Traco Architectural

Detail Manual Master Index

1630 SS IR Curtain Wall System

Features

- 1630 SS IR is an outside glazed captured curtain wall system
- 1630 SS IR has a 3" (76.2 mm) sight line
- Standard 7-13/16" (198.4 mm) or 8-13/16" (223.8 mm) depth systems
- Infill 1-5/16" (33.3 mm)
- Thermally Broken by means of a continuous 1/4" (6.4 mm) low conductance spacer
- Perimeter seal can be installed at the pressure plate or mullion shoulder
- Frame options available to accommodate design pressures from 70 psf to 130 psf
- 1630 SS IR can be supplied fabricated and KD or in stock lengths
- Dry Glazing and Wet Glazing option
- Interlocking mullion design eliminates need for anti-buckling clips
- Concealed fastener joinery creates smooth, monolithic appearance
- EPDM gaskets and thermal break
- Screw spline joinery method allows shop assembly of ladder sections, reducing field labor
- Corners available with shear block fabrication method
- Offers entrance framing systems
- Silicone compatible glazing materials for long-lasting seals
- Two color option
- Permanodic™ anodized finishes in seven choices
- Painted finishes in standard and custom choices

Additional Features*

- Large Missile and Small Missile Hurricane Impact tested
- Blast Mitigation tested

Product Applications

- Ideal for low-rise applications where high performance is desired
- Most of the product assembly can be done in the shop rather than the field. This allows for better quality control and reduces expensive field labor.

*See NOA product approval for specific features tested and approved for hurricane impact.

For specific product applications,
Consult your Kawneer representative.

Architects - Most extrusion and window types illustrated in this catalog are standard products for Kawneer. These concepts have been expanded and modified to afford you design freedom. Some miscellaneous details are non-standard and are intended to demonstrate how the system can be modified to expand design flexibility. Please contact your Kawneer representative for further assistance.

LAWS AND BUILDING AND SAFETY CODES GOVERNING THE DESIGN AND USE OF GLAZED ENTRANCE, WINDOW, AND CURTAIN WALL PRODUCTS VARY WIDELY. KAWNEER DOES NOT CONTROL THE SELECTION OF PRODUCT CONFIGURATIONS, OPERATING HARDWARE, OR GLAZING MATERIALS, AND ASSUMES NO RESPONSIBILITY THEREFOR.

Metric (SI) conversion figures are included throughout these details for reference. Numbers in parentheses ( ) are millimeters unless otherwise noted.

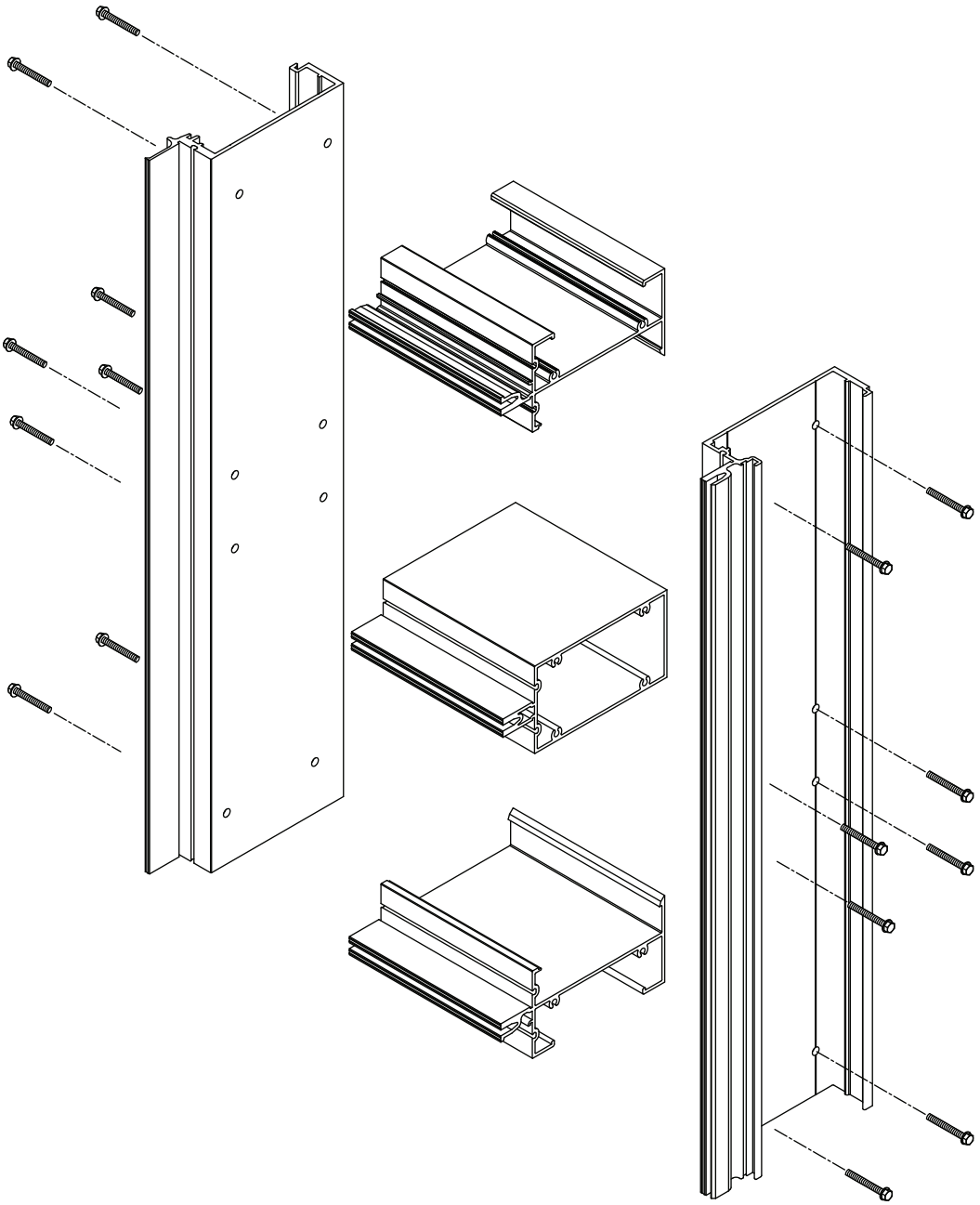
The following metric (SI) units are found in these details:

m – meter
cm – centimeter
mm – millimeter
s – second
Pa – pascal
MPa – megapascal

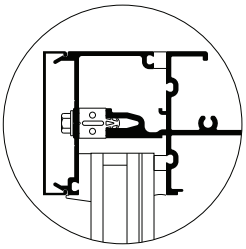
Kawneer reserves the right to change configurations without prior notice when deemed necessary for product improvement.

1630 SS IR Curtain Wall System

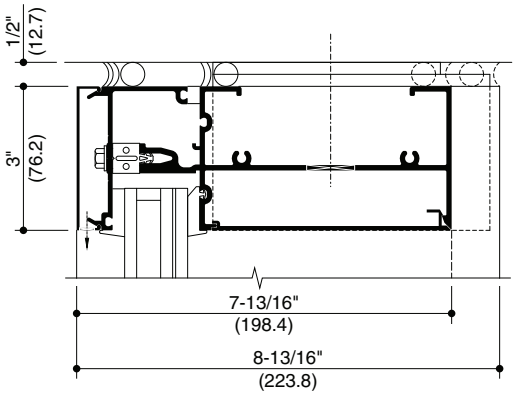
PICTORIAL VIEW



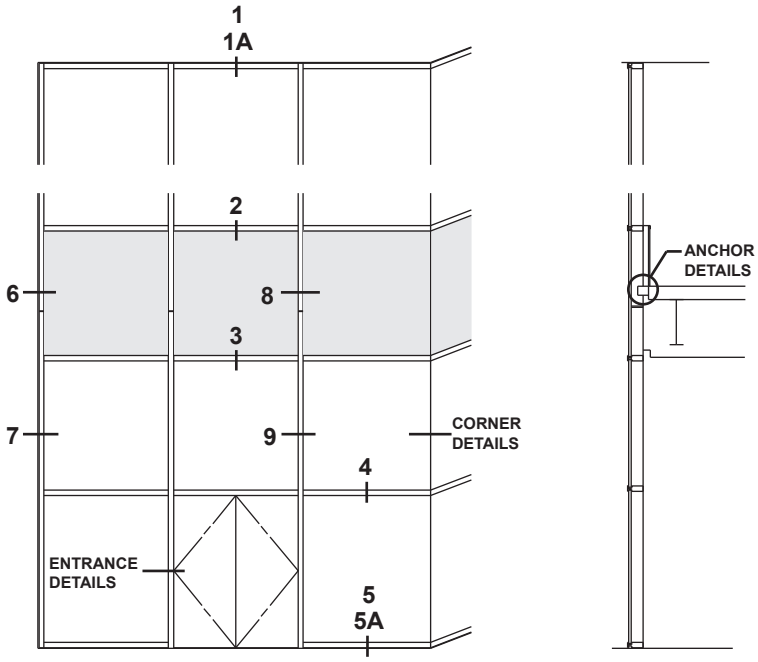
SCALE 3" = 1'-0"



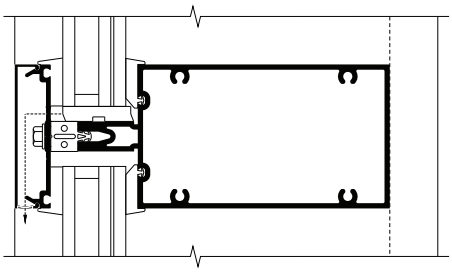
OPTIONAL WET GLAZING
LARGE MISSILE (LMI)



1
HEAD



TYPICAL ELEVATION
ELEVATION IS NUMBER KEYED TO DETAILS



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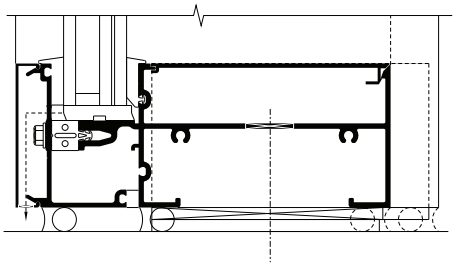
HORIZONTAL



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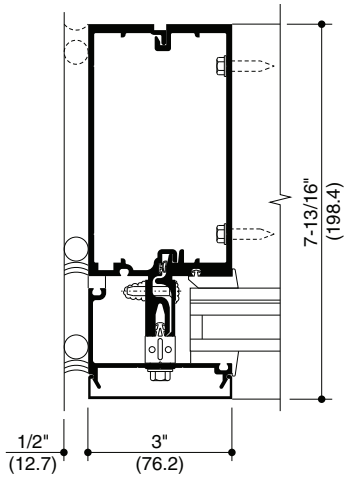
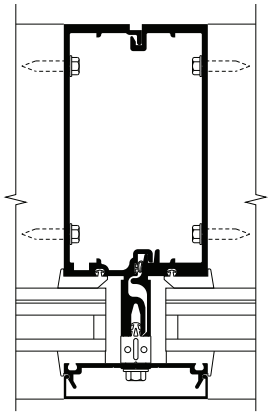
SILL

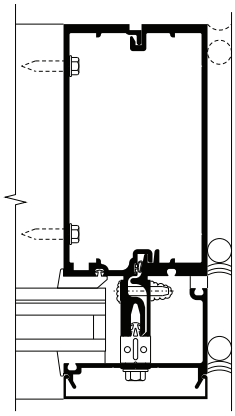
SCALE 3" = 1'-0"



6
LEFT JAMB
7-13/16" DEEP



8
VERTICAL
7-13/16" DEEP



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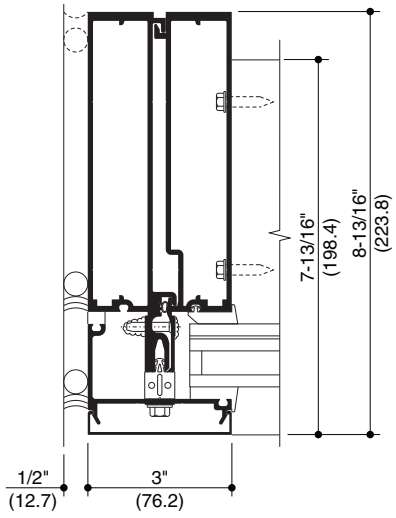
RIGHT JAMB
7-13/16" DEEP



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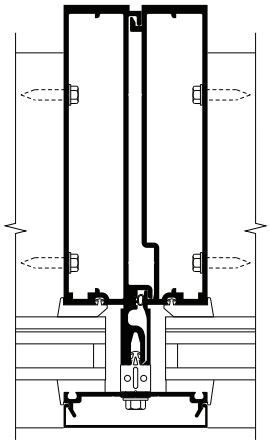
LEFT JAMB
8-13/16" DEEP



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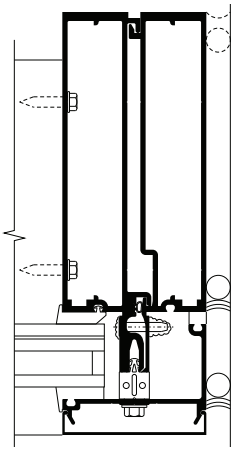
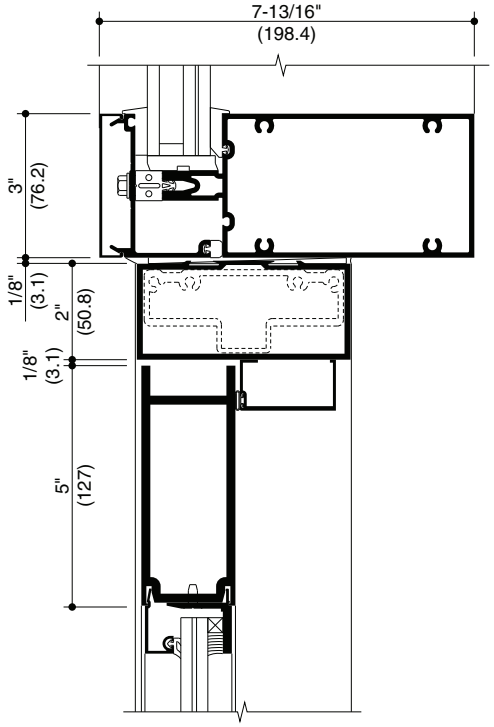
VERTICAL
8-13/16" DEEP



