One button: "Ground Fault" |
| Switch | One switch: "Ready/Not Ready" |
| Test points (banana jack receptacles) | Pilot (1 kHz PWM signal) ground |
| Tests EVSE Safety and Functionality | |
| EVSE ability to charge vehicle | ✓ |
| Confirm interlocked power | ✓ |
| Confirm ground fault detection | ✓ |
| J1772 "handshake" compatibility | ✓ |

Dimensions

Approximate Dimensions in Inches (mm)

Electric Vehicle Simulator



Residential Electric Vehicle Charging

Electric Vehicle Charging Station Pedestal

1.3

Electric Vehicle Charging Station Pedestal



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| Dimensions | V15-T1-22 |

Electric Vehicle Charging Station Pedestal

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.

Features

- EV Charging Pedestals ship with EV Chargers mounted and pre-wired
- Single or dual EVSE pedestal options
- Available with Eaton Level 1 and Level 2 charging stations
- Quick and easy installation
- Rugged stainless steel construction
- Indoor/outdoor rated
- Standard 24 foot cord
- Optional utility-grade sub-metering
- Greater flexibility for external installations
- Dual EVSE pedestal option allows for multiple vehicle charging
- Customization available

Pedestal Wiring



Standards and Certifications

- UL 1773/50/50E



1.3 Residential Electric Vehicle Charging

Electric Vehicle Charging Station Pedestal

1

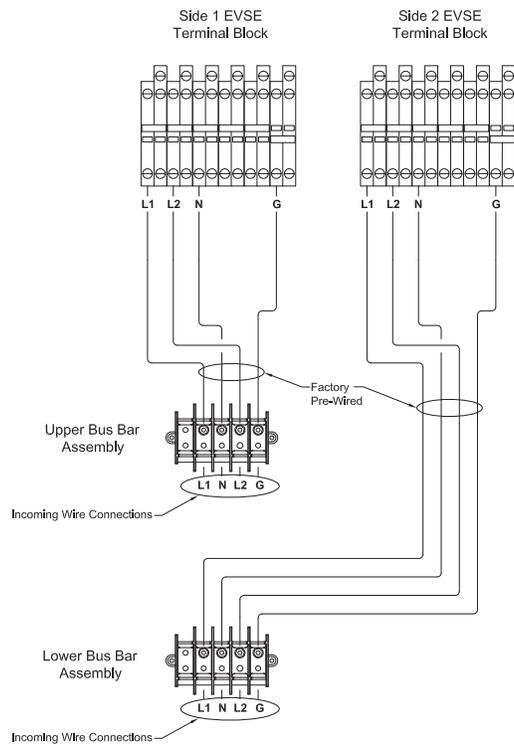
Technical Data and Specifications

Electric Vehicle Charging Station Pedestal

| Description | Specification |
|----------------------------|-------------------------|
| Weight (lbs) | |
| Single EVSE—mount pedestal | 42 lbs |
| Dual EVSE—mount pedestal | 65 lbs |
| Enclosure | |
| Rating/material | NEMA 3R—stainless steel |

Wiring Diagram

Electric Vehicle Charging Station Pedestal

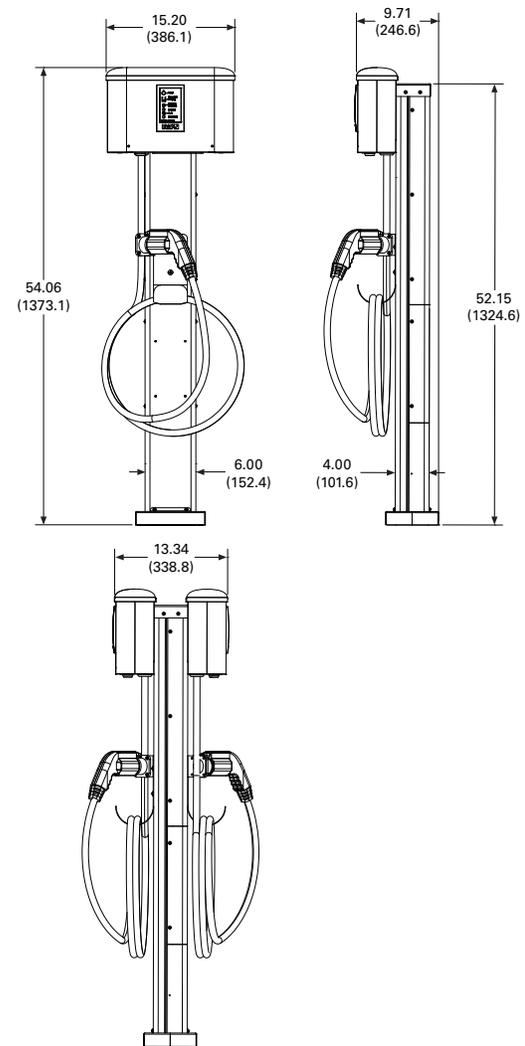


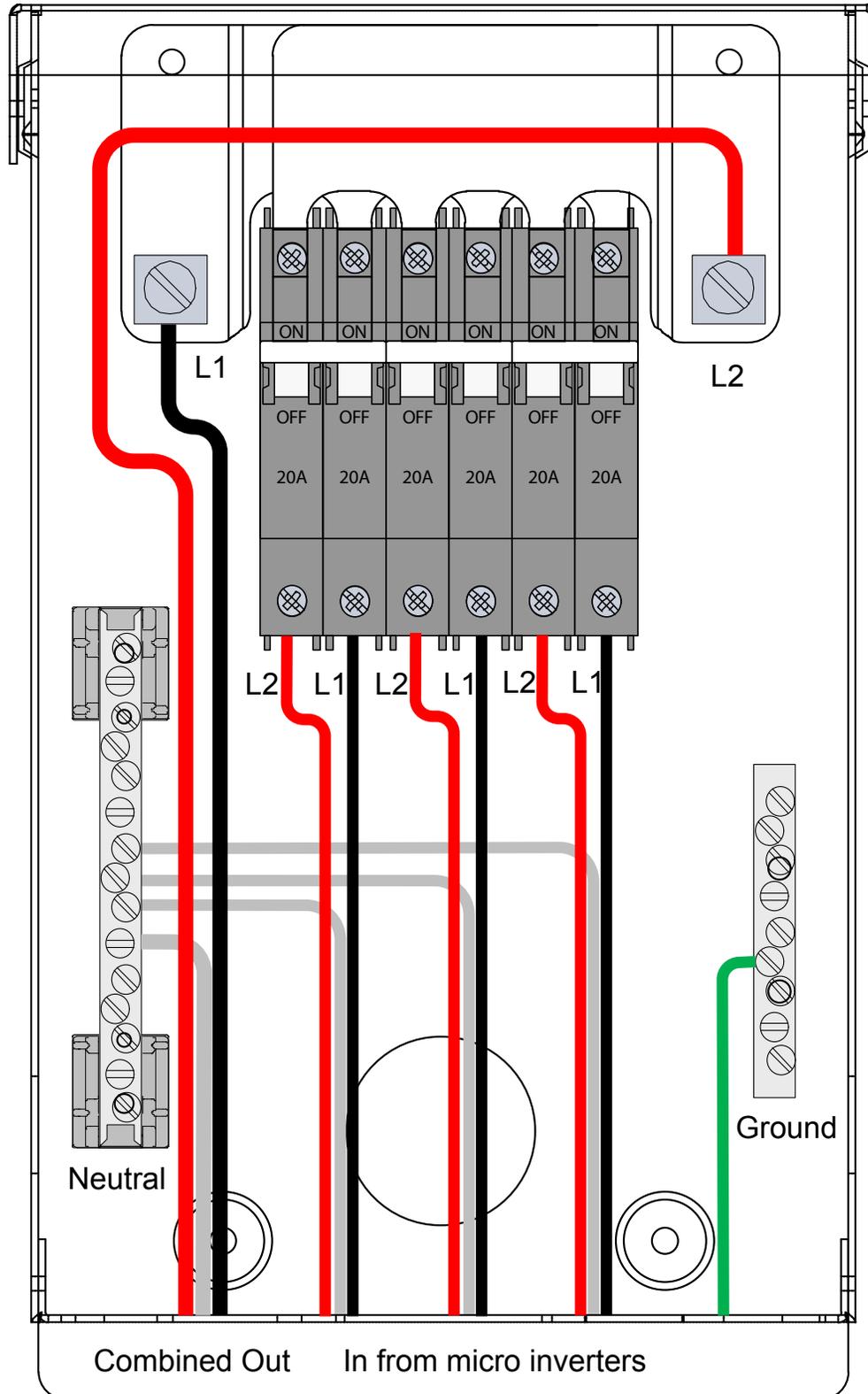
Dimensions

Approximate Dimensions in Inches (mm)

Electric Vehicle Charging Station Pedestal

| Description | |
|--------------------------------|--|
| Single EVSE pedestal—H x W x D | 54.06 (1373.1) x 15.20 (386.1) x 9.70 (246.4) |
| Dual EVSE pedestal—H x W x D | 54.06 (1373.1) x 15.20 (386.1) x 13.30 (337.8) |







MNPV6 Disco / MNPV6 -250 MNPV6-AC Disco Installation



MNPV6 Disco
Shown with optional circuit breakers

The MNPV6 Disco combiner is rated for outdoor use. Designed for combining PV strings up to 150VDC, 120 amps total output with the MNPV6 Disco or 300 VDC, 120 amps total output with the MNPV6-250 Disco, or 240 VAC, 120 Amps per phase with the MNPV6-AC Disco.

Applications:

- PV combiner up to six strings using MNEPV 150 VDC breakers with the MNPV6 Disco
- PV combiner up to three strings using MNEPV 300 VDC breakers with the MNPV6-250 Disco
- AC Combiner for up to three strings for use with micro inverters using MNEAC 240 VAC Breakers
- DC load center using MNPV breakers

Features:

- Convenient disconnect handle
- All aluminum powder coated housing that won't rust
- Flip up cover that can stay in the open position during installation
- PV Negative bus bar with 14 useable openings (10 #14-6 and 4#1/0-14)
- Chassis ground bus bar with 14 useable openings (10 #14-6 and 4#1/0-14)
- Standard din rail to mount up to 6, 150V or 3, 300 Volt breakers
- 120 Amp tin plated copper bus bar to combine breaker outputs - bus bar may be split in two
- Dead front cover snaps into place after wiring is complete for safety
- Knockouts for PV in and PV out on bottom and sides
- Top surface is available to bring conduit in from directly above the enclosure

MidNite Solar inc
17722 – 67th Ave Ne
Arlington, Wa 98223 USA

360-403-7207 Voice
360-691-6862 Fax



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MNPV6 Disco / -250 / AC Disco Installation Instructions Cont.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS - These instructions contain important safety and operating instructions for the MidNite Solar MNPV6 Disco and MNPV6-250 Disco solar combiner boxes.

If you do not fully understand any of the concepts, terminology, or hazards outlined in these instructions, please refer installation to a qualified dealer, electrician or installer. These instructions are not meant to be a complete explanation of a renewable energy system.

GENERAL PRECAUTIONS

WORKING WITH OR IN THE VICINITY OF A LEAD ACID BATTERY, SEALED OR VENTED IS DANGEROUS. VENTED BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL OPERATION. FOR THIS REASON, IT IS VERY IMPORTANT THAT BEFORE SERVICING EQUIPMENT IN THE VICINITY OF LEAD-ACID BATTERIES YOU REVIEW AND FOLLOW THESE INSTRUCTIONS CAREFULLY.

If service or repair should become necessary, contact MidNite Solar Inc. Improper servicing may result in a risk of shock, fire or explosion. To reduce these risks, disconnect all wiring before attempting any maintenance or cleaning. Turning off the inverter will not reduce these risks. Solar modules produce power when exposed to light. When it is not possible to disconnect the power coming from the Photovoltaics by an external means such as a combiner, cover the modules with an opaque material before servicing any connected equipment.

Never attempt to charge a frozen battery.

When it is necessary to remove a battery, make sure that the battery bank disconnect breaker is in the off position and that the PV breakers, grid breakers and any other sources of power to the inverter are in the off position. Then remove the negative terminal from the battery first.

To reduce risk of battery explosion follow these instructions and those published by the battery manufacturer as well as the manufacturer of any additional equipment used in the vicinity of the batteries. Before installing the battery enclosure, read all instructions and cautionary markings in or on any connected electrical equipment.

Avoid producing sparks in the vicinity of the batteries when using vented batteries. Provide ventilation to clear the area of explosive gases. Sealed AGM and Gel batteries do not under normal conditions create explosive gases. Be especially cautious when using metal tools. Dropping a metal tool onto batteries can short circuit them. The resulting spark can lead to personal injury or damage to the equipment. Provide ventilation to outdoors from the battery compartment when installing vented batteries such as golf cart T-105 batteries. The addition of a spill tray is also a good idea.

Clean all battery terminals. Very high currents are drawn from the batteries; even a small amount of electrical resistance can result in overheating, poor performance, premature failure or even fire.

Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing or eyes. Wear complete eye and clothing protection. Always avoid touching eyes while working near batteries. If battery acid or battery terminal corrosion contacts skin or clothing, wash immediately with soap and water. If acid enters the eyes, immediately flood with cool running water for at least 15 minutes and get medical attention immediately. Baking soda neutralizes battery acid electrolyte. Keep a supply near the batteries.

Do not work alone. Someone should be in the range of your voice or close enough to come to your aid when you work with or near electrical equipment.

Remove rings, bracelets, necklaces, watches etc. when working with batteries, photovoltaic modules or other electrical equipment. Power from an illuminated photovoltaic array makes a very effective arc welder with dire consequences if one of the welded pieces is on your person.

To reduce the risk of injury, connect only deep cycle lead acid type rechargeable batteries. Other types of batteries may leak or burst, causing personal injury or damage.

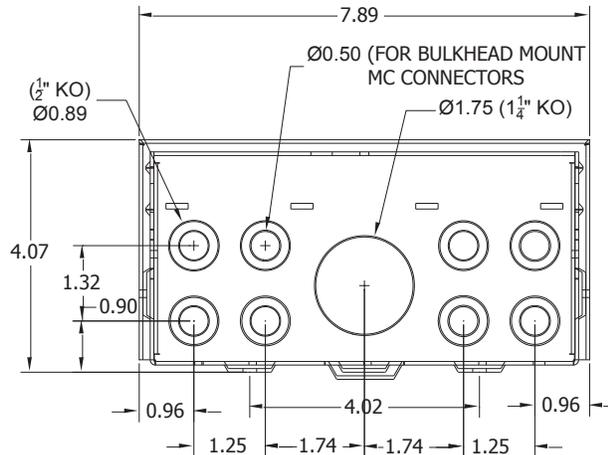
MNPV6 Disco / -250 / AC Disco Installation Instructions Cont.

Installation

The installation of a PV combiner is fairly straight forward. Select the location to install your combiner first. Some systems have the PV modules located close to the inverters and or battery system. If this is the case, you can elect to mount the MNPV6 Disco / MNPV6-250 Disco inside and run each PV string down to the MNPV6 Disco / MNPV6-250 Disco inside the house. This is convenient for trouble shooting and upgrading. For longer runs the combiner will be mounted outdoors on the pole for pole mounted PV arrays or similar mounting for rack mounted arrays. The combiner can be mounted in the vertical position or slanted backwards to accommodate up to a 3/12 roof pitch. All unused holes should be blocked using RTV sealant or some similar goop in order to keep rain and insects out of the enclosure. Care must be taken to insure that no water will get on terminal busbars when mounted less than vertical.



The following dimensioned drawings show the location and size of knockouts available on the MNPV6 Disco / MNPV6-250 Disco. Note that on the MNPV6 Disco the center bottom knock out is sized for a 1 1/4" conduit adapter. The left and right side each have a 1/2" knock out for either wire entry or for lightning arrestors. Follow directions above referring to rain and insects when using side knockouts to keep water off terminal busbars. Lightning arrestors may require a locknut on the outside in order to clear the lid.



MNPV6 Disco Bottom conduit locations and sizes (not to scale)

Note: The plastic dead front fits very tight. You must first remove the lid in order to remove the deadfront.

Remove the deadfront:
Pry off the lid as shown using something like a screwdriver as a lever. The dead front will then come out easily.



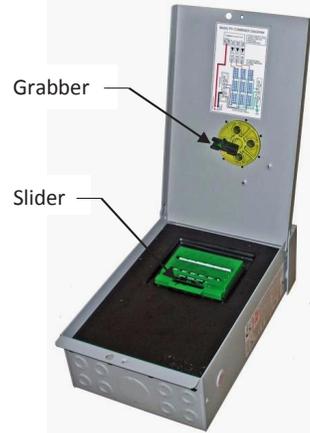
MNPV6 Disco / -250 / AC Disco Installation Instructions Cont.

Handle Installation

To avoid possible damage to the combiner parts it is important to follow these instructions carefully.

1. Turn off breakers.
2. Move handle to the off position.
3. Orient the grabber as shown.
4. Close cover. Do not use force.

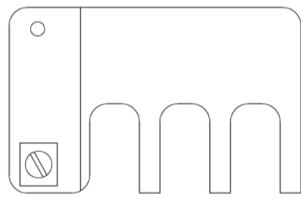
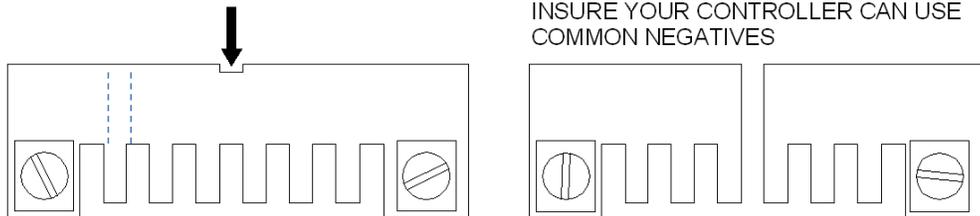
With the breakers and the handle in the Off position, place the grabber into the opening in the handle where shown (Photo right and image on slider). Ensure that the grabber lines up with the rail on the circuit breaker slider. Check for proper actuation by moving the handle and listening for the breakers.



The MNPV6 Disco's busbar can be split into two sections making the MNPV6 Disco equivalent to 2 MNPV3 combiners in one. This is sometimes done in 12 and 24V systems where more controllers are required for additional power. For instance in a 24 volt system using a 60 amp charge controller, you are limited to about 1600 watts of PV per controller. If using Kyocera KC130 modules, you can make three strings of 4 modules in series. This adds up to 1560 watts per controller. That is a good match of PV vs. controller capability. The MNPV3 can accommodate this arrangement directly, but the MNPV6 Disco can accommodate two of these systems, thus saving wiring, space and money. See the following figure on splitting the busbar into two systems.

CUT SLICE OUT OF BUSBAR TO ACCOMMODATE TWO CONTROLLERS EACH CONTROLLER CAN HAVE THREE STRINGS OF PV MODULES

THIS PROVIDES TWO SEPARATE PLUS OUTPUTS TO FEED INTO TWO CONTROLLERS. NEGATIVE BUSBAR IS COMMON IN THIS CONDITION. CHECK TO INSURE YOUR CONTROLLER CAN USE COMMON NEGATIVES



Busbar for 300VDC Breakers. (MNPV6-250 Disco)

300 VDC breakers take up two spaces and require a larger busbar. Install the busbar into the connection marked "-" on the breakers.

MNPV6 Disco / -250 / AC Disco Installation Instructions Cont.

Circuit breaker selection.

When selecting breakers for use with the MidNite combiners, first check with the PV manufacturer to determine the proper “series fuse”. The term fuse is used even though you are probably using breakers. This is a carryover from UL terminology. MidNite Solar offers PV combiner breakers rated at **150VDC, 300VDC and 240 VAC**.

150V DC breakers come in these amperage ratings. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 20, 30, 40, 50, 60 and 63.

Part numbers for breakers are as follows: MNEPV10, MNEPV15, MNEPV20 etc, the last 2 digits being the amperage rating of the breaker.

300VDC breakers are twice as wide as the 150 volt versions. The wire input and output are located on the top side. These breakers come in 7,10,12,15,20,30 and 50 amp sizes. Part numbers are MNEPV15-300 etc. Other sizes are available on special order.

AC breakers come in 10, 15, 20, 30, 40, 50 and 60 amp sizes. Part numbers for AC breakers are as follows: MNEAC10, MNEAC20-2P etc.

IMPORTANT! Polarity of the din rail DC breakers. The DC breakers supplied by MidNite Solar are custom manufactured in Lesotho Africa by CBI. These breakers, like many other DC breakers are polarity sensitive. This means that they need to be installed correctly in order to insure that they will be able to trip if called upon to do so. In a PV combiner the + sign marked on the breaker connects to the PV positive output. The same breaker when hooked up to the battery circuit (not in a PV combiner) hooks up a little different. The + sign hooks up to the battery plus. This hook up is not obvious. The + sign designates the highest potential should be connected there. This is an easy one to determine in a PV combiner. Follow the current path through the combiner, into the PV input of a charge controller and out of the controller to an output breaker and then into the battery plus. You would think that the end of the output breaker connected to the controller would be at a higher potential than the battery plus. In normal operation this is true. The main job of this output breaker is to trip when and if there is a catastrophic failure. (Any manufacturer of power electronics will tell you that power electronics can fail). If the output breaker fails to trip, you are at risk of fire from the output wires burning up. When a charge controller fails, they always short from positive output to negative output. Since these two terminals inside the charge controller are normally connected up to a very large battery bank, you have a direct short across the battery bank if the controller fails. During this condition, the controller is acting like a piece of wire. The battery positive terminal is the highest potential! Make sure that the plus (line) of the breaker is connected to the battery plus terminal. If the breaker is connected backwards, it can fuse in the closed position as it attempts to open. That could ruin your entire day!

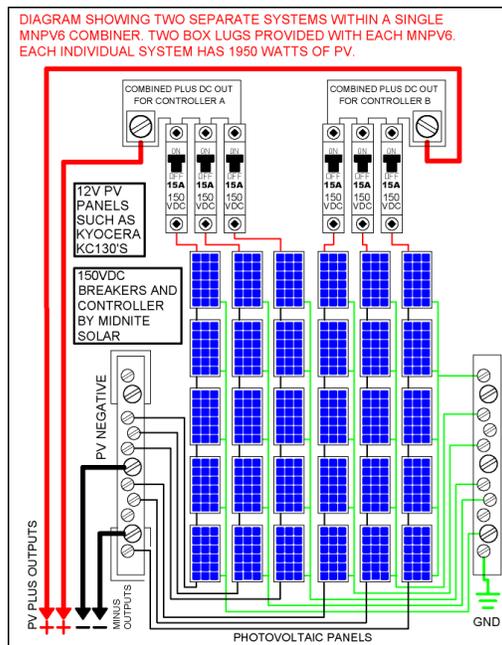
Combiner wiring.

