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ACCESS
WINDOW AND DOOR
— DESIGN CENTRE —

Technical Catalog

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Overview

Introduction

The Access GENE0 Window and Door System is a high performance, glass fiber composite system of windows and doors. It achieves NFRC U-factors as low as 0.80 W/m²K (0.14 BTU/hr-ft²°F) with performance grades up to CW-70 and R-95. Air and water performance are superior due to triple compression seals and pressure equalization.

Material

The primary material of the extruded frame components is REHAU RAU-FIPRO X, a glass fiber composite (fiberglass). Instead of a more typical polyester or epoxy matrix, RAU-FIPRO X uses thermoplastic. The thermoplastic matrix allows profiles to be thermally fusion welded, eliminating mechanical corner connections and eliminating a source of failure in traditional fiberglass windows as well as offering superior screw-holding ability for hardware attachment. The glass fibers drastically increase strength and reduce thermal expansion as compared to traditional PVC. In many cases steel reinforcement is not required, reducing weight and improving thermal performance. Profiles are capped with a 1mm thick layer of white RAU-PVC with a high definition surface finish. This capstock is formulated and certified for use anywhere in North America, including high-UV areas. Exterior and interior color choices are available through the use of applied laminates.

Profiles

Profiles have a depth of 86mm and are a six-chamber design (Figure 1). The large chamber in both the frame and sash permits galvanized steel reinforcement to be used as required. This chamber becomes sealed after welding; no drainage penetrates this chamber, eliminating the danger of corrosion. When steel is not required, GPS foam chamber insert may be used to increase thermal performance.

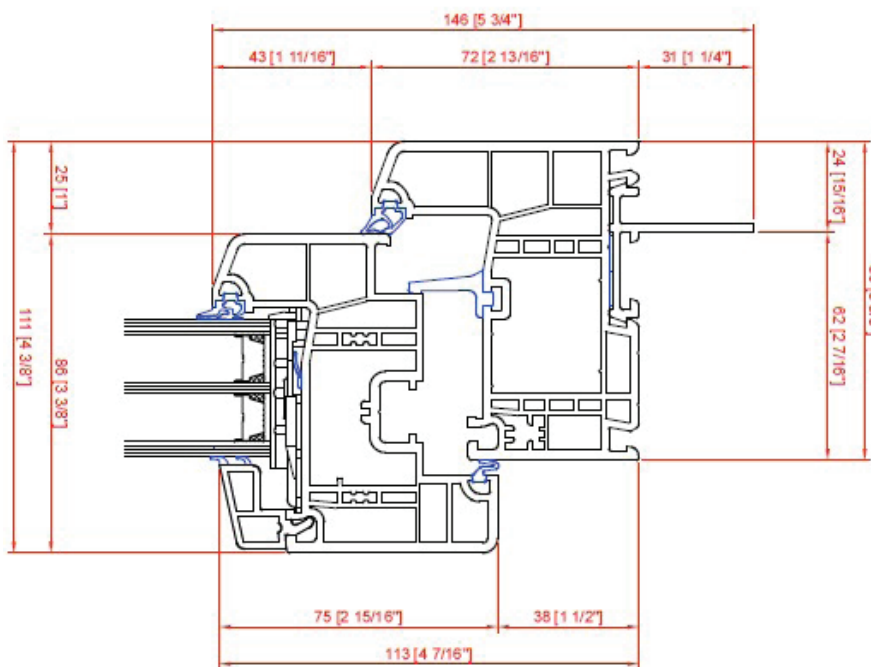


Figure 1: GENE0 Profiles, jamb viewed from above, exterior is at top

The profile design features a triple seal system (Figure 2). The primary center fin seal is continuous, eliminating air infiltration at the upper hinge found in dual seal tilt & turn designs. It also divides the area between the frame and sash into two chambers, reducing convective heat loss. The height of the center seal provides a large amount of water head for drainage which combined with pressure equalization yields extremely high water performance.

Grooves and screw bosses designed into the profiles minimize the loads on screws and prevent hardware pull-out associated with traditional fiberglass casement windows. In addition to screws, hinges have non-threaded bosses for load bearing.

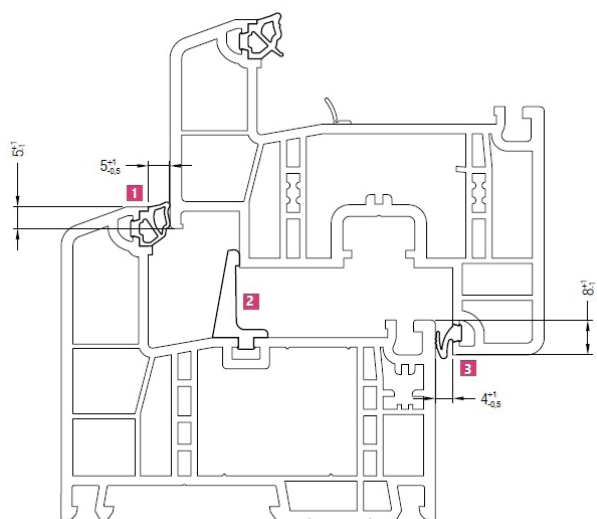


Figure 2: Triple seal design

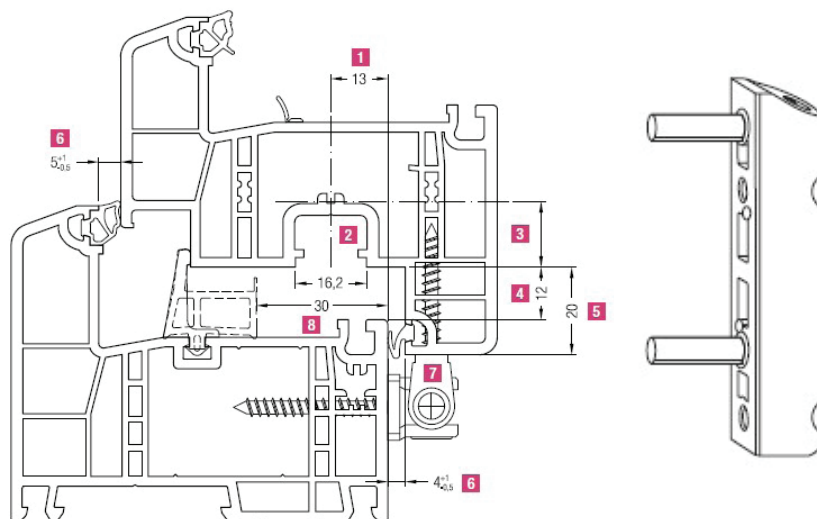


Figure 3: Hardware attachment detail and example of hinge bosses

Operation Type and Hardware

The Access GENEIO Window and Door System can be used for Picture (Fixed) Windows, Tilt & Turn Windows and Doors, Hopper (Tilt-only) Windows, as well as Entry Doors and Parallel Slide Patio Doors.

Tilt and Turn Windows feature operation by a single handle. Turning the handle 90° allows the window to swing inward like a casement window. Turning the handle 180° allows the window to tilt in. The tilt position provides for secure, draft free ventilation. The window may even be left in this position in a light rain. The turn position facilitates cleaning and allows for emergency egress.

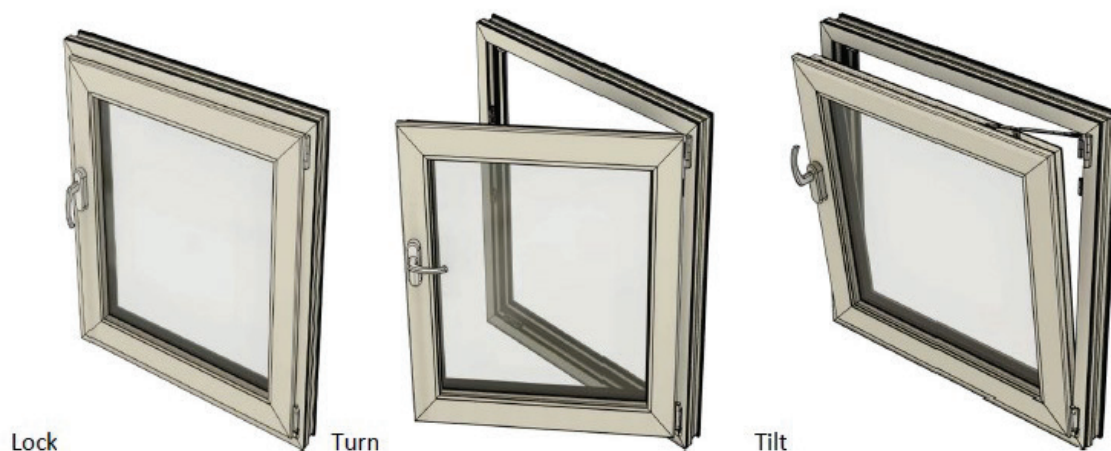


Figure 4: Tilt & turn operation

The hardware by Roto Frank of Germany locks around the entire perimeter and features mushroom locks and security strikes to prevent forced entry (Figure 5).

Figure 5: Mushroom lock and security strike



Entry Doors feature a five point, handle operated lock featuring a dead bolt plus four mushroom locks with security strikes. Lifting the handle engages the locks; the door can then be secured by turning the knob or key. The handle is then blocked and will fail before the lock if forced entry is attempted. The door is unlocked by knob or key. Pushing the handle down unlatches the door. Electronic operation is an option.

Entry Doors may be fully glazed, filled with a 44mm (1 3/4") panel, or any combination of glass and panels. Access Windows and Doors is ready to assist in designing a custom door for any application.

Parallel slide doors work like a van door to provide triple compression seals in a sliding product (Figure 7).

Figure 6: Custom entry doors



Figure 7: Parallel slide door



Glazing

Glazing is available in a 24mm dual pane, or triple pane up to 51mm (2") thick. Triple pane glazing has two layers of low emissivity coating and is highly recommended for climate zones five and above. Available coatings include Cardinal LoE 180, LoE2 272 and LoE3 366, as well as Guardian Climaguard 80/71, 70/36, Sunguard SNX 62/27 and Sunguard 68. Spacer systems include Cardinal Endur®, Qualex T-Spacer™, and Tremco Eneredge®. Standard triple glazing is 37mm or 44mm; for passive house applications Access has the ability to maintain a constant 15.9mm (0.625") gap between the glass. (This is not recommended for climate zones seven and higher as performance decreases relative to 12.7mm (0.5") below -18°C (0°F). Argon fill is standard; an air fill with capillary tubes is available for high altitude locations. Please see the glazing chapter for comprehensive information on NFRC certified options.

Models and Size Limitations

Definitions

Element is defined as one lite, either operating or a non-operating picture window.

Unit is defined as one or more elements designed to fit a single opening.

Unit Restrictions

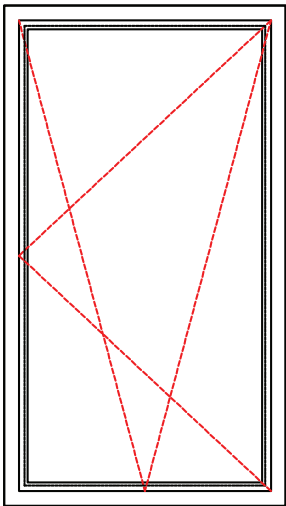
The maximum dimension on any side for any unit is 3.05m (120.0”).

Standard Models

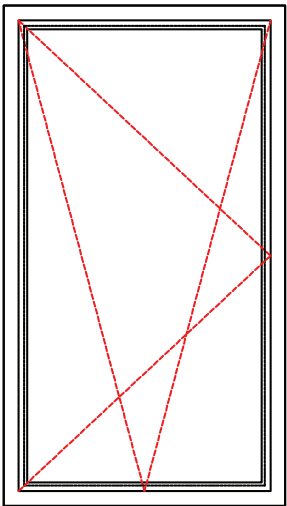
In order to facilitate easy ordering and customer communication, Access Windows and Doors has standardized the most popular designs. These standard designs are by no means the limit of what can be produced. If there is a desired design not shown here your sales representative will be happy to discuss it with you.

Single Element Windows

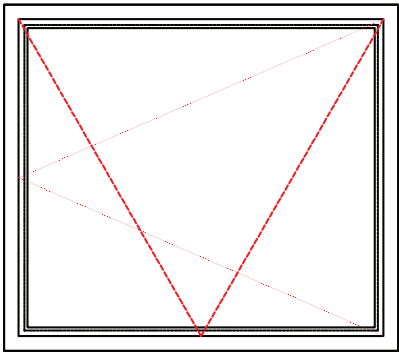
Single element windows are available as Tilt & Turn or Fixed windows. If a Tilt & Turn window is significantly wider than it is tall, normal operation will be restricted to Tilt-only (Hopper) by means of a turn restrictor.



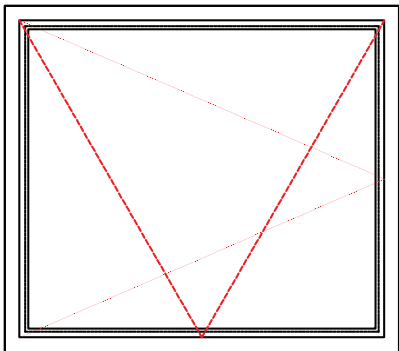
Left Tilt and Turn
Model 4701L



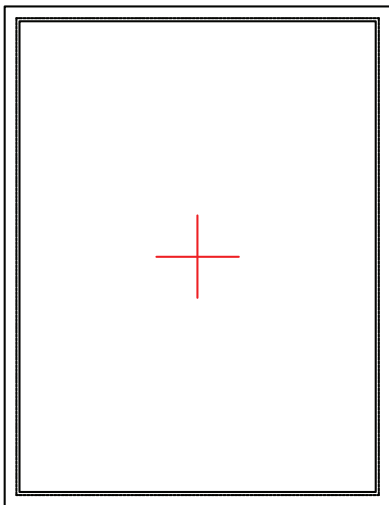
Right Tilt and Turn
Model 4701R



Left Tilt and Turn
with Turn Restrictor



Right Tilt and Turn
with Turn Restrictor

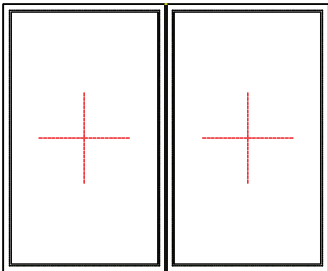


Picture Window
Model 4701P

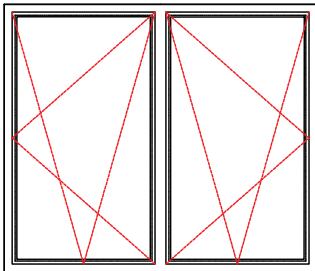
Multiple Element Windows

Multiple element windows are created by either dividing a single frame with a t-mullion or transom, or by combining two or more individual frames. The decision on whether to use a mullion or combine frames, and the size of the mullion (98mm or 126mm) if used depends on structural requirements. Unless otherwise required, Access Windows and Doors sizes mullions and reinforcement for deflections under L/200 at 1200 Pa (25 psf).

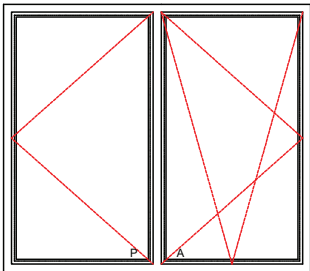
Two-Lite Windows



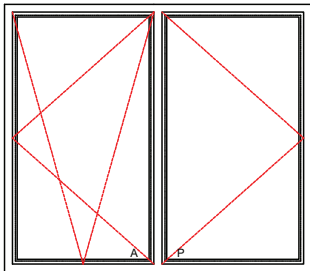
Two Lite Picture Window
Model 4702P



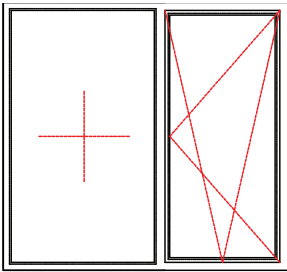
Double Tilt & Turn
Model 4702



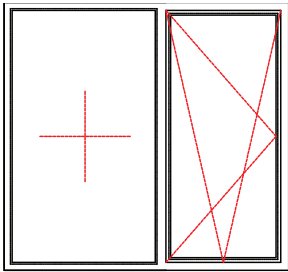
French Window,
Right Side Active
Left Side Turn only
Model 4702R



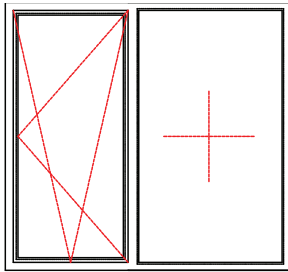
French Window, Left
Side Active
Right Side Turn only
Model 4702L



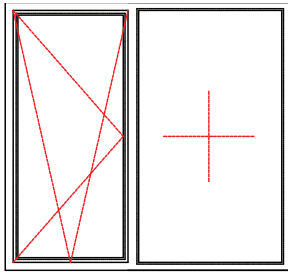
Double Window
Left Side Picture Window
Right Side Left Tilt & Turn
Model 4702OL



Double Window
Left Side Picture Window
Right Side Right Tilt & Turn
Model 4702OR

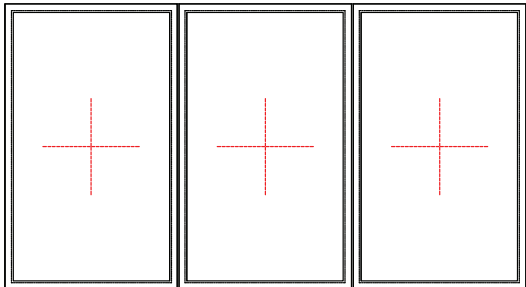


Double Window
Right Side Picture Window
Left Side Left Tilt & Turn
Model 4702LO

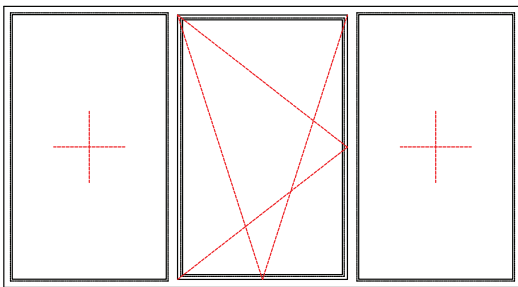


Double Window
Right Side Picture Window
Left Side Right Tilt & Turn
Model 4702RO

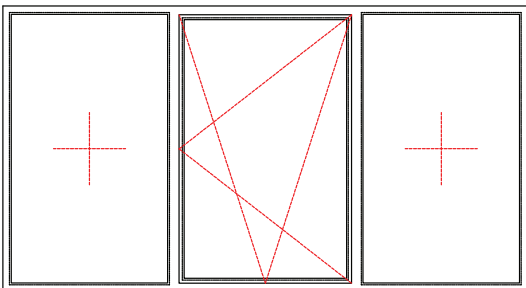
Three-lite Windows



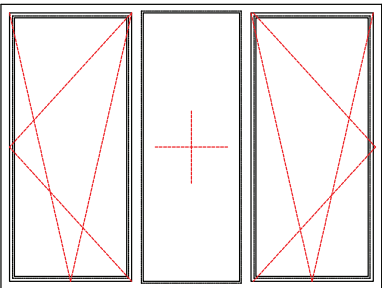
Three Lite Picture Window
Model 4703P



Right Tilt & Turn
flanked by Picture Window
Model 4703R

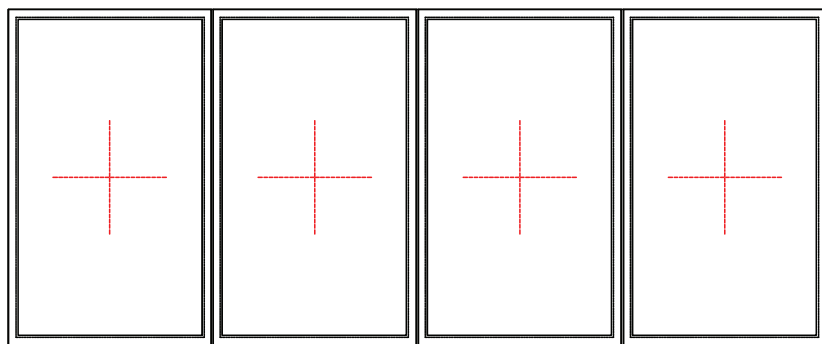


Left Tilt & Turn
flanked by Picture Window
Model 4703L

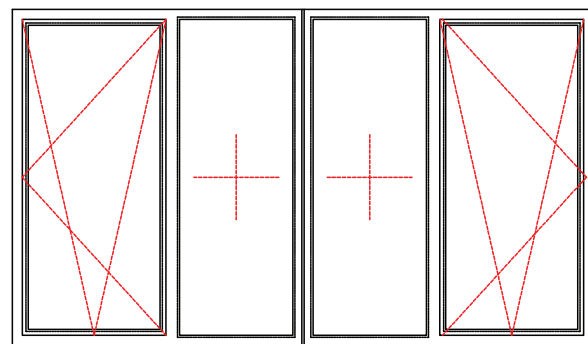


Picture Window
flanked by Two Tilt & Turn
Hinged at Jambes

Four-Lite Windows



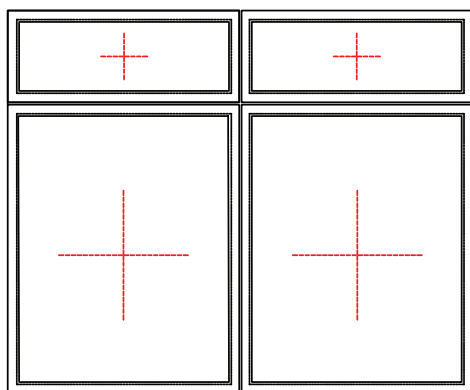
Four Lite Picture
Window
Model 4704P



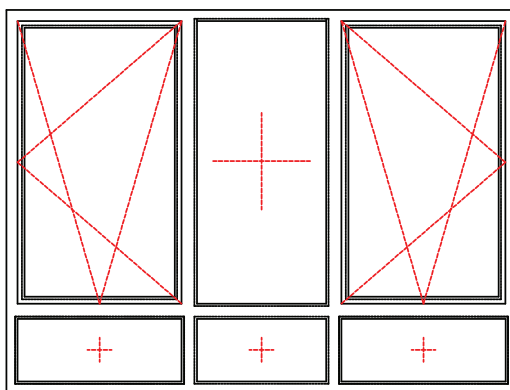
Four Lite Window
End Units Operate Hinged at
Jambs
Model 4704

Transoms and Bottom Transoms

A transom window (T) may be added to the top or bottom (“bottom transom”, BT) of any window model by adding “T” or “BT” to the end of the model designator. The transoms may be continuous (subject to size restrictions) or divided like the corresponding window. Some examples are below.



Two Lite Picture Window
with Transom above
Model 4702PT



Picture Window
flanked by Two Tilt & Turn
Hinged at Jambs
with Transom Windows below

Doors

Entry

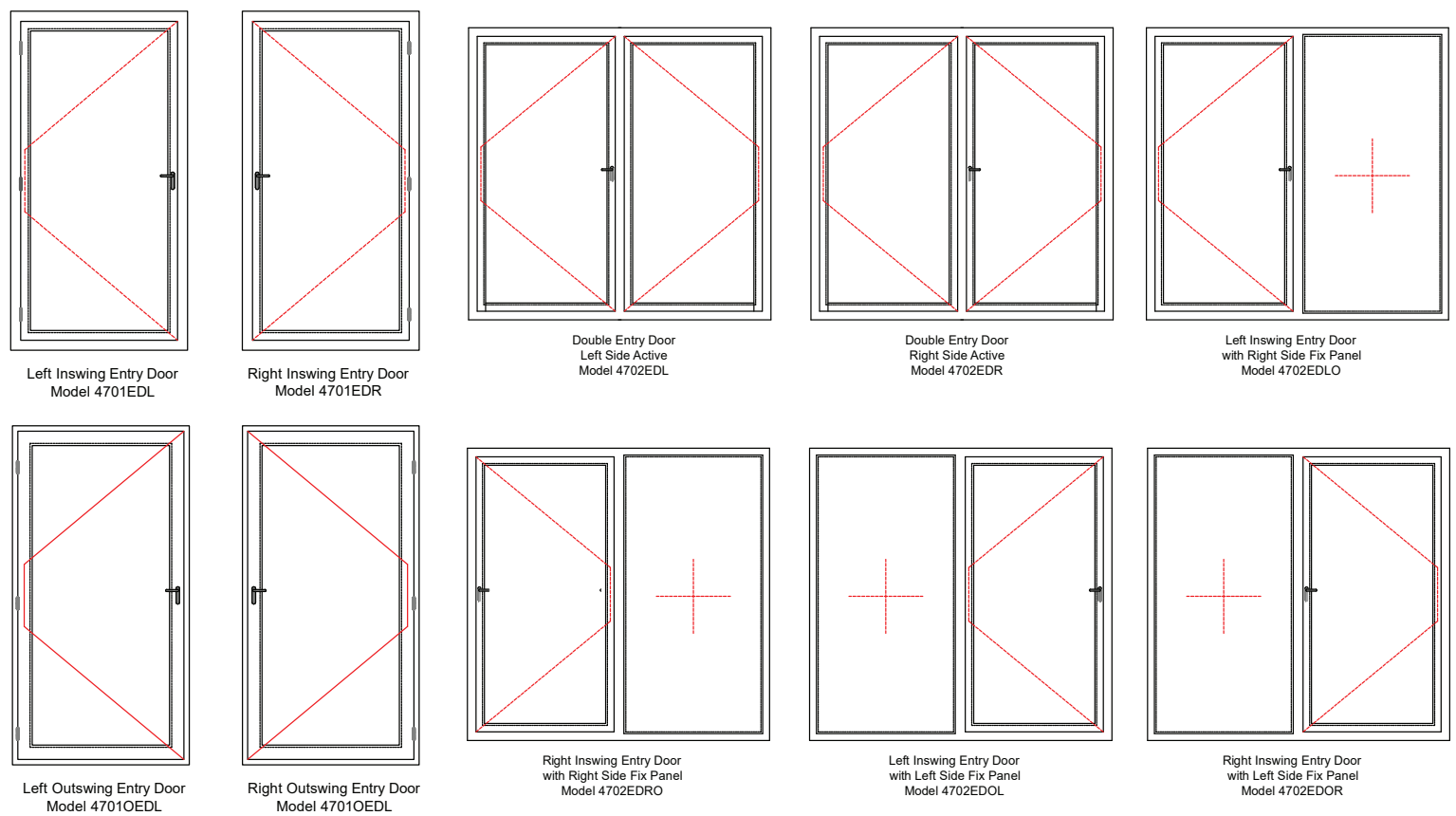
Entry Doors are the best solution for a door that receives high traffic. These doors use European handle sets for operation and include a conventional door latch. Lifting the handle engages the deadbolt and a minimum of four mushroom security locks (active sash on single door). Turning the key or lock knob then blocks handle actuation. Unlocking is done by turning the key or knob the opposite direction. Then, a push down on the handle will open the door. When the door is not locked, the handle operates the door catch.

Entry Doors are available with a low-profile 20mm (0.79”) high thermally broken aluminum sill or a high-performance (HP), 56mm glass fiber composite sill. The former features a single compression seal along with a bulb seal, while the latter offers a triple compression seal. The high-performance sill is recommended for climate zones seven and higher and is designated by adding “HP” to the end of the model number.

The standard models feature full glazing. However, 44mm (1 ¾”) fiberglass sandwich panels are available and Access has the ability to divide the door sash into almost any combination of glass and panel. See Figures 1 for some examples.



Figure 1: Some custom entry doors



Note: Double doors are available in an outswing configuration by specifying an ‘O’ before ‘ED’.

Balcony Doors

Balcony Doors are intended for doors that do not need to be unlocked from the outside. They are built with the same profiles and hardware as windows. (In German they are called “Fenstertüren” – window-doors.) From the inside, they operate just as a Tilt & Turn Window. From the outside, there is a pull handle to pull the door closed. In the closed position, it is held closed by a magnetic cabinet-style catch. (The cabinet catch will not hold the door closed against a strong wind.) These doors are ideal for balconies and anywhere a sliding patio door might be considered. No screen is standard. The high-performance sill is standard. The low-profile sill is available upon special request but is not recommended as the bulb seal cannot be used with tilt & turn hardware.

Balcony Doors follow the same model convention as Tilt & Turn Windows with the exception of an added “BD”. Example: A French Tilt & Turn Balcony Door with the left side active is a “4702BDL”.

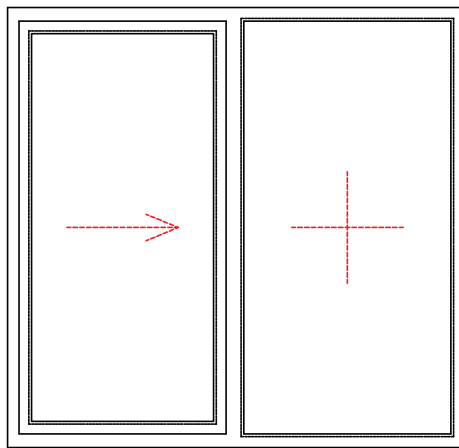
Terrace Doors

Terrace Doors are a hybrid of an Entry Door and a Balcony Door. They use the larger sash profiles of the entry door but use Tilt & Turn hardware. However, a handle is added to the exterior of the door for exterior operation. To provide security, a lock cylinder with a knob on the inside and key on the outside are added. This allows handle actuation to be blocked in either the tilt or closed position. These doors are a good option where it will occasionally be necessary to unlock the door from the outside. No screen is standard. The high-performance sill is standard. The low-profile sill is available upon special request but is not recommended as the bulb seal cannot be used with tilt & turn hardware.

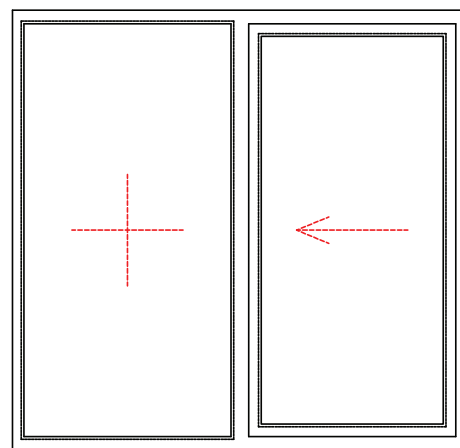
Terrace Doors follow the same model convention as Tilt & Turn Windows with the exception of an added “BD”. Example: A French Tilt & Turn Terrace Door with the right side active is a “4702TDR”.

Parallel Slide

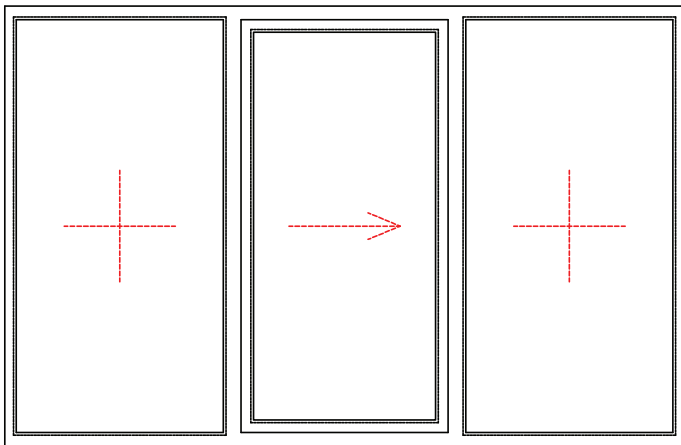
Parallel Slide Doors are similar to van doors as they have a controlled movement of the sash. The sash has a ventilation setting where it is open approximately 1 cm (3/8”) around the entire perimeter but the door is still secure. Parallel slide doors come standard with a pull handle and magnetic catch like a balcony door; full exterior operation is available as an option. This door is the preferred solution for a sliding door in North America.



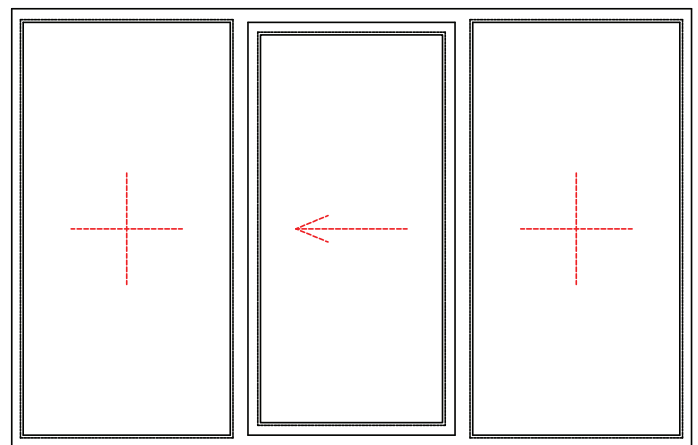
Left Side Active
Slides to the right
Model 4702PSL



Right Side Active
Slides to the left
Model 4702PSR



Center Panel
Slides to the right
Model 4703PSL



Center Panel
Slides to the left
Model 4703PSR

Tilt & Slide

Tilt and Slide Doors combine the compression seals of a balcony door with the space-savings of a sliding door. Tilt & Slide hardware is only available with a high, 72mm (2.83”) sill. Tilt & Slide Doors come standard with a pull handle and magnetic catch like a balcony door; full exterior operation is available as an option. Tilt & slide doors are NOT recommended for households with young children or frequent guests because their operation is not intuitive for most people in North America. Tilt & Slide Doors follow the model convention of Parallel Slide Doors with “TS” replacing “PS”.

Custom Models

Access Windows and Doors is happy to combine elements into a single unit. Such units’ maximum sizes are governed by the maximum size for any single element, the maximum size of the unit based on color and mullion deflections of under L/200 at design pressure.

Size Limitations

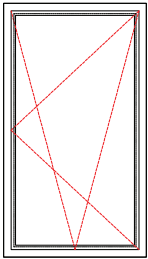
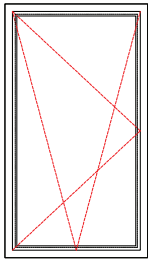
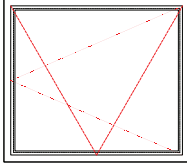
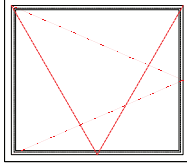
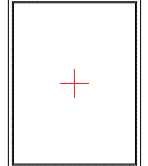
This section lists standard models and their minimum and maximum sizes.

Single element windows reflect maximum sizes per the fabrication manual limited by 2000 Pa (40 psf) design pressure and manufacturing limitations. For higher design pressures, sizes are limited by the maximum test size. (See the Performance chapter.)

Multi-element window maximum sizes reflect L/200 or better mullion performance at 1200 Pa (25 psf) design pressure. Very large windows may require the larger Z84 sash instead of the standard Z57 sash. This reduces glass area by 27mm (1.06”) on all four sides.

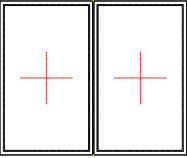
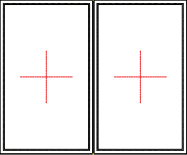
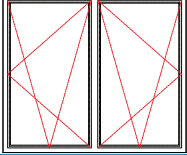
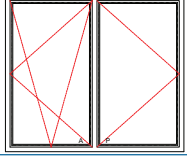
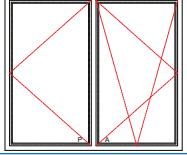
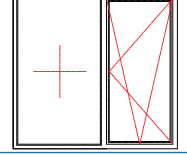
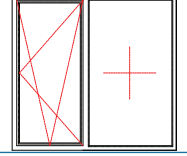
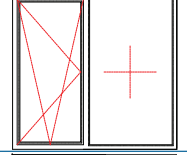
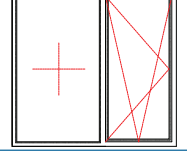
For higher design pressure, consult with Engineering. In all cases for multi-element windows, larger sizes are often possible with specifically designed mullion reinforcement. In this case the maximum size of any single element is governed by the “Single Element Windows” section.

Single Element Windows

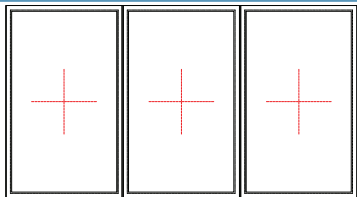
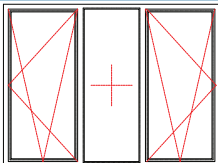
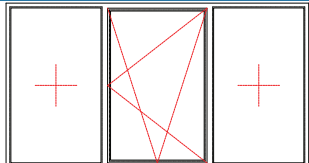
Model	Depiction	Min. Width cm (in)	Min. Height cm (in)	Max. Width cm (in)	Max. Height cm (in)	Max. Area m ² (ft ²)
4701L		51 (20)	51 (20)	122 (48)	250 (98)	2.5 (26.9)
4701R		51 (20)	51 (20)	122 (48)	250 (98)	2.5 (26.9)
4701LH (tilt only)		51 (20)	51 (20)	244 (96)	244 (96)	1.86 (20)
4701RH (tilt only)		51 (20)	51 (20)	244 (96)	244 (96)	1.86 (20)
4701P		30 (12)	30 (12)	250 (118)	250 (98)	4.64 (50)

Multiple Element Windows

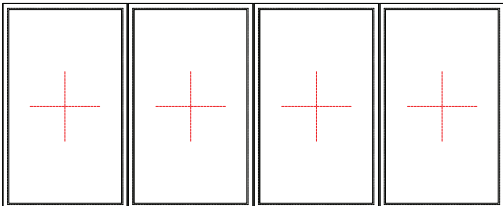
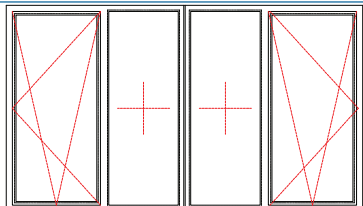
Two-lite Windows

Model	Depiction	Min. Width cm (in)	Min. Height cm (in)	Max. Width cm (in)	Max. Height cm (in)	Max. Area m ² (ft ²)
4702P		61 (24)	30 (12)	183 (72)	221 (87)	
4702P				305 (120)	193 (76)	
4702		102 (40)	51 (20)	244 (96)	244 (96)	
4702L (Mullionless French)		102 (40)	51 (20)	244 (96)	244 (96)	4.49 (48.3)
4702R (Mullionless French)						
4702OL		102 (40)	51 (20)	284 (112)	If $W \leq 234$ (92), 244 (96) otherwise 225 (88)	
4702OR						
4702LO						
4702RO						

Three-lite Windows

Model	Depiction	Min. Width cm (in)	Min. Height cm (in)	Max. Width cm (in)	Max. Height cm (in)
4703P		69 (36)	30 (12)	274 (108)	221 (87)
4703P				305 (120)	193 (76)
4703		152 (60)	51 (20)	305 (120)	244 (96)
4703L		152 (60)	51 (20)	305 (120)	244 (96)
4703R					

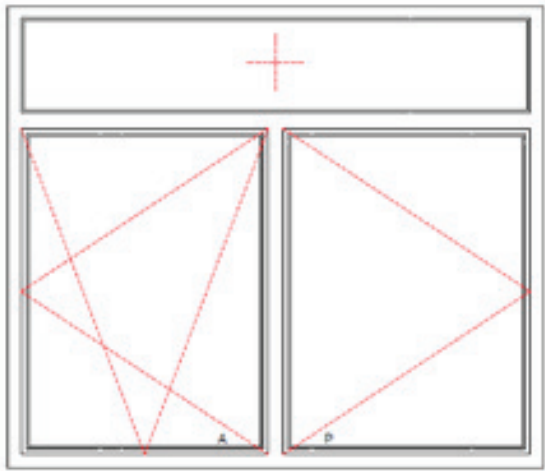
Four-lite Windows

Model	Depiction	Min. Width cm (in)	Min. Height cm (in)	Max. Width cm (in)	Max. Height cm (in)
4704P		122 (48)	30 (12)	366 (144)	221 (87)
4704P				305 (120)	193 (76)
4704		152 (60)	51 (20)	305 (120)	244 (96)

Transom and Bottom Transoms

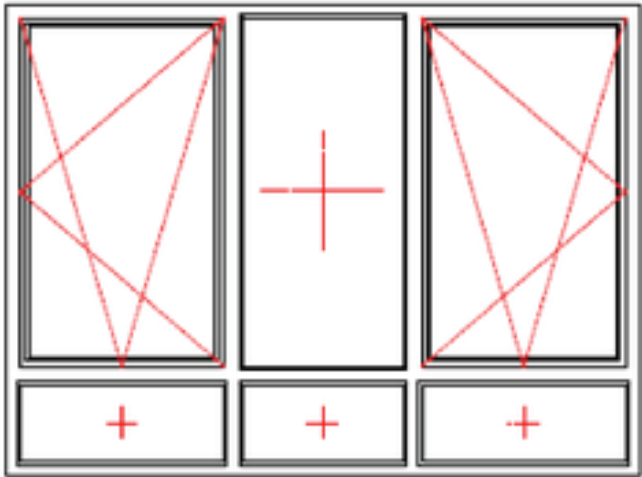
A window may have a transom added above it or below it by adding a “T” or “BT” to the model number. For up to a 91.4 cm (36”) tall transom, the maximum width of a continuous transom is 203 cm (80”). For wider windows, or taller (bottom) transoms, the (bottom) transom will be split in line with the window (above) below it. For the former case, the maximum size is governed by the maximum size of the base model, PLUS the height of the transom.

Transom and Bottom Transoms Continued



Example: 4702LT, 200 cm wide, 90cm transom

Because this is under 203 cm wide, the transom may be continuous. The 4702LT has a maximum height of 244cm. Because the transom is continuous, the maximum overall height with the transom is 244cm + 90cm=334 cm.



Example, 4703BT, 250 cm wide

Because this unit is over 203cm wide, it will need three individual bottom transoms. Because the bottom transom is not continuous, the maximum overall height is governed by the maximum size of a 4703, 244cm

Doors

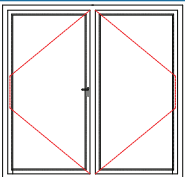
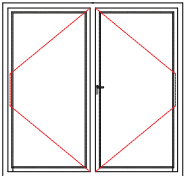
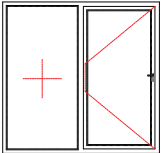
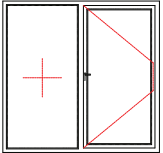
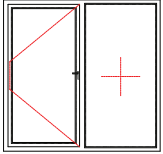
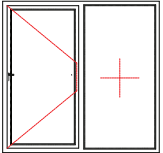
Entry

Please note that “ED” denotes an inswing entry door and “OED” an outswing entry door.

Single Doors

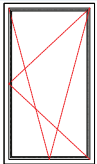
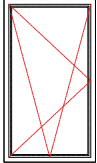
Model	Depiction	Min. Width cm (in)	Min. Height cm (in)	Max. Width cm (in)	Max. Height cm (in)
4701EDL		71 (28)	188 (76)	171 (50)	244 (96)
4701EDR					
4701OEDL					
4701OEDR					

Two-lite Doors

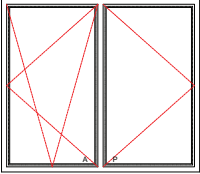
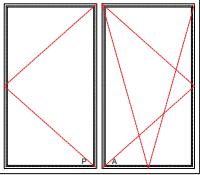
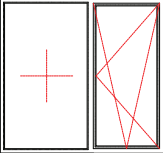
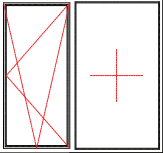
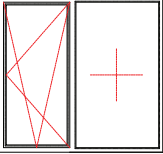
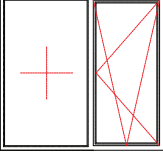
Model	Depiction	Min. Width cm (in)	Min. Height cm (in)	Max. Width cm (in)	Max. Height cm (in)	Max. Area m ² (ft ²)
4702EDL (4702ODL) (Mullionless French)		142 (56)	196 (77.25)	224 (96)	224 (96)	4.49 (48.3)
4702EDR (4702ODR) (Mullionless French)						
4702EDOL (4702OEDOL)		142 (56)	188 (76)	284 (112)	If W ≤ 183 (92), 244 (96) otherwise 225 (88)	
4702EDOR (4702OEDOR)						
4702EDLO (4702OEDLO)						
4702EDRO (4702OEDRO)						

Balcony and Terrace Doors

Single Doors

Model	Depiction	Min. Width cm (in)	Min. Height cm (in)	Max. Width cm (in)	Max. Height cm (in)	Max. Area m ² (ft ²)
4701BDL (4701TDL)		51 (20)	51 (20)	120 (47)	250 (98)	2.5 (26.9)
4701BDR (4701TDR)		51 (20)	51 (20)	305 (120)	250 (98)	2.5 (26.9)

Two-lite Doors

Model	Depiction	Min. Width cm (in)	Min. Height cm (in)	Max. Width cm (in)	Max. Height cm (in)	Max. Area m ² (ft ²)
4702BDL (4702TDL) (Mullionless French)		102 (40)	51 (20)	224 (96)	224 (96)	4.49 (48.3)
4702BDR (4702TDR) (Mullionless French)						
4702BDOL (4702TDOL)		102 (40)	51 (20)	284 (112)	If W ≤ 234 (92), 244 (96) otherwise 225 (88)	
4702BDOR (4702TDOR)						
4702BDLO (4702TDLO)						
4702BDRO (4702TDRO)						

Parallel Slide and Tilt & Slide

Note: Parallel slide is the standard operation, recommended for North American clients , and shown here. Tilt & slide is available upon request.

Model	Depiction	Min. Width cm (in)	Min. Height cm (in)	Max. Width cm (in)	Max. Height cm (in)
4702PSL		150 (59)	91 (36)	305 (120)	If $W \leq 234$ (92), 244 (96) otherwise 225 (88)
4702PSR					
4703PSL		255 (89)	91 (36)	305 (120)	244 (96)
4703PSR					

Custom Design Limitations

Maximum sizes are governed by the maximum size for any single element, the maximum size of the unit based on color and mullion deflections of under L/200 at design pressure.

Colours, Finishes and Options

Introduction

The GENE0 RAU-FIPRO X profiles come with a 1mm thick white RAU-PVC cap with an HDF (high definition finish) surface. This surface has a superior gloss for longevity and low maintenance. The gloss prevents dirt from embedding into the cap, allowing the profiles to maintain their color.

Exterior and interior non-white colors are available as well, through the use of laminates. Access uses only premium acrylic-based laminates, Renolit Exofoil FX or skai by Continental. These laminates are far more durable than painted surfaces.

Colors are classified as “stocked”, “standard”, and “custom”. Stocked colors are kept in inventory levels to minimize any delay in production. Standard colors may see an additional two-week lead time. Custom colors are available subject to minimum order quantities, additional lead time, and waste surcharge.