6
RIGHT JAMB
8-13/16" DEEP

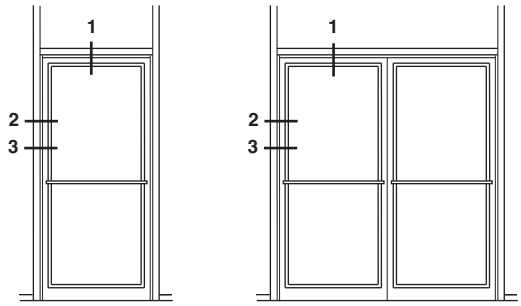
SCALE 3" = 1'-0"



1

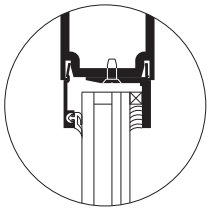
TRANSOM BAR

BUTT HUNG OR OFFSET PIVOT
WITH SINGLE ACTING OFFSET ARM
CONCEALED OVERHEAD CLOSER
LARGE MISSILE (LMI)



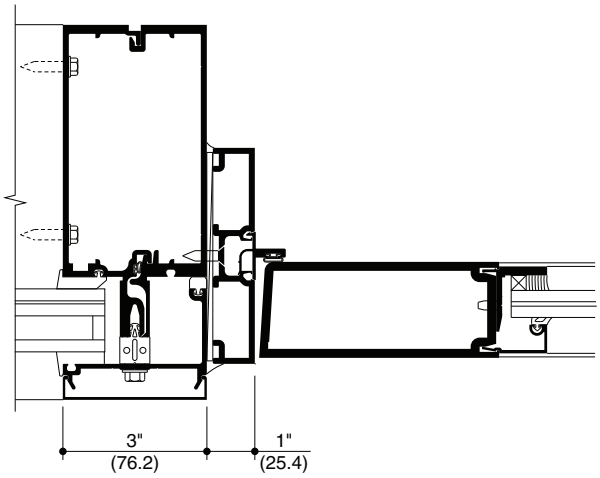
ENTRANCE ELEVATION

ELEVATION IS NUMBER KEYED TO DETAILS



OPTIONAL
1" DOOR INFILL
LARGE MISSILE (LMI)

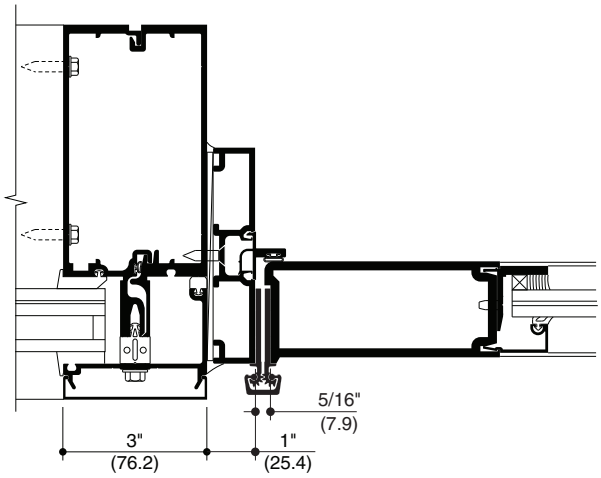
NOTE: DOORS SHOWN GLAZED WITH 9/16" INFILL



2

DOOR JAMB

BUTT HUNG
OR
OFFSET PIVOT
LARGE MISSILE (LMI)

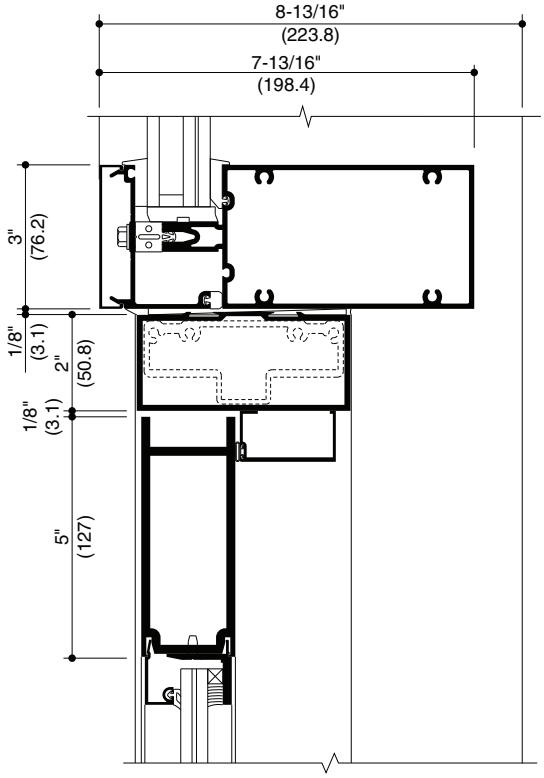


3

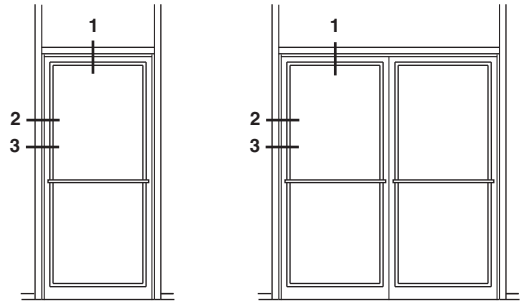
DOOR JAMB

CONTINUOUS HINGE
LARGE MISSILE (LMI)

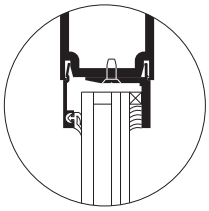
SCALE 3" = 1'-0"



1
TRANSOM BAR
BUTT HUNG OR OFFSET PIVOT
WITH SINGLE ACTING OFFSET ARM
CONCEALED OVERHEAD CLOSER
LARGE MISSILE (LMI)



ENTRANCE ELEVATION
ELEVATION IS NUMBER KEYED TO DETAILS



OPTIONAL
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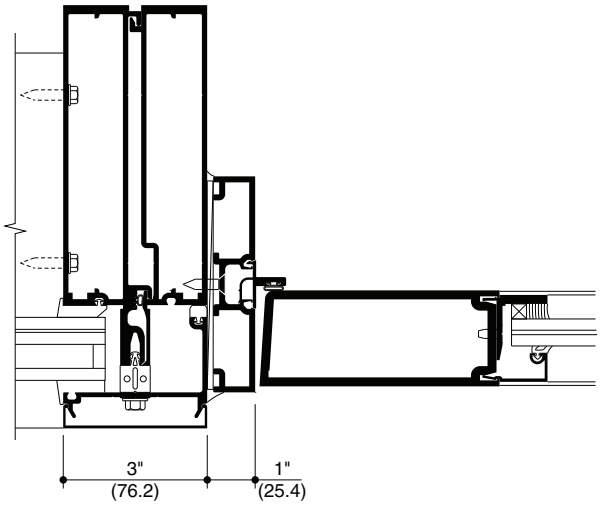
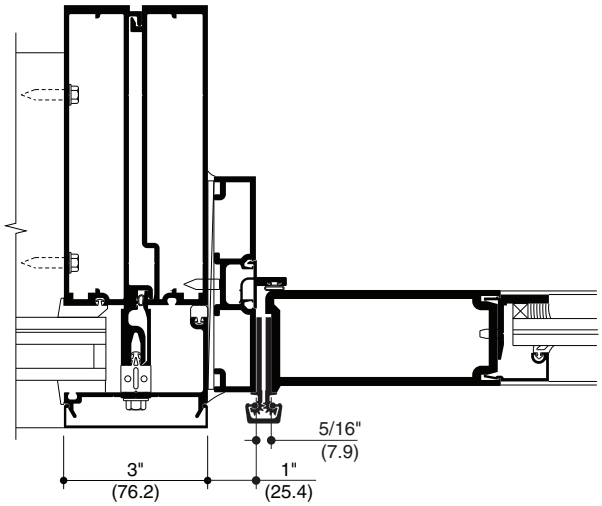
NOTE: DOORS SHOWN GLAZED WITH 9/16" INFILL

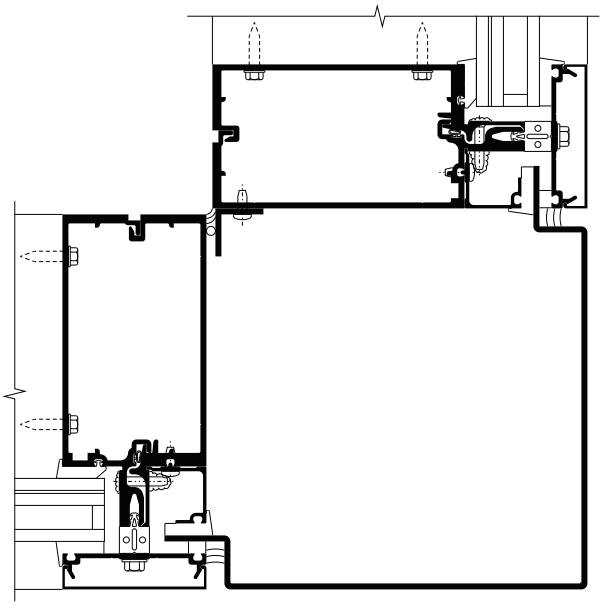


2
DOOR JAMB
BUTT HUNG
OR
OFFSET PIVOT
LARGE MISSILE (LMI)

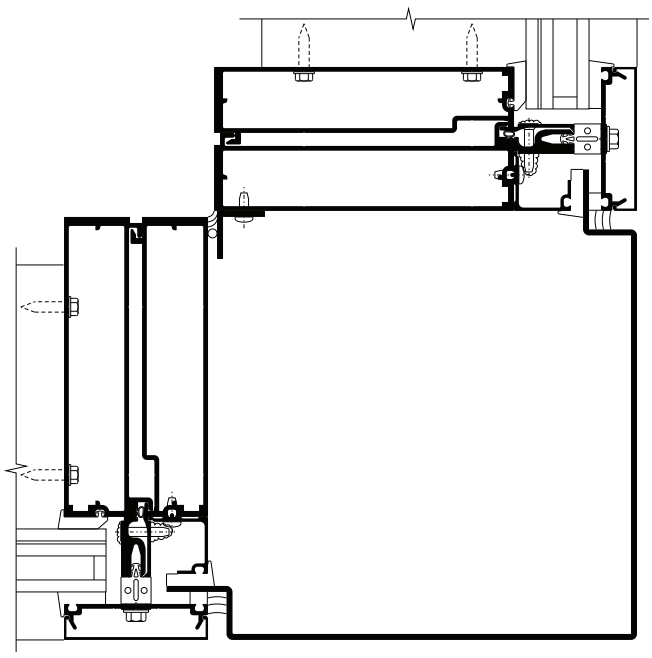


3
DOOR JAMB
CONTINUOUS HINGE
LARGE MISSILE (LMI)

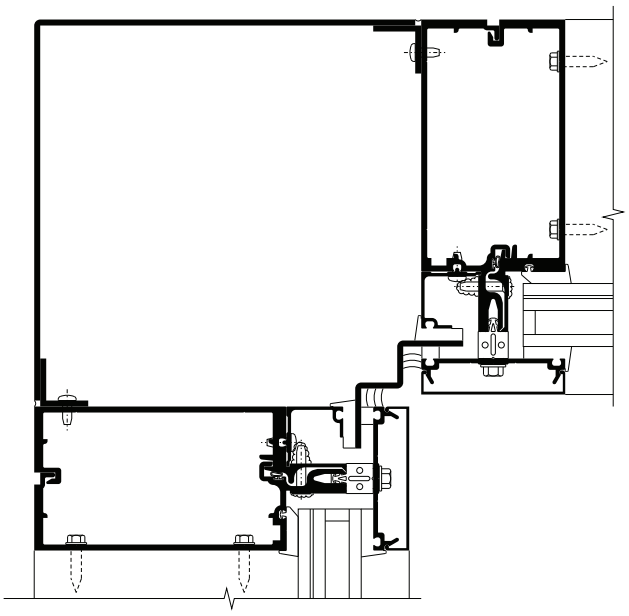
SCALE 3" = 1'-0"