There are numerous ways to hook up a PV array. There are no “best” or “correct” ways to accomplish this. They all have merit. For instance if the battery bank is 24 volts and you have six 24 volt PV modules, what would be the best way to wire them? For this installation we will assume a Classic 150 or similar charge controller that allows the freedom to change PV array voltages.

1. This array could have all 6 panels hooked in parallel using the MNPV6 combiner and 6 MNEPV15 breakers. This array would be ok if situated close to the battery bank. It requires larger wires than would a higher voltage array, but has the advantage of being directly connected to the battery bank in case the controller fails. You can also substitute a PWM controller for the MPPT in the event it becomes necessary.
2. The array could be wired in three strings of two panels in series for a 48 volt nominal array. This is a very common installation and could be made with 3 breakers. This hook up is safe from a cold VOC standpoint, but you cannot directly connect it to the battery bank. You cannot easily hook up a PWM controller either. If the PV array is between 30 and 100 feet from the battery bank, this hook up may offer the best power production.
3. The array could also be hooked up in two strings of three modules in series. The MNPV6 disco / MNPV6-250 Disco and two breakers would accommodate this array. You have room to grow this system without adding

MNPV6 Disco / -250 / AC Disco Installation Instructions Cont.

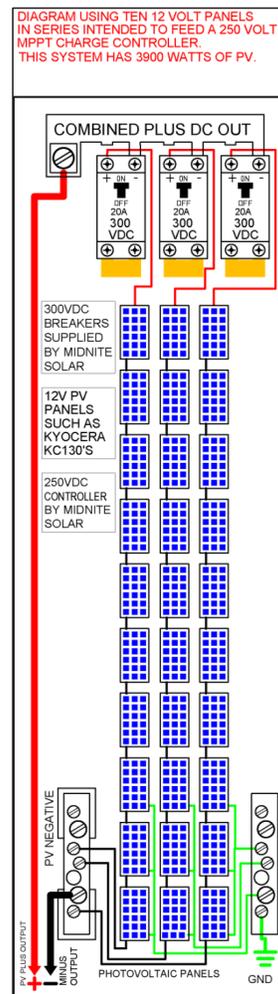
another combiner. Combiners can also be combined for additional power, so if more modules are added later, you can simply add an additional combiner. When putting three 24 V modules in series you must pay attention to VOC during cold spells so that you do not over voltage the controller. MidNite Solar breakers are rated for 150 and 300VDC. This configuration works very well especially when the array is far away from the battery bank. You can sometimes save enough money on reduced wire size to pay for an MPPT charge controller. The following wiring diagrams are intended to help you decide which type of combiner installation to do.



Above left: MNPV6 Disco wired with a split bus bar. A basic wiring diagram is located inside the top cover of the combiner. Additional wiring diagrams are available at www.midnitesolar.com in AutoCad format. These diagrams may be downloaded and modified to represent a specific installation.

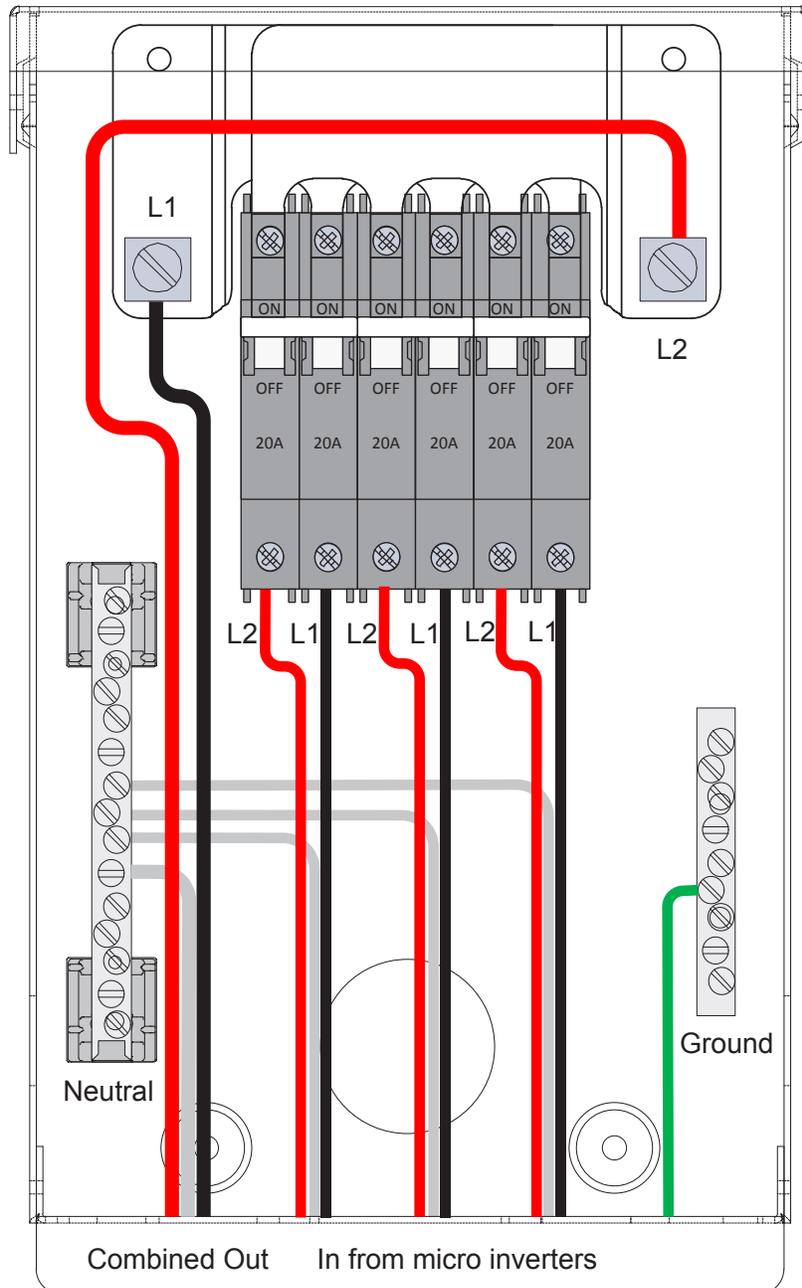
Torque - Circuit Breaker
QY Circuit breakers 150 or 300 V 20 in-lbs (2.3Nm)
Important! Re-Torque to 20 in-lbs (2.3Nm) after 1 hour.

| Torque – Terminal Bus Bar | |
|---------------------------|-------------------|
| 10AWG | 20 in-lbs (2.3Nm) |
| 8AWG | 25 in-lbs (2.8Nm) |
| 6AWG | 35 in-lbs (4.0Nm) |
| 4AWG | 45 in-lbs (5.1Nm) |
| 2AWG – 1/0 | 50 in-lbs (5.6Nm) |



Above right is a special configuration that is possible with the MidNite Solar Classic charge controller. The MNPV6-250 Disco holds three 300VDC breakers. 300VDC breakers take up two spaces. Here we have 3 strings of 10 130 watt panels for a total of 3900 watts. Note that PV input and combined output are both wired to the top side of the breaker. Observe polarity as noted above.

MNPV6 Disco / -250 / AC Disco Installation Instructions Cont.





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MNPV6 Disco / -250 / AC Disco Installation Instructions Cont.

MIDNITE SOLAR INC. LIMITED WARRANTY

MidNite Solar Power electronics, sheet metal enclosures and accessories

MidNite Solar Inc. warrants to the original customer that its products shall be free from defects in materials and workmanship for a period of five (5) years. At its option, Midnite Solar will repair or replace at no charge any MidNite product that proves to be defective within such warranty period. This warranty shall not apply if the MidNite Solar product has been damaged by unreasonable use, accident, negligence, service or modification by anyone other than Midnite Solar, or by any other causes unrelated to materials and workmanship. The original consumer purchaser must retain original purchase receipt for proof of purchase as a condition precedent to warranty coverage. To receive in-warranty service, the defective product must be received no later than two (2) weeks after the end of the warranty period. The product must be accompanied by proof of purchase and Return Authorization (RA) number issued by MidNite Solar. For an RMA number contact MidNite Solar Inc, 17722 67th Ave NE Arlington, WA 98223 (360) 403-7207. Purchasers must prepay all delivery costs or shipping charges to return any defective MidNite Solar product under this warranty policy.

Except for the warranty that the products are made in accordance with the specifications therefore supplied or agreed to by customer, MIDNITE SOLAR MAKES NO WARRANTY EXPRESSED OR IMPLIED, AND ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEEDS THE FOREGOING WARRANTY IS HEREBY DISCLAIMED BY MIDNITE SOLAR AND EXCLUDED FROM ANY AGREEMENT MADE BY ACCEPTANCE OF ANY ORDER PURSUANT TO THIS QUOTATION. MIDNITE SOLAR WILL NOT BE LIABLE FOR ANY CONSEQUENTIAL DAMAGES, LOSS OR EXPENSE ARISING IN CONNECTION WITH THE USE OF OR THE INABILITY TO USE ITS GOODS FOR ANY PURPOSE WHATSOEVER. MIDNITE SOLAR'S MAXIMUM LIABILITY SHALL NOT IN ANY CASE EXCEED THE CONTRACT PRICE FOR THE GOODS CLAIMED TO BE DEFECTIVE OR UNSUITABLE.

Products will be considered accepted by customer unless written notice to the contrary is given to MIDNITE SOLAR within ten (10) days of such delivery to customer. MIDNITE SOLAR shall not in any case be liable for any event occurring or defect discovered with regard to said product unless written notice thereof is given to MIDNITE SOLAR within ninety (90) days of such product delivery to customer. MIDNITE SOLAR is not responsible for loss or damage to products owned by customer and located on MIDNITE SOLAR'S premises caused by fire or other casualties beyond MIDNITE SOLAR'S control. This warranty is in lieu of all other warranties expressed or implied.

MIDNITE SOLAR INC. 17722 67th AVE NE ARLINGTON, WA 98223

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PH: 360-403-7207 FAX: 360-691-6862

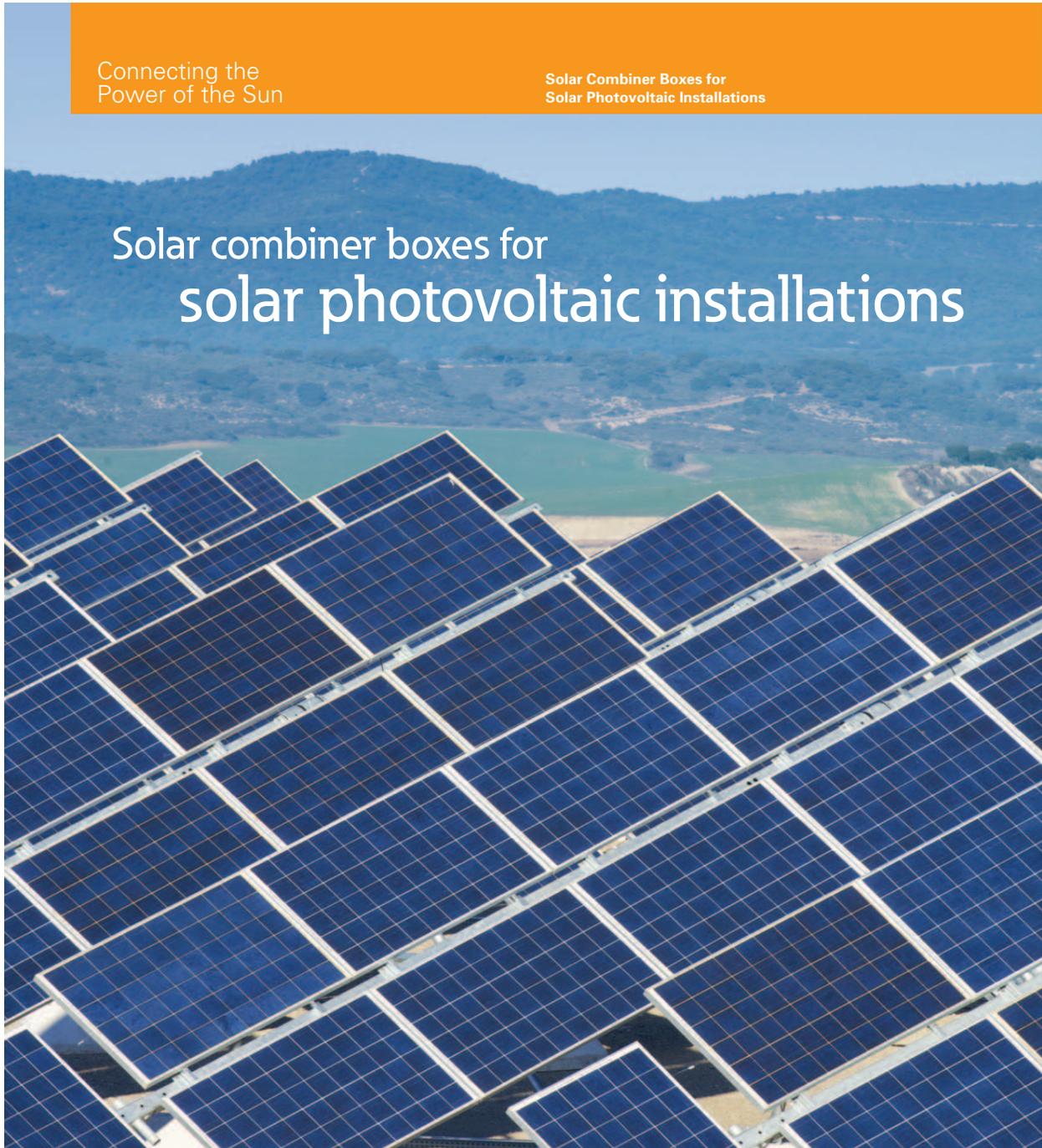


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Connecting the
Power of the Sun

Solar Combiner Boxes for
Solar Photovoltaic Installations

Solar combiner boxes for solar photovoltaic installations



Powering Business Worldwide



Solar energy is heating up

Interest in renewable energy sources has never been greater, and the fastest growing of these new green technologies is the use of photovoltaic (PV) panels (modules) to generate power from the sun. PV modules directly convert the sun's light into electricity, providing power during daylight hours. PV systems are being installed on virtually every type of building, resulting in a growing need for products to meet the requirements of these systems.

Eaton's solar combiner boxes

Solar photovoltaic (PV) installations convert sunlight into electricity, providing clean, renewable energy. Solar PV systems contain many separate DC source circuits that must be combined into a single circuit prior to inversion into clean, usable AC power for the electric grid.

Eaton is proud to offer a line of solar combiner boxes that provides customers with a high-quality product good enough to bear the Eaton brand.

Solar combiner boxes aggregate the many DC source circuits present in a solar PV system, and provide the overcurrent protection requirements of the National Electrical Code®. Containing input fuse holders for source protection, the load sides of the fuse holders are connected together on a common bus that contains the output lugs, allowing multiple circuits to be combined into one outgoing circuit.

Eaton's combiner boxes are available in two styles—source combiners and array combiners. Source combiners are located closer to the source, or the solar panels. They have smaller input fuse holders and lower output currents.

Array combiners (sometimes referred to as re-combiners) are found in larger installations. They aggregate the outputs from several source combiners into a single circuit. Array combiners feature larger input fuse holders and higher output currents.

With the full selection of inputs and fuse holder ratings, Eaton's solar combiner boxes allow for the complete management of solar DC circuits. Until now, these products have been available only from companies specializing in the solar market. With Eaton's recently announced DC photovoltaic switch, this offering gives Eaton customers a one-stop shop for solar PV balance-of-system electrical equipment.



3 EATON CORPORATION

Technical Details

| | NEMA 3R Catalog Number | NEMA 4 Catalog Number | Number of Circuits | Maximum Fuse Size ❶ | Dimensions (H x W x D) | Weight | Incoming Wire Range | Output Conductors | Maximum Continuous DC Current |
|------------------|------------------------|-----------------------|--------------------|---------------------|------------------------|--------|---------------------|-------------------|-------------------------------|
| Source Combiners | SC8R | SC8P | 8 | 30 | 16 x 12 x 6 | 30 | #16-#4 | 1-#6 to 350 kcmil | 310 |
| | SC10R | SC10P | 10 | 30 | 16 x 12 x 6 | 30 | #16-#4 | 1-#6 to 350 kcmil | 310 |
| | SC12R | SC12P | 12 | 30 | 16 x 12 x 6 | 30 | #16-#4 | 1-#6 to 350 kcmil | 310 |
| | SC16R | SC16P | 16 | 30 | 16 x 16 x 6 | 36 | #16-#4 | 2-#6 to 350 kcmil | 400 |
| | SC24R | SC24P | 24 | 20 ❷ | 20 x 20 x 6 | 45 | #16-#4 | 2-#6 to 350 kcmil | 400 ❷ |
| Array Combiners | AC6100R | AC6100P | 6 | 100 | 36 x 36 x 8 | 156 | #6-2/0 | 2-#4 to 500 kcmil | 720 |
| | AC12100R | AC12100P | 12 | 100 | 48 x 36 x 8 | 227 | #6-2/0 | 4-#4 to 500 kcmil | 1520 |
| | AC6200R | AC6200P | 6 | 200 | 42 x 36 x 8 | 206 | #6-4/0 | 4-#4 to 500 kcmil | 1520 |
| | AC12200R | AC12200P | 12 | 200 ❷ | 48 x 36 x 8 | 278 | #6-4/0 | 4-#4 to 500 kcmil | 1520 ❷ |

❶ Fuses not included.

❷ Total installed fuse capacity shall not exceed maximum continuous DC current rating.

Source combiner features

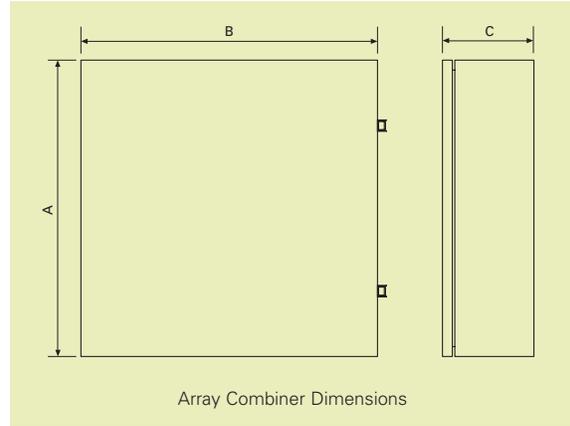
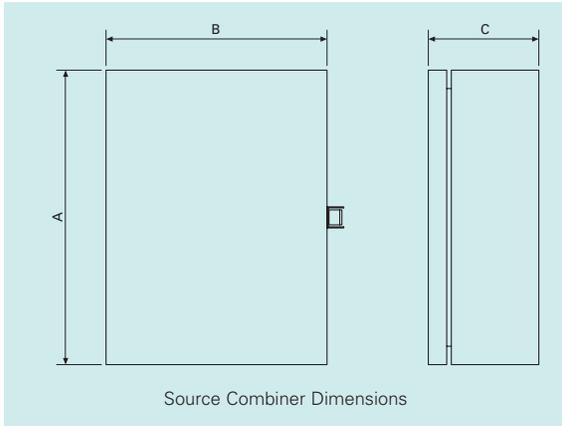
- ❶ ETL listed to UL® 1741 standard
- ❷ Touch-safe midget class fuse holders (non load-break) are rated for 600 Vdc continuous duty (fuses not included)
- ❸ Poured-in-place gaskets for superior moisture resistance
- ❹ Suitable for either positive or negative grounded arrays
- ❺ Available in 8, 10, 12, 16 and 24 circuit configurations
- ❻ NEMA® 3R or NEMA 4 powder-coated steel enclosures
- ❼ White back pan with high-contrast labeling for easier, faster installation
- ❽ Padlockable latch



Array combiner features

- ❶ ETL listed to UL 1741 standard
- ❷ Rated for 600 Vdc continuous duty
- ❸ Poured-in-place gaskets for superior moisture resistance
- ❹ Suitable for either positive or negative grounded arrays
- ❺ Available in 6 and 12 circuit configurations
- ❻ 100 or 200A input fuse holders (Class R)

Note: Fuses not included.



Source Combiner Dimensions

| Catalog Number | A | B | C | Number of Circuits | Output Lug Capacity |
|----------------|-------|-------|------|--------------------|------------------------|
| SC8R/P | 16.00 | 12.00 | 6.00 | 8 | #6 AWG—350 kcmil Cu/Al |
| SC10R/P | 16.00 | 12.00 | 6.00 | 10 | #6 AWG—350 kcmil Cu/Al |
| SC12R/P | 16.00 | 12.00 | 6.00 | 12 | #6 AWG—350 kcmil Cu/Al |
| SC16R/P | 16.00 | 16.00 | 6.00 | 16 | #6 AWG—350 kcmil Cu/Al |
| SC24R/P | 20.00 | 20.00 | 6.00 | 24 | #6 AWG—350 kcmil Cu/Al |

Array Combiner Dimensions

| Catalog Number | A | B | C | Number of Circuits | Output Lug Capacity |
|----------------|-------|-------|------|--------------------|----------------------------|
| AC6100R/P | 30.00 | 30.00 | 9.25 | 6 | (2) #4 AWG—500 kcmil Cu/Al |
| AC12100R/P | 42.00 | 36.00 | 9.25 | 12 | (4) #4 AWG—500 kcmil Cu/Al |
| AC6200R/P | 42.00 | 36.00 | 9.25 | 6 | (4) #4 AWG—500 kcmil Cu/Al |
| AC12200R/P | 60.00 | 36.00 | 9.25 | 12 | (4) #4 AWG—500 kcmil Cu/Al |





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Eaton's Electrical Sector is a global leader in power distribution, power quality, control and automation, and monitoring products. When combined with Eaton's full-scale engineering services, these products provide customer-driven PowerChain™ solutions to serve the power system needs of the data center, industrial, institutional, public sector, utility, commercial, residential, IT, mission critical, alternative energy and OEM markets worldwide.

PowerChain solutions help enterprises achieve sustainable and competitive advantages through proactive management of the power system as a strategic, integrated asset throughout its life cycle, resulting in enhanced safety, greater reliability and energy efficiency. For more information, visit www.eaton.com/electrical.



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Residential and Light Commercial

Eaton Grid-Tied Solar Inverter (3.8–7 kW)



Solar Power Center Loadcenters and Meter Breakers



Residential Electric Vehicle Charging



| | |
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1.1 Eaton Grid-Tied Solar Inverter (3.8–7 kW)

1

Eaton Grid-Tied Solar Inverter (3.8–7 kW)



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| Eaton Grid-Tied Solar Inverter (3.8–7 kW) Product Selection/Technical Data and Specifications | V15-T1-3 |

Product Overview

The Eaton Grid-Tied Solar Inverter’s breakthrough technology and features deliver maximum return on investment for consumers. Eaton solar inverter units offer the highest efficiency and voltage operating ranges available in order to maximize energy yield.