Screen frames are powder coated to the best match possible of the exterior color.

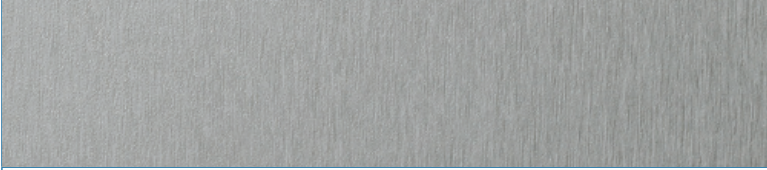
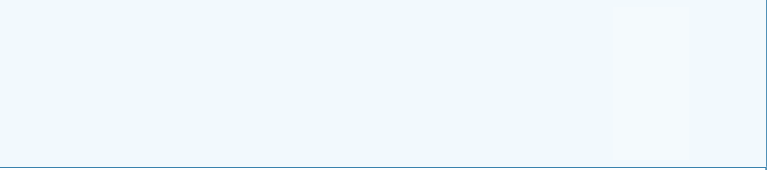
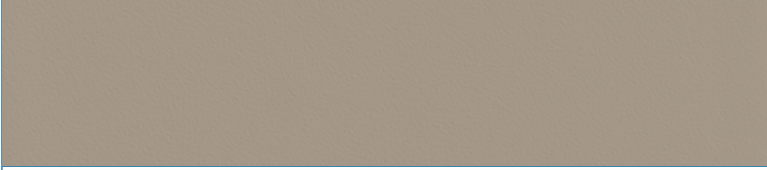
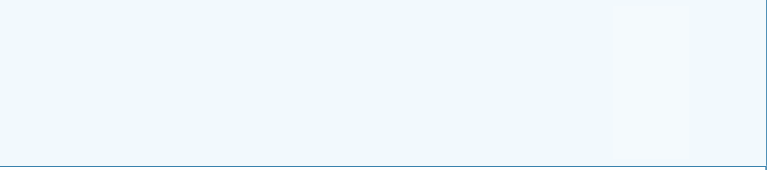
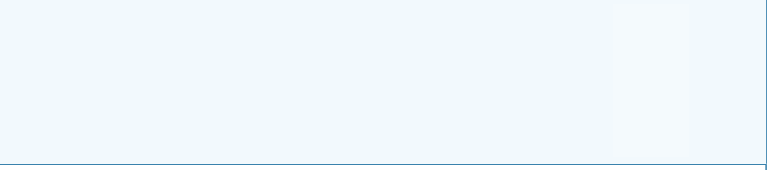
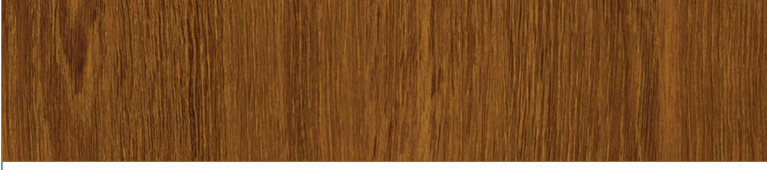
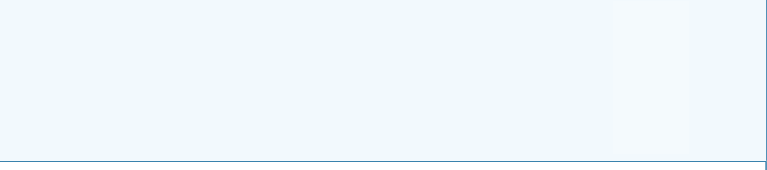
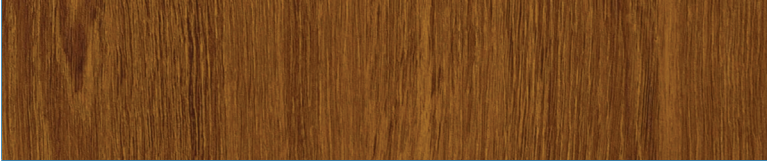
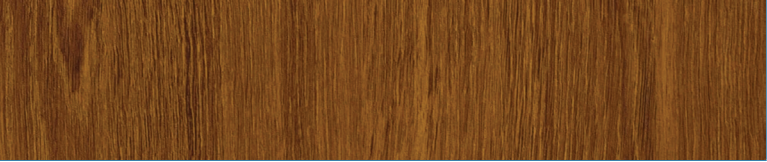
Please note that the digital and print depictions of color in this catalog will not precisely match the profile laminates. Please ask your sales representative for a physical sample to confirm any color choice.

Profiles

Stocked

Exterior	Interior
White	White
North American Bronze	White
Black Brown	White
Black Brown	Black Brown

Standard

Exterior	Interior
Silver D	White
	
Brushed Silver	White
	
Burnt Almond	White
	
Dark Oak	White
	
Dark Oak	Dark Oak
	
Oak Colonial	White
	
Oak Colonial	Oak Colonial
	

Custom Laminates

A variety of custom solid and woodgrain laminates are available. These are subject to longer lead times and project minimums. Please contact your sales representative for samples.

Hardware Style and Finishes

Window and Balcony Door

The standard handle is the Maco Harmony (Figure 1). It is available in powder coated white or anodized silver. Hinge covers are available to match these finishes.

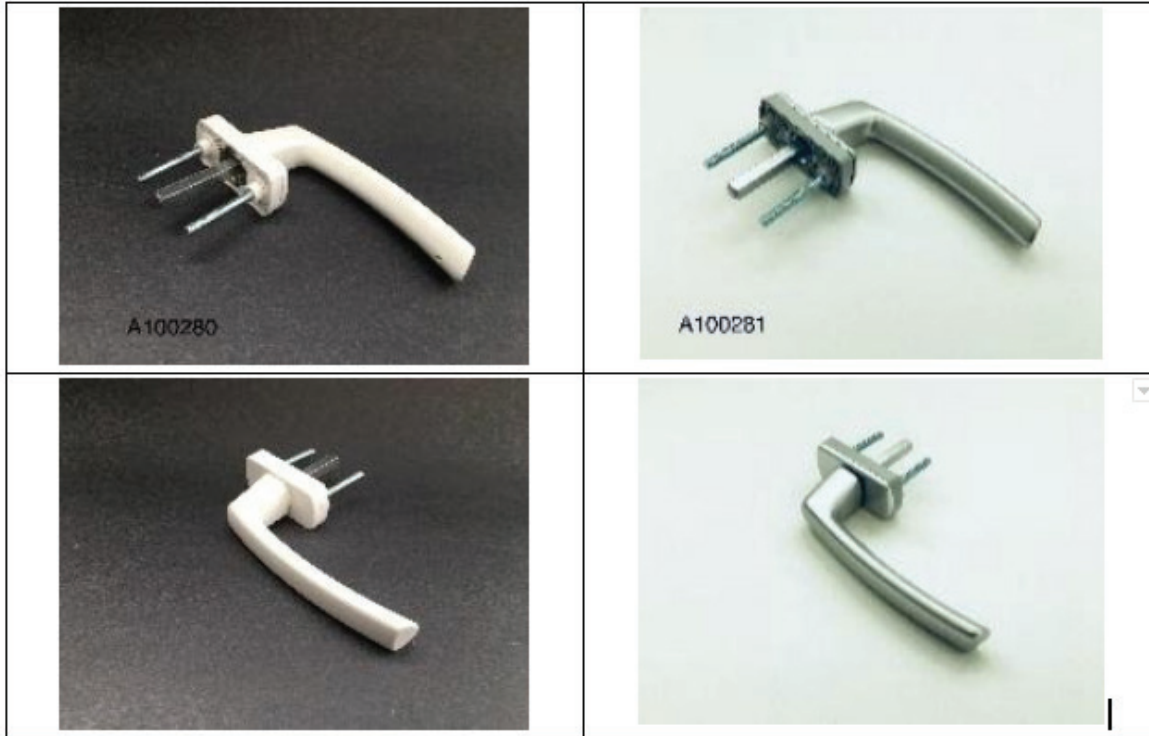


Figure 1: Maco Harmony Window and Balcony Door Handle in White (left) and Silver

Balcony doors differ from windows only in that they have a magnetic catch. This allows the door to be pulled closed from the outside via a pull handle (Figure 2). These are available in white or silver.

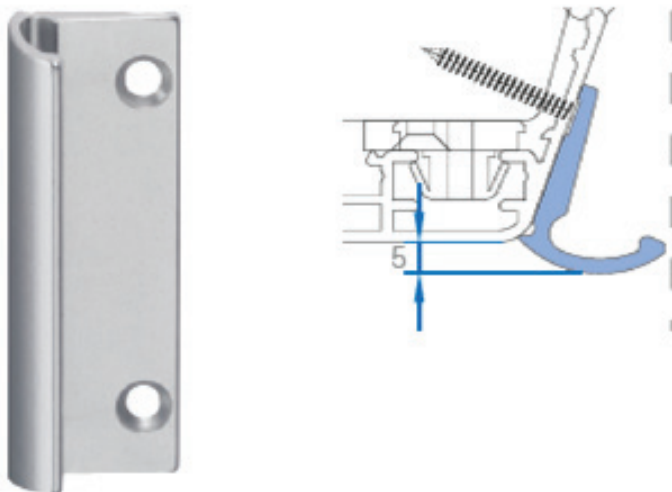


Figure 2: Pull Handle (check if this is correct)

Terrace Door

Terrace doors use the same handles as balcony doors but add a handle on the outside for exterior operation as well as a lock cylinder with a knob inside, keyed outside (Figure 3).



Figure 3: Lock Cylinder

Entry Door

The standard entry door handle is by Maco (Figure 4). They are available in anodized silver or custom powder coated. The standard hinges are “flag” style by Roto (Figure 5) and are available in white or custom powder coated. Entry doors use the same lock cylinder as terrace doors (Figure 3).



Figure 4: Entry Door Handle (Interior side is left.)



Figure 5: Flag-Style Hinge

Other Hardware Options

Arrestable Brake Stay

The arrestable brake stay locks the sash in the turned position by turning the handle to the closed position. When this option is installed, the anti-mishandling device cannot be installed. (The anti-mishandling device prevents the window handle from being turned while the window is tilted or turned, which prevents the window from both tilting and turning.)

Concealed Tilt & Turn Hinges

Concealed tilt & turn hinges (Roto Designo) are available as an option. Concealed hinges limit the swing of a window to approximately 100°.

Turn Restrictor

Windows that are significantly wider than they are tall will have turn restrictors installed, limiting them to tilt-only operation. The turn restrictor may be disengaged for cleaning only, with one person supporting the handle side of the sash.

Window Grid Options

Grids Between the Glass (GBG)

Grids between the glass (GBG) are typically placed between the outer two panes of glass. They are available in a variety of rectangular patterns (See Table 1 for some examples.), shapes, and colors. (See Tables 2-6; two-tone muntin bars may be placed with either side facing the exterior.)

In comparison to true divided lites and simulated divided lites (SDL's), GBG offer easier cleaning. They have superior thermal performance to true divided lites as there is less edge of glass.

Table 1: GBG Example Patterns

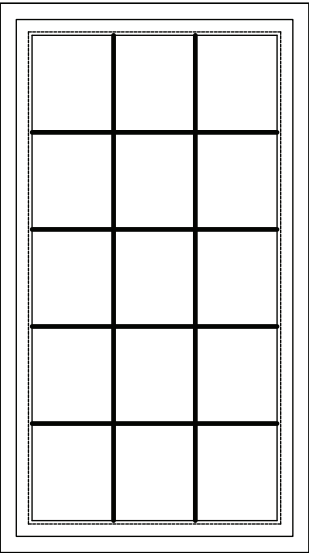
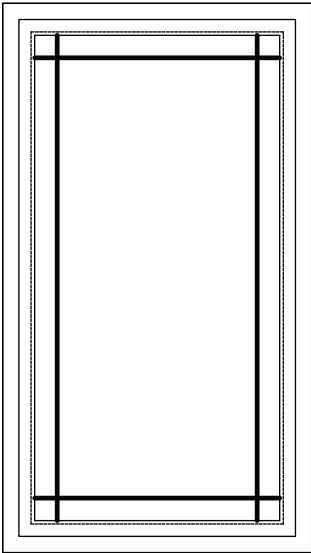
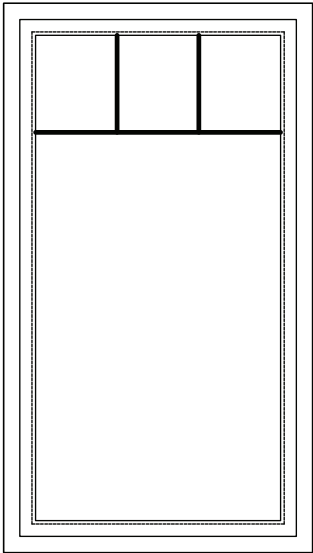
COLONIAL	PRAIRIE	TOP
		

Table 2: ¼” x ⅝” Single Colour Muntins

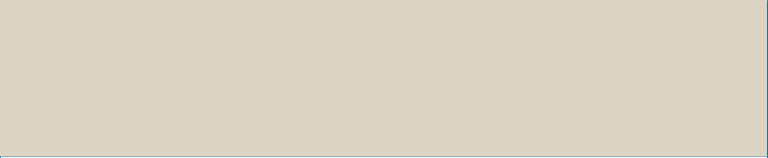
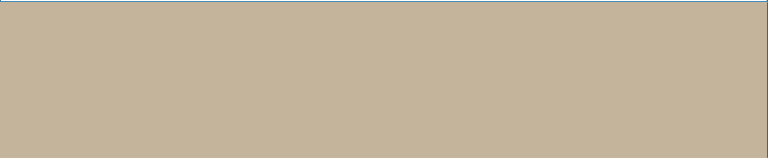
	Tan
	
	Champagne
	
	White
	
	Sandstone
	
	Bronze
	

Table 3: ¼” x ⅝” Two-tone Muntin Bars

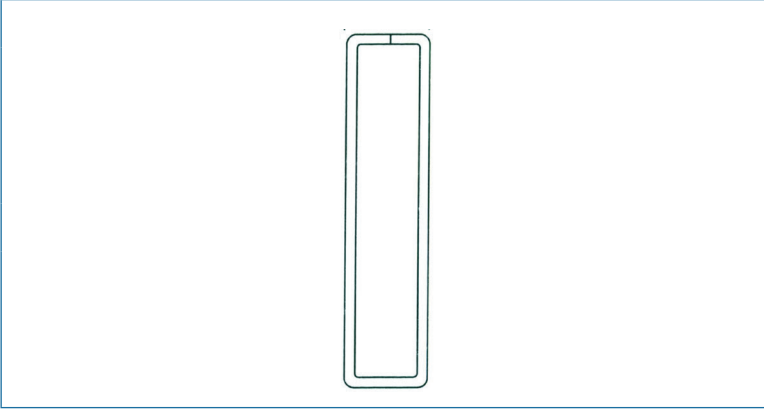
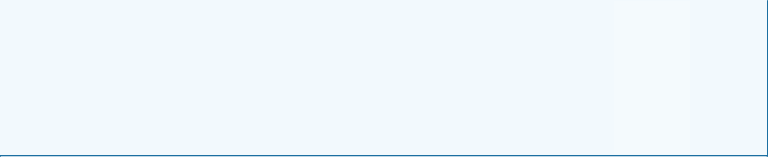
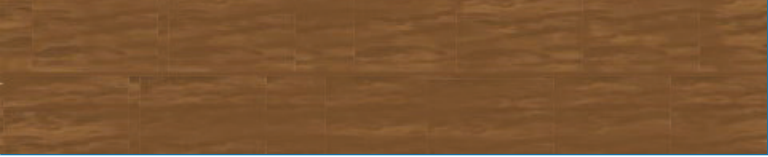
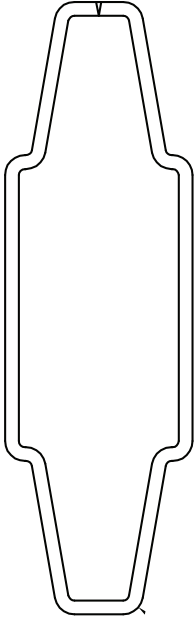
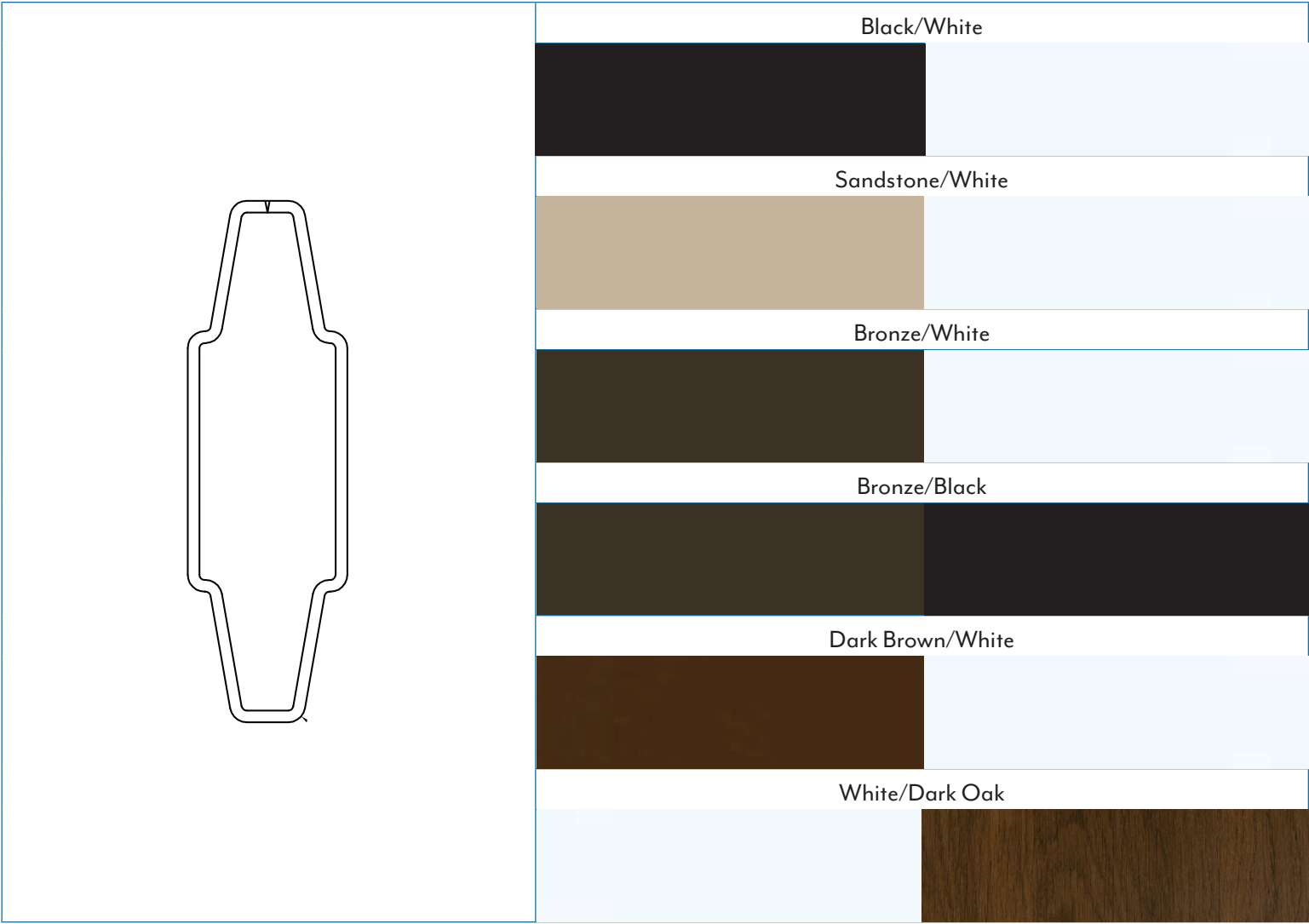
	White
	
	Amber Oak
	

Table 5: 5.5 x 18mm Single Colour Contour Muntin Bars

	White
	Dark Brown
	Champagne
	Sandstone
	Bronze



Simulated Divided Lites

Simulated divided lites are available in white with spacer bars in one of the two spaces between the three panes of glass. Figure 5 shows the interior and exterior SDL bars available.

If there is a requirement for a non-white SDL bar aluminum bars will be powder coated to match on a special order basis.

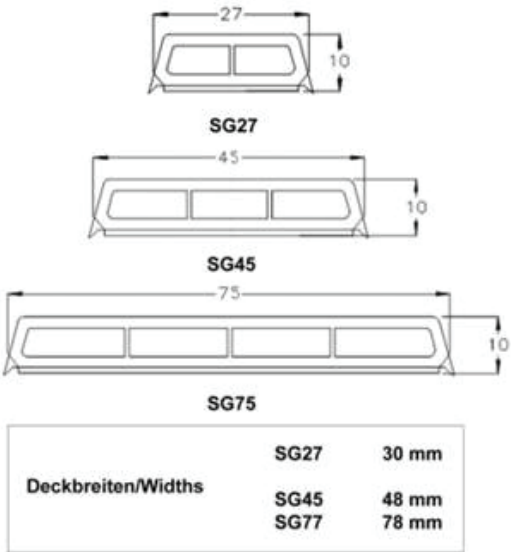


Figure 6: Interior & exterior SDL bars available in white

Egress

The following tables are for the following requirements and assume the sash is limited to swinging 90°. (These are calculated based on the National Building Code of Canada for Canada and the International Building Code for the U.S. Local requirements may be stricter. If local requirements are stricter, please let your sales representative know and we will ensure compliance with the specifications provided to us.)

Canada: The minimum clear opening width is 15” and the minimum clear opening area is 3.8 ft².

USA: The minimum clear opening width is 20” and the minimum clear opening area is 4.7 ft².

4701L or R

Width (in)	Height (in) (Canada)	Height (in) (USA)
22	42	x
23	40	x
24	38	x
25	36	x
26	35	x
27	33	47
28	32	45
29	31	43
30	30	41
31	29	40
32	28	39
33	27	37
34	26	36
35	26	35
36	25	34

X: Does not meet minimum width requirements

(Valid for all models with a minumum of one operating sash devided 50/50 built with 98mm T-mullion.)

Width (in)	Height (in) (Canada)	Height (in) (USA)
44	40	x
45	39	x
46	38	x
47	37	x
48	36	x
49	35	x
50	35	x
51	34	x
52	33	47
53	33	46
54	32	45
55	31	44
56	31	43
57	30	42
58	30	42
59	29	41
60	29	40

X: Does not meet minimum width requirements

(Valid for all models with a minimum of one operating sash divided 1/3 – 1/3 – 1/3 built with 98mm T-mullion.)

Width (in)	Height (in) (Canada)	Height (in) (USA)
65	41	x
66	40	x
67	39	x
68	39	x
69	38	x
70	37	x
71	37	x
72	36	x
73	36	x
74	35	x
75	35	x
76	34	x
77	34	x
78	33	47
79	33	46
80	32	45
82	32	45
83	31	44
84	31	43
85	30	43
86	30	42
87	30	42
88	29	41
89	29	40
91	28	40
92	28	39
93	28	39
94	28	38
95	27	38
96	27	37

X: Does not meet minimum width requirements

Performance

Thermal

Thermal performance data includes the U-value, typically referred to as U or U_w , the solar heat gain coefficient (SHGC or g) as well as condensation resistance (CR). Also, visible transmittance of light is often reported with the thermal performance.

The U-value is the predicted heat loss through the window typically given in BTU/hr·ft²°F or W/m·K. In reality different parts of the window have different U-values; reported whole window U-values are a weighted average. A lower U-value represents a higher performing window.

The solar heat gain coefficient (SHGC or g) is a measure of what fraction of the sun's solar energy enters through the window. Generally, for northern climates, a medium SHGC is preferred. However, high SHGC glazing can allow free heat in the winter if the home is designed for it. Also, large unshaded western facing windows might be best glazed with low SHGC glass to prevent discomfort in the summer sun.

Condensation resistance (CR) is a measure as to how well a window resists condensation on the interior surfaces during the winter. A higher number is better.

Visible transmittance (VT) is how much visible light is transmitted through a standard size window. It is equal to the product of the glass areas and the VT of the glass, divided by the window area. VT of the glass alone is often a more useful measure.

Notes on Thermal Performance Standards by David Paulus, P.E., PhD.

Access Windows and Doors, or Access' extrusion supplier, REHAU, has certified performance on the GENEIO system from the National Fenestration Rating Council (NFRC), Passive House Institute U.S. (PHIUS) and the European Passivhaus Institut (PHI). This chapter gives whole window U-values as reported by the NFRC, as well as frame U-value (U_f) and ψ -Values as reported by PHIUS and PHI. Additionally, specific PHIUS center glass U-values (U_g) are given here. Standard EN673 and ISO15099 center glass U-values are reported in the glazing chapter.

The ratings for the same frame with the same glazing can vary significantly. This is because (1) the boundary conditions are different for each case. NFRC uses -18°C (0°F), PHI uses 0°C (32°F) and PHIUS uses various temperatures based on climate zone. As the outside temperature gets colder, the driving force for natural convection increases and U-value increases.

Moreover, NFRC uses the ISO 15099 model to calculate glazing U-value, while PHI and PHIUS use EN673. PHIUS accepts both ISO 15099 and EN673. The latter is a dated standard, written for easy calculations, and therefore does not consider the complex interactions between glazing layers. It is optimistic, and, as written in the standard, not temperature dependent. It should be noted that unlike PHI and PHIUS, the NFRC requires performance to be validated with physical testing. It is very rare for a window to come back with measured performance better than modelled performance. So, ISO 15099 has proven more accurate. EN673 also predicts wider optimal gaps between the glass. Access in most cases offers either a 13mm (1/2") or 16mm (5/8") gap as ISO 15099 predicts optimal performance at -18°C (0°F) for a 13mm gap; The 16mm gap provides very

good performance between -18°C and 0°C (0°F and 32°). European suppliers of passive house windows are sometimes going with 18mm gaps; although their EN673 U_g looks good on paper, it is underperforming the smaller gaps when the window needs to perform best.

Both the NFRC and PHIUS use Lawrence Berkeley’s “Therm” program for calculating frame U-Factors albeit with different methodology. The certifications for PHI show a lower frame U-Factor for the same frame; it is likely a more optimistic two-dimensional heat transfer program was used.

Finally, both PHI and PHIUS report the information necessary to calculate the U-Factor of any given window size. NFRC reports only whole window values for a standard size window.

The conservative approach to simulating a house (for the purpose of calculating heating and cooling loads) using one of the various programs that look for U_p , U_g and ψ , such as the Passive House Planning Package, would use NFRC values for U_g , and PHIUS values for U_f and ψ . Then, for PHIUS or PHI certification, re-simulate with the more optimistic EN U_g values.

Notes on Reinforcement and Chamber Inserts

The GENEO frame and sash profiles have a large chamber for steel reinforcement if required. Whether or not the profiles receive reinforcement depends on several factors, including color, design wind load, installed climate zone, and the length of the profile. In general, profiles that are white on the exterior are less likely to require reinforcement.

If chambers can be kept small enough, air itself can insulate as well or better than a foam insert. Because of the size of this large chamber for reinforcement, natural convection currents can build, and therefore the frame U-value can be decreased by filling it with an optional graphite expanded foam (GPS) chamber inserts in the reinforcement chambers and in the frame and sash upstands. (Figure 1; the inserts are depicted in light blue.)

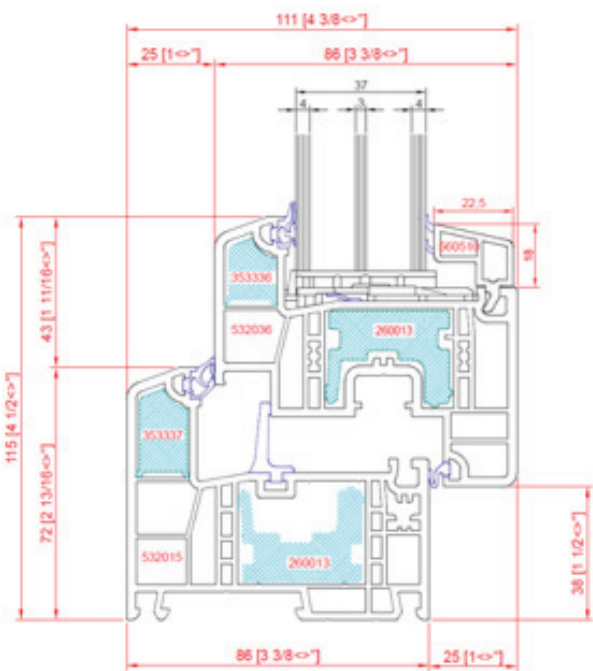


Figure 1: Tilt & turn chamber inserts

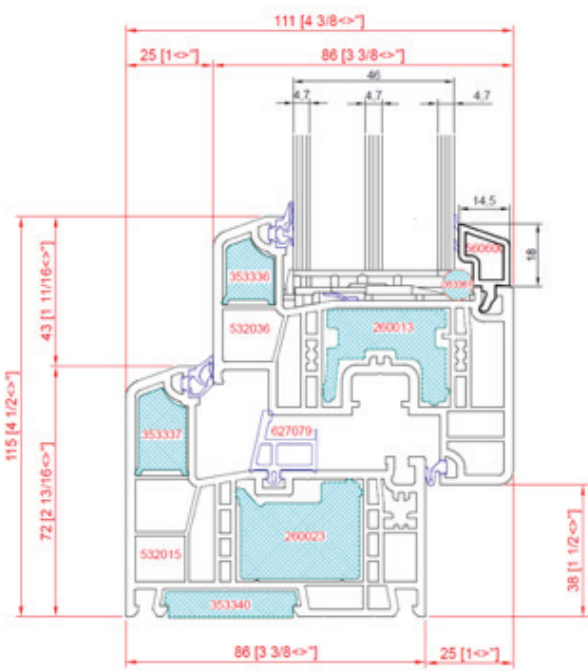


Figure 2: PHZ chamber inserts (light blue) and center seal (part 627079)

An additional, but marginal, performance gain can be had by adding an additional chamber insert, as well as changing the center seal and adding a bulb under the glazing. This is the PHZ (“Passivhauszertifiziert”, or passive house certified) version and is recommended for projects seeking Passivhaus Institut (PHI) certification. The additional performance gain of these inserts is minimal compared to the insert for the reinforcement chamber, and projects can typically meet PHIUS certification without it.

NFRC Whole Window Performance

The following tables list NFRC performance data based on window type (tilt and turn or fixed (picture) window) and spacer system. GENEO windows are offered with either Cardinal Endur® spacer of 13mm (1/2”) to 16mm (5/8”), SuperSpacer® T-Spacer of 13mm to 16mm (1/2” to 5/8”), or a Tremco Eneredge® spacer of 16mm (5/8”). Access recommends the 13mm spacer for climate zones seven and above as it will have better performance in extreme cold. The certified values include U-value (U), solar heat gain coefficient (SHGC), visible transmittance (VT) and condensation resistance (CR). All values are for windows with no grids. Grids slightly reduce SHGC and VT.

Table 1: NFRC Performance for Access GENE0 Tilt & Turn Windows using Triple Pane Cardinal Glass and Cardinal Endur Spacer, Argon Fill

	Coating		Thickness (mm)				U-value		SHGC		VT		
Reinforcement or chamber inserts	Surface 2	Surface 5	Pane 1	Pane 2	Pane 3	Overall	W/m2K	BTU/hr*F20F	No grids	Grids <1"	No grids	Grids <1"	CR
None	LoE 180	LoE 180	3.9	3.0	3.9	37	0.91	0.16	0.37	0.33	0.47	0.41	79
None	LoE ² 272	LoE 180	3.9	3.0	3.9	37	0.91	0.16	0.25	0.23	0.42	0.37	79
None	LoE ² 272	LoE ² 272	3.9	3.0	3.9	37	0.91	0.16	0.24	0.21	0.38	0.34	79
None	LoE ³ 366	LoE 180	3.9	3.0	3.9	37	0.91	0.16	0.17	0.15	0.38	0.34	80
None	LoE 180	LoE 180	3.9	3.9	3.9	37	0.97	0.17	0.37	0.33	0.47	0.41	79
None	LoE ² 272	LoE 180	3.9	3.9	3.9	37	0.91	0.16	0.25	0.22	0.42	0.37	79
None	LoE ² 272	LoE ² 272	3.9	3.9	3.9	37	0.91	0.16	0.24	0.21	0.38	0.34	79
None	LoE ³ 366	LoE 180	3.9	3.9	3.9	37	0.91	0.16	0.17	0.15	0.38	0.34	80
None	LoE 180	LoE 180	4.7	4.7	4.7	37	0.97	0.17	0.36	0.32	0.46	0.40	77
None	LoE ² 272	LoE 180	4.7	4.7	4.7	37	0.97	0.17	0.25	0.22	0.42	0.37	77
None	LoE ² 272	LoE ² 272	4.7	4.7	4.7	37	0.97	0.17	0.24	0.21	0.38	0.33	78
None	LoE ³ 366	LoE 180	4.7	4.7	4.7	37	0.97	0.17	0.17	0.15	0.37	0.33	78
Full	LoE 180	LoE 180	3.9	3.0	3.9	37	0.97	0.17	0.37	0.33	0.47	0.41	79
Full	LoE ² 272	LoE 180	3.9	3.0	3.9	37	0.97	0.17	0.25	0.23	0.42	0.37	79
Full	LoE ² 272	LoE ² 272	3.9	3.0	3.9	37	0.97	0.17	0.24	0.21	0.38	0.34	79
Full	LoE ³ 366	LoE 180	3.9	3.0	3.9	37	0.97	0.17	0.17	0.15	0.38	0.34	80
Full	LoE 180	LoE 180	3.9	3.9	3.9	37	1.02	0.18	0.37	0.33	0.47	0.41	79
Full	LoE ² 272	LoE 180	3.9	3.9	3.9	37	0.97	0.17	0.25	0.22	0.42	0.37	79
Full	LoE ² 272	LoE ² 272	3.9	3.9	3.9	37	0.97	0.17	0.24	0.21	0.38	0.34	79
Full	LoE ³ 366	LoE 180	3.9	3.9	3.9	37	0.97	0.17	0.17	0.15	0.38	0.34	80
Full	LoE 180	LoE 180	4.7	4.7	4.7	37	1.02	0.18	0.36	0.32	0.46	0.40	77
Full	LoE ² 272	LoE 180	4.7	4.7	4.7	37	1.02	0.18	0.25	0.22	0.42	0.37	77
Full	LoE ² 272	LoE ² 272	4.7	4.7	4.7	37	1.02	0.18	0.24	0.21	0.38	0.33	78
Full	LoE ³ 366	LoE 180	4.7	4.7	4.7	37	1.02	0.18	0.17	0.15	0.37	0.33	78
Chamber Inserts	LoE 180	LoE 180	3.9	3.0	3.9	37	0.91	0.16	0.37	0.33	0.47	0.41	79
Chamber Inserts	LoE ² 272	LoE 180	3.9	3.0	3.9	37	0.85	0.15	0.25	0.23	0.42	0.37	79
Chamber Inserts	LoE ² 272	LoE ² 272	3.9	3.0	3.9	37	0.85	0.15	0.24	0.21	0.38	0.34	79
Chamber Inserts	LoE ³ 366	LoE 180	3.9	3.0	3.9	37	0.85	0.15	0.17	0.15	0.38	0.34	80
Chamber Inserts	LoE 180	LoE 180	3.9	3.9	3.9	37	0.91	0.16	0.37	0.33	0.47	0.41	79
Chamber Inserts	LoE ² 272	LoE 180	3.9	3.9	3.9	37	0.91	0.16	0.25	0.22	0.42	0.37	79
Chamber Inserts	LoE ² 272	LoE ² 272	3.9	3.9	3.9	37	0.85	0.15	0.24	0.21	0.38	0.34	79
Chamber Inserts	LoE ³ 366	LoE 180	3.9	3.9	3.9	37	0.85	0.15	0.17	0.15	0.38	0.34	80
Chamber Inserts	LoE 180	LoE 180	4.7	4.7	4.7	37	0.91	0.16	0.36	0.32	0.46	0.40	77
Chamber Inserts	LoE ² 272	LoE 180	4.7	4.7	4.7	37	0.91	0.16	0.25	0.22	0.42	0.37	77
Chamber Inserts	LoE ² 272	LoE ² 272	4.7	4.7	4.7	37	0.91	0.16	0.24	0.21	0.38	0.33	78
Chamber Inserts	LoE ³ 366	LoE 180	4.7	4.7	4.7	37	0.91	0.16	0.17	0.15	0.37	0.33	78

Note: With 4.7mm glass in a 37mm IG, the U-value can in some instances increase by 0.01 Btu/hr*F^2 when grids between the glass are used.

Table 2: NFRC Performance for Access GENEO Tilt & Turn Windows using Triple Pane Cardinal Glass and Cardinal Endur Spacer, Air Fill with Capillary Tubes for High Elevations

	Coating		Thickness (mm)				U-value		SHGC		VT		
Reinforcement or chamber inserts	Surface 2	Surface 5	Pane 1	Pane 2	Pane 3	Overall	W/m2K	BTU/h*ft ² *°F	No grids	Grids <1"	No grids	Grids <1"	CR
None	LoE 180	LoE 180	3.9	3.0	3.9	37	1.08	0.19	0.37	0.33	0.47	0.41	75
None	LoE ² 272	LoE 180	3.9	3.0	3.9	37	1.02	0.18	0.25	0.23	0.42	0.37	75
None	LoE ³ 366	LoE 180	3.9	3.0	3.9	37	1.02	0.18	0.17	0.15	0.38	0.34	76
None	LoE 180	LoE 180	3.9	3.9	3.9	37	1.08	0.19	0.37	0.33	0.47	0.41	74
None	LoE ² 272	LoE 180	3.9	3.9	3.9	37	1.08	0.19	0.25	0.22	0.42	0.37	75
None	LoE ³ 366	LoE 180	3.9	3.9	3.9	37	1.08	0.19	0.17	0.15	0.38	0.34	75
None	LoE 180	LoE 180	4.7	4.7	4.7	37	1.14	0.20	0.36	0.32	0.46	0.40	72
None	LoE ² 272	LoE 180	4.7	4.7	4.7	37	1.14	0.20	0.25	0.22	0.42	0.37	73
None	LoE ³ 366	LoE 180	4.7	4.7	4.7	37	1.08	0.19	0.17	0.15	0.37	0.33	73
Full	LoE 180	LoE 180	3.9	3.0	3.9	37	1.14	0.20	0.37	0.33	0.47	0.41	74
Full	LoE ² 272	LoE 180	3.9	3.0	3.9	37	1.08	0.19	0.25	0.23	0.42	0.37	75
Full	LoE ³ 366	LoE 180	3.9	3.0	3.9	37	1.08	0.19	0.17	0.15	0.38	0.34	75
Full	LoE 180	LoE 180	3.9	3.9	3.9	37	1.14	0.20	0.37	0.33	0.47	0.41	74
Full	LoE ² 272	LoE 180	3.9	3.9	3.9	37	1.14	0.20	0.25	0.22	0.42	0.37	74
Full	LoE ³ 366	LoE 180	3.9	3.9	3.9	37	1.08	0.19	0.17	0.15	0.38	0.34	75
Full	LoE 180	LoE 180	4.7	4.7	4.7	37	1.20	0.21	0.36	0.32	0.46	0.40	72
Full	LoE ² 272	LoE 180	4.7	4.7	4.7	37	1.20	0.21	0.25	0.22	0.42	0.37	72
Full	LoE ³ 366	LoE 180	4.7	4.7	4.7	37	1.14	0.20	0.17	0.15	0.37	0.33	72
Chamber Inserts	LoE 180	LoE 180	3.9	3.0	3.9	37	1.02	0.18	0.37	0.33	0.47	0.41	75
Chamber Inserts	LoE ² 272	LoE 180	3.9	3.0	3.9	37	1.02	0.18	0.25	0.23	0.42	0.37	75
Chamber Inserts	LoE ³ 366	LoE 180	3.9	3.0	3.9	37	0.97	0.17	0.17	0.15	0.38	0.34	76
Chamber Inserts	LoE 180	LoE 180	3.9	3.9	3.9	37	1.02	0.18	0.37	0.33	0.47	0.41	75
Chamber Inserts	LoE ² 272	LoE 180	3.9	3.9	3.9	37	1.02	0.18	0.25	0.22	0.42	0.37	75
Chamber Inserts	LoE ³ 366	LoE 180	3.9	3.9	3.9	37	1.02	0.18	0.17	0.15	0.38	0.34	75
Chamber Inserts	LoE 180	LoE 180	4.7	4.7	4.7	37	1.08	0.19	0.36	0.32	0.46	0.40	72
Chamber Inserts	LoE ² 272	LoE 180	4.7	4.7	4.7	37	1.08	0.19	0.25	0.22	0.42	0.37	73
Chamber Inserts	LoE ³ 366	LoE 180	4.7	4.7	4.7	37	1.08	0.19	0.17	0.15	0.37	0.33	73

Note: With 4.7mm glass in a 37mm IG, the U-value can in some instances increase by 0.01 Btu/hr*ft²*°F when grids between the glass are used.

