

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 the resistance to heat flow and the better the 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 the solar heat gain coefficient, the less solar heat transmitted.

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)	0.34	0.29	0.48	56
Clad Aspen Awning Windows (wide sash only)	0.34	0.29	0.48	53
Clad Casement Windows (wide sash)	0.34	0.29	0.48	56
Clad Casement Windows (narrow sash)	0.34	0.32	0.53	54
Clad Casement Picture Windows (wide sash)	0.32	0.33	0.56	55
Clad Casement Picture Windows (narrow sash)	0.33	0.35	0.60	53
Clad French Casement Windows (wide sash)	0.34	0.29	0.48	56
Clad Awning Windows (wide sash)	0.34	0.29	0.48	53
Clad Awning Windows (narrow sash)	0.34	0.31	0.53	51
Clad Sedona Casement Windows	0.34	0.29	0.48	56
Clad Sedona Casement Picture Windows	0.32	0.33	0.56	55
Clad Carmel Double Hung Windows	0.34	0.31	0.53	53
Clad Carmel Double Hung Picture Windows	0.33	0.32	0.55	57
Clad Horizontal Sliding Windows	0.34	0.31	0.53	54
Clad Direct Glaze Windows	0.32	0.38	0.65	51
Clad Direct Glaze Windows (w/ sash)	0.31	0.33	0.56	55
Clad Patio Sliding Doors	0.33	0.28	0.47	54
Clad Patio Sliding Door Sidelights (wide stiles)	0.37	0.20	0.32	57
Clad Patio Sliding Door Sidelights (narrow stiles)	0.37	0.26	0.43	56
Clad Inswing Doors	0.33	0.25	0.43	57
Clad Inswing Door Sidelights	0.34	0.19	0.32	58
Clad Outswing Doors	0.35	0.26	0.43	57
Clad Outswing Door Sidelights	0.36	0.20	0.32	58
Clad Commercial Outswing Doors	0.37	0.22	0.36	54
Clad Flexible Access Inswing Doors	0.34	0.24	0.40	57
Clad Flexible Access Inswing Door Sidelights	0.35	0.18	0.30	58
Clad Flexible Access Outswing Doors	0.34	0.24	0.40	52
Clad Flexible Access Outswing Door Sidelights	0.39	0.19	0.29	54
Clad Transoms	0.35	0.27	0.45	54
Wood Exterior Product				
Casement Windows (wide sash)	0.31	0.28	0.48	57
Casement Picture Windows (wide sash)	0.30	0.33	0.56	56
French Casement Windows (wide sash)	0.31	0.28	0.48	57
Awning Windows (wide sash)	0.31	0.28	0.48	55
Sedona Casement Windows	0.31	0.28	0.48	57
Sedona Casement Picture Windows	0.30	0.33	0.56	56
Sedona Awning Windows	0.31	0.28	0.48	55
Direct Glaze Windows	0.30	0.37	0.64	56
Direct Glaze Windows (w/ sash)	0.30	0.33	0.56	57
Patio Sliding Doors	0.32	0.27	0.45	54
Patio Sliding Door Sidelights (standard wide stiles)	0.32	0.19	0.31	59
Patio Sliding Door Sidelights (narrow stiles)	0.32	0.26	0.43	58
Inswing Doors	0.32	0.25	0.43	58
Inswing Door Sidelights	0.32	0.19	0.32	59
Outswing Doors	0.32	0.26	0.43	58
Outswing Door Sidelights	0.32	0.20	0.32	59
Transoms	0.31	0.27	0.45	56
All values calculated using insulated glass with Cardinal LoE 272. Consult the Sierra Pacific Windows Architectural CD or website for more glazing options.				

TECHNICAL INFORMATION

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 four performance classes: R, LC, CW and AW.

Performance Grade:

Product performance is designated by a product code or performance designator. For example:

Class CW - PG 40; size tested 915 x 1829 mm (36 x 72 in) - Type C

In the example above, CW is the performance class. PG 40 is the performance grade based on the combined air infiltration, water infiltration and structural performance test results. Next is the size tested in metric (imperial). Type C identifies the product as a casement window.

