Introduction and Product Performance

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Manual History

On the bottom left hand corner of each page is a version number that will help the user identify when a change has been made to the information contained on the page. The most current version of the manual can be found at www.infinitywindows.com. The chart below details when the paper copy of the revised manual was printed along with the corresponding version number.

Version	Print Date	Notes/Memo Topic
2013.1	October 2013	Original Release

How to Use this Manual

Manual Objectives:

The content of this manual will aid in understanding the wide variety of standards, codes, and regulations governing the use of windows and doors. Consumer-friendly information on a variety of highly-rated Infinity Replacement Windows from Marvin products along with fenestration standards, including glazing, Ultrex® finishes, hardware, and overall product performance can be used to help your clients understand what products best fit their project needs.

Intended Audience:

This manual is primarily intended for professionals who:

- Provide shop drawings, sales and service to customers
- Write job specifications
- Need further product knowledge

Sources of Additional Help:

- Infinity Sales Support: *1-800-372-1072*
- Our Website: *www.infinitywindows.com*
- CSI Specifications
- Installations Instructions
- Warranty Information
- Care and Maintenance
- Owner's Manual
- Parts Manual

The online version of this document is the document of record and will be the most current version. Specifications and technical data are subject to change without notice.

This manual is designed to make Infinity Replacement Windows from Marvin product knowledge easy to find and utilize. Used in conjunction with the Infinity Parts Manual, Infinity CSI Specifications, Infinity Installation and Service Guide, it will provide a library of information on Infinity Products.

Each window and door product has an individual chapter with product specific features. The line entries of the table of contents are linked to a specific page for assistance in locating necessary information. Within each chapter, there may be links to other guides and instructions to provide additional assistance in understanding the product.

Product Notes:

- Numbers in parentheses () following measurements are metric equivalents in millimeters rounded to the nearest whole number.
- Allow 1/16" (2) tolerance on all measurements.
- For accessories, dimensions and applications, see the Accessories section of this manual.
- All measurements for rough opening, masonry opening, frame size are rounded to the nearest 1/16th of an inch.
- Rounded fraction for glass size, daylight opening, RO spring line are to the nearest 32nd of an inch.
- E = (Egress): Window that meets the requirements for egress. Please note that the top of the sill must be no more than 44" (1118) from the floor. Code restrictions may vary depending on you local building codes.
- T = (Tempered): For safety and/or code requirements, some units will require tempered glass.

Trademark Information:

The following trademarks are referenced in this manual:

- E-Gard® is a registered trademark of Truth Hardware
- LoĒ-180™, LoĒ^2-272®, LoĒ^3-366® are a trademark of Cardinal Glass Company

How to Submit Suggestions:

Comments or suggestions regarding this publication can be directed to: Technical Publications, Marvin Windows and Doors, P.O. Box 100, Warroad, MN 56763 or call (218) 386-1430 or 1-800-346-5044.

Top Level Abbreviations

Infinity Product Abbreviations

	General Term
CR	Condensation Resistance
DLO	Daylight Opening
DP	Design Pressure
EXT	Exterior
FS	Frame Size
GS	Glass Size
HP	High Performance
IG	Insulating Glass
INACT	Inactive (X)
INST	Installed
LF	Lineal Feet
LH	Left Hand
LT	Lite
MO	Masonry Opening
OSM	Outside Measurement
OPER	Operator (X)
PG	Performance Grade
PROJ	Projection
RO	Rough Opening
SCR	Screen
SHGC	Solar Heat Gain Coefficient
SO	Sash Opening
SPLN	Springline
ST	Stationary (O)
VLT	Visible Light Transmittance
WDW	Window
	Options
BAY	Bay
BOW	Bow
BMC	Brick Mould Casing
GBG	Grilles-Between-the-Glass
GRIL	Grille
SDL	Simulated Divided Lite
TEMP	Tempered
WOCD	Window Opening Control Device
	Full Frame Sliding Windows
NDH	Infinity Double Hung
NDHTR	Infinity Double Hung Transom
NDHP	Infinity Double Hung Picture
NGL	Infinity Glider
NGLTS	Infinity Glider Triple Sash
NGLP	Infinity Glider Picture
NGLTR	Infinity Glider Transom
	Insert Sliding Windows
NINDH	Infinity Insert Double Hung
NINDT	Infinity Insert Double Hung Transom
NINDP	Infinity Insert Double Hung Picture
NINGL	Infinity Insert Glider
NINTG	Infinity Insert Glider Triple Sash
NINGP	Infinity Insert Glider Picture
NINGT	Infinity Insert Glider Transom
	Full Frame Swinging Windows
NAWN	Infinity Awning
NCA	Infinity Casement
NCAP	Infinity Casement Picture
	Insert Swinging Windows
NINCA	Infinity Insert Casement
NINAW	Infinity Insert Awning
NINCP	Infinity Insert Casement Picture
	Stationary Windows
NDGRT	Infinity Direct Glaze Round Top
NINDGRT	Infinity Insert Direct Glaze Round Top
NPDG	Infinity Direct Glaze Polygon
NINPDG	Infinity Insert Direct Glaze Polygon
POLY	Polygon
RECT	Rectangle
RT	Round Top
TRI	Triangle
	Sliding Doors
NSFD	Infinity Sliding French Door
NSPD	Infinity Sliding Patio Door
	Integrity by Marvin Swinging Doors
IIFD	Integrity Inswing French Door
IOFD	Integrity Outswing French Door

Glossary of Terms

ACRYLONITRILE BUTADIENE STYRENE (ABS): A composite plastic that is often used for building materials because of its heat and impact resistant properties.

APRON: A piece of casing or decorative trim installed against the wall immediately beneath the stool of a window.

ARGON GAS: An inert gas known for its ability to provide insulating properties in insulating glass air spaces.

ASTRAGAL: A moulding applied to one stile of a French door which the other door panel strikes. Usually head and footbolt devices will be found on the astragal side.

ASSEMBLY: A collection of single units mulled together.

AWNING WINDOW: A combination of frame and sash, hinged at the top of the vertical jambs which allows the unit to pivot from the top with the sash opening to the exterior of the building.

BALANCES: Any system of block and tackle or spiral springs used in the jamb of double hung units to counter the weight of the sash to allow for easier opening and top sash retention.

BAR: A narrow member in a divider system to create a series of divided lites in the daylight opening of the sash or panel. GBG and SDL spacer bars must be connected to the rails and stiles. Bars can be assembled into a variety of patterns including cottage, prairie, rectangular, etc.

BAY WINDOWS: An arrangement of three individual window units, attached as to project from the building at various angles.

BOW WINDOWS: A series of adjoining window units, installed on a radius.

BRICK MOULD CASING (BMC): An exterior moulding that butts to the exterior facing material of the structure. The casing serves as the boundary moulding for brick or other siding material.

CAM LOCK: A lock used on casement and awning windows that utilizes a cam to pull the window closed.

CAPILLARY TUBES: A tube inserted into the insulating glass spacer that allows the inside and outside air pressure to equalize in higher elevations. Capillary tubes will allow gas fills, other than air to escape.

CASEMENT WINDOW (CA): A vertical hinged window system consisting of a frame, sash, weather strip, locks, hinges and an operating crank device, on operating units.

CELLULAR POLYVINYL CHLORIDE (cPVC): A wood replacement product made of Polyvinyl Chloride molded into forms enabling it to be cut and shaped much like wood without wood's disadvantages.

CHECK RAIL: The horizontal members of a double hung sash that are designed to mate with the check rail of the paired sash.

CLEAR OPENING (CO): The opening created when the window or door is completely open.

CLUTCH: The plastic and metal assembly on which the cam pivots of a double hung sash rests. The clutch is attached to the balance system which allow opening and closing of the sash.

CONDENSATION RESISTANCE (CR): Measures the ability of a product to resist the formation of condensation on the interior surface of that product. The higher the CR rating the better it resists forming condensation.

COTTAGE WINDOW: A double hung window with the top sash smaller than the bottom sash.