Table 3: NFRC Performance for Access GENEO Tilt & Turn Windows using Dual Pane Cardinal Glass and Cardinal Endur Spacer

		Thickness (mm)				U-value		SHGC		VT		
Reinforcement or chamber inserts	Fill	Coating	Pane 1	Pane 2	Overall	W/m2K	BTU/h·ft²·°F	No grids	Grids <1"	No grids	Grids <1"	CR
None	Air	LoE 180	3.9	3.9	24	1.65	0.29	0.43	0.38	0.53	0.47	59
None	Air	LoE² 272	3.9	3.9	24	1.59	0.28	0.28	0.25	0.48	0.43	59
None	Air	LoE³ 366	3.9	3.9	24	1.59	0.28	0.19	0.17	0.43	0.38	60
None	Argon	LoE 180	3.9	3.9	24	1.48	0.26	0.43	0.38	0.53	0.47	63
None	Argon	LoE² 272	3.9	3.9	24	1.42	0.25	0.28	0.25	0.48	0.43	63
None	Argon	LoE³ 366	3.9	3.9	24	1.42	0.25	0.19	0.17	0.43	0.38	64
Full	Air	LoE 180	3.9	3.9	24	1.71	0.30	0.43	0.38	0.53	0.47	59
Full	Air	LoE² 272	3.9	3.9	24	1.65	0.29	0.28	0.25	0.48	0.43	60
Full	Air	LoE³ 366	3.9	3.9	24	1.65	0.29	0.19	0.17	0.43	0.38	60
Full	Argon	LoE 180	3.9	3.9	24	1.54	0.27	0.43	0.38	0.53	0.47	63
Full	Argon	LoE² 272	3.9	3.9	24	1.48	0.26	0.28	0.25	0.48	0.43	63
Full	Argon	LoE³ 366	3.9	3.9	24	1.48	0.26	0.19	0.17	0.43	0.38	64

Table 4: NFRC Performance for Access GENEO Tilt & Turn Windows using Triple Pane Guardian Glass and SuperSpacer T-Spacer, Argon Fill

	Coating		Thickness (mm)				U-value		SHGC		VT		CR
	Surface 2	Surface 5	Pane 1	Pane 2	Pane 3	Overall	W/m2K	BTU/hr*ft2°F	No grids	Grids <1"	No grids	Grids <1"	
Reinforcement or Chamber Inserts													
None	80/71	80/71	4.6	4.6	4.6	43	0.97	0.17	0.38	0.34	0.47	0.42	78
None	70/36	80/71	4.6	4.6	4.6	43	0.91	0.16	0.23	0.21	0.41	0.36	79
None	70/36	70/36	4.6	4.6	4.6	43	0.91	0.16	0.22	0.20	0.36	0.32	79
None	62/27	80/71	4.6	4.6	4.6	43	0.91	0.16	0.16	0.15	0.38	0.33	79
None	80/71	80/71	5.6	5.6	5.6	43	0.97	0.17	0.37	0.33	0.47	0.41	77
None	70/36	80/71	5.6	5.6	5.6	43	0.97	0.17	0.23	0.21	0.41	0.36	78
None	70/36	70/36	5.6	5.6	5.6	43	0.91	0.16	0.22	0.20	0.36	0.31	78
None	62/27	80/71	5.6	5.6	5.6	43	0.91	0.16	0.16	0.15	0.37	0.32	78
None	62/27	SN 68	5.6	5.6	5.6	43	0.91	0.16	0.16	0.15	0.32	0.28	78
None	62/27	62/27	5.6	5.6	5.6	43	0.91	0.16	0.16	0.14	0.29	0.25	79
Full	80/71	80/71	3.8	3.8	3.8	37	1.02	0.18	0.39	0.35	0.48	0.42	76
Full	80/71	80/71	3.8	3.8	3.8	43	1.02	0.18	0.39	0.35	0.48	0.42	76
Full	70/36	80/71	3.8	3.8	3.8	37	1.02	0.18	0.24	0.21	0.42	0.37	76
Full	70/36	80/71	3.8	3.8	3.8	43	0.97	0.17	0.24	0.21	0.42	0.37	76
Full	70/36	70/36	3.8	3.8	3.8	43	0.97	0.17	0.23	0.20	0.37	0.32	76
Full	62/27	80/71	3.8	3.8	3.8	37	0.97	0.17	0.16	0.15	0.38	0.33	76
Full	62/27	80/71	3.8	3.8	3.8	43	0.97	0.17	0.16	0.15	0.38	0.33	77
Full	80/71	80/71	4.6	4.6	4.6	46	1.02	0.18	0.38	0.34	0.47	0.42	76
Full	70/36	80/71	4.6	4.6	4.6	46	0.97	0.17	0.23	0.21	0.41	0.36	76
Full	62/27	80/71	4.6	4.6	4.6	46	0.97	0.17	0.16	0.15	0.38	0.33	76
Full	80/71	80/71	4.6	4.6	4.6	43	1.02	0.18	0.38	0.34	0.47	0.42	76
Full	70/36	80/71	4.6	4.6	4.6	43	0.97	0.17	0.23	0.21	0.41	0.36	76
Full	70/36	70/36	5.6	5.6	5.6	43	0.97	0.17	0.22	0.20	0.36	0.31	76
Full	62/27	80/71	5.6	5.6	5.6	43	0.97	0.17	0.16	0.15	0.37	0.32	76
Full	62/27	SN 68	5.6	5.6	5.6	43	0.97	0.17	0.16	0.15	0.32	0.28	76
Full	62/27	62/27	5.6	5.6	5.6	43	0.97	0.17	0.16	0.14	0.29	0.25	76
Chamber Inserts	80/71	80/71	3.8	3.8	3.8	37	0.91	0.16	0.39	0.35	0.48	0.42	77
Chamber Inserts	80/71	80/71	3.8	3.8	3.8	43	0.91	0.16	0.39	0.35	0.48	0.42	79
Chamber Inserts	70/36	80/71	3.8	3.8	3.8	37	0.91	0.16	0.24	0.21	0.42	0.37	78
Chamber Inserts	70/36	80/71	3.8	3.8	3.8	43	0.91	0.16	0.24	0.21	0.42	0.37	80
Chamber Inserts	70/36	70/36	3.8	3.8	3.8	43	0.85	0.15	0.23	0.20	0.37	0.32	80
Chamber Inserts	62/27	80/71	3.8	3.8	3.8	37	0.91	0.16	0.16	0.15	0.38	0.33	78
Chamber Inserts	62/27	80/71	3.8	3.8	3.8	43	0.85	0.15	0.16	0.15	0.38	0.33	80
Chamber Inserts	80/71	80/71	4.6	4.6	4.6	46	0.91	0.16	0.38	0.34	0.47	0.42	79
Chamber Inserts	70/36	80/71	4.6	4.6	4.6	46	0.91	0.16	0.23	0.21	0.41	0.36	80
Chamber Inserts	62/27	80/71	4.6	4.6	4.6	46	0.85	0.15	0.16	0.15	0.38	0.33	80
Chamber Inserts	80/71	80/71	4.6	4.6	4.6	43	0.91	0.16	0.38	0.34	0.47	0.42	78
Chamber Inserts	70/36	80/71	4.6	4.6	4.6	43	0.91	0.16	0.23	0.21	0.41	0.36	79
Chamber Inserts	70/36	70/36	4.6	4.6	4.6	43	0.85	0.15	0.22	0.20	0.36	0.32	79
Chamber Inserts	62/27	80/71	4.6	4.6	4.6	43	0.85	0.15	0.16	0.15	0.38	0.33	79
Chamber Inserts	80/71	80/71	5.6	5.6	5.6	43	0.91	0.16	0.37	0.33	0.47	0.41	77
Chamber Inserts	70/36	80/71	5.6	5.6	5.6	43	0.91	0.16	0.23	0.21	0.41	0.36	78
Chamber Inserts	70/36	70/36	5.6	5.6	5.6	43	0.85	0.15	0.22	0.20	0.36	0.31	78
Chamber Inserts	62/27	80/71	5.6	5.6	5.6	43	0.91	0.16	0.16	0.15	0.37	0.32	78
Chamber Inserts	62/27	SN 68	5.6	5.6	5.6	43	0.85	0.15	0.16	0.15	0.32	0.28	79
Chamber Inserts	62/27	62/27	5.6	5.6	5.6	43	0.85	0.15	0.16	0.14	0.29	0.25	79
PHZ	80/71	80/71	3.8	3.8	3.8	43	0.91	0.16	0.39	0.35	0.48	0.42	79
PHZ	70/36	80/71	3.8	3.8	3.8	43	0.85	0.15	0.24	0.21	0.42	0.37	80
PHZ	80/71	80/71	4.6	4.6	4.6	46	0.91	0.16	0.38	0.34	0.47	0.42	79
PHZ	70/36	80/71	4.6	4.6	4.6	46	0.85	0.15	0.23	0.21	0.41	0.36	80

Table 5: NFRC Performance for Access GENEO Tilt & Turn Windows using Dual Pane Guardian Glass and SuperSpacer T-Spacer

		Thickness (mm)				U-value		SHGC		VT		
Reinforcement or chamber Inserts	Fill	Coating	Pane 1	Pane 2	Overall	W/m2K	BTU/h*°ft2°F	No grids	Grids <1"	No grids	Grids <1"	CR
None	Argon	SG 68	3.8	3.8	24	1.48	0.26	0.26	0.23	0.47	0.41	63
None	Argon	SG 68	4.6	4.6	24	1.42	0.25	0.26	0.23	0.46	0.41	61
None	Argon	SG 68	5.6	5.6	24	1.42	0.25	0.26	0.23	0.46	0.40	61
Full	Argon	SG 68	3.8	3.8	24	1.48	0.26	0.26	0.23	0.47	0.41	63
Full	Argon	SG 68	4.6	4.6	24	1.48	0.26	0.26	0.23	0.46	0.41	62
Full	Argon	SG 68	5.6	5.6	24	1.48	0.26	0.26	0.23	0.46	0.40	63

Table 6: NFRC Performance for Access GENEO Tilt & Turn Windows using Triple Pane Cardinal Glass, Tremco Eneredge Spacer, and Argon Fill

	Coating		Thickness (mm)				U-value		SHGC		VT		
Reinforcement or chamber inserts	Surface 2	Surface 5	Pane 1	Pane 2	Pane 3	Overall	W/m2K	BTU/h*°ft2°F	No grids	Grids <1"	No grids	Grids <1"	CR
Full	LoE 180	LoE 180	3.9	3.9	3.9	43	0.97	0.17	0.37	0.33	0.47	0.41	77
Full	LoE ² 272	LoE 180	3.9	3.9	3.9	43	0.97	0.17	0.25	0.22	0.42	0.37	77
Full	LoE ³ 366	LoE 180	3.9	3.9	3.9	43	0.97	0.17	0.17	0.15	0.38	0.34	77
Full	LoE 180	LoE 180	4.7	4.7	4.7	46	0.97	0.17	0.36	0.33	0.46	0.40	77
Full	LoE ² 272	LoE 180	4.7	4.7	4.7	46	0.97	0.17	0.25	0.22	0.42	0.37	77
Full	LoE ³ 366	LoE 180	4.7	4.7	4.7	46	0.97	0.17	0.17	0.15	0.37	0.33	77
Chamber Inserts	LoE 180	LoE 180	3.9	3.9	3.9	43	0.85	0.15	0.37	0.33	0.47	0.41	82
Chamber Inserts	LoE ² 272	LoE 180	3.9	3.9	3.9	43	0.85	0.15	0.25	0.22	0.42	0.37	82
Chamber Inserts	LoE ³ 366	LoE 180	3.9	3.9	3.9	43	0.85	0.15	0.17	0.15	0.38	0.34	82
Chamber Inserts	LoE 180	LoE 180	4.7	4.7	4.7	46	0.85	0.15	0.36	0.33	0.46	0.40	82
Chamber Inserts	LoE ² 272	LoE 180	4.7	4.7	4.7	46	0.85	0.15	0.25	0.22	0.42	0.37	82
Chamber Inserts	LoE ³ 366	LoE 180	4.7	4.7	4.7	46	0.85	0.15	0.17	0.15	0.37	0.33	82
PHZ	LoE 180	LoE 180	3.9	3.9	3.9	43	0.85	0.15	0.37	0.33	0.47	0.41	82
PHZ	LoE ² 272	LoE 180	3.9	3.9	3.9	43	0.85	0.15	0.25	0.22	0.42	0.37	82
PHZ	LoE ³ 366	LoE 180	3.9	3.9	3.9	43	0.85	0.15	0.17	0.15	0.38	0.34	82
PHZ	LoE 180	LoE 180	4.7	4.7	4.7	46	0.85	0.15	0.36	0.33	0.46	0.40	82
PHZ	LoE ² 272	LoE 180	4.7	4.7	4.7	46	0.85	0.15	0.25	0.22	0.42	0.37	82
PHZ	LoE ³ 366	LoE 180	4.7	4.7	4.7	46	0.85	0.15	0.17	0.15	0.37	0.33	82

Table 7: NFRC Performance for Access GENEO Tilt & Turn Windows using Triple Pane Cardinal Glass and Cardinal Endur Spacer, Argon Fill

	Coating		Thickness (mm)				U-value		SHGC		VT		
Reinforcement or chamber inserts	Surface 2	Surface 5	Pane 1	Pane 2	Pane 3	Overall	W/m2K	BTU/hr*H2°F	No grids	Grids <1"	No grids	Grids <1"	CR
None	LoE 180	LoE 180	3.9	3.0	3.9	37	0.91	0.16	0.43	0.39	0.54	0.48	76
None	LoE ² 272	LoE 180	3.9	3.0	3.9	37	0.91	0.16	0.29	0.26	0.49	0.44	77
None	LoE ² 272	LoE ² 272	3.9	3.0	3.9	37	0.91	0.16	0.28	0.25	0.45	0.40	77
None	LoE ³ 366	LoE 180	3.9	3.0	3.9	37	0.91	0.16	0.19	0.18	0.44	0.40	77
None	LoE 180	LoE 180	3.9	3.9	3.9	37	0.91	0.16	0.43	0.39	0.54	0.48	76
None	LoE ² 272	LoE 180	3.9	3.9	3.9	37	0.91	0.16	0.29	0.26	0.49	0.44	77
None	LoE ² 272	LoE ² 272	3.9	3.9	3.9	37	0.91	0.16	0.28	0.25	0.45	0.40	77
None	LoE ³ 366	LoE 180	3.9	3.9	3.9	37	0.91	0.16	0.19	0.18	0.44	0.39	77
None	LoE 180	LoE 180	4.7	4.7	4.7	37	0.97	0.17	0.42	0.38	0.53	0.48	74
None	LoE ² 272	LoE 180	4.7	4.7	4.7	37	0.97	0.17	0.29	0.26	0.48	0.43	75
None	LoE ² 272	LoE ² 272	4.7	4.7	4.7	37	0.97	0.17	0.27	0.25	0.44	0.39	75
None	LoE ³ 366	LoE 180	4.7	4.7	4.7	37	0.91	0.16	0.19	0.18	0.44	0.39	75
Full	LoE 180	LoE 180	3.9	3.0	3.9	37	0.97	0.17	0.43	0.39	0.54	0.48	76
Full	LoE ² 272	LoE 180	3.9	3.0	3.9	37	0.91	0.16	0.29	0.26	0.49	0.44	76
Full	LoE ² 272	LoE ² 272	3.9	3.0	3.9	37	0.91	0.16	0.28	0.25	0.45	0.40	76
Full	LoE ³ 366	LoE 180	3.9	3.0	3.9	37	0.91	0.16	0.19	0.18	0.44	0.40	76
Full	LoE 180	LoE 180	3.9	3.9	3.9	37	0.97	0.17	0.43	0.39	0.54	0.48	75
Full	LoE ² 272	LoE 180	3.9	3.9	3.9	37	0.97	0.17	0.29	0.26	0.49	0.44	76
Full	LoE ² 272	LoE ² 272	3.9	3.9	3.9	37	0.91	0.16	0.28	0.25	0.45	0.40	76
Full	LoE ³ 366	LoE 180	3.9	3.9	3.9	37	0.91	0.16	0.19	0.18	0.44	0.39	76
Full	LoE 180	LoE 180	4.7	4.7	4.7	37	0.97	0.17	0.42	0.38	0.53	0.48	74
Full	LoE ² 272	LoE 180	4.7	4.7	4.7	37	0.97	0.17	0.29	0.26	0.48	0.43	75
Full	LoE ² 272	LoE ² 272	4.7	4.7	4.7	37	0.97	0.17	0.27	0.25	0.44	0.39	75
Full	LoE ³ 366	LoE 180	4.7	4.7	4.7	37	0.97	0.17	0.19	0.18	0.44	0.39	75
Chamber Inserts	LoE 180	LoE 180	3.9	3.0	3.9	37	0.91	0.16	0.43	0.39	0.54	0.48	77
Chamber Inserts	LoE ² 272	LoE 180	3.9	3.0	3.9	37	0.85	0.15	0.29	0.26	0.49	0.44	77
Chamber Inserts	LoE ² 272	LoE ² 272	3.9	3.0	3.9	37	0.85	0.15	0.28	0.25	0.45	0.40	77
Chamber Inserts	LoE ³ 366	LoE 180	3.9	3.0	3.9	37	0.85	0.15	0.19	0.18	0.44	0.40	77
Chamber Inserts	LoE 180	LoE 180	3.9	3.9	3.9	37	0.91	0.16	0.43	0.39	0.54	0.48	76
Chamber Inserts	LoE ² 272	LoE 180	3.9	3.9	3.9	37	0.91	0.16	0.29	0.26	0.49	0.44	77
Chamber Inserts	LoE ² 272	LoE ² 272	3.9	3.9	3.9	37	0.85	0.15	0.28	0.25	0.45	0.40	77
Chamber Inserts	LoE ³ 366	LoE 180	3.9	3.9	3.9	37	0.85	0.15	0.19	0.18	0.44	0.39	77
Chamber Inserts	LoE 180	LoE 180	4.7	4.7	4.7	37	0.91	0.16	0.42	0.38	0.53	0.48	75
Chamber Inserts	LoE ² 272	LoE 180	4.7	4.7	4.7	37	0.91	0.16	0.29	0.26	0.48	0.43	75
Chamber Inserts	LoE ² 272	LoE ² 272	4.7	4.7	4.7	37	0.91	0.16	0.27	0.25	0.44	0.39	75
Chamber Inserts	LoE ³ 366	LoE 180	4.7	4.7	4.7	37	0.91	0.16	0.19	0.18	0.44	0.39	76

Note: With 4.7mm glass in a 37mm IG, the U-value can in some instances increase by 0.01 Btu/hr*H2°F when grids between the glass are used.

Table 8: NFRC Performance for Access GENE0 Picture Windows using Triple Pane Cardinal Glass and Cardinal Endur Spacer, Air Fill with Capillary Tubes for High Elevations

	Coating		Thickness (mm)				U-value		SHGC		VT		CR
	Surface 2	Surface 5	Pane 1	Pane 2	Pane 3	Overall	W/m2K	BTU/hr*ft ² F	No grids	Grids <1"	No grids	Grids <1"	
Reinforcement or chamber inserts													
None	LoE 180	LoE 180	3.9	3.0	3.9	37	1.08	0.19	0.43	0.39	0.54	0.48	73
None	LoE ² 272	LoE 180	3.9	3.0	3.9	37	1.02	0.18	0.29	0.26	0.49	0.44	73
None	LoE ³ 366	LoE 180	3.9	3.0	3.9	37	1.02	0.18	0.20	0.18	0.44	0.40	74
None	LoE 180	LoE 180	3.9	3.9	3.9	37	1.08	0.19	0.43	0.39	0.54	0.48	72
None	LoE ² 272	LoE 180	3.9	3.9	3.9	37	1.08	0.19	0.29	0.26	0.49	0.44	73
None	LoE ³ 366	LoE 180	3.9	3.9	3.9	37	1.02	0.18	0.20	0.18	0.44	0.39	73
None	LoE 180	LoE 180	4.7	4.7	4.7	37	1.14	0.20	0.42	0.38	0.53	0.48	70
None	LoE ² 272	LoE 180	4.7	4.7	4.7	37	1.14	0.20	0.29	0.26	0.48	0.43	71
None	LoE ³ 366	LoE 180	4.7	4.7	4.7	37	1.08	0.19	0.20	0.18	0.44	0.39	71
Full	LoE 180	LoE 180	3.9	3.0	3.9	37	1.08	0.19	0.43	0.39	0.54	0.48	73
Full	LoE ² 272	LoE 180	3.9	3.0	3.9	37	1.08	0.19	0.29	0.26	0.49	0.44	73
Full	LoE ³ 366	LoE 180	3.9	3.0	3.9	37	1.08	0.19	0.20	0.18	0.44	0.40	73
Full	LoE 180	LoE 180	3.9	3.9	3.9	37	1.08	0.19	0.43	0.39	0.54	0.48	73
Full	LoE ² 272	LoE 180	3.9	3.9	3.9	37	1.08	0.19	0.29	0.26	0.49	0.44	73
Full	LoE ³ 366	LoE 180	3.9	3.9	3.9	37	1.08	0.19	0.20	0.18	0.44	0.39	73
Full	LoE 180	LoE 180	4.7	4.7	4.7	37	1.20	0.21	0.42	0.38	0.53	0.48	70
Full	LoE ² 272	LoE 180	4.7	4.7	4.7	37	1.14	0.20	0.29	0.26	0.48	0.43	71
Full	LoE ³ 366	LoE 180	4.7	4.7	4.7	37	1.14	0.20	0.20	0.18	0.44	0.39	71
Chamber Inserts	LoE 180	LoE 180	3.9	3.0	3.9	37	1.02	0.18	0.43	0.39	0.54	0.48	73
Chamber Inserts	LoE ² 272	LoE 180	3.9	3.0	3.9	37	1.02	0.18	0.29	0.26	0.49	0.44	73
Chamber Inserts	LoE ³ 366	LoE 180	3.9	3.0	3.9	37	1.02	0.18	0.20	0.18	0.44	0.40	74
Chamber Inserts	LoE 180	LoE 180	3.9	3.9	3.9	37	1.02	0.18	0.43	0.39	0.54	0.48	73
Chamber Inserts	LoE ² 272	LoE 180	3.9	3.9	3.9	37	1.02	0.18	0.29	0.26	0.49	0.44	73
Chamber Inserts	LoE ³ 366	LoE 180	3.9	3.9	3.9	37	1.02	0.18	0.20	0.18	0.44	0.39	73
Chamber Inserts	LoE 180	LoE 180	4.7	4.7	4.7	37	1.08	0.19	0.42	0.38	0.53	0.48	71
Chamber Inserts	LoE ² 272	LoE 180	4.7	4.7	4.7	37	1.08	0.19	0.29	0.26	0.48	0.43	71
Chamber Inserts	LoE ³ 366	LoE 180	4.7	4.7	4.7	37	1.08	0.19	0.20	0.18	0.44	0.39	71

Note: With 4.7mm glass in a 37mm IG, the U-value can in some instances increase by 0.01 Btu/hr*ft²F when grids between the glass are used.

Table 9: NFRC Performance for Access GENEO Tilt & Turn Windows using Dual Pane Cardinal Glass and Cardinal Endur Spacer

		Thickness (mm)				U-value		SHGC		VT		
Reinforcement or chamber inserts	Fill	Coating	Pane 1	Pane 2	Overall	W/m2K	BTU/h·ft²°F	No grids	Grids <1"	No grids	Grids <1"	CR
None	Air	LoE 180	3.9	3.9	24	1.76	0.31	0.5	0.45	0.62	0.55	57
None	Air	LoE² 272	3.9	3.9	24	1.71	0.30	0.33	0.29	0.56	0.5	58
None	Air	LoE³ 366	3.9	3.9	24	1.65	0.29	0.22	0.2	0.5	0.45	59
None	Argon	LoE 180	3.9	3.9	24	1.54	0.27	0.5	0.45	0.62	0.55	61
None	Argon	LoE² 272	3.9	3.9	24	1.48	0.26	0.33	0.29	0.56	0.5	62
None	Argon	LoE³ 366	3.9	3.9	24	1.48	0.26	0.22	0.2	0.5	0.45	62
Full	Air	LoE 180	3.9	3.9	24	1.76	0.31	0.5	0.45	0.62	0.55	57
Full	Air	LoE² 272	3.9	3.9	24	1.71	0.30	0.33	0.29	0.56	0.5	58
Full	Air	LoE³ 366	3.9	3.9	24	1.71	0.30	0.22	0.2	0.5	0.45	59
Full	Argon	LoE 180	3.9	3.9	24	1.59	0.28	0.5	0.45	0.62	0.55	61
Full	Argon	LoE² 272	3.9	3.9	24	1.54	0.27	0.33	0.29	0.56	0.5	62
Full	Argon	LoE³ 366	3.9	3.9	24	1.48	0.26	0.22	0.2	0.5	0.45	62

Table 10: NFRC Performance for Access GENEO Tilt & Turn Windows using Triple Pane Guardian Glass and SuperSpacer Triseal, Argon Fill

Reinforcement or chamber inserts	Coating		Thickness (mm)				U-value		SHGC		VT		
	Surface 2	Surface 5	Pane 1	Pane 2	Pane 3	Overall	W/m2K	BTU/hr*42°F	No grids	Grids <1"	No grids	Grids <1"	CR
None	80/71	80/71	4.6	4.6	4.6	43	0.91	0.16	0.44	0.40	0.55	0.49	75
None	70/36	80/71	4.6	4.6	4.6	43	0.91	0.16	0.27	0.24	0.48	0.43	76
None	70/36	70/36	4.6	4.6	4.6	43	0.85	0.15	0.26	0.23	0.42	0.37	76
None	62/27	80/71	4.6	4.6	4.6	43	0.91	0.16	0.19	0.17	0.43	0.38	76
None	80/71	80/71	5.6	5.6	5.6	43	0.97	0.17	0.43	0.39	0.54	0.48	75
None	70/36	80/71	5.6	5.6	5.6	43	0.91	0.16	0.27	0.24	0.47	0.42	75
None	70/36	70/36	5.6	5.6	5.6	43	0.91	0.16	0.25	0.23	0.41	0.37	75
None	62/27	80/71	5.6	5.6	5.6	43	0.91	0.16	0.19	0.17	0.42	0.38	75
None	62/27	SN 68	5.6	5.6	5.6	43	0.85	0.15	0.19	0.17	0.37	0.33	76
None	62/27	62/27	5.6	5.6	5.6	43	0.85	0.15	0.18	0.16	0.33	0.30	76
Full	80/71	80/71	3.8	3.8	3.8	37	0.97	0.17	0.45	0.40	0.56	0.50	74
Full	80/71	80/71	3.8	3.8	3.8	43	0.97	0.17	0.45	0.40	0.56	0.50	75
Full	70/36	80/71	3.8	3.8	3.8	37	0.97	0.17	0.27	0.25	0.49	0.43	75
Full	70/36	80/71	3.8	3.8	3.8	43	0.91	0.16	0.27	0.25	0.49	0.43	75
Full	70/36	70/36	3.8	3.8	3.8	43	0.91	0.16	0.26	0.23	0.42	0.38	75
Full	62/27	80/71	3.8	3.8	3.8	37	0.97	0.17	0.19	0.17	0.44	0.39	75
Full	62/27	80/71	3.8	3.8	3.8	43	0.91	0.16	0.19	0.17	0.44	0.39	75
Full	80/71	80/71	4.6	4.6	4.6	46	0.97	0.17	0.44	0.40	0.55	0.49	74
Full	70/36	80/71	4.6	4.6	4.6	46	0.91	0.16	0.27	0.24	0.48	0.43	74
Full	62/27	80/71	4.6	4.6	4.6	46	1.02	0.18	0.19	0.17	0.43	0.38	73
Full	80/71	80/71	4.6	4.6	4.6	43	0.97	0.17	0.44	0.40	0.55	0.49	75
Full	70/36	80/71	4.6	4.6	4.6	43	0.91	0.16	0.27	0.24	0.48	0.43	75
Full	70/36	70/36	4.6	4.6	4.6	43	0.91	0.16	0.26	0.23	0.42	0.37	75
Full	62/27	80/71	4.6	4.6	4.6	43	0.91	0.16	0.19	0.17	0.43	0.38	75
Full	80/71	80/71	5.6	5.6	5.6	43	0.97	0.17	0.43	0.39	0.54	0.48	74
Full	70/36	80/71	5.6	5.6	5.6	43	0.97	0.17	0.27	0.24	0.47	0.42	75
Full	70/36	70/36	5.6	5.6	5.6	43	0.91	0.16	0.25	0.23	0.41	0.37	75
Full	62/27	80/71	5.6	5.6	5.6	43	0.97	0.17	0.19	0.17	0.42	0.38	75
Full	62/27	SN 68	5.6	5.6	5.6	43	0.91	0.16	0.19	0.17	0.37	0.33	75
Full	62/27	62/27	5.6	5.6	5.6	43	0.91	0.16	0.18	0.16	0.33	0.30	75
Chamber Inserts	80/71	80/71	3.8	3.8	3.8	37	0.91	0.16	0.45	0.40	0.56	0.50	75
Chamber Inserts	80/71	80/71	3.8	3.8	3.8	43	0.91	0.16	0.45	0.40	0.56	0.50	76
Chamber Inserts	70/36	80/71	3.8	3.8	3.8	37	0.91	0.16	0.27	0.25	0.49	0.43	75
Chamber Inserts	70/36	80/71	3.8	3.8	3.8	43	0.85	0.15	0.27	0.25	0.49	0.43	77
Chamber Inserts	70/36	70/36	3.8	3.8	3.8	43	0.85	0.15	0.26	0.23	0.42	0.38	77
Chamber Inserts	62/27	80/71	3.8	3.8	3.8	37	0.91	0.16	0.19	0.17	0.44	0.39	76
Chamber Inserts	62/27	80/71	3.8	3.8	3.8	43	0.85	0.15	0.19	0.17	0.44	0.39	77
Chamber Inserts	80/71	80/71	4.6	4.6	4.6	46	0.91	0.16	0.44	0.40	0.55	0.49	77
Chamber Inserts	70/36	80/71	4.6	4.6	4.6	46	0.85	0.15	0.27	0.24	0.47	0.42	78
Chamber Inserts	62/27	80/71	4.6	4.6	4.6	46	0.85	0.15	0.25	0.23	0.41	0.37	78
Chamber Inserts	80/71	80/71	4.6	4.6	4.6	43	0.91	0.16	0.44	0.40	0.55	0.49	76
Chamber Inserts	70/36	80/71	4.6	4.6	4.6	43	0.85	0.15	0.27	0.24	0.48	0.43	76
Chamber Inserts	70/36	70/36	4.6	4.6	4.6	43	0.85	0.15	0.26	0.23	0.42	0.37	77
Chamber Inserts	62/27	80/71	4.6	4.6	4.6	43	0.85	0.15	0.19	0.17	0.43	0.38	76
Chamber Inserts	80/71	80/71	5.6	5.6	5.6	43	0.91	0.16	0.43	0.39	0.54	0.48	74
Chamber Inserts	70/36	80/71	5.6	5.6	5.6	43	0.91	0.16	0.27	0.24	0.47	0.42	75
Chamber Inserts	70/36	70/36	5.6	5.6	5.6	43	0.85	0.15	0.25	0.23	0.41	0.37	76
Chamber Inserts	62/27	80/71	5.6	5.6	5.6	43	0.91	0.16	0.19	0.17	0.42	0.38	75
Chamber Inserts	62/27	SN 68	5.6	5.6	5.6	43	0.85	0.15	0.19	0.17	0.37	0.33	76
Chamber Inserts	62/27	62/27	5.6	5.6	5.6	43	0.85	0.15	0.18	0.16	0.33	0.30	76
PHZ	80/71	80/71	3.8	3.8	3.8	43	0.91	0.16	0.45	0.40	0.56	0.50	76
PHZ	70/36	80/71	3.8	3.8	3.8	43	0.85	0.15	0.27	0.25	0.49	0.43	77
PHZ	80/71	80/71	4.6	4.6	4.6	46	0.91	0.16	0.44	0.40	0.55	0.49	77
PHZ	70/36	80/71	4.6	4.6	4.6	46	0.85	0.15	0.27	0.24	0.47	0.42	78

Table 10: NFRC Performance for Access GENE0 Tilt & Turn Windows using Dual Pane Guardian Glass and SuperSpacer TriSeal Spacer

		Thickness (mm)				U-value		SHGC		VT		
Reinforcement or chamber inserts	Fill	Coating	Pane 1	Pane 2	Overall	W/m2K	BTU/h*H2oF	No grids	Grids <1"	No grids	Grids <1"	CR
None	Argon	SG 68	3.8	3.8	24	1.54	0.27	0.30	0.27	0.54	0.48	61
None	Argon	SG 68	4.6	4.6	24	1.54	0.27	0.30	0.27	0.54	0.48	61
None	Argon	SG 68	5.6	5.6	24	1.48	0.26	0.30	0.27	0.53	0.47	62
Full	Argon	SG 68	3.8	3.8	24	1.54	0.27	0.30	0.27	0.54	0.48	61
Full	Argon	SG 68	4.6	4.6	24	1.54	0.27	0.30	0.27	0.54	0.48	61
Full	Argon	SG 68	5.6	5.6	24	1.48	0.26	0.30	0.27	0.53	0.47	62

Table 12: NFRC Performance for Access GENE0 Tilt & Turn Windows using Triple Pane Cardinal Glass, Tremco Eneredge Spacer, and Argon Fill

	Coating		Thickness (mm)				U-value		SHGC		VT		
Reinforcement or chamber inserts	Surface 2	Surface 5	Pane 1	Pane 2	Pane 3	Overall	W/m2K	BTU/h*H2oF	No grids	Grids <1"	No grids	Grids <1"	CR
Full	LoE 180	LoE 180	3.9	3.9	3.9	43	0.91	0.16	0.43	0.39	0.54	0.48	77
Full	LoE ² 272	LoE 180	3.9	3.9	3.9	43	0.91	0.16	0.29	0.26	0.49	0.44	77
Full	LoE ³ 366	LoE 180	3.9	3.9	3.9	43	0.91	0.16	0.19	0.18	0.44	0.39	77
Full	LoE 180	LoE 180	4.7	4.7	4.7	46	0.91	0.16	0.42	0.38	0.53	0.48	75
Full	LoE ² 272	LoE 180	4.7	4.7	4.7	46	0.91	0.16	0.29	0.26	0.48	0.43	76
Full	LoE ³ 366	LoE 180	4.7	4.7	4.7	46	0.91	0.16	0.19	0.17	0.44	0.39	76
Chamber Inserts	LoE 180	LoE 180	3.9	3.9	3.9	43	0.85	0.15	0.43	0.39	0.54	0.48	79
Chamber Inserts	LoE ² 272	LoE 180	3.9	3.9	3.9	43	0.85	0.15	0.29	0.26	0.49	0.44	79
Chamber Inserts	LoE ³ 366	LoE 180	3.9	3.9	3.9	43	0.85	0.15	0.19	0.18	0.44	0.39	79
Chamber Inserts	LoE 180	LoE 180	4.7	4.7	4.7	46	0.85	0.15	0.42	0.38	0.53	0.48	79
Chamber Inserts	LoE ² 272	LoE 180	4.7	4.7	4.7	46	0.85	0.15	0.29	0.26	0.48	0.43	80
Chamber Inserts	LoE ³ 366	LoE 180	4.7	4.7	4.7	46	0.85	0.15	0.19	0.17	0.44	0.39	79
PHZ	LoE 180	LoE 180	3.9	3.9	3.9	43	0.85	0.15	0.43	0.39	0.54	0.48	79
PHZ	LoE ² 272	LoE 180	3.9	3.9	3.9	43	0.85	0.15	0.29	0.26	0.49	0.44	79
PHZ	LoE ³ 366	LoE 180	3.9	3.9	3.9	43	0.85	0.15	0.19	0.18	0.44	0.39	80
PHZ	LoE 180	LoE 180	4.7	4.7	4.7	46	0.85	0.15	0.42	0.38	0.53	0.48	80
PHZ	LoE ² 272	LoE 180	4.7	4.7	4.7	46	0.85	0.15	0.29	0.26	0.48	0.43	80
PHZ	LoE ³ 366	LoE 180	4.7	4.7	4.7	46	0.85	0.15	0.19	0.17	0.44	0.39	80

Calculation of whole window U-values and g-values (SHGC) with PHI or PHIUS certification values

The Passivhaus Institut (PHI) and Passive House Institute U.S. (PHIUS) certifications allow for whole window U-values and g (or SHGC) to be calculated for any given window size.

Combining the information from the certification, along with U_g calculated per EN673, allows us to calculate U_w , the U-value for the whole window.

Where

U_w = whole window U-value

U_g = center glass U-value via EN673 or PHIUS labels

A_g = glass area

U_f = frame U-value

A_f = frame area

ψ_g = glass edge loss coefficient

l_g = perimeter of glass area

A_w = area of entire window

$$U_w = \frac{U_g A_g + U_f A_f + \psi_g l_g}{A_w}$$

Similarly, g may be calculated:

$$g_w = \frac{g_g A_g}{A_w}$$

Where

g_w = solar gain factor for the entire window

g_g = solar gain factor for the glass

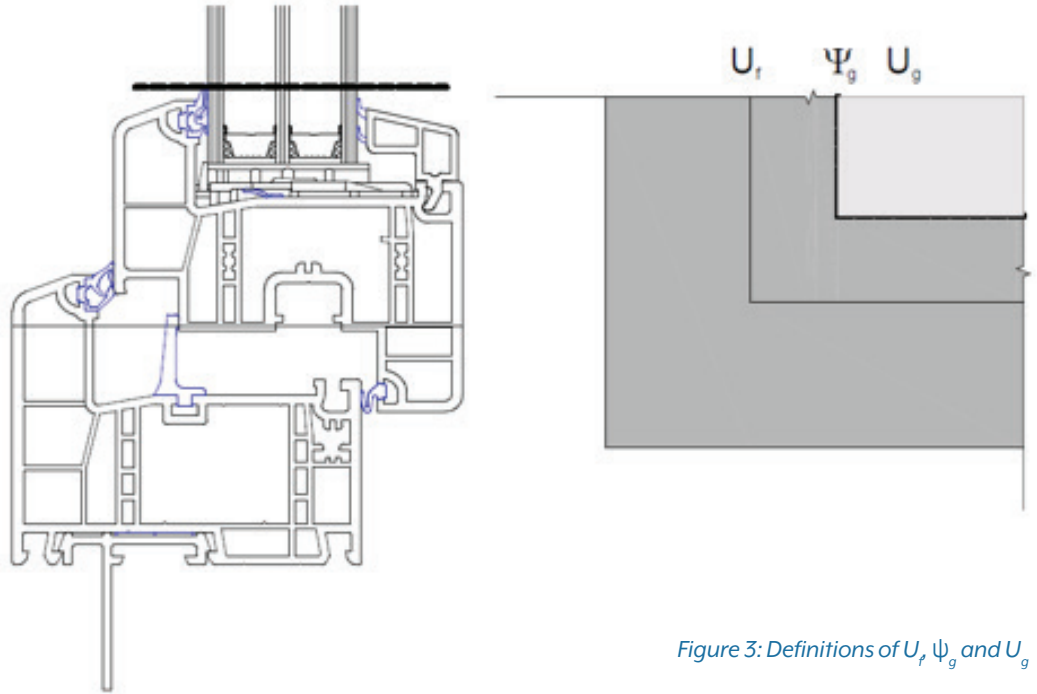


Figure 3: Definitions of U_f , ψ_g and U_g

Passivhaus Institut (PHI) Certification

The GENEIO tilt & turn window is certified through REHAU as a Passivhaus Institut “B” component.

Frame Values per PHI Certification

Table 1: Access 4700 GENEO PHI Certification Values

Frame values	Frame Width mm (in)	U-Value Frame U_f W/m2K (Btu/hr·ft2°F)	ψ -glass edge ψ_g W/m·K (Btu/hr·ft°F)
Top	115 (4.53)	0.77 (0.14)	0.023 (0.013)
Side	115 (4.53)	0.77 (0.14)	0.023 (0.013)
Bottom	115 (4.53)	0.77 (0.14)	0.023 (0.013)
Mullion (one operator)	141 (5.55)	0.77 (0.14)	0.023 (0.013)

Frame values for other common components

REHAU has performed simulations for every possible frame, sash, mullion, reinforcement, and sill combination. Access Windows and Doors will supply this information upon request to the architect or energy modeler.

PHIUS Certification

The GENEO PHIUS certified performance is on window labels. Copies of labels for currently available certified glass packages are below.

Calculation based on ISO 10077-2, EN 673, EN 410

Product name: Access GENEO PHZ TiltTurn-3.9-180-Ener

ASHRAE/IECC /DOE North American Climate Zone

North, East, South-facing West - facing



Center-of-glass properties

Cardinal 3.9LoE180-3.9Clear-3.9LoE180-ARG No Grids

Climate specific recommendations:

	W/m2K	BTU/hr.ft2.F	SHGC	W/m2K	BTU/hr.ft2.F
8	0.91	0.16	0.554	0.715	0.126
7	0.88	0.16	0.554	0.682	0.120
6	0.86	0.15	0.554	0.646	0.114
5	0.86	0.15	0.554	0.646	0.114
4	0.86	0.15	0.554	0.651	0.115
Marine North	0.86	0.15	0.554	0.654	0.115
Marine South	0.87	0.15	0.554	0.660	0.116
3	0.87	0.15	0.554	0.656	0.116
2 West	0.88	0.15	0.554	0.672	0.118
2 East	0.88	0.15	0.554	0.672	0.118

Whole-window installed U-value

Ucog-Value

WASCO GENEO TiltTurn-3.9-1

Tremco EnerEDGE

	FRAME				Psi-spacer		Psi-opaque
	Frame height		U-frame		Ψ		
	mm	in	W/m2K	BTU/hr.ft2.F	W/mK	BTU/hr.ft.F	W/mK
Head	116	4.59	0.85	0.15	0.023	0.013	0.138
Sill	116	4.59	0.85	0.15	0.023	0.013	BTU/hr.ft.F
left jamb	116	4.59	0.84	0.15	0.023	0.013	0.080
right jamb	116	4.59	0.84	0.15	0.023	0.013	Grade B

Valid through April 2021

Figure 4: PHIUS certification for GENEO Tilt & Turn, 3.9mm thick LoE 180 glazing, chamber inserts in large chambers

Figure 5: PHIUS certification for GENE0 Tilt & Turn, 3.9mm thick LoE² 272 glazing, chamber inserts in large chambers

Valid through April 2021

Figure 6: PHIUS certification for GENE0 Tilt & Turn, 3.9mm thick LoE 180 glazing, PHZ chamber inserts

Valid through April 2021

Figure 7: PHIUS certification for GENE0 Tilt & Turn, 3.9mm thick LoE^2 272 glazing, PHZ chamber inserts

Valid through April 2021

Figure 8: PHIUS certification for GENE0 fixed window, 3.9mm thick LoE 180 glazing, chamber inserts in large chambers

Valid through April 2021

Calculation based on ISO 10077-2, EN 673, EN 410

Product name: ACCESS GENE0 Fixed-3.9-272-Ener		Center-of-glass properties			
ASHRAE/IECC /DOE North American Climate Zone	North, East, South-facing West - facing			Cardinal 3.9LoE2272-3.9Clear-3.9LoE180 ARG No Grids	
Climate specific recommendations:		Whole-window installed U-value		Ucog-Value	
		W/m2K	BTU/hr.ft2.F	SHGC	BTU/hr.ft2.F
8		0.86	0.15	0.391	0.692
7		0.83	0.15	0.391	0.658
6		0.80	0.14	0.391	0.623
5	✓	0.80	0.14	0.391	0.619
4	✓	0.80	0.14	0.391	0.623
Marine North	✓	0.81	0.14	0.391	0.626
Marine South	✓	0.81	0.14	0.391	0.631
3	✓	0.81	0.14	0.391	0.628
2 West		0.82	0.14	0.391	0.643
2 East		0.82	0.14	0.391	0.643
WASCO GENE0 Fixed-3.9-272		FRAME		Psi-spacer	Psi-opaque
Tremco EnerEDGE		U-frame		Ψ	
		mm	in	W/mK	BTU/hr.ft.F
Head		74	2.90	0.021	0.012
Sill		74	2.90	0.021	0.012
left jamb		74	2.90	0.021	0.012
right jamb		74	2.90	0.021	0.012

Valid through April 2021

Figure 9: PHIUS certification for GENE0 fixed window, 3.9mm thick LoE² 272 glazing, chamber inserts in large chambers

Calculation based on ISO 10077-2, EN 673, EN 410

Product name: ACCESS GENE0 FixedPHZ-3.9-180-Ener		Center-of-glass properties			
ASHRAE/IECC /DOE North American Climate Zone	North, East, South-facing West - facing			Cardinal 3.9LoE180-3.9Clear-3.9LoE180- ARG No Grids	
Climate specific recommendations:		Whole-window installed U-value		Ucog-Value	
		W/m2K	BTU/hr.ft2.F	SHGC	BTU/hr.ft2.F
8		0.87	0.15	0.554	0.715
7		0.85	0.15	0.554	0.682
6		0.82	0.14	0.554	0.646
5	✓	0.82	0.14	0.554	0.646
4	✓	0.82	0.14	0.554	0.651
Marine North	✓	0.82	0.14	0.554	0.654
Marine South		0.83	0.15	0.554	0.660
3		0.83	0.15	0.554	0.656
2 West		0.84	0.15	0.554	0.672
2 East		0.84	0.15	0.554	0.672
WASCO GENE0 FixedPHZ-3.9		FRAME		Psi-spacer	Psi-opaque
Tremco EnerEDGE		U-frame		Ψ	
		mm	in	W/mK	BTU/hr.ft.F
Head		74	2.90	0.023	0.013
Sill		74	2.90	0.023	0.013
left jamb		74	2.90	0.023	0.013
right jamb		74	2.90	0.023	0.013

Valid through April 2021

Figure 10: PHIUS certification for GENE0 fixed window, 3.9mm thick LoE 180 glazing, PHZ chamber inserts

Calculation based on ISO 10077-2, EN 673, EN 410

Product name: ACCESS GENE0 FixedPHZ-3.9-272-Ener		Center-of-glass properties			
ASHRAE/IECC /DOE North American Climate Zone	North, East, South-facing West - facing			Cardinal 3.9LoE2272-3.9Clear-3.9LoE180 ARG No Grids	
Climate specific recommendations:		Whole-window installed U-value		Ucog-Value	
		W/m2K	BTU/hr.ft2.F	SHGC	BTU/hr.ft2.F
8		0.85	0.15	0.391	0.692
7		0.83	0.15	0.391	0.658
6		0.80	0.14	0.391	0.623
5	✓	0.79	0.14	0.391	0.619
4	✓	0.80	0.14	0.391	0.623
Marine North	✓	0.80	0.14	0.391	0.626
Marine South	✓	0.80	0.14	0.391	0.631
3	✓	0.80	0.14	0.391	0.628
2 West		0.81	0.14	0.391	0.643
2 East		0.81	0.14	0.391	0.643
WASCO GENE0 FixedPHZ-3.9		FRAME		Psi-spacer	Psi-opaque
Tremco EnerEDGE		U-frame		Ψ	
		mm	in	W/m2K	BTU/hr.ft2.F
Head		74	2.90	0.80	0.14
Sill		74	2.90	0.80	0.14
left jamb		74	2.90	0.80	0.14
right jamb		74	2.90	0.80	0.14

Valid through April 2021

Figure 11: PHIUS certification for GENE0 fixed window, 3.9mm thick LoE² 272 glazing, PHZ chamber inserts

Calculation based on ISO 10077-2, EN 673, EN 410

Product name: ACCESS GENE0 Fixed-4.7-180-Ener		Center-of-glass properties			
ASHRAE/IECC /DOE North American Climate Zone	North, East, South-facing West - facing			Cardinal 4.7LoE180-4.7Clear-4.7LoE180- ARG No Grids	
Climate specific recommendations:		Whole-window installed U-value		Ucog-Value	
		W/m2K	BTU/hr.ft2.F	SHGC	BTU/hr.ft2.F
8		0.87	0.15	0.545	0.714
7		0.85	0.15	0.545	0.681
6		0.82	0.14	0.545	0.645
5	✓	0.82	0.14	0.545	0.645
4	✓	0.82	0.15	0.545	0.650
Marine North	✓	0.83	0.15	0.545	0.653
Marine South		0.83	0.15	0.545	0.659
3		0.83	0.15	0.545	0.655
2 West		0.84	0.15	0.545	0.671
2 East		0.84	0.15	0.545	0.671
WASCO GENE0 Fixed-4.7-180		FRAME		Psi-spacer	Psi-opaque
Tremco EnerEDGE		U-frame		Ψ	
		mm	in	W/m2K	BTU/hr.ft2.F
Head		77	3.05	0.83	0.15
Sill		77	3.05	0.83	0.15
left jamb		77	3.05	0.83	0.15
right jamb		77	3.05	0.83	0.15

Valid through April 2021

Figure 12: PHIUS certification for GENE0 fixed window, 4.7mm thick LoE 180 glazing, chamber inserts in large chambers

Product name: **ACCESS GENE0 Fixed-4.7-272-Ener**

Valid through April 2021

Figure 13: PHIUS certification for GENE0 fixed window, 4.7mm thick LoE² 272 glazing, chamber inserts in large chambers

Product name: **ACCESS GENE0 FixedPHZ-4.7-180-Ener**

Valid through April 2021

Figure 14: PHIUS certification for GENE0 fixed window, 4.7mm thick LoE 180 glazing, PHZ chamber inserts

Product name: ACCESS GENE0 FixedPHZ-4.7-272-Ener		Center-of-glass properties			
ASHRAE/IECC /DOE North American Climate Zone	North, East, South-facing West - facing			Cardinal 4.7LoE2272-4.7Clear-4.7LoE180 ARG No Grids	
Climate specific recommendations:		Whole-window installed U-value		Ucog-Value	
		W/m2K	BTU/hr.ft2.F	SHGC	BTU/hr.ft2.F
8		0.86	0.15	0.386	0.690
7		0.83	0.15	0.386	0.657
6		0.80	0.14	0.386	0.622
5	✓	0.80	0.14	0.386	0.618
4	✓	0.80	0.14	0.386	0.622
Marine North	✓	0.80	0.14	0.386	0.625
Marine South	✓	0.81	0.14	0.386	0.630
3	✓	0.81	0.14	0.386	0.627
2 West		0.82	0.14	0.386	0.642
2 East		0.82	0.14	0.386	0.642
WASCO GENE0 FixedPHZ-4.7		FRAME		Psi-spacer	
Tremco EnerEDGE		U-frame		Psi	
		mm	in	W/mK	BTU/hr.ft.F
Head		77	3.05	0.024	0.014
Sill		77	3.05	0.024	0.014
left jamb		77	3.05	0.024	0.014
right jamb		77	3.05	0.024	0.014

Valid through April 2021

Figure 15: Figure 11: PHIUS certification for GENE0 fixed window, 4.7mm thick LoE² 272 glazing, PHZ chamber inserts

Air, Water and Structure

Understanding Structural Performance

Performance Grade and Category

Windows are tested to meet a certain performance grade in a specified category. Windows are divided into five categories – Residential, Light Commercial, Commercial Window and Architectural Window. As one moves from R to AW the minimum test sizes become larger, the minimum performance grade becomes higher, and more tests are required. For example, CW and AW require that deflections remain under L/175. That means, no part of the window may deflect more than 1/175th of its own length. In order to meet a performance grade (PG), the window must meet a certain design pressure, water test pressure and air infiltration performance. Because of the size and test differences, a CW, for example, might be stronger than a R window that has a higher performance grade. The below shows how pressures relate to wind load.

