

TECHNICAL INFORMATION

Glazing Performance Terms

U-Factor: U-factor measures how well a product prevents heat from escaping. The rate of heat loss is indicated in terms of the U-factor (U-value) of a window assembly. U-factor ratings generally fall between 0.20 and 1.20. The insulating value is indicated by the R-value, which is the inverse of the U-factor. The lower the U-factor, the greater a window's resistance to heat flow and the better its insulating value.

Solar Heat Gain Coefficient: Solar heat gain coefficient (SHGC) measures how well a product blocks heat caused by sunlight. The SHGC is the fraction of incident solar radiation admitted through a window, both directly transmitted and absorbed and subsequently released inward. SHGC is expressed as a number between 0 and 1. The lower a window's solar heat gain coefficient, the less solar heat it transmits.

Visible Transmittance: The visible transmittance (Vt) is an optical property that indicates the amount of visible light transmitted. Vt is expressed as a number between 0 and 1. The higher the Vt, the more light is transmitted.

Condensation Resistance Rating: Condensation Resistance (CR) measures how well a window or door resists the formation of condensation. CR is expressed as a number between 1 and 100. The higher the number, the better the resistance to condensation.



NFRC Labeling

All certified Sierra Pacific Windows and Doors are shipped with both a temporary and permanent label affixed to the glass.

The temporary label is intended to remain on the unit through the construction process and provides the consumers, builders and code officials with energy performance ratings in a comparable, easy-to-read format. The label shows the product is NFRC certified, provides a brief product description, and shows the pertinent thermal performance values.

The permanent label allows for manufacturer identification and performance tracking for the life of the product.

NFRC Thermal Performance Data				
Type	U-factor	SHGC	Vt	CR
Clad Exterior Product				
Clad Aspen Casement Windows (wide sash only)	0.35	0.29	0.48	55
Clad Aspen Awning Windows (wide sash only)	0.35	0.29	0.48	53
Clad Casement Windows (wide sash)	0.35	0.29	0.49	55
Clad Casement Windows (narrow sash)	0.35	0.31	0.54	53
Clad Casement Picture Windows (wide sash)	0.34	0.35	0.57	54
Clad Casement Picture Windows (narrow sash)	0.34	0.35	0.60	53
Clad French Casement Windows (wide sash)	0.35	0.29	0.49	55
Clad Awning Windows (wide sash)	0.36	0.29	0.49	53
Clad Awning Windows (narrow sash)	0.35	0.31	0.53	51
Clad Sedona Casement Windows	0.35	0.29	0.49	55
Clad Sedona Casement Picture Windows	0.34	0.35	0.57	54
Clad Carmel Double Hung Windows	0.35	0.31	0.53	53
Clad Carmel Double Hung Picture Windows	0.34	0.32	0.55	56
Clad Horizontal Sliding Windows	0.35	0.31	0.53	54
Clad Direct Glaze Windows	0.33	0.37	0.65	49
Clad Direct Glaze Windows (w/ sash)	0.32	0.35	0.60	54
Clad Patio Sliding Doors	0.35	0.28	0.47	51
Clad Patio Sliding Sidelights (wide stiles)	0.39	0.20	0.32	57
Clad Patio Sliding Sidelights (narrow stiles)	0.38	0.26	0.44	56
Clad Inswing Doors	0.34	0.25	0.43	58
Clad Inswing Door Sidelights	0.34	0.25	0.43	58
Clad Outswing Doors	0.36	0.26	0.43	57
Clad Outswing Door Sidelights	0.38	0.26	0.44	56
Clad Commercial Outswing Doors	0.36	0.26	0.43	57
Clad Flexible Access Inswing Doors	0.36	0.24	0.40	52
Clad Flexible Access Inswing Door Sidelights	0.38	0.18	0.30	54
Clad Flexible Access Outswing Doors	0.39	0.24	0.40	50
Clad Flexible Access Outswing Door Sidelights	0.41	0.19	0.30	52
Clad Transoms	0.37	0.27	0.45	54
Wood Exterior Product				
Casement Windows (wide sash)	0.32	0.28	0.48	56
Casement Picture Windows (wide sash)	0.31	0.33	0.56	56
French Casement Windows (wide sash)	0.32	0.28	0.48	56
Awning Windows (wide sash)	0.32	0.28	0.48	54
Sedona Casement Windows	0.32	0.28	0.48	56
Sedona Casement Picture Windows	0.31	0.33	0.56	56
Sedona Awning Windows	0.32	0.28	0.48	54
Direct Glaze Windows	0.31	0.37	0.65	55
Direct Glaze Windows (w/sash)	0.31	0.33	0.57	56
Patio Sliding Doors	0.33	0.28	0.47	54
Patio Sliding Door Sidelights (standard wide stiles)	0.34	0.20	0.32	58
Patio Sliding Door Sidelights (narrow stiles)	0.34	0.26	0.44	58
Inswing Doors	0.33	0.25	0.43	58
Inswing Door Sidelights	0.33	0.26	0.45	58
Outswing Doors	0.34	0.26	0.43	58
Outswing Door Sidelights	0.33	0.26	0.44	58
Transoms	0.33	0.27	0.46	55
All values calculated using insulated glass with Cardinal LoE 272.				
Consult the Sierra Pacific Windows Architectural CD or website for more glazing options.				