Installation time and costs are greatly reduced through packaging the combiner box, AC/DC disconnects and wire raceway with the inverter. The design also simplifies service on the unit through a two-piece modular configuration, which allows the wiring box to remain connected and mounted if the need ever arises to replace the power module.

Features and Benefits

Ratings

- 3800W, 4000W, 5000W, 6000W, 7000W

Maximum Energy Harvest

- 97% CEC efficiency
- Broad voltage operating range (105–500 Vdc) for superior performance in low light and high temperature environments
- Transformerless design

Saves Installation Time and Cost

- Integrated PV system AC/DC disconnect switch
- Four branch circuit–rated negative and positive fused inputs
- Integrated NEC®-compliant wire raceway

Versatility in Installation

- Field-selectable voltage output: 208/240/277 Vac
- LCD display with side pushbutton for nighttime monitoring
- NEMA® 3R enclosure
- Two-piece modular design

Eaton Value

- A global leader in inverter technology
- Complete balance of system provider
- Eaton reputation for quality, support, and service
- Installation certification via Eaton Certified Contractor Network (ECCN)

Application Description

Available in four individual sizes: 4 kW, 5 kW, 6 kW and 7 kW respectively. The 4 kW unit has the ability to be field-converted to output 3.8 kW to accommodate lower rated AC loadcenters. This inverter family is to be used in grid-tied applications only, thus having the ability to feed power to the utility grid. The design focus of these residential/light commercial inverters was on maximizing energy harvest and minimizing installation time and cost. The inverters boast an extremely high efficiency and a wide DC voltage operating range, while fully integrating the complete balance of system into the unit, including a four-string DC combiner, a DC disconnect switch, an AC disconnect switch and a wire raceway.

Standards and Certifications

- ETL Listed (in compliance with UL® Std 1741)
- CSA® Listed (Std C22.2 No. 107.1)
- CEC Listed



Eaton Grid-Tied Solar Inverter (3.8–7 kW)

1.1

Product Selection/Technical Data and Specifications

1

Eaton Grid-Tied Solar Inverter (3.8–7 kW)

| Description | PV240 | PV250 | PV260 | PV270 |
|--|---|-----------------------------|-----------------------------|-----------------------------|
| Input (DC) | | | | |
| Nominal DC voltage | 360V | 360V | 360V | 360V |
| Maximum DC voltage | 600V | 600V | 600V | 600V |
| System startup voltage | 150V | 150V | 150V | 150V |
| Shutdown voltage | Typical 80V | Typical 80V | Typical 80V | Typical 80V |
| MPPT voltage range | 105–500V | 105–500V | 105–500V | 105–500V |
| Full rating voltage range | 225–500V | 200–500V | 200–500V | 200–500V |
| Maximum DC current | 19A | 26A | 32A | 37A |
| Number of DC input terminals | 4 | 4 | 4 | 4 |
| Output (AC) | | | | |
| Nominal AC power at 240 Vac and 277 Vac | 3800W | 4000W | 5000W | 6000W |
| Nominal AC power at 208 Vac | 3800W | 3800W | 4600W | 7000W |
| Maximum AC power at 240 Vac and 277 Vac | 3800W | 4000W | 5000W | 7000W |
| Maximum AC power at 208 Vac | 3800W | 3800W | 4600W | 7000W |
| Nominal AC voltage | 208V/240V/277V | 208V/240V/277V | 208V/240V/277V | 208V/240V/277V |
| Nominal frequency | 60 Hz | 60 Hz | 60 Hz | 60 Hz |
| Disconnection time of excess operational frequency range | <0.16 sec | <0.16 sec | <0.16 sec | <0.16 sec |
| Nominal AC current at 208 Vac | 18.3A | 18.3A | 22.1A | 33.7A |
| Nominal AC current at 240 Vac | 15.8A | 16.7A | 20.8A | 29.2A |
| Nominal AC current at 277 Vac | 13.7A | 14.4A | 18.1A | 25.3A |
| Maximum AC current at 208 Vac | 18.3A | 18.5A | 22.5A | 35.0A |
| Maximum AC current at 240 Vac | 15.8A | 18.5A | 22.5A | 33.2A |
| Maximum AC current at 277 Vac | 13.7A | 16.4A | 20.5A | 28.7A |
| Power factor | > 0.99 | > 0.99 | > 0.99 | > 0.99 |
| Efficiency | | | | |
| Peak efficiency | 97.50% | 97.50% | 97.50% | 97.50% |
| CEC efficiency | 97% | 97% | 97% | 97% |
| General Data | | | | |
| Topology | Transformerless | Transformerless | Transformerless | Transformerless |
| Dimensions (W/H/D) inches | 17.1/33.3/8.3 | 17.1/33.3/8.3 | 17.1/33.3/8.3 | 17.1/33.3/8.3 |
| Weight (lbs) | 86 | 90 | 101 | 101 |
| Power consumption: standby/night | < 7W/< 0.2W | < 7W/< 0.2W | < 7W/< 0.2W | < 7W/< 0.2W |
| DC insulation resistance | > 4M ohms | > 4M ohms | > 4M ohms | > 4M ohms |
| Enclosure | NEMA 3R | NEMA 3R | NEMA 3R | NEMA 3R |
| Heat dissipation | Force air cooling, variable fan speed according to temperature on heat sink | | | |
| Operating temperature range | –25 to +50°C | –25 to +50°C | –25 to +50°C | –25 to +50°C |
| Humidity | 0 to 95%, noncondensing | 0 to 95%, noncondensing | 0 to 95%, noncondensing | 0 to 95%, noncondensing |
| Communication | RS-232/Super-485 | RS-232/Super-485 | RS-232/Super-485 | RS-232/Super-485 |
| Ground fault protection | Internal GFCI and Isolation detection function, in accordance with UL 1741 | | | |
| Disconnect | Integrated AC and DC switch | Integrated AC and DC switch | Integrated AC and DC switch | Integrated AC and DC switch |
| Certifications | ETL (in compliance with UL 1741), CSA, CEC | | | |
| DC surge protection | 4 kV | 4 kV | 4 kV | 4 kV |
| AC surge protection | 6 kV | 6 kV | 6 kV | 6 kV |

1.2 Solar Power Center Loadcenters and Meter Breakers

1

Solar Power Center Loadcenters and Meter Breakers



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| Additional Information | V15-T1-8 |

Solar Power Center Loadcenters and Meter Breakers

Product Description

Eaton’s Solar Power Centers combine both utility power and solar photovoltaic (PV) power into one enclosure. Solar Power Centers can be applied as a component of a complete PV electrical system. Eaton offers the most complete line of Balance of System (BOS) products in the industry, along with a wide variety of configurations including loadcenters and meter breakers.

The Solar Power Centers feature industry-exclusive factory-installed permanent markings, which help to ensure National Electrical Code® (NEC) compliance. Required by the NEC, these markings enable quick and easy identification of product ratings and location of the parallel energy source disconnect. Prior to installation, contact your local utility to confirm approval.

Product Types

Loadcenters are enclosures specifically designed to house the branch circuit breakers and wiring required to distribute power to individual circuits. They contain either a main breaker when used at the service entrance point or a main lug when used as a sub-panel to add circuits to existing service. The main breaker protects the entire panel and can be used as a service disconnect. The branch breakers protect the wires leading to individual electrical loads such as fixtures and outlets.

Meter breakers are service entrance equipment that consist of a single meter socket and loadcenter (circuit breaker distribution section) or meter socket and main breaker combined in one enclosure. Sometimes called Combos, All-in-Ones, Meter Centers or Meter Mains, these units are increasing in popularity as the socket and loadcenter or main breaker are located in one location, thus providing the contractor with a labor and material savings when installing.

Meter breakers are most often sold in the western, southwestern and southeastern United States. The popularity of meter breakers is continuing to increase as more utilities deregulate and pass the responsibility of supplying watt-hour meter sockets on to the electrical contractor.

Solar Power Center Loadcenters and Meter Breakers

1.2

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Application Description

How to Size a Solar-Ready Loadcenter or a Meter Breaker for your Solar Application

The National Electrical Code (2008) Section 690.64(B)(2)/(2011) Section 705.12(D)(2) states: "The sum of the ampere ratings of overcurrent devices in circuits supplying power to a busbar or conductor shall not exceed 120 percent of the rating of the busbar or conductor."

For example: A 200A main breaker loadcenter + a backfed 70A PV breaker = 270A = 120% of the 225A busbar rating. In 2014, 120% was extended to 125% of the conductor rating.

Note: Check with local utility for exact requirements.

| Panel Main Breaker Ampere Rating | Standard Bus Ampere Rating | Maximum Total Ampere Rating of all PV Backfed Mains | Maximum Ampere Rating of Panel Mains + PV Mains |
|----------------------------------|----------------------------|---|---|
| 100 | 100 | 20 | 120 |
| 100 | 125 | 50 | 150 |
| 125 | 125 | 25 | 150 |
| 200 | 200 | 40 | 240 |
| 200 | 225 | 70 | 270 |
| 225 | 225 | 45 | 270 |
| 400 | 400 | 80 | 480 |

Features and Benefits

Solar Power Center

- Up to 225A rated copper bussing maximizes solar source up to 70A for standard units
- 100A, 125A and 200A main breakers available factory installed, which provides additional flexibility in PV sizing
- Main breaker and PV backfed main are located at opposite ends of the distribution panel
- Single-phase, three-wire 120/240 Vac
- Overhead and underground feed applications
- Padlocking provisions
- Surface and flush designs available
- Top or bottom exit of load wiring
- Limited lifetime warranty for Type CH and 10-year warranty for Type BR

Loadcenters

- Type CH features plug-on neutral loadcenters and breakers that enable the contractor to connect the breaker directly to the neutral bar, eliminating the need for wiring a pigtail
- Type CH features unique stab design, which provides a tight connection to the bus
- Top or bottom feed
 - Straight-in wiring saves labor and material
 - Only one panel for either application—no modifications necessary
- Extra 1.50-inch (38.1 mm) knockout for bundling enables easier installation
- Drywall marking on enclosure indicates proper mounting depth for flush applications
- Unique sandalwood finish is aesthetically appealing with scratch-resistant powder coating
- Silver flash plated copper bus provides superior conductivity

Meter Breakers

- Meter socket and distribution section are located in one enclosure, which provides labor and material savings
- EUSERC / West Coast and Non-EUSERC designs
- Ring, ringless and lever bypass designs
- 7-inch-deep designs available, which is ideal for stucco homes
- Endwall knockouts are easily accessible for future wiring without damaging stucco

Standards and Certifications

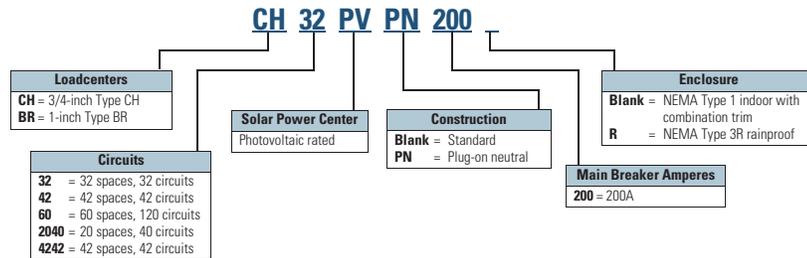
- Complies with NEC (2008) Section 690.64(B) / (2011) Section 705.12(D), which identifies the acceptable installation and marking requirements for utility interactive solar inverters
- UL Listed
- Non-EUSERC
- EUSERC/West Coast

1.2 Solar Power Center Loadcenters and Meter Breakers

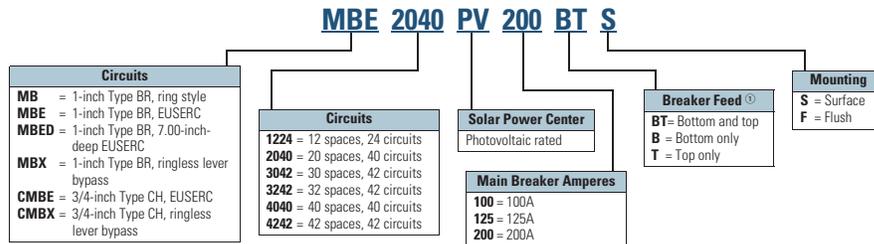
1

Catalog Number Selection

Solar Power Center Loadcenters



Solar Power Center Meter Breakers



Note

① See product selection table on next page for valid catalog strings. Contact the Eaton Flex Center with questions or if you can not find the right catalog string.



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Solar Power Center Loadcenters and Meter Breakers

1.2

1

Product Selection

Solar Power Center Meter Breakers

Type CH Meter Breakers

| Max. Number of 3/4-Inch Spaces | Max. Number of Circuits | Main Breaker (A) | Bus Rating (A) | Max. PV Input (A) | Mounting | Service Design | Bus | kAIC | Enclosure ① | Catalog Number |
|---|-------------------------|------------------|----------------|-------------------|----------|----------------|-----|------|-------------|-----------------|
| Combination Service Entrance Devices—EUSERC (Side-by-Side Construction) | | | | | | | | | | |
| 32 | 42 | 200 | 225 | 70 | Flush | UG | Cu | 22 | 7 | CMBE3242PV200BF |
| 32 | 42 | 200 | 225 | 70 | Surface | UG | Cu | 22 | 7 | CMBE3242PV200BS |
| 42 | 42 | 200 | 225 | 70 | Flush | UG/OH | Cu | 22 | 12 | CMBE4242PV200BF |
| 42 | 42 | 200 | 225 | 70 | Surface | UG/OH | Cu | 22 | 12 | CMBE4242PV200BS |
| 42 | 42 | 200 | 225 | 70 | Surface | OH | Cu | 22 | 12 | CMBE4242PV200TS |
| Combination Service Entrance Devices—Non-EUSERC—Lever Bypass (Over/Under Construction) | | | | | | | | | | |
| 32 | 42 | 200 | 225 | 70 | Surface | UG/OH | Cu | 22 | 14 | CMBX3242PV200TS |

Type BR Meter Breakers

| Max. Number of 1-Inch Spaces | Max. Number of Circuits | Main Breaker (A) | Bus Rating (A) | Max. PV Input (A) | Mounting | Service Design | Bus | kAIC | Enclosure ① | Catalog Number |
|---|-------------------------|------------------|----------------|-------------------|------------|----------------|-----|------|-------------|-----------------|
| Combination Service Entrance Devices—EUSERC (Side-by-Side Construction) | | | | | | | | | | |
| 12 | 24 | 100 ② | 125 | 50 | Flush | UG/OH | Al | 10 | 2 | MBE1224PV100BTF |
| 12 | 24 | 100 ② | 125 | 50 | Surface | UG/OH | Al | 10 | 2 | MBE1224PV100BTS |
| 12 | 24 | 125 ② | 125 | 25 | Flush | UG/OH | Al | 10 | 2 | MBE1224PV125BTF |
| 12 | 24 | 125 ② | 125 | 25 | Surface | UG/OH | Al | 10 | 2 | MBE1224PV125BTS |
| 20 | 40 | 200 | 225 | 70 | Flush | UG/OH | Cu | 22 | 18 | MBE2040PV200BTF |
| 20 | 40 | 200 | 225 | 70 | Surface | UG/OH | Cu | 22 | 18 | MBE2040PV200BTS |
| 30 | 42 | 200 | 225 | 70 | Flush | UG | Cu | 22 | 7 | MBE3042PV200BF |
| 30 | 42 | 200 | 225 | 70 | Surface | UG | Cu | 22 | 7 | MBE3042PV200BS |
| 40 | 40 | 200 | 225 | 70 | Flush | UG/OH | Cu | 22 | 12 | MBE4040PV200BTF |
| 40 | 40 | 200 | 225 | 70 | Surface | UG/OH | Cu | 22 | 12 | MBE4040PV200BTS |
| Combination Service Entrance Devices—EUSERC—7-Inch-Deep Design | | | | | | | | | | |
| 30 | 42 | 200 | 225 | 70 | Semi-flush | UG | Cu | 22 | — | MBED3042PV200BF |
| Combination Service Entrance Devices—Non-EUSERC (Over/Under Construction) | | | | | | | | | | |
| 20 | 40 | 200 | 225 | 70 | Surface | UG/OH | Cu | 22 | — | MB2040PV200BTS |
| Combination Service Entrance Devices—Non-EUSERC—Lever Bypass (Over/Under Construction) | | | | | | | | | | |
| 20 | 40 | 200 | 225 | 70 | Surface | UG/OH | Cu | 22 | — | MBX2040PV200BTS |

Solar Power Center Loadcenters

Type CH Plug-On Neutral Loadcenters

| Max. Number of 3/4-Inch Spaces | Max. Number of Circuits | Main Breaker (A) ③ | Bus Rating (A) | Max. PV Input (A) | Mounting | Enclosure | Bus | kAIC | Box Size ④ | Cover Included | Catalog Number |
|--------------------------------|-------------------------|--------------------|----------------|-------------------|-------------|-----------|-----|------|------------|----------------|----------------|
| 32 | 32 | 200 | 225 | 70 | Combination | NEMA 1 | Cu | 25 | J | Yes | CH32PVPN200 |
| 42 | 42 | 200 | 225 | 70 | Combination | NEMA 1 | Cu | 25 | K | Yes | CH42PVPN200 |
| 60 | 120 ⑤ | 200 | 225 | 70 | Combination | NEMA 1 | Cu | 25 | N | Yes | CH60PVPN200 |

Type BR Loadcenters

| Max. Number of 1-Inch Spaces | Max. Number of Circuits | Main Breaker (A) ③ | Bus Rating (A) | Max. PV Input (A) | Mounting | Enclosure | Bus | kAIC | Box Size ④ | Cover Included | Catalog Number |
|------------------------------|-------------------------|--------------------|----------------|-------------------|-------------|-----------|-----|------|------------|----------------|----------------|
| 20 | 40 | 200 | 225 | 70 | Combination | NEMA 1 | Cu | 25 | D1 | Yes | BR2040PV200 |
| 20 | 40 | 200 | 225 | 70 | Surface | NEMA 3R | Cu | 25 | D1R | Yes | BR2040PV200R ④ |
| 42 | 42 | 200 | 225 | 70 | Combination | NEMA 1 | Cu | 25 | L2 | Yes | BR4242PV200 |
| 42 | 42 | 200 | 225 | 70 | Surface | NEMA 3R | Cu | 25 | L2R | Yes | BR4242PV200R ④ |

Notes

- ① For box size information, refer to Electrical Sector Solutions—Volume 1: Residential and Light Commercial, Tab 1, CA08100002E.
- ② Type BR main breaker factory installed. All other units Type CSR.
- ③ Type CSR main breaker factory installed.
- ④ Rainproof panels are furnished with hub closure plates. For rainproof hubs or box size information, refer to Electrical Sector Solutions—Volume 1: Residential and Light Commercial, Tab 1, CA08100002E.
- ⑤ Requires the use of Type CHNT breakers.

1.2 Solar Power Center Loadcenters and Meter Breakers

1

Contact the Eaton Flex Center (1-800-330-6479 or flexcenterlincoln@eaton.com) for additional solar features including different device availability, main breaker, bus and solar input ratings.

Additional Information

Loadcenter and accessories—reference **Volume 1—Residential and Light Commercial**, CA08100002E, Tab 1.

Meter breaker and accessories—reference **Volume 1—Residential and Light Commercial**, CA08100002E, Tab 1.

Replacement parts for Solar Power Centers.

- Meter breaker:
 - Deadfront
 - Swing door
 - Utility pull section cover
- Loadcenter:
 - Combination cover
 - NEMA 3R covers
 - NEMA 3R deadfronts

Replacement Parts

Meter Breaker

| Meter Breaker | Deadfront | Swing Door | Utility Pull Section Cover | Breaker Cover Deep |
|-----------------|--------------|--------------|----------------------------|--------------------|
| CMBE3242PV200BF | MBICVR6PV | MBFCVR7PVCH | MBUCVR2PV | — |
| CMBE3242PV200BS | | | | |
| CMBE4242PV200BF | MBICVR23PV | MBFCVR5PVCHB | MBUCVR4PV | — |
| CMBE4242PV200BS | | | | |
| CMBE4242PV200TS | MBICVR23PV | MBFCVR5PVCHT | MBUCVR4PV | — |
| CMBX3242PV200TS | CMBXDICVR1PV | CMBXDFCVR1PV | — | — |
| MBE1224PV100BTF | MBICVR25PV | MBFCVR13PV | MBUCVR3PV | — |
| MBE1224PV100BTS | | | | |
| MBE1224PV125BTF | | | | |
| MBE1224PV125BTS | | | | |
| MBE2040PV200BTF | MBICVR30PV | MBFCVR14PV | MBDCVR4PV | — |
| MBE2040PV200BTS | | | | |
| MBE3042PV200BF | MBICVR31PV | MBFCVR7PVBR | MBUCVR2PV | — |
| MBE3042PV200BS | | | | |
| MBE4040PV200BTF | MBICVR24PV | MBFCVR5PVBR | MBUCVR4PV | — |
| MBE4040PV200BTS | | | | |
| MBED3042PV200BF | N/A | MBEDFCVR2PV | MBEDUCVR1PV | MBEDDCVR2PV |
| MB2040PV200BTS | MBICVR1PV | MBFCVR2PV | — | — |
| MBX2040PV200BTS | ARP03070CHPV | ARP03071CHPV | — | — |

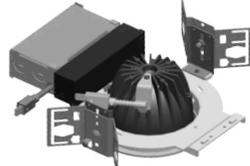
Loadcenter

| NEMA 1 | Combination Cover | NEMA 3R Cover | NEMA 3R Deadfront |
|------------------|-------------------|---------------|-------------------|
| CH32PVPN200 | CH8JFPV | — | — |
| CH42PVPN200 | CH8KFPV | — | — |
| CH60PVPN200 | CH8NFPV | — | — |
| BR2040PV200 | BRCOVC35PV | — | — |
| BR4242PV200 | BRCOVC53PV | — | — |
| Raintight | | | |
| BR2040PV200R | — | BR3RDOOR9PV | BR3RDF11PV |
| BR4242PV200P | — | BR3RDOOR13PV | BR3RDF15PV |



NDLED4 INSTALLATION INSTRUCTIONS

Thank you for buying RAB lighting fixtures. Our goal is to design the best quality products to get the job done right. We'd like to hear your comments. Call the Marketing Department at 888-RAB-1000 or email: marketing@rabweb.com



NDLED4R
Cut-Out Diameter: 5"



NDLED4S
Cut-Out: 5"x5"

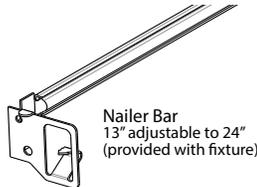
IMPORTANT

READ CAREFULLY BEFORE INSTALLING FIXTURE. RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE.