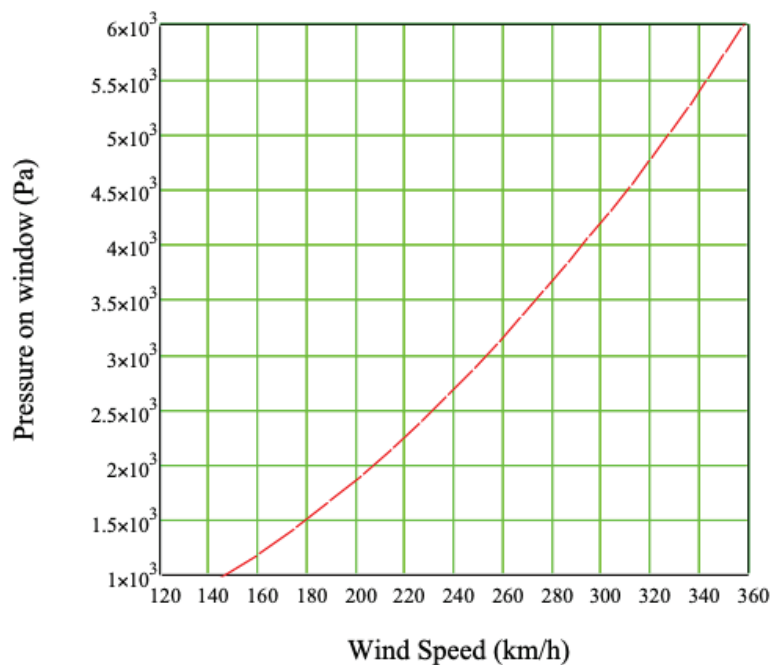


Figure 16: Pressure on a window due to wind, SI Units

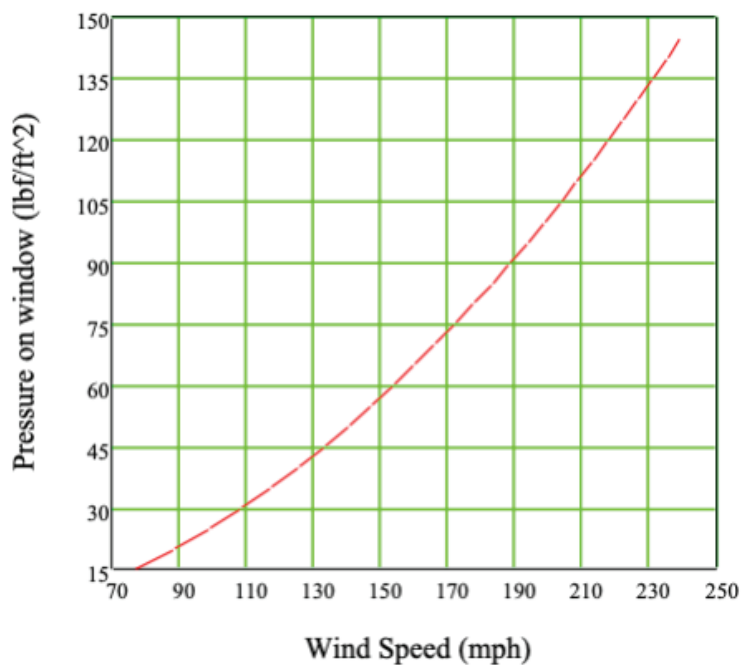


Figure 17: Pressure on a window due to wind, U.S. units

Design Pressure

Design pressure consists of two tests. The first is the design pressure test, where the window is taken to its design pressure. Deflection is measured at the point of greatest deflection. If a CW or AW grade is required, the deflection must be $L/175$ or less. In all cases, the window must not be damaged. The second test is the structural test pressure, where the window is loaded 50% beyond its design pressure. Some permanent distortion is allowable, but the window may not catastrophically fail.

Water Infiltration

Water performance is tested similarly to structure, except the pressure differential is much less, approximately 140 to 1200 Pa (3 to 25 psf). While holding this pressure differential, water is sprayed on the face of the window, and no water may penetrate for at least fifteen minutes.

Air Infiltration

Air leakage is measured at 75 Pa (1.57 psf), the equivalent of a 40 km/hr (25 mph) wind for all windows. Please note that when Access tests for air infiltration we test production windows and not special windows optimized for the test; we are not looking for advertising numbers but for quality assurance.

In Canada, air infiltration and exfiltration cannot exceed 0.5 L/s/m^2 (0.10 cfm/ft^2) in order to achieve the best rating, A3, for operable windows. Fixed windows cannot exceed 0.2 L/s/m^2 (0.04 cfm/ft^2). In the United States, requirements are less stringent. Only air infiltration is tested. 1.5 L/s/m^2 (0.30 cfm/ft^2) is allowed for all classes except AW. An AW window's air infiltration cannot exceed 0.5 L/s/m^2 (0.10 cfm/ft^2).

Test Data

Issued to Access Windows and Doors.

					Air			Water
Type	Class	PG	Size mm (in)	DP Pa (psf)	Infiltration L/s/m ² (cfm/ft ²)	Exfiltration L/s/m ² (cfm/ft ²)	Canadian Infiltration Exfiltration	Test Pressure Pa (psf)
Tilt & Turn	R	95	1200 x 1500 (47 x 59)	±4550 (±95)	<0.1 (<0.01)	<0.1 (<0.01)	A3	1200 (25.06)
Tilt & Turn	CW	75	1375 x 2440 (54 x 96)	±3600 (±75)	0.23 (0.05)	0.15 (0.03)	A3	730 (15.25)
Picture	R	90	1200 x 1500 (47 x 59)	±4310 (±90)	<0.1 (<0.01)	<0.1 (<0.01)	Fixed	1400 (29.24)
Picture	CW	50	1882 x 2440 (74 x 96)	±2400 (±50)	<0.1 (<0.01)	<0.1 (<0.01)	Fixed	730 (15.25)
Tilt & Turn/ Picture	R	55	2794 x 1505 (110 x 59)	±2630 (±55)	<0.1 (<0.01)	<0.1 (<0.01)	A3	900 (18.80)
Side Hinged Door (Inswing)	CW	85	1118 x 2440 (44 x 96)	±4080 (±85)	0.09 (0.02)	0.08 (0.02)	A3	730 (15.25)
Side Hinged Door (Inswing)	CW	80	1118 x 2440 (44 x 96)	±3840 (±80)	0.07 (0.01)	0.12 (0.02)	A3	730 (15.25)

Issued to REHAU Construction

					Air			Water
Type	Class	PG	Size mm (in)	DP Pa (psf)	Infiltration L/s/m ² (cfm/ft ²)	Exfiltration L/s/m ² (cfm/ft ²)	Canadian Infiltration Exfiltration	Test Pressure Pa (psf)
Tilt & Turn	CW	70	1200 x 2180 (47.2 x 85.8)	±3360 (±70)	0.01 (0.002)	0.01 (0.002)	A3	720 (15)
Fixed	CW	50	2440 x 2440 (96 x 96)	±2400 (±50)	0.004 (0.001)	0.004 (0.001)	Fixed	720 (15)
French Tilt & Turn Door	CW	45	2292 x 2177 (90 x 86)	±2160 (±45)	0.005 (0.001)	0.005 (0.001)	A3	730 (15)

Hardware

This chapter gives an overview of the hardware used in GENE0 windows and doors produced by Access, as well as basic adjustment procedures.

Drawings are courtesy of Roto Hardware.

Tilt & Turn

Locking Hardware

Locking is continuous around the entire perimeter of the window or door. Corners have a security cam (Figure 1) that has a mushroom shape to prevent it from being pried from the security strike (Figure 3). Security cams or compression cams (Figure 2) are used an average of every 700mm (27.6") with no more than 800mm (31.5") between locking points, or between a hinge and a locking point. Figure 4 shows an overview of typical tilt & turn hardware on a window.



Figure 1: Security Lock Cam



Figure 2: Compression Lock Cam

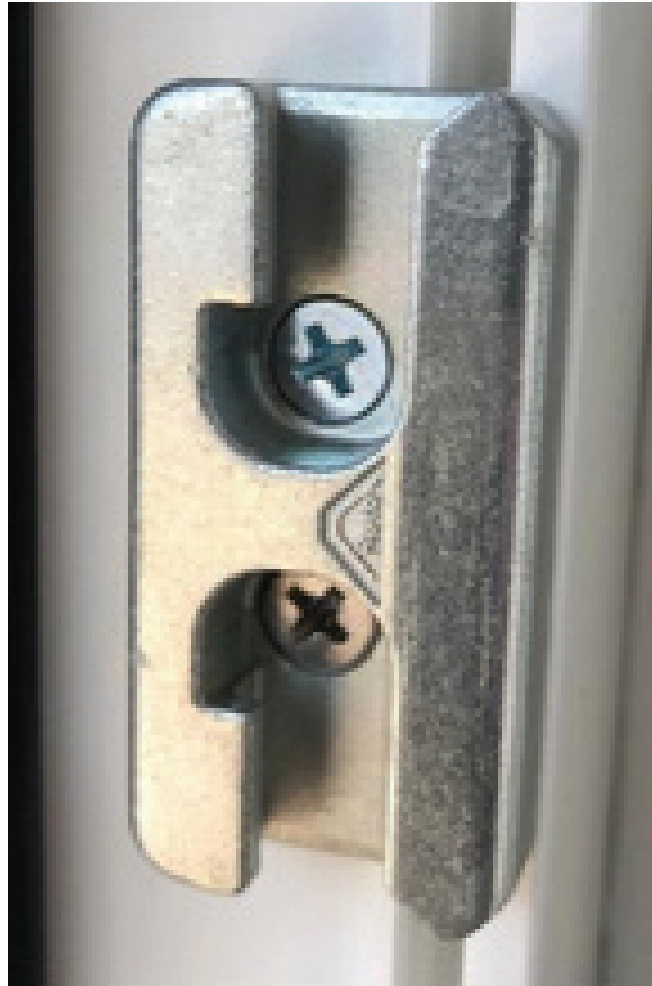


Figure 3: Security Strike

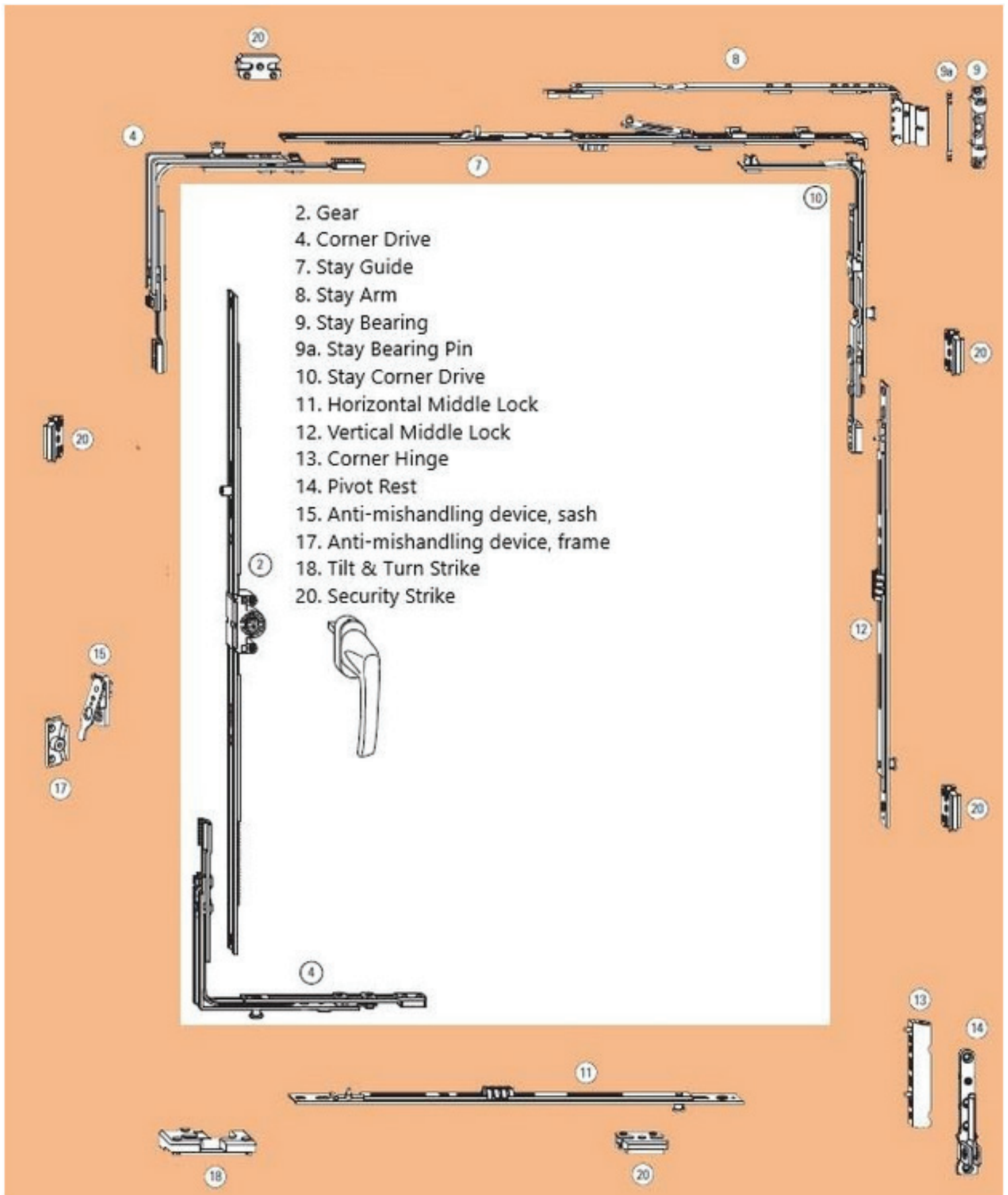


Figure 4: Overview of Typical Tilt & Turn Hardware

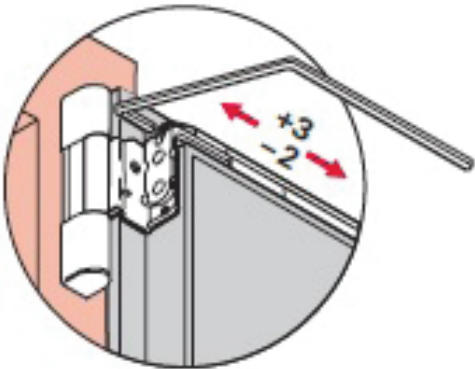
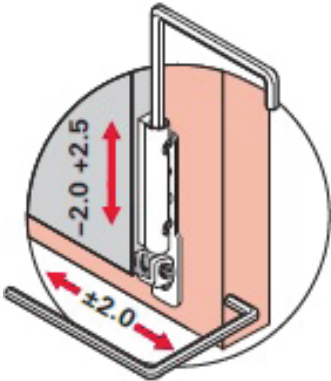
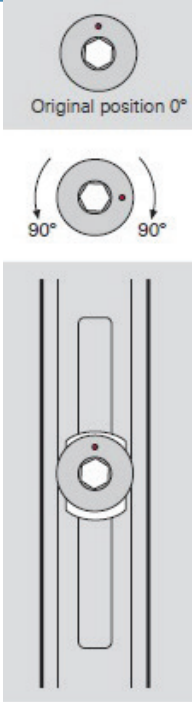
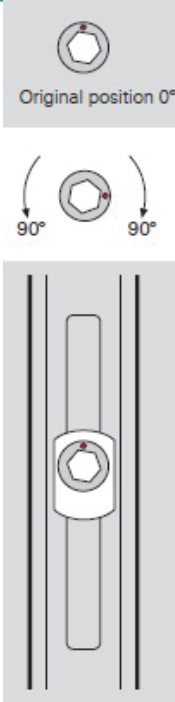
Hinges

Two different hinge systems are available. A face mounted hinge is standard while a concealed hinge set is optional. The standard hinge system has several advantages over the concealed system, including a greater range of adjustability and easier installation and removal of the sash.

Hinge and Gasket Squish Adjustment

Adjustment is carried out with a 4mm hex key. The hinges are three-way adjustable for sash position – left to right laterally at the top, left to right laterally at the bottom, and height at the bottom. Additionally, gasket squish may be adjusted. This is also adjusted with a 4mm hex key. The neutral position of the cams are shown in the diagram below. Observe the cam while turning in order to determine if gasket squish is being increased or decreased.

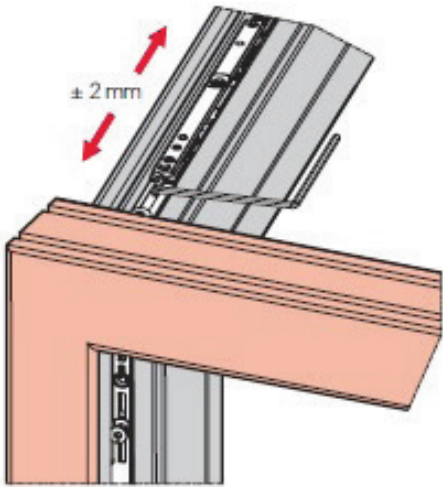
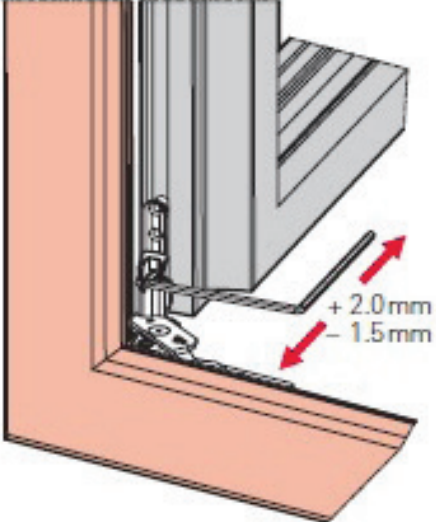
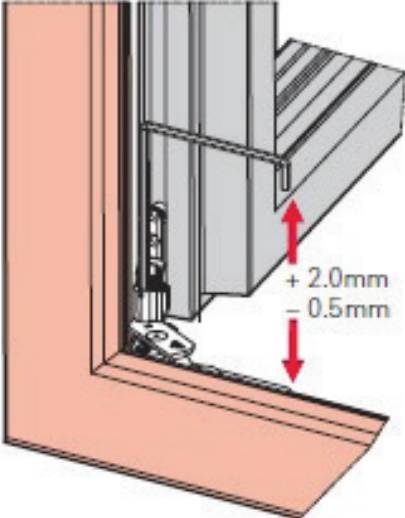
Table 1: Adjustment of Non-concealed Tilt & Turn Hinges and Gasket Squish

Lateral Adjustment, Top of Sash	Lateral and Height Adjustment, Bottom of Sash
	
Gasket Squish, Security Lock Cam	Gasket Squish, Compression Lock Cam
	

Concealed Hinge Adjustment

Concealed hinges are also adjusted with a 4mm hex key. Gasket squish adjustment is the same as with non-concealed hinges.

Table 2: Concealed Hinge Adjustment

Top Lateral Adjustment	Bottom Lateral Adjustment	Bottom Height Adjustment
		

Entry Door

Locks

The standard lock is a handle operated lock with a deadbolt and four security cams (Figure 5) that lock into security strikes (Figure 3). The lock itself consists of a main lock with a deadbolt, coupled to two extensions, each with two security cams (Figure 6).

The door is locked by first lifting the handle. Then, either the knob (from the inside) or the key (from the outside) is turned 90°. This blocks movement of the handle; the handle shaft will fail before the lock can be forced. In order to open the door, either the knob or key is turned 90° in the opposite direction. Now, pushing the handle down will allow the door to open.



Figure 5: Entry Door Lock Cam



Figure 6: Entry Door Lock (Substitute photo if possible.)

Hinges

The standard hinges are flag style from Roto (Figure 7). A parts diagram is shown in Figure 8.

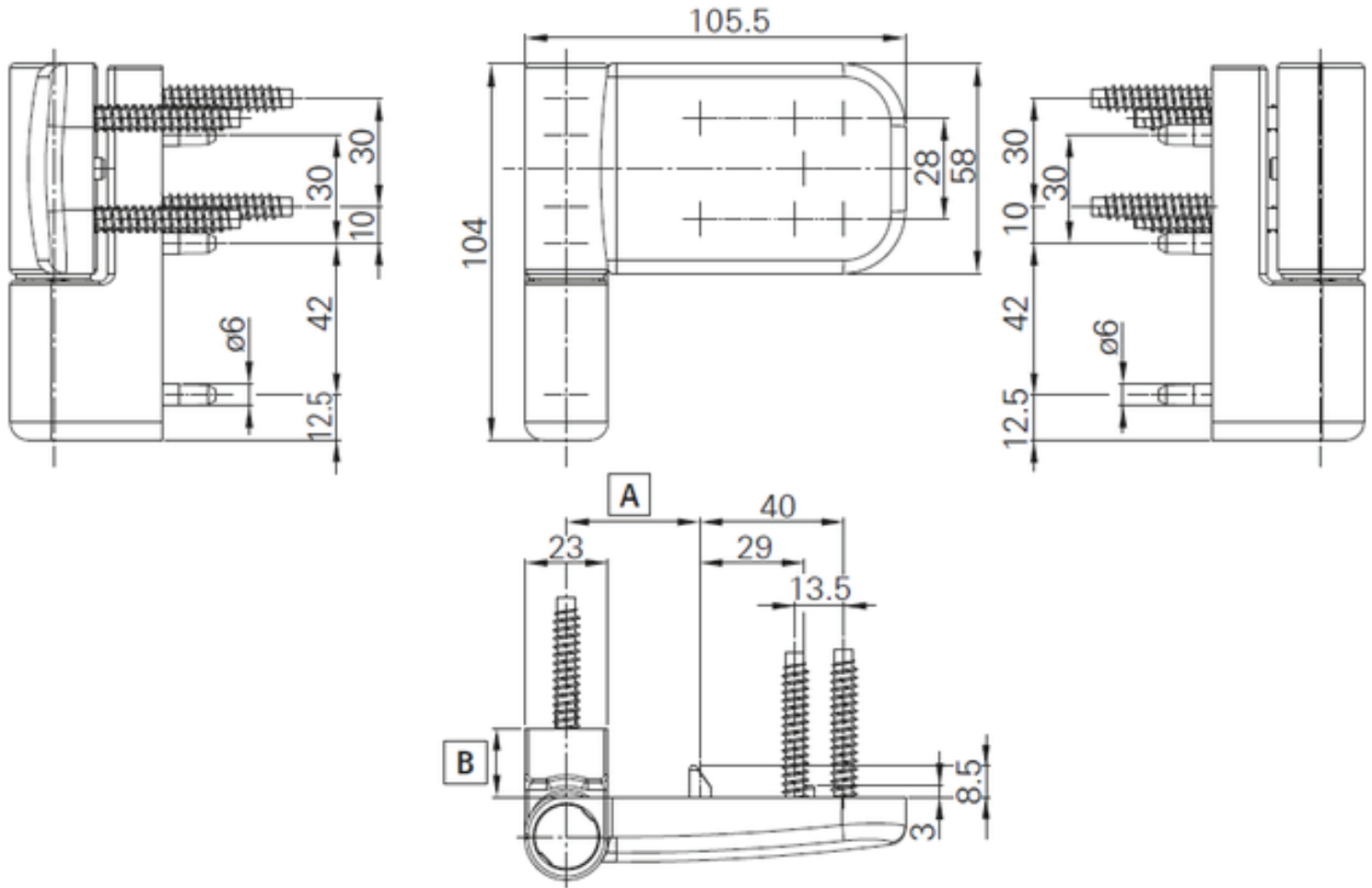


Figure 7: Flag Style Hinge

Handles and Lock Cylinders

Handles and lock cylinders are detailed in “Colors, Finishes and Options”

Parallel Slide

Parallel slide hardware instructions and drawings are supplied upon request.

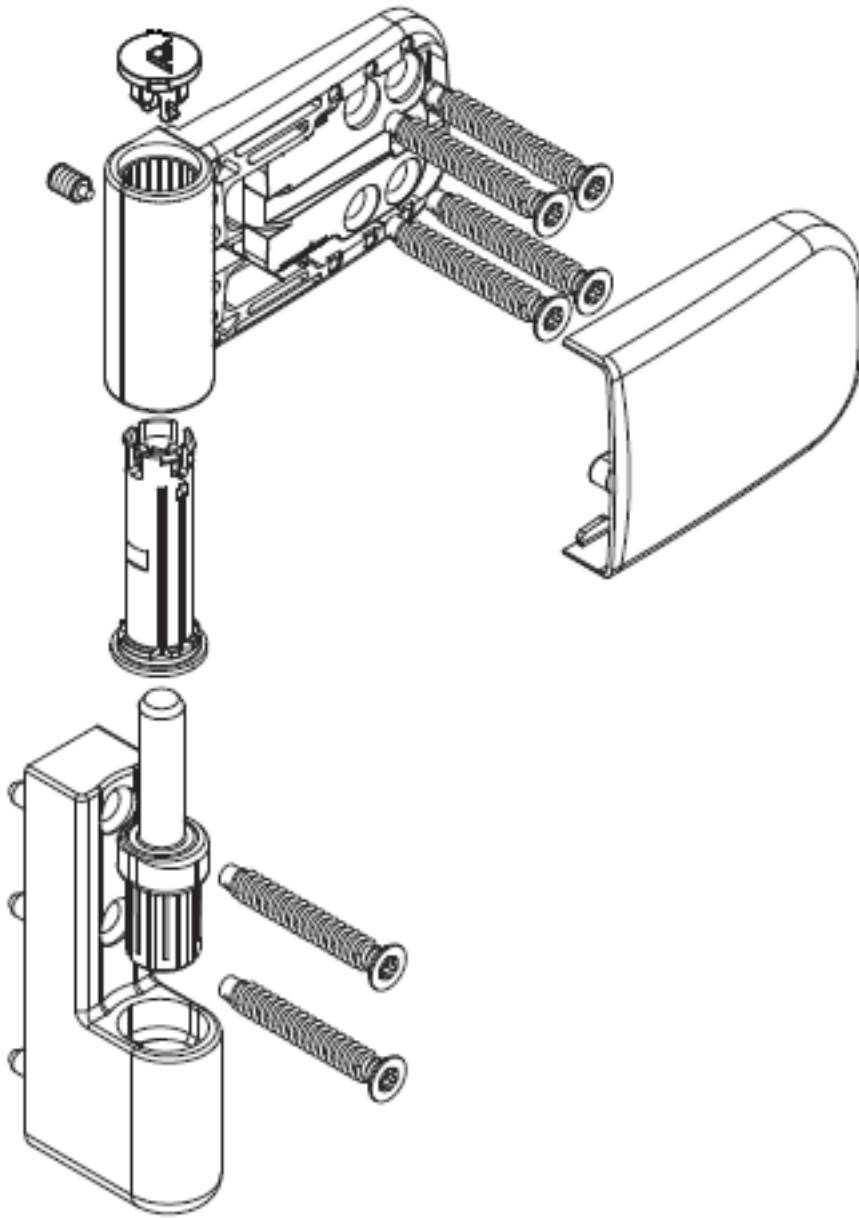


Figure 8: Hinge Parts Diagram

Glazing

Introduction

Access Windows and Doors has NFRC certified options using glass from Cardinal and Guardian. This chapter lists the standard offerings, as well as their center glass performance specifications.

The 4700 GENE0 system is capable of accepting insulated glass units up to 53mm (2.09”) thick. This eliminates the need to excessively shrink the gaps between the panes as thicker glass is required.

If a project requires glazing not listed here Access Windows and Doors will be happy to investigate feasibility.

Coating and Spacer Options

Cardinal Glass with Cardinal Endur® Spacer

The 4700 GENE0 system is offered with dual and triple pane units using Cardinal Glass and the Cardinal Endur® warm-edge spacer system. The standard fill is 90% argon; an air fill with capillary tubes is available for high elevations. High, medium and low solar heat gain coefficient (SHGC) options are available.

Dual pane glazing is not recommended for Climate Zones Five and above except for unconditioned spaces.

For most residential applications in northern climates, medium SHGC triple pane glazing with the Endur® spacer is recommended.

Cardinal Glass with Tremco Eneredge®

High and medium SHGC triple pane options are available with a 15.9mm (0.625”) Tremco Eneredge® spacer. These options are verified through the Passive House Institute U.S. (PHIUS) and are recommended for projects seeking PHIUS or Passivhausinstitut (PH) certification. They are not recommended for Climate Zones Seven and Higher as the larger spacing reduces performance as compare to the Endur® options when temperatures fall below -18°C (0°F).

Guardian Glass with Super Spacer® Triseal™

High, medium, and low SHGC triple pane options are available in 37mm and/or 43mm overall depending on the glass thickness. These options are verified through the Passive House Institute U.S. (PHIUS) and are recommended for projects seeking PHIUS or Passivhausinstitut (PH) certification. They are not recommended for Climate Zones Seven and Higher as the larger spacing reduces performance as compare to the Endur® options when temperatures fall below -18°C (0°F).

Glass Wind Load

Glazing thickness is chosen for a glass wind load of 1400 Pa (30 PSF) unless otherwise dictated by the project.

Center of Glass Properties

Notes on Calculation Methods

Center glass U-values and SHGC's are given in the tables in this chapter as calculated by two different methods, ISO 15099 and EN673. The values listed under ISO 15099 are calculated at -18°C (0°F) outside temperature and are more accurate. The values listed under EN 673 are calculated at 0°C (32°F) outside temperature and are generally optimistic because of the simplified EN673 model and the relatively warm outside temperature at which the U-value is calculated. Additionally, EN673 tends to predict wider optimal gaps between the glass, which can be a seriously detriment to glazing performance at cold temperatures.

The introduction to ISO 15099-2003 reads “Traditionally, windows have been characterized by separately calculating the “dark” or “night-time” thermal transmittance and the solar energy transmittance through the fenestration system. The thermal transmittance without the effect of solar radiation is calculated using the procedures given in ISO 10292 (for the vision portion)... These calculations require the use of reference conditions that are not representative of actual conditions. In this International Standard the energy balance equations are set up for every glazing layer taking into account the solar absorption and actual temperatures. From these energy balance equations, the temperatures of the individual layers and gaps are determined. This is the only standard that takes into account these complex interactions.”

It should be noted that EN673 is nearly identical to ISO 10292.

The EN673 values reported here are only for comparison with manufacturers who do not report ISO 15099 values. It should also be known that glazing that appears to perform better under the EN673 standard can and often performs worse under the more accurate ISO 15099 standard.

Tables - Center of Glass Properties

All data has been calculated with LBNL Window Version 7.

Triple Pane Glazing Options Featuring Cardinal Glass with Endur® Spacer, Argon Fill

Coating		Glass Thickness (mm)				ISO 15099				EN 673			
Surface #2	Surface #5	Pane 1	Pane 2	Pane 3	Gap (mm)	Overall Thickness (mm)	Ucg (W/m²K)	Ucg (Btu/hr-ft²°F)	SHGC	Ucg (W/m²K)	Ucg (Btu/hr-ft²°F)	g	VT
LoE 180	LoE 180	4.1	3.0	4.1	13.0	37.2	0.751	0.132	0.547	0.743	0.131	0.539	0.693
LoE² 272	LoE 180	3.9	3.0	4.1	13.0	37.0	0.732	0.129	0.367	0.717	0.126	0.371	0.628
LoE² 272	LoE² 272	3.9	3.0	3.9	13.0	36.8	0.708	0.124	0.348	0.692	0.122	0.346	0.570
LoE³ 366	LoE 180	3.9	3.0	3.9	13.0	36.8	0.716	0.126	0.244	0.691	0.121	0.252	0.566
LoE 180	LoE 180	4.1	3.9	4.1	13.0	38.1	0.751	0.132	0.542	0.743	0.131	0.534	0.690
LoE 180	LoE 180	4.1	3.9	4.1	16.0	44.1	0.750	0.132	0.543	0.646	0.133	0.535	0.690
LoE² 272	LoE 180	3.9	3.9	4.1	13.0	37.9	0.732	0.129	0.365	0.716	0.126	0.368	0.625
LoE² 272	LoE 180	3.9	3.9	4.1	16.0	43.9	0.732	0.129	0.364	0.618	0.109	0.367	0.625
LoE² 272	LoE² 272	3.9	3.9	3.9	13.0	37.7	0.707	0.124	0.346	0.691	0.121	0.344	0.567
LoE³ 366	LoE 180	3.9	3.9	4.1	13.0	37.9	0.716	0.126	0.243	0.691	0.121	0.251	0.564
LoE³ 366	LoE 180	3.9	3.9	4.1	16.0	43.9	0.715	0.126	0.242	0.591	0.104	0.249	0.564
LoE 180	LoE 180	4.8	4.7	4.8	11.5	37.3	0.786	0.138	0.532	0.807	0.142	0.523	0.680
LoE² 272	LoE 180	4.8	4.7	4.8	11.5	37.3	0.767	0.135	0.360	0.781	0.137	0.364	0.616
LoE² 272	LoE² 272	4.8	4.7	4.8	11.5	37.3	0.744	0.131	0.343	0.757	0.133	0.341	0.559
LoE³ 366	LoE 180	4.7	4.7	4.8	11.5	37.2	0.749	0.132	0.242	0.757	0.133	0.251	0.555
LoE 180	LoE 180	4.8	4.7	4.8	14.5	43.3	0.740	0.130	0.533	0.689	0.121	0.524	0.680
LoE² 272	LoE 180	4.8	4.7	4.8	14.5	43.3	0.722	0.127	0.360	0.661	0.116	0.363	0.616
LoE² 272	LoE² 272	4.8	4.7	4.8	14.5	43.3	0.698	0.123	0.343	0.636	0.112	0.341	0.559
LoE³ 366	LoE 180	4.7	4.7	4.8	14.5	43.2	0.705	0.124	0.241	0.636	0.112	0.249	0.555
LoE 180	LoE 180	5.7	5.7	5.7	13.0	43.1	0.747	0.131	0.514	0.740	0.130	0.505	0.666
LoE² 272	LoE 180	5.7	5.7	5.7	13.0	43.1	0.728	0.128	0.352	0.713	0.125	0.355	0.604
LoE² 272	LoE² 272	5.7	5.7	5.7	13.0	43.1	0.704	0.124	0.337	0.689	0.121	0.335	0.548
LoE³ 366	LoE 180	5.7	5.7	5.7	13.0	43.1	0.711	0.125	0.239	0.689	0.121	0.248	0.544

Triple Pane Glazing Options Featuring Cardinal Glass with Endur® Spacer, Air Fill with Capillary Tubes

Coating		Glass Thickness (mm)				ISO 15099				EN 673			
Surface #2	Surface #5	Pane 1	Pane 2	Pane 3	Gap (mm)	Overall Thickness (mm)	U _{cg} (W/m ² K)	U _{cg} (Btu/hr-ft ² -°F)	SHGC	U _{cg} (W/m ² K)	U _{cg} (Btu/hr-ft ² -°F)	g	VT
LoE 180	LoE 180	4.1	3.0	4.1	13.0	37.2	0.936	0.164	0.547	0.941	0.165	0.538	0.693
LoE ² 272	LoE 180	3.9	3.0	4.1	13.0	37.0	0.918	0.161	0.369	0.917	0.161	0.373	0.628
LoE ² 272	LoE ² 272	3.9	3.0	4.1	13.0	37.0	0.897	0.158	0.349	0.892	0.157	0.346	0.570
LoE ³ 366	LoE 180	3.9	3.0	3.9	13.0	36.8	0.902	0.158	0.247	0.894	0.157	0.256	0.566
LoE 180	LoE 180	4.1	3.9	4.1	13.0	38.1	0.935	0.164	0.542	0.940	0.165	0.532	0.690
LoE ² 272	LoE 180	3.9	3.9	4.1	13.0	37.9	0.917	0.161	0.366	0.916	0.161	0.370	0.625
LoE ² 272	LoE ² 272	3.9	3.9	4.1	13.0	37.9	0.896	0.157	0.365	0.893	0.157	0.344	0.567
LoE ³ 366	LoE 180	3.9	3.9	4.1	13.0	37.9	0.901	0.158	0.246	0.894	0.157	0.255	0.564
LoE 180	LoE 180	4.8	4.7	4.8	11.5	37.3	0.993	0.174	0.532	1.022	0.180	0.521	0.680
LoE ² 272	LoE 180	4.8	4.7	4.8	11.5	37.3	0.975	0.171	0.366	0.999	0.176	0.366	0.616
LoE ² 272	LoE ² 272	4.8	4.7	4.8	11.5	37.3	0.954	0.168	0.344	0.977	0.172	0.341	0.559
LoE ³ 366	LoE 180	4.7	4.7	4.8	11.5	37.2	0.958	0.168	0.246	0.977	0.172	0.256	0.555
LoE 180	LoE 180	4.8	4.7	4.8	14.5	43.3	0.904	0.159	0.532	0.870	0.153	0.523	0.680
LoE ² 272	LoE 180	4.8	4.7	4.8	14.5	43.3	0.887	0.156	0.363	0.845	0.148	0.365	0.616
LoE ² 272	LoE ² 272	4.8	4.7	4.8	14.5	43.3	0.865	0.152	0.344	0.821	0.144	0.341	0.559
LoE ³ 366	LoE 180	4.7	4.7	4.8	14.5	43.2	0.872	0.153	0.246	0.822	0.144	0.253	0.555
LoE 180	LoE 180	5.7	5.7	5.7	13.0	43.1	0.930	0.163	0.514	0.936	0.164	0.503	0.666
LoE ² 272	LoE 180	5.7	5.7	5.7	13.0	43.1	0.913	0.160	0.354	0.912	0.160	0.358	0.604
LoE ² 272	LoE ² 272	5.7	5.7	5.7	13.0	43.1	0.891	0.157	0.337	0.889	0.156	0.336	0.548
LoE ³ 366	LoE 180	5.7	5.7	5.7	13.0	43.1	0.897	0.158	0.243	0.890	0.156	0.253	0.544

Dual Pane Glazing Options Featuring Cardinal Glass with Endur® Spacer, Argon Fill

Coating		Glass Thickness (mm)				ISO 15099				EN 673			
Surface #2	Surface #5	Pane 1	Pane 2	Pane 3	Gap (mm)	Overall Thickness (mm)	U _{cg} (W/m ² K)	U _{cg} (Btu/hr-ft ² -°F)	SHGC	U _{cg} (W/m ² K)	U _{cg} (Btu/hr-ft ² -°F)	g	VT
LoE 180	NA	4.1	3.9		16.0	24.0	1.521	0.267	0.628	1.238	0.218	0.625	0.786
LoE ² 272	NA	3.9	3.9		16.0	23.8	1.465	0.257	0.407	1.163	0.204	0.414	0.714
LoE ³ 366	NA	3.9	3.9		16.0	23.8	1.415	0.249	0.271	1.096	0.193	0.281	0.643

Dual Pane Glazing Options Featuring Cardinal Glass with Endur® Spacer, Air Fill with Capillary Tubes

Coating		Glass Thickness (mm)				ISO 15099				EN 673			
Surface #2	Surface #5	Panel	Panel	Panel	Gap (mm)	Overall Thickness (mm)	Ucg (W/m²K)	Ucg (Btu/hr-ft²°F)	SHGC	Ucg (W/m²K)	Ucg (Btu/hr-ft²°F)	g	VT
LoE 180	NA	4.1	3.9		16.0	24.0	1.778	0.312	0.628	1.448	0.254	0.625	0.786
LoE² 272	NA	3.9	3.9		16.0	23.8	1.729	0.304	0.410	1.381	0.243	0.418	0.714
LoE³ 366	NA	3.9	3.9		16.0	23.8	1.687	0.296	0.275	1.322	0.232	0.286	0.643

Triple Pane Glazing Options Featuring Cardinal Glass with Tremco Eneredge® Spacer, Argon Fill

Coating		Glass Thickness (mm)				ISO 15099				EN 673			
Surface #2	Surface #5	Panel	Panel	Panel	Gap (mm)	Overall Thickness (mm)	Ucg (W/m²K)	Ucg (Btu/hr-ft²°F)	SHGC	Ucg (W/m²K)	Ucg (Btu/hr-ft²°F)	g	VT
LoE 180	LoE 180	4.1	3.9	4.1	15.9	43.9	0.750	0.132	0.543	0.649	0.114	0.535	0.690
LoE² 272	LoE 180	3.9	3.9	4.1	15.9	43.7	0.732	0.129	0.364	0.621	0.109	0.367	0.625
LoE 180	LoE 180	4.8	4.7	4.8	15.9	46.1	0.748	0.131	0.534	0.648	0.114	0.525	0.680
LoE² 272	LoE 180	4.8	4.7	4.8	15.9	46.1	0.730	0.128	0.360	0.620	0.109	0.362	0.616

Dual Pane Glazing Options Featuring Guardian Glass with Super Spacer® TriSeal Spacer, Argon Fill

Coating		Glass Thickness (mm)				ISO 15099				EN 673			
Surface #2	Surface #5	Panel	Panel	Panel	Gap (mm)	Overall Thickness (mm)	Ucg (W/m²K)	Ucg (Btu/hr-ft²°F)	SHGC	Ucg (W/m²K)	Ucg (Btu/hr-ft²°F)	g	VT
SG68		3.8	3.8		15.9	23.5	1.457	0.256	0.377	1.153	0.203	0.385	0.690
SG68		4.6	4.6		14.2	23.4	1.428	0.251	0.375	1.144	0.201	0.384	0.685
SG68		5.6	5.6		12.7	23.9	1.399	0.246	0.373	1.232	0.216	0.383	0.679

Triple Pane Glazing Options Featuring Guardian Glass with Super Spacer® Triseal, Argon Fill

Coating		Glass Thickness (mm)				ISO 15099				EN 673			
Surface #2	Surface #5	Panel 1	Panel 2	Panel 3	Gap (mm)	Overall Thickness (mm)	Ucg (W/m²K)	Ucg (Btu/hr-ft²°F)	SHGC	Ucg (W/m²K)	Ucg (Btu/hr-ft²°F)	g	VT
CL 80/71	CL 80/71	3.8	3.8	3.8	12.7	36.8	0.798	0.140	0.569	0.806	0.142	0.561	0.720
CL 70/36	CL 80/71	3.8	3.8	3.8	12.7	36.8	0.754	0.132	0.349	0.744	0.131	0.353	0.624
CL 70/36	CL 70/36	3.8	3.8	3.8	12.7	36.8	0.702	0.123	0.327	0.691	0.121	0.324	0.541
SG 62/27	CL 80/71	3.8	3.8	3.8	12.7	36.8	0.741	0.130	0.239	0.725	0.127	0.248	0.561
SG 62/27	SG 62/27	3.8	3.8	3.8	12.7	36.8	0.676	0.119	0.227	0.660	0.116	0.227	0.438
CL 80/71	CL 80/71	3.8	3.8	3.8	15.9	43.2	0.793	0.139	0.570	0.703	0.124	0.562	0.720
CL 70/36	CL 80/71	3.8	3.8	3.8	15.9	43.2	0.748	0.131	0.348	0.636	0.112	0.352	0.624
SG 62/27	CL 80/71	3.8	3.8	3.8	15.9	43.2	0.736	0.129	0.238	0.616	0.108	0.246	0.561
CL 80/71	CL 80/71	4.6	4.6	4.6	14.2	42.2	0.783	0.138	0.558	0.751	0.132	0.550	0.712
CL 70/36	CL 80/71	4.6	4.6	4.6	14.2	42.2	0.741	0.130	0.345	0.687	0.121	0.349	0.618
CL 70/36	CL 70/36	4.6	4.6	4.6	14.2	42.2	0.688	0.121	0.324	0.633	0.111	0.322	0.536
SG 62/27	CL 80/71	4.6	4.6	4.6	14.2	42.2	0.728	0.128	0.237	0.668	0.117	0.246	0.555
SG 62/27	SG 62/27	4.6	4.6	4.6	14.2	42.2	0.662	0.116	0.225	0.601	0.106	0.227	0.433
CL 80/71	CL 80/71	4.6	4.6	4.6	15.9	45.6	0.791	0.139	0.559	0.701	0.123	0.550	0.712
CL 70/36	CL 80/71	4.6	4.6	4.6	15.9	45.6	0.747	0.131	0.344	0.635	0.112	0.348	0.618
SG 62/27	CL 80/71	4.6	4.6	4.6	15.9	45.6	0.734	0.129	0.237	0.615	0.108	0.245	0.555
CL 80/71	CL 80/71	5.6	5.6	5.6	12.7	42.2	0.794	0.139	0.545	0.802	0.141	0.536	0.703
CL 70/36	CL 80/71	5.6	5.6	5.6	12.7	42.2	0.751	0.132	0.341	0.741	0.130	0.346	0.610
CL 70/36	CL 70/36	5.6	5.6	5.6	12.7	42.2	0.699	0.123	0.321	0.688	0.121	0.319	0.530
SG 62/27	CL 80/71	5.6	5.6	5.6	12.7	42.2	0.738	0.130	0.237	0.723	0.127	0.247	0.548
SG 62/27	SG 62/27	5.6	5.6	5.6	12.7	42.2	0.673	0.118	0.225	0.657	0.115	0.227	0.427

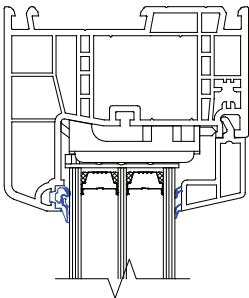
Frame Edge, Clear Opening & Visible Glass Dimensions