DAYLIGHT OPENING (DLO): The width and the height of the visible glass.

DEPTH OF THE JAMB: The point from the backside of the nailing fins to the interior of the frame.

DESIGN PRESSURE (DP): A rating system that is based on testing for structural performance under static air pressure. Water leakage, air leakage, operating force and forced entry must also comply to attain a DP rating.

DIRECT GLAZE (DG): Refers to a stationary window where the glass is glazed directly into the frame.

DIVIDED LITES: See Simulated Divided Lites.

DOUBLE HUNG (DH): A window unit with two movable sash which operate by sliding vertically. Double hung sash are retained in position with the use of balancing devices.

DRIP CAP: A formed aluminum or vinyl piece which is installed at the top of windows and doors that allows water to run off the casing and head jamb of the unit and prevent water from flowing into the frame.

EGRESS: Refers to an escape opening in a room designated as a sleeping area. Windows and doors must meet a minimum size requirement to qualify as an egress product.

EMISSIVITY: A measure of a surface's ability to emit long-wave infrared radiation or room temperature radiant heat energy. Emissivity varies from 0 (no emitted infrared) to 1 (100% emitted infrared). The lower the emissivity, the lower the resultant U-Factor and the better insulating performance of the material.

ESCUTCHEON: A decorative door handle plate attached to the stile directly behind the handle(s).

Glossary of Terms

EVERWOOD™: Low-maintenance engineered interior wood grain surface that looks, feels, paints and stains like wood.

EXTRUSION: A linear component of plastic or metal made by the process of heating the raw material and forcing it through a die as it cools to provide a specific cross-sectional shape.

FENESTRATION: Anything designed to fill an opening in a structure. Used in our industry to specifically apply to doors and windows.

FIELD MEASUREMENT GUIDE: A form that is filled out prior to ordering the Infinity product to ensure the correct measurements are taken to ensure proper fit of the window.

FLUSH FIN: Exterior accessory for full frame units used to seal against the exterior of a building. Primarily used in stucco applications.

FOOTBOLT: A locking rod device installed vertically in the stile or astragal of a door, when activated, secures the panel in a stationary position.

FRAME: The stationary portion of a window that encloses either the glass (direct glaze) or the sash (operating or stationary) and consists of the following parts:

1. HEAD JAMB: The top frame member.
2. SILL: The bottom frame member.
3. SIDE JAMB: Side or vertical frame members.
4. JAMB EXTENSION: The addition onto the standard jamb to adapt a window unit to deeper wall thicknesses. (Field installed)
5. BRICK MOULD: The exterior trim member applied to the side jambs and head jamb. Often used to secure the wood windows to the wall opening.
6. FLUSH FIN: Exterior accessory for full frame units used to seal against the exterior of a building. Primarily used in stucco applications.

FRAME EXPANDER: Decorative exterior accessory for full frame units used to seal against the exterior of a building. Primarily used in stucco applications.

FRENCH DOOR: A door consisting of moderate width top rail and stiles with a larger bottom rail.

GLASS SIZE (GS): The measurement of the actual glass, not the visible glass.

GLAZING: The action or process of installing glass into windows and doors.

GLIDER (GL): Horizontal operating units which have one or more sash that glide open and shut horizontally.

GRILLES-BETWEEN-THE-GLASS (GBG): A narrow profiled aluminum member installed between two pieces of glass that gives a divided-lite appearance.

HANDING: A term used to describe the right or left hand operation of a window or door.

IG: Insulating glass

INACTIVE PANEL (X): Secondary operating door panel.

INSERT UNIT: A specially designed, made-to-order sash and frame unit that is used to replace existing window without disturbing existing interior trim or exterior casing.

INSWING FRENCH DOOR: A French door with panels that swing to the inside. One or two panel units available from Integrity by Marvin as stationary or operating.

INSULATING GLASS (IG): A glass assembly with two or more panes of glass sealed with a perimeter spacer.

JAMB EXTENSION: A jamb-like member usually surfaced on four sides, which increases or extends the depth of the exterior or interior window or door frame.

KEYED CYLINDER LOCK: A lock providing an exterior entry and locking convenience.

LAMINATED GLASS: Glass composed of two sheets of glass fused together with a sheet of transparent plastic between the sheets. When broken, laminated glass will generally not leave the opening and is often used as safety or security glazing.

LOĒ GLASS: LoĒ stands for low emissivity. The lower the emissivity the higher the percentage of long wave radiation blocked thereby improving thermal performance. LoĒ glass is coated with a thin microscopic, virtually invisible, metal or metallic oxide layer. The primary function is to reduce the U-factor by suppressing radiative heat flow. A secondary feature is the blocking of short wave radiation to impede heat gain. There are two basic types of LoĒ glass. The first, vacuum or sputter coated LoĒ, is referred to as softcoat (See LoĒ^2-272® definition). The second is pyrolitic LoĒ, commonly referred to as hardcoat.

LOĒ^2-272: A high performance glass providing year-round comfort in all types of weather. It reflects heat back into the room in the winter and rejects the sun's heat and damaging UV rays in the summer. The LoĒ^2-272 coated glass products are specifically designed for insulating glass units as a second surface coating.

Glossary of Terms

LOĒ^3-366®: A high performance glass providing the highest levels of year-round comfort and energy savings. It provides the ideal balance of solar control and high visibility. Additionally, it provides a more efficient reduction in ultraviolet light transmission.

MASONRY OPENING (MO): A brick, stone or block opening into which a window or door unit is installed. Exterior casing may cause the Masonry Opening to be larger than the Rough Opening.

MEETING STILES: The vertical members of a glider sash or sliding door panel that are designed to mate with the meeting stile of the paired sash.

MULL COVER: Used as a cover for the mullion when joining two or more windows.

MULLING: The act of attaching two or more window or door units together. The joint is then finished with a mullion center cap or mull trim.

MULLION REINFORCEMENT (MRF): A system of high-strength members placed between units of an assembly and fastened to the frame of the units to provide enhanced structural performance.

MULTI-POINT LOCKING SYSTEM: A line of standard or optional multiple point locking mechanisms installed on the operative panel(s)/ sash of various Infinity products to enhance security and performance.

NON-KEYED LOCK: A handle without a keyed cylinder. The door cannot be locked or unlocked from the exterior

NAILING FIN: A factory installed vinyl strip that is inserted into a kerf in the frame of full frame units.

ORIEL WINDOW: A double hung window with the bottom sash smaller than the top sash.

OBSCURE GLASS: A pattern glass that provides privacy while maintaining full light transmission. It is formed by running molten glass through special rollers that apply the pattern to one side.

OUTSIDE MEASUREMENT (OM): The measurement in width from outside of jamb to outside of jamb. Height measurement from top of head jamb to bottom of sill. The outer edges of what is being measured.

ONE-WIDE (1W): Term used to describe one frame with single or multiple sash or panels.

OPERATOR (X): An operating sash, panel or unit.

OUTSWING FRENCH DOOR (OFD): A French door with panels that swing to the outside. One or two panel units available as stationary or operating.

OX and XO: The letters OX or XO identify the operation of window or door units as viewed from the exterior. The letter O stands for stationary while the letter X stands for operating.

PANEL: An assembly of stiles and rails with glass that form the stationary or operating section of the door and is fitted in the frame.

PERFORMANCE CLASS: A methodology to grade product performance types.

R = Residential, LC = Light Commercial, CW = Commercial, AW =Architectural

PERFORMANCE GRADE (PG): A numeric designator that defines performance that applies to: air leakage resistance, water penetration resistance and deflection resistance according to Standard Specifications.

PITCH: A term used to describe the angle of a roof. For example: A 4-12 pitch indicates that the roof rises 4" (102) vertically for each 12" (305) horizontally.

POLYGON (POLY): A high level term used to describe any shape with three or more straight sides. Typical fenestration shapes are triangles, trapezoids, pentagons, hexagons and octagons.

PULTRUSION: Lineal profiles of constant cross section manufactured by combining plastic resin and continuous glass fiber reinforcement. These thermally insulating and structural components are ideally suited for applications where strength, thermal stability and weather resistance are required.