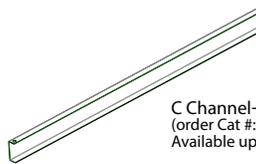
RAB fixtures must be wired in accordance with the National Electrical Code and all applicable local codes. Proper grounding is required for safety. THIS PRODUCT MUST BE INSTALLED IN ACCORDANCE WITH THE APPLICABLE INSTALLATION CODE BY A PERSON FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THE PRODUCT AND THE HAZARDS INVOLVED.

WARNING: Make certain power is OFF before installing or maintaining fixture. No user serviceable parts inside.

MOUNTING BARS



Nailer Bar
13" adjustable to 24"
(provided with fixture)



C Channel-27"
(order Cat #: C-Chan 27)
Available upon request



C Channel-51"
(order Cat #: C-Chan 51)
Available upon request

ROUGH-IN MOUNTING

1. Nailer bars are provided for use with wood joist installations. Insert through **Nailer Bar Slots** in **Butterfly Brackets** and secure accordingly. C-Channels are optionally available, consult factory. Consult local building codes for final support of fixture.
2. Remove appropriate **Knock out** on Junction box. Press **Clip** to open the **Junction Box**.
3. Feed the supply wires through **Knock out** hole and connect to the driver. See wiring section for details.
4. The fixture can be adjusted to different heights above the ceiling surface. For height adjustment, loosen the **Wing Nut** and slide the **Butterfly Bracket**. If necessary remove the **Wing Nut** and insert in screw in different hole provided on the **Butterfly Bracket**. (Fig: 2)
5. Adjust both the **Butterfly Brackets** such that the frame of **Rough-In Section** is flush with the finished ceiling surface. Tighten the **Wing nuts**.

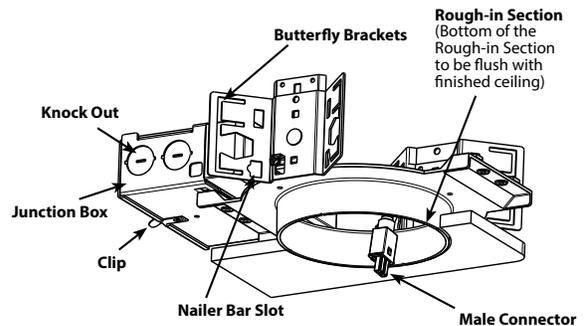


Fig: 1

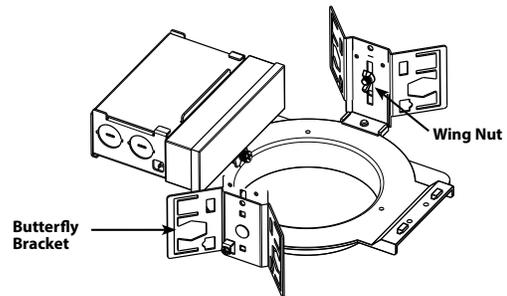


Fig: 2

Note: These instructions do not cover all details or variations in equipment nor do they provide for every possible situation during installation, operation or maintenance. RAB cannot troubleshoot Lutron systems and have provided only basic information. See www.lutron.com for complete instructions and functional compatibility of Lutron Drivers with Lutron or other Control systems/ dimmers.



NDLED4 INSTALLATION INSTRUCTIONS

Thank you for buying RAB lighting fixtures. Our goal is to design the best quality products to get the job done right. We'd like to hear your comments. Call the Marketing Department at 888-RAB-1000 or email: marketing@rabweb.com

TRIM MODULE MOUNTING

1. Pull **Female Connector** conduit through frame opening. Raise **Trim Module** towards opening and connect to **Male Connector** conduit as shown in Fig. 3
2. Press **Torsion Springs** inward and slide **Trim Module** into frame opening. Release both springs into opening together. **Trim Ring** should be flush to ceiling.
3. For the Wallwash Model, orient the fixture such that the reflector is in correct orientation. Look for 'Towards the Wall' label on the fixture.

WIRING

RISK OF FIRE. Universal voltage driver permits operation at 120V thru 277V, 50 or 60 Hz. For Non-Dimming, Electronic Low Voltage (ELV) and Triac Dimming follow the wiring directions in Fig. 4.

1. Connect the GROUND wire from fixture to supply ground.
2. Connect the black fixture lead to the (+) LINE supply lead.
3. Connect the white fixture lead to the (-) COMMON supply lead.

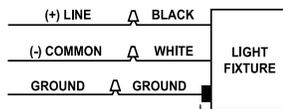


Fig: 4

Lutron L3D Hi-Lume series drivers work with Lutron 3-Wire Control (Fig. 5) or EcoSystem Digital Controls (Fig. 6).

Note: See www.lutron.com for complete instructions and functional compatibility of Lutron drivers with Lutron or other control systems/dimmers.

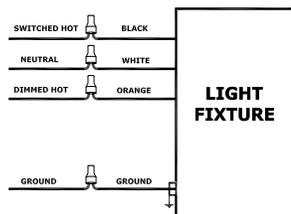


Fig: 5

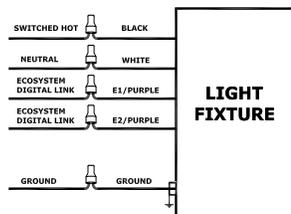


Fig: 6

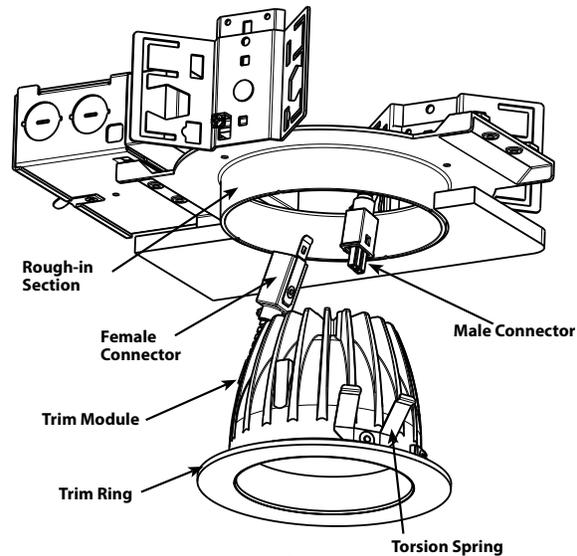


Fig: 3

CLEANING & MAINTENANCE

CAUTION: Be sure fixture temperature is cool enough to touch. Do not clean or maintain while fixture is energized.

1. Do not open fixture to clean the LED. Do not touch the LED.
2. Do not touch reflector, lens, or trim cone.
3. Do not clean any fixture surface with wood base cleaning material such as paper towels or tissues. Only use micro fiber cleaning cloth.

TROUBLESHOOTING

1. Check that the line voltage at the fixture is correct. Refer to wiring directions.
2. Is the fixture grounded properly?
3. For questions on compatibility of dimmers purchased separately refer to www.rabweb.com
4. If the LED is blinking the fixture may be overheating. Remove the Trim assembly and if the fixture is labeled 'BLINKING LIGHT OF THIS THERMALLY PROTECTED LUMINAIRE MAY INDICATE OVERHEATING' allow the fixture to cool down. Determine cause of overheating and remove. Fixtures with this label have a thermal protector that turns fixture off above a certain temperature. It will automatically restart when cool.



Easy Installation & Product Help

Tech Help Line
Call our experts 888 RAB-1000

rabweb.com
Visit our website for product info

email
Answered promptly sales@rabweb.com

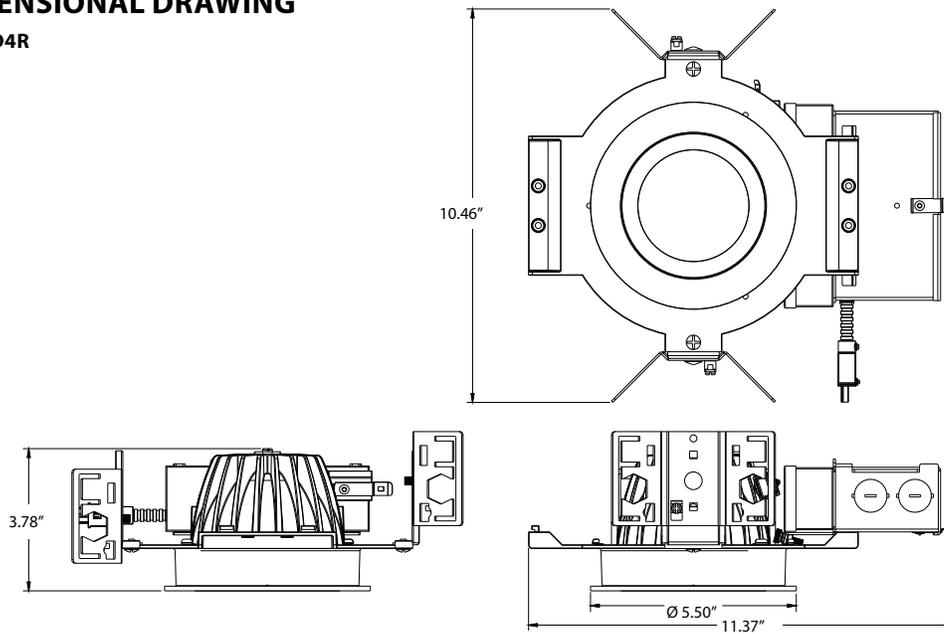


NDLED4 INSTALLATION INSTRUCTIONS

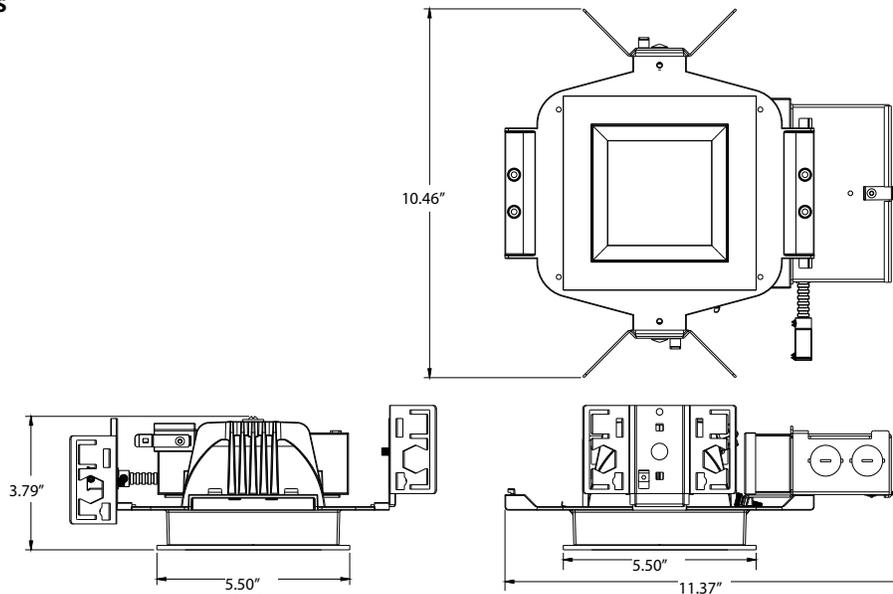
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DIMENSIONAL DRAWING

NDLED4R



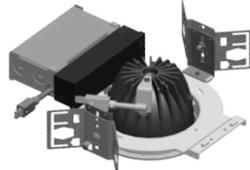
NDLED4S





NDLED6 INSTALLATION INSTRUCTIONS

Thank you for buying RAB lighting fixtures. Our goal is to design the best quality products to get the job done right. We'd like to hear your comments. Call the Marketing Department at 888-RAB-1000 or email: marketing@rabweb.com



NDLED6R
Cut-Out Diameter: 7"



NDLED6S
Cut-Out: 7"x7"

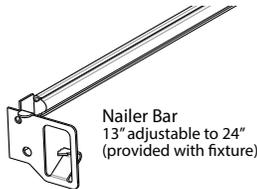
IMPORTANT

READ CAREFULLY BEFORE INSTALLING FIXTURE. RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE.

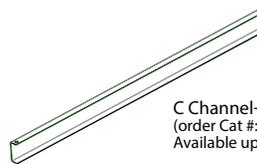
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WARNING: Make certain power is OFF before installing or maintaining fixture. No user serviceable parts inside.

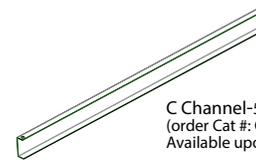
MOUNTING BARS



Nailer Bar
13" adjustable to 24"
(provided with fixture)



C Channel-27"
(order Cat #: C-Chan 27)
Available upon request



C Channel-51"
(order Cat #: C-Chan 51)
Available upon request

ROUGH-IN MOUNTING

1. Nailer bars are provided for use with wood joist installations. Insert through **Nailer Bar Slots** in **Butterfly Brackets** and secure accordingly. C-Channels are optionally available, consult factory. Consult local building codes for final support of fixture.
2. Remove appropriate **Knock out** on Junction box. Press **Clip** to open the **Junction Box**.
3. Feed the supply wires through **Knock out** hole and connect to the driver. See wiring section for details.
4. The fixture can be adjusted to different heights above the ceiling surface. For height adjustment, loosen the **Wing Nut** and slide the **Butterfly Bracket**. If necessary remove the **Wing Nut** and insert in screw in different hole provided on the **Butterfly Bracket**. (Fig: 2)
5. Adjust both the **Butterfly Brackets** such that the frame of **Rough-In Section** is flush with the finished ceiling surface. Tighten the **Wing nuts**.

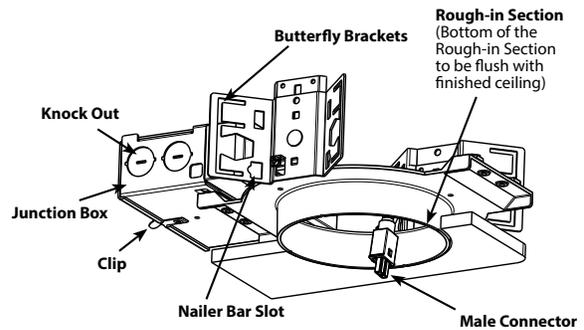


Fig: 1

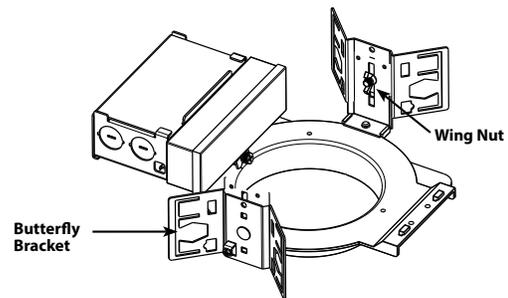


Fig: 2

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NDLED6 INSTALLATION INSTRUCTIONS



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TRIM MODULE MOUNTING

1. Pull **Female Connector** conduit through frame opening. Raise **Trim Module** towards opening and connect to **Male Connector** conduit as shown in Fig. 3.
2. Press **Torsion Springs** inward and slide **Trim Module** into frame opening. Release both springs into opening together. **Trim Ring** should be flush to ceiling.
3. For the Wallwash Model, orient the fixture such that the reflector is in correct orientation. Look for 'Towards the Wall' label on the fixture.

WIRING

RISK OF FIRE. Universal voltage driver permits operation at 120V thru 277V, 50 or 60 Hz. For Non-Dimming, Electronic Low Voltage (ELV) and Triac Dimming follow the wiring directions in Fig. 4.

1. Connect the GROUND wire from fixture to supply ground.
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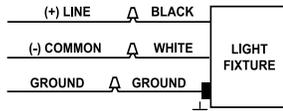


Fig: 4

Lutron L3D Hi-Lume series drivers work with Lutron 3-Wire Control (Fig. 5) or EcoSystem Digital Controls (Fig. 6).

Note: See www.lutron.com for complete instructions and functional compatibility of Lutron drivers with Lutron or other control systems/dimmers.

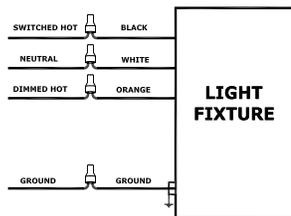


Fig: 5

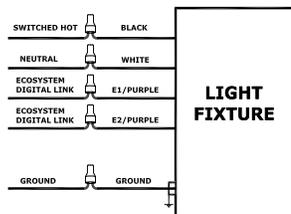


Fig: 6

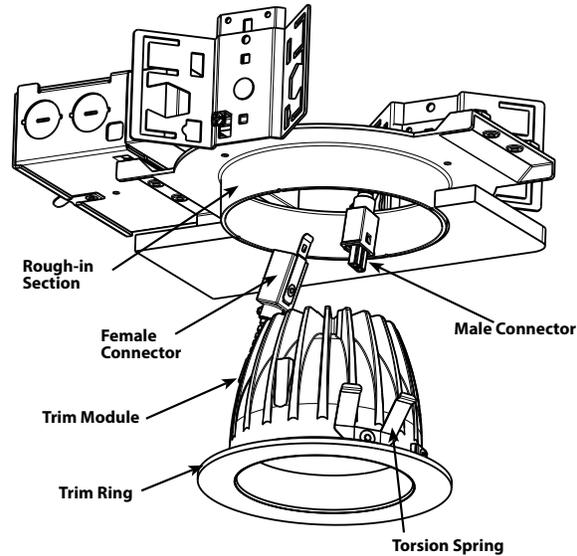


Fig: 3

CLEANING & MAINTENANCE

CAUTION: Be sure fixture temperature is cool enough to touch. Do not clean or maintain while fixture is energized.

1. Do not open fixture to clean the LED. Do not touch the LED.
2. Do not touch reflector, lens, or trim cone.
3. Do not clean any fixture surface with wood base cleaning material such as paper towels or tissues. Only use micro fiber cleaning cloth.

TROUBLESHOOTING

1. Check that the line voltage at the fixture is correct. Refer to wiring directions.
2. Is the fixture grounded properly?
3. For questions on compatibility of dimmers purchased separately refer to www.rabweb.com
4. If the LED is blinking the fixture may be overheating. Remove the Trim assembly and if the fixture is labeled 'BLINKING LIGHT OF THIS THERMALLY PROTECTED LUMINAIRE MAY INDICATE OVERHEATING' allow the fixture to cool down. Determine cause of overheating and remove. Fixtures with this label have a thermal protector that turns fixture off above a certain temperature. It will automatically restart when cool.

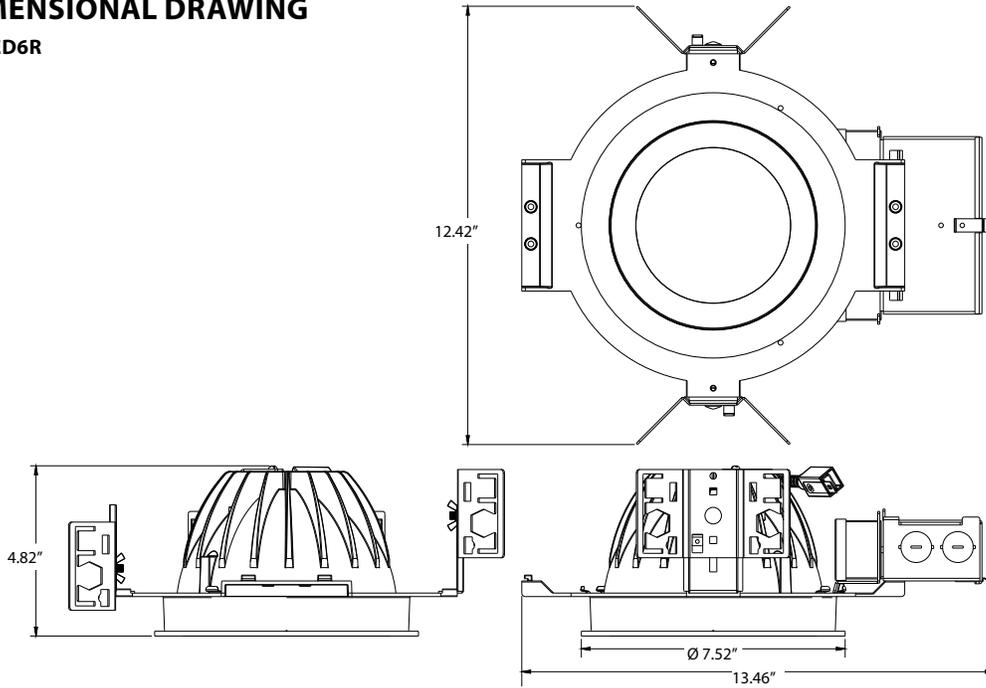


NDLED6 INSTALLATION INSTRUCTIONS

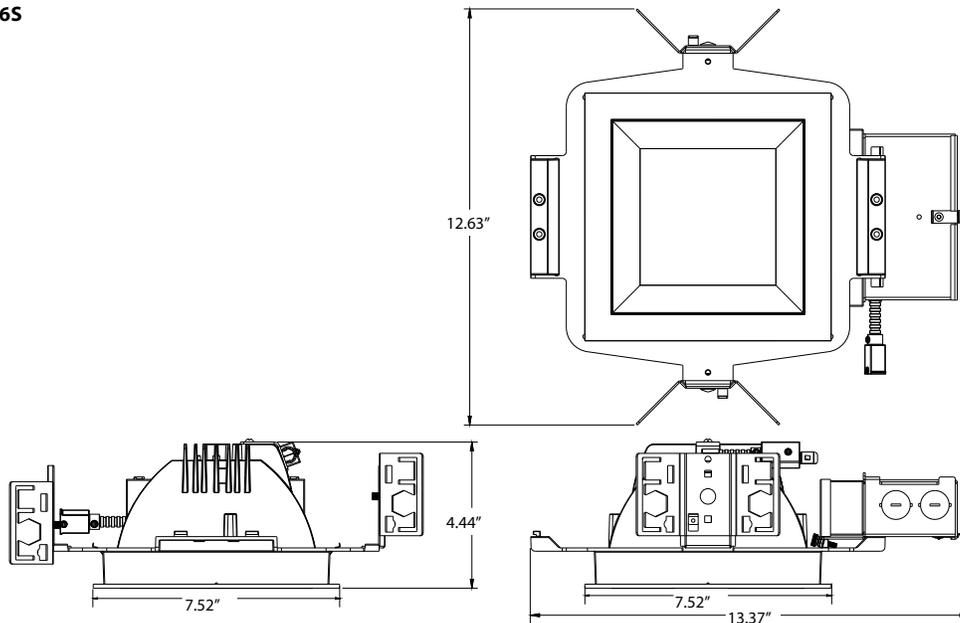
Thank you for buying RAB lighting fixtures. Our goal is to design the best quality products to get the job done right. We'd like to hear your comments. Call the Marketing Department at 888-RAB-1000 or email: marketing@rabweb.com

DIMENSIONAL DRAWING

NDLED6R



NDLED6S



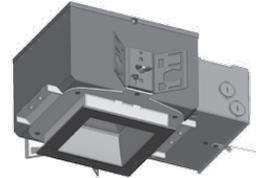


NDIC4 INSTALLATION INSTRUCTIONS

Thank you for buying RAB lighting fixtures. Our goal is to design the best quality products to get the job done right. We'd like to hear your comments. Call the Marketing Department at 888-RAB-1000 or email: marketing@rabweb.com



NDIC4R
Cut-Out Diameter: 5"



NDIC4S
Cut-Out: 5"x5"

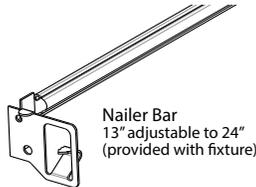
IMPORTANT

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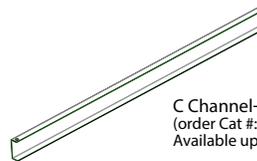
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WARNING: Make certain power is OFF before installing or maintaining fixture. No user serviceable parts inside.