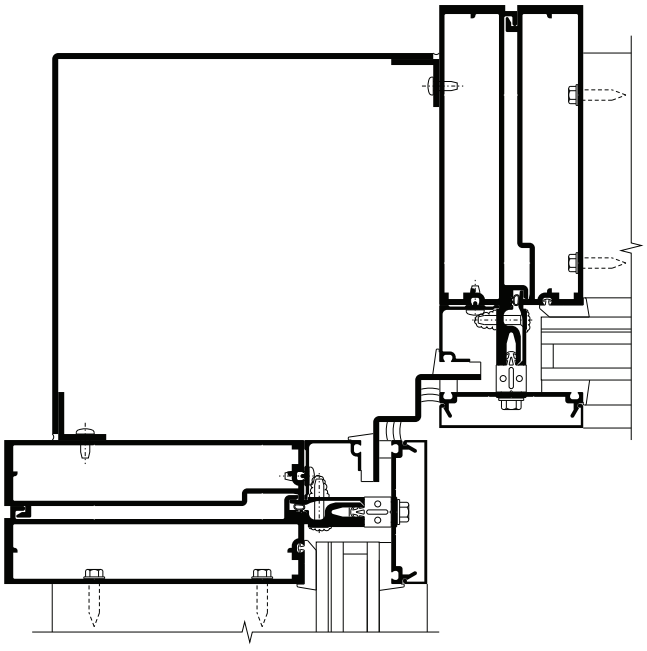
90° OUTSIDE CORNER
7-13/16" DEEP



90° OUTSIDE CORNER
8-13/16" DEEP

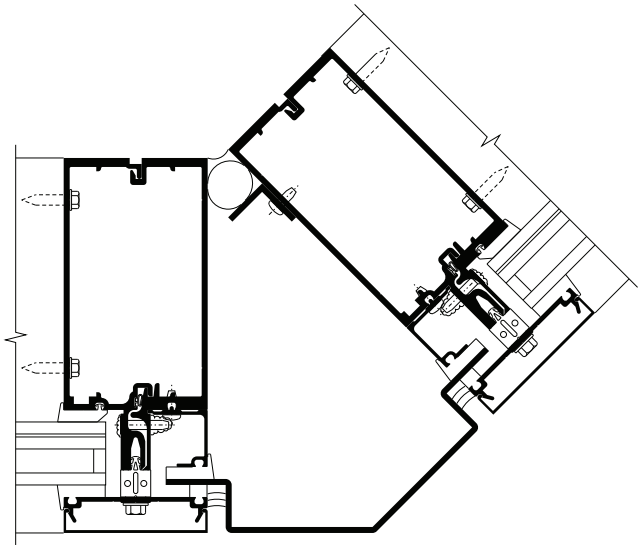


90° INSIDE CORNER
7-13/16" DEEP

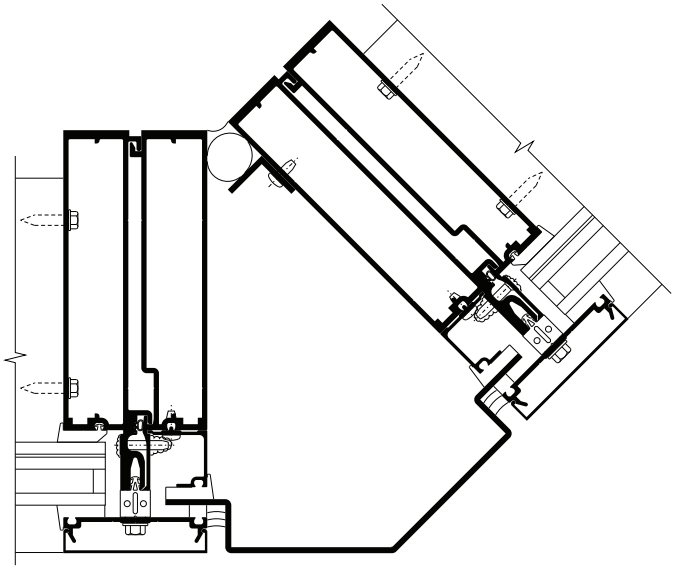


90° INSIDE CORNER
8-13/16" DEEP

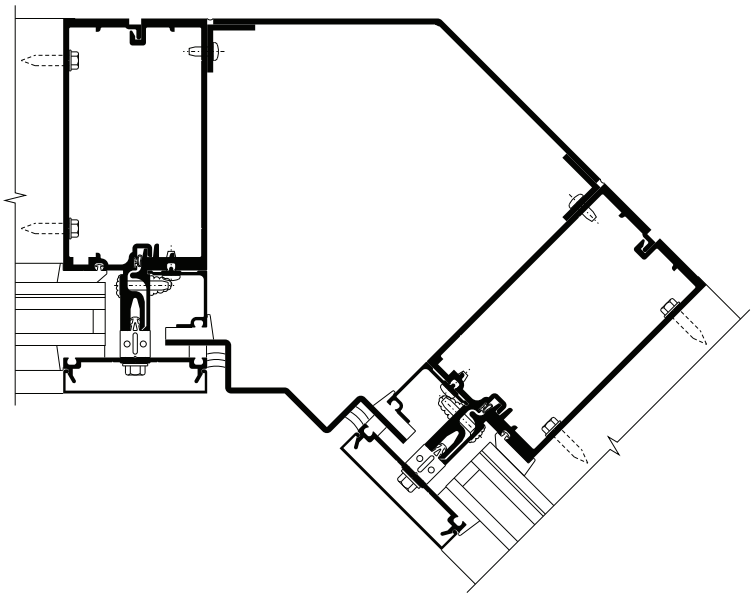
SCALE 3" = 1'-0"



135° OUTSIDE CORNER
7-13/16" DEEP

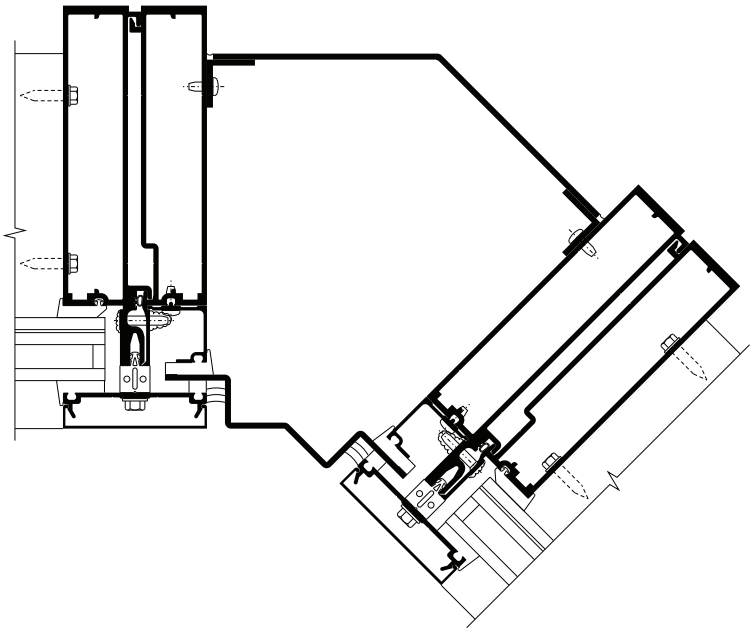


135° OUTSIDE CORNER
8-13/16" DEEP

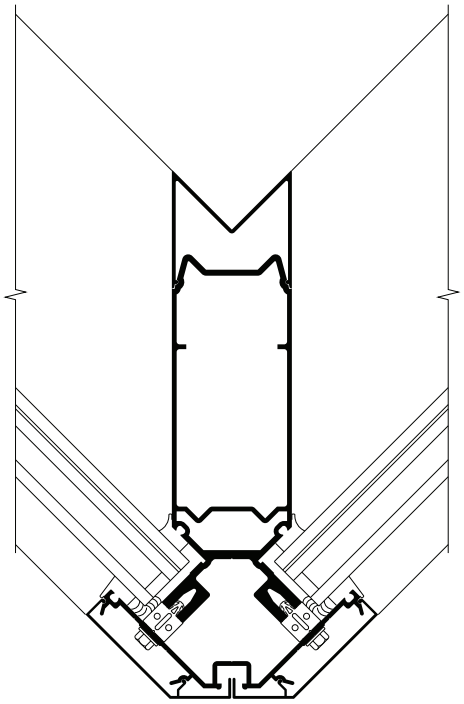


135° INSIDE CORNER
7-13/16" DEEP

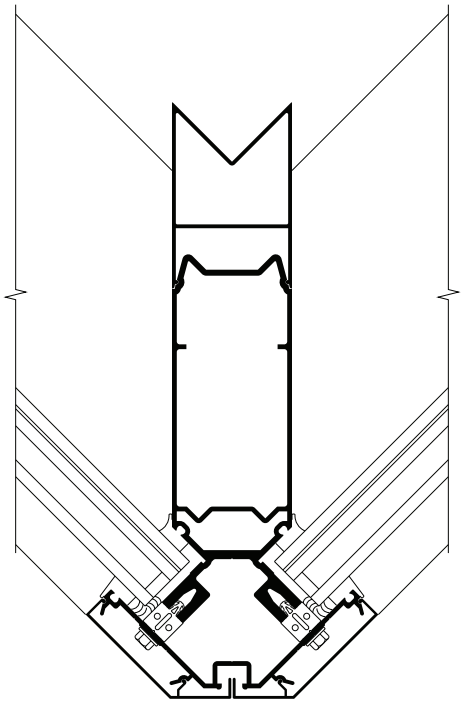
SCALE 3" = 1'-0"



135° INSIDE CORNER
8-13/16" DEEP



135° OUTSIDE CORNER
7-13/16" DEEP

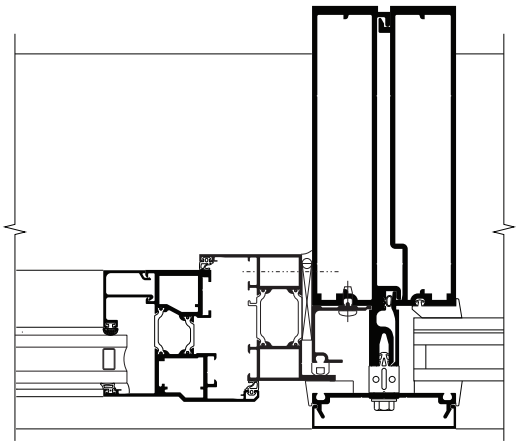


135° OUTSIDE CORNER
8-13/16" DEEP

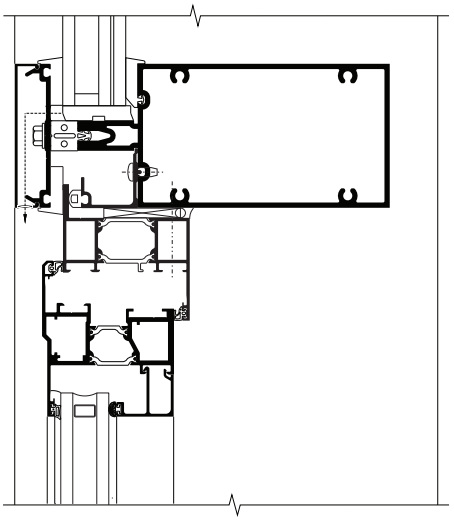
SCALE 3" = 1'-0"

Shown with AA™ 900 Thermal Window

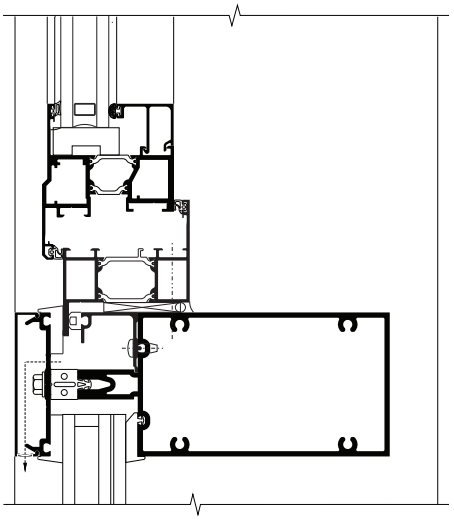
NOTE: Other vent types can be accommodated. Contact your Kawneer representative for other options.