RADIUS: The length of an imaginary line from the center point of a circle to the arc or circumference of a circle.

RAILS: The cross or horizontal members of the framework of a sash, door or other panel assembly.

ROTO-GEAR: A term used to describe the steel drive worm, gears and crank device used for opening awning and casement windows.

ROUGH OPENING (RO): The opening in the wall where a window or door unit is to be installed. Openings are larger than the size of the unit to allow room for insulation, shimming and squaring of the unit.

ROUND TOP (RT): Any window unit with a radius frame member. The most common shape is a semicircle window with a horizontal sill which may be mulled to the top of another window or door. Round tops can be used separately or combined with other units to create a seemingly endless selection.

Glossary of Terms

SASH: An assembly of stiles and rails with glass that form the stationary or operating section of the window and is fitted into the frame. The operating and/or stationary portion of the window unit that is separate from the frame. The sash consists of two or more the following parts:

1. STILES - Vertical sash members.
2. RAILS - Horizontal sash members.
3. CHECK RAILS - Horizontal sash members that meet, as in double hung units
4. MEETING STILES - Vertical check stiles that meet, as in the glider or patio door.

SASH LIFT: A handle on the inside bottom rail of the lower sash for raising and lowering the sash.

SASH LOCK: A device which holds a window shut and prohibits it from being opened from the outside.

SCREEN OM (outside measurement): The width and the height of a screen including wood or metal surrounds.

SCREENS (full and half): A close-mesh woven screen material of metal or fiberglass attached to an aluminum surround. Screens inhibit entry of insects, yet permit light, air and vision.

SEQUENTIAL LOCKING SYSTEM: The action is sequential where the lower lock activates first moving the sash to the weather strip; the top then engages to snug the sash to the frame.

SILL: The horizontal member forming the bottom of a window or exterior door frame; the lowest member of the frame of a structure, resting on the foundation and supporting the frame.

SIMULATED DIVIDED LITES (SDL): Permanent grille bars adhered to the interior and exterior surfaces of the glass with a spacer bar between the panes of glass to simulate authentic divided lites.

SLIDING FRENCH DOOR (SFD): A sliding door utilizing French door style panels.

SLIDING PATIO DOOR (SPD): A sliding door utilizing narrow stiles and rails.

SNUBBER: An interlocking metal bracket attached at the center of the hinge side of a casement sash and frame with certain heights and top sides of an awning sash and frame with certain widths. It allows operation but pulls the sash tightly against the frame weather strip to maximize performance when closed.

SOLAR HEAT GAIN COEFFICIENT (SHGC): The ratio of the solar heat gain entering the space through the fenestration product to the incident solar radiation. Solar heat gain includes directly transmitted solar heat and absorbed solar radiation which is then re-radiated, conducted, or convected into space. The lower a window's SHGC, the less solar heat it transmits to the interior, and the greater its shading ability.

SPACER: Used to separate the two pieces of glass in an insulating glass panel.

SQUARE FOOT (Sq. Ft.): For measuring the area of a unit. RO width (in inches) x RO height (in inches) divided by 144 equals the area in square feet of a unit.

STATIONARY (O): A non-operating sash, panel or unit.

STILES: The upright or vertical perimeter pieces of a sash, panel or screen.

STRUCTURAL BRACKET: Aluminum bracket used to attach a unit to the rough opening. It is used to add structural strength to an installation.

TEMPERED GLASS: Float glass panels heated and then cooled rapidly in a controlled environment. This process makes the glass several times stronger than regular glass. It also makes it safer because when broken it yields small pebble-like fragments.

THREE-WIDE (3W): Term referring to any product or unit when three frames (i.e. separate jambs) are mulled together as a multiple unit.

TRANSOM: A window above a window or door.

TWO-WIDE (2W): Term referring to any product or unit when two frames (i.e. separate jambs) are mulled together as a multiple unit.

ULTREX: A pultruded composite material made of polyester resin and glass fibers with an acrylic cap on primary surfaces.

U-FACTOR: (Btu/hr.-sq. ft. - *F.) A measurement of the amount of heat flow through a product. The lower the U-factor, the greater the resistance to heat flow and better its insulating value.

UV BLOCKAGE: LoĒ glass options will screen out ultraviolet waves while allowing visible light into a structure, reducing fading damage to interior surfaces.

UNIT: One single product such as a one wide casement.

VENTING OPENING: The total opening created when a door or window is completely open.

VISIBLE LIGHT TRANSMITTANCE (VT): Percentage of visible light transmitted through the unit.

WEATHER STRIP: A resilient material designed to seal the sash and frame members in order to reduce air and water infiltration.

WINDOW OPENING CONTROL DEVICE (WOCD): A device that limits the travel of sash with an emergency escape release mechanism.

XO: See OX entry.

Unit Features on Windows and Doors

Infinity Replacement Windows from Marvin offers an assortment of products and features to fit your window and door requirements. Each product offers similarities that allow multiple products to be positioned in your project and look similar yet distinctive. Below is a collection of the similar characteristics you will find throughout our product lines. For product specific features, refer to the individual chapters for additional information.

Ultrex® Frame and Sash:

- Custom reinforced fiberglass composite pultrusion
- Exterior: Stone White, Sierra, Cashmere, Pebble Gray, Bahama Brown, Bronze
- Interior: Stone White, Sierra, EverWood™

Interior Jamb Extension:

- 4 9/16" jamb extensions
- Field applied

Simulated Divided Lites (SDL):

- Bar (interior and exterior): 7/8” (22)
- Simulated rail (interior and exterior): 2 11/32" (60)
- Exterior: color matched to exterior Ultrex: Stone White, Pebble, Bronze, Sierra, Cashmere, Bahama Brown
- Interior: ABS material - interior color match: Stone White, Sierra, EverWood™
- Pattern: rectangular, cottage, prairie

Grilles-Between-the-Glass (GBG):

- 11/16" (17) white contoured aluminum bar.
- Exterior colors: Stone White, Pebble, Bronze, Sierra, Cashmere, Bahama Brown. The exterior GBG color is designed to best match the Infinity Ultrex colors when used with LoĒ glass. The use of different types of glazing options may alter the exterior GBG color appearance.
- Interior colors: White, Satin Taupe, Sierra, Bronze
- Pattern: rectangular, cottage, prairie

Hardware:

- Standard colors: Stone White, Sierra, Satin Taupe
- Optional colors: Brass, Satin Nickel, Oil Rubbed Bronze

Screens:

- Screen included with base package
- Factory installed
- Roll formed aluminum frame
- Interior screen color: Stone White, Satin Taupe, Sierra, or EverWood™
- Exterior screen color: Color matched to exterior Ultrex: Stone White, Pebble, Bronze, Sierra, Cashmere, Bahama Brown
- Standard screen mesh material: charcoal fiberglass
- Optional screen mesh material: high transparency

Accessories:

- Installation brackets: 6 3/8” (162), 9 3/8” (238), or 15 3/8” (390).
- BMC, casing and subsill
- Frame expander
- Coil stock
- Interior frame cover
- 5/8" sheetrock receiver
- Jamb extension adaptor
- Mull kits
- Structural mull kits

Egress Code: International Building Code - 2006-2012

International Building Code - 2006, 2009 and 2012

Section 1026 in 2006 code and Section 1029 in 2009 and 2012 codes - Emergency Escape and Rescue

Minimum Size: Emergency escape and rescue opening shall have a minimum net clear opening of 5.7 square feet (.053 m^2). Exception: The minimum net clear opening for emergency escape and rescue opening on the ground level at grade 5.0 square feet (0.46m^2).

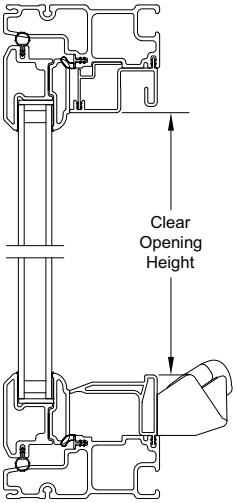
Minimum Dimensions: The minimum net clear opening height dimension shall be 24 inches (610 mm). The net clear opening width dimension shall be 20 inches (508). The net clear opening height dimension shall be the result of normal operation of the opening.