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

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

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

Product is tested to a structural test pressure equal to 1.5 times the design pressure.

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	TYPICAL PERFORMANCE RATING*
CLAD CASEMENT	CW - PG 40
CLAD SEDONA CASEMENT	CW - PG 45
CLAD ASPEN CASEMENT	CW - PG 40
CLAD FRENCH CASEMENT	CW - PG 30
CLAD AWNING	CW - PG 55
CLAD SEDONA AWNING	CW - PG 30
CLAD ASPEN AWNING	CW - PG 55
CLAD CARMEL DOUBLE HUNG	LC - PG 40
CLAD SLIDER	CW - PG 30
CLAD DIRECT GLAZE	CW - PG 55
CLAD 90° CORNER WINDOW	CW - PG 50
CLAD PATIO SLIDER	LC - PG 40
CLAD INSWING FRENCH DOOR	LC - PG 30
CLAD OUTSWING FRENCH DOOR	LC - PG 40

WOOD EXTERIOR PRODUCT	TYPICAL PERFORMANCE RATING*
PRIMED CASEMENT	CW - PG 40
PRIMED SEDONA CASEMENT	CW - PG 35
PRIMED FRENCH CASEMENT	CW - PG 30
PRIMED AWNING	CW - PG 45
PRIMED SEDONA AWNING	CW - PG 30
PRIMED DIRECT GLAZE	R - PG 25
PRIMED PATIO SLIDER	LC - PG 25
PRIMED INSWING FRENCH DOOR	LC - PG 25
PRIMED OUTSWING FRENCH DOOR	LC - PG 25

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.

TECHNICAL INFORMATION

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.

Sierra Pacific Windows Sound Transmission Ratings			
Product	Size	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 direct glaze w/ 3/16 -3/16 -3/16" triple IG	48 x 60	32	26
Clad direct glaze w/ 3/16"-3/16"-1/4" lami triple IG	48 x 60	37	30
Clad wood casement w/ 3/4" IG	36 x 48	30	24
Clad wood casement w/ 3/4" lami IG	24 x 60	35	29
Clad wood casement w/ 3/4" simulite IG	36 x 48	35	28
Clad wood casement w/ 1/4" NWI lami	30 x 60	37	32
Clad Aspen wood casement w/ 18"-1/8"-1/8" triple IG	24 x 60	33	25
Clad Aspen wood casement w/ 3/4" lami IG	24 x 60	35	29
Clad patio sliding door w/ 3/4" IG	72 x 82	25	23
Clad patio sliding door w/ 3/4" lami IG	72 x 82	31	28
Clad patio sliding door w/ 3/4" lami IG (3-3/8" stiles)	96 x 84	30	27
Clad patio sliding door w/ 3/4" simulite IG	72 x 82	24	23
Clad patio sliding door sidelight w/ 3/4" IG	36 x 82	31	26
Clad patio sliding door sidelight w/ 3/4" lami IG	36 x 82	36	30
Clad patio sliding door sidelight w/ 3/4" simulite IG	36 x 82	32	27
Clad patio sliding door w/ 7/8" NWI lami IG	72 x 82	34	29
Clad patio sliding door w/ 7/8" dual lami IG	72 x 82	34	29
Clad IS door w/ 3/4" lami IG	36 x 84	32	28
Clad OS door w/ 3/4" lami IG	36 x 84	33	30
Clad OS door w/ 7/8" NWI lami IG	48 x 82	35	31
Clad OS door w/ 3/4" lami IG	36 x 82	32	28
Clad horizontal sliding window w/ 3/4" & 3/4" lami IG	72 x 60	29	25
Clad horizontal sliding window w/ 3/4" lami IG	60 x 48	33	28
Clad horizontal sliding window w/ 3/4" IG	60 x 48	27	22
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