JAMB

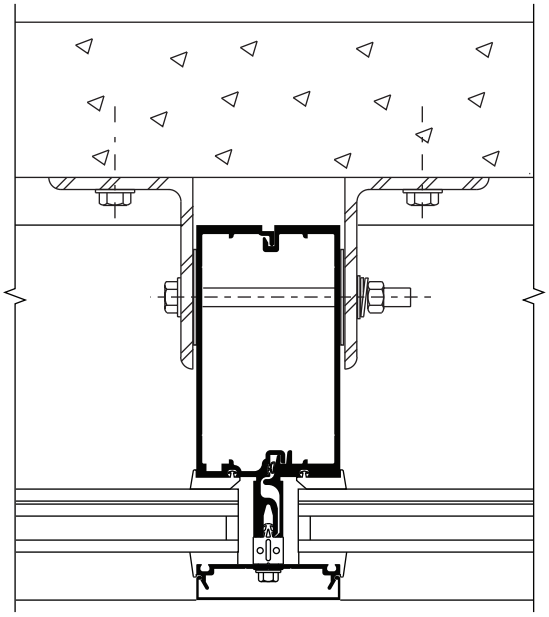


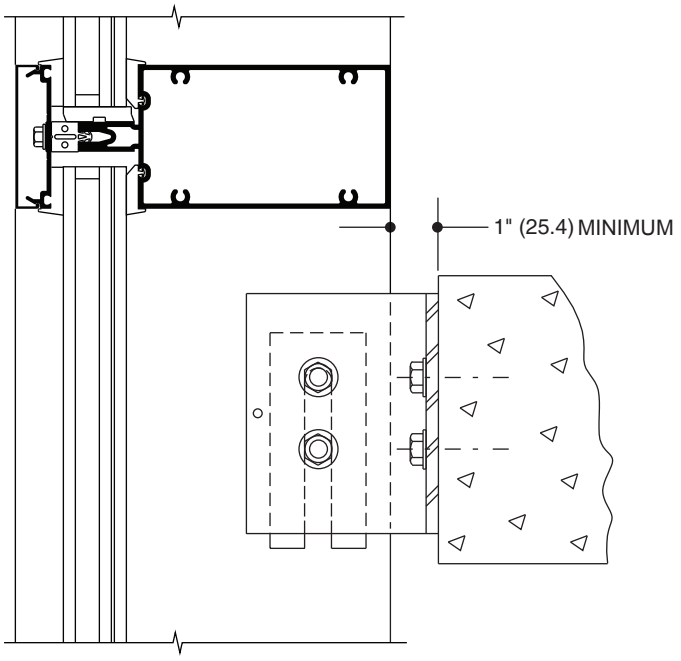
HEAD



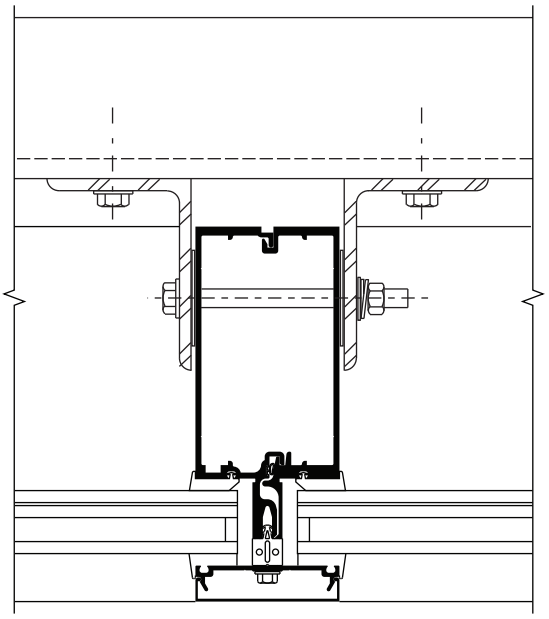
SILL

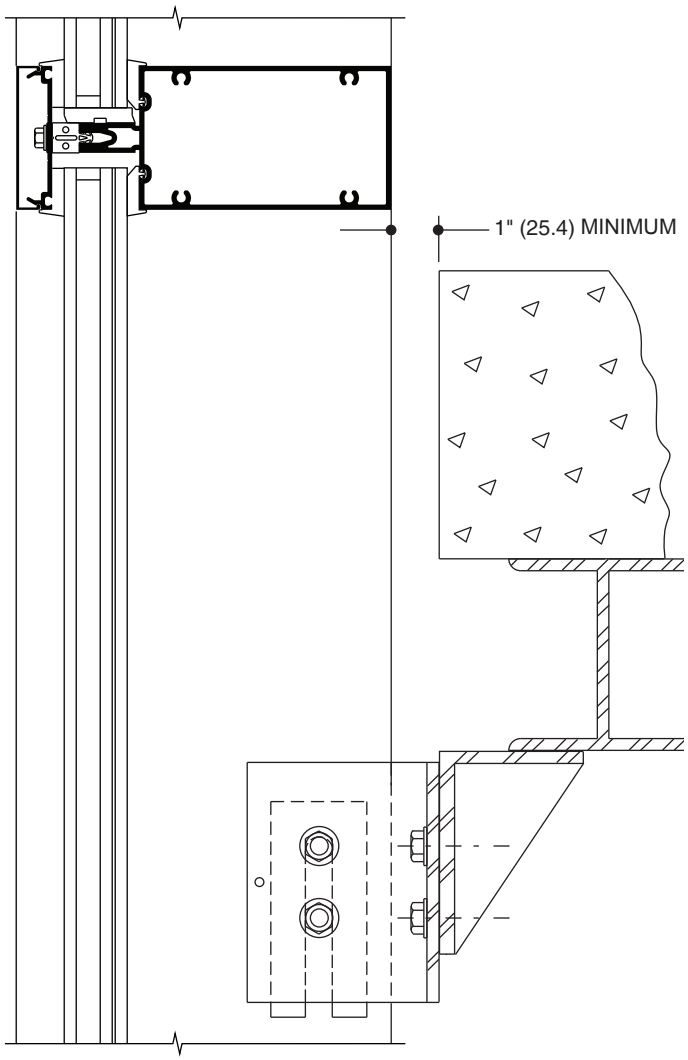
Actual project conditions will determine specific anchor design. Details on this page are for reference only.





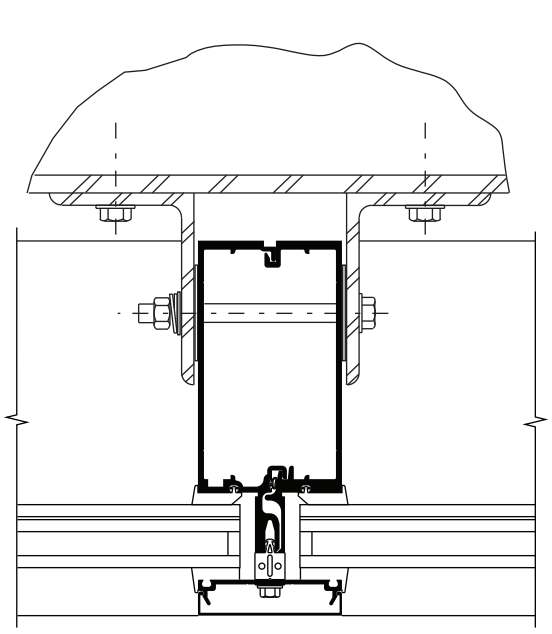
ANCHORING TO FLOOR SLAB

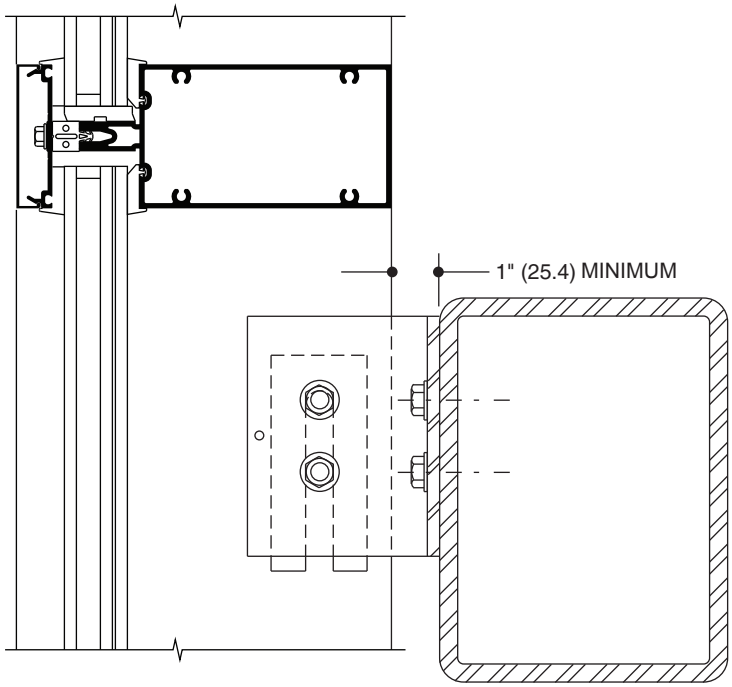




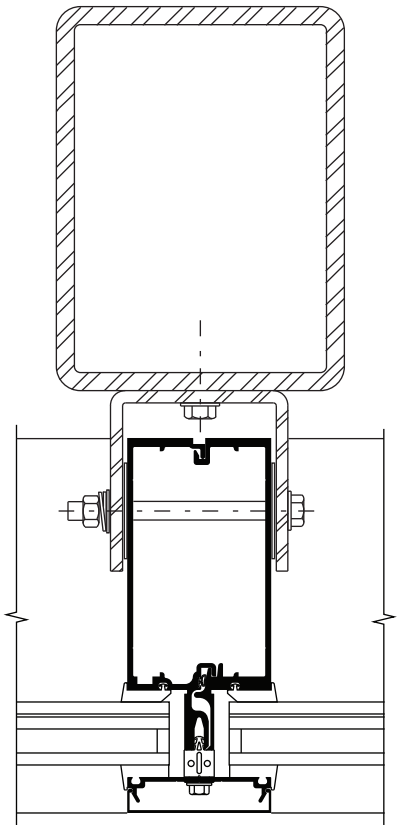
ANCHORING TO SUPPORT STEEL

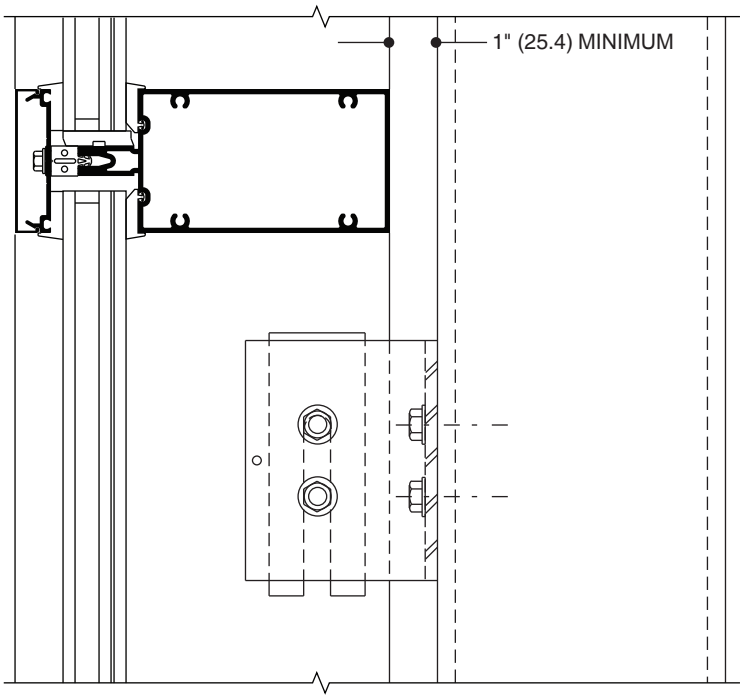
Actual project conditions will determine specific anchor design. Details on this page are for reference only.





ANCHORING TO HORIZONTAL STRUCTURAL STEEL





ANCHORING TO VERTICAL STRUCTURAL STEEL

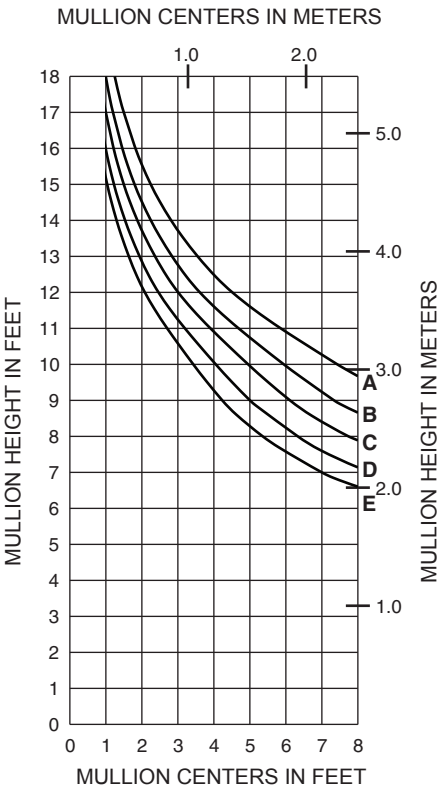
WIND LOAD CHARTS

Mullions are designed for deflection limitations in accordance with AAMA TIR-A11 of L/175 up to 13'-6" and L/240 +1/4" above 13'-6". These curves are for mullions WITH HORIZONTALS and are based on engineering calculations for stress and deflection. Allowable wind load stress for ALUMINUM 15,152 psi (104MPa), STEEL 30,000 psi (207MPa). Charted curves, in all cases are for the limiting value. Wind load charts contained herein are based upon nominal wind load utilized in allowable stress design. A conversion from Load Resistance Factor Design (LRFD) is provided. To convert ultimate wind loads to nominal loads, multiply ultimate wind loads by a factor of 0.6 per ASCE/SEI 7. A 4/3 increase in allowable stress has not been used to develop these curves. For special situations not covered by these curves, contact your Kawneer representative for additional information.

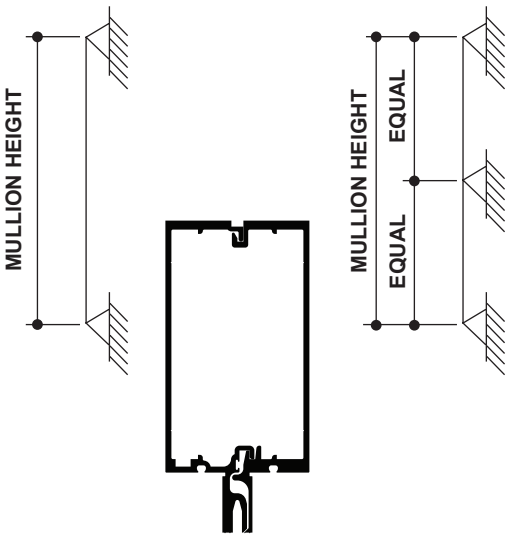
DEADLOAD CHARTS

Horizontal or deadload limitations are based upon 1/8" (3.2), maximum allowable deflection at the center of an intermediate horizontal member. The accompanying charts are calculated for 1" (25.4) thick insulating glass or 1/4" (6.4) thick glass supported on two setting blocks placed at the loading points shown.