Windows, Balcony Doors and Terrace Doors

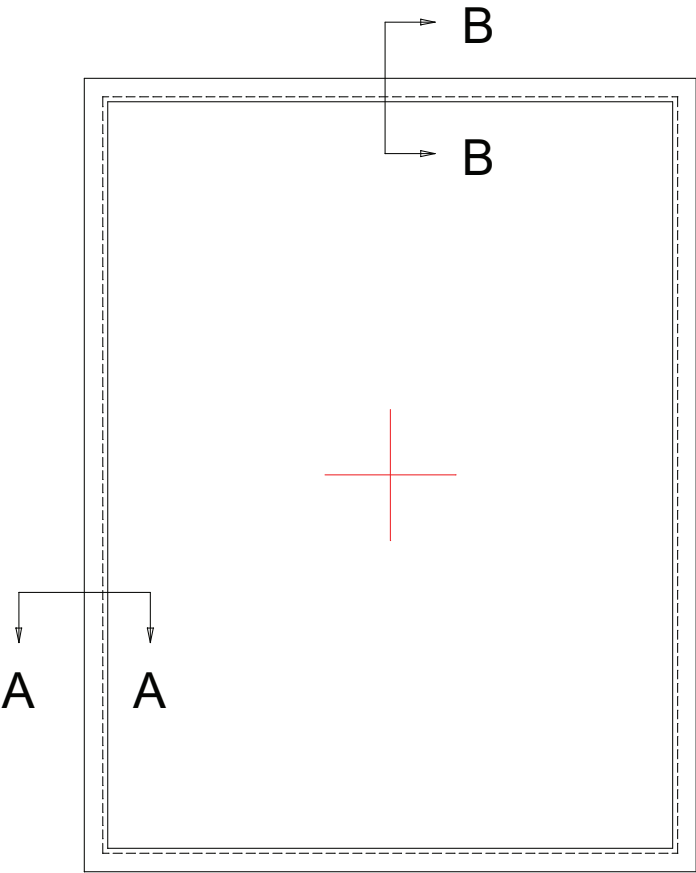
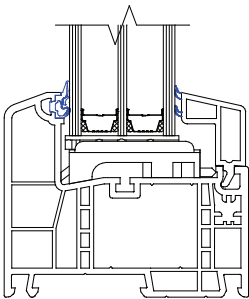
4701P



section A -A



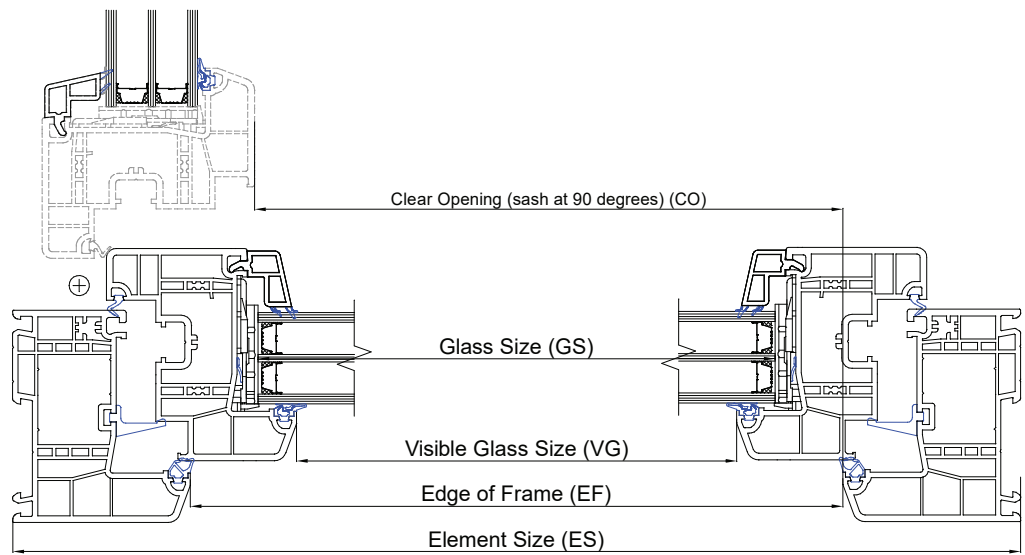
section B - B



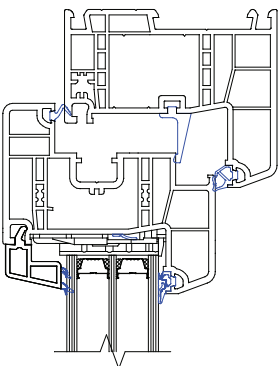
Components	Dimension		Scale
4700 Frame 72 - 532015	Edge of Frame (EF)	Glass Size (GS)	NTS
	ES - 144mm	ES - 114mm	
Glazing Bead 22.5 x 18mm - 560510	ES - 5.669"	ES - 4.488"	

4701L, 57mm Sash

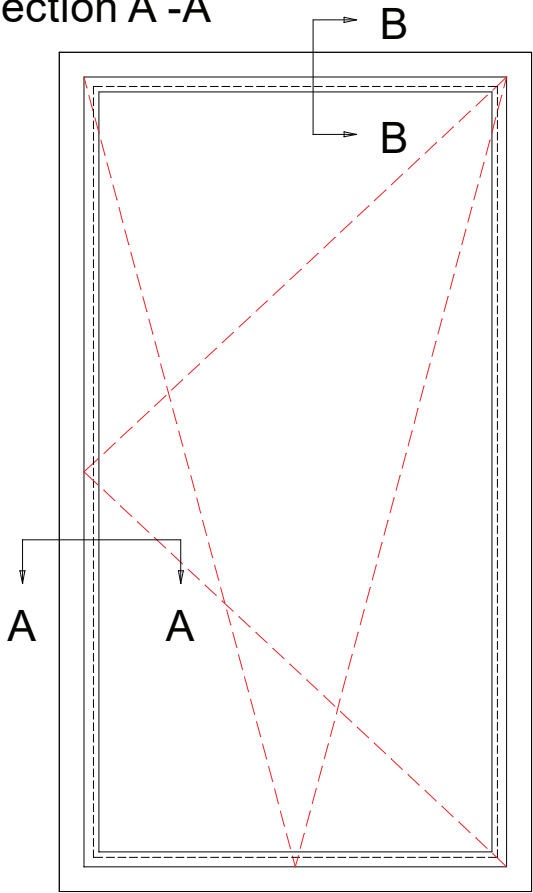
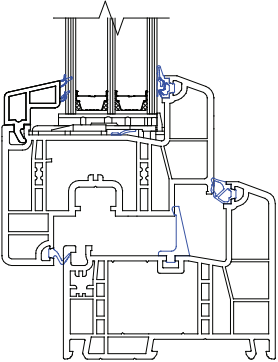
Dimensions are valid for 4701L, 4701R, 4701BDL and 4701BDR with 57mm sash. EF, VG, and GS dimensions are valid for vertical dimensions as well.



section A - A

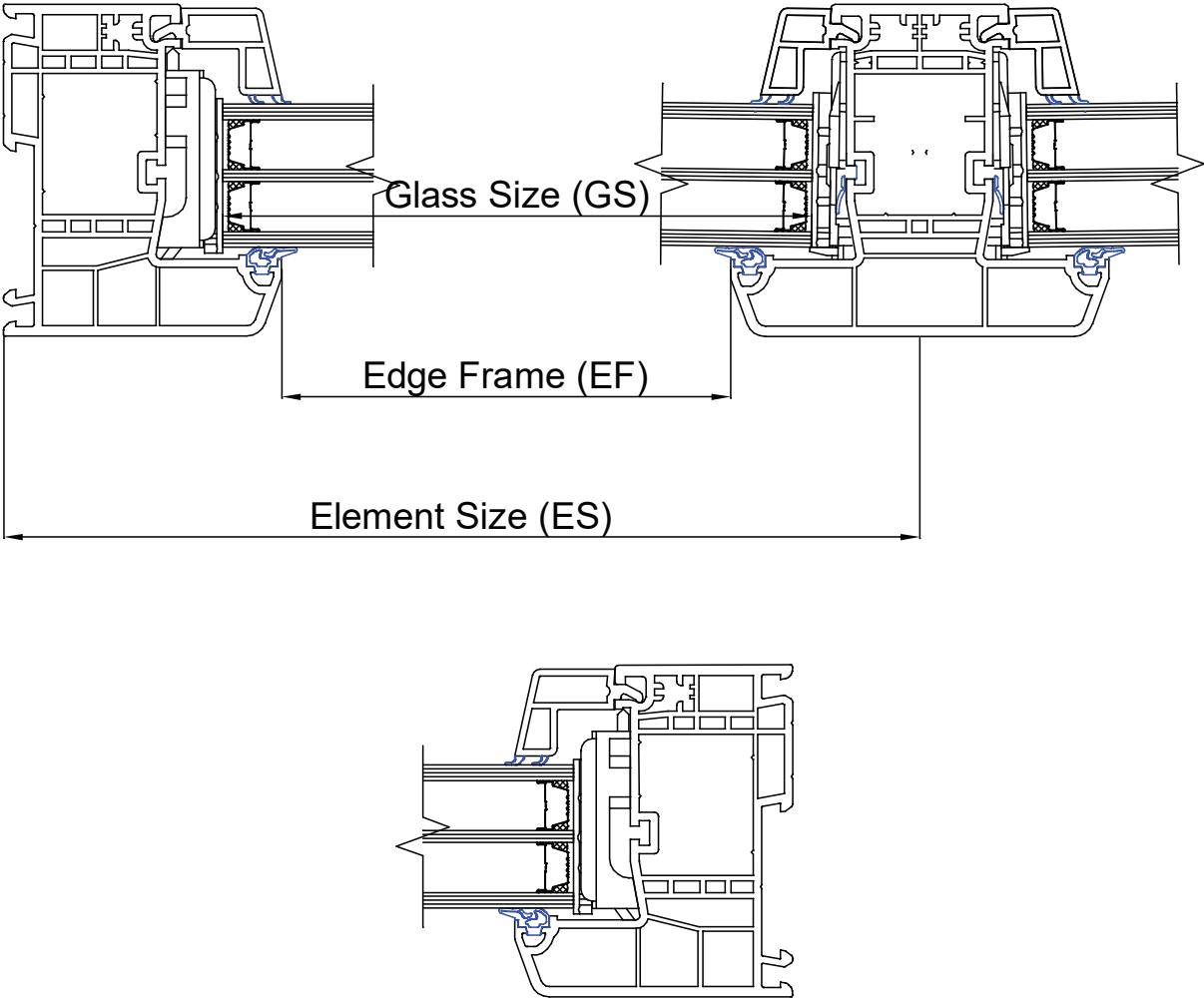


section B - B

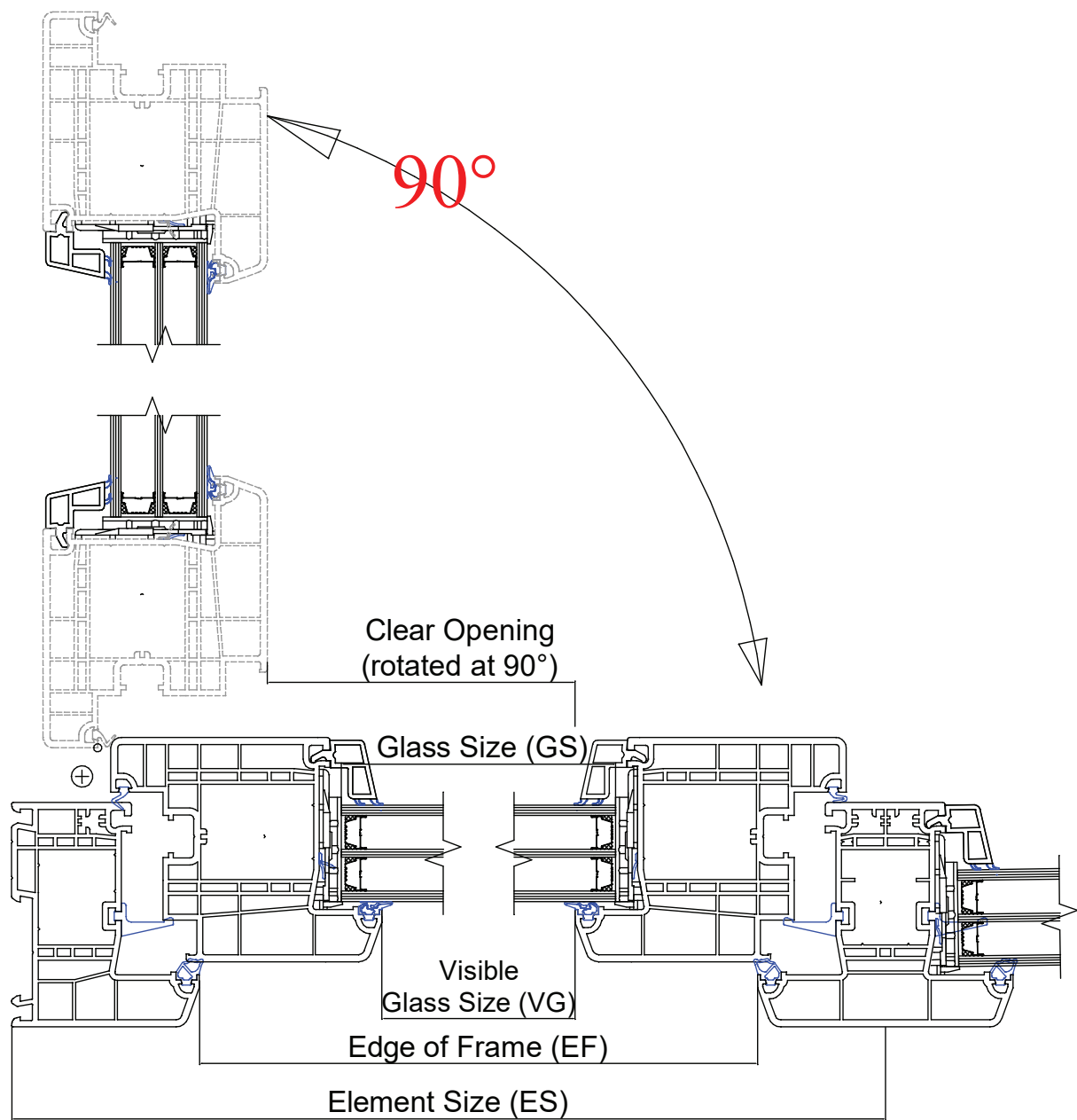


Components	Dimension				Scale
4700 Frame 72 - 532015	Edge of Frame (EF)	Visible Glass Size (VG)	Glass Size (GS)	Clear Opening	NTS
4700 Sash 57-Z - 532036	ES - 144mm	ES - 230mm	ES - 199mm	ES - 170mm	
Glazing Bead 22.5 x 18mm - 560510	ES - 5.67"	ES - 9.06"	ES - 7.8345"	ES - 6.7"	

Details are valid for multi-lite picture windows as well as picture windows in a single frame with an operating unit.



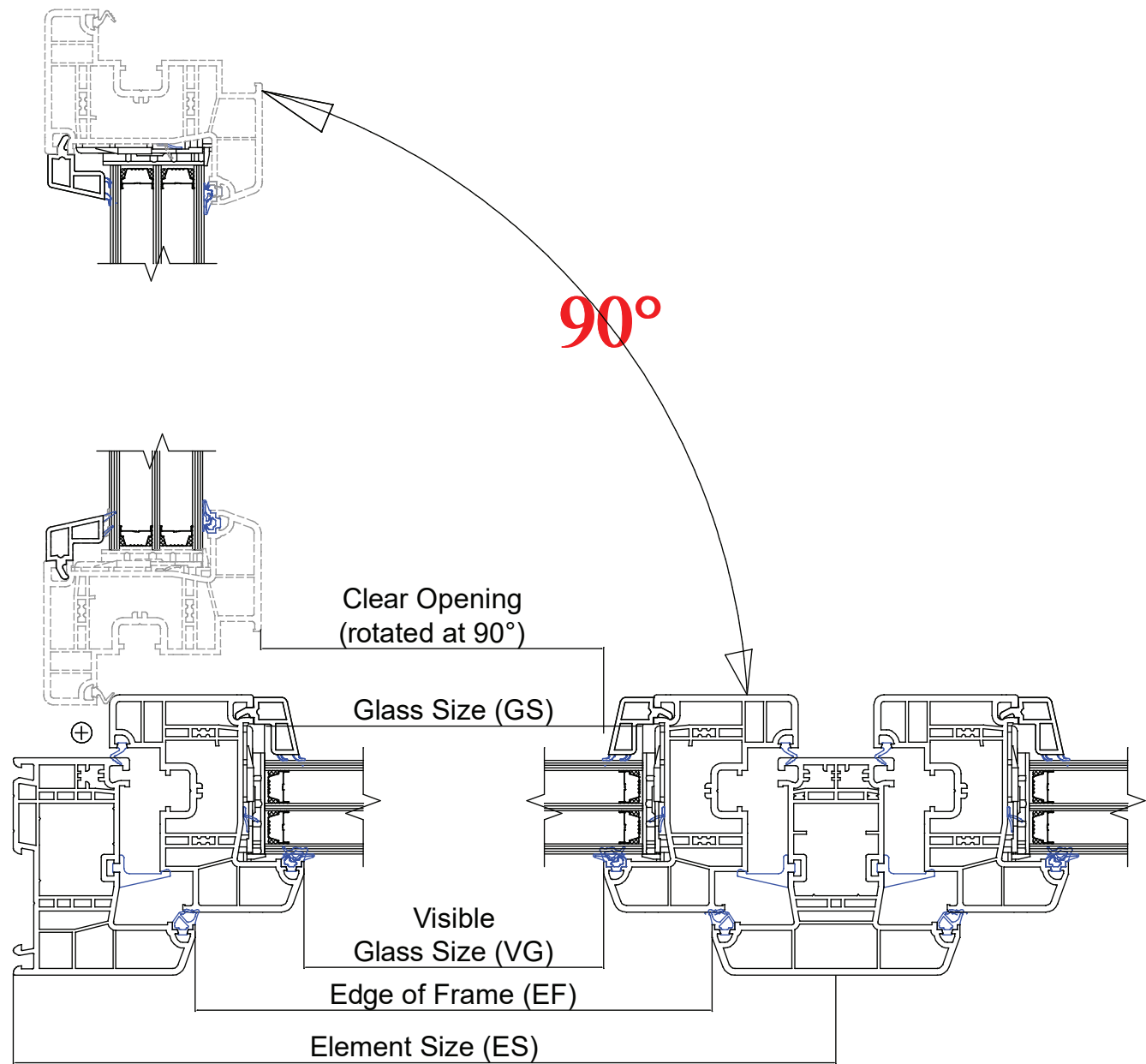
Components	Dimension		Scale
4700 Frame 72 - 532015	Edge of Frame (EF)	Glass Size (GS)	NTS
4700 Mullion 98 - 532055	ES - 121mm	ES - 85mm	
Glazing Bead 22.5 x 18mm - 560510	ES - 4.75"	ES - 3.346"	



Components	Units	Dimension				Scale
4700 Frame 72 - 532015	Metric/Imperial	Edge of Frame (EF)	Visible Glass Size (VG)	Glass Size (GS)	Clear Opening	NTS
4700 Sash 84-Z - 532136		ES - 121mm/4.764"	ES/2 - 261mm/10.276"	ES/2 - 229mm/9.016"	ES - 147mm/5.787"	
4700 Mullion 98 - 532055						

4702, 98mm Mullion, 57mm Sash

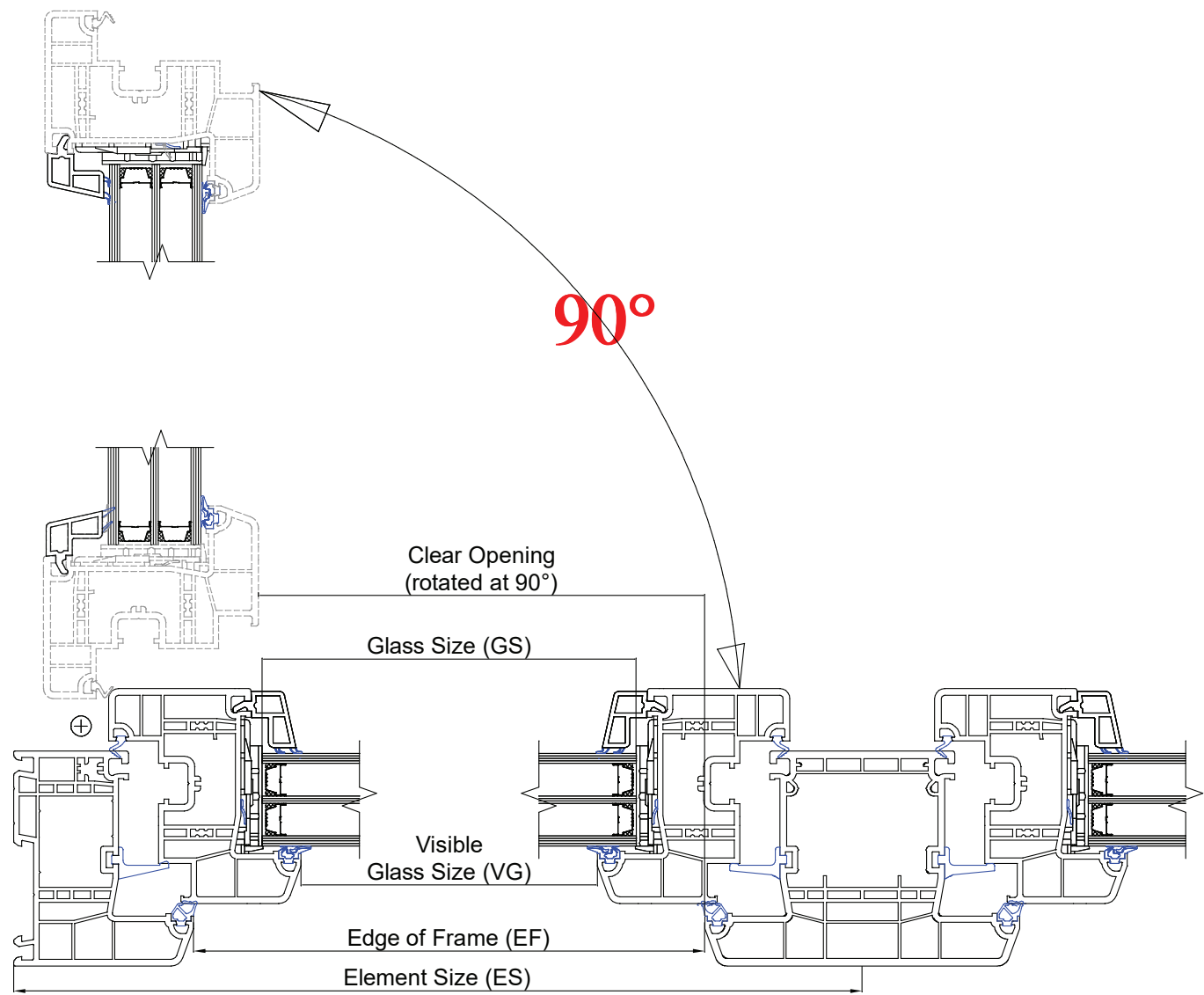
Use 4701L drawing for vertical dimensions.



Components	Units	Dimension				Scale
4700 Frame 72 - 532015	Metric/Imperial	Edge of Frame (EF)	Visible Glass Size (VG)	Glass Size (GS)	Clear Opening	NTS
4700 Sash 57-Z - 532036		ES - 121mm/4.764"	ES/2 - 207mm/8.150"	ES/2 - 175mm/6.89"	ES - 147mm/5.787"	
4700 Mullion 98 - 532055						

4702, 126mm Mullion, 57mm Sash

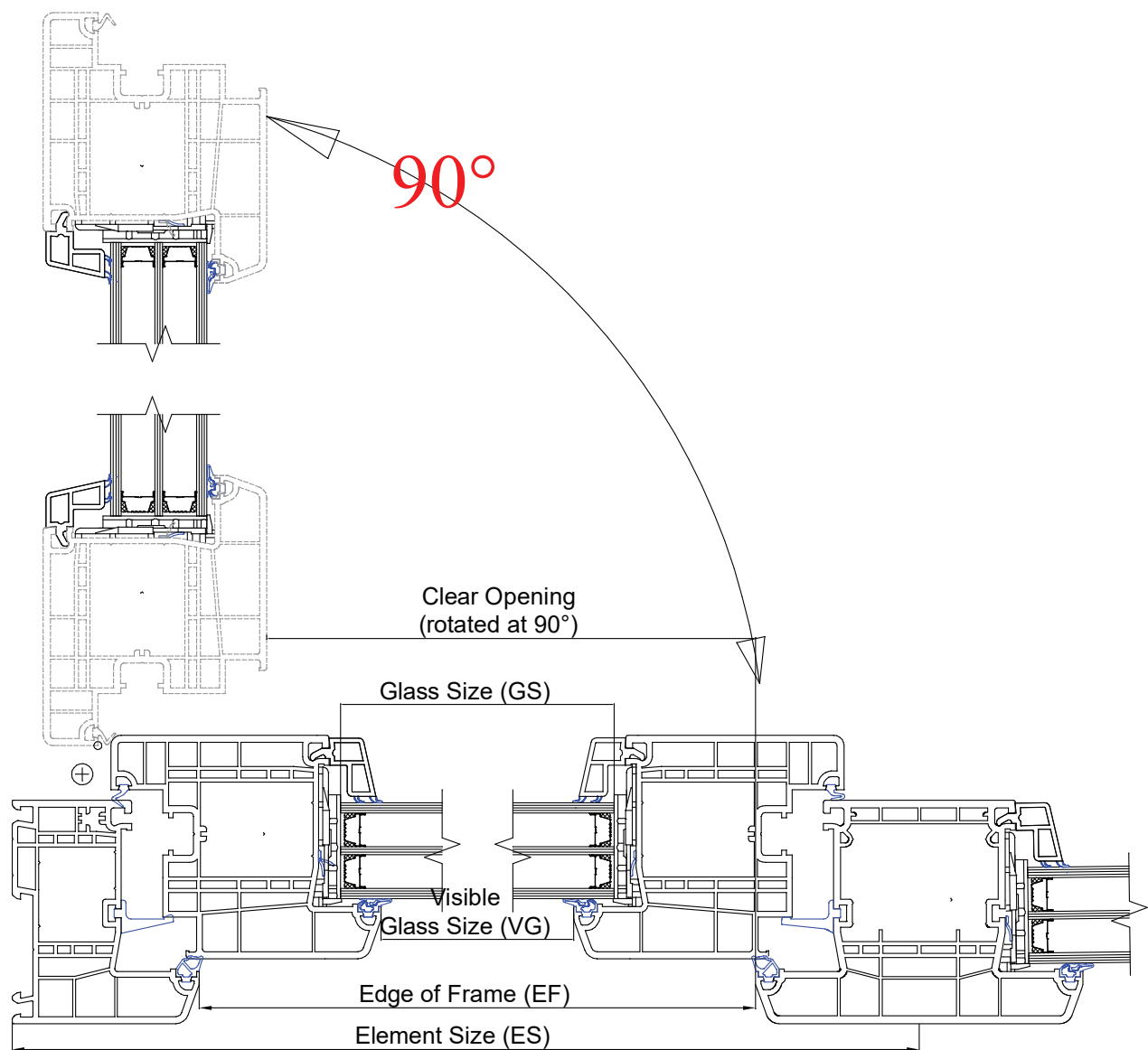
Use 4701L, 57mm Sash drawing for vertical dimensions.



Components	Units	Dimension				Scale
4700 Frame 72 - 532015	Metric/Imperial	Edge of Frame (EF)	Visible Glass Size (VG)	Glass Size (GS)	Clear Opening	NTS
4700 Sash 57-Z - 532136		ES - 135mm/5.315"	ES - 221mm/8.707"	ES - 189mm/7.441"	ES - 161mm/6.339"	
4700 Mullion 126 - 532345						

4702, 126mm Mullion, 84mm Sash

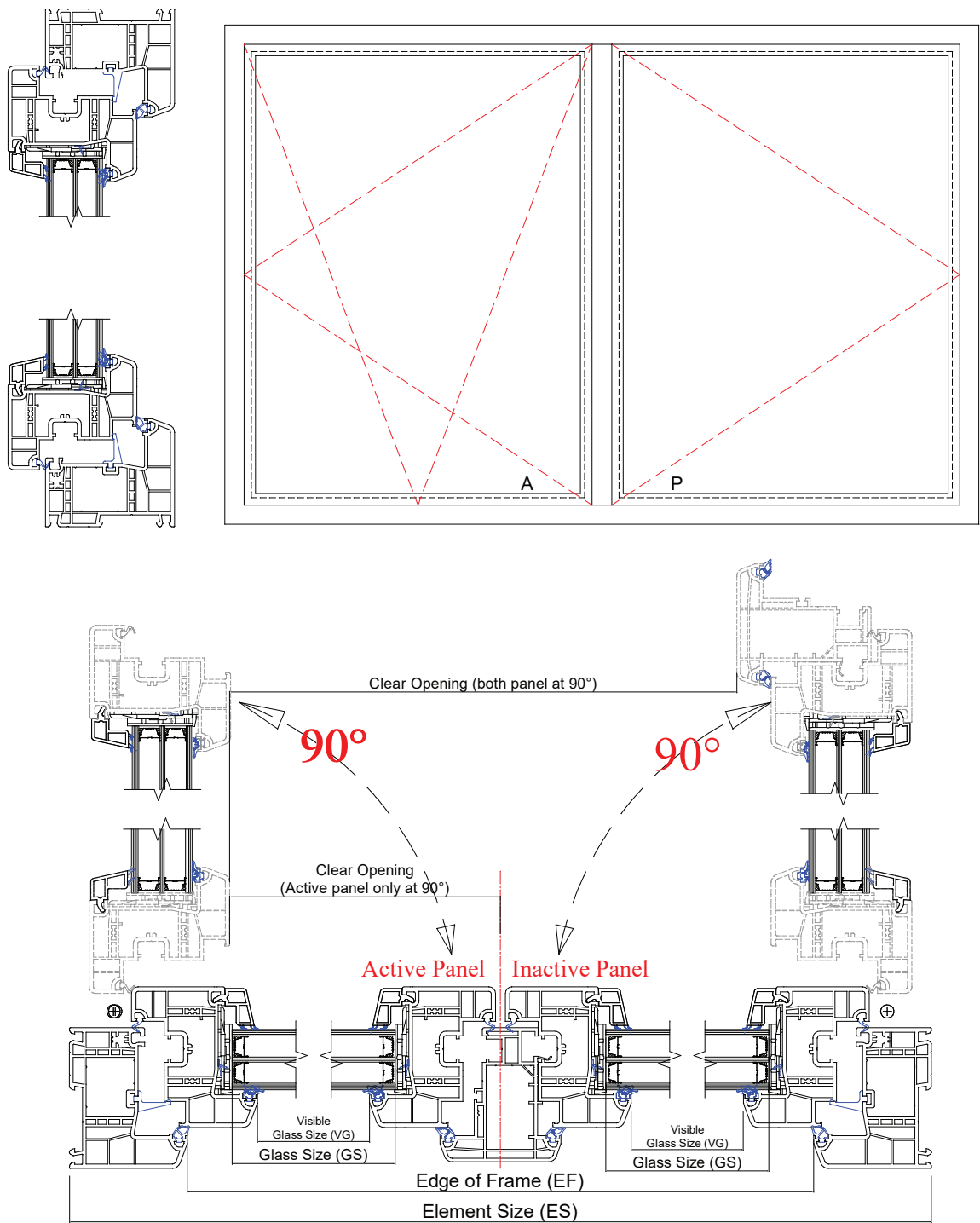
Use 4701L, 84mm Sash drawing for vertical dimensions.



Components	Units	Dimension				Scale
4700 Frame 72 - 532015	Metric/Imperial	Edge of Frame (EF)	Visible Glass Size (VG)	Glass Size (GS)	Clear Opening	NTS
4700 Sash 84-Z - 532136		ES - 135mm/5.315"	ES - 751mm/10.827"	ES - 243mm/9.567"	ES - 161mm/6.339"	
4700 Mullion 126 - 532345						

French Window or Balcony Door, 57mm Sash

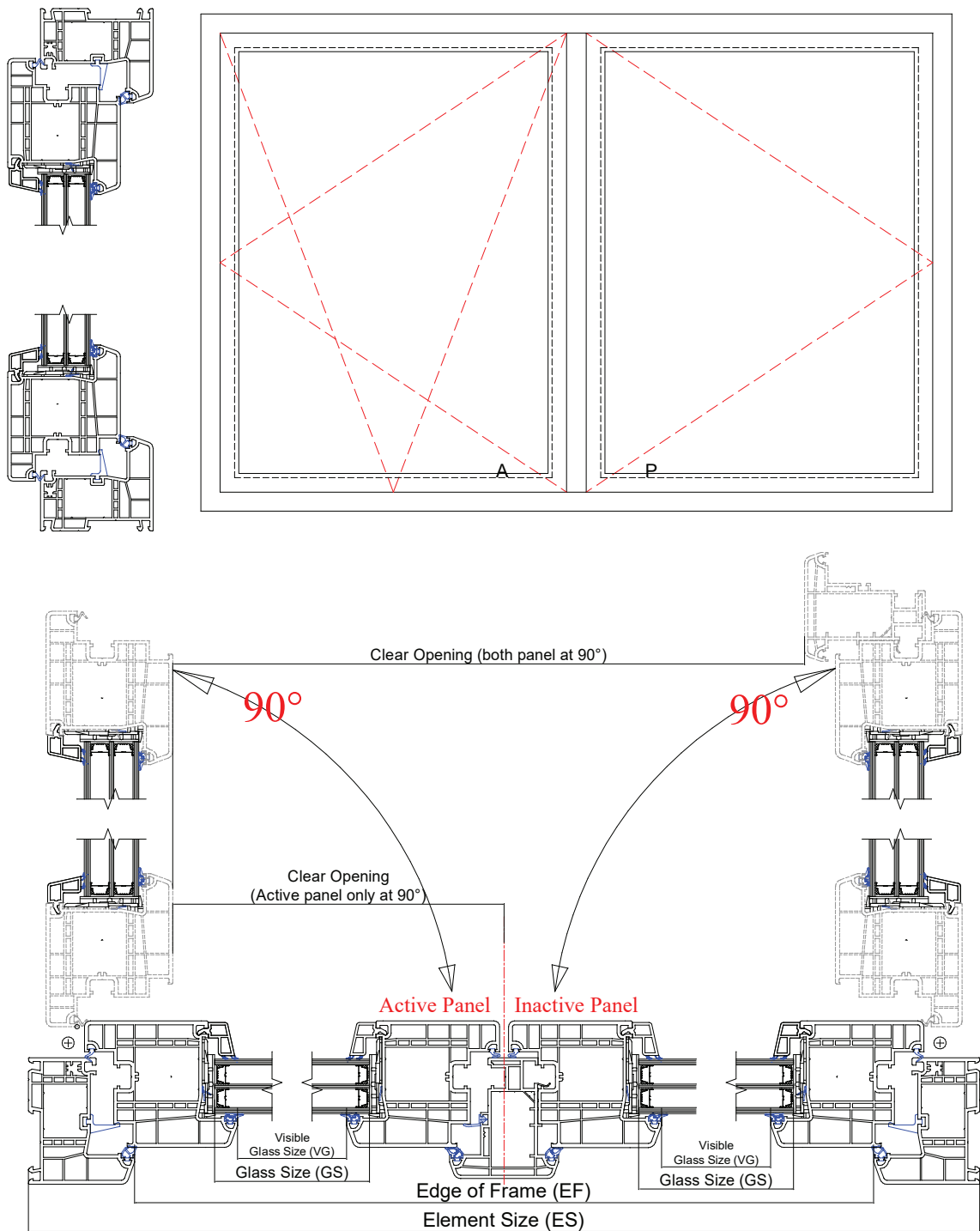
Dimensions are valid for 4702L, 4702R, 4702 BDL and 4702BDR with 57mm sash. Use single window or door drawings with the appropriate sill for vertical dimensions.



Components	Units	Dimension					Scale
4700 Frame 72 - 532015	Metric/ Imperial	Edge of Frame (EF)	Visible Glass Size (VG)	Glass Size (GS)	Clear Opening Active Panel (CO a)	Clear Opening Both Panel (CO bp)	NTS
4700 Sash 57-Z - 532136		ES -	ES -	ES -	ES - 377mm/8.875"	ES - 217mm/8.5"	
4700 Astragal 74 - 532080		144mm/5.67"	195mm/7.625"	163mm/8.875"			

French Window, Balcony Door, or Terraced Door, 84mm Sash

Dimensions are valid for 4702L, 4702R, 4702 BDL, 4702BDR, 4702TDL, 4702TDR with 57mm sash. Use single window or door drawings with the appropriate sill for vertical dimensions.

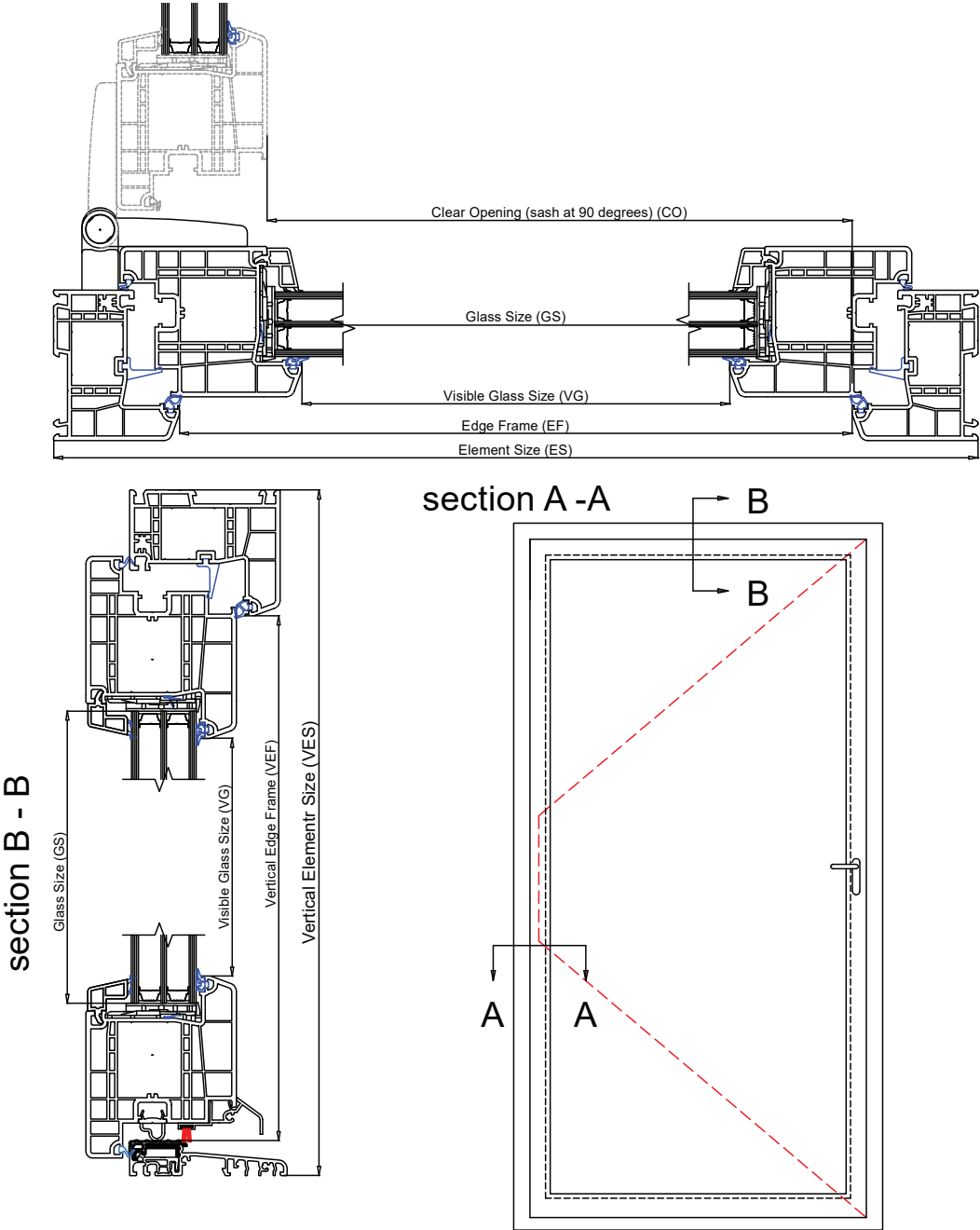


Components	Units	Dimension					Scale
4700 Frame 72 - 532015	Metric/ Imperial	Edge of Frame (EF)	Visible Glass Size (VG)	Glass Size (GS)	Clear Opening Active Panel (CO a)	Clear Opening Both Panel (CO bp)	NTS
4700 Sash 57-Z - 532136		ES -	ES -	ES -	ES - 135mm/5.315"	ES - 217mm/8.543"	
4700 Astragal 74 - 532080		144mm/5.67"	249mm/9.803"	217mm/8.543"			

Entry Doors

4701EDL

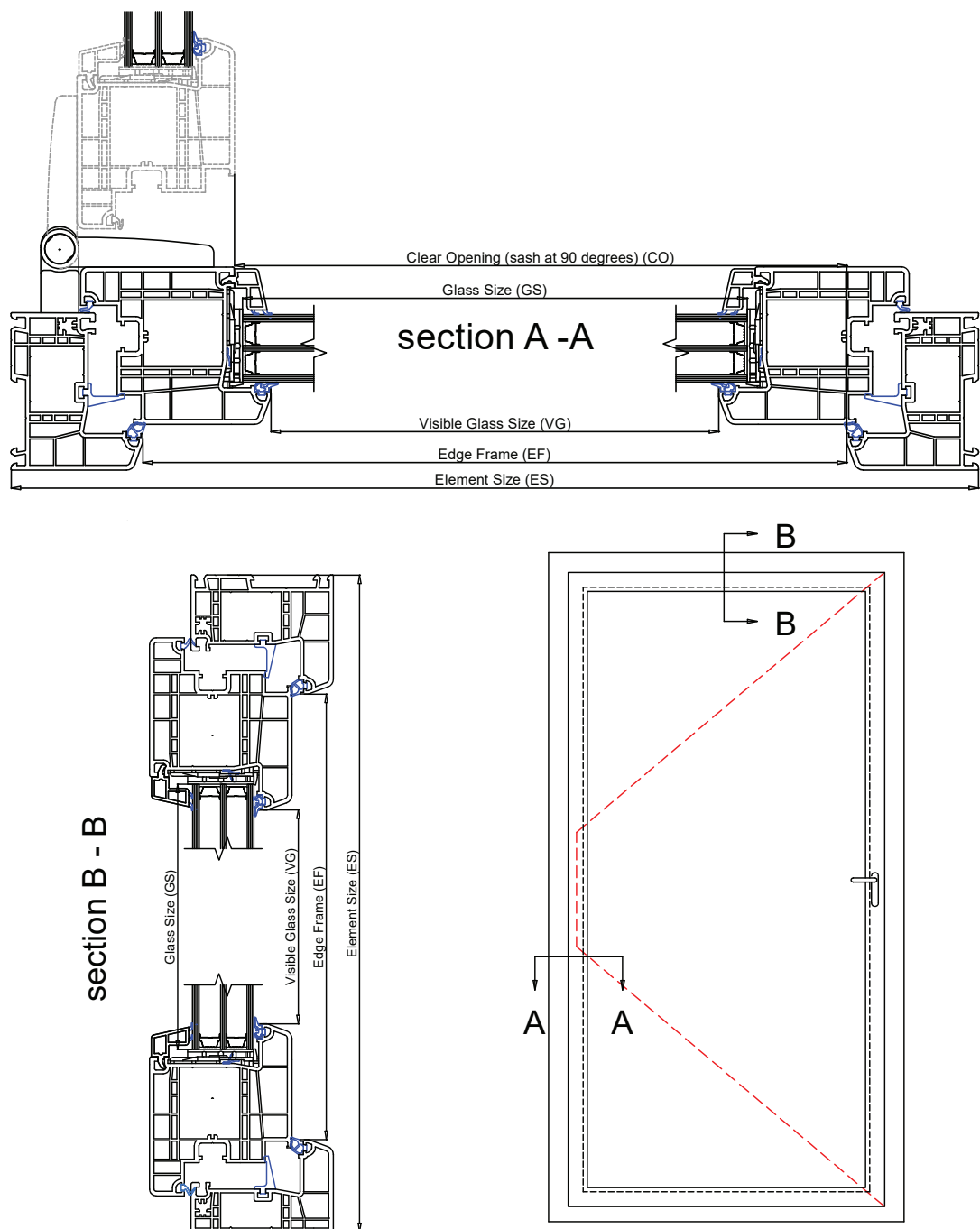
Dimension are valid for 4701EDL and 4701EDR with 20mm aluminum sill and 84mm sash.



Components	Units	Horizontal Dimension				Scale
4700 Frame 20mm Alum Sash	Metric/ Imperial	Edge of Frame (EF)	Visible Glass Size (VG)	Glass Size (GS)	Clear Opening (CO)	NTS
4700 Sash 84-Z - 532136		ES - 144mm/5.67"	ES - 284mm/11.125"	ES - 252mm/9.875"	ES - 252mm/9.875"	
Door Treshold Seal - 353383						
		Vertical Dimension				
		ES - 92mm/3.622"	ES - 256mm/10.07"	ES - 224mm/8.82"		

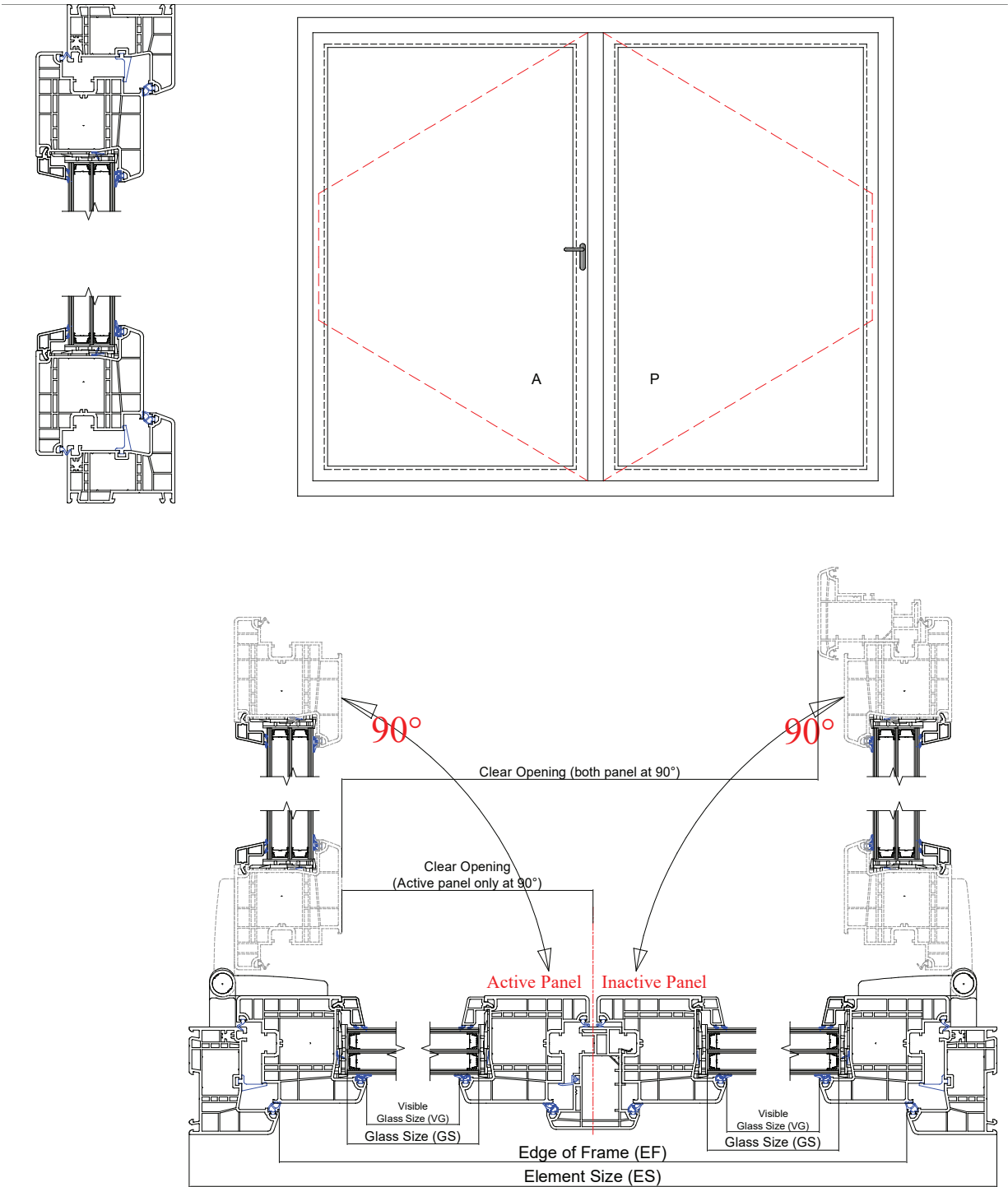
4701EDLHP

Dimensions are valid for 4701EDLHP and 4701EDRHP with 56mm sill and 84mm sash.