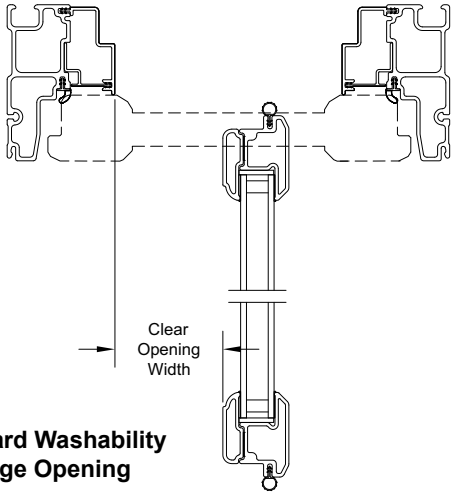
Maximum Height from the Floor: Emergency escape and rescue opening shall have the bottom of the clear opening not greater than 44 inches (118) measured from the floor.

Operational Constraints: Emergency escape and rescue opening shall be operational from the inside of the room without the use of keys or tools. Bars, grilles, grates, or similar devices are permitted to be placed over emergency and rescue opening provided the minimum net clear opening size complies with Section 1026 in 2006 code and 1029 2009 and 2012 codes and such devices shall be releasable or removable from the inside without the use of key, tool, or force greater than that which is required for a normal operation of the escape and rescue opening.

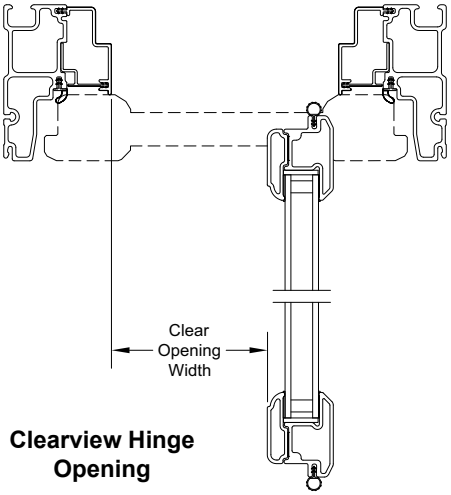
Code restrictions may vary depending on your local building code.

NOTE: Net clear opening drawing is located in individual chapter with measurement conversions. NCA sample below.





Standard Washability Hinge Opening



Clearview Hinge Opening

AAMA Paint & Coating Specifications

The American Architectural Manufacturers Association (AAMA) is a trade association representing firms engaged in the manufacture and sale of architectural building components and related products. Voluntary standards have been created to test a product's durability, strength, resistance to environmental degradation and longevity. AAMA has a standard set of stringent performance tests designed to evaluate high-performance coatings on fenestration products. The quality of these finishes is affected by the pigment formula as well as the resin used to bind pigment to the substrate surface. Infinity Replacement Windows from Marvin uses a cross-head extruded acrylic organic coating system to create a finish that meets AAMA 623 voluntary performance requirements and test procedures for organic coatings on fiber reinforced thermoset profiles. The chart below lists the requirements of AMAMA 623, from aesthetic changes such as chalking and color retention to testing designed to replicate harsh coastal conditions.

AAMA Coating Specification for Ultrex Units	
Coating Adhesion:	
Specification Details	AAMA 623-10
Dry Film Thickness	0.8 mils minimum
Dry Film Hardness	No rupture of film to substrate
Direct Impact	No removal of film from substrate
South Florida Weathering:	
Specification Details	AAMA 623-10
Color Retention	1 yr fade ≤5 Delta E color change
Chalk Resistance	1 yr chalk = 8
Chemical Resistance:	
Specification Details	AAMA 623-10
Muriatic Acid	15 minute = no attack, 90% gloss retention, ≤5 Delta E color change
Mortar	24 hours = no attack, 90% gloss retention, ≤5 Delta E color change
Detergent	72 hours = no attack, 90% gloss retention, ≤5 Delta E color change
Accelerated Testing:	
Specification Details	AAMA 623-10
Humidity	1,500 hours
Cold Crack Cycle	720 hours
Oven Aging	168 hours

Industry and Federal Performance Standards

Infinity Replacement Windows from Marvin meets or exceed the following industry and federal performance standards

AAMA	American Architectural Manufacturers Association
ASCE	American Society of Civil Engineers
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
CSA	Canadian Standards Association
	A - Air Leakage
	B- Water Leakage
	C - Wind Resistance
	Minimum Requirement = A1, B1, C1
CWDMA	Canadian Window and Door Manufacturers Association
FHA	Federal Housing Administration
HUD	Housing and Urban Development
IGCC	Insulating Glass Certification Council
IGMAC	Insulating Glass Manufacturers Association of Canada
NFRC	National Fenestration Rating Council - Product Thermal Properties
WDMA	Window and Door Manufacturers Association
SIGMA	Sealed Insulating Glass Manufacturers Association
SMA	Screen Manufacturers Association

Infinity products have been tested and passed the following applicable test procedures referenced by WDMA, AAMA, IGCC, IGMA, SMA and CMBSO.

WDMA I.S.4	Industry Standard for Water-Repellent Preservative Treatment of Millwork
ASTM C-1036	Standard Specification for Flat Glass
ASTM E-90-09	Laboratory Measurement of Airborne Sound Transmission of Building Partitions
ASTM E-283	Standard Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors
ASTM E-330	Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Differences
ASTM E-547	Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Differences
ASTM E-1300	Standard Practice for Determining the Load Resistance of Glass in Buildings
ASTM E-2068	Standard Test Method for Determination of Operating Force of Sliding Windows and Doors
ASTM E-2190	Standard Specification for Insulating Glass Unit Performance and Evaluation
ASTM F-588	Standard Test Method for Resistance of Window Assemblies to Forced Entry
ASTM F-842	Standard Test Method for Measurements of Forced Entry Resistance of Horizontal Sliding Door Assemblies
ASTM F-2090	Standard Specification for Window Fall Prevention Devices with Emergency Escape (Egress) Release Mechanisms
AAMA/WDMA/CSA 101/I.S. 2/A440-05	Standard/Specification for windows, doors, and unit skylights
AAMA/WDMA/CSA 101/I.S. 2/A440-08	NAFS North American Fenestration Standard/Specification for windows, doors, and unit skylights
AAMA/WDMA/CSA 101/I.S. 2/A440-11	NAFS 2011 - North American Fenestration Standard/Specification for windows, doors, and skylights

Product Rating Codes / Performance Classes

Product Type

AP = Awning, Hopper, Projected Window

C = Casement Windows

DAW = Dual Action Windows

DASHD = Dual Action Side-Hinges Door

FD = Fixed Door

FW = Fixed Windows

H = Hung Windows

HGD = Hinged Glass Doors

HP = Horizontally Pivoted Window

HS = Horizontal Sliding Windows

LW DASHD = Limited Water Dual Action Side Hinged Door

MA = Mullion Assembly

POW = Parallel Opening Window

SD = Sliding Door

SGD = Sliding Glass Doors

SHD = Side-Hinged Door

SHW = Side-Hinged (inswinging) window

SLT = Side Lite

SP = Specialty Product

SSP = Secondary Storm Product

TH = Top-Hinged Window

VP = Vertical Pivoted Window

VS = Vertical Sliding Window

Performance Class and Grade

R = Residential

LC = Light Commercial

CW=Commercial

HC = Heavy Commercial

AW =Architectural

Product Rating Code for ’05
Example
AP - C 40

- 40 — Design Grade
- C — Performance Class
- AP — Product Type

Product Rating Code for ’08,’11
Example
LC - PG25 - H

- H — Product Type
- PG25 — Performance Grade
- LC — Performance Class

Product Rating Codes / Performance Classes / Design Pressure Ratings

Performance Classes ('05 Standards)	(psf) Min. DP	(psf) Struct. Press.	(psf) Water Press.	(cfm/ft^2) Max. Air. Inf.
R = Residential	15	22.5	2.90	0.3 (1.57 psf)
LC = Light Commercial	25	37.5	3.75	0.3 (1.57 psf)
C = Commercial	30	45.0	4.50	0.3 (1.57 psf)
Metric	Pa	Pa	Pa	L/s/m2
R = Residential	720	1080	140	1.5 (75Pa)
LC = Light Commercial	1200	1800	180	1.5 (75Pa)
C = Commercial	1400	2160	220	1.5 (75Pa)