SINGLE SPAN

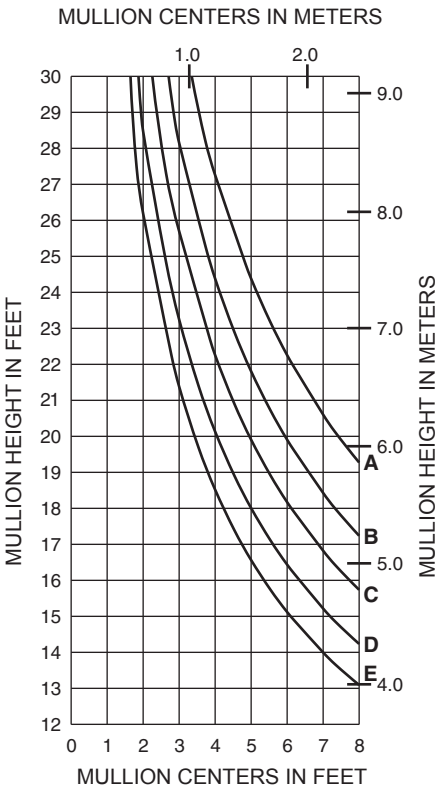


	Allowable Stress Design Load	LRFD Ultimate Design Load
A =	60 PSF (2880)	100 PSF (4790)
B =	75 PSF (3600)	125 PSF (6000)
C =	90 PSF (4310)	150 PSF (7200)
D =	110 PSF (5270)	183 PSF (8770)
E =	130 PSF (6220)	217 PSF (10370)

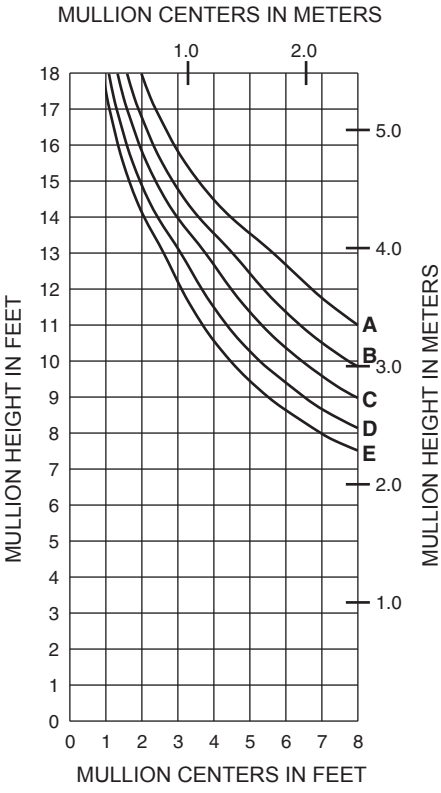


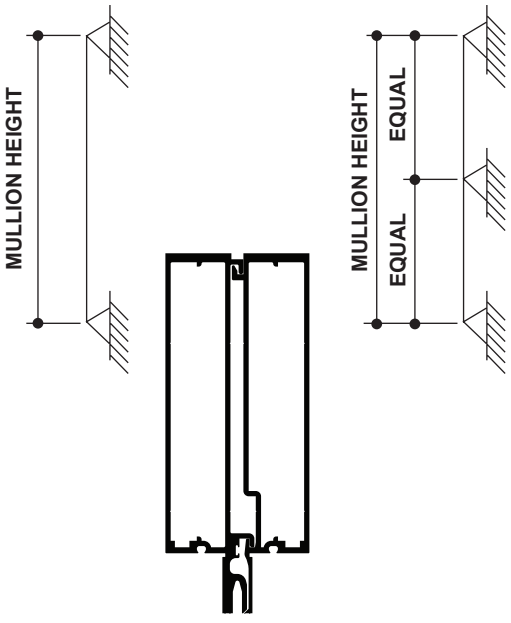
176001 176002
I = 15.354 (639.08 x 10^4)
S = 4.413 (72.32 x 10^3)

TWIN SPAN



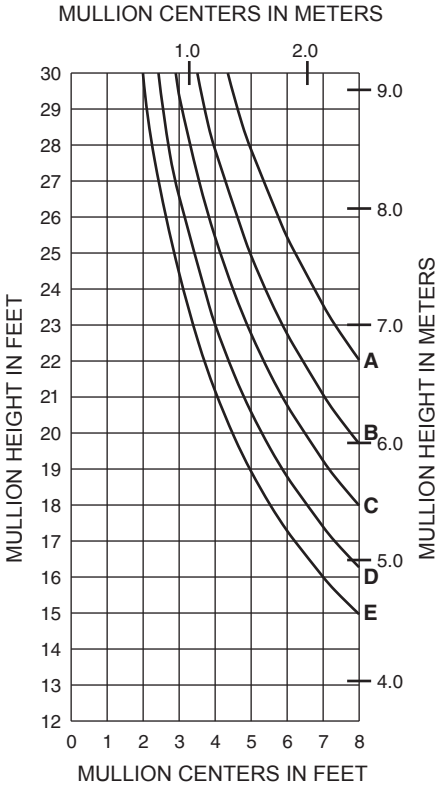
SINGLE SPAN



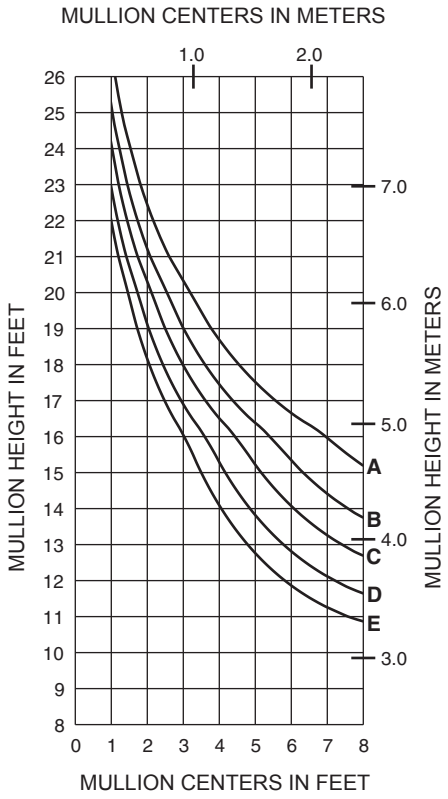


176003 176004
I = 24.511 (1020.22 x 10^4)
S = 5.766 (94.49 x 10^3)

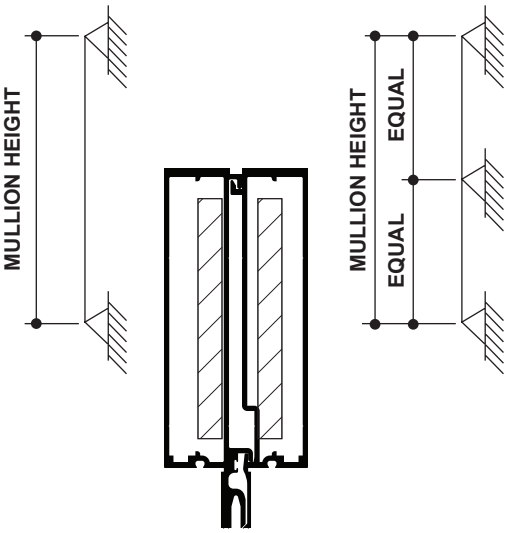
TWIN SPAN



SINGLE SPAN



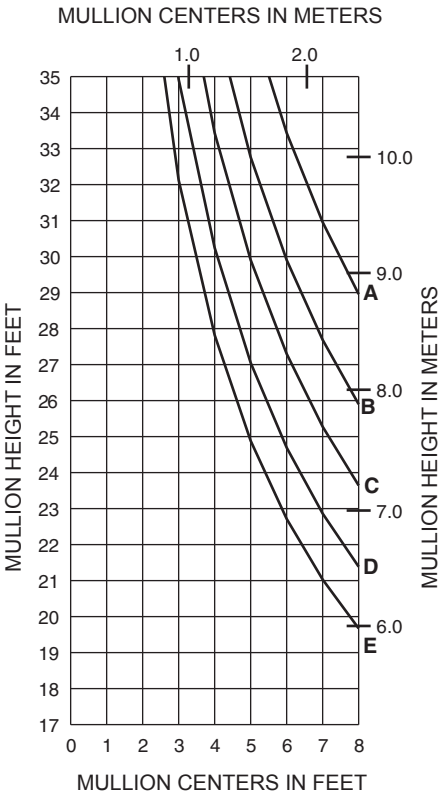
	Allowable Stress Design Load	LRFD Ultimate Design Load
A =	60 PSF (2880)	100 PSF (4790)
B =	75 PSF (3600)	125 PSF (6000)
C =	90 PSF (4310)	150 PSF (7200)
D =	110 PSF (5270)	183 PSF (8770)
E =	130 PSF (6220)	217 PSF (10370)



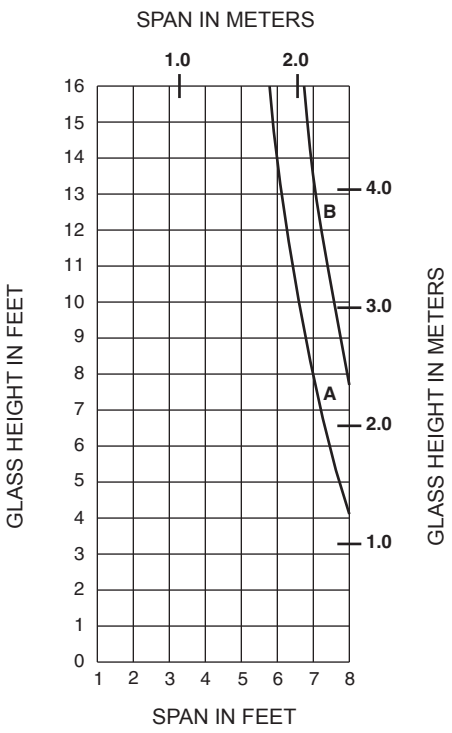
176003 176004
With 176229 (1/2" x 5") Steel Bars

I = 24.511 (1020.22 x 10^4)
S = 6.180 (101.27 x 10^3)
Steel
I = 5.208 (216.77x 10^4)
S = 2.083 (34.13 x 10^3)

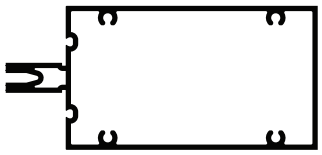
TWIN SPAN



(1-5/16" INFILL)



A = 1/4 POINT LOADING
B = 1/8 POINT LOADING

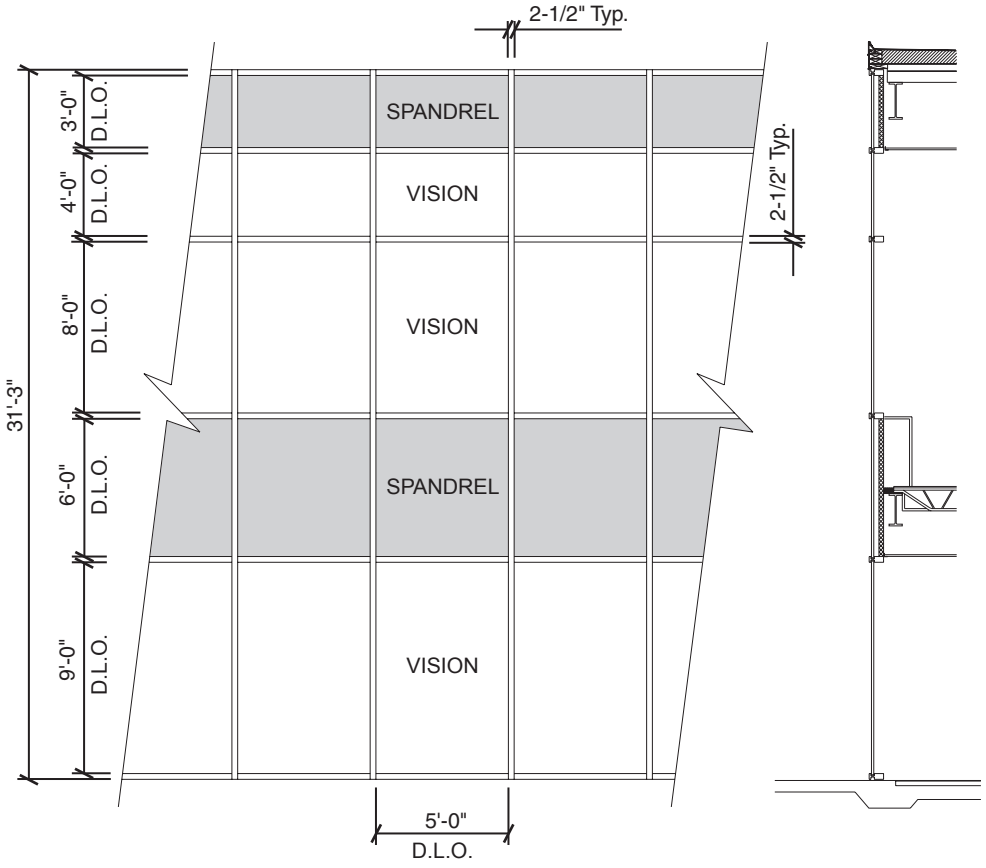


176007

$I = 3.334 (138.77 \times 10^4)$
$S = 2.222 (36.41 \times 10^3)$

Generic Project Specific U-factor Example Calculation
(Percent of Glass will vary on specific products depending on sitelines)

(Based on single bay of Curtain Wall/Window Wall)