Components	Units	Horizontal Dimension				Scale
4700 Frame 56mm Low Sill	Metric/ Imperial	Edge of Frame (EF)	Visible Glass Size (VG)	Glass Size (GS)	Clear Opening (CO)	NTS
4700 Sash 84-Z - 532136		ES - 144mm/5.67"	ES - 284mm/11.18"	ES - 252mm/9.92"	ES - 194mm/7.638"	
Glazing Bead 22.5x18mm - 560510						
		Vertical Dimension				
		ES - 128mm/5.04"	ES - 268mm/10.55"	ES - 236mm/9.29"		

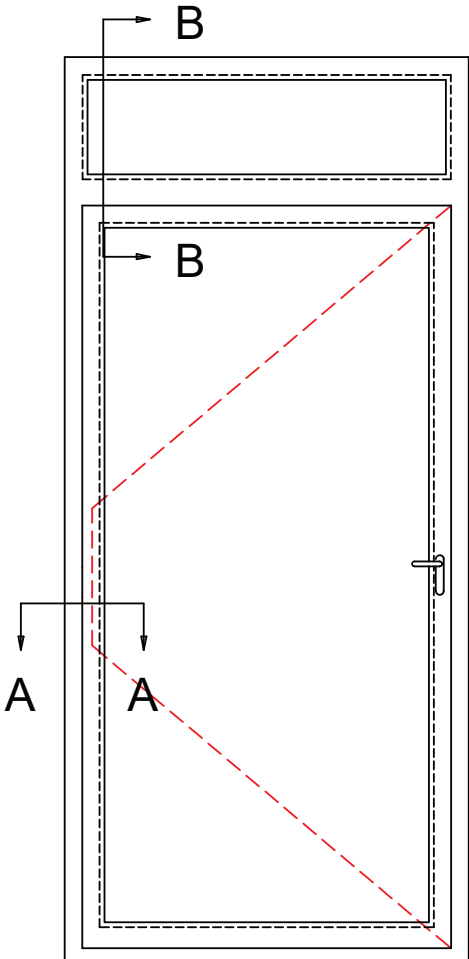
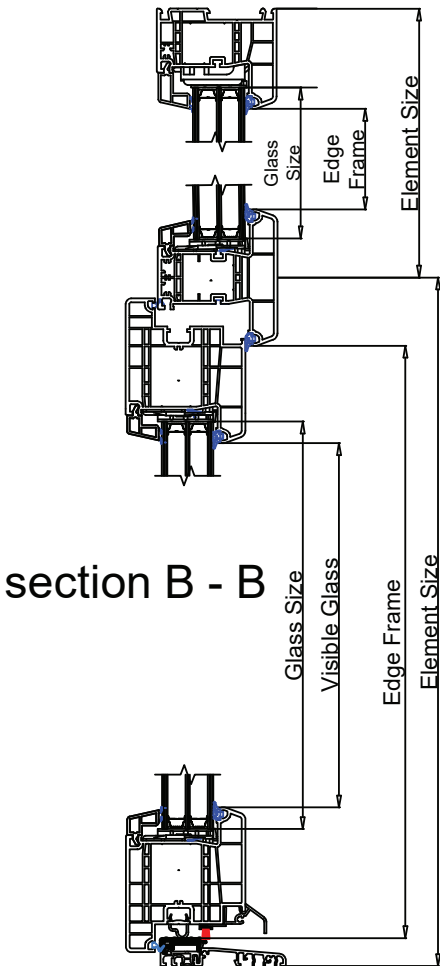
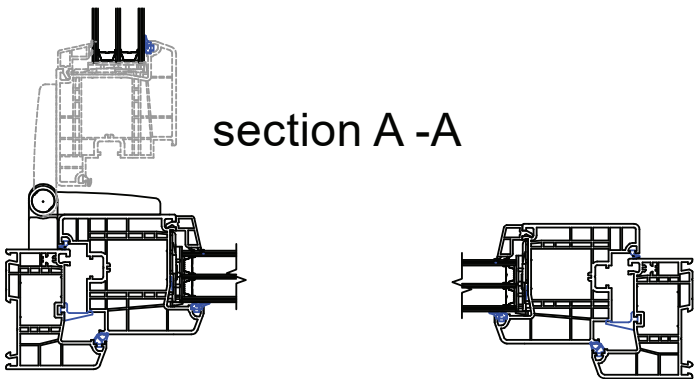
Dimensions are valid for 4702EDL and 4702EDR. Use appropriate single door drawing for vertical dimensions.



Components	Units	Dimension					Scale
4700 Frame 72 - 532015	Metric/ Imperial	Edge of Frame (EF)	Visible Glass Size (VG)	Glass Size (GS)	Clear Opening Active Panel (CO a)	Clear Opening Both Panel (CO bp)	NTS
4700 Sash 84-Z - 532136		ES -	ES -	ES -	ES -	ES -	
4700 Astragal 74 - 532080		144mm/5.67"	249mm/9.803"	217mm/8.543"	ES - 135mm/5.315"	ES - 217mm/8.543"	

4701EDLT (Entry door with transom)

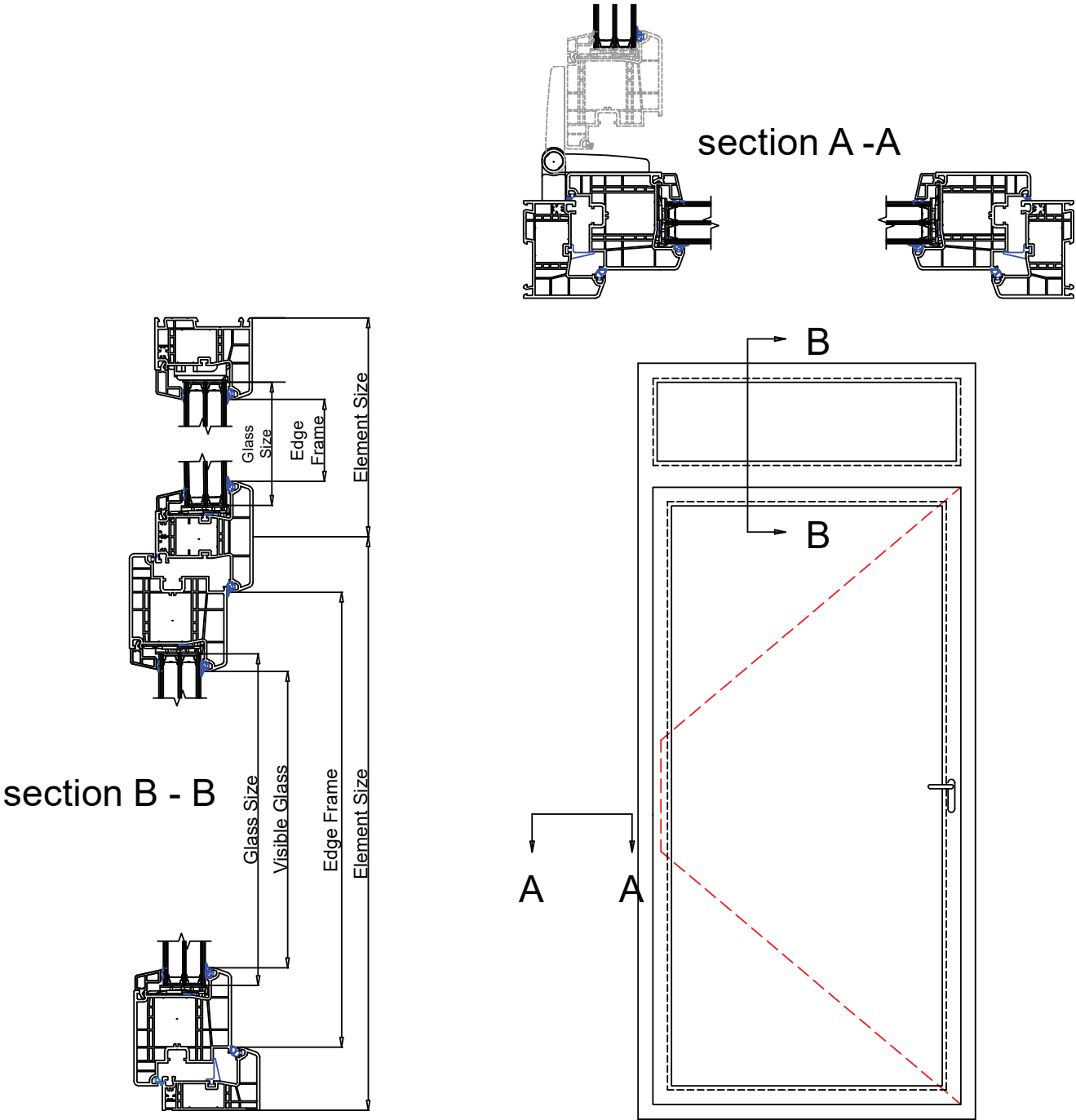
Dimensions are valid for entry doors with 20mm aluminum sill, 84mm sash and transom.



Components	Units	Dimension Below Mullion			Scale
20mm Alum Sill	Metric/ Imperial	Edge of Frame (EF)	Visible Glass Size (VG)	Glass Size (GS)	NTS
4700 Sash 84-Z - 532136		ES - 69mm/2.72"	ES - 189mm/7.44"	ES - 157mm/6.18"	
4700 Mullion 98 - 532055					
		Dimension Above Mullion			
		ES - 121mm/4.75"		ES - 85mm/3.346"	

4701EDLHPT (Entry door with transom)

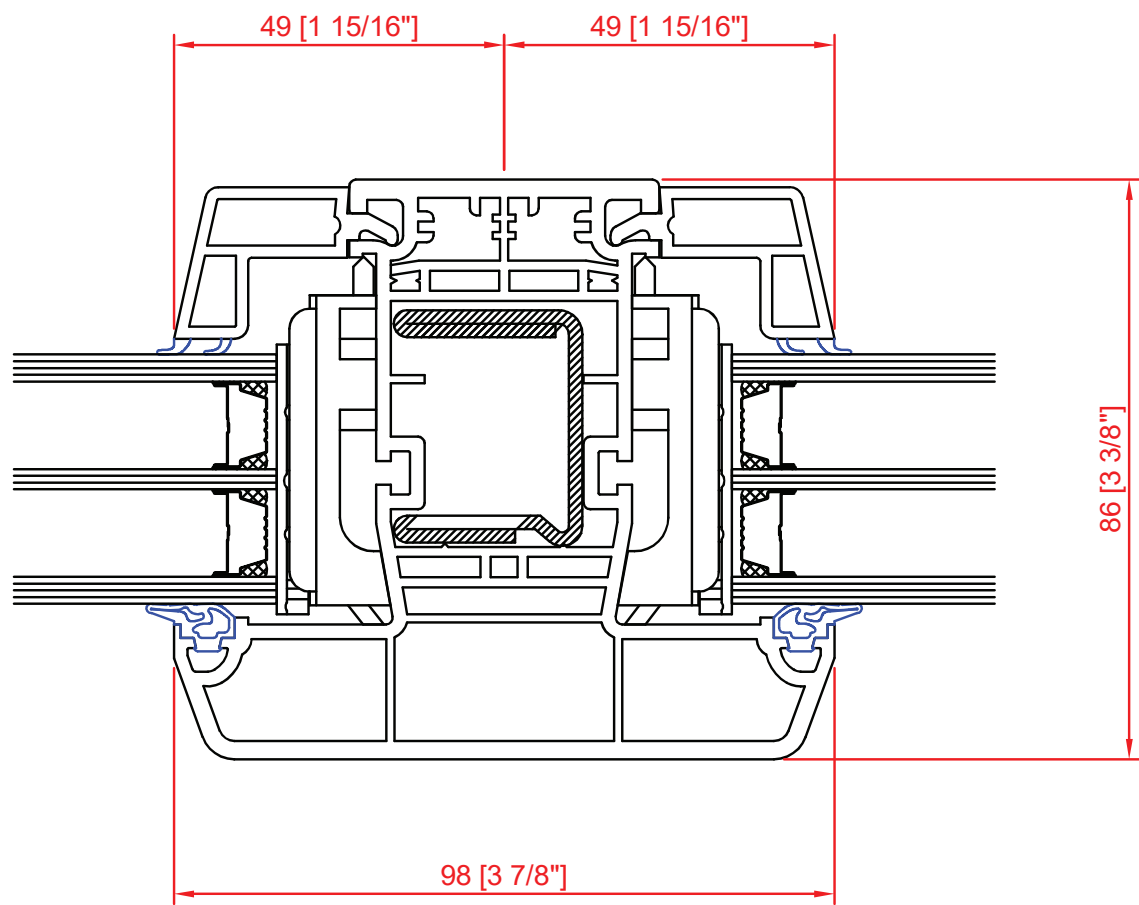
Dimensions are valid for entry doors with 56mm high performance sill, 84mm sash and transom.



Components	Units	Dimension Below Mullion			Scale
4700 Frame 56mm Low Sill	Metric/ Imperial	Edge of Frame (EF)	Visible Glass Size (VG)	Glass Size (GS)	NTS
4700 Sash 84-Z - 532136		ES - 105mm/4.13"	ES - 245mm/9.64"	ES - 213mm/8.39"	
4700 Mullion 98 - 532055		Dimension Above Mullion			
		ES - 121mm/4.75"		ES - 85mm/3.346"	

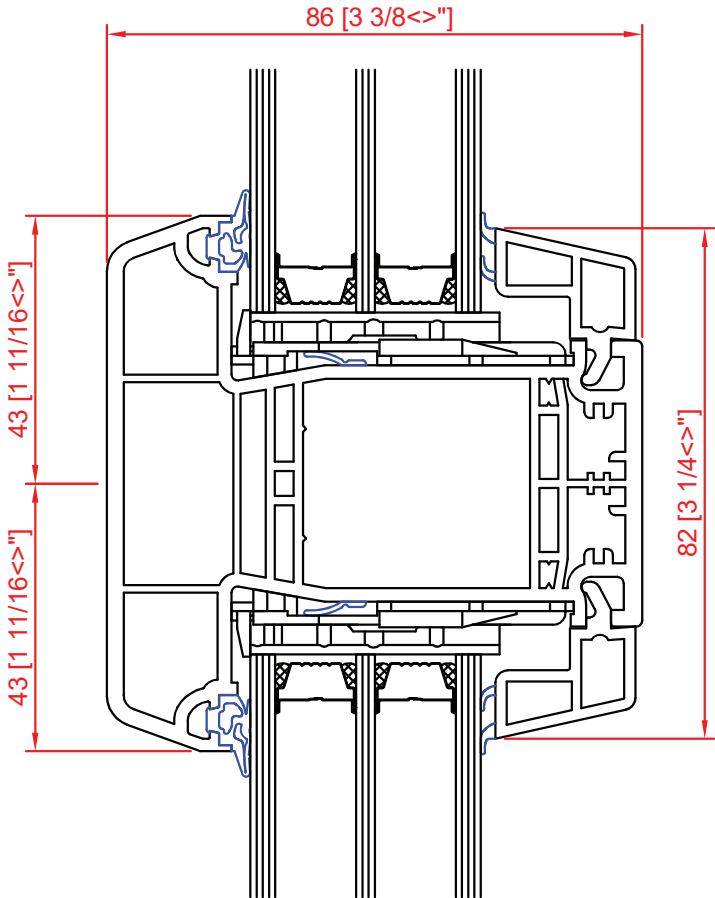
Section Details

Astragal with 57mm Sash



Components	Scale		Reference Code	Description
4700 Frame 72 - 532015	NTS	Sash Profile	1532036	Z57S Sash Inswing
4700 Astragal 74 - 532080		Astragal Profile	1532080	74mm Astragal
Glazing Bead 22.5x18mm - 560510				

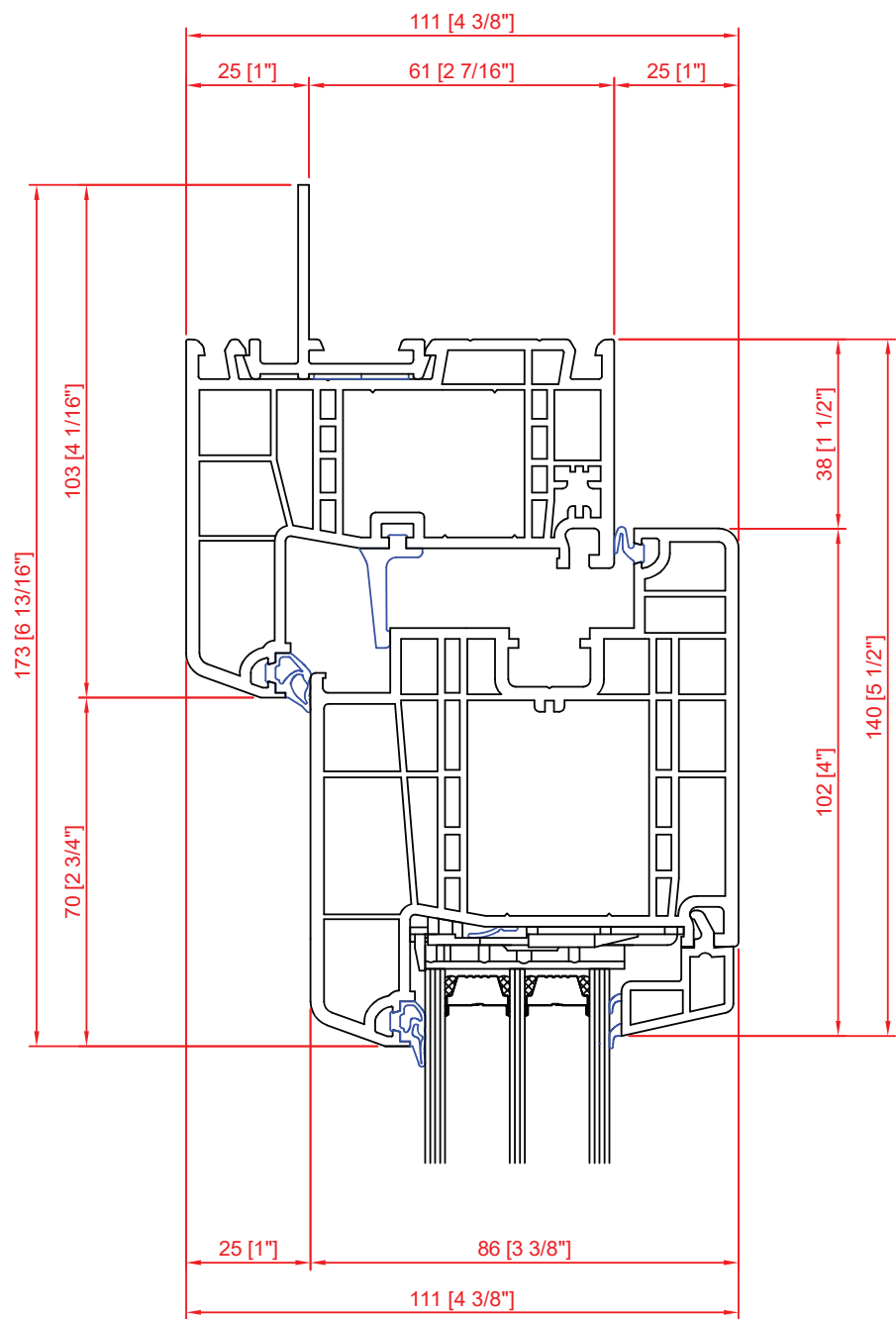
Astragal with 84mm Sash



Components	Scale		Reference Code	Description
4700 Sash 84Z - 532136	NTS	Sash Profile	1532036	4700 Sash 84Z
4700 Astragal 74 - 532080		Astragal Profile	1532080	74mm Astragal
Glazing Bead 22.5x18mm - 560510				

Head, Tilt & Turn with 84mm Sash

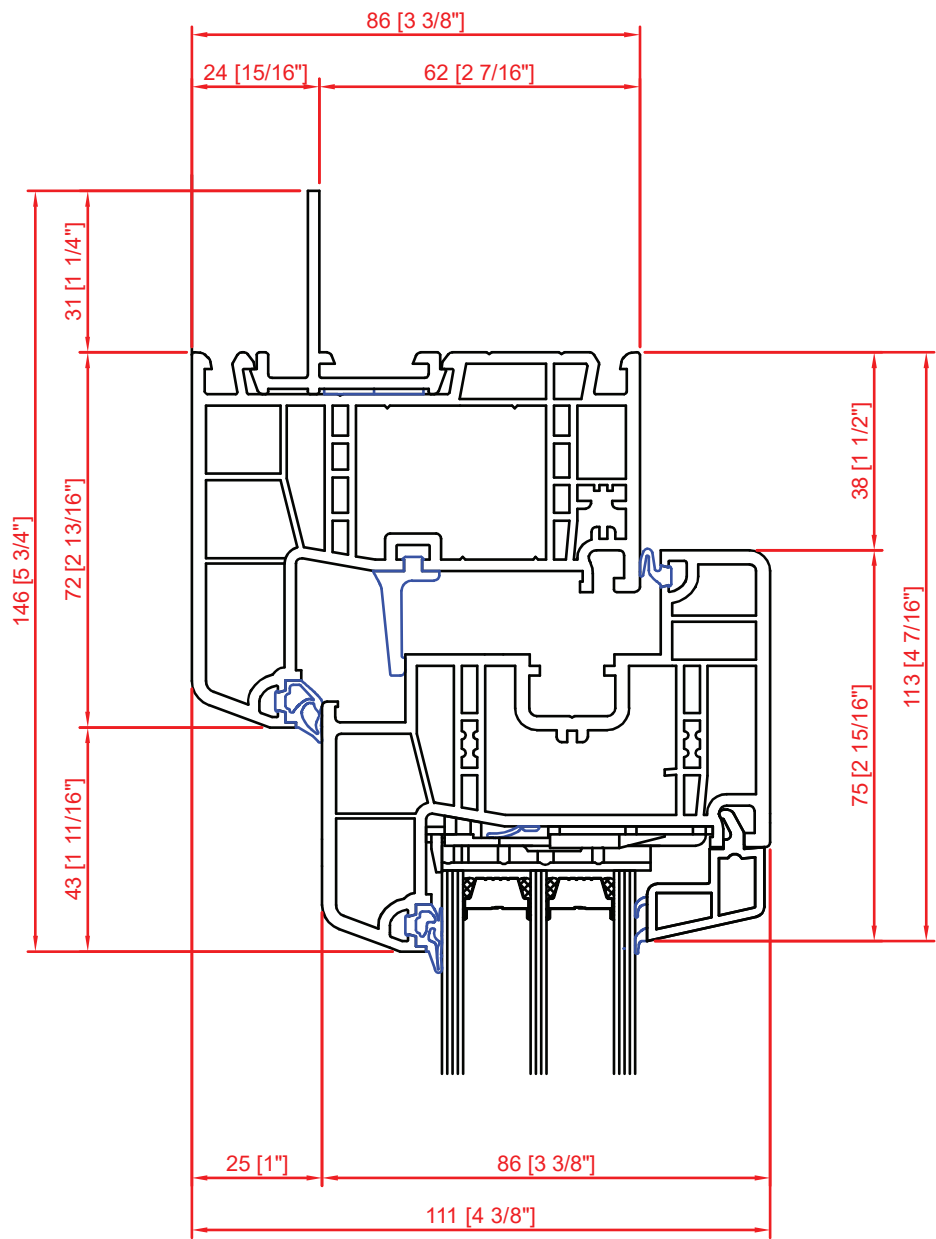
Note for windows the head, jambs and sill are all identical.



Components	Scale
4700 Frame 72 - 532015	NTS
4700 Sash 84Z - 532136	
Glazing Bead 22.5x18mm - 560510	

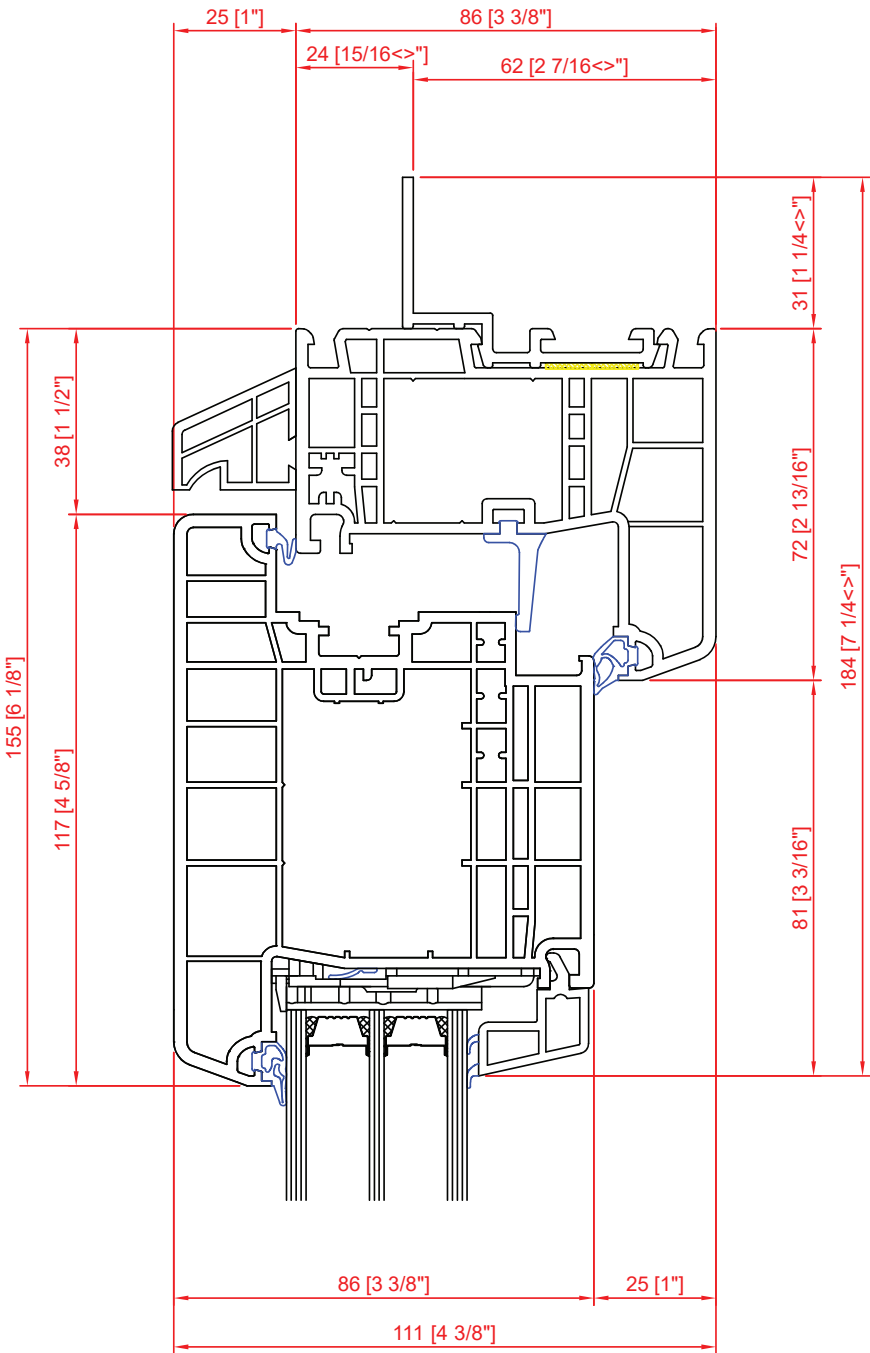
Head, Tilt & Turn with 57mm Sash

Note for windows the head, jambs and sill are all identical.



Components	Scale		Reference Code	Description
4700 Sash 84Z - 532136	NTS	Sash Profile	1532036	4700 Sash 84Z
4700 Frame 72 - 532015		Frame Profile	1532015	4700 Frame 72
Glazing Bead 22.5x18mm - 560510				

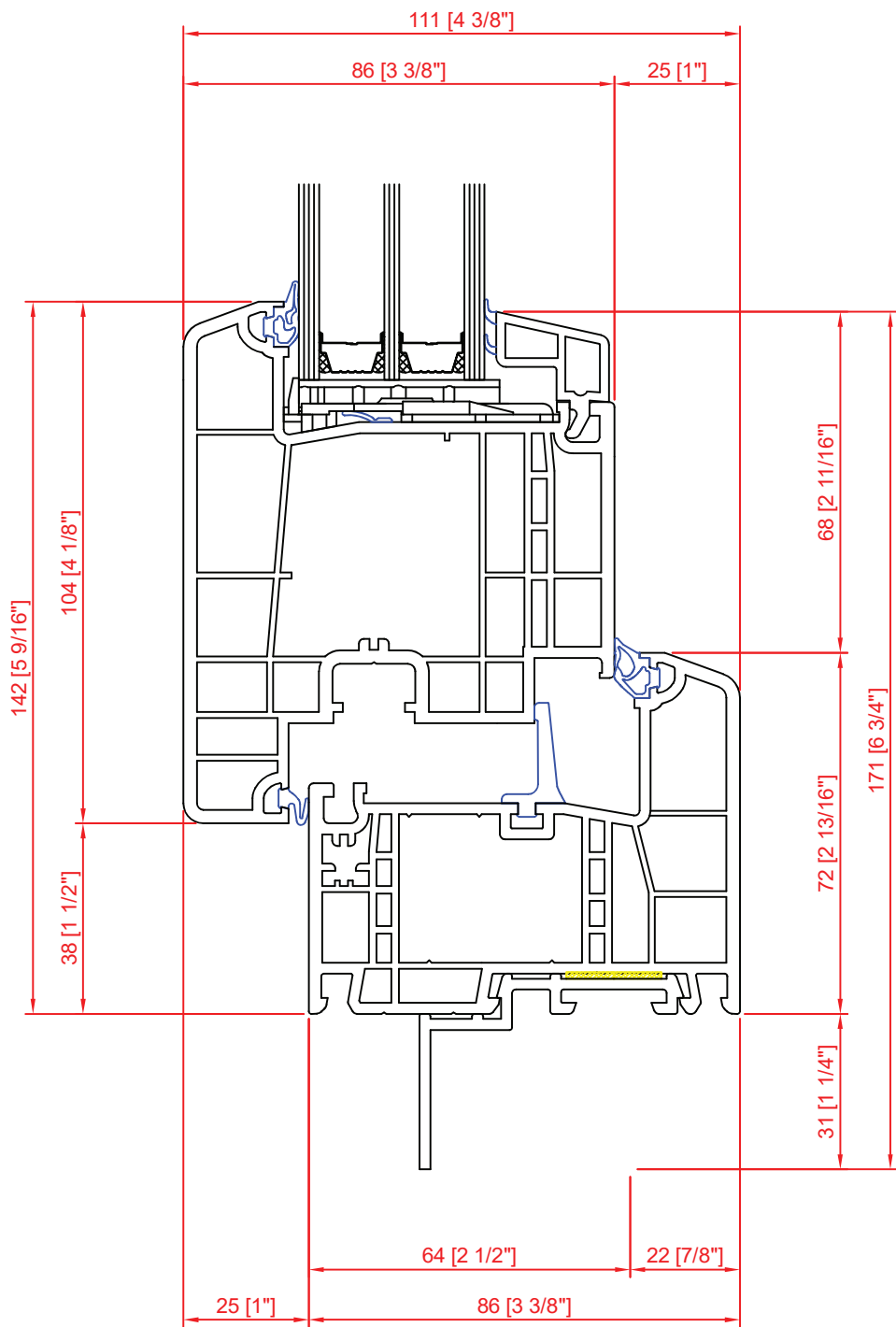
Head, Outswing Door



Components	Scale
4700 Frame 72 - 532015	NTS
4700 Sash 118-T - 550170	
Glazing Bead 22.5x18mm - 560510	

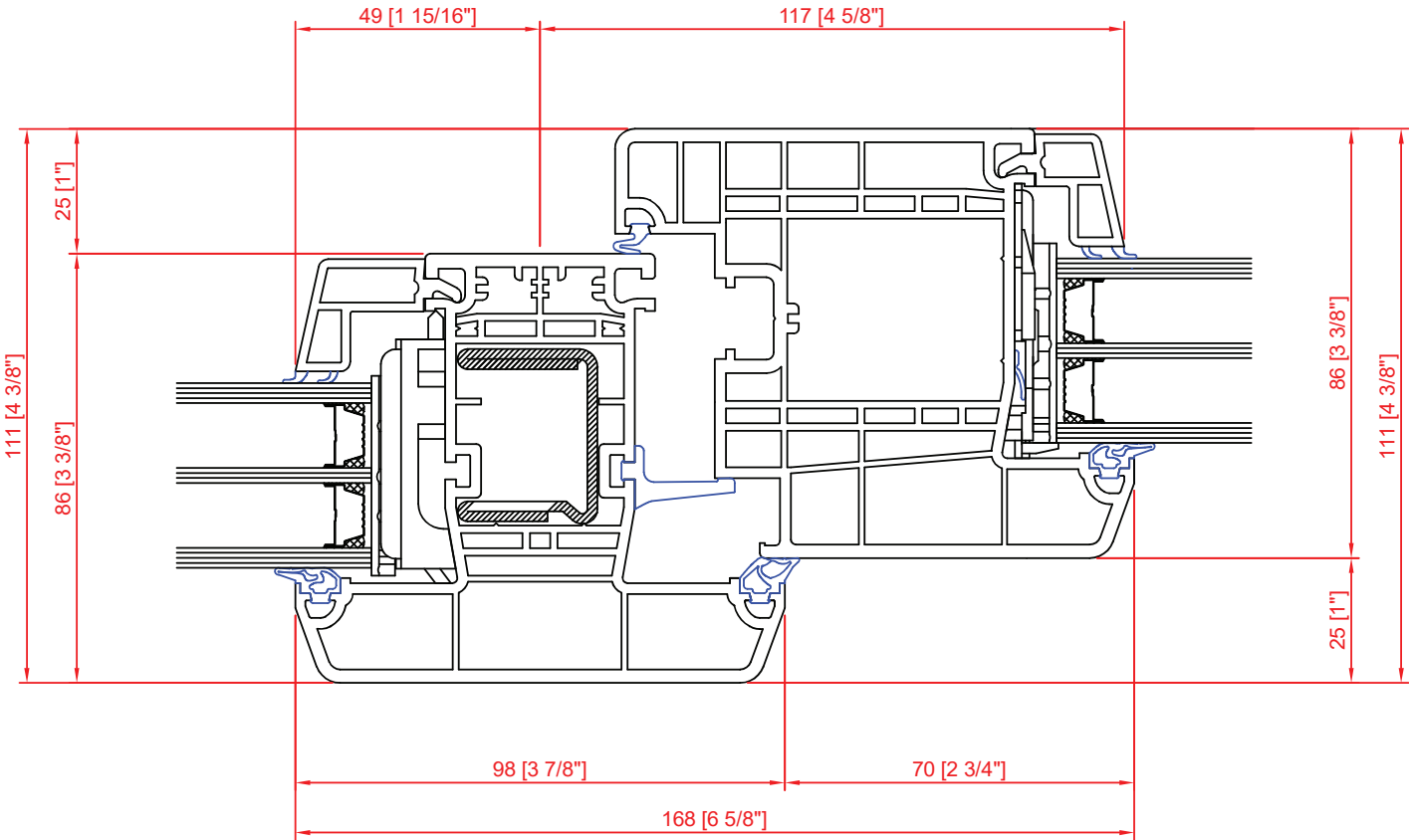
Jamb, Fized Glazing

For single picture windows, head, sill and jambs are identical.



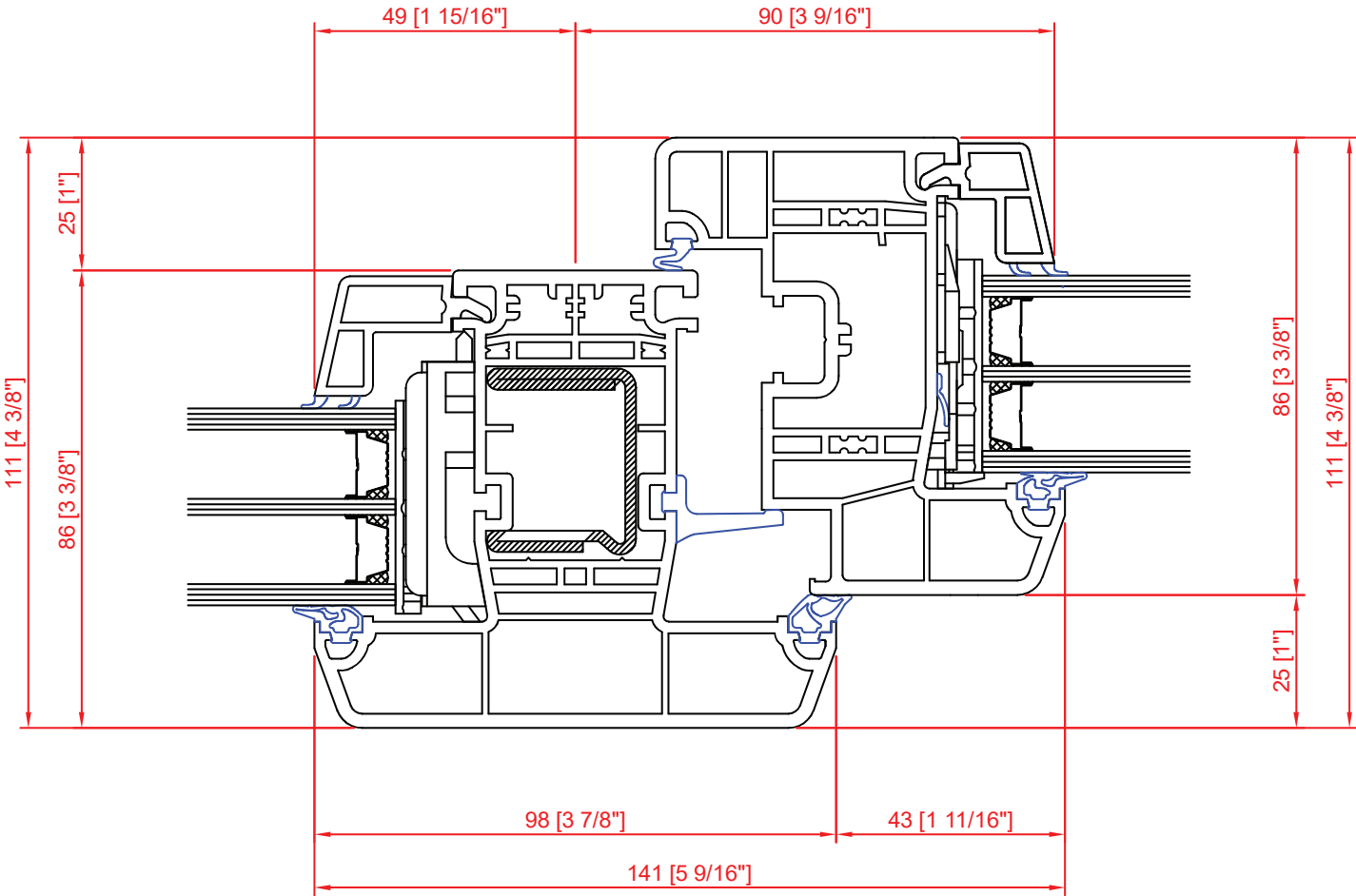
Components	Scale
4700 Frame 72 - 532015	NTS
4700 Nailing Fin	
Glazing Bead 22.5x18mm - 560510	

Mullion, Picture Window and 84mm Sash

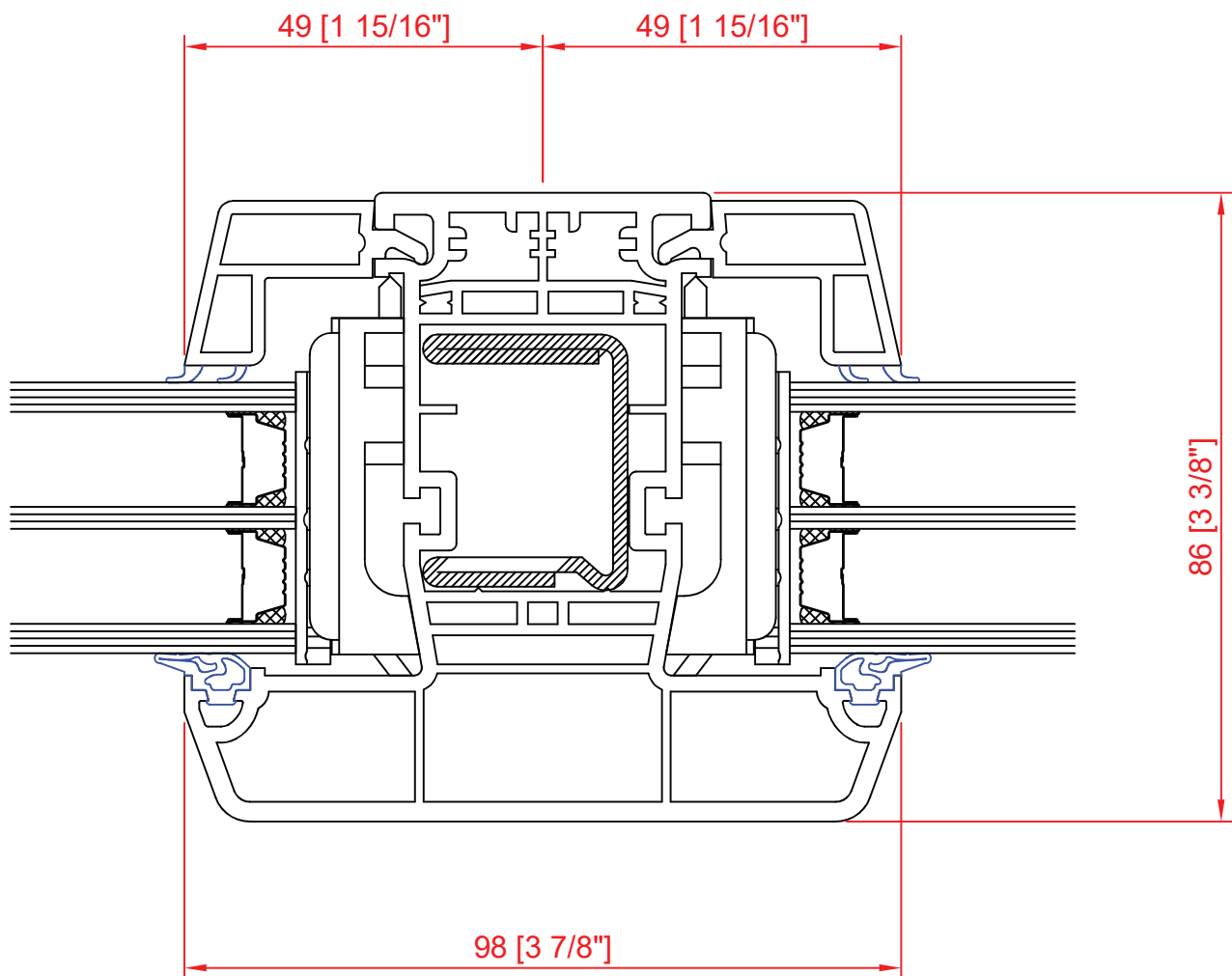


Components	Scale
4700 Mullion 98 - 532055	NTS
Reinforcement C 35x28x2mm - 244536	
4700 Sash 84Z - 532136	

Mullion, Picture Window and 57mm Sash



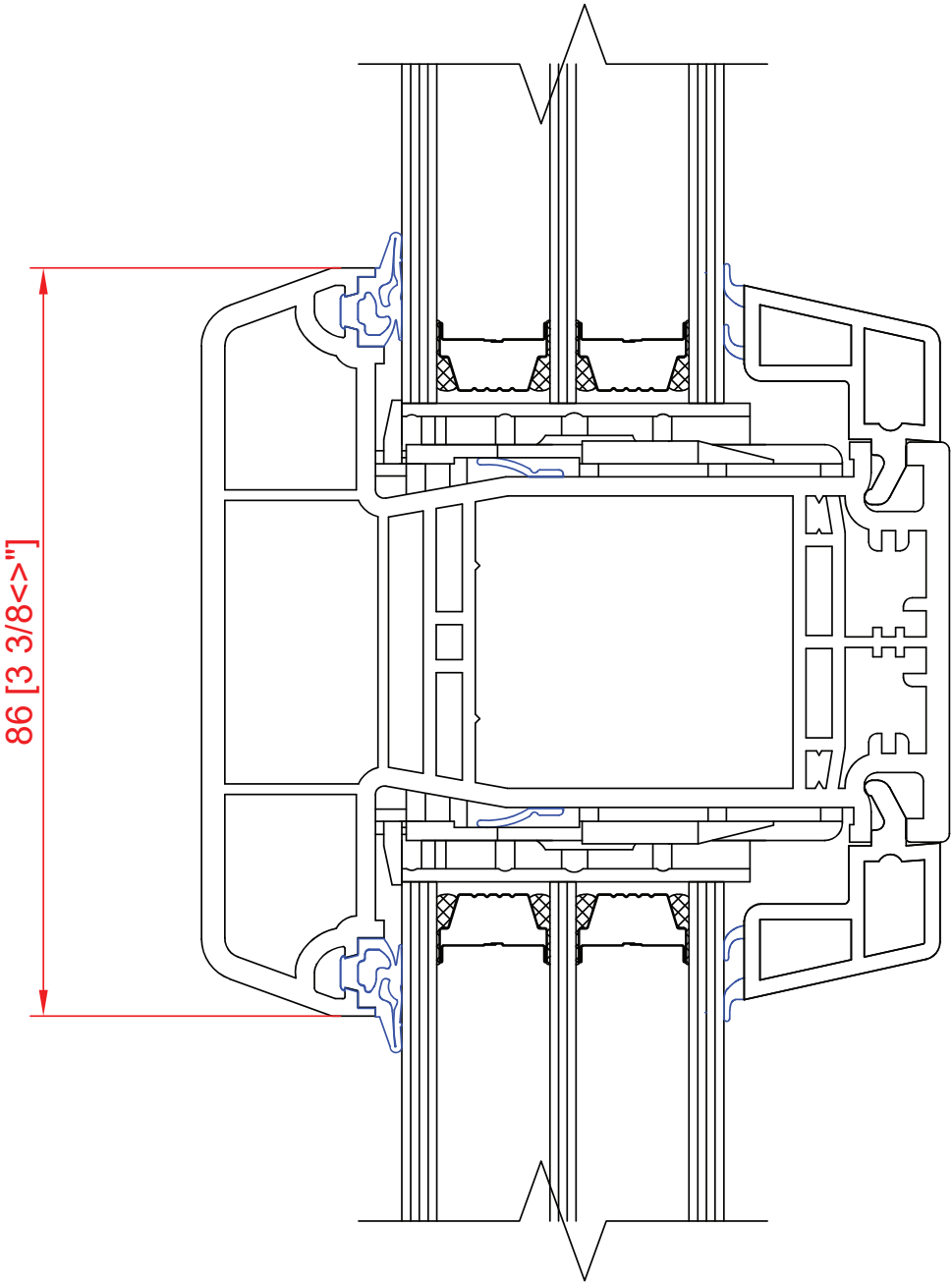
Components	Scale
4700 Mullion 98 - 532055	NTS
Reinforcement C 35x28x2mm - 244536	
4700 Sash 57Z - 532036	