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Understanding Product Performance

The functional performance of window or door products is determined through a series of tests which include air / water infiltration and structural wind load testing. Product performance as specified by AAMA/WDMA/CSA/101/I.S.2/A440 is based upon performance class and performance grade assigned as a result of these and other tests.

Performance class:

AAMA/WDMA/CSA/101/I.S.2/A440 defines five performance classes: R, LC, C, HC and AW.

Performance grade:

The performance grade is the design pressure (in psf) for which a product has been rated. Product is tested to a structural test pressure equal to 1.5 times the design pressure.

Product performance is designated by a product code followed by the performance class and the performance grade, for example

C-C 30

Where the first C identifies the product type as a casement window that has been designated C (class) 30 (grade). 30 is the design pressure in psf.

The “gateway” design pressure, structural test pressure and water resistance test pressure (all in psf) for each performance class is:

Performance Class	Design Pressure	Structural Test Pressure	Water Resistance Test Pressure
R	15	22.5	2.86
LC	25	37.5	3.75
C	30	45	4.50
HC	40	60	6.00
AW	40	60	8.00

“Gateway” (minimum) test sizes are mandatory for each performance class and vary by product type.

Requirements also include testing for air infiltration. Air infiltration testing is performed at 1.57 or 6.24 psf depending upon the product type and performance class.

Other test requirements are also dependant upon product type and performance class. Among these are forced entry, hardware load and operating force.

Optional performance grade levels are available when higher structural or water performance is desired.

CLAD EXTERIOR PRODUCT	PERFORMANCE RATING
CLAD CASEMENT	C40
CLAD SEDONA CASEMENT	C30
CLAD ASPEN CASEMENT	C40
CLAD FRENCH CASEMENT	C30
CLAD AWNING	C40
CLAD SEDONA AWNING	C30
CLAD ASPEN AWNING	C40
CLAD CARMEL DOUBLE HUNG	C40
CLAD SLIDER	R15
CLAD DIRECT GLAZE	C40
CLAD 90° CORNER WINDOW	C40
CLAD PATIO SLIDER	C40
CLAD INSWING FRENCH DOOR	R15
CLAD OUTSWING FRENCH DOOR	R15

WOOD EXTERIOR PRODUCT	PERFORMANCE RATING
PRIMED CASEMENT	C40
PRIMED SEDONA CASEMENT	C30
PRIMED FRENCH CASEMENT	C30
PRIMED AWNING	C40
PRIMED SEDONA AWNING	C30
PRIMED DIRECT GLAZE	R20
PRIMED PATIO SLIDER	LC25
PRIMED INSWING FRENCH DOOR	R15
PRIMED OUTSWING FRENCH DOOR	R15

For further information regarding product performance specifications, please refer to AAMA/WDMA/CSA/101/I.S.2/A440 "Standard/Specification for windows, doors and unit skylights".