Performance Classes ('08 and '11 Standards)	(psf) Min. DP	(psf) Struct. Press.	(psf) Water Press.	(cfm/ft^2) Max. Air. Inf.
R = Residential	15	22.5	2.90	0.3 (1.57 psf)
LC = Light Commercial	25	37.5	3.75	0.3 (1.57 psf)
CW = Commercial	30	45.0	4.50	0.3 (1.57 psf)
Metric	Pa	Pa	Pa	L/s/m2
R = Residential	720	1080	140	1.5 (75Pa)
LC = Light Commercial	1200	1800	180	1.5 (75Pa)
CW = Commercial	1400	2160	220	1.5 (75Pa)

NOTE: AAMA/WDMA chose to establish 2.90 or 2.92 psf as the minimum air pressure used during water testing although it is greater than 15% of the design pressure at DP15.

Design Pressure Rating						
Design Pressure Rating		DP15	DP20	DP25	DP30	DP35
Design Pressure (DP)	(psf)	15.00	20.00	25.00	30.00	35.00
Structural Test Pressure (STP)	(psf)	22.50	30.00	37.50	45.00	52.50
Water penetration resistance test pressure	(psf)	2.90	3.00	3.75	4.50	5.25
Design Pressure Rating		DP40	DP45	DP50	DP55	DP60
Design Pressure (DP)	(psf)	40.00	45.00	50.00	55.00	60.00
Structural Test Pressure (STP)	(psf)	60.00	67.50	75.00	82.50	90.00
Water penetration resistance test pressure	(psf)	6.00	6.75	7.50	8.25	9.00
Metric Design Pressure		DP15	DP20	DP25	DP30	DP35
Design Pressure (DP)	(Pa)	720	960	1200	1440	1680
Structural Test Pressure (STP)	(Pa)	1080	1440	1800	2160	2520
Water penetration resistance test pressure	(Pa)	140	150	180	220	260
Metric Design Pressure		DP40	DP45	DP50	DP55	DP60
Design Pressure (DP)	(Pa)	1920	2160	2400	2640	2880
Structural Test Pressure (STP)	(Pa)	2880	3240	3600	3960	4320
Water penetration resistance test pressure	(Pa)	290	330	360	400	440

ENERGY STAR® Program - United States

www.energystar.gov

About ENERGY STAR®

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.

Residential Windows, Doors and Skylights

Thanks to advances in technology, today's ENERGY STAR® qualified windows, doors, and skylights offer greater savings than ever before. Just look for the ENERGY STAR® label.

Save energy and money.

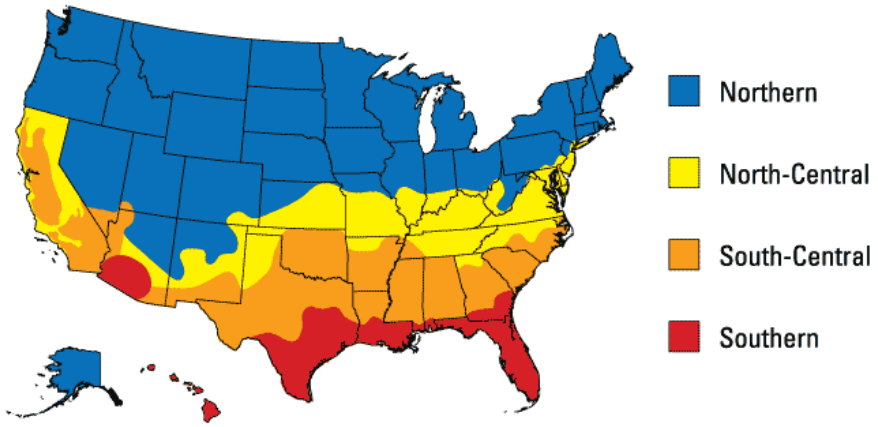
Replacing old windows with ENERGY STAR® qualified windows lowers household energy bills by 7-15 percent. Lower energy consumption also reduces greenhouse gas emissions from power plants and shrinks a house's carbon footprint.

Current Specification Effective Date: January 4, 2010

As of January 4, 2010, ENERGY STAR® qualified windows, doors, and skylights meet new performance levels, see below.

Windows and skylights must meet NFRC U-Factor and, where applicable, Solar Heat Gain Coefficient (SHGC) requirements based on climate zone. Doors must meet U-Factor and, where applicable, SHGC requirements based on glazing level (amount of glass).

At this time, most Infinity Replacement Window from Marvin product lines qualify for the ENERGY STAR® program. For more specific information, please refer to the individual product sections in your Infinity Replacement Window from Marvin catalog.



Windows

Climate Zone	U-Factor[1]	SHGC[2]	
Northern	≤ 0.30	Any	Prescriptive
	=0.31	≥ 0.35	Equivalent Energy Performance
	=0.32	≥ 0.40	
North-Central	≤ 0.32	≤ 0.40	
South-Central	≤ 0.35	≤ 0.30	
Southern	≤ 0.60	≤ 0.27	

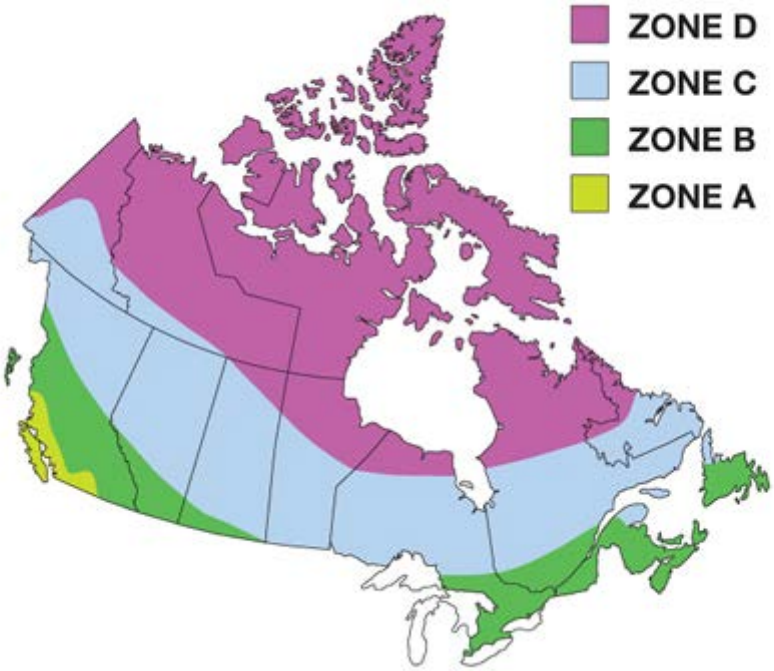
Doors

Glazing Level	U-Factor[1]	SHGC[2]
Opaque	≤ 0.21	No Rating
≤ ½-Lite	≤ 0.27	≤ 0.30
> ½-Lite	≤ 0.32	≤ 0.30