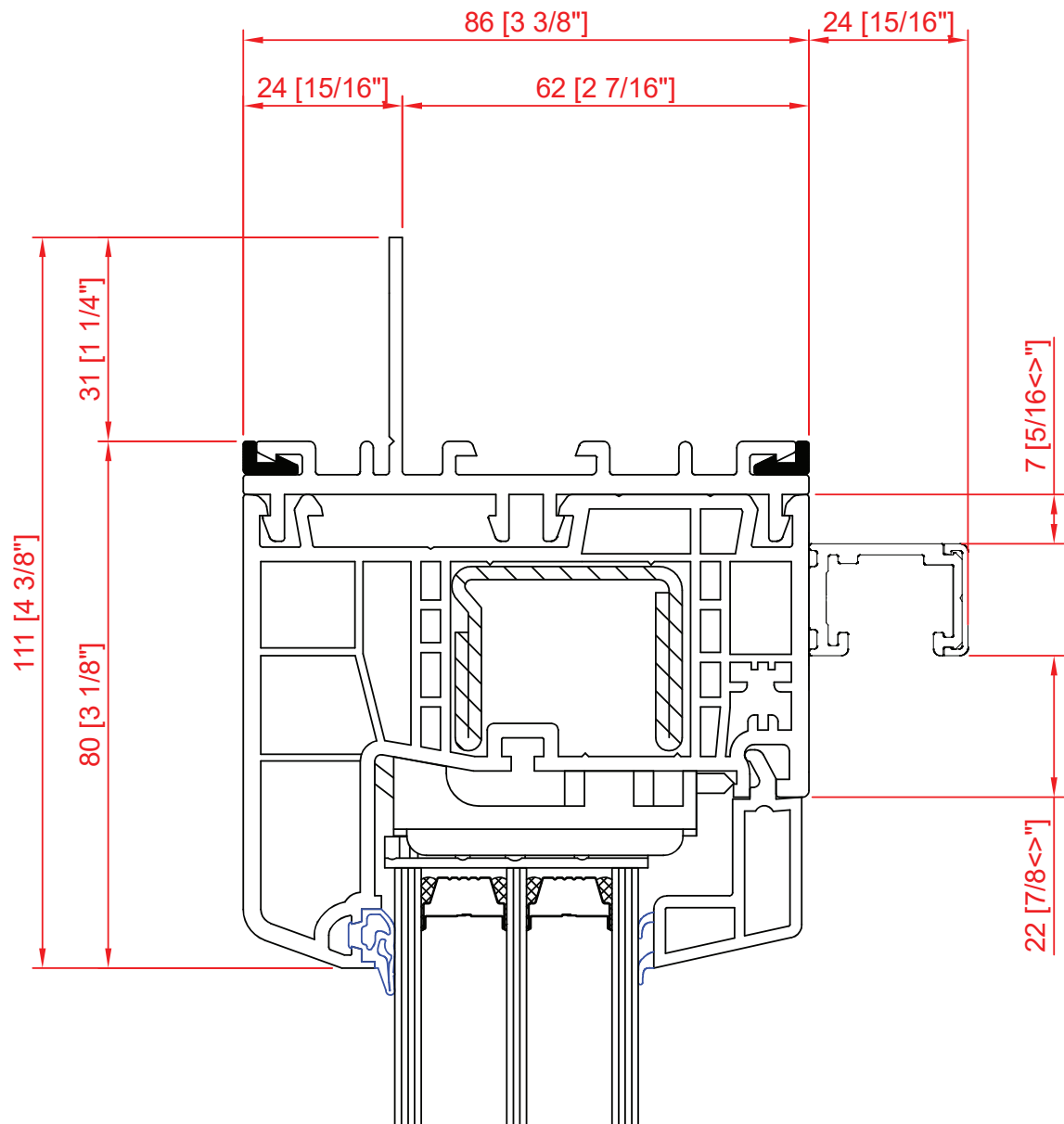
Components	Scale
4700 Mullion 98 - 532055	NTS
Reinforcement C 35x28x2mm - 244536	
Glazing Bead 22.5x18mm - 560510	

Sash Bar

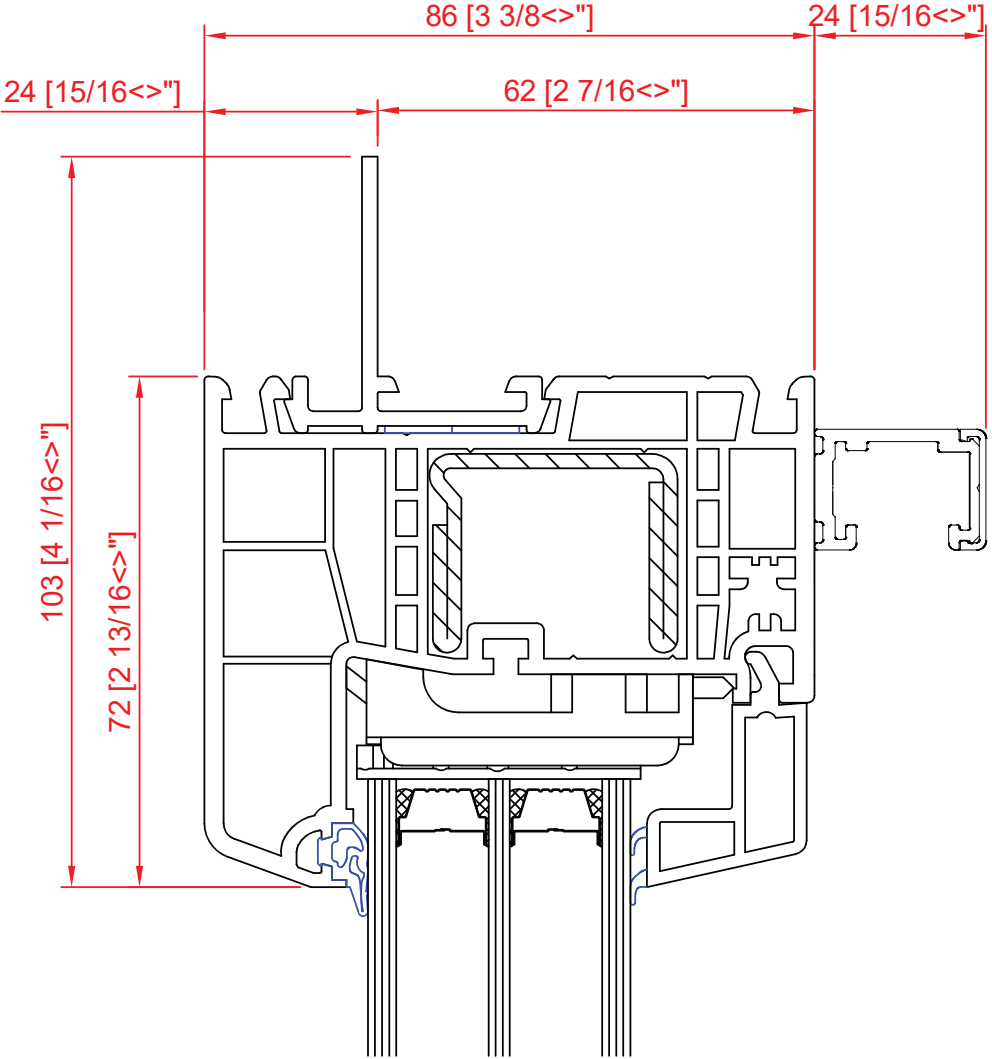
Sash bar is used to divide window and door sashes in multiple lites.



Components	Scale
4700 Sashbar 86mm - 532575	NTS

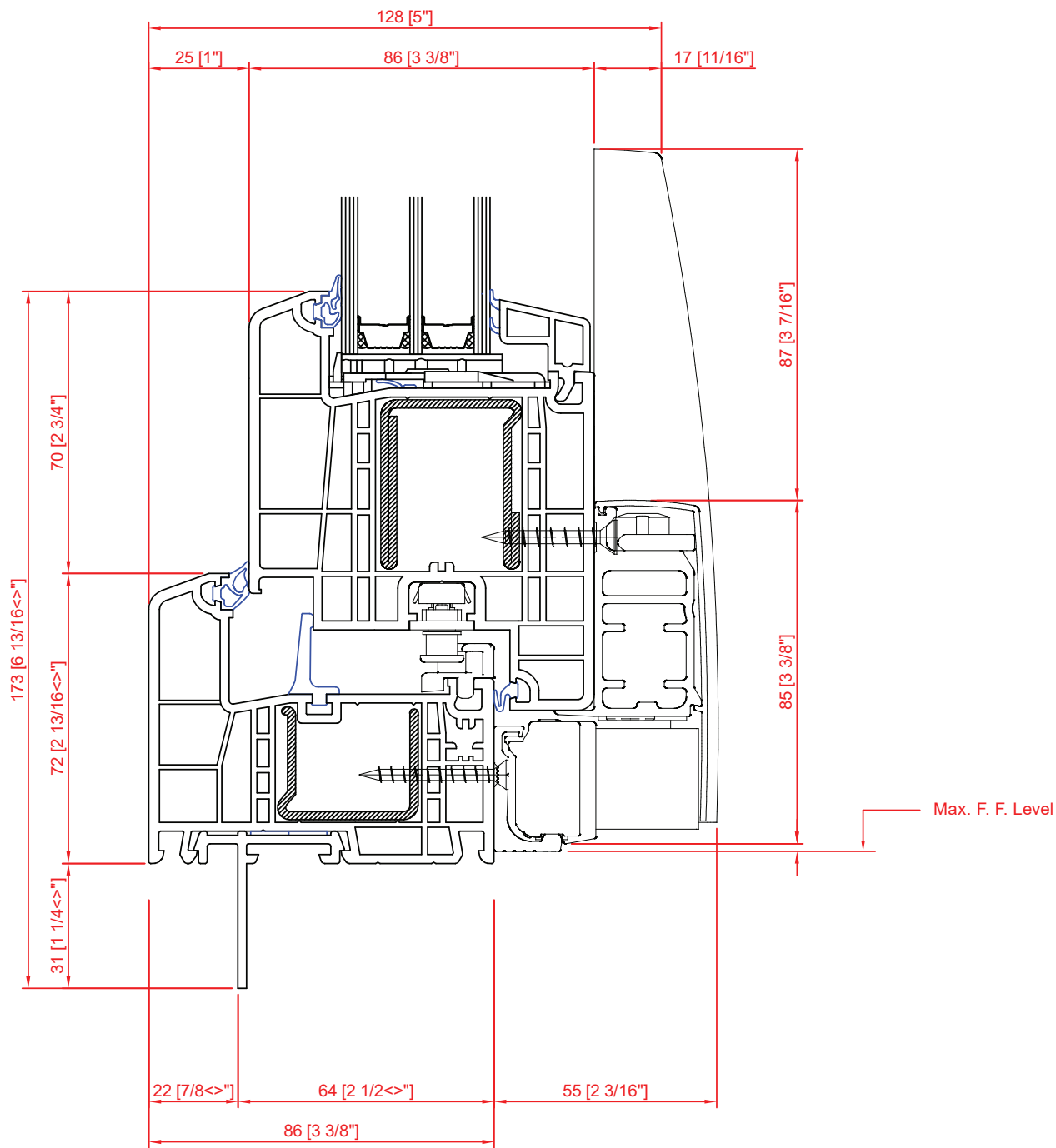


Components	Scale
4700 Frame 72 - 532015	NTS
4700 Sash 84Z - 532136	
Glazing Bead 22.5x18mm - 560510	

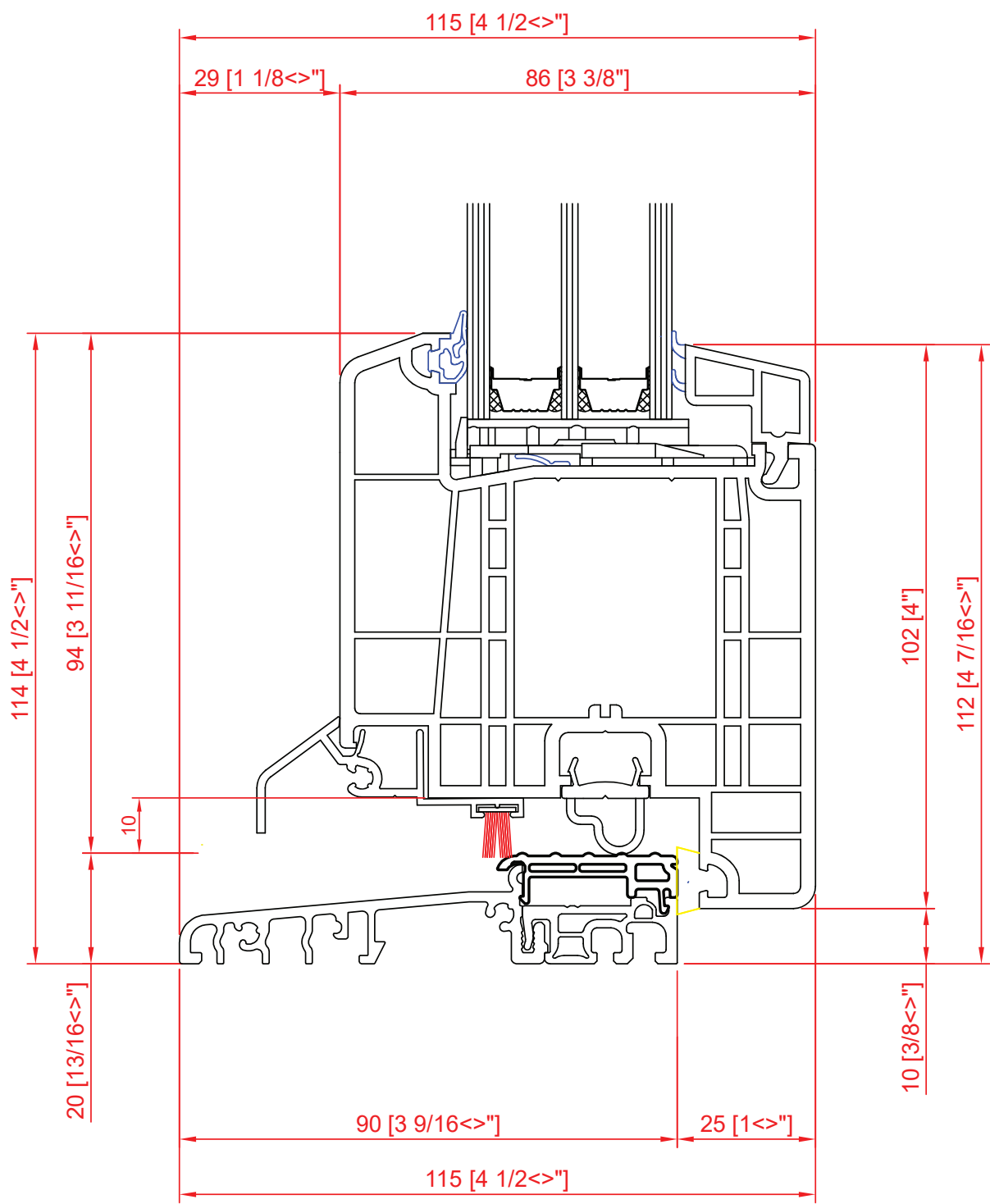


Components	Scale
4700 Frame 72 - 532015	NTS
4700 Sash 84Z - 532136	
Glazing Bead 22.5x18mm - 560510	

Sill, 56mm High Performance, 84mm Sash

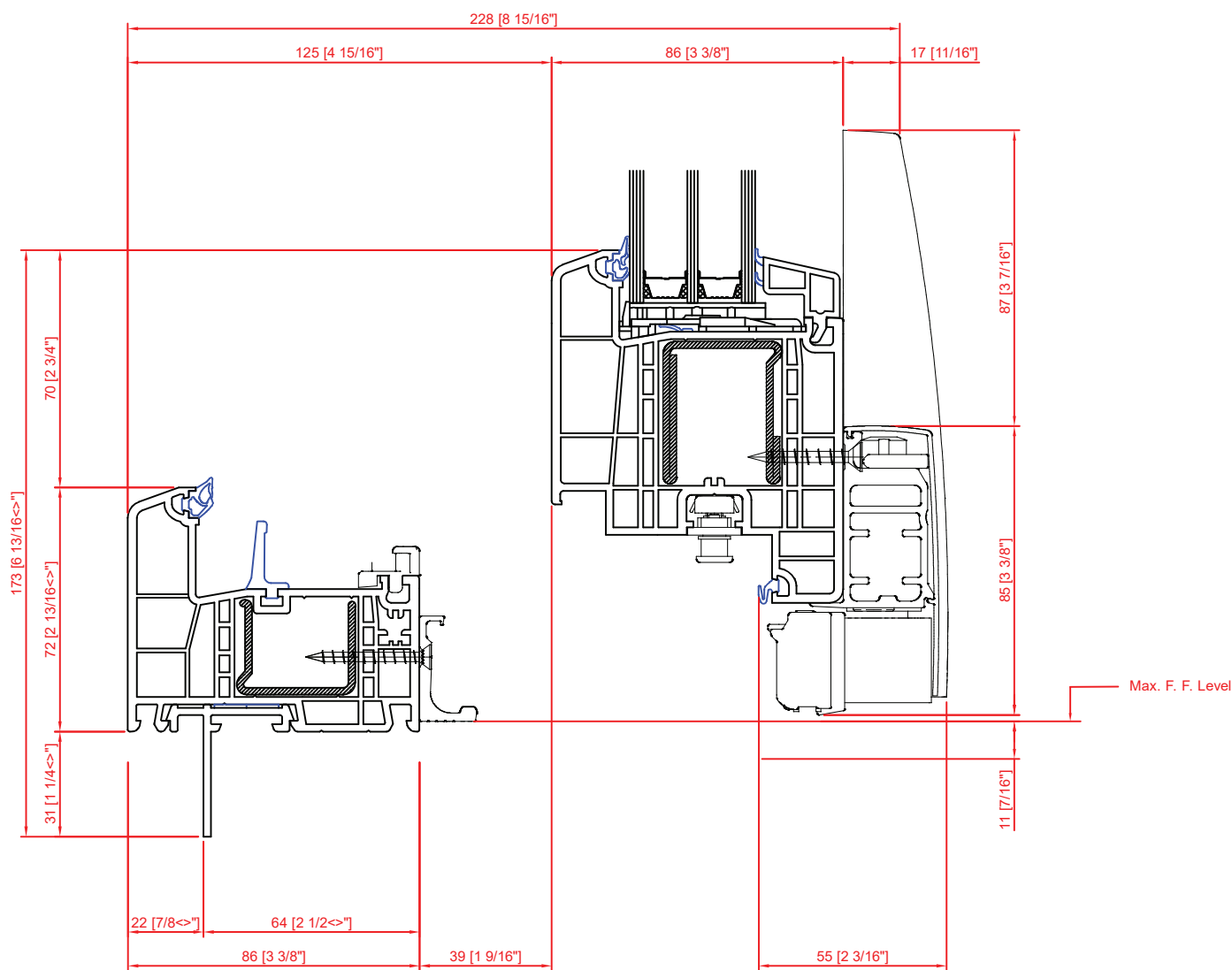


Components	Scale
4700 Frame 56mm	NTS
4700 Sash 84Z - 532I36	
56mm Low Profile	



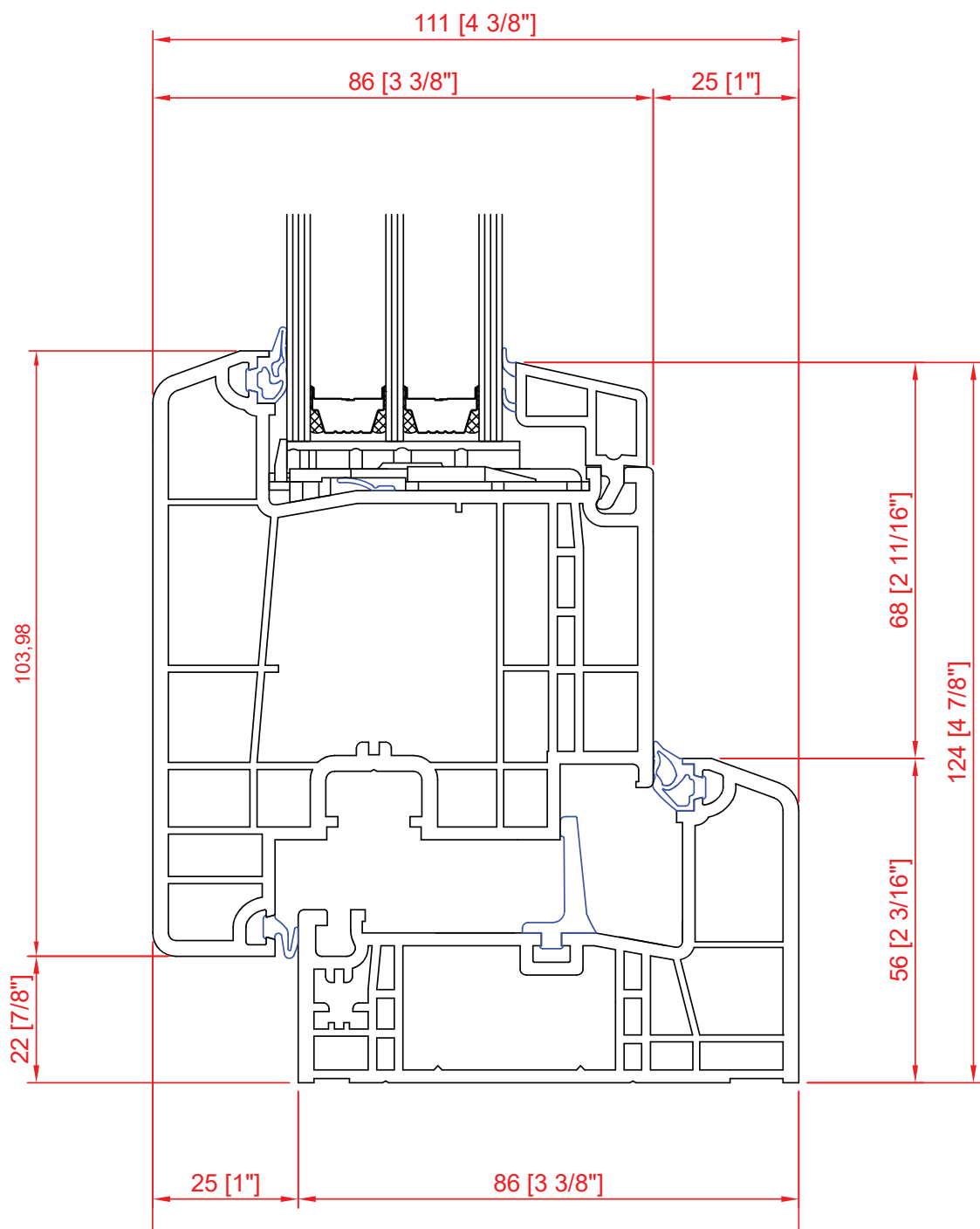
Components	Scale
20mm Alum Sill	NTS
4700 Sash 84Z - 532I36	

Sill - Tilt + Glide Door Sash



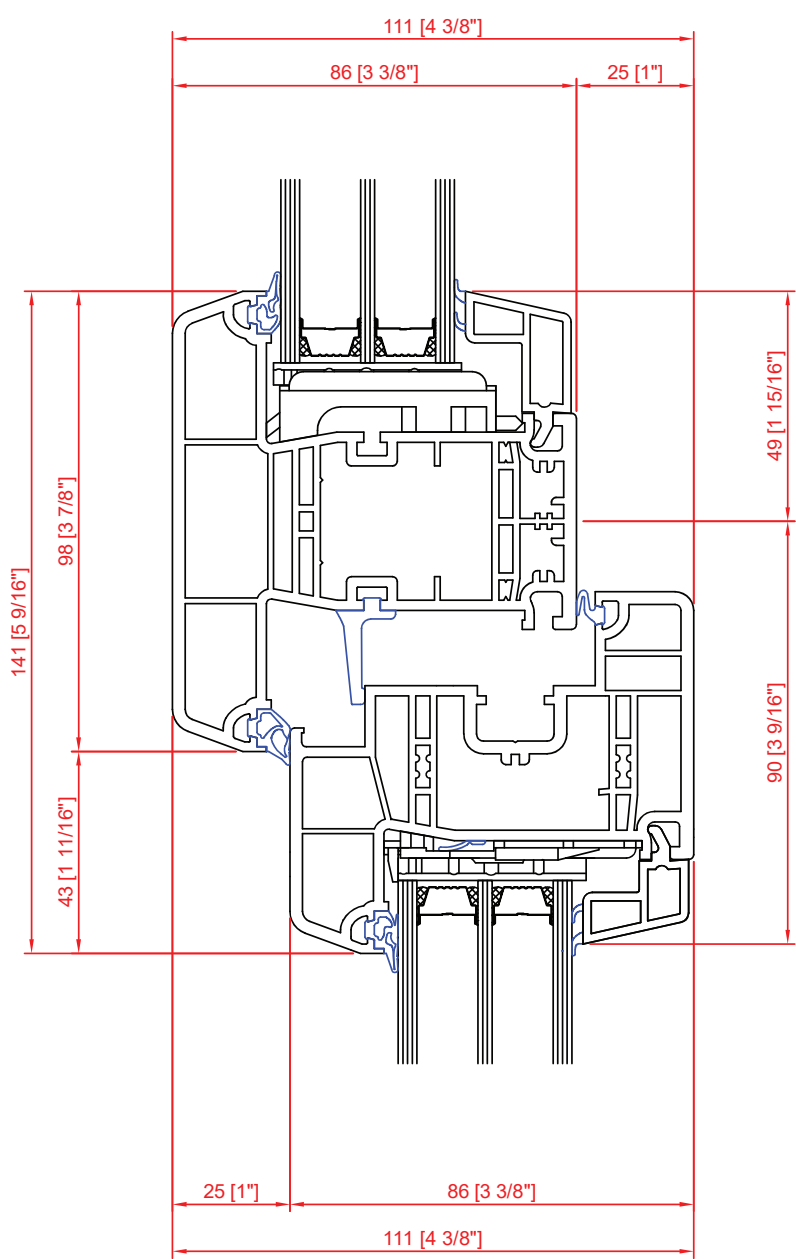
Components	Scale
4700 Frame 72 - 532015	NTS
4700 Sash 84Z - 532136	
Glazing Bead 22.5x18mm - 560510	

Sill, 56mm High Performance, Outswing Door

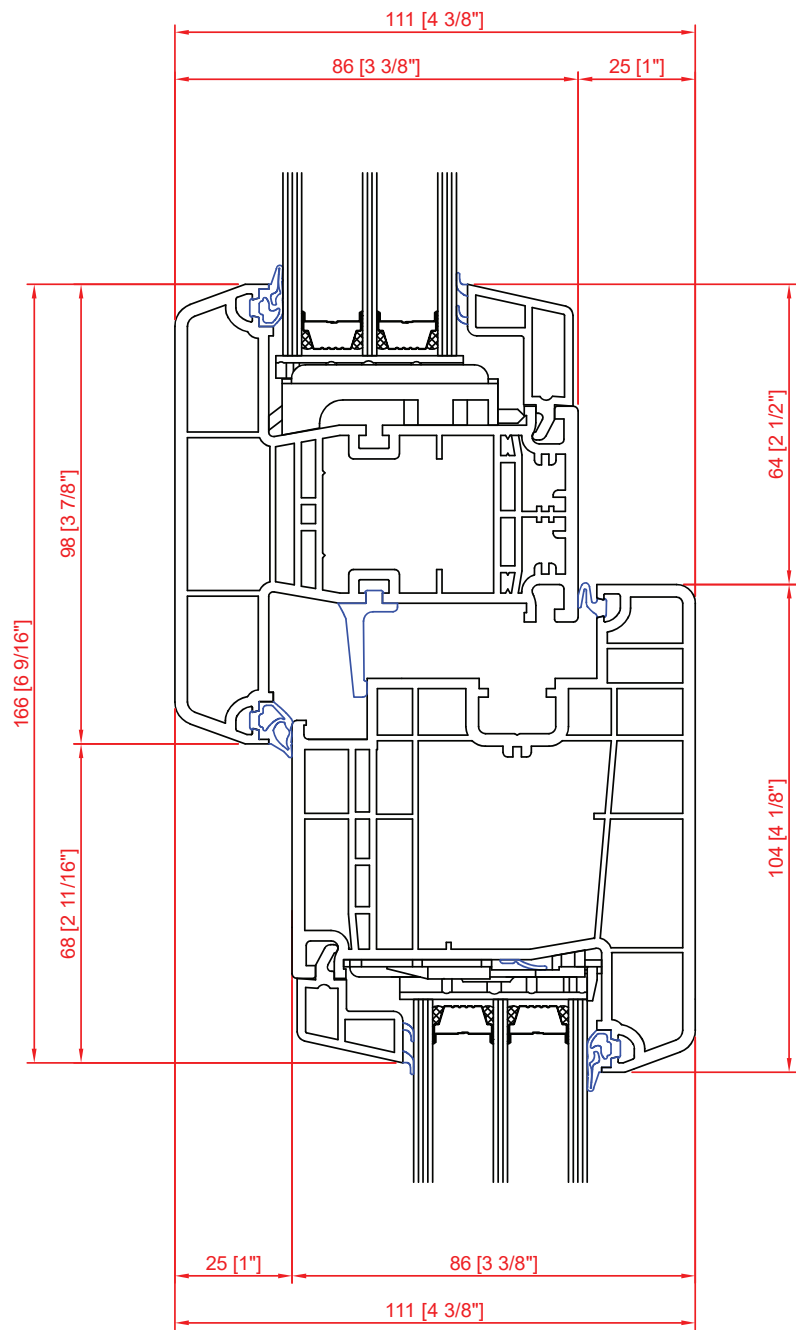


Components	Scale
4700 Frame 56	NTS
4700 Sash 104T - 532146	
Glazing Bead 22.5x18mm - 560510	

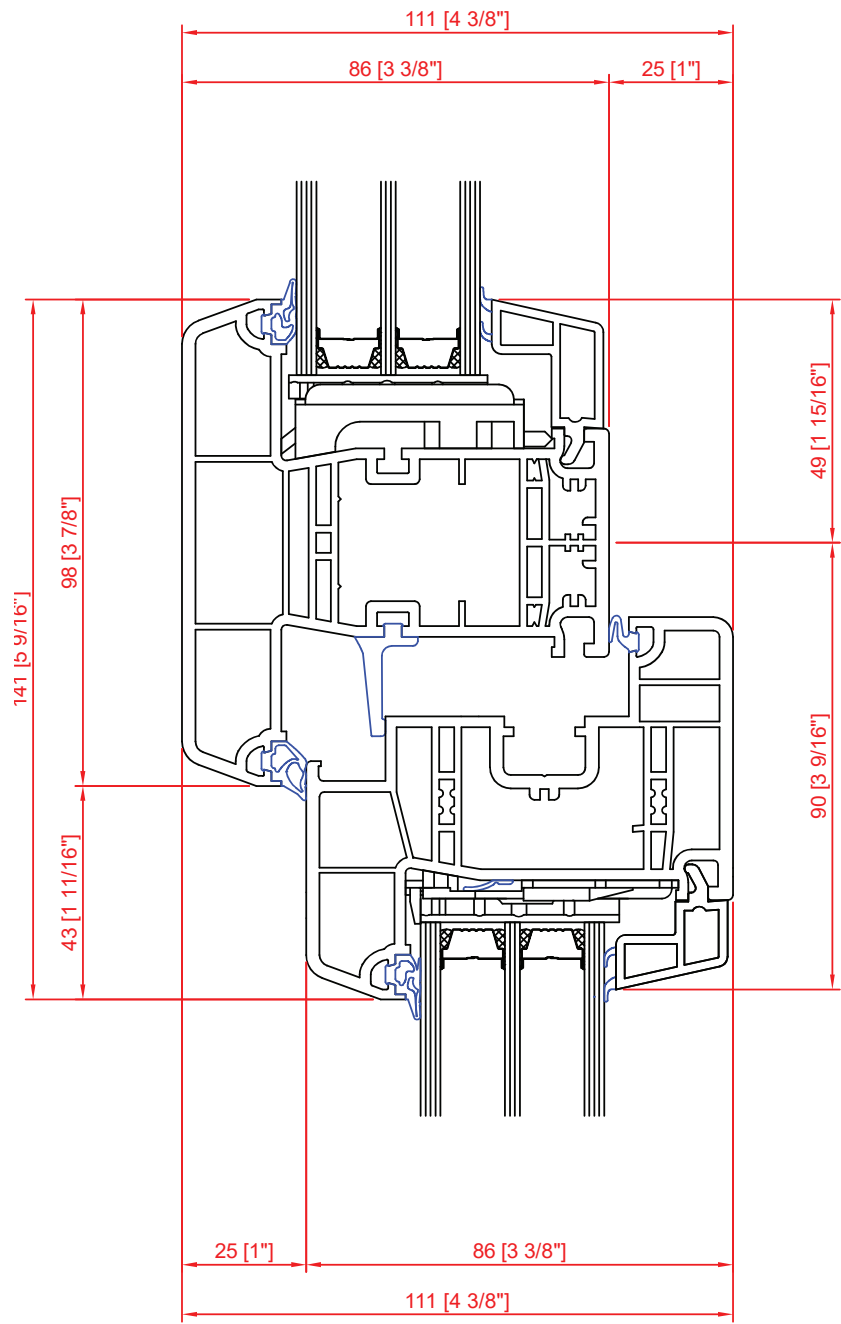
Sill, 20mm Aluminum, Outswing Door



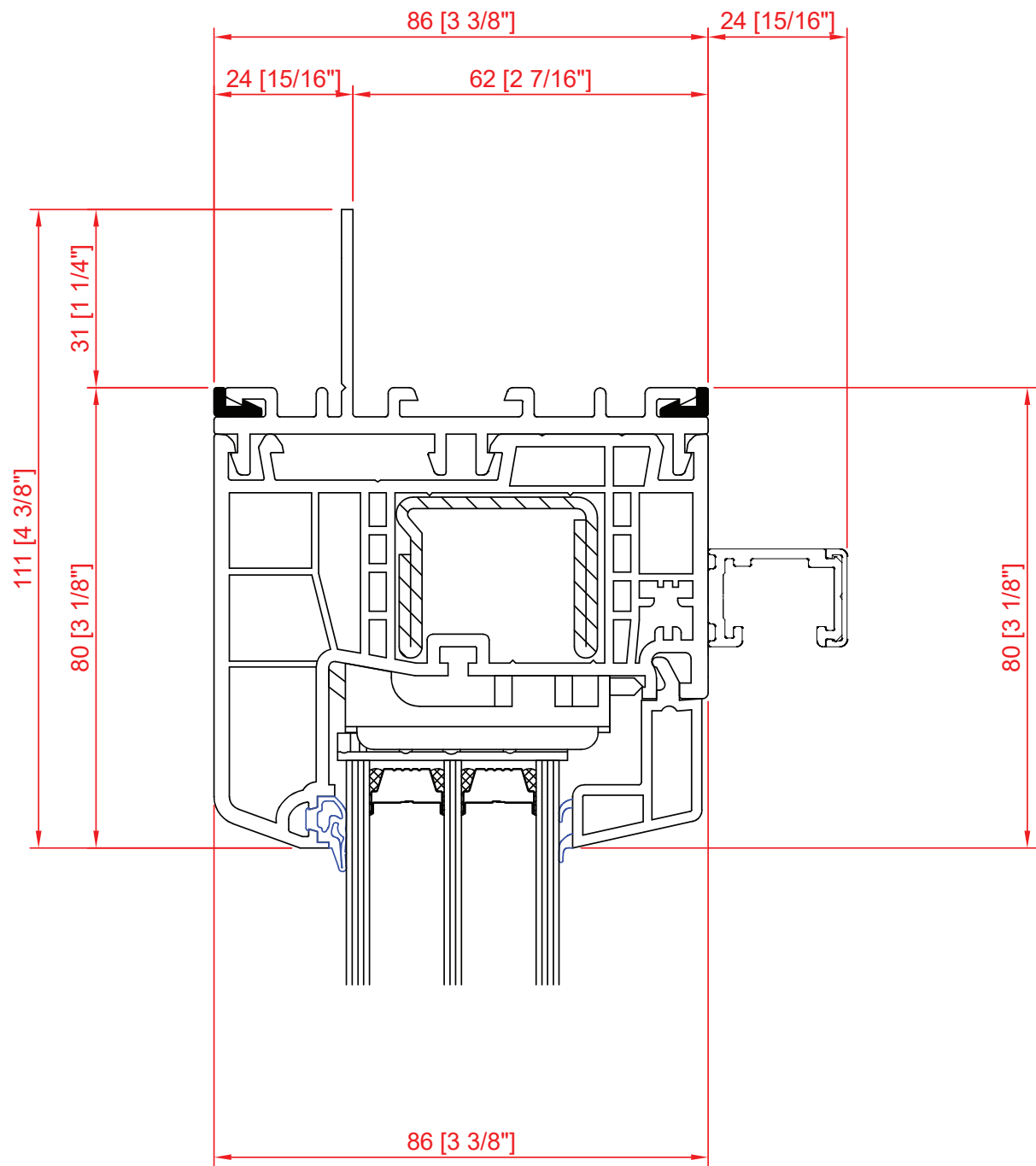
Components	Scale
4700 Mullion 98 - 532055	NTS
4700 Sash 57Z - 532036	
Glazing Bead 22.5x18mm - 560510	



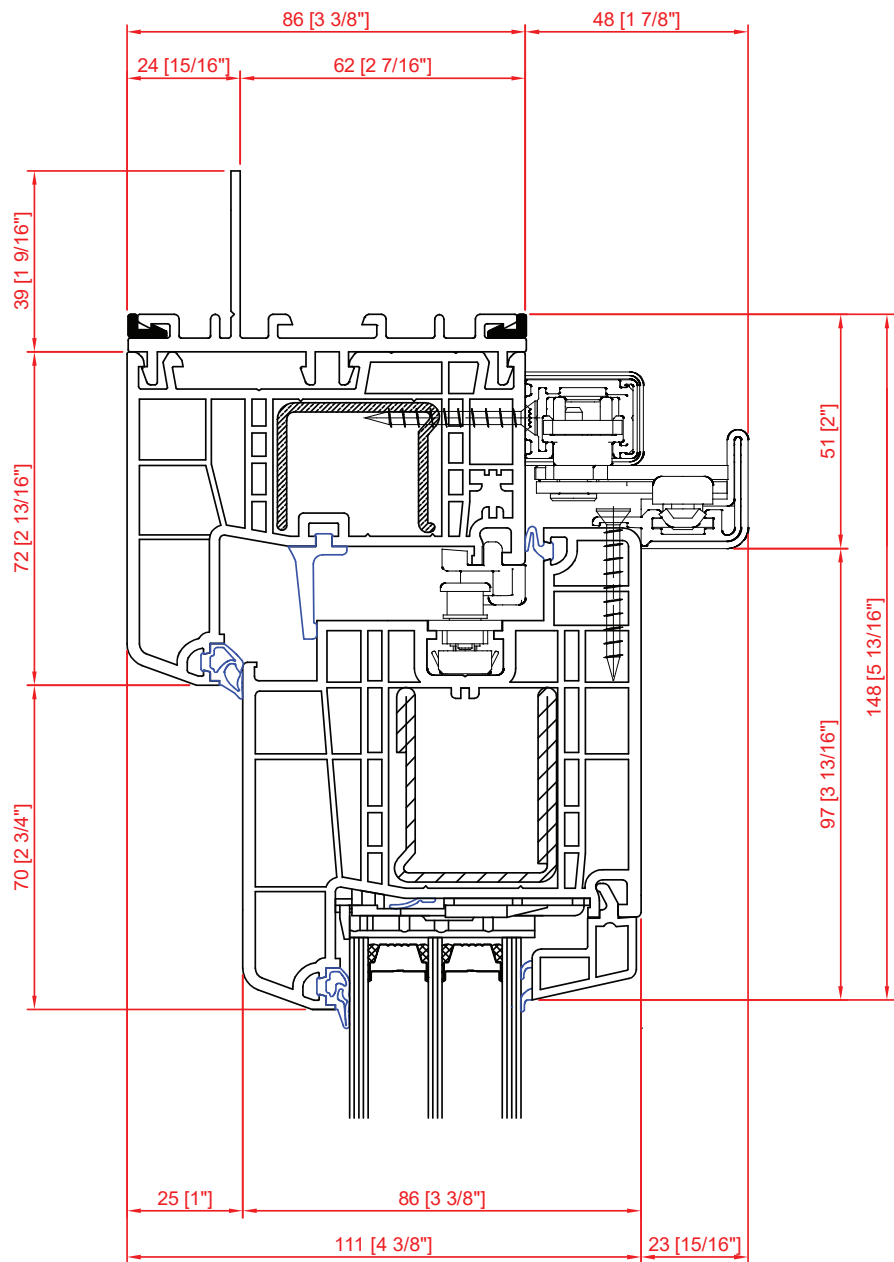
Components	Scale
4700 Mullion 98 - 532055	NTS
4700 Sash 84Z - 532136	
Glazing Bead 22.5x18mm - 560510	



Components	Scale
4700 Mullion 98 - 532055	NTS
4700 Sash 57Z - 532036	
Glazing Bead 22.5x18mm - 560510	

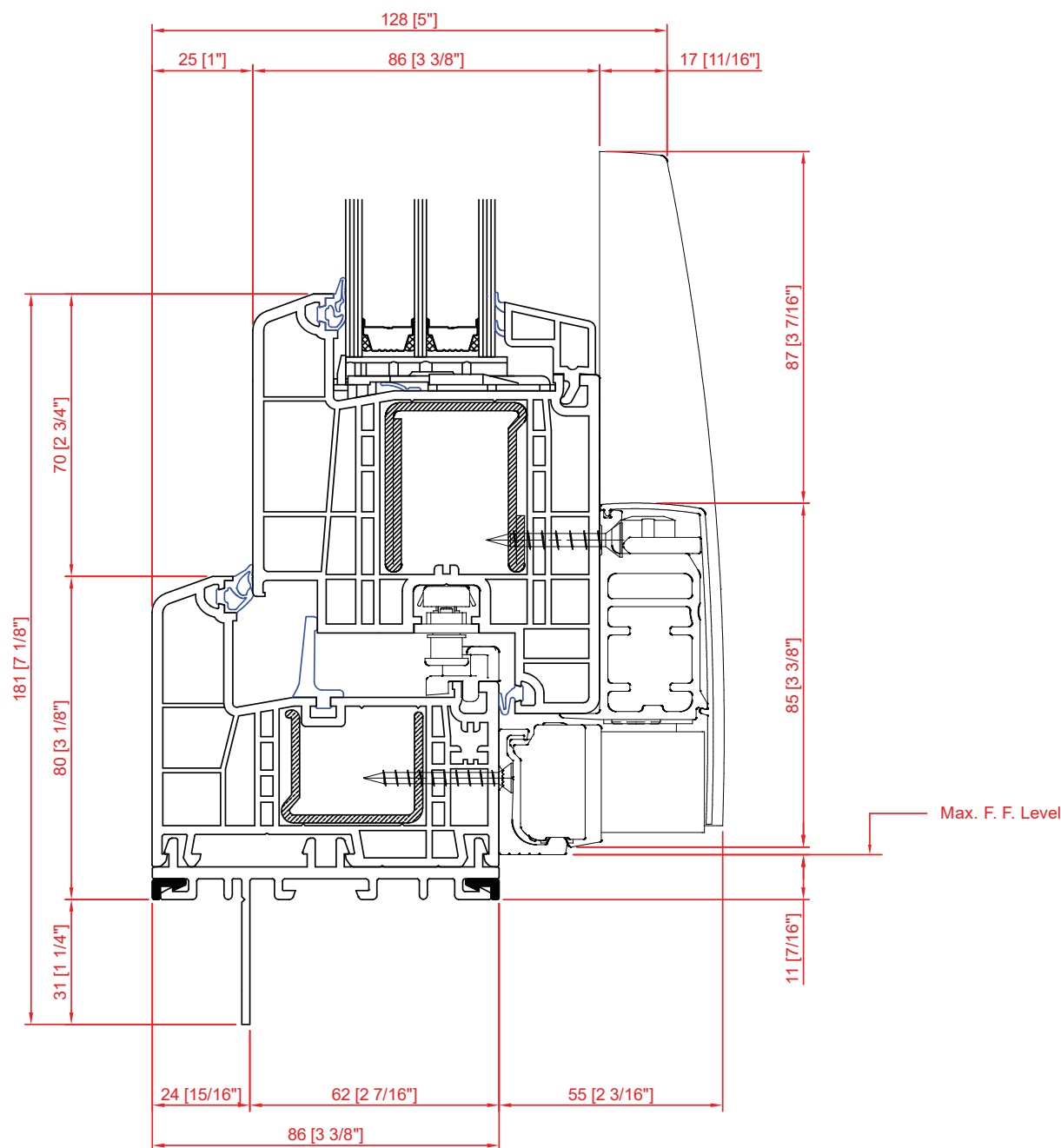


Components	Scale
4700 Frame 72 - 532015	NTS
4700 Nailing Fin, X8 NF	
Glazing Bead 22.5x18mm - 560510	