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.	Pass
	No coating removal allowed.	
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. It represents the degree to which a coating's color is degraded as a result of exposure to ultraviolet 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. It represents the degree to which a coating erodes due to weathering. Measured coating loss must be less than 10%.	Pass

Test	AAMA 2605 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.	Pass
	No coating removal allowed.	
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. 40 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 4000 hours. A visual inspection for blisters in the coating determines pass or fail.	4000 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 4000 hours. Immediately apply tape over the scored area and pull sharply off. A visual inspection for scribe creepage and blistering determines pass or fail.	4000 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.	10 year South Florida
Color Retention	Portion of South Florida weather-related exposure testing. It represents the degree to which a coating's color is degraded as a result of exposure to ultraviolet 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. It represents the degree to which a coating erodes due to weathering. Measured coating loss must be less than 10%.	Pass

Windload Reinforcing Mullions

Need for Structural Reinforcement

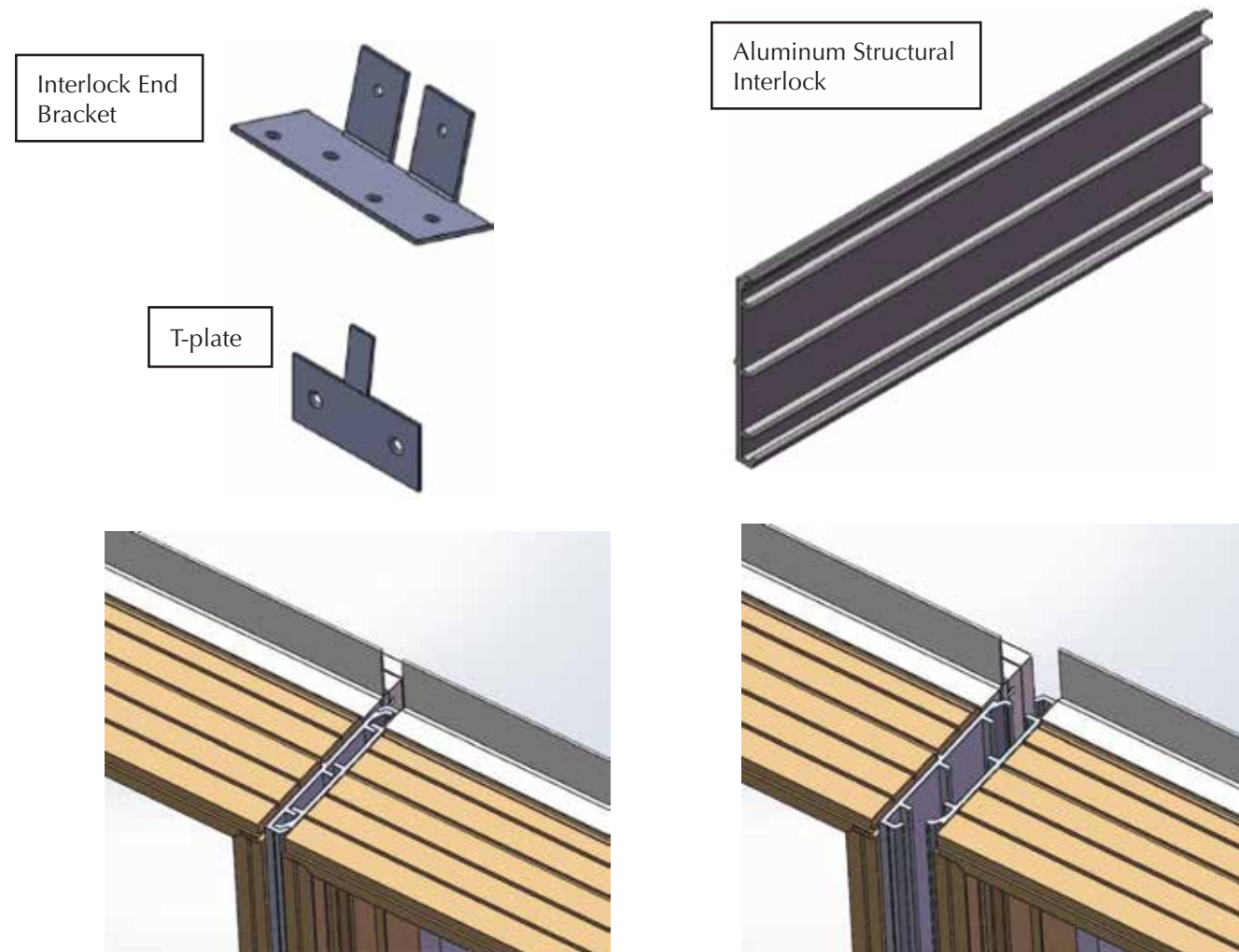
Large mull composites of windows are very popular. Many of these composites are installed in homes and buildings constructed on mountains, canyon rims or oceanside. While these sites provide magnificent views, they also introduce the potential for exposing windows to very strong windloads.