Specific ratings can vary by product size and configuration.

Please contact Sierra Pacific Windows for additional information.

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Sound Attenuation

Sound attenuation can be an important consideration when choosing windows and doors. Sound Transmission Class (STC) is a method of rating that provides a single value to represent sound transmission loss. While the method is frequently used, it is based on noise reduction achieved over a range of frequencies associated with indoor environment (human speech or office equipment). Outdoor-Indoor Transmission Class (OITC) is actually a better measure of a windows or doors transmission loss because it is based on a range of lower frequency sounds (traffic, trains, aircraft, etc.). Both rating numbers are provided for Sierra Pacific products.

OITC ratings are typically lower than STC ratings because lower frequency sounds are more difficult to attenuate.

Sierra Pacific Windows Sound Transmission Ratings			
Product	Product Callout	STC	OITC
Clad direct glaze w/ 3/4" IG	36 x 48	29	24
Clad direct glaze w/ 3/4" lami IG	36 x 48	33	28
Clad wood casement w/ 3/4" IG	36 x 48	30	24
Clad wood casement w/ 3/4" lami IG	36 x 48	35	29
Clad wood casement w/ 3/4" simulite IG	36 x 48	35	28
Clad patio slider door w/ 3/4" IG	72 x 82	25	23
Clad patio slider door w/ 3/4" lami IG	72 x 82	34	29
Clad patio slider door w/ 3/4" simulite IG	72 x 82	24	23
Clad patio slider sidelight w/ 3/4" IG	36 x 82	31	26
Clad patio slider sidelight w/ 3/4" lami IG	36 x 82	36	30
Clad patio slider sidelight w/ 3/4" simulite IG	36 x 82	32	27
Clad IS door w/ 3/4" lami IG	36 x 82	32	28
Clad OS door w/ 3/4" lami IG	36 x 82	33	30
Clad horizontal sliding window w/ 3/4" lami IG	72 x 60	29	25
Clad Carmel double hung w/ 3/4" IG	36 x 48	30	24
Clad Carmel double hung w/ 3/4" lami IG	36 x 48	35	29
Clad Carmel double hung w/ 3/4" simulite IG	36 x 48	34	28

Powder Coating

The coating on Sierra Pacific's exterior extruded aluminum is a modified polyester powder formulated with a special proprietary resin that offers excellent mechanical characteristics such as hardness, impact resistance, adhesion and flexibility. In addition, our coating also provides outstanding chemical resistance, abrasion resistance and corrosion protection.

These high performance coatings are designed to meet AAMA 2604 specifications and have surpassed the five year South Florida Exposure requirement. AAMA 2605 coatings are available upon request.