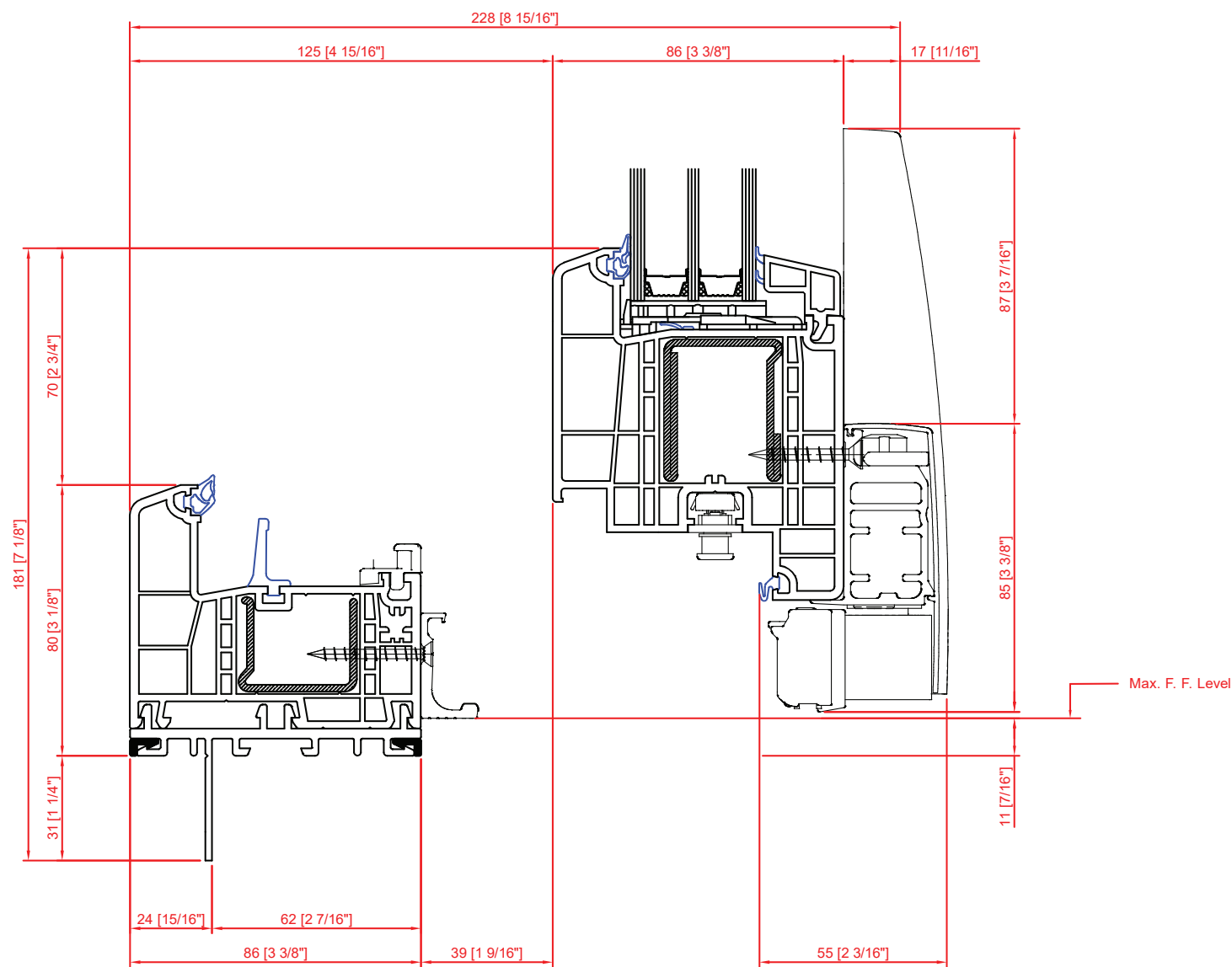
Components	Scale
4700 Frame 72 - 532015	NTS
4700 Sash 84Z - 532036	
Glazing Bead 22.5x18mm - 560510	

Sill, Tilt & Glide and Parallel Slide, Sash Closed

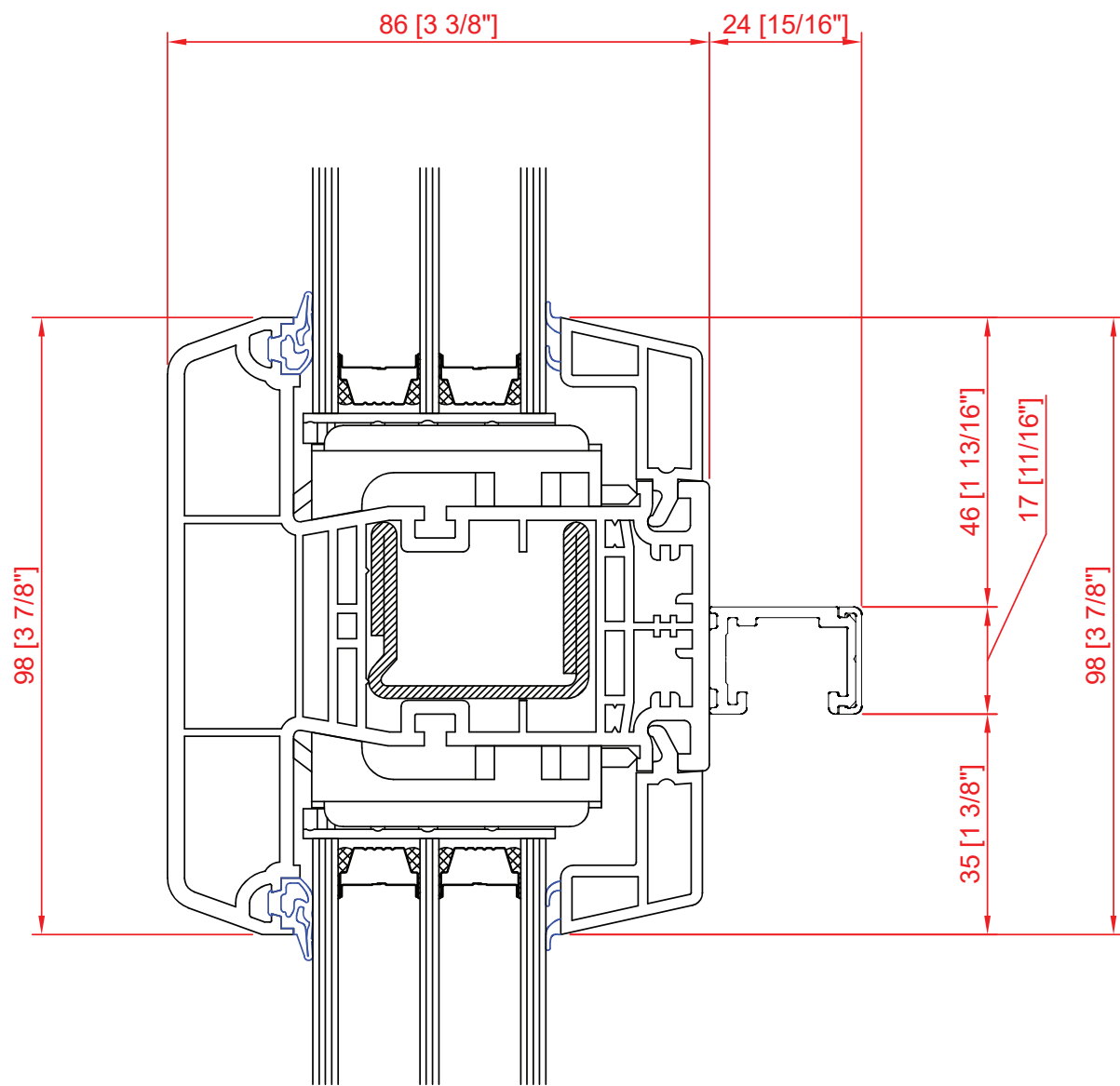


Components	Scale
4700 Frame 72 - 532015	NTS
4700 Sash 84Z - 532136	
Glazing Bead 22.5x18mm - 560510	

Sill, Tilt & Glide and Parallel Slide, Sash Open

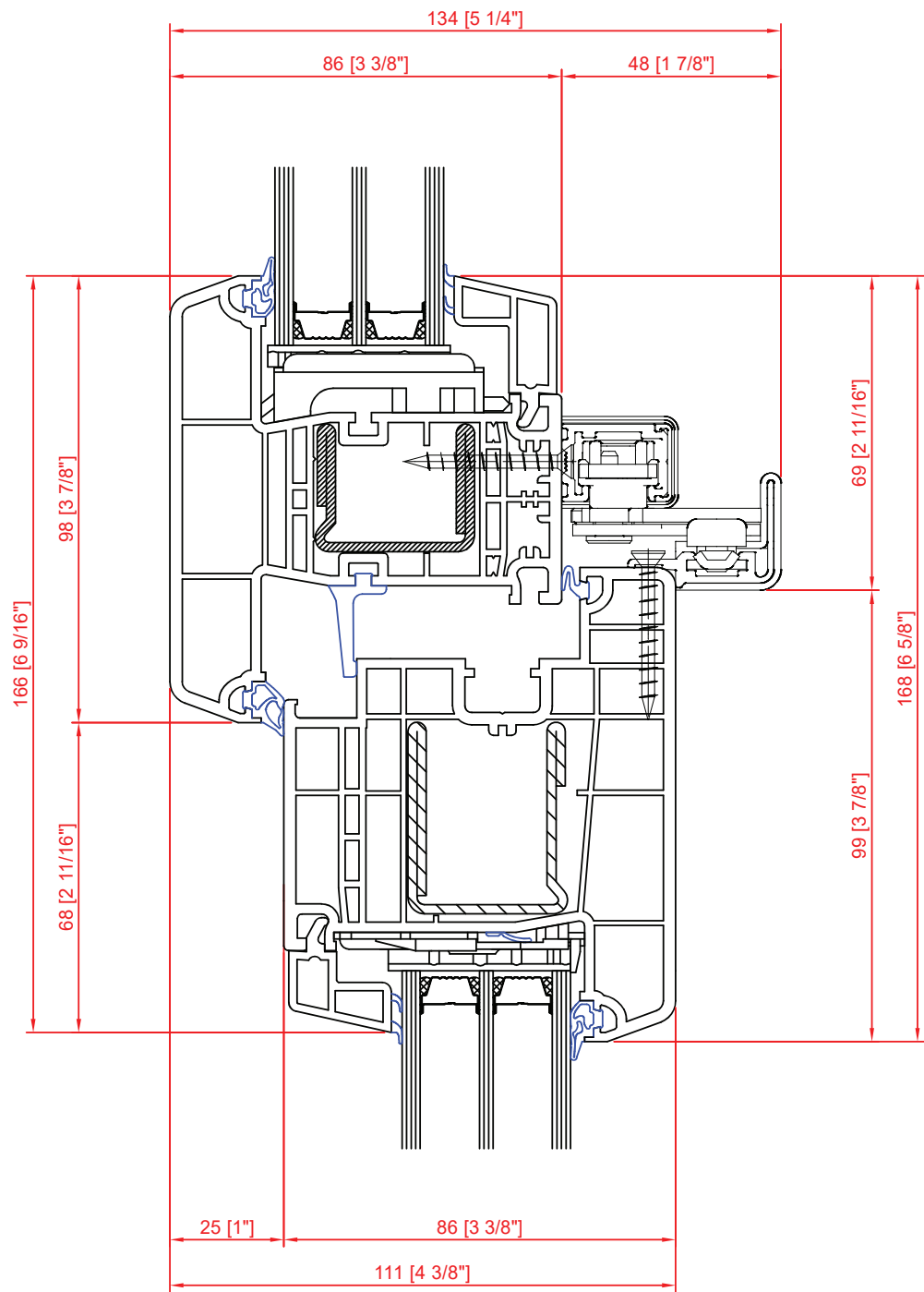


Components	Scale
4700 Frame 72 - 532015	NTS
4700 Sash 84Z - 532136	
Glazing Bead 22.5x18mm - 560510	



Components	Scale
4700 Frame 72 - 532015	NTS
Glazing Bead 22.5x18mm - 560510	

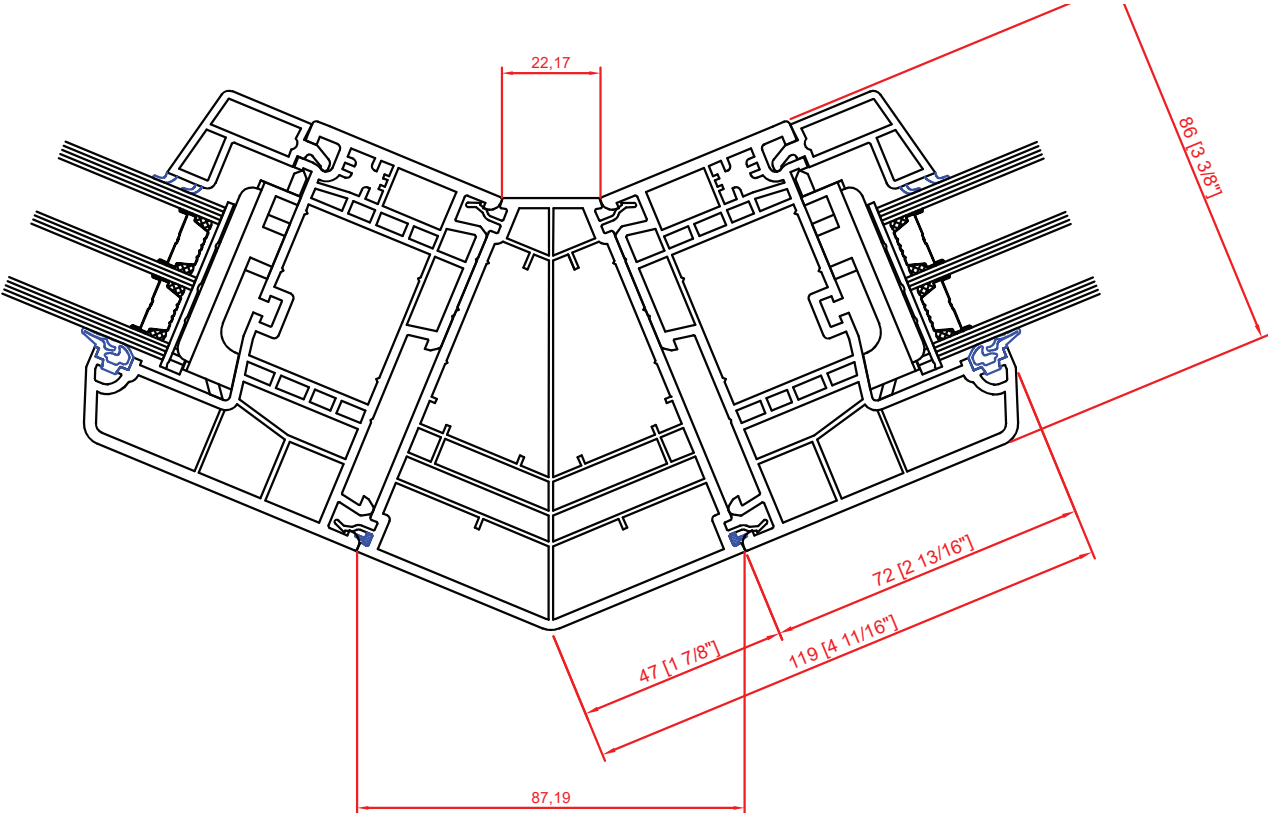
Head, Tilt & Glide and Parallel Slide, Active Lite with Transom



Components	Scale
4700 Mullion 98 - 532055	NTS
4700 Sash 104T - 532146	
Glazing Bead 22.5x18mm - 560510	

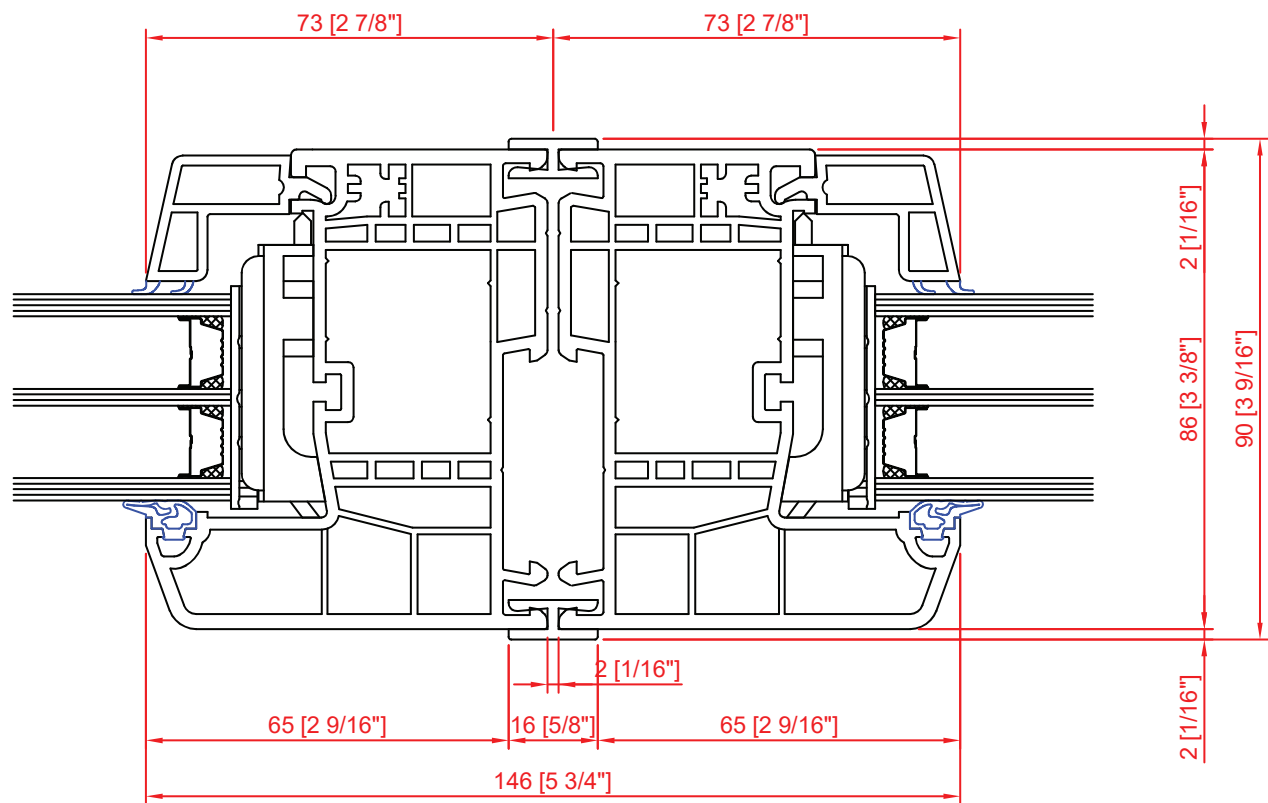
Coupling Details

135mm Angled Coupler



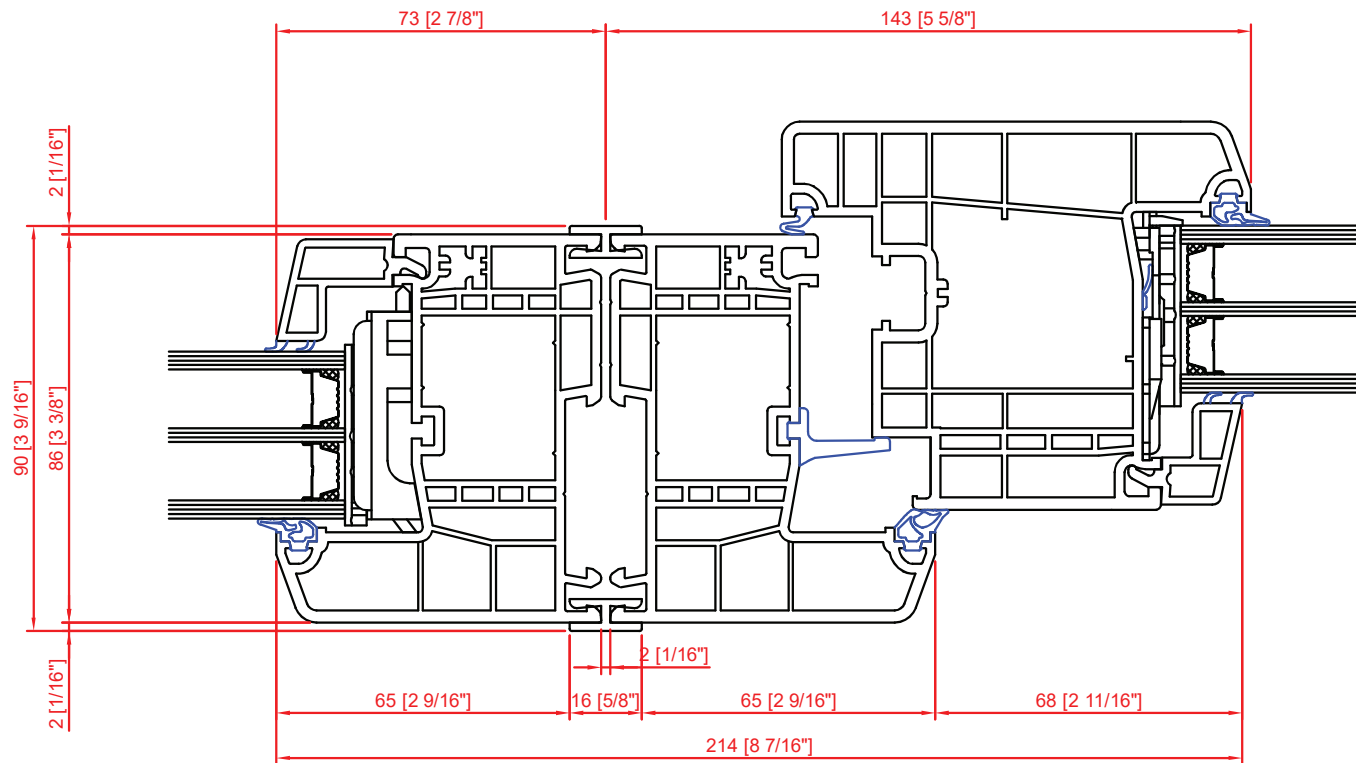
Components	Scale		Reference Code	Description
4700 Frame 72 - 532015	NTS	Frame Profile	1532015	4700 Frame 72
Coupling - 533245		Coupl. Profile	533245	
Glazing Bead 22.5x18mm - 560510				

Standard Coupler, Picture Window to Picture Window



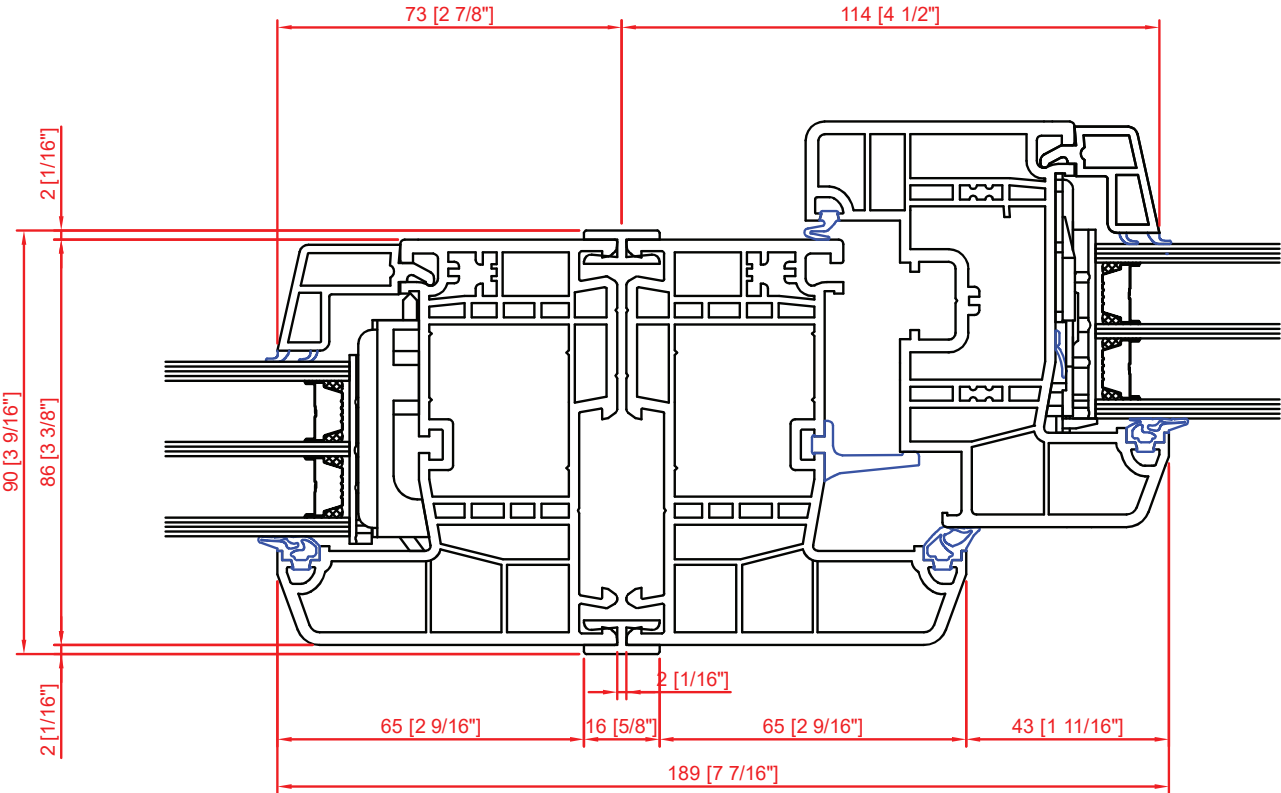
Components	Scale		Reference Code	Description
4700 Frame 72 - 532015	NTS	Frame Profile	1532015	72mm Frame
2mm Coupler - 732460		Coupl. Profile	732460	2mm Coupler
Glazing Bead 22.5x18mm - 560510				

Standard Coupler, Picture Window to Frame with 84mm Sash



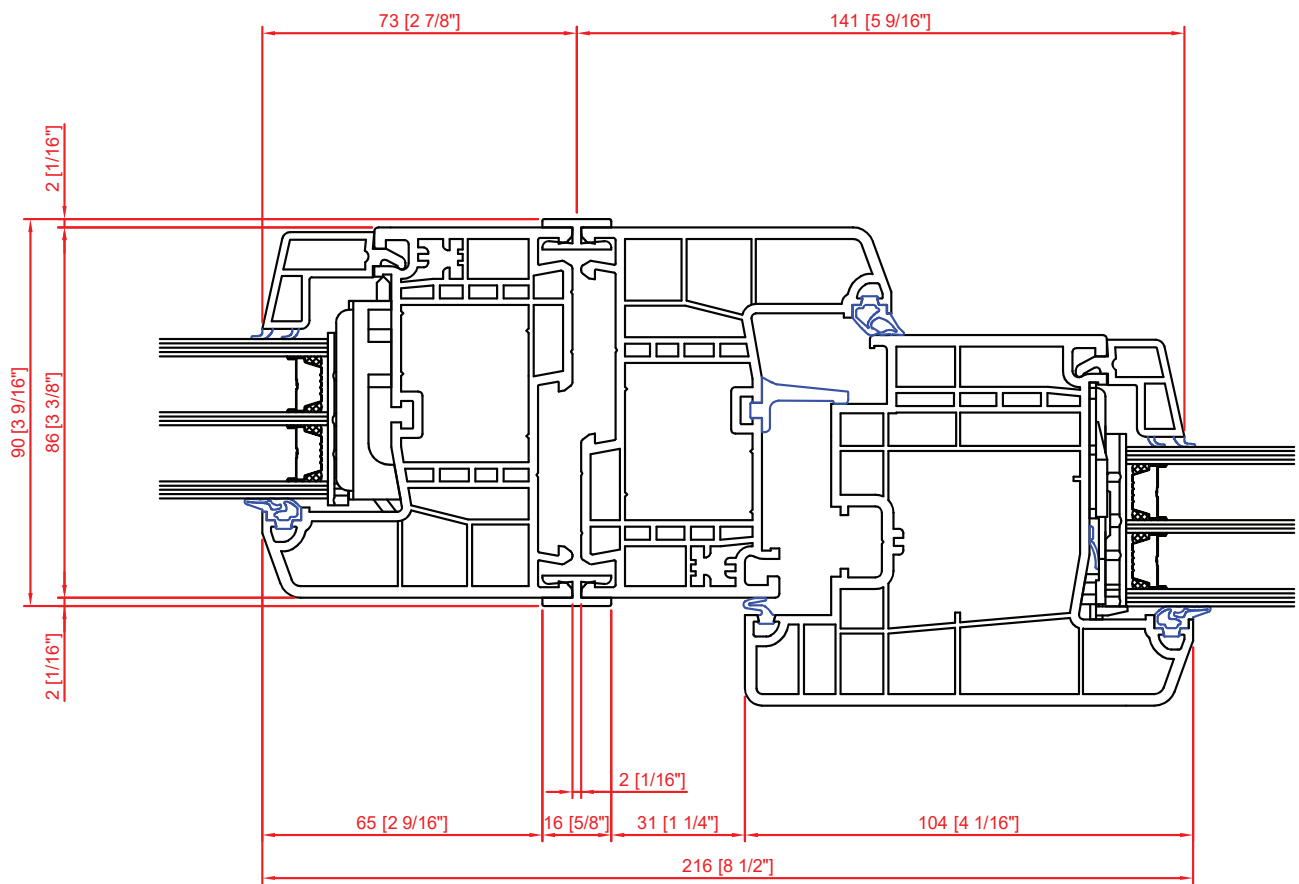
Components	Scale		Reference Code	Description
4700 Frame 72 - 532015	NTS	Frame Profile	1532015	72mm Frame
4700 Sash 84Z - 532136		Coupl. Profile	732460	2mm Coupler
Glazing Bead 22.5x18mm - 560510		Sash Profile	1532136	Z84S Sash

Standard Coupler, Picture Window to Frame with 57mm Sash

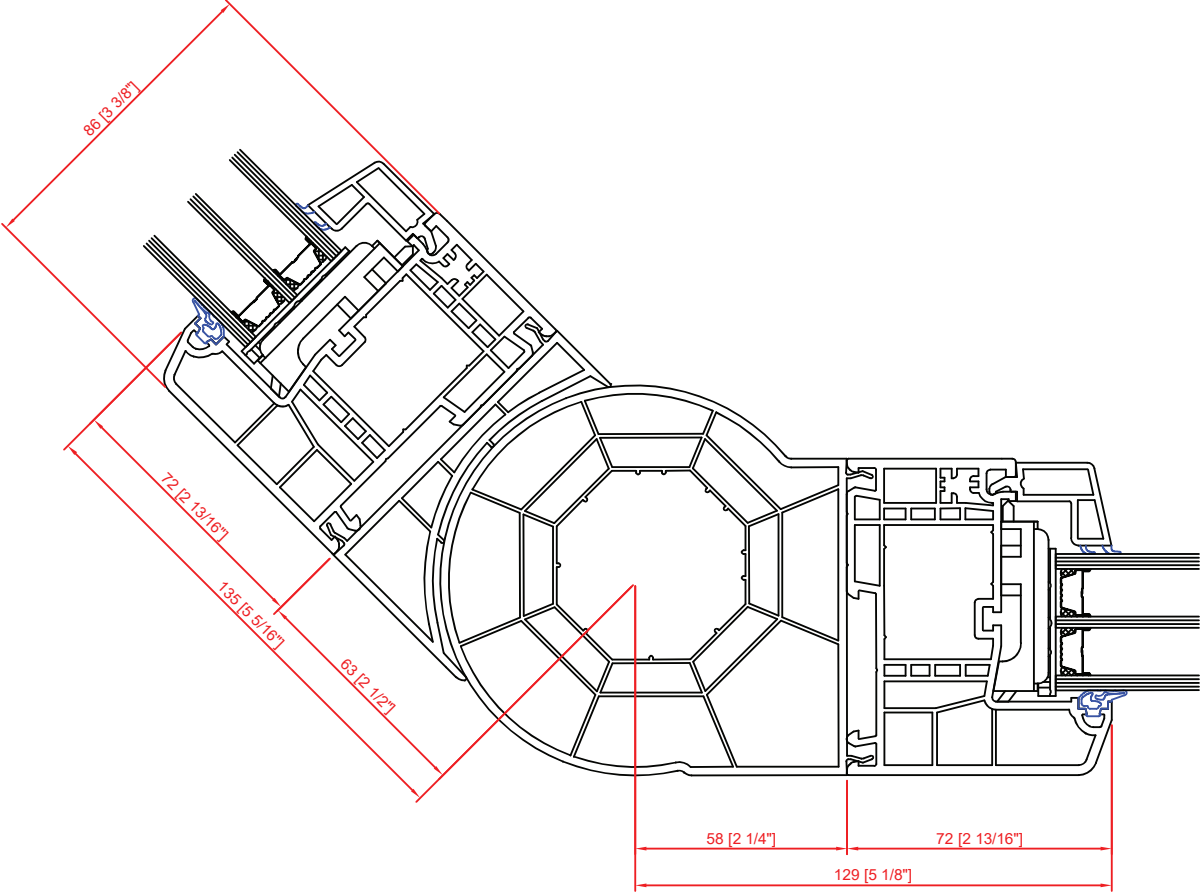


Components	Scale		Reference Code	Description
4700 Frame 72 - 532015	NTS	Frame Profile	1532015	72mm Frame
4700 Sash 57Z - 532036		Coupl. Profile	732460	2mm Coupler
Glazing Bead 22.5x18mm - 560510		Sash Profile	1532136	Z57S Sash

Standard Coupler, Picture Window to Frame with Outswing Door Sash



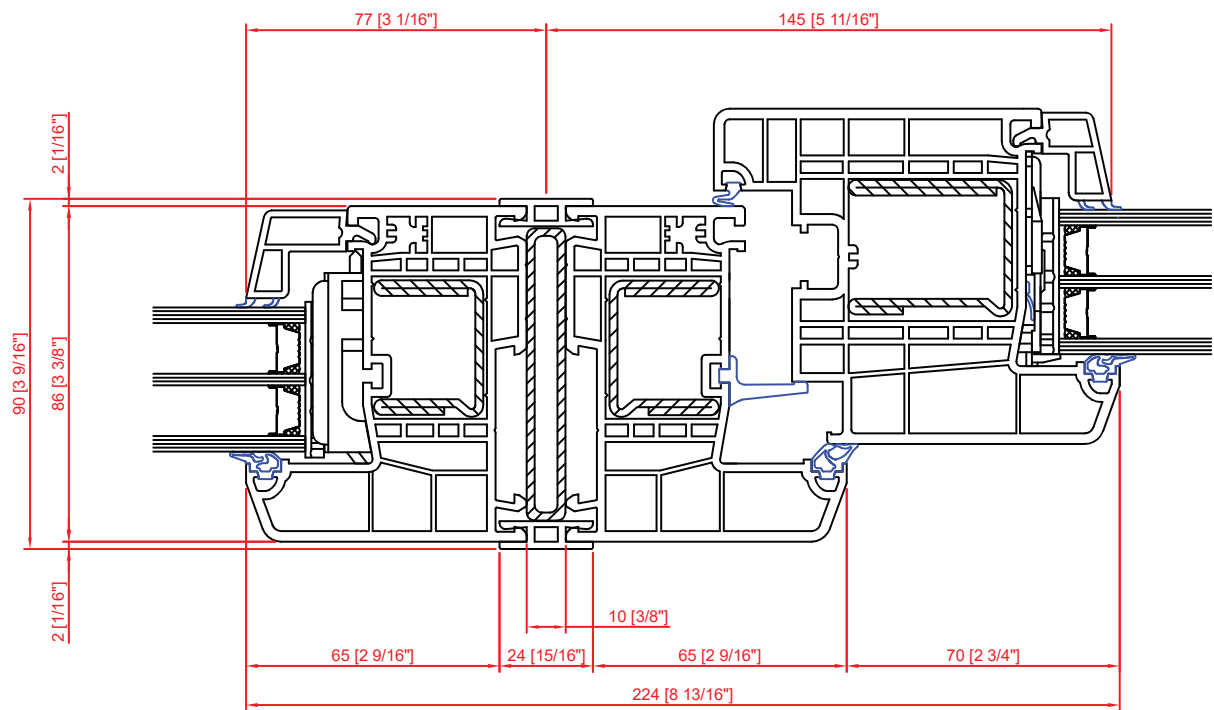
Components	Scale		Reference Code	Description
4700 Frame 72 - 532015	NTS	Frame Profile	1532015	72mm Frame
4700 Sash 104T - 532146		Coupl. Profile	732460	2mm Coupler
Glazing Bead 22.5x18mm - 560510		Sash Profile	1532146	104T Sash



Components	Scale
4700 Frame 72 - 532015	NTS
4700 Coupler Vario 1 (Male)	
4700 Coupler Vario 2 (Female)	
Glazing Bead 22.5x18mm - 560510	

Structural Coupling

This example shows an inswing door next to a fixed lite. However, this coupling may be used between any two frames where required.



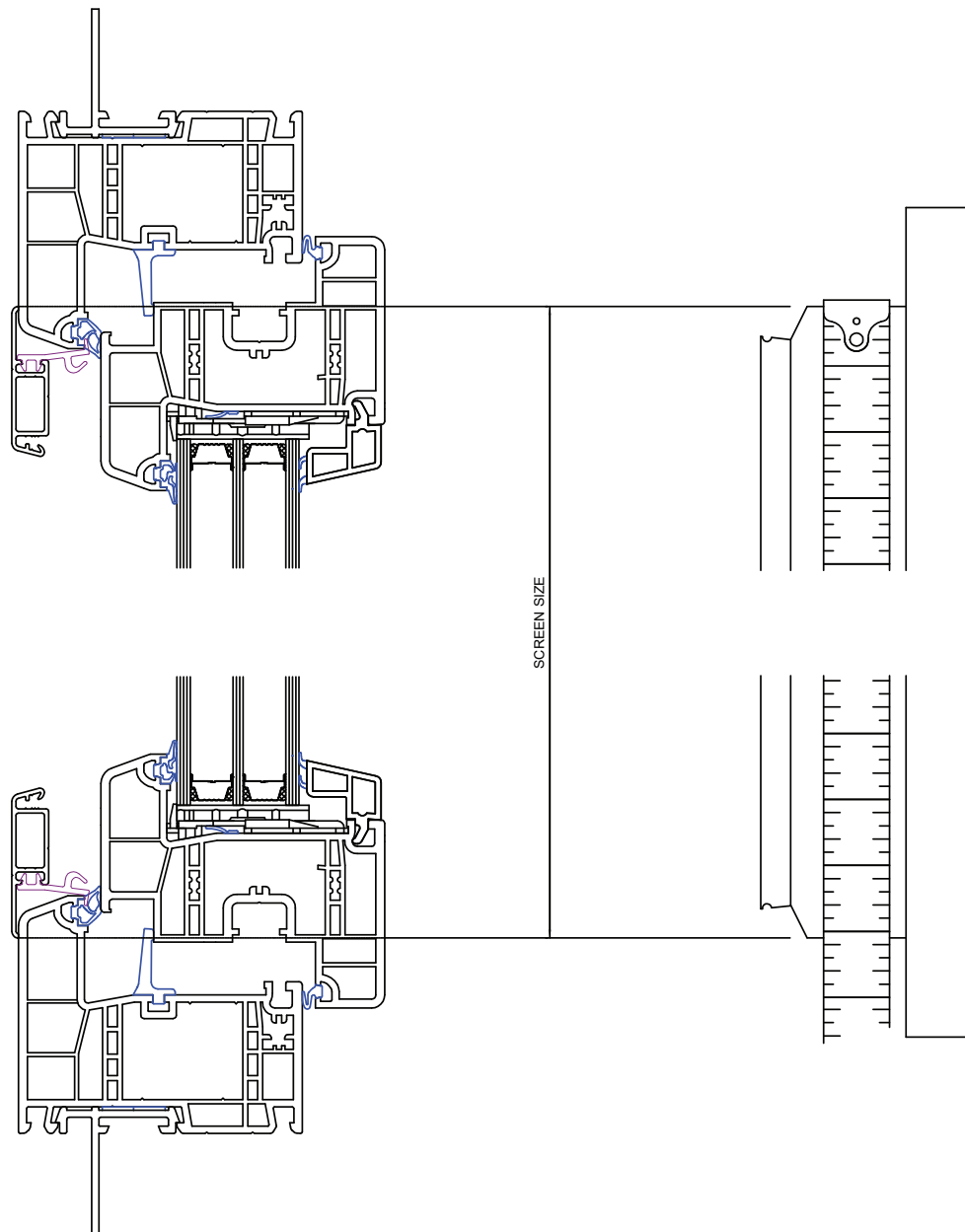
Components	Scale
4700 Frame 72 - 532015	NTS
4700 Sash 84Z - 532136	
Glazing Bead 22.5x18mm - 560510	

Accessories

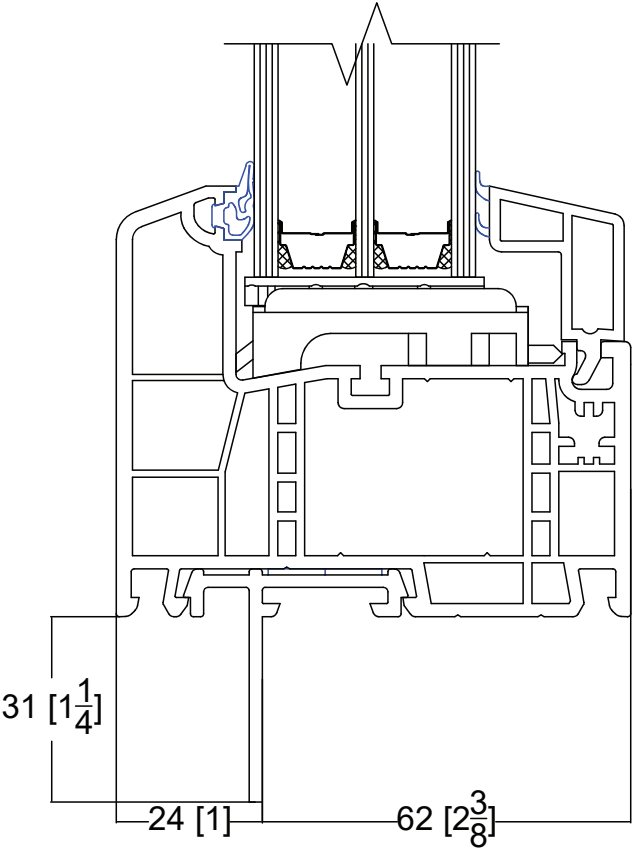
Access Windows and Doors offers a variety of accessories for the North American market including insect screens (standard on operating windows but may be optionally deleted), a nailing flange, and a dry wall return holder.

The following pages show drawings of these accessories.

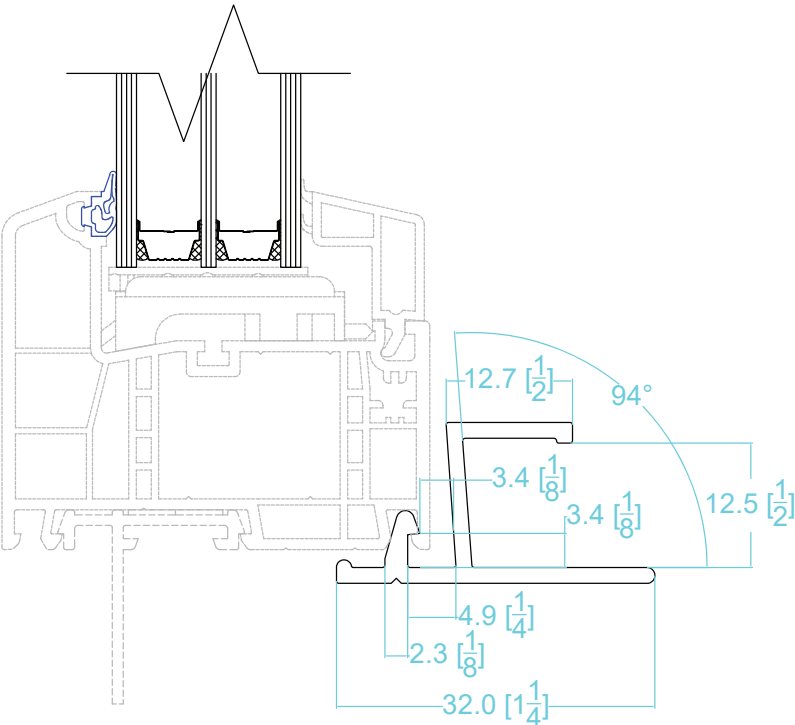
Insect Screen



Nailing Flange

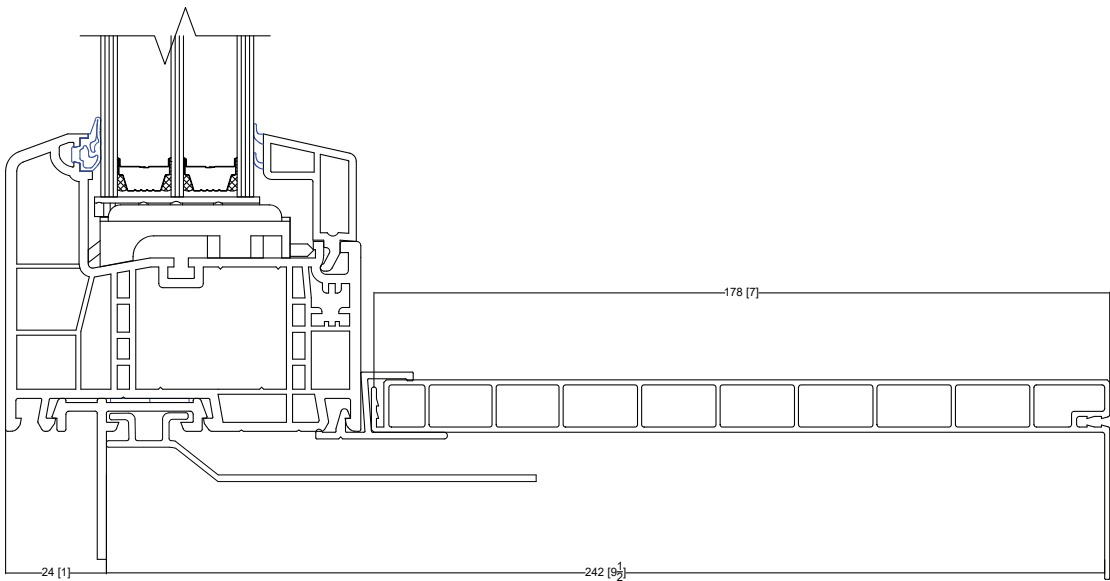


Dry Wall Return holder



Jamb Extension

Notes: 7" Jamb extension can be trimmed into customized length based on requirements. It is also available in widths 3 3/8", 5 1/2", 7" and additional 6" extension



Components	
1	7" Jamb Extension
2	Drywall Return
3	Twist Anchor
4	Nailing Fin

Casing