[1] *Btu/h·ft²·°F*

[2] *Fraction of incident solar radiation*

ENERGY STAR® Program - Canada



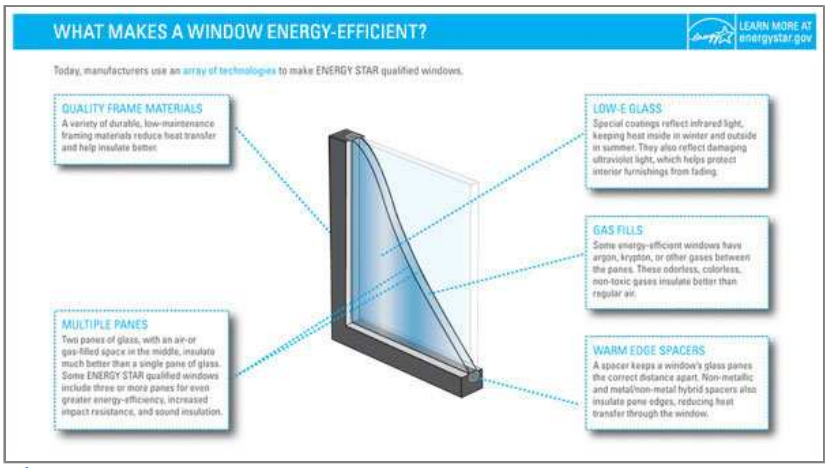
ENERGY STAR Requirements for Windows
(Effective October 1,2010)

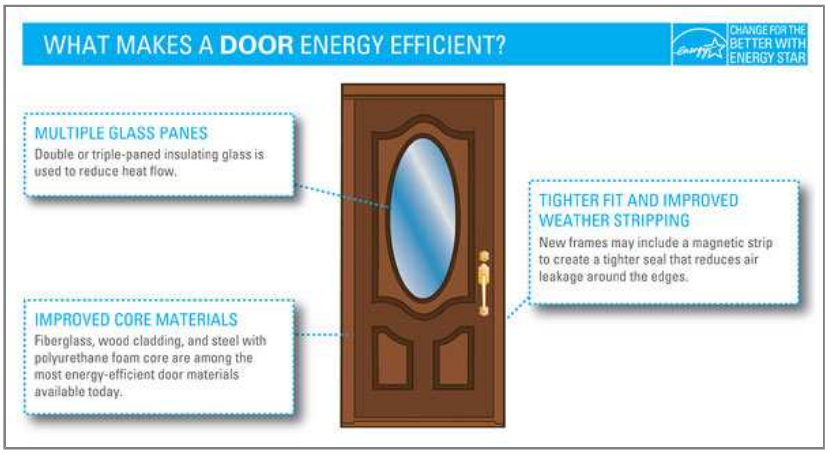
Zone	Heating Degree-Day Range	Compliance Paths			
		Energy Rating (ER)	or	U-Factor	
		Minimum ER (unitless) Maximum U-Factor 2.00 W/m²×K (0.35 Btu/h×ft.²×°F)		Maximum U-Factor W/m²×K (Btu/h×ft.²×°F)	Minimum ER (unitless)
A	<= 3500	21	or	1.80 (0.32)	13
B	> 3500 to <= 5500	25	or	1.60 (0.28)	17
C	> 5500 to <= 8000	29	or	1.40 (0.25)	21
D	> 8000	34	or	1.20 (0.21)	25

ENERGY STAR Requirements for Doors
(Effective October 1,2010)

Zone	Heating Degree-Day Range	Compliance Paths			
		Energy Rating (ER)	or	U-Factor	
		Minimum ER (unitless) Maximum U-Factor 2.00 W/m²×K (0.35 Btu/h×ft.²×°F)		Maximum U-Factor W/m²×K (Btu/h×ft.²×°F)	Minimum ER (unitless)
A	<= 3500	21	or	1.80 (0.32)	N/A
B	> 3500 to <= 5500	25	or	1.60 (0.28)	N/A
C	> 5500 to <= 8000	29	or	1.40 (0.25)	N/A
D	> 8000	34	or	1.20 (0.21)	N/A

ENERGY STAR® Program





NFRC Certification Program

Who is the NFRC?

The National Fenestration Rating Council (NFRC) is a non-profit public/private group of manufacturers, builders, designers, specifiers, code officials, utilities, regulators and consumers formed to establish a national energy performance rating system for fenestration products.

Sanctioned by the federal government under the Energy Policy Act of 1992, NFRC will, in addition to U-Factor (thermal transmission), rate other factors, including solar heat gain, optical properties, air infiltration and condensation resistance.

It is important to note that the NFRC is not setting minimum performance standards or mandating specific performance levels. NFRC has established a single rating system with a rigorous process for comparing product performance. By certifying and labeling their products in accordance with the NFRC program, manufacturers demonstrate their commitment to provide accurate energy performance information.

Whole Product Performance

NFRC ratings are based on “whole product performance”. Although a window, door, or skylight may have high performance glazing, its overall performance may be reduced by a poorly performing frame. Similarly, a very energy efficient frame may be wasted on ineffective glazing and sealing. Whole product performance helps builders and consumers compare products of different construction and attributes directly.

When reading a NFRC Label, it is important to remember that the U-Factor, SHGC, and VT, values represent the whole window, not the center-of-glass

NFRC Labeling

Certification and Labeling Process

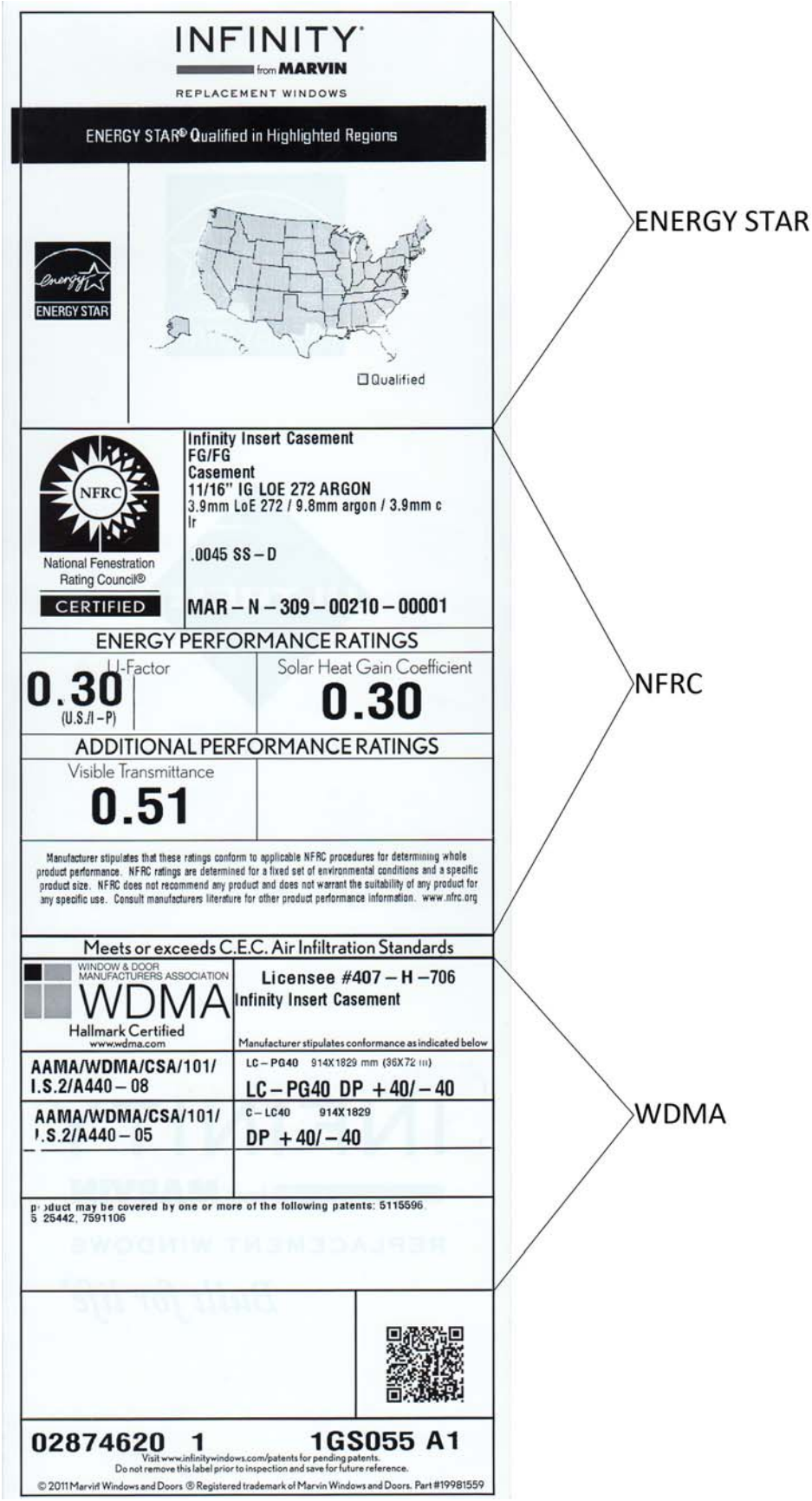
Window and door manufacturers attempting to certify their fenestration products are required to have them evaluated by two different types of independent NFRC accredited laboratories.