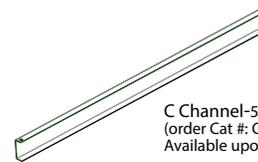
MOUNTING BARS



Nailer Bar
13" adjustable to 24"
(provided with fixture)



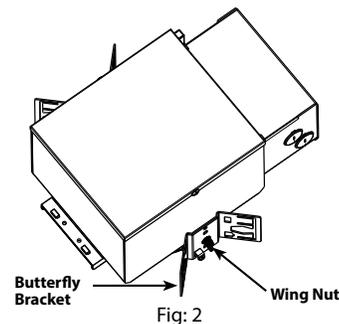
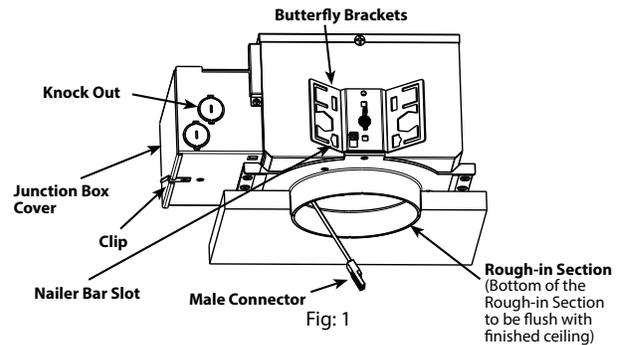
C Channel-27"
(order Cat #: C-Chan 27)
Available upon request



C Channel-51"
(order Cat #: C-Chan 51)
Available upon request

ROUGH-IN MOUNTING

1. Nailer bars are provided for use with wood joist installations. Insert through **Nailer Bar Slots** in **Butterfly Brackets** and secure accordingly. C-Channels are optionally available, consult factory. Consult local building codes for final support of fixture.
2. Remove appropriate **Knock out** on Junction box. Press **Clip** to remove the **Junction Box Cover**.
3. Feed the supply wires through **Knock out** hole and connect to the driver. Re-install **Junction Box Cover**. See wiring section for details.
4. The fixture can be adjusted to different heights above the ceiling surface. For height adjustment, loosen the **Wing Nut** and slide the **Butterfly Bracket**. If necessary remove the **Wing Nut** and insert in screw in different hole provided on the **Butterfly Bracket**. (Fig: 2)
5. Adjust both the **Butterfly Brackets** such that the frame of **Rough-In Section** is flush with the finished ceiling surface. Tighten the **Wing nuts**.



RAB NDIC4 fixtures are IC rated allowing fixtures to be completely covered with insulation and also comply with minimum Air Leakage requirements per the Washington State Energy Code and Model Energy Code.



NDIC4 INSTALLATION INSTRUCTIONS

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TRIM MODULE MOUNTING

1. Pull **Male Connector** conduit through frame opening. Raise **Trim Module** towards opening and connect to **Female Connector** conduit as shown in Fig. 3.
2. Press **Torsion Springs** inward and slide **Trim Module** into frame opening. Release both springs into opening together. **Trim Ring** should be flush to ceiling.
3. For the Wallwash Model, orient the fixture such that the reflector is in correct orientation. Look for 'Towards the Wall' label on the fixture.

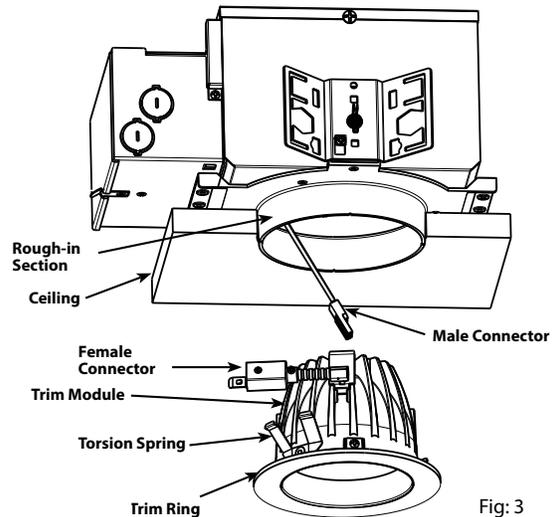


Fig: 3

WIRING

RISK OF FIRE. Universal voltage driver permits operation at 120V thru 277V, 50 or 60 Hz. For Non-Dimming, Electronic Low Voltage (ELV) and Triac Dimming follow the wiring directions in Fig. 4.

1. Connect the GROUND wire from fixture to supply ground.
2. Connect the black fixture lead to the (+) LINE supply lead.
3. Connect the white fixture lead to the (-) COMMON supply lead.

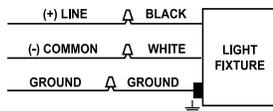


Fig: 4

Lutron L3D Hi-Lume series drivers work with Lutron 3-Wire Control (Fig. 5) or EcoSystem Digital Controls (Fig. 6).

Note: See www.lutron.com for complete instructions and functional compatibility of Lutron drivers with Lutron or other control systems/dimmers.

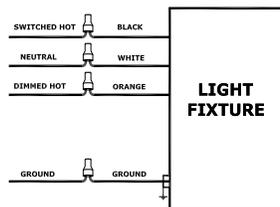


Fig: 5

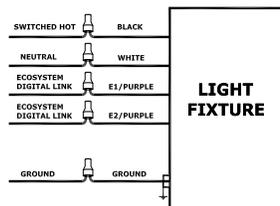


Fig: 6

CLEANING & MAINTENANCE

CAUTION: Be sure fixture temperature is cool enough to touch. Do not clean or maintain while fixture is energized.

1. Do not open fixture to clean the LED. Do not touch the LED.
2. Do not touch reflector, lens, or trim cone.
3. Do not clean any fixture surface with wood base cleaning material such as paper towels or tissues. Only use micro fiber cleaning cloth.

TROUBLESHOOTING

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Easy Installation & Product Help

Tech Help Line
Call our experts 888 RAB-1000

rabweb.com
Visit our website for product info

email
Answered promptly sales@rabweb.com

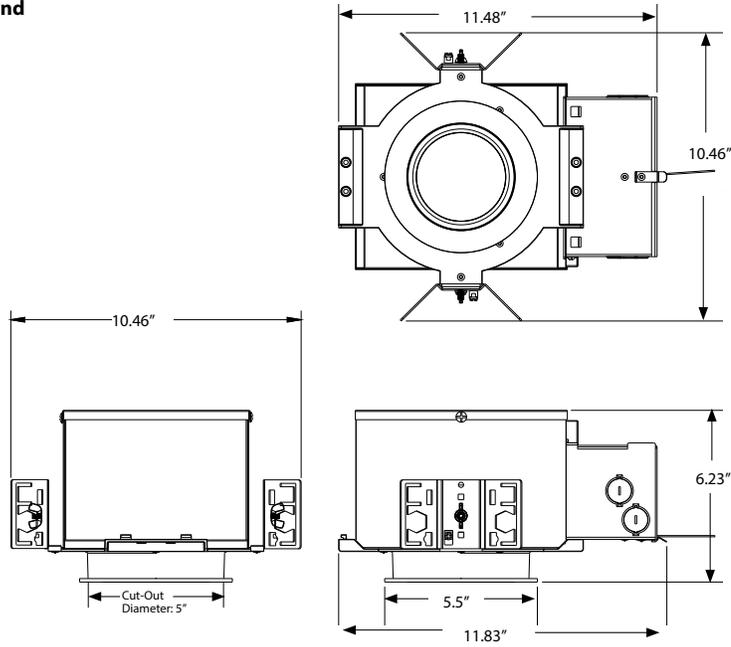


NDIC4 INSTALLATION INSTRUCTIONS

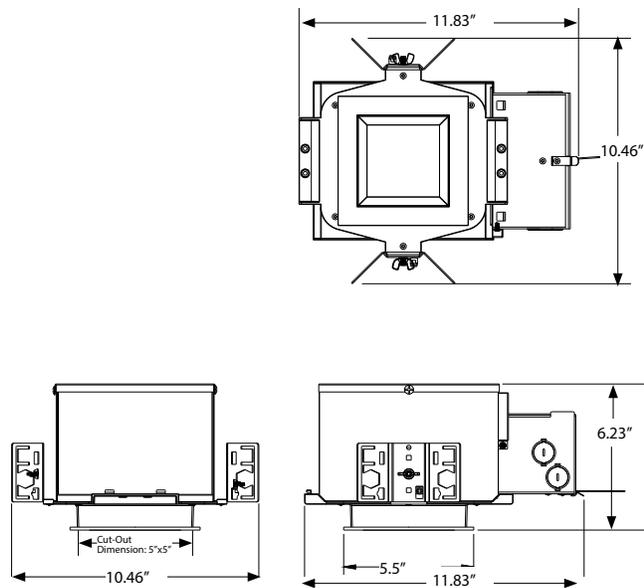
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DIMENSIONAL DRAWING

4" Round



4" Square





NDIC6 INSTALLATION INSTRUCTIONS

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NDIC6R
Cut-Out Diameter: 7"



NDIC6S
Cut-Out: 7"x7"

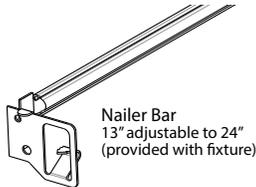
IMPORTANT

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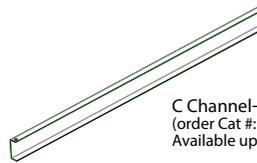
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WARNING: Make certain power is OFF before installing or maintaining fixture. No user serviceable parts inside.

MOUNTING BARS



Nailer Bar
13" adjustable to 24"
(provided with fixture)



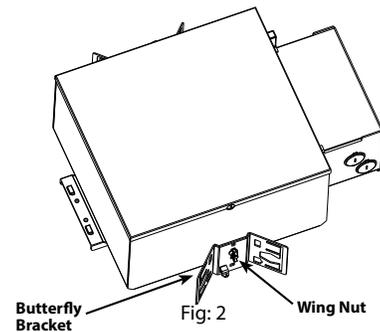
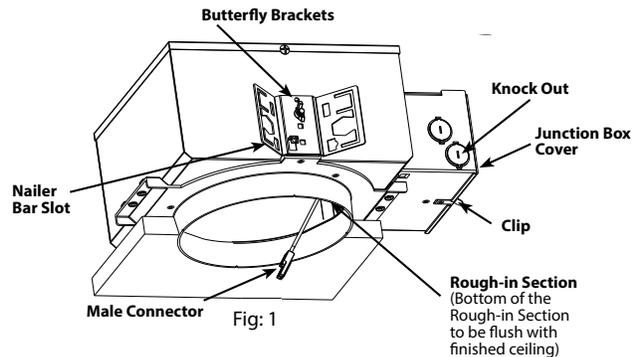
C Channel-27"
(order Cat #: C-Chan 27)
Available upon request



C Channel-51"
(order Cat #: C-Chan 51)
Available upon request

ROUGH-IN MOUNTING

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5. Adjust both the **Butterfly Brackets** such that the frame of **Rough-In Section** is flush with the finished ceiling surface. Tighten the **Wing nuts**.



RAB NDIC6 fixtures are IC rated allowing fixtures to be completely covered with insulation and also comply with minimum Air Leakage requirements per the Washington State Energy Code and Model Energy Code.



NDIC6 INSTALLATION INSTRUCTIONS

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WIRING

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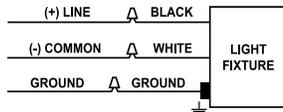


Fig: 4

Lutron L3D Hi-Lume series drivers work with Lutron 3-Wire Control (Fig. 5) or EcoSystem Digital Controls (Fig. 6).

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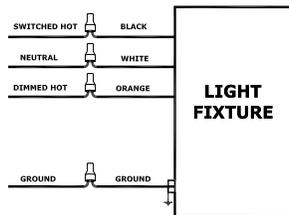


Fig: 5

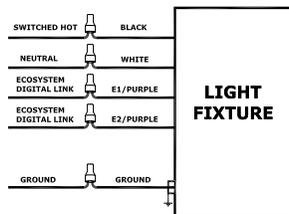


Fig: 6

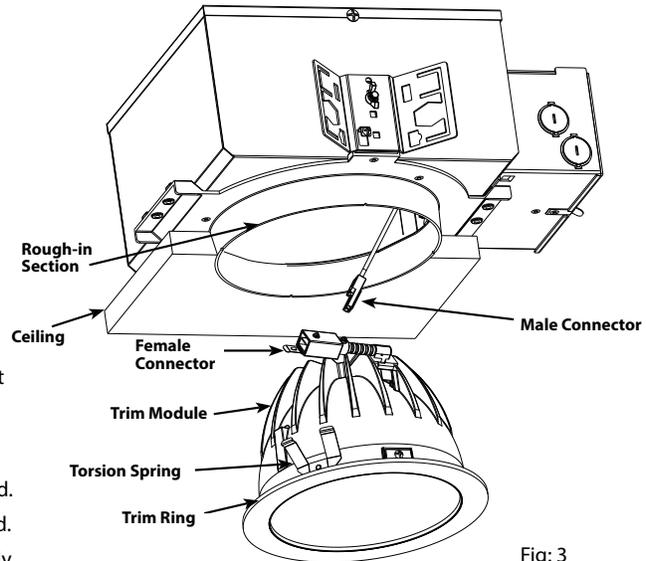


Fig: 3

CLEANING & MAINTENANCE

CAUTION: Be sure fixture temperature is cool enough to touch. Do not clean or maintain while fixture is energized.

1. Do not open fixture to clean the LED. Do not touch the LED.
2. Do not touch reflector, lens, or trim cone.
3. Do not clean any fixture surface with wood base cleaning material such as paper towels or tissues. Only use micro fiber cleaning cloth.

TROUBLESHOOTING

1. Check that the line voltage at the fixture is correct. Refer to wiring directions.
2. Is the fixture grounded properly?
3. For questions on compatibility of dimmers purchased separately refer to www.rabweb.com

Note: These instructions do not cover all details or variations in equipment nor do they provide for every possible situation during installation, operation or maintenance. RAB cannot troubleshoot Lutron systems and have provided only basic information. See www.lutron.com for complete instructions and functional compatibility of Lutron Drivers with Lutron or other Control systems/dimmers.

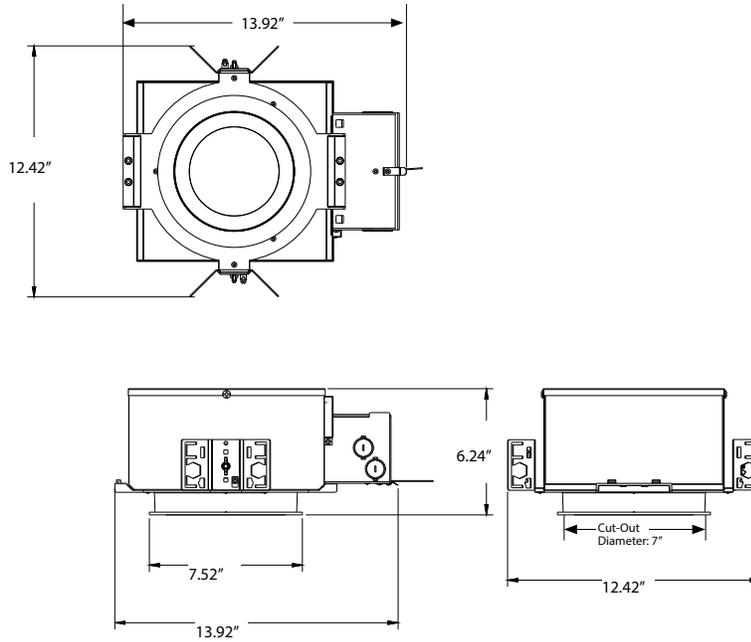


NDIC6 INSTALLATION INSTRUCTIONS

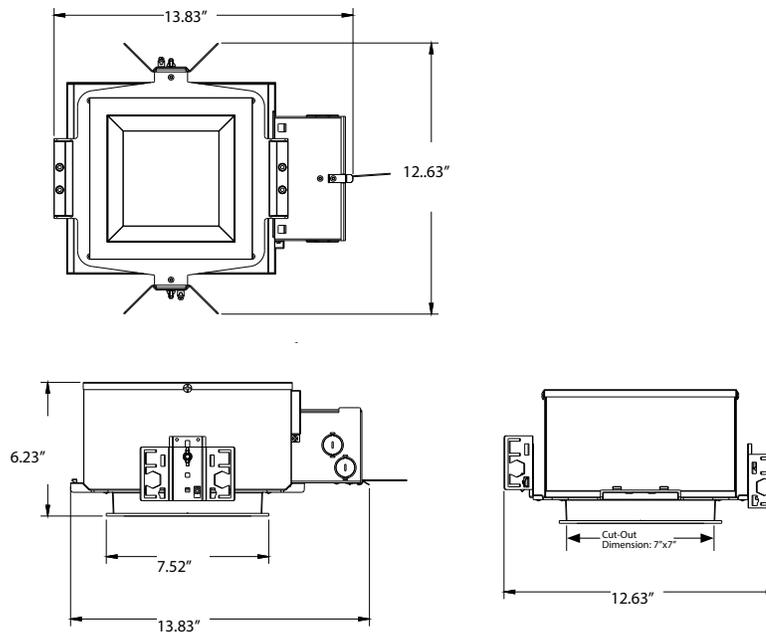
Thank you for buying RAB lighting fixtures. Our goal is to design the best quality products to get the job done right. We'd like to hear your comments. Call the Marketing Department at 888-RAB-1000 or email: marketing@rabweb.com

DIMENSIONAL DRAWING

NDIC6R



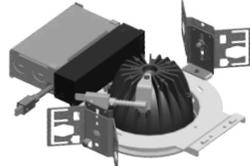
NDIC6S





NDLED4 INSTALLATION INSTRUCTIONS

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NDLED4R
Cut-Out Diameter: 5"



NDLED4S
Cut-Out: 5"x5"

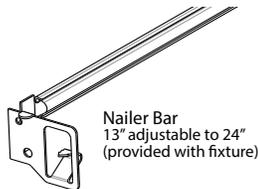
IMPORTANT

READ CAREFULLY BEFORE INSTALLING FIXTURE. RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE.

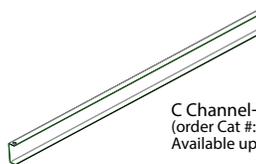
RAB fixtures must be wired in accordance with the National Electrical Code and all applicable local codes. Proper grounding is required for safety. THIS PRODUCT MUST BE INSTALLED IN ACCORDANCE WITH THE APPLICABLE INSTALLATION CODE BY A PERSON FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THE PRODUCT AND THE HAZARDS INVOLVED.

WARNING: Make certain power is OFF before installing or maintaining fixture. No user serviceable parts inside.

MOUNTING BARS



Nailer Bar
13" adjustable to 24"
(provided with fixture)



C Channel-27"
(order Cat #: C-Chan 27)
Available upon request



C Channel-51"
(order Cat #: C-Chan 51)
Available upon request

ROUGH-IN MOUNTING

1. Nailer bars are provided for use with wood joist installations. Insert through **Nailer Bar Slots** in **Butterfly Brackets** and secure accordingly. C-Channels are optionally available, consult factory. Consult local building codes for final support of fixture.
2. Remove appropriate **Knock out** on Junction box. Press **Clip** to open the **Junction Box**.
3. Feed the supply wires through **Knock out** hole and connect to the driver. See wiring section for details.
4. The fixture can be adjusted to different heights above the ceiling surface. For height adjustment, loosen the **Wing Nut** and slide the **Butterfly Bracket**. If necessary remove the **Wing Nut** and insert in screw in different hole provided on the **Butterfly Bracket**. (Fig: 2)
5. Adjust both the **Butterfly Brackets** such that the frame of **Rough-In Section** is flush with the finished ceiling surface. Tighten the **Wing nuts**.

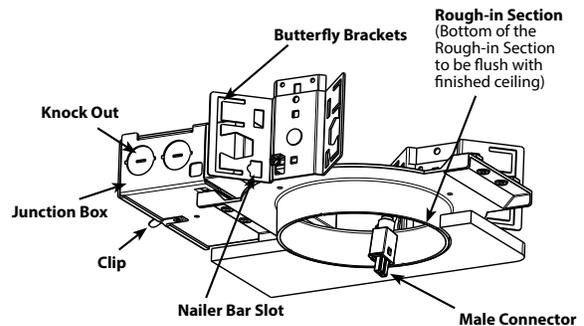


Fig: 1

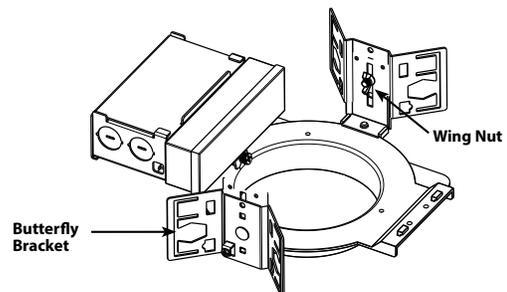


Fig: 2

Note: These instructions do not cover all details or variations in equipment nor do they provide for every possible situation during installation, operation or maintenance. RAB cannot troubleshoot Lutron systems and have provided only basic information. See www.lutron.com for complete instructions and functional compatibility of Lutron Drivers with Lutron or other Control systems/ dimmers.



NDLED4 INSTALLATION INSTRUCTIONS

Thank you for buying RAB lighting fixtures. Our goal is to design the best quality products to get the job done right. We'd like to hear your comments. Call the Marketing Department at 888-RAB-1000 or email: marketing@rabweb.com

TRIM MODULE MOUNTING

1. Pull **Female Connector** conduit through frame opening. Raise **Trim Module** towards opening and connect to **Male Connector** conduit as shown in Fig. 3
2. Press **Torsion Springs** inward and slide **Trim Module** into frame opening. Release both springs into opening together. **Trim Ring** should be flush to ceiling.
3. For the Wallwash Model, orient the fixture such that the reflector is in correct orientation. Look for 'Towards the Wall' label on the fixture.