Test	AAMA 2604 Criteria	Sierra Pacific Powder Performance
Film Thickness	Minimum thickness of 1.2 mil	2.5 to 3 mils
Pencil Hardness	Minimum F	2H/Exceeds
Adhesion Tests		
Cross Hatch Adhesion	No film removal allowed	Pass
Wet Film Adhesion	No film removal or blistering after immersion in water @ 100°F for 24 hours	Pass
Boiling Water Adhesion	No film removal or blistering after immersion in boiling water for 30 minutes	Pass
Impact Resistance		
Impact Test	Use impact tool to dent surface. Apply tape to dented area and remove. No coating removal allowed.	Pass
Abrasion Resistance		
Abrasion Resistance	The abrasion resistance of the coating is calculated according to a falling sand test method. This is measured according to the amount of sand in liters required to remove 1 mil of coating. 20 minimum.	Pass
Corrosion Resistance		
Humidity Resistance	Evaluates a coating's resistance to delamination in a high humidity environment. The coating is first scribed completely through its cross-section and then exposed to 100% relative humidity at 100° F for 3000 hours. A visual inspection for blisters in the coating determines pass or fail.	3000 Hours
Salt Spray Resistance	Shows a coating's resistance to delamination in a highly corrosive environment. The coating is first scribed through its cross-section and then exposed to 5% salt fog for 3000 hours. Immediately apply tape over the scored area and pull sharply off. A visual inspection for scribe creepage and blistering determines pass or fail.	3000 Hours
Weathering		
South Florida Weathering Test	South Florida exposure is a standardized real-world weathering exposure test that analyzes color and gloss retention, as well as chalk and erosion resistance.	5 year South Florida
Color Retention	Portion of South Florida weather-related exposure testing. Represents the degree to which a coating's color is degraded as a result of exposure to ultra violet radiation present in sunlight. Less than 5 Δ E	Pass
Chalk Resistance	Portion of South Florida weather-related exposure testing. Represents the degree to which a coating chalks due to weathering. A visual inspection determines the degree of chalking. No greater than #8 rating.	Pass
Erosion Resistance	Portion of South Florida weather-related exposure testing. Represents the degree to which a coating erodes due to weathering. Measured coating loss must be less than 10%.	Pass

Mechanical Durability

- Higher surface hardness/scratch resistance than common liquid coatings
 - Reduced chance of damage to coating during installation
 - Better longevity against mechanical damage
 - High resistance to cleaners and chemicals
 - High resistance to windborne abrasives

Superior Exterior Performance

- High resistance to acid rain and corrosive atmosphere
- Meets ASTM/AAMA 3,000 hour salt spray resistance testing
- Meets 3,000 hour ASTM humidity testing
- High resistance to chalking
- High resistance to film coating erosion
- Improved color and gloss retention