1. The first type of laboratory is a computer simulation lab which evaluates a window or door's thermal efficiency by computer simulation programs. The computer program takes into account the product's frame and glazing system attributes and derives an overall product U-Factor.

2. The second type of laboratory is a physical testing laboratory which takes an actual product and evaluates it in a thermal chamber. The physical test lab will also derive an overall product U-Factor.

For additional regional information, please contact your local Infinity representative.

NFRC Label


INFINITY
from MARVIN
REPLACEMENT WINDOWS
ENERGY STAR® Qualified in Highlighted Regions
ENERGY STAR
Qualified
ENERGY STAR
NFRC
National Fenestration Rating Council®
CERTIFIED
Infinity Insert Casement
FG/FG
Casement
11/16" IG LOE 272 ARGON
3.9mm LoE 272 / 9.8mm argon / 3.9mm c
lr
.0045 SS – D
MAR – N – 309 – 00210 – 00001
ENERGY PERFORMANCE RATINGS
U-Factor
0.30
(U.S./I-P)
Solar Heat Gain Coefficient
0.30
ADDITIONAL PERFORMANCE RATINGS
Visible Transmittance
0.51
Manufacturer stipulates that these ratings conform to applicable NFRC procedures for determining whole product performance. NFRC ratings are determined for a fixed set of environmental conditions and a specific product size. NFRC does not recommend any product and does not warrant the suitability of any product for any specific use. Consult manufacturers literature for other product performance information. www.nfrc.org
NFRC
Meets or exceeds C.E.C. Air Infiltration Standards
WINDOW & DOOR MANUFACTURERS ASSOCIATION
WDMA
Hallmark Certified
www.wdma.com
Licensee #407 – H –706
Infinity Insert Casement
Manufacturer stipulates conformance as indicated below
AAMA/WDMA/CSA/101/
I.S.2/A440 – 08
LC – PG40 914X1829 mm (36X72 in)
LC – PG40 DP +40/ – 40
AAMA/WDMA/CSA/101/
I.S.2/A440 – 05
C – LC40 914X1829
DP +40/ – 40
product may be covered by one or more of the following patents: 5115596, 5 25442, 7591106
WDMA
02874620 1 1GS055 A1
Visit www.infinitywindows.com/patents for pending patents.
Do not remove this label prior to inspection and save for future reference.
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Building Categories and Design Factors

Design Wind Pressure (PSF) - ASCE 7 -05												
Location	Zone	Effective Wind Area (SF)	Basic Wind Speed V (MPH)									
			85		90		100		110		120	
Walls	4	10	+13	-14	+15	-16	+18	-19	+22	-24	+26	-28
		50	+12	-13	+13	-14	+16	-18	+19	-22	+23	-26
		500	+10	-11	+11	-12	+13	-15	+16	-18	+19	-21
			130		140		150		160		170	
		10	+30	-33	+35	-38	+40	-44	+46	-50	+52	-56
		50	+27	-30	+31	-35	+36	-40	+41	-46	+46	-51
		500	+23	-25	+26	-29	+30	-34	+34	-38	+39	-43
Walls	5		85		90		100		110		120	
		10	+13	-17	+15	-19	+18	-24	+22	-29	+26	-35
		50	+12	-15	+13	-16	+16	-20	+19	-25	+23	-29
		500	+10	-11	+11	-12	+13	-15	+16	-18	+19	-21
			130		140		150		160		170	
		10	+30	-41	+35	-47	+40	-54	+46	-62	+52	-70
		50	+27	-34	+31	-40	+36	-46	+36	-52	+46	-59
		500	+23	-25	+26	-29	+30	-34	+30	-38	+39	-43

NOTE:

- Design wind pressures above represent the net pressure (sum of external and internal pressures) applied normal to all surfaces.
- Values shown are for exposure B. For other exposures, multiply values shown by the following factor: exposure C: 1.40 and exposure D: 1.66
- Linear interpolation between values of tributary area is permissible.
- Values shown are for an importance factor I = 1.0. For other values of I, multiply values shown by I.
- Plus and minus signs signify pressure acting toward and away from the exterior surface, respectively.
- All component and cladding elements shall be designed for both positive and negative pressures shown in the table.
- Notation:
  - 10 percent of least horizontal dimension or 0.4 h, whichever is smaller, but not less than 40% of least horizontal dimension or 3 ft.
  - Mean roof height in feet (meters).

BUILDING WIND LOADS

The information presented is provided to simplify the determination of structural wind load requirements of ASCE 7-05. ASCE 7-05 may not have local precedence. Please refer to your local codes for design pressures that apply to your area.

ASCE 7-05 Design wind load tables are based on the following:

- Wind loads tables are based on Exposure B.
- Tributary area of the structural elements is less than or equal to 10 sq. ft.
- Does not apply to roof areas.
- Roof slope is greater than 10 degrees.
- Building is less than or equal to 30 feet tall.
- The building is completely enclosed, all windows and doors are designed to withstand full wind load.
- Applicable to components and cladding, which include windows and doors.

If the tributary area is greater than 10 sq. ft. or if the roof slope is less than 10 degrees, the design wind loads from this table may be conservative. However, if the building has openings in the elevation which may allow wind to pass through, the design values in the tables may be too low. For these cases, ASCE 7-05 should be consulted.

NOTE: Windows and doors designed to resist wind loading are not considered openings.

Building Categories and Design Factors

EXPOSURES

Exposure B: Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single family dwellings or larger. Use of this exposure category shall be limited to those areas for which terrain representative of Exposure B prevails in the upward direction for a distance of at least 1,500 ft. (460 m) or 10 times the height of the building or other structure, whichever is greater.

Exposure C: Open terrain with scattered obstructions having heights generally less than 30 ft. (9.1 m). This category includes flat open country, grasslands and shorelines in hurricane prone regions.

Exposure D: Flat, unobstructed areas exposed to wind flowing over open water (excluding shorelines in hurricane prone regions) for a distance of at least 1 mile (1.61 km) Shorelines in Exposure D include inland waterways, the Great Lakes and coastal areas of California, Oregon, Washington and Alaska. This exposure shall apply only to those buildings and other structures exposed to the wind coming from over the water. Exposure D extends inland from the shoreline a distance of 1500 feet (460 m) or 10 times the height of the building or structure, whichever is greater.