WIRING

RISK OF FIRE. Universal voltage driver permits operation at 120V thru 277V, 50 or 60 Hz. For Non-Dimming, Electronic Low Voltage (ELV) and Triac Dimming follow the wiring directions in Fig. 4.

1. Connect the GROUND wire from fixture to supply ground.
2. Connect the black fixture lead to the (+) LINE supply lead.
3. Connect the white fixture lead to the (-) COMMON supply lead.

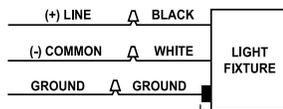


Fig: 4

Lutron L3D Hi-Lume series drivers work with Lutron 3-Wire Control (Fig. 5) or EcoSystem Digital Controls (Fig. 6).

Note: See www.lutron.com for complete instructions and functional compatibility of Lutron drivers with Lutron or other control systems/dimmers.

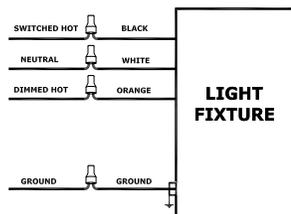


Fig: 5

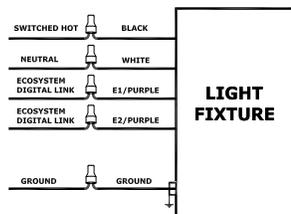


Fig: 6

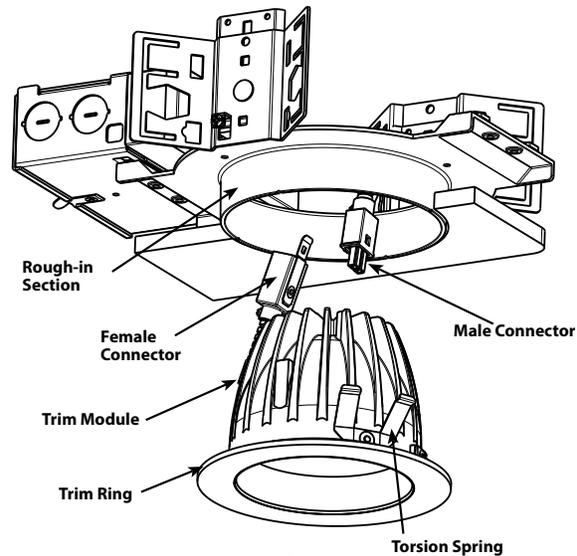


Fig: 3

CLEANING & MAINTENANCE

CAUTION: Be sure fixture temperature is cool enough to touch. Do not clean or maintain while fixture is energized.

1. Do not open fixture to clean the LED. Do not touch the LED.
2. Do not touch reflector, lens, or trim cone.
3. Do not clean any fixture surface with wood base cleaning material such as paper towels or tissues. Only use micro fiber cleaning cloth.

TROUBLESHOOTING

1. Check that the line voltage at the fixture is correct. Refer to wiring directions.
2. Is the fixture grounded properly?
3. For questions on compatibility of dimmers purchased separately refer to www.rabweb.com
4. If the LED is blinking the fixture may be overheating. Remove the Trim assembly and if the fixture is labeled 'BLINKING LIGHT OF THIS THERMALLY PROTECTED LUMINAIRE MAY INDICATE OVERHEATING' allow the fixture to cool down. Determine cause of overheating and remove. Fixtures with this label have a thermal protector that turns fixture off above a certain temperature. It will automatically restart when cool.



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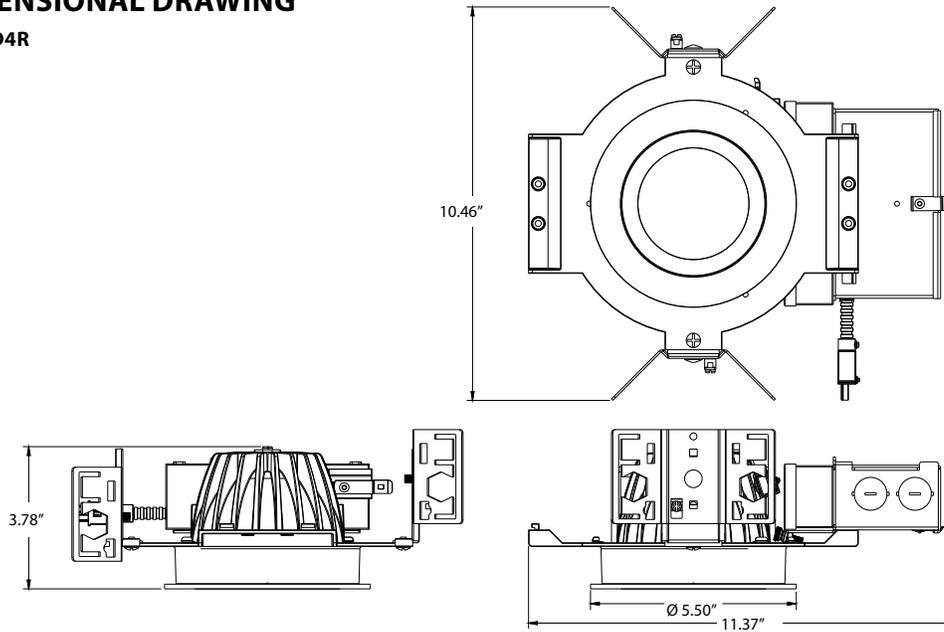


NDLED4 INSTALLATION INSTRUCTIONS

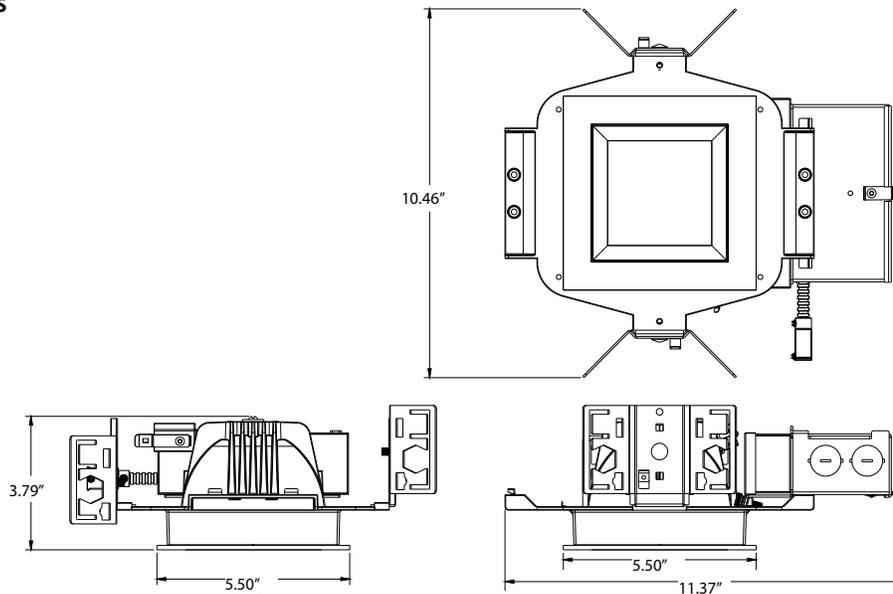
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DIMENSIONAL DRAWING

NDLED4R



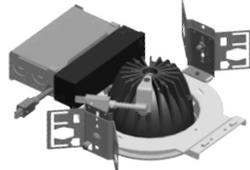
NDLED4S





NDLED6 INSTALLATION INSTRUCTIONS

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NDLED6R
Cut-Out Diameter: 7"



NDLED6S
Cut-Out: 7"x7"

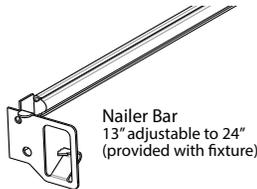
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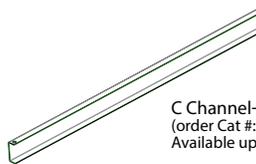
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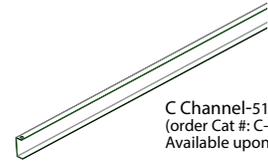
MOUNTING BARS



Nailer Bar
13" adjustable to 24"
(provided with fixture)



C Channel-27"
(order Cat #: C-Chan 27)
Available upon request



C Channel-51"
(order Cat #: C-Chan 51)
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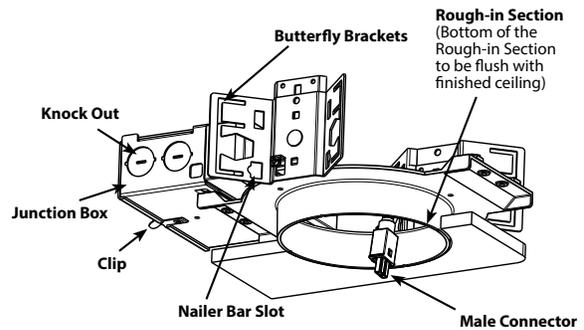


Fig: 1

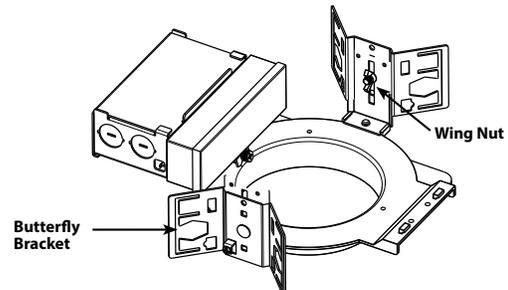


Fig: 2

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NDLED6 INSTALLATION INSTRUCTIONS



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TRIM MODULE MOUNTING

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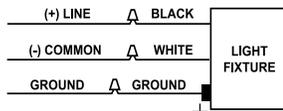


Fig: 4

Lutron L3D Hi-Lume series drivers work with Lutron 3-Wire Control (Fig. 5) or EcoSystem Digital Controls (Fig. 6).

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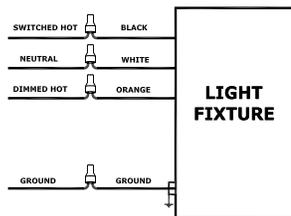


Fig: 5

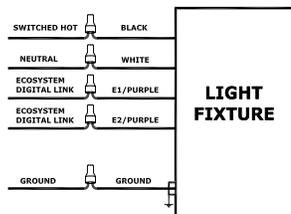


Fig: 6

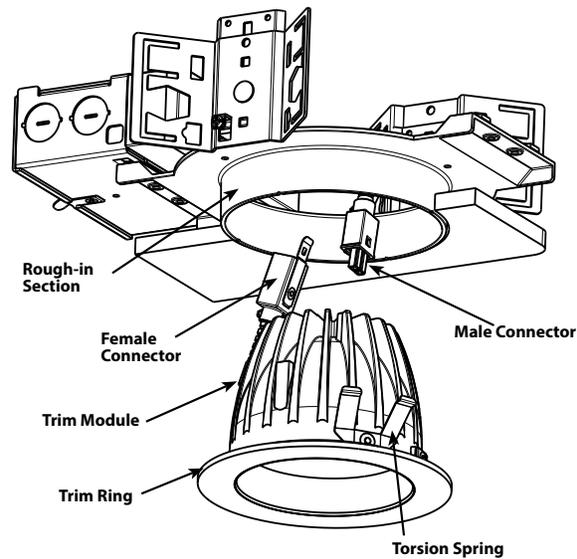


Fig: 3

CLEANING & MAINTENANCE

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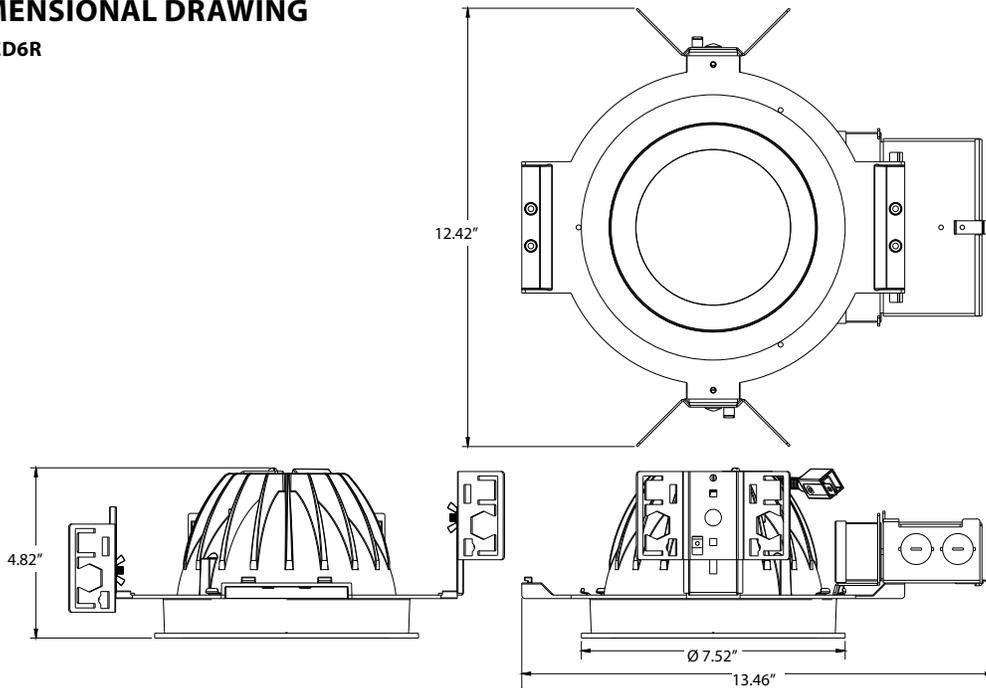


NDLED6 INSTALLATION INSTRUCTIONS

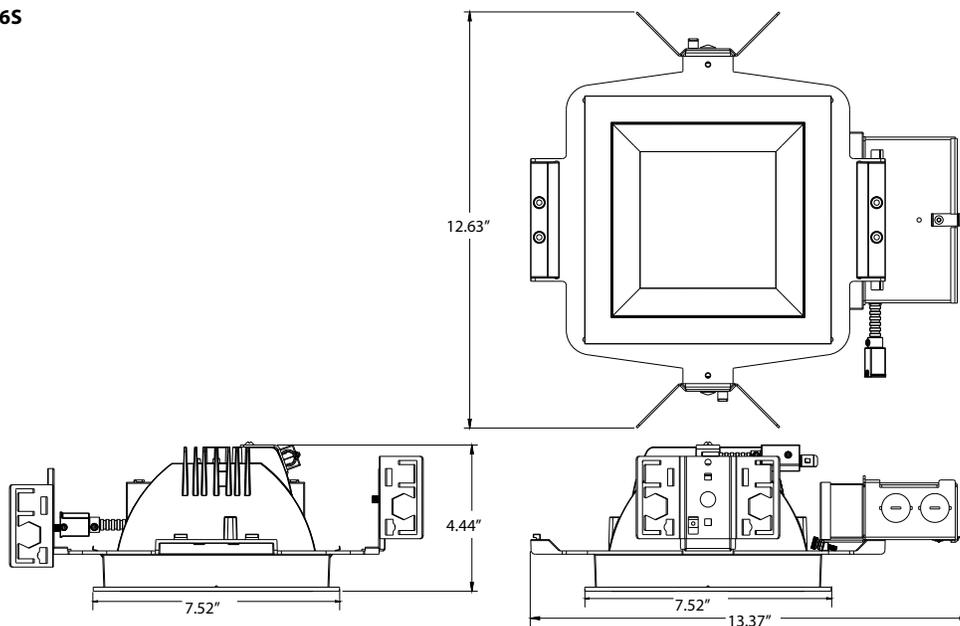
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DIMENSIONAL DRAWING

NDLED6R



NDLED6S

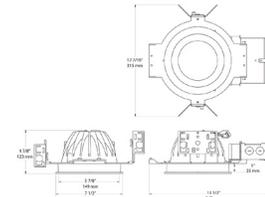


ND6R20

Easy to install 4" and 6" rough-in with die-cast aperture ring, removable driver, thermal protector and adjustable butterfly brackets. This rough-in is designed to make new construction recessed downlighting easy

Color: N/A

Weight: N/A



LED Info

Watts: 20W
Color Temp: Sold Separately
Color Accuracy: N/A
L70 Lifespan: N/A
LM79 Lumens: N/A
Efficacy: N/A

Driver Info

Type: Constant Current
120V: 0.18A
208V: 0.11A
240V: 0.10A
277V: 0.09A
Input Watts: N/A
Efficiency: N/A

Technical Specifications

UL Listed:

Suitable for wet locations covered ceiling.

Photometrics:

Photometrics are based on prorated reports. Contact the RAB Lighting Design department for the most up-to-date data.

Housing Component:

This component must be ordered with New Construction Round Trim Module in order to make a complete fixture.

Driver:

TRIAC, Constant Current, Class 2, 120V, 50/60Hz, 350mA, 0.15A, Power Factor 98.9%, THD ≤ 20%.

Dimming Driver:

TRIAC compatible dimmer with dimming as low as 10%.

Ambient Temperature:

Suitable for use in 40°C ambient temperatures.

Cold Weather Starting:

The minimum starting temperature is -40°F/-40°C.

Aperture Size:

6" Rough-In.

Drop Ceiling Installation:

NDLED can be installed in drop ceiling tiles when using optional c-channel bars and following local construction codes.

Junction Box:

Integral junction box with wiring capacity for Min 90°C supply conductors
4 in 4 out

Air Tight:

Housing certified Air Tight as per ASTM E283

Butterfly Brackets:

The Butterfly bracket allows to mount with the following 1/4 x 1/2" bar stock, C Channel, 1/2" conduit, or nailer bars.

Easy Installation:

The EZConnector makes installation easy.

Thermal Protector:

Thermal protector included. Disables power if temperature exceeds safe operation levels.

California Title 24:

ND6R20 complies with 2013 California Title 24 building and electrical codes as a residential indoor fixture. It also complies as a commercial indoor fixture for general spaces when used with a vacancy sensor and TRIAC dimming control. Select a vacancy sensor using catalog number LVS800. TRIAC dimmer provided by others.

Warranty:

RAB warrants that our LED products will be free from defects in materials and workmanship for a period of five (5) years from the date of delivery to the end user, including coverage of light output, color stability, driver performance and fixture finish.

Country of Origin:

Designed by RAB in New Jersey and assembled in the USA by RAB's IBEW Local 3 workers.

Buy American Act Compliant:

This product is a COTS item manufactured in the United States, and is compliant with the Buy American Act.



26 50 00

ND6R20 - continued

Created: 02/10/2015

Recovery Act (ARRA) Compliant:

This product complies with the 52.225-21 "Required Use of American Iron, Steel, and Manufactured Goods-- Buy American Act-- Construction Materials (October 2010).

Trade Agreements Act Compliant:

This product is a COTS item manufactured in the United States, and is compliant with the Trade Agreements Act.

GSA Schedule:

Suitable in accordance with FAR Subpart 25.4.



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Tech Help Line: 888 RAB-1000

Email: sales@rabweb.com

On the web at: www.rabweb.com

Note: Specifications are subject to change without notice

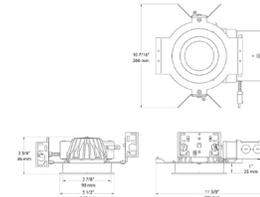
Page 2 of 2

NDLED4R-50Y-W-W

High-end, new construction LED downlights in 4" and 6" make installation a breeze when you're framing out a space from the ground up or when you have access from the top of the ceiling.

Color: White trim white cone

Weight: N/A



LED Info

Watts: N/A
Color Temp: 3000K (Warm)
Color Accuracy: N/A
L70 Lifespan: 100000
LM79 Lumens: N/A
Efficacy: N/A

Driver Info

Type: Sold Separately
120V: N/A
208V: N/A
240V: N/A
277V: N/A
Input Watts: N/A
Efficiency: N/A

Technical Specifications

UL Listed:

Suitable for wet locations covered ceiling.

Photometrics:

Photometrics are based on prorated reports. Contact the RAB Lighting Design department for the most up-to-date data.

Trim Component:

This component must be ordered with New Construction Round Rough-In in order to make a complete fixture.

Housing:

Professional-grade, die-cast aluminum construction.

Trim Ring:

White powder coated die cast trim ring.

Trim Cone:

White round trim cone.

Drop Ceiling Installation:

NDLED can be installed in drop ceiling tiles when using optional c-channel bars and following local construction codes.

Aperture Size:

4" Trim Module.

Dimming:

Dimmable. Requires rough-in with dimming driver.

Optics:

50° beam spread with specular thermoplastic optics and Nanostructure lens technology for smooth light output and high efficiency.

Junction Box:

Integral junction box with wiring capacity for Min 90°C supply conductors
4 in 4 out

Easy Installation:

The EZ-Connector makes installation easy.

Color Consistency:

3-step MacAdam Ellipse binning to achieve consistent fixture-to-fixture color.

California Title 24:

NDLED4R complies with 2013 California Title 24 building and electrical codes as a residential indoor fixture and commercial indoor fixture for general spaces.

Warranty:

RAB warrants that our LED products will be free from defects in materials and workmanship for a period of five (5) years from the date of delivery to the end user, including coverage of light output, color stability, driver performance and fixture finish.

Country of Origin:

Designed by RAB in New Jersey and assembled in the USA by RAB's IBEW Local 3 workers.

Buy American Act Compliant:

This product is a COTS item manufactured in the United States, and is compliant with the Buy American Act.

Recovery Act (ARRA) Compliant:

This product complies with the 52.225-21 "Required Use of American Iron, Steel, and Manufactured Goods-- Buy American Act-- Construction Materials (October 2010).



26 50 00

NDLED4R-50Y-W-W - continued

Created: 02/10/2015

Trade Agreements Act Compliant:

This product is a COTS item manufactured in the United States, and is compliant with the Trade Agreements Act.

GSA Schedule:

Suitable in accordance with FAR Subpart 25.4.



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Note: Specifications are subject to change without notice

Page 2 of 2



26 50 00

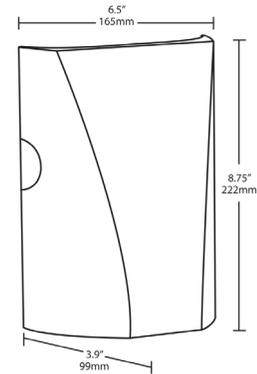
Created: 02/10/2015

SLIM18NW/PC

12, 18 and 26 Watt SLIM wallpacks are ultra efficient and deliver impressive light distribution with a compact low-profile design that's super easy to install as a downlight or uplight.

Color: White

Weight: 4.5 lbs



LED Info

Watts: 18W
Color Temp: 4000K (Neutral)
Color Accuracy: 82
L70 Lifespan: 100000
LM79 Lumens: 1855
Efficacy: 93 LPW

Driver Info

Type: Constant Current
120V: 0.18A
208V: N/A
240V: N/A
277V: N/A
Input Watts: 20W
Efficiency: 90%

Technical Specifications

SLIM18 with Photocell:

120V Button Photocell Included. Photocell is only compatible with 120V.