TECHNICAL INFORMATION

Windload Reinforcing Mullions

Need for structural reinforcement

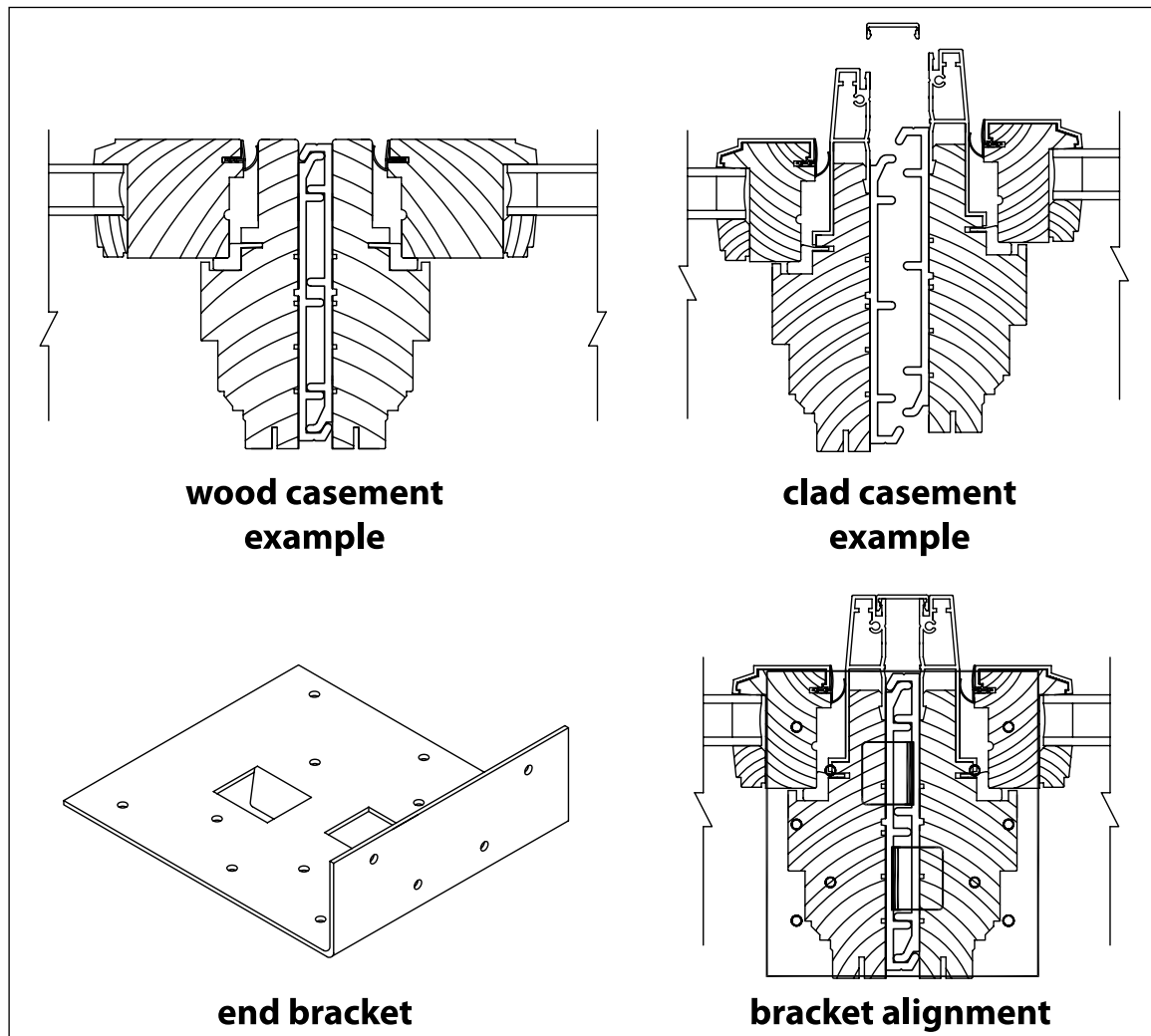
Large mull composites of windows are very popular. Many of these composites are installed in homes and buildings constructed on mountains, canyon rims or oceanside. While these sites provide magnificent views, they also introduce the potential for exposing windows to very strong windloads.

Standard mulling methods of joining window units is more than sufficient for many composites. Under heavy windload situations, however, standard mullion joints could bow (deflect) beyond their design limits. In these situations, it is necessary to consider additional structural mullion reinforcement.

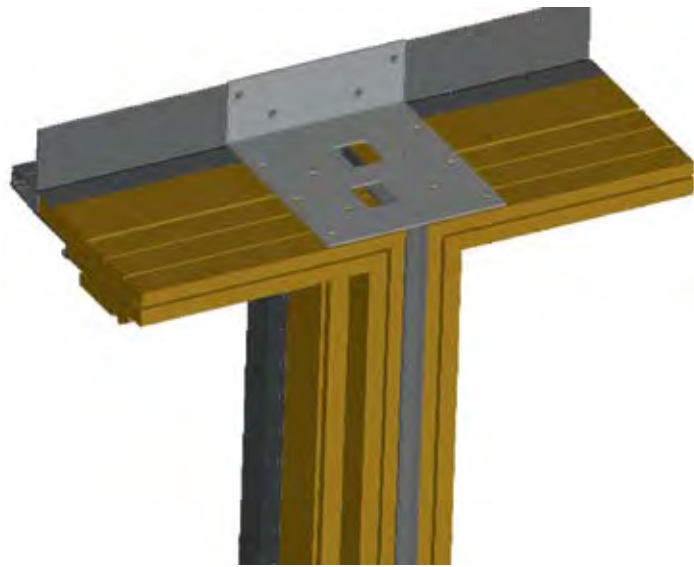
Structural alternatives

Assuming that structural reinforcement is required, there are currently two options. First, the customer can supply his own. He can add additional framing or secure the services of a structural engineer to design specific supports. The second option is to use a structural reinforcement option supplied by Sierra Pacific Windows.