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.



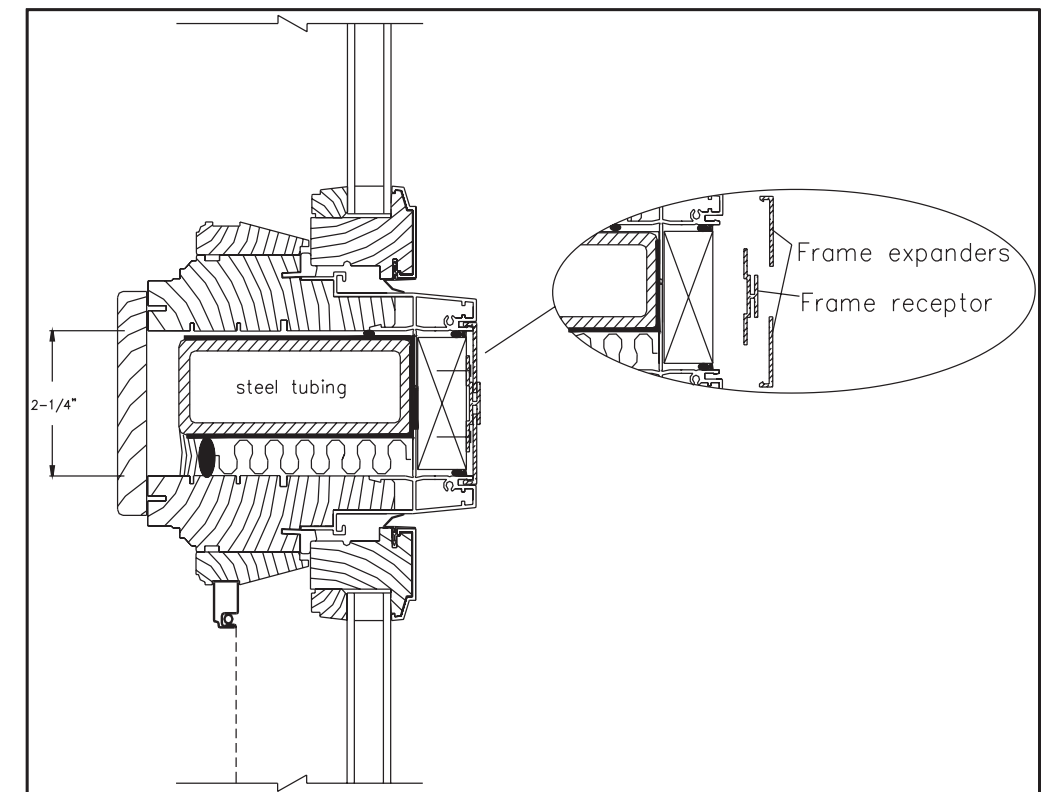
Drawings have been simplified for clarity. They are not intended for installation purposes.

Aluminum Structural Reinforcement



Steel Tubing 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 mull composites. Note that this option will add a minimum of 2-1/4" to the width of the mullion joint.



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

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