UL Listing:

Suitable for wet locations. Suitable for mounting within 1.2m (4ft) of the ground.

IP Rating:

Ingress Protection rating of IP66 for dust and water.

LED:

Multi-chip, long-life LED.

Lifespan:

100,000-hour LED lifespan based on IES LM-80 results and TM-21 calculations.

Driver:

Constant Current, Class 2, 100-277V, 50/60 Hz., 4KV surge protection, 500mA, 100-240VAC 0.3-0.15 Amps, 277VAC 0.15 Amps, Power Factor 99%.

THD:

10.4% at 120V

Cold Weather Starting:

The minimum starting temperature is -40°F/-40°C.

Ambient Temperature:

Suitable for use in 40°C (104°F) ambient temperatures.

Thermal Management:

Superior heat sinking with internal Air-Flow fins.

Housing:

Precision die-cast aluminum housing.

Mounting:

Heavy-duty mounting bracket with hinged housing for easy installation.

Recommended Mounting Height:

Up to 14 ft.

HID Replacement Range:

The SLIM18 can be used to replace 100W MH based on delivered lumens.

Lens:

Tempered glass lens.

Reflector:

Specular thermoplastic.

Gaskets:

High-temperature silicone.

Finish:

Our environmentally friendly polyester powder coatings are formulated for high-durability and long-lasting color, and contains no VOC or toxic heavy metals.

ADA Compliant:

SLIM™ is ADA Compliant.

DLC Listed:

This product is on the Design Lights Consortium (DLC) Qualified Products List and is eligible for rebates from DLC Member Utilities.

Dark Sky Approved:

The International Dark Sky Association has approved this product as a full cutoff, fully shielded luminaire.

Color Consistency:

3-step MacAdam Ellipse binning to achieve consistent fixture-to-fixture color.



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26 50 00

Created: 02/10/2015

SLIM18NW/PC - continued

Color Stability:

LED color temperature is warranted to shift no more than 200K in CCT over a 5 year period.

Color Uniformity:

RAB's range of CCT (Correlated Color Temperature) follows the guidelines for the American National Standard for Specifications for the Chromaticity of Solid State Lighting (SSL) Products, ANSI C78.377-2011.

Green Technology:

Mercury and UV free, and RoHS compliant.

California Title 24:

SLIM18/PC complies with 2013 California Title 24 building and electrical codes as a commercial outdoor non-pole-mounted fixture < 30 Watts.

IESNA LM-79 & LM-80 Testing:

RAB LED luminaires have been tested by an independent laboratory in accordance with IESNA LM-79 and LM-80, and have received the Department of Energy "Lighting Facts" label.

Patents:

The design of the SLIM™ is protected by patents in U.S. Pat D681,864, and pending patents in Canada, China, Taiwan and Mexico.

Country of Origin:

Designed by RAB in New Jersey and assembled in the USA by RAB's IBEW Local 3 workers.

Buy American Act Compliant:

This product is a COTS item manufactured in the United States, and is compliant with the Buy American Act.

Recovery Act (ARRA) Compliant:

This product complies with the 52.225-21 "Required Use of American Iron, Steel, and Manufactured Goods-- Buy American Act-- Construction Materials (October 2010).

Trade Agreements Act Compliant:

This product is a COTS item manufactured in the United States, and is compliant with the Trade Agreements Act.

GSA Schedule:

Suitable in accordance with FAR Subpart 25.4.



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Tech Help Line: 888 RAB-1000

Email: sales@rabweb.com

On the web at: www.rabweb.com

Note: Specifications are subject to change without notice

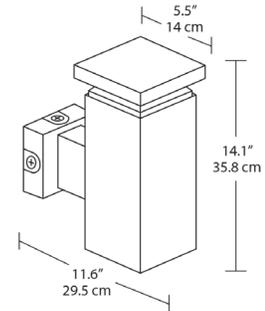
Page 2 of 2

WBLED18N/PCS

18 Watt LED wall sconce. Die-cast aluminum wall bracket with five 1/2" conduit openings with plugs.

Color: Bronze

Weight: 13.1 lbs



LED Info

Watts: 18W
Color Temp: 4000K (Neutral)
Color Accuracy: 85
L70 Lifespan: 100000
LM79 Lumens: 818
Efficacy: 37 LPW

Driver Info

Type: Constant Current
120V: 0.24A
208V: N/A
240V: N/A
277V: N/A
Input Watts: 22W
Efficiency: 82%

Technical Specifications

WBLED18 with Photocell:

120V Swivel Photocell Included. Photocell is only compatible with 120V.

UL Listing:

Suitable for wet locations. Suitable for mounting within 4 ft. (1.2m) of the ground.

LEDs:

6W multi-chip, long-life LEDs

Lifespan:

100,000-hour LED lifespan based on IES LM-80 results and TM-21 calculations

Driver:

Constant Current, Class 2, 100-277V, 50/60 Hz, 6kV Surge Protection, 700mA, 100-277VAC 0.04 A.

THD:

16.3% at 120V, 23.2% at 277V

Ambient Temperature:

Suitable for use in 40°C (104°F) ambient temperatures

Cold Weather Starting:

Minimum starting temperature is -40°F/-40°C

Thermal Management:

Cast aluminum Thermal Management system for optimal heat sinking. The BLED is designed for cool operation, maximum efficiency and long life by minimizing LED junction temperature.

Housing:

Die-cast aluminum with extruded aluminum bollard shaft

Lens:

Clear, vandal-resistant polycarbonate

Reflector:

Specular polycarbonate

Gaskets:

High-temperature silicone gaskets seal out moisture

Mounting:

Die-cast aluminum wall bracket with five (5) 1/2" conduit openings with plugs

Color Consistency:

3-step MacAdam Ellipse binning to achieve consistent fixture-to-fixture color.

Color Stability:

LED color temperature is warranted to shift no more than 200K in CCT over a 5 year period.

Color Uniformity:

RAB's range of CCT (Correlated Color Temperature) follows the guidelines of the American National Standard for Specifications for the Chromaticity of Solid State Lighting (SSL) Products, ANSI C78.377-2011

Finish:

Our environmentally friendly polyester powder coatings are formulated for high-durability and long-lasting color, and contain no VOC or toxic heavy metals.

Green Technology:

Mercury and UV free, and RoHS compliant. Polyester powder coat finish formulated without the use of VOC or toxic heavy metals.

California Title 24:

WBLED18/PCS complies with 2013 California Title 24 building and electrical codes as a commercial outdoor non-pole-mounted fixture < 30 Watts.



26 50 00

WBLED18N/PCS - continued

Created: 02/10/2015

IESNA LM-79 & IESNA LM-80 Testing:

RAB LED fixtures have been tested by an independent laboratory in accordance with IESNA LM-79 and 80, and have received the Department of Energy "Lighting Facts" label.

Patents:

The design of WBLED is protected by patents pending in US, Canada, China, Taiwan and Mexico.

Warranty:

RAB warrants that our LED products will be free from defects in materials and workmanship for a period of five (5) years from the date of delivery to the end user, including coverage of light output, color stability, driver performance and fixture finish.

Country of Origin:

Designed by RAB in New Jersey and assembled in the USA by RAB's IBEW Local 3 workers.

Buy American Act Compliant:

This product is a COTS item manufactured in the United States, and is compliant with the Buy American Act.

Recovery Act (ARRA) Compliant:

This product complies with the 52.225-21 "Required Use of American Iron, Steel, and Manufactured Goods -- Buy American Act -- Construction Materials (October 2010).

Trade Agreements Act Compliant:

This product is a COTS item manufactured in the United States, and is compliant with the Trade Agreements Act.

GSA Schedule:

Suitable in accordance with FAR Subpart 25.4.



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Page 2 of 2

SLIM™ 12W/18W/26W INSTALLATION INSTRUCTIONS



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IMPORTANT

READ CAREFULLY BEFORE INSTALLING FIXTURE. RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE.

RAB fixtures must be wired in accordance with the National Electrical Code and all applicable local codes. Proper grounding is required for safety. THIS PRODUCT MUST BE INSTALLED IN ACCORDANCE WITH THE APPLICABLE INSTALLATION CODE BY A PERSON FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THE PRODUCT AND THE HAZARDS INVOLVED.

WARNING: Make certain power is OFF before installing or maintaining fixture.

No user servicable parts inside.

FIXTURE MOUNTING

To ensure weatherproof seal, apply weatherproof silicone sealant around the edge of the **Wall Mounting Box** and/or **Junction Box**. This is especially important with an uneven wall surface. Silicone all plugs and unused conduit entries.

MOUNTING TO JUNCTION BOX

1. Loosen the **Bottom Screw** and open the **Housing**.
Knock out appropriate **Slots** when mounting to Junction Box. (not supplied)
2. Using the **Leveling Bubble** in the **Wall Mounting Box**, level the **Fixture**.
3. Feed supply wires through **Junction Box**, **Gasket** and **Wall Mounting Box**. Check the **Gasket** is fully sealed.
4. Wire the fixture using provided wire connectors.
5. Place wired fixture over the **Wall Mounting Box**, close and tighten the **Bottom Screw**. Check **Door Gasket**.

MOUNTING TO WALL

1. Secure **Wall Mounting Box** to a sturdy wall. Use appropriate mounting hardware such as lag bolts and anchors with washers suitable for the mounting surface.
2. Using the **Leveling Bubble** in the **Wall Mounting Box**, level the **Fixture**.
3. Secure fixture on top hinges as shown in Fig 1 for hands free wiring.
4. Wire the fixture using provided wire connectors.
5. Place wired fixture over the **Wall Mounting Box**, close and tighten the **Bottom Screw**. Check **Door Gasket**.

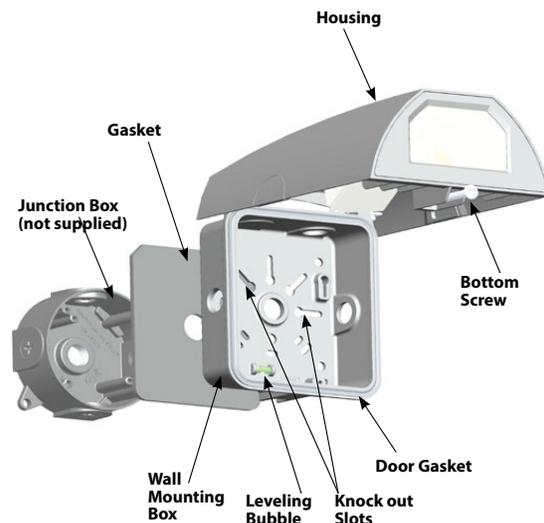


Fig. 1
Hands free Wiring



26 50 00

SLIM™ 12W/18W/26W INSTALLATION INSTRUCTIONS

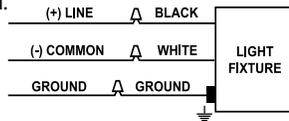


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WIRING

Universal voltage driver permits operation at 120V thru 277V, 50 or 60 Hz. Units ordered with (/347) suffix are 347V, 60Hz.

1. Connect the black fixture lead to the (+) LINE supply lead.
2. Connect the white fixture lead to the (-) COMMON supply lead.
3. Connect the GROUND wire from fixture to supply ground.



CLEANING & MAINTENANCE

CAUTION: Be sure fixture temperature is cool enough to touch. Do not clean or maintain while fixture is energized.

1. Clean glass lens & fixture with non-abrasive glass cleaning solution.
2. Do not open fixture to clean the LED. Do not touch the LED.

TROUBLESHOOTING

1. Check that the line voltage at fixture is correct. Refer to wiring directions.
2. Is the fixture grounded properly?

0-10V DIMMABLE WIRING

Universal voltage driver permits operation at 120V thru 277V, 50 or 60 Hz. For 0-10V Dimming, follow the wiring directions as in fig. 2.

1. For Junction Box Mount, feed wires through silicone wiring plug into the junction box.
2. Connect the black fixture lead to the (+) LINE supply lead.
3. Connect the white fixture lead to the (-) COMMON supply lead.
4. Connect the GROUND wire from fixture to supply ground. Do NOT connect the GROUND of the dimming fixture to the output.
5. Connect the purple fixture lead to the (V+) DIM lead.
6. Connect the gray fixture lead to the (V-) DIM lead.
7. Cap the yellow fixture lead, if present. Do NOT connect.

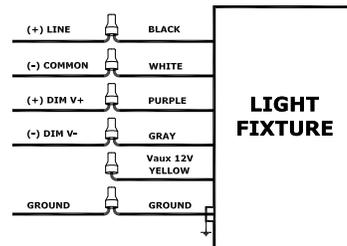


Fig. 2

SLIM12

| | |
|---|-----------------|
| Light Output (Lumens) | 1531 |
| Watts | 13.8 |
| Lumens per Watt (Efficacy) | 111 |
| Color Accuracy Color Rendering Index (CRI) | 67 |
| Light Color Correlated Color Temperature (CCT) | 5119 (Daylight) |

2700K 3000K 4500K Daylight 6500K

All results are according to IESNA LM-79-2008: Approved Method for the Electrical and Photometric Testing of Solid-State Lighting. The U.S. Department of Energy (DOE) verifies product test data and results.

Visit www.lightingfacts.com for the Label Reference Guide.

Registration Number: WYMA-03FAUK (8/23/2014)
Model Number: SLIM12 (Upgrade - 6/4/2014)
Type: Luminaire - Area/Roadway

SLIM18

| | |
|---|-----------------|
| Light Output (Lumens) | 2096 |
| Watts | 19.9 |
| Lumens per Watt (Efficacy) | 105 |
| Color Accuracy Color Rendering Index (CRI) | 67 |
| Light Color Correlated Color Temperature (CCT) | 5121 (Daylight) |

2700K 3000K 4500K Daylight 6500K

All results are according to IESNA LM-79-2008: Approved Method for the Electrical and Photometric Testing of Solid-State Lighting. The U.S. Department of Energy (DOE) verifies product test data and results.

Visit www.lightingfacts.com for the Label Reference Guide.

Registration Number: WYMA-T08F05 (8/23/2014)
Model Number: SLIM18 (Upgrade - 6/6/2014)
Type: Luminaire - Area/Roadway

SLIM26

| | |
|---|-----------------|
| Light Output (Lumens) | 2849 |
| Watts | 29.4 |
| Lumens per Watt (Efficacy) | 97 |
| Color Accuracy Color Rendering Index (CRI) | 67 |
| Light Color Correlated Color Temperature (CCT) | 5114 (Daylight) |

2700K 3000K 4500K Daylight 6500K

All results are according to IESNA LM-79-2008: Approved Method for the Electrical and Photometric Testing of Solid-State Lighting. The U.S. Department of Energy (DOE) verifies product test data and results.

Visit www.lightingfacts.com for the Label Reference Guide.

Registration Number: WYMA-NR01F (8/23/2014)
Model Number: SLIM26 (Upgrade - 6/6/2014)
Type: Luminaire - Area/Roadway

Note: These instructions do not cover all details or variations in equipment nor do they provide for every possible situation during installation operation or maintenance. Patent - US: pat. 681,864



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rabweb.com
Visit our website for product info

email
Answered promptly sales@rabweb.com

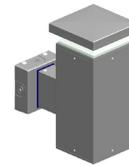


ARCHITECTURAL SCONCE INSTALLATION INSTRUCTIONS

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WBLED ROUND



WBLED SQUARE

IMPORTANT

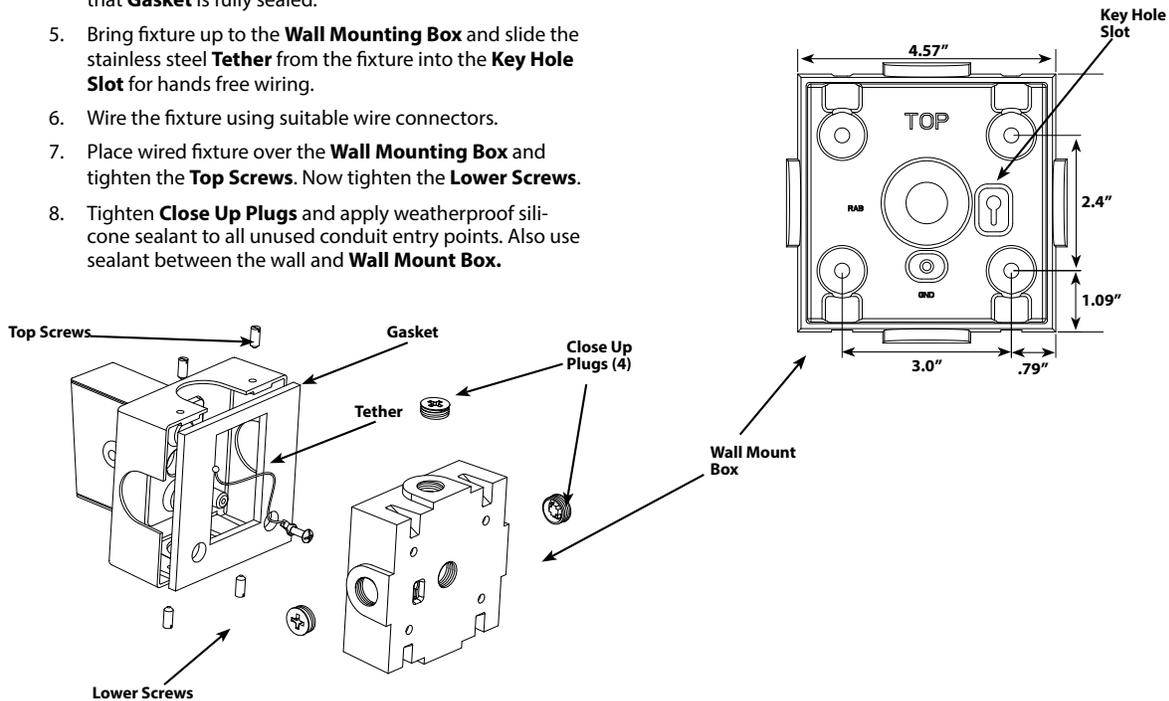
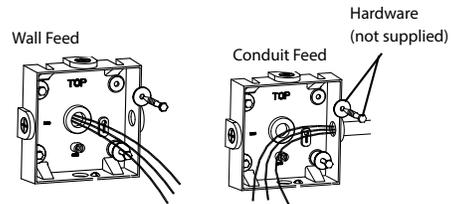
READ CAREFULLY BEFORE INSTALLING FIXTURE. RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE.

RAB fixtures must be wired in accordance with the National Electrical Code and all applicable local codes. Proper grounding is required for safety. THIS PRODUCT MUST BE INSTALLED IN ACCORDANCE WITH THE APPLICABLE INSTALLATION CODE BY A PERSON FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THE PRODUCT AND THE HAZARDS INVOLVED.

WARNING: Make certain power is OFF before installing or maintaining fixture. No user serviceable parts inside.

MOUNTING TO A WALL

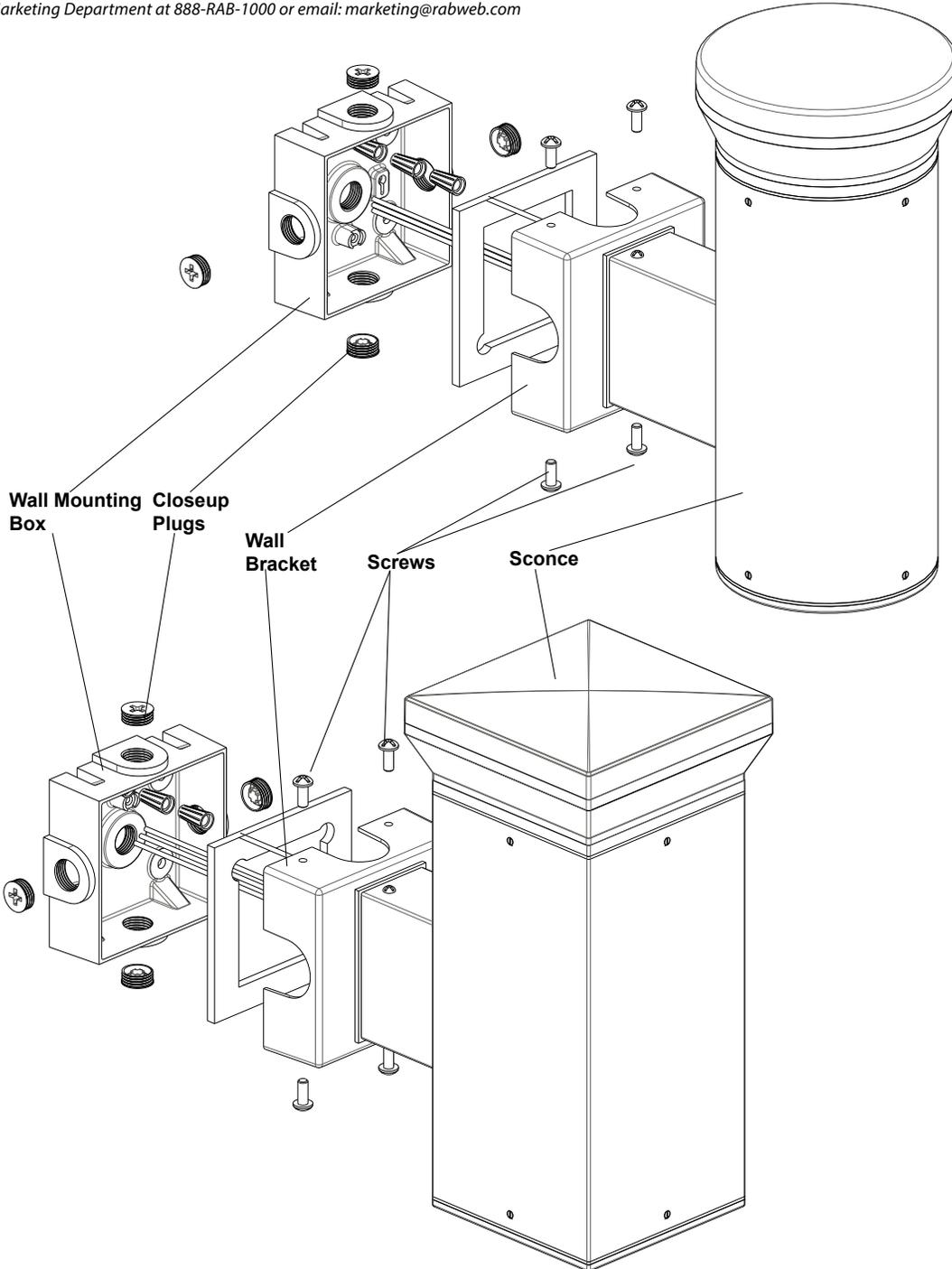
1. Detach the **Wall Mounting Box** from the **Scence** opening the four screws.
2. Orient box so that "TOP" is on top.
3. Secure **Wall Mounting Box** to a sturdy wall. Use appropriate mounting hardware such as lag bolts and anchors with washers suitable for the mounting surface.
4. Feed supply wires through **Wall Mounting Box**. Check that **Gasket** is fully sealed.
5. Bring fixture up to the **Wall Mounting Box** and slide the stainless steel **Tether** from the fixture into the **Key Hole Slot** for hands free wiring.
6. Wire the fixture using suitable wire connectors.
7. Place wired fixture over the **Wall Mounting Box** and tighten the **Top Screws**. Now tighten the **Lower Screws**.
8. Tighten **Close Up Plugs** and apply weatherproof silicone sealant to all unused conduit entry points. Also use sealant between the wall and **Wall Mount Box**.