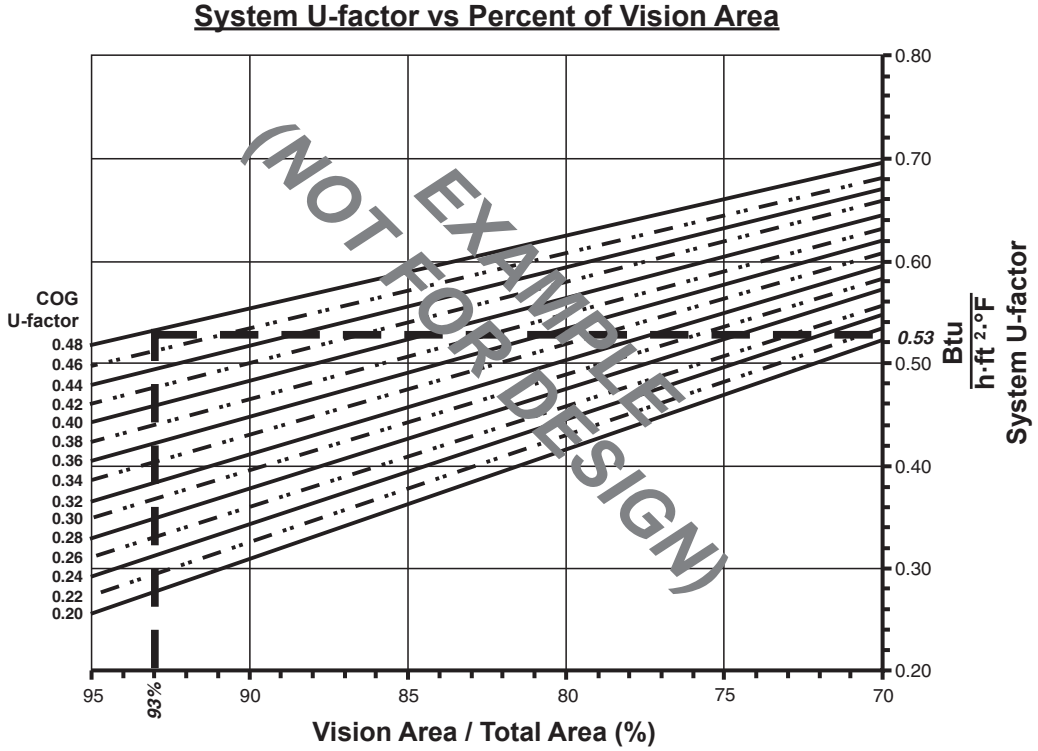
Vision Area

Example Glass U-factor	= 0.48 Btu/(ft^2 · h · °F)
Vision Area	= 5(9 + 8 + 4) = 105.0 ft^2
Total Area (Vision)	= 5' 2-1/2" (9' 3-3/4" + 8' 2-1/2" + 4' 2-1/2") = 113.2 ft^2
Percentage of Vision Glass	= (Vision Area ÷ Total Area)100 = (105.0 ÷ 113.2)100 = 93%

Spandrel Area

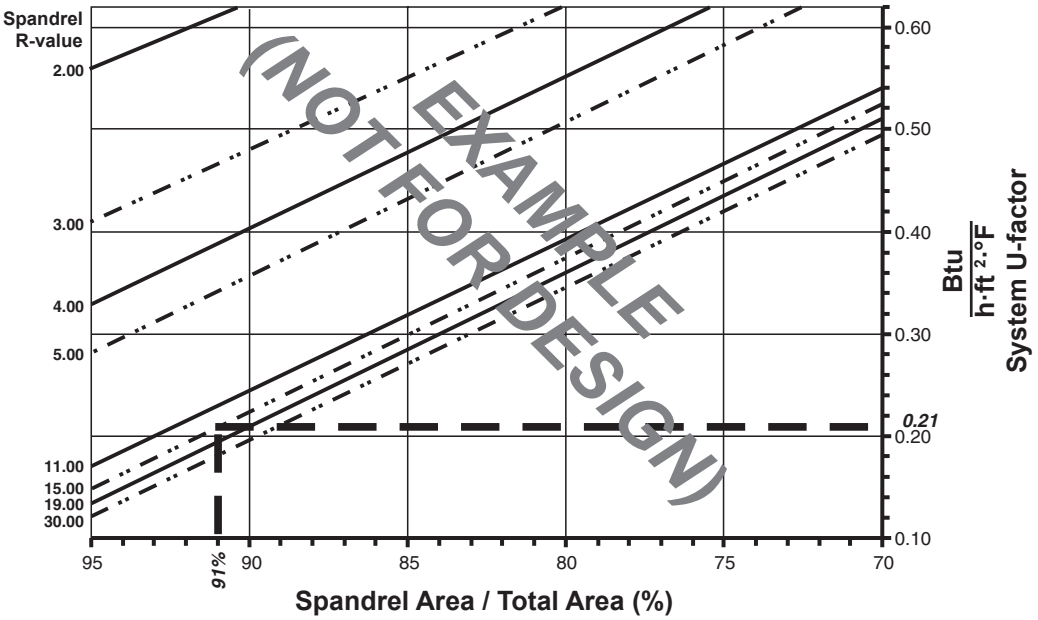
Example Spandrel R-value	= 15 (ft^2 · h · °F)/Btu
Spandrel Area	= 5(6 + 3) = 45.0 ft^2
Total Area (Spandrel)	= 5' 2-1/2" (6' 2-1/2" + 3' 3-3/4") = 49.6 ft^2
Percent of Spandrel	= (Spandrel Area ÷ Total Area)100 = (49.0 ÷ 49.6)100 = 91%

Vision Area Chart



Based on a single curtain wall bay of 93% vision glass and center of glass U-factor of 0.48, System U-factor is equal to 0.53 Btu/(h·ft ²·°F)

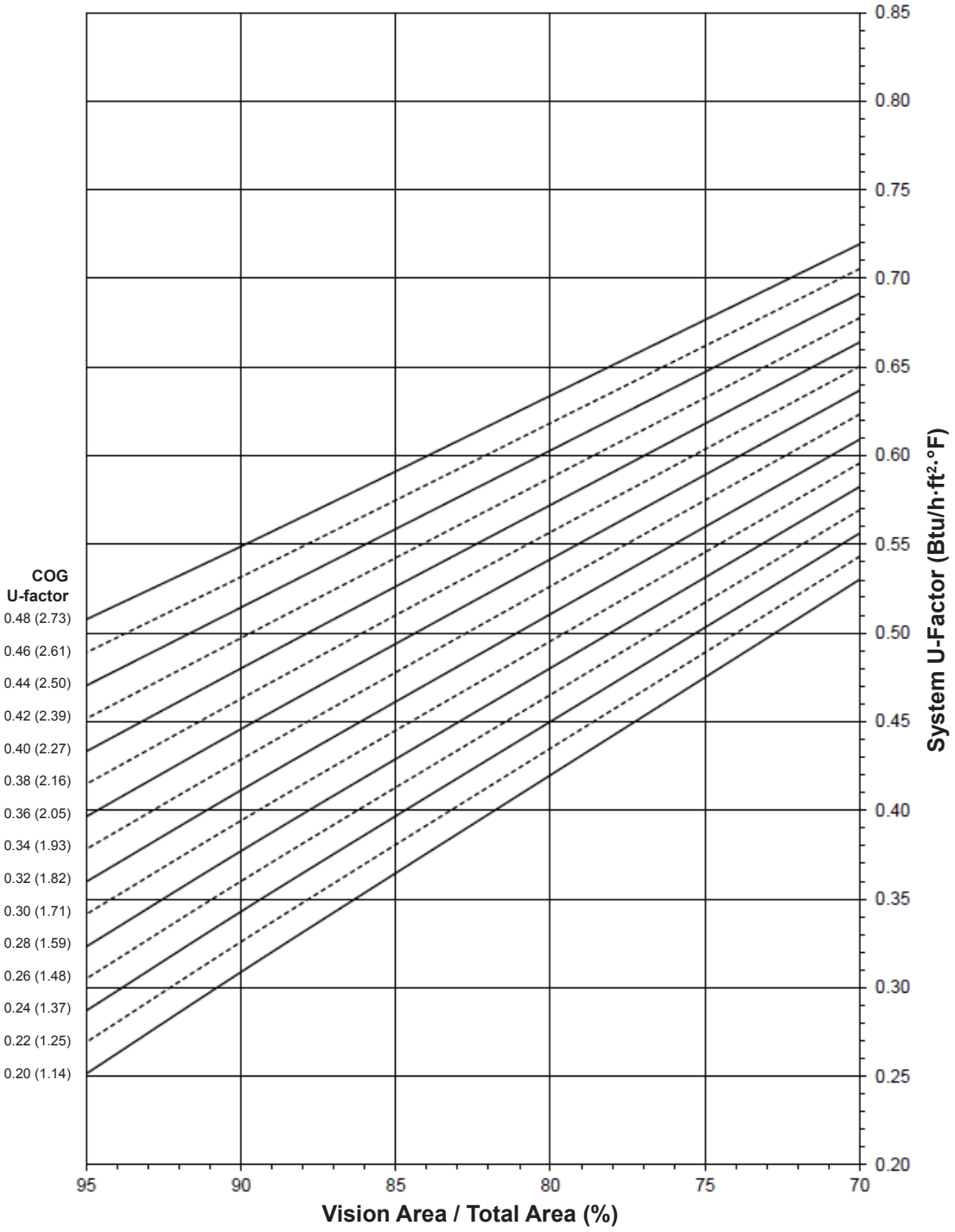
Spandrel Area Chart



Based on a single curtain wall bay of 91% spandrel and center of spandrel R-value of 15, system U-factor is equal to 0.21 Btu/(h·ft ²·°F)

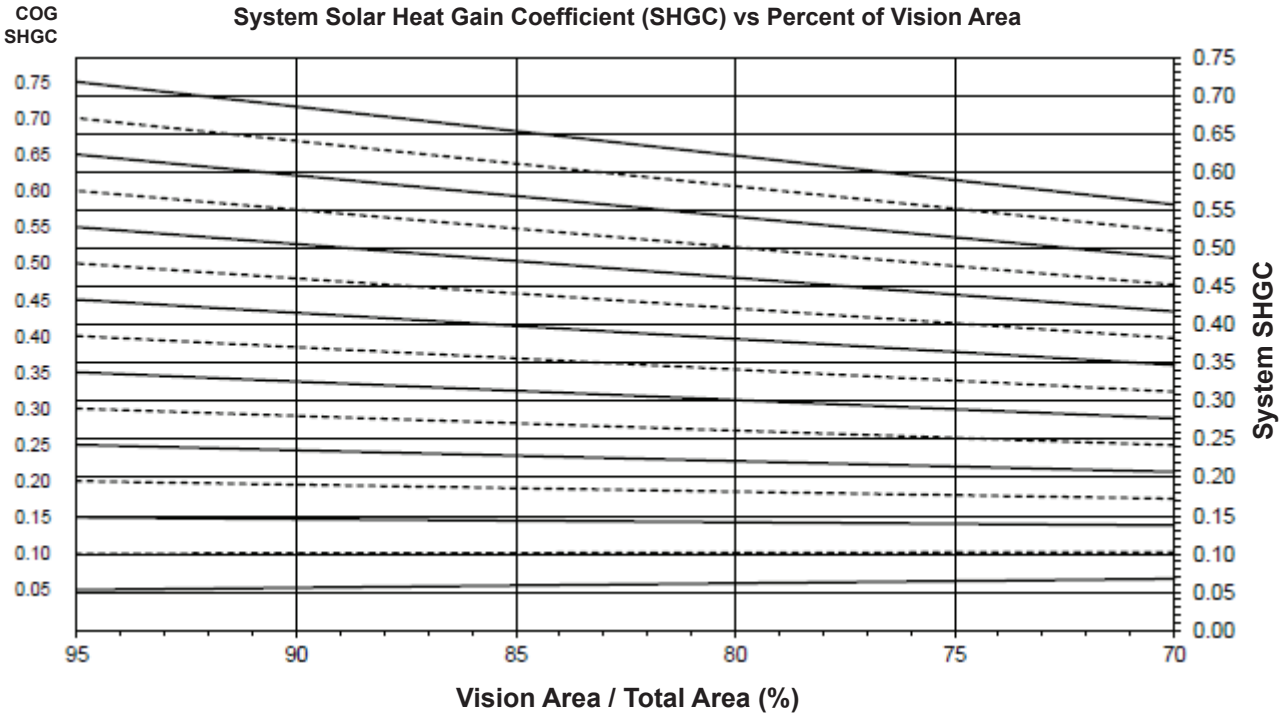
Note:
Values in parentheses are metric.
COG=Center of Glass.
Charts are generated per AAMA 507.

System U-Factor for Vision Glass

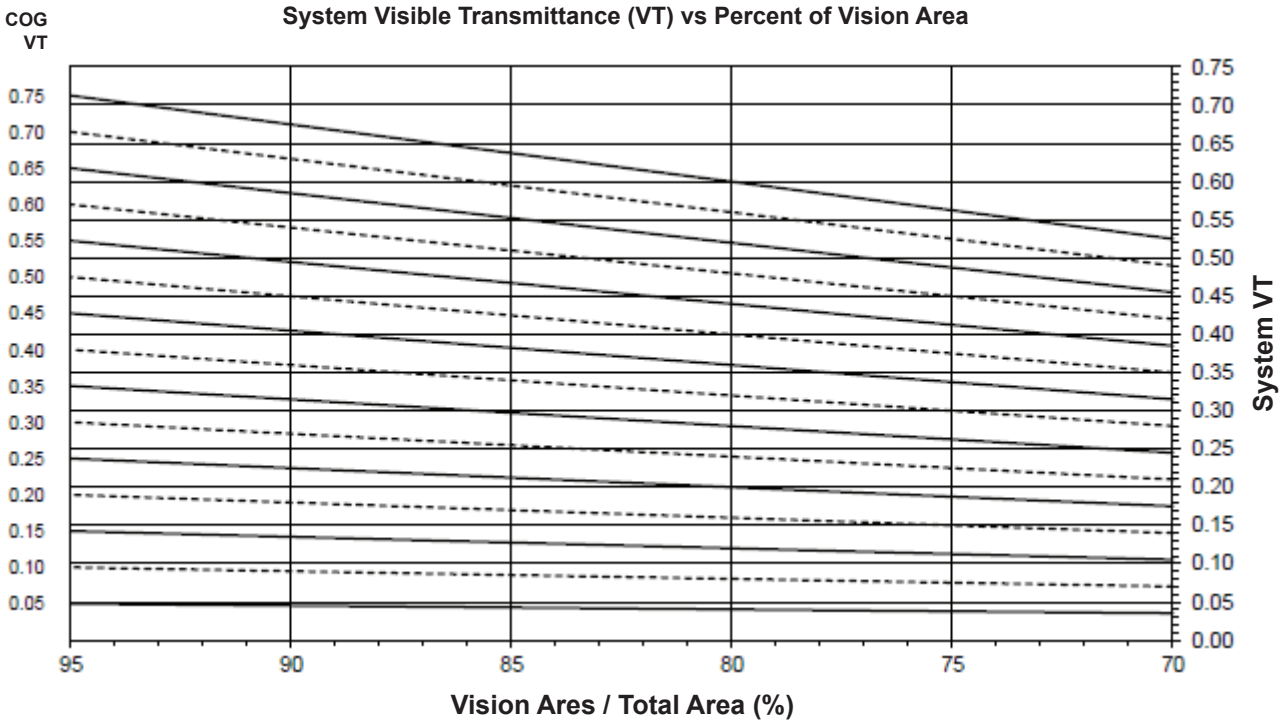


Notes for System U-Factor, SHGC and VT charts:

For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values (winter conditions) and are obtained from your glass supplier.