INSTRUCTIONS:

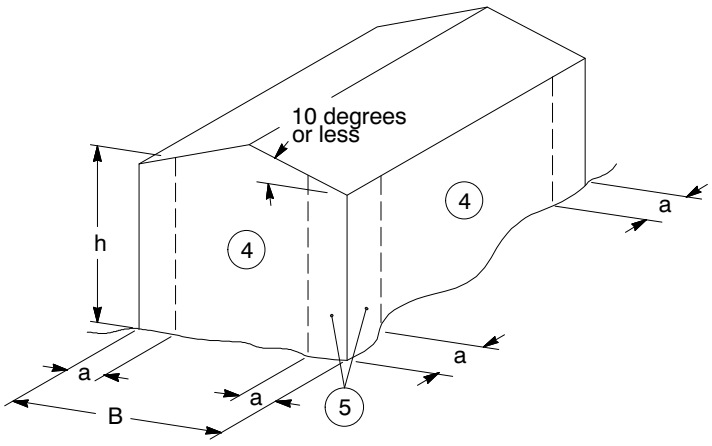
- Determine the Basic Wind Speed (V) in mph from Design Wind Load Table based on the location of the building.
- Determine the Roof Height (h) of the building in feet. This is the mean height of the roof above the lowest grade adjacent to the building. Eave height may be used for roof slope of less than 10 degrees.
- Determine least width (B) of the building in feet. This is defined as the shortest distance between two parallel lines which contain the entire building floor plan.
- Determine high pressure outside corner loading zones (a) in feet from building illustration on following page. a = (0.10) x (B) or a = (0.4) x (h), whichever is smaller, but not less than either (0.04) x (B) or 3 feet (76).
- Determine design pressure from Design Pressure Table.
- All design pressure values are assumed for buildings with an importance Factor Category of II. See Design Factors chart on following page.
- If category III, IV is more appropriate then multiply the design pressure by the corresponding Design Factor - See Design Factor chart.

CAPILLARY TUBES:

As a general rule, capillary tubes are recommended in 1-lite insulated units installed in elevations of 5,000 feet or more above sea level. Capillary tubes are also recommended in smaller (or) divided lite units where one side of glass is less than 12- (305) in length at elevations of 3,000 feet or more above sea level. Infinity does not install capillary tubes into insulated units just for transit through higher elevations (such as insulated units shipping to the west coast via Rocky Mountains). The final installation location of the unit determines if a capillary tube is necessary or not.

BUILDING CATEGORIES

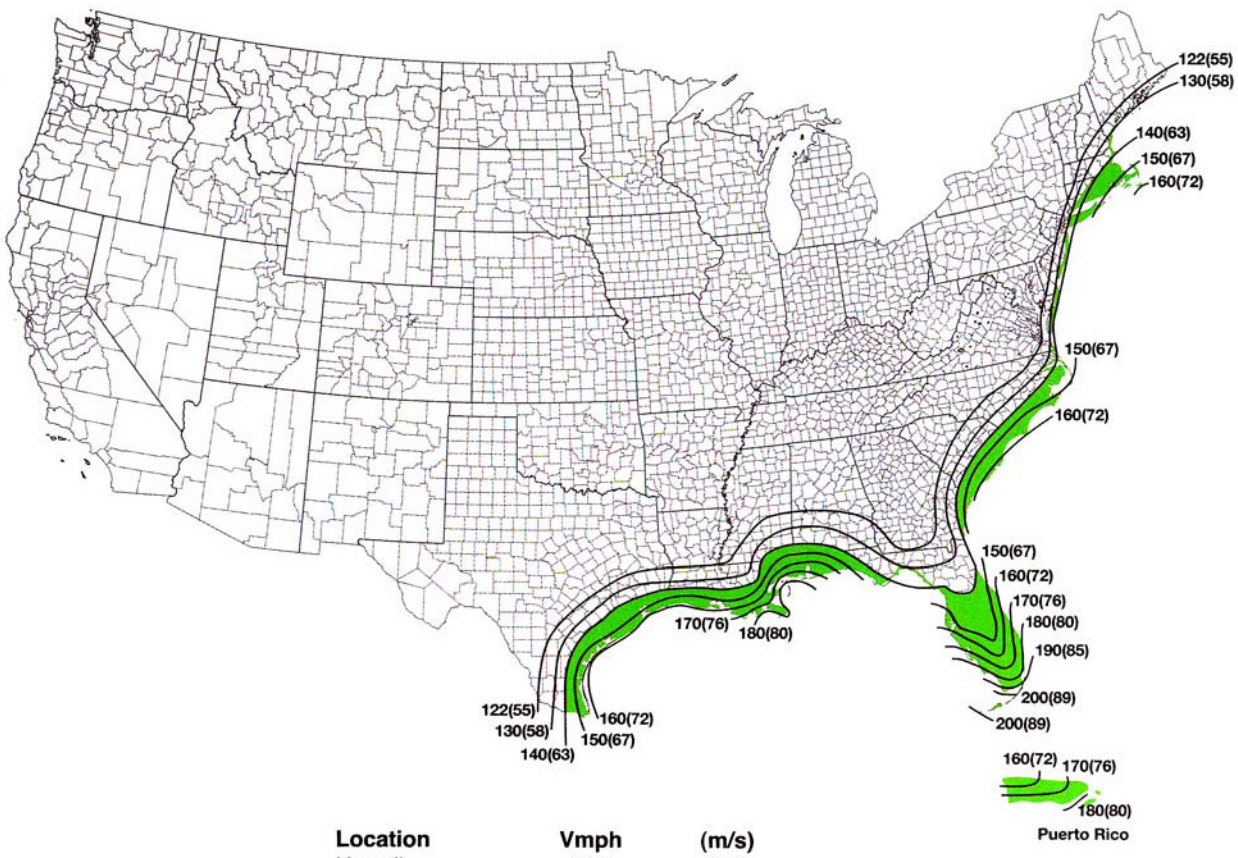
Category	Nature of Occupancy
I	Buildings and structures that represent a low hazard to human life in the event of failure, such as agricultural buildings, certain temporary facilities, and minor storage facilities.
II	Buildings and structures where primary occupancy is one in which more than 300 people congregate in one area.
III	Buildings and other structures in which more than 300 people congregate in one area or structures containing sufficient quantities of toxic, explosive or other hazardous substances including, but not limited to: Petro chemical facilities. Fuel storage facilities. Manufacturing or storage facilities for hazardous chemicals. Manufacturing or storage facilities for explosives.
IV	Buildings and structures designated as essential facilities including, but not limited to: Hospital and other medical facilities having surgery or emergency treatment areas. Fire or rescue and police stations. Structures and equipment in government. Communication centers and other facilities required for emergency responses. Designated shelters for hurricanes.

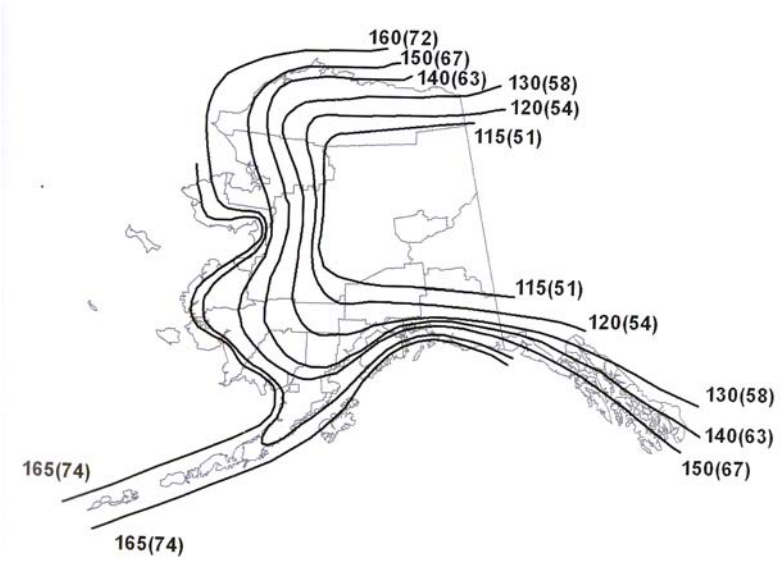


Design Factors

Category	Non–Hurricane prone regions and Hurricane prone regions with V = 85/100 mph and Alaska	Hurricane prone regions with V greater than 100 mph
I	0.87	0.77
II	1.00	1.00
III	1.15	1.15
IV	1.15	1.15

Wind Speed Map - ASCE 7-05



Location	Vmph	(m/s)
Hawaii	145	(65)
Guam	210	(94)
Virgin Islands	175	(78)
American Samoa	170	(76)

NOTE: WBDR for Risk Category IV and Risk Category III buildings health care facilities V ≥ 140 mph; and within 1 mile of the coastal mean high water line where V ≥ 130 mph.