ARCHITECTURAL SCNCE INSTALLATION INSTRUCTIONS



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WBLED IN 0913

ARCHITECTURAL SCNCE INSTALLATION INSTRUCTIONS

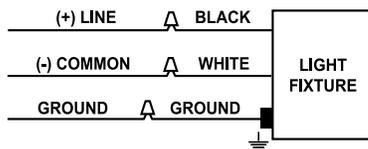


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WIRING

Universal voltage driver permits operation at 120V to 277VAC, 50 or 60 Hz.

1. Connect the BLACK fixture lead to the (+) LINE supply lead.
2. Connect the WHITE fixture lead to the (-) COMMON supply lead.
3. Connect the bare copper Ground wire from fixture to supply ground.



CLEANING & MAINTENANCE

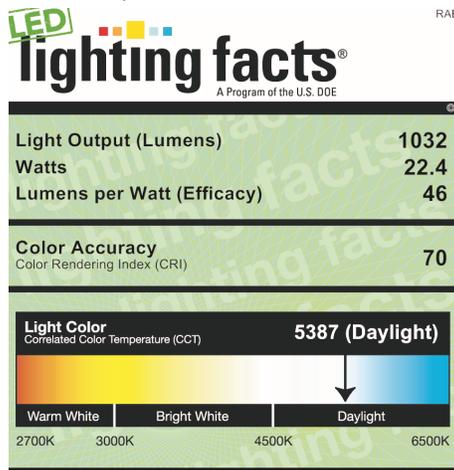
CAUTION: Be sure fixture temperature is cool enough to touch. Do not clean or maintain while fixture is energized.

1. Clean lens with non-abrasive cleaning solution.
2. Do not open the fixture to clean the LED. Do not touch the LED.

TROUBLESHOOTING

1. Check that the line voltage at the fixture is correct. Refer to wiring directions.
2. Is the fixture is grounded properly?

WBLED24 Square Sconce 18W Cool LED



All results are according to IESNA LM-79-2008: Approved Method for the Electrical and Photometric Testing of Solid-State Lighting. The U.S. Department of Energy (DOE) verifies product test data and results.

Visit www.lightingfacts.com for the Label Reference Guide.

Registration Number: WVMA-NLrQYN (9/25/2013)
Model Number: WBLED18
Type: Luminaire - Other

SCNCE Round: US pat. D675,766, CA Pat. pending, CN ZL201230350184.6, MX pat. pending, TX: pat.pending
SCNCE Square: US pat. D675,767, CA Pat. pending, CN ZL201230350185.0, MX pat. pending, TX: pat.pending

WBLEDR24 Round Sconce 18W Cool LED



All results are according to IESNA LM-79-2008: Approved Method for the Electrical and Photometric Testing of Solid-State Lighting. The U.S. Department of Energy (DOE) verifies product test data and results.

Visit www.lightingfacts.com for the Label Reference Guide.

Registration Number: WVMA-Lh41CK (9/25/2013)
Model Number: WBLEDR18
Type: Luminaire - Other

Note: These instructions do not cover all details or variations in equipment nor do they provide for every possible situation during installation, operation or maintenance.



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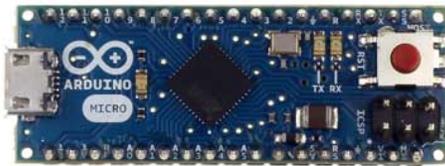


DIVISION 27 COMMUNICATIONS

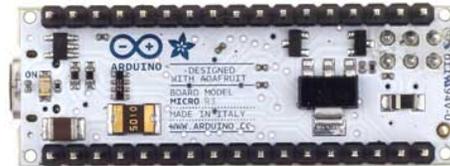
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(<http://arduino.cc/en/uploads/Main/ArduinoMicroBack.jpg>)
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[main_page=product_info&cPath=11_12&products_id=245](http://store.arduino.cc/ww/index.php?main_page=product_info&cPath=11_12&products_id=245))

Buy From **Distributors**

(<http://arduino.cc/en/Main/Buy>)

Overview

The Arduino Micro is a microcontroller board based on the ATmega32u4 (datasheet (http://www.atmel.it/Images/Atmel-7766-8-bit-AVR-ATmega16U4-32U4_%20Datasheet.pdf)), developed in conjunction with Adafruit (<http://adafruit.com/>). It has 20 digital input/output pins (of which 7 can be used as PWM outputs and 12 as analog inputs), a 16 MHz crystal oscillator, a micro USB connection, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a micro USB cable to get started. It has a form factor that enables it to be easily placed on a breadboard.

The Micro is similar to the Arduino Leonardo in that the ATmega32u4 has built-in USB communication, eliminating the need for a secondary processor. This allows the Micro to appear to a connected computer as a mouse and keyboard, in addition to a virtual (CDC) serial / COM port. It also has other implications for the behavior of the board; these are detailed on the getting started page (<http://arduino.cc/en/Guide/ArduinoLeonardo>).

Summary

| | |
|-----------------------------|------------|
| Microcontroller | ATmega32u4 |
| Operating Voltage | 5V |
| Input Voltage (recommended) | 7-12V |
| Input Voltage (limits) | 6-20V |
| Digital I/O Pins | 20 |
| PWM Channels | 7 |



27 00 00

| | |
|-------------------------|---|
| Analog Input Channels | 12 |
| DC Current per I/O Pin | 40 mA |
| DC Current for 3.3V Pin | 50 mA |
| Flash Memory | 32 KB (ATmega32u4) of which 4 KB used by bootloader |
| SRAM | 2.5 KB (ATmega32u4) |
| EEPROM | 1 KB (ATmega32u4) |
| Clock Speed | 16 MHz |

Schematic & Reference Design

EAGLE files: arduino-micro-reference-design.zip (<http://arduino.cc/en/uploads/Main/arduino-micro-reference-design.zip>)
Schematic: arduino-micro-schematic-rev3b.pdf (<http://arduino.cc/en/uploads/Main/arduino-micro-schematic.pdf>)

Power

The Arduino Micro can be powered via the micro USB connection or with an external power supply. The power source is selected automatically.

External (non-USB) power can come either from a DC power supply or battery. Leads from a battery or DC power supply can be connected to the Gnd and Vin pins.

The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

The power pins are as follows:

- **V_I**. The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin.
- **5V**. The regulated power supply used to power the microcontroller and other components on the board. This can come either from VIN via an on-board regulator, or be supplied by USB or another regulated 5V supply.
- **3V**. A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.
- **≡** Ground pins.

Memory

The ATmega32u4 has 32 KB (with 4 KB used for the bootloader). It also has 2.5 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library (<http://www.arduino.cc/en/Reference/EEPROM>)).

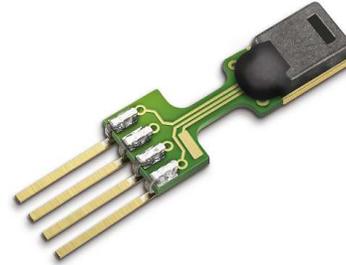
Input and Output

Each of the 20 digital i/o pins on the Micro can be used as an input or output, using `pinMode()` (<http://arduino.cc/en/Reference/PinMode>), `digitalWrite()` (<http://arduino.cc/en/Reference/DigitalWrite>), and `digitalRead()` (<http://arduino.cc/en/Reference/DigitalRead>) functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kOhms. In addition, some pins have specialized functions:

- **Serial: 0 (RX) and 1 (TX)**. Used to receive (RX) and transmit (TX) TTL serial data using the ATmega32U4 hardware serial capability. Note that on the Micro, the `Serial` class refers to USB (CDC) communication; for TTL serial on pins 0 and 1, use the `Serial1` class.
- **TWI: 2 (SDA) and 3 (SCL)**. Support TWI communication using the `Wire` library (<http://arduino.cc/en/Reference/Wire>).
- **External Interrupts: 0(RX), 1(TX), 2 and 3**. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the `attachInterrupt()` (<http://arduino.cc/en/Reference/AttachInterrupt>) function for details.
- **PWM: 3, 5, 6, 9, 10, 11 and 13**. Provide 8-bit PWM output with the `analogWrite()` (<http://arduino.cc/en/Reference/AnalogWrite>) function.
- **SPI: on the ICSP header**. These pins support SPI communication using the `SPI` library (<http://arduino.cc/en/Reference/SPI>). Note that the SPI pins are not connected to any of the digital I/O pins as they are on the Arduino Uno, they are only available on the ICSP connector and on the nearby pins labelled MISO, MOSI and SCK.
- **RX_LED/SS** This is an additional pin with respect to the Leonardo. It is connected to the RX_LED that indicates the activity of transmission during USB communication, but is can also be used as slave select pin (SS) in SPI communication.
- **LED: 13**. There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.

Datasheet SHT7x (SHT71, SHT75) Humidity and Temperature Sensor IC

- Fully calibrated
- Digital output
- Low power consumption
- Excellent long term stability
- Pin type package – easy integration



Product Summary

SHT7x (including SHT71 and SHT75) is Sensirion's family of relative humidity and temperature sensors with pins. The sensors integrate sensor elements plus signal processing in compact format and provide a fully calibrated digital output. A unique capacitive sensor element is used for measuring relative humidity while temperature is measured by a band-gap sensor. The applied CMOSens® technology guarantees excellent reliability and long term stability. Both sensors are seamlessly coupled to a 14bit analog to digital converter and a serial interface circuit. This results in superior signal quality, a fast response time and insensitivity to external disturbances (EMC).

Each SHT7x is individually calibrated in a precision humidity chamber. The calibration coefficients are programmed into an OTP memory on the chip. These coefficients are used to internally calibrate the signals from the sensors. The 2-wire serial interface and internal voltage regulation allows for easy and fast system integration. The small size and low power consumption makes SHT7x the ultimate choice for even the most demanding applications.

SHT7x is supplied on FR4 with pins which allows for easy integration or replacement. The same sensor is also available as surface mountable packaging (SHT1x) or on flex print (SHTA1).

Dimensions

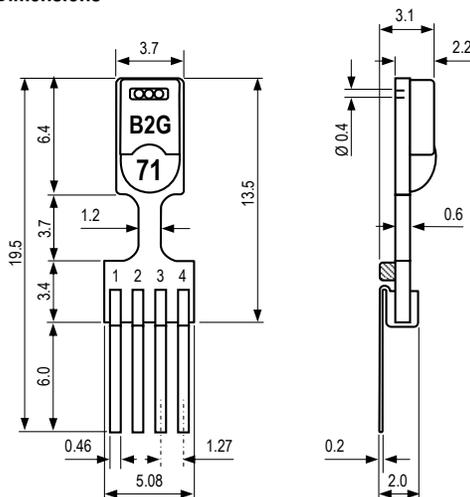


Figure 1: Drawing of SHT7x (applies to SHT71 and SHT75) sensor packaging, dimensions in mm (1mm = 0.039inch). Contact assignment: 1: SCK, 2: VDD, 3: GND, 4: DATA. Hatched item on backside of PCB is a 100nF capacitor – see Section 2.1 for more information.

Sensor Chip

SHT7x V4 – for which this datasheet applies – features a version 4 Silicon sensor chip. Besides a humidity and a temperature sensor the chip contains an amplifier, A/D converter, OTP memory and a digital interface. V4 sensors can be identified by the alpha-numeric traceability code on the sensor cap – see example “B2G” code on Figure 1.

Material Contents

While the sensor is made of a CMOS chip the sensor housing consists of an LCP cap with epoxy glob top on an FR4 substrate. Pins are made of a Cu/Be alloy coated with Ni and Au. The device is fully RoHS and WEEE compliant, thus it is free of Pb, Cd, Hg, Cr(6+), PBB and PBDE.

Evaluation Kits

For sensor trial measurements, for qualification of the sensor or even experimental application (data logging) of the sensor there is an evaluation kit *EK-H4* available including SHT71 (same sensor chip as SHT1x) and 4 sensor channels, hard and software to interface with a computer. For other evaluation kits please check www.sensirion.com/humidity.

Sensor Performance

Relative Humidity

| Parameter | Condition | min | typ | max | Units |
|--------------------------------|------------|--------------|-------|------|--------|
| Resolution ¹ | | 0.4 | 0.05 | 0.05 | %RH |
| | | 8 | 12 | 12 | bit |
| Accuracy ² SHT71 | typ | | ±3.0 | | %RH |
| | max | see Figure 2 | | | |
| Accuracy ² SHT75 | typ | | ±1.8 | | %RH |
| | max | see Figure 2 | | | |
| Repeatability | | | ±0.1 | | %RH |
| Hysteresis | | | ±1 | | %RH |
| Nonlinearity | raw data | | ±3 | | %RH |
| | linearized | | <<1 | | %RH |
| Response time ³ | tau 63% | | 8 | | s |
| Operating Range | | 0 | | 100 | %RH |
| Long term drift ⁴ | normal | | < 0.5 | | %RH/yr |

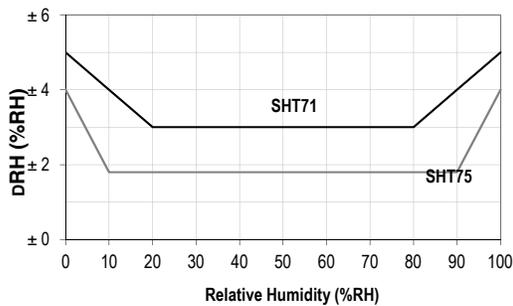


Figure 2: Maximal RH-tolerance at 25°C per sensor type.

Temperature

| Parameter | Condition | min | typ | max | Units |
|--------------------------------|-----------|--------------|--------|-------|-------|
| Resolution ¹ | | 0.04 | 0.01 | 0.01 | °C |
| | | 12 | 14 | 14 | bit |
| Accuracy ² SHT71 | typ | | ±0.4 | | °C |
| | max | see Figure 3 | | | |
| Accuracy ² SHT75 | typ | | ±0.3 | | °C |
| | max | see Figure 3 | | | |
| Repeatability | | | ±0.1 | | °C |
| Operating Range | | -40 | | 123.8 | °C |
| | | -40 | | 254.9 | °F |
| Response Time ⁶ | tau 63% | 5 | | 30 | s |
| Long term drift | | | < 0.04 | | °C/yr |

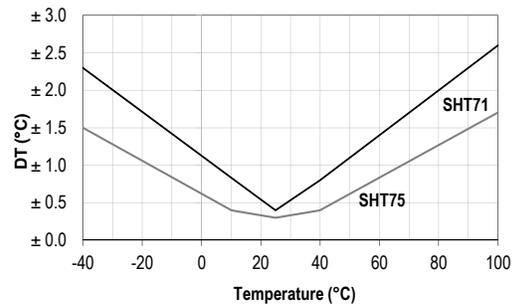


Figure 3: Maximal T-tolerance per sensor type.

Electrical and General Items

| Parameter | Condition | min | typ | max | Units |
|--------------------------------|---|-----|-----|-----|-------|
| Source Voltage | | 2.4 | 3.3 | 5.5 | V |
| Power Consumption ⁵ | sleep | | 2 | 5 | µW |
| | measuring | | 3 | | mW |
| | average | | 90 | | µW |
| Communication | digital 2-wire interface, see Communication | | | | |
| Storage | 10 – 50°C (0 – 80°C peak), 20 – 60%RH | | | | |

Packaging Information

| Sensor Type | Packaging | Quantity | Order Number |
|-------------|--------------|----------|--------------|
| SHT71 | Tape Stripes | 50 | 1-100092-04 |
| SHT75 | Tape Stripes | 50 | 1-100071-04 |

This datasheet is subject to change and may be amended without prior notice.

¹ The default measurement resolution of is 14bit for temperature and 12bit for humidity. It can be reduced to 12/8bit by command to status register.

² Accuracies are tested at Outgoing Quality Control at 25°C (77°F) and 3.3V. Values exclude hysteresis and are only applicable to non-condensing environments.

³ Time for reaching 63% of a step function, valid at 25°C and 1 m/s airflow.

⁴ Value may be higher in environments with high contents of volatile organic compounds. See Section 1.3 of Users Guide.

⁵ Values for VDD=3.3V at 25°C, average value at one 12bit measurement per second.

⁶ Response time depends on heat capacity of and thermal resistance to sensor substrate.

1. XBee/XBee-PRO OEM RF Modules

The XBee and XBee-PRO OEM RF Modules were engineered to meet IEEE 802.15.4 standards and support the unique needs of low-cost, low-power wireless sensor networks. The modules require minimal power and provide reliable delivery of data between devices.

The modules operate within the ISM 2.4 GHz frequency band and are pin-for-pin compatible with each other.



1.1. Key Features

Long Range Data Integrity

XBee

- Indoor/Urban: up to 100' (30 m)
- Outdoor line-of-sight: up to 300' (100 m)
- Transmit Power: 1 mW (0 dBm)
- Receiver Sensitivity: -92 dBm

XBee-PRO

- Indoor/Urban: up to 300' (100 m)
- Outdoor line-of-sight: up to 1 mile (1500 m)
- Transmit Power: 100 mW (20 dBm) EIRP
- Receiver Sensitivity: -100 dBm

RF Data Rate: 250,000 bps

Advanced Networking & Security

Retries and Acknowledgements
 DSSS (Direct Sequence Spread Spectrum)
 Each direct sequence channels has over 65,000 unique network addresses available
 Source/Destination Addressing
 Unicast & Broadcast Communications
 Point-to-point, point-to-multipoint and peer-to-peer topologies supported
 Coordinator/End Device operations

Low Power

XBee

- TX Current: 45 mA (@3.3 V)
- RX Current: 50 mA (@3.3 V)
- Power-down Current: < 10 µA

XBee-PRO

- TX Current: 215 mA (@3.3 V)
- RX Current: 55 mA (@3.3 V)
- Power-down Current: < 10 µA

ADC and I/O line support

Analog-to-digital conversion, Digital I/O
 I/O Line Passing

Easy-to-Use

No configuration necessary for out-of box RF communications
 Free X-CTU Software (Testing and configuration software)
 AT and API Command Modes for configuring module parameters
 Extensive command set
 Small form factor

Free & Unlimited RF-XPert Support

1.1.1. Worldwide Acceptance

FCC Approval (USA) Refer to Appendix A [p59] for FCC Requirements. Systems that contain XBee/XBee-PRO RF Modules inherit MaxStream Certifications.

ISM (Industrial, Scientific & Medical) **2.4 GHz frequency band**

Manufactured under **ISO 9001:2000** registered standards

XBee/XBee-PRO RF Modules are optimized for use in the **United States, Canada, Australia, Israel and Europe.** Contact MaxStream for complete list of government agency approvals.



1.2. Specifications

Table 1-01. Specifications of the XBee/XBee-PRO OEM RF Modules

| Specification | XBee | XBee-PRO |
|--|--|---|
| Performance | | |
| Indoor/Urban Range | up to 100 ft. (30 m) | Up to 300' (100 m) |
| Outdoor RF line-of-sight Range | up to 300 ft. (100 m) | Up to 1 mile (1500 m) |
| Transmit Power Output (software selectable) | 1mW (0 dBm) | 60 mW (18 dBm) conducted, 100 mW (20 dBm) EIRP* |
| RF Data Rate | 250,000 bps | 250,000 bps |
| Serial Interface Data Rate (software selectable) | 1200 - 115200 bps (non-standard baud rates also supported) | 1200 - 115200 bps (non-standard baud rates also supported) |
| Receiver Sensitivity | -92 dBm (1% packet error rate) | -100 dBm (1% packet error rate) |
| Power Requirements | | |
| Supply Voltage | 2.8 – 3.4 V | 2.8 – 3.4 V |
| Transmit Current (typical) | 45mA (@ 3.3 V) | If PL=0 (10dBm): 137mA(@3.3V), 139mA(@3.0V) PL=1 (12dBm): 155mA (@3.3V), 153mA(@3.0V) PL=2 (14dBm): 170mA (@3.3V), 171mA(@3.0V) PL=3 (16dBm): 188mA (@3.3V), 195mA(@3.0V) PL=4 (18dBm): 215mA (@3.3V), 227mA(@3.0V) |
| Idle / Receive Current (typical) | 50mA (@ 3.3 V) | 55mA (@ 3.3 V) |
| Power-down Current | < 10 µA | < 10 µA |
| General | | |
| Operating Frequency | ISM 2.4 GHz | ISM 2.4 GHz |
| Dimensions | 0.960" x 1.087" (2.438cm x 2.761cm) | 0.960" x 1.297" (2.438cm x 3.294cm) |
| Operating Temperature | -40 to 85° C (industrial) | -40 to 85° C (industrial) |
| Antenna Options | Integrated Whip, Chip or U.FL Connector | Integrated Whip, Chip or U.FL Connector |
| Networking & Security | | |
| Supported Network Topologies | Point-to-point, Point-to-multipoint & Peer-to-peer | |
| Number of Channels (software selectable) | 16 Direct Sequence Channels | 12 Direct Sequence Channels |
| Addressing Options | PAN ID, Channel and Addresses | |
| Agency Approvals | | |
| United States (FCC Part 15.247) | OUR-XBEE | OUR-XBEEPRO |
| Industry Canada (IC) | 4214A XBEE | 4214A XBEEPRO |
| Europe (CE) | ETSI | ETSI (Max. 10 dBm transmit power output)* |
| Japan | n/a | 005NYCA0378 (Max. 10 dBm transmit power output)** |

* When operating in Europe: XBee-PRO RF Modules must be configured to operate at a maximum transmit power output level of 10 dBm. The power output level is set using the PL command. The PL parameter must equal "0" (10 dBm).

Additionally, European regulations stipulate an EIRP power maximum of 12.86 dBm (19 mW) for the XBee-PRO and 12.11 dBm for the XBee when integrating high-gain antennas.

** When operating in Japan: Transmit power output is limited to 10 dBm. A special part number is required when ordering modules approved for use in Japan. Contact MaxStream for more information [call 1-801-765-9885 or send e-mails to sales@maxstream.net].

Antenna Options: The ranges specified are typical when using the integrated Whip (1.5 dBi) and Dipole (2.1 dBi) antennas. The Chip antenna option provides advantages in its form factor; however, it typically yields shorter range than the Whip and Dipole antenna options when transmitting outdoors. For more information, refer to the "XBee Antenna" application note located on MaxStream's web site (<http://www.maxstream.net/support/knowledgebase/article.php?kb=153>).