Charts are generated per AAMA 507.



Charts are generated per AAMA 507.

Thermal Transmittance [1] (BTU/hr • ft [2] • °F)

Glass U-Factor [3]	Overall U-Factor [4]
0.48	0.57
0.46	0.55
0.44	0.53
0.42	0.52
0.40	0.50
0.38	0.48
0.36	0.47
0.34	0.45
0.32	0.43
0.30	0.42
0.28	0.40
0.26	0.38
0.24	0.37
0.22	0.35
0.20	0.33

NOTE: For glass values that are not listed, linear interpolation is permitted.

1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 2000mm wide by 2000mm high (78-3/4" by 78-3/4").

SHGC Matrix [2]

Glass SHGC [3]	Overall SHGC [4]
0.75	0.67
0.70	0.63
0.65	0.58
0.60	0.54
0.55	0.50
0.50	0.45
0.45	0.41
0.40	0.36
0.35	0.32
0.30	0.28
0.25	0.23
0.20	0.19
0.15	0.14
0.10	0.10
0.05	0.06

Visible Transmittance [2]

Glass VT [3]	Overall VT [4]
0.75	0.66
0.70	0.62
0.65	0.57
0.60	0.53
0.55	0.48
0.50	0.44
0.45	0.40
0.40	0.35
0.35	0.31
0.30	0.26
0.25	0.22
0.20	0.18
0.15	0.13
0.10	0.09
0.05	0.04

Architects - These concepts have been expanded and modified to afford you design freedom.
Please contact your Kawneer representative for further assistance.
The extrusions and window types illustrated in this catalog are standard products for Kawneer.

LAWS AND BUILDING AND SAFETY CODES GOVERNING THE DESIGN AND USE OF GLAZED ENTRANCE, WINDOW, AND CURTAIN WALL PRODUCTS VARY WIDELY. KAWNEER DOES NOT CONTROL THE SELECTION OF PRODUCT CONFIGURATIONS, OPERATING HARDWARE, OR GLAZING MATERIALS, AND ASSUMES NO RESPONSIBILITY THEREFOR.

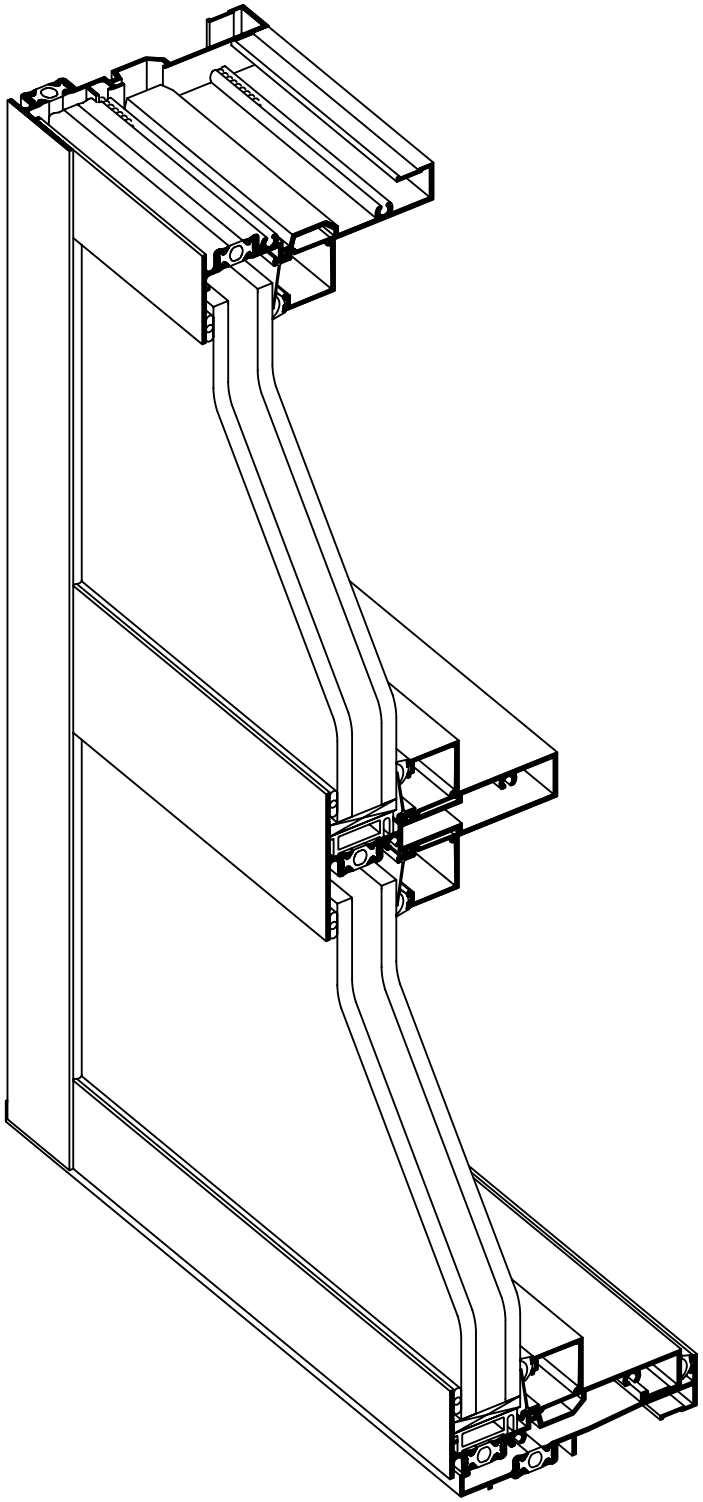
Metric (SI) conversion figures are included throughout these details for reference.
Numbers in parentheses ( ) are millimeters unless otherwise noted.

The following metric (SI) units are found in these details:

m - meter
cm - centimeter
mm - millimeter
s - second
Pa - pascal
MPa - megapascal

Kawneer reserves the right to change configurations without prior notice when deemed necessary for product improvement.

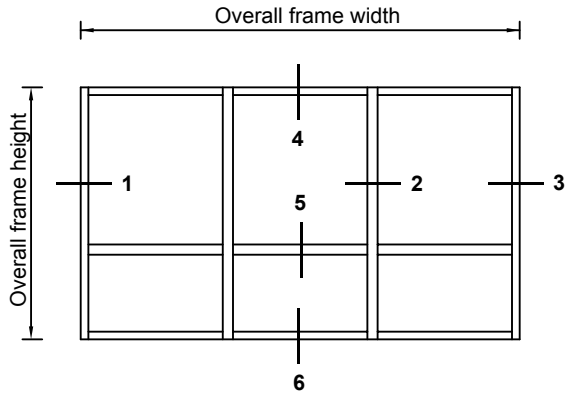
- 19/32" (14.6 mm) ISOPORT ® glass-reinforced nylon 6/6 thermal break provides:
    - Improved condensation resistance and thermal transmittance performance capability
    - Rigid profile with composite structural performance
    - Exterior / interior finish options
- Meets or exceeds the highest performance levels of CSA standard CAN/CSA-A440 windows
- Seamless coupling mullion features unbroken weather joints on exterior surface
- Provision for thermal movement
- Simple joinery with overlapping flanges for economical construction and good weathering capability
- Optional full rain screen capability
- Accommodates 1" sealed glazing units
- Glass installed and replaced from interior
- Exterior pre-shim butyl glazing tapes
- Interior EPDM rubber glazing gaskets
- Lock-in glass stop
- Companion open-out or open-in vent inserts available
- Accepts 512 Ventrow® inserts

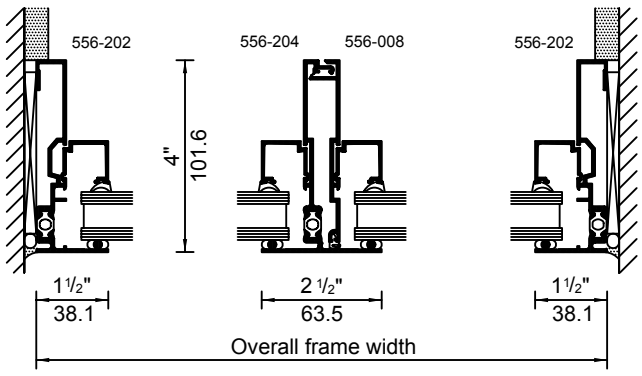


SCALE: 1/4 FULL SIZE

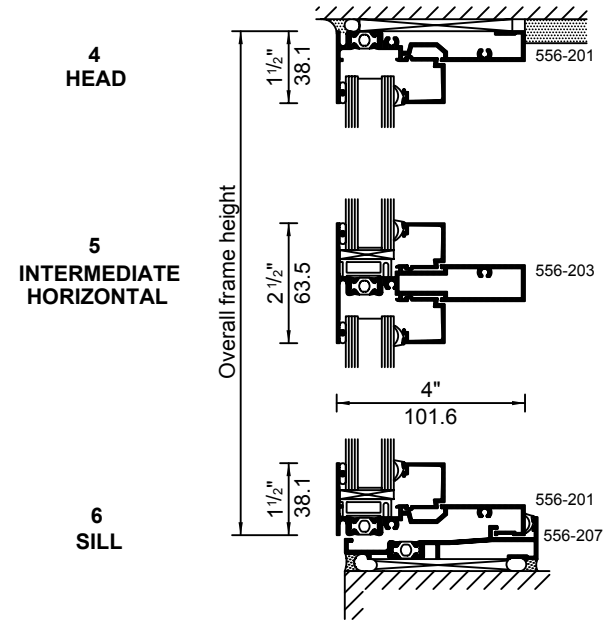
TYPE A

HORIZONTAL STRIP WINDOW



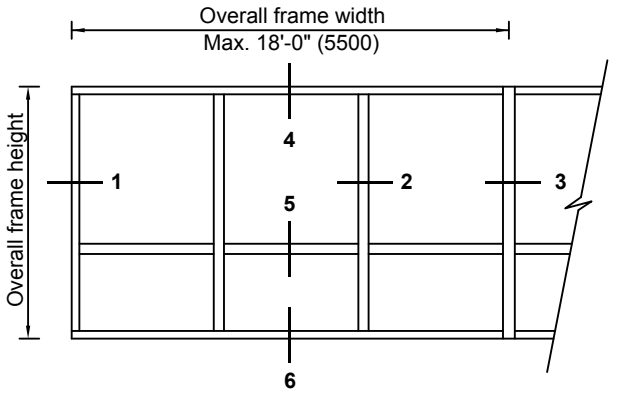


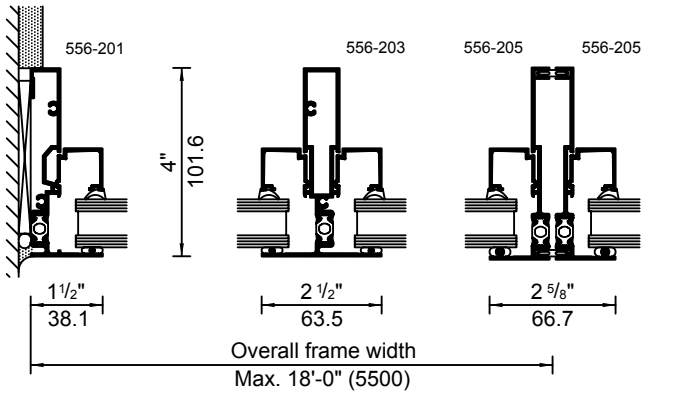
1 JAMB | **2 COUPLING MULLION** | **3 JAMB**



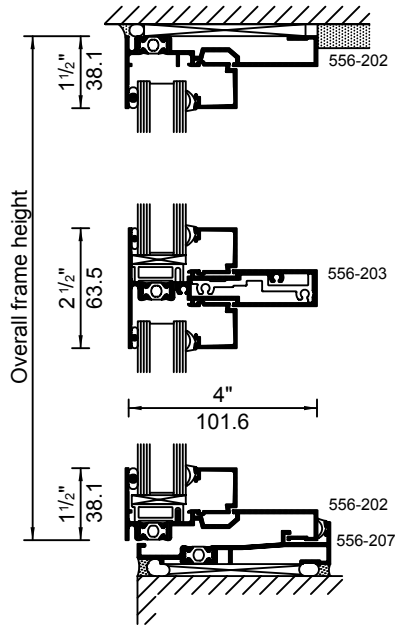
TYPE B

MULTI-MODULAR STRIP WINDOW OR PUNCHED OPENING



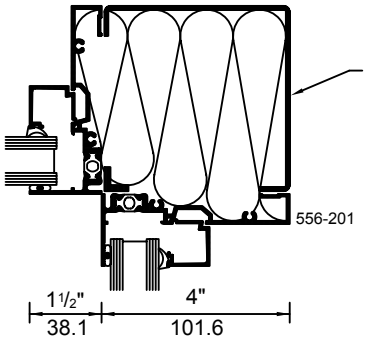


1 JAMB | **2 TUBULAR MULLION** | **3 MULTI-MODULAR COUPLING MULLION**

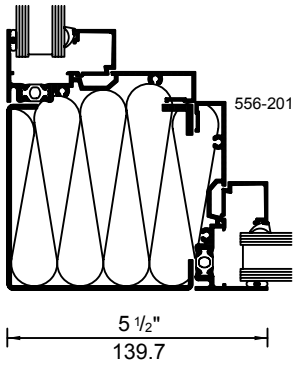


SCALE: 1/4 FULL SIZE

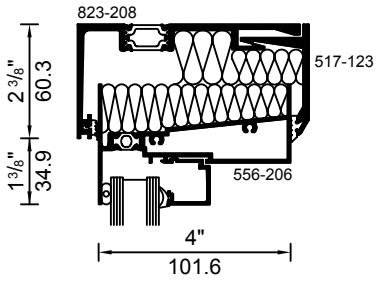
90° INSIDE CORNER



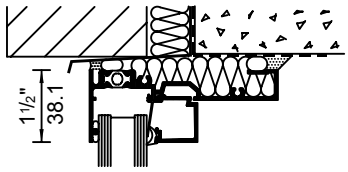
90° OUTSIDE CORNER



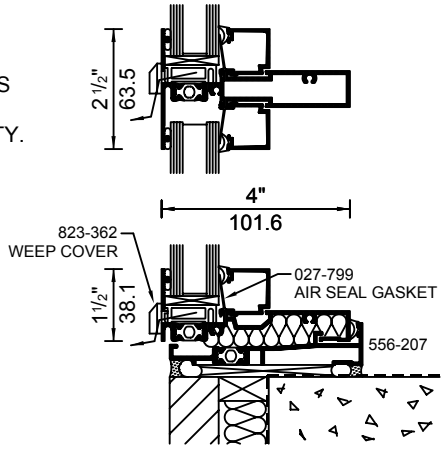
DEFLECTION HEAD
(ALLOWS ± 5/8" (15.9) MOVEMENT)



RAIN SCREEN WINDOW



NOTE:
BUILDING INTERFACE DETAILS VARY WIDELY AND ARE SIMPLIFIED HERE FOR CLARITY.