Sierra Pacific Windows offers two structural reinforcement alternatives. The first is a 1/2" narrow aluminum support. This system consists of two symmetrically interlocking aluminum extrusions with end brackets to anchor the extrusions to the framing structure. Since the narrow support widens the mullion joint by only 1/2", there is minimal visual interference. It works with both wood and aluminum clad wood product.

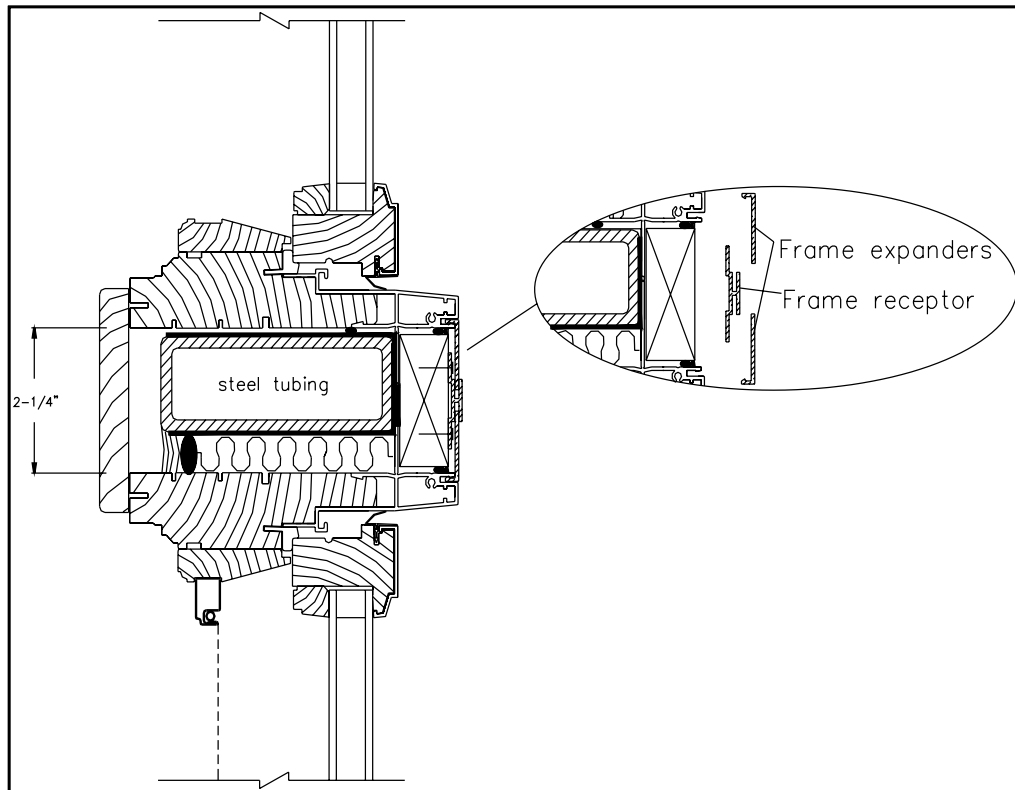


Drawings have been simplified for clarity. They are not intended for installation purposes.



Aluminum Structural Reinforcement

For higher windload requirements, a second alternative is available. Steel tubing (typically 1-1/2" x 4") can provide support beyond the capacity of the aluminum. Utilizing welded steel plates for anchoring into frame walls, steel tubing provides additional support for larger mullion composites. Note that this option will add a minimum of 2-1/4" to the width of the mullion joint.



Steel Tubing Structural Reinforcement

Either support alternative can be used horizontally or vertically. Sierra Pacific Windows also has mullion cover options to complete the installation.

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