For some regions and projects there may be minimum energy efficiency requirements for the building envelope, and its components, including windows. The shading coefficient (SC) and the thermal transmittance (U - value) of the window is then required to determine whether the building design complies with the specified energy requirements. Shading coefficient depends on the glass selected and should be obtained from the glass supplier. The U - value of the window varies with the type of glass and sealed unit edge construction, the window frame, and the relative areas of these components.

The window thermal transmittance values (U - values) shown in the chart below are based on CSA - A440.2 "Energy Performance Evaluation of Windows and Sliding Glass Doors". U - values of the centre of glass, edge of glass and frame areas were computed using the VISION and FRAME thermal simulation programs. Overall window U - values were calculated using the following relationship:

$$U_w = (U_c\ A_c + U_e\ A_e + U_f\ A_f\ )/A_w$$

where

U_w = U-value of complete window product

U_c = calculated centre of glass U-value

U_e = calculated edge of glass U-value

U_f = calculated frame U-value

A_c = centre of glass area

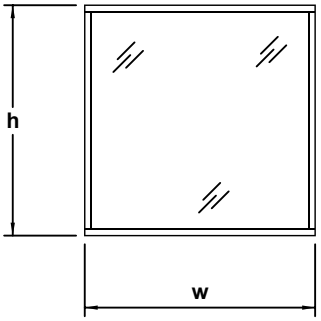
A_e = edge of glass area

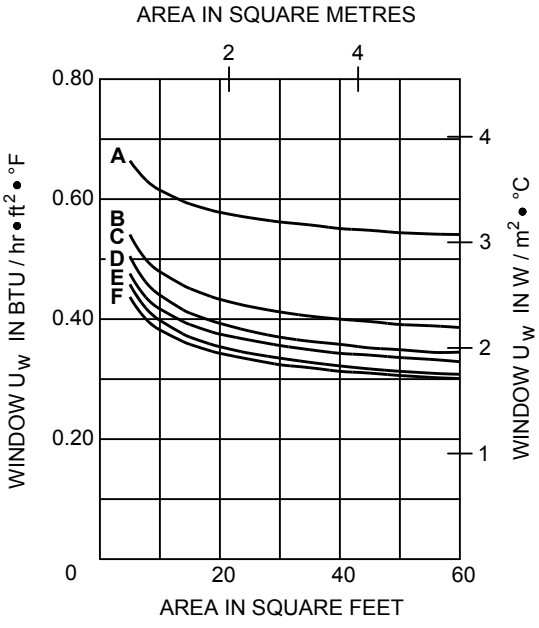
A_f = frame area

A_w = total window area

OVERALL WINDOW U-VALUE (U_w)

For fixed window configurations as shown with height (h) equal to width (w).





SEALED UNIT GLAZING TYPE

A = 6mm clear / ½" air / 6mm clear / metal spacer

B = 6mm clear / ½" air / 6mm low-e[1] / metal spacer

C = 6mm clear / ½" argon / 6mm low-e[1] / metal spacer

D = 6mm clear / ½" argon / 6mm low-e[1] / Helima thermally broken spacer

E = 6mm clear / ½" argon / 6mm low-e[2] / Helima thermally broken spacer

F = 6mm clear / ½" argon / 6mm low-e[2] / Edgetech Super Spacer®

1 - low-e coating emittance = 0.10
2 - low-e coating emittance = 0.03

NOTES: THE ABOVE SEALED UNIT GLAZING OPTIONS ARE PRESENTED FOR THE PURPOSES OF ILLUSTRATING THERMAL PERFORMANCE CAPABILITIES.

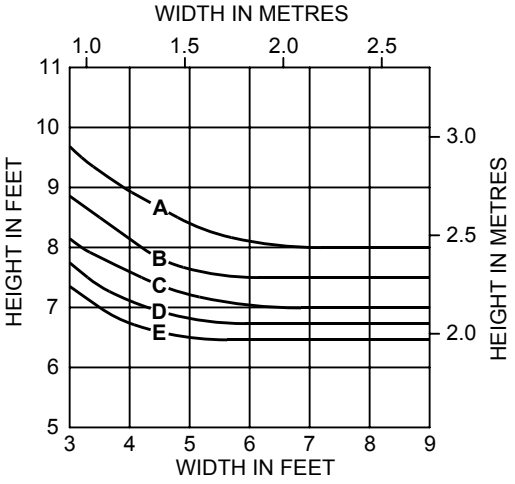
FOR WINDOWS WITH HEIGHT NOT EQUAL TO WIDTH, WHEN ADDING INTERMEDIATE VERTICALS OR HORIZONTALS, OR DIFFERENT GLASS INFILL, THE OVERALL WINDOW U - VALUE MAY VARY.

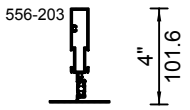
THE SPECIFIER SHOULD SELECT GLASS TO MEET THE PERFORMANCE REQUIREMENTS OF THE PROJECT.

Calculations are based on CAN3-S157 "Strength Design in Aluminum" in accordance with the National Building Code of Canada and an allowable deflection of 1/175 of mullion span.

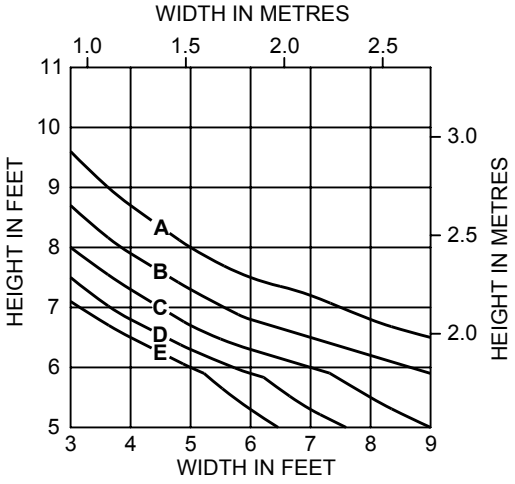
WINDLOAD LIMITATIONS

WITHOUT HORIZONTALS



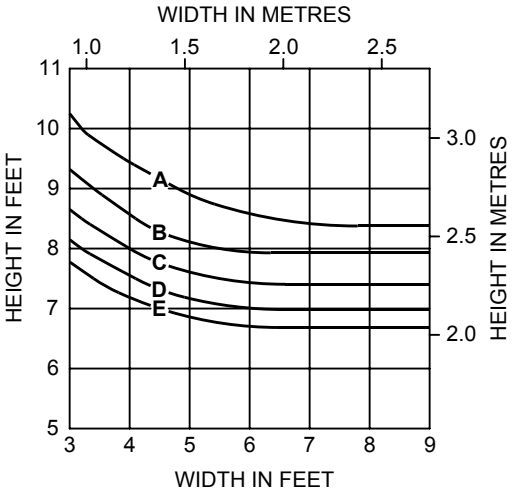


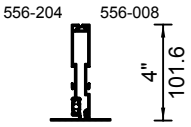
WITH HORIZONTALS



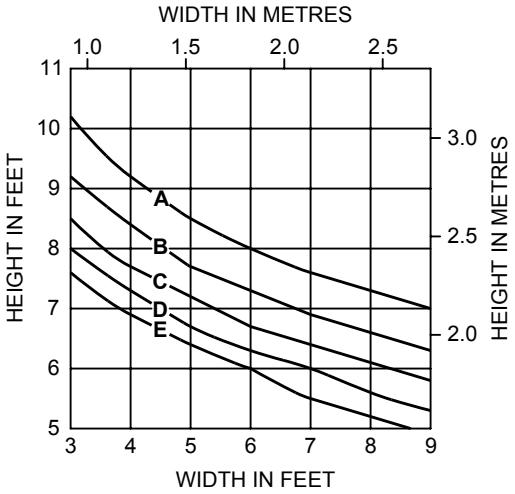
A = 15 p.s.f. (0.72 kPa.)
B = 20 p.s.f. (0.96 kPa.)
C = 25 p.s.f. (1.20 kPa.)
D = 30 p.s.f. (1.44 kPa.)
E = 35 p.s.f. (1.68 kPa.)

WITHOUT HORIZONTALS





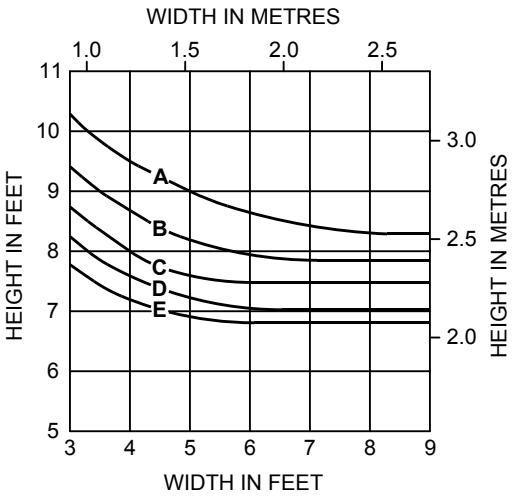
WITH HORIZONTALS

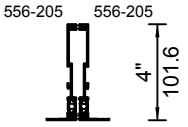


Calculations are based on CAN3-S157 "Strength Design in Aluminum" in accordance with the National Building Code of Canada and an allowable deflection of 1/175 of mullion span.

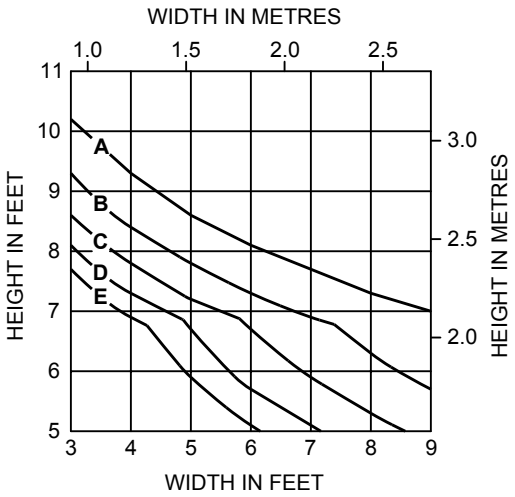
WINDLOAD LIMITATIONS

WITHOUT HORIZONTALS



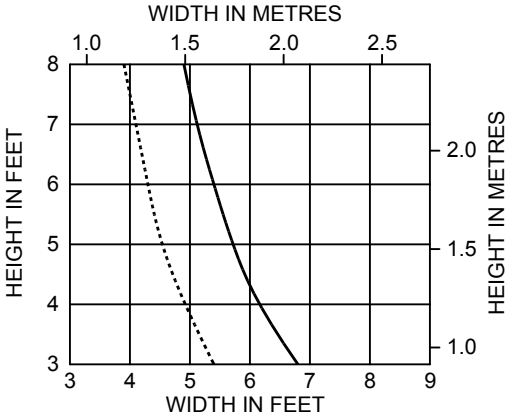


WITH HORIZONTALS



A = 15 p.s.f. (0.72 kPa.)
B = 20 p.s.f. (0.96 kPa.)
C = 25 p.s.f. (1.20 kPa.)
D = 30 p.s.f. (1.44 kPa.)
E = 35 p.s.f. (1.68 kPa.)

DEADLOAD LIMITATIONS

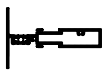


Intermediate Horizontal Over Ventilator (Maximum Deflection 1/16")

Intermediate Horizontal Over Fixed Lite (Maximum Deflection 1/8")

Curves are for 25 mm (1") sealed units with (2) 6 mm (1/4") lites with setting blocks 3" (76 mm) from the ends of the lite.

Intermediate Horizontal 556-203



$I = 0.12\ in^4 (0.05 \times 10^6 mm^4)$
$S = 0.09\ in^3 (0.15 \times 10^4 mm^3)$

Architects - These concepts have been expanded and modified to afford you design freedom.
Please contact your Kawneer representative for further assistance.
The extrusions and window types illustrated in this catalog are standard products for Kawneer.

LAWS AND BUILDING AND SAFETY CODES GOVERNING THE DESIGN AND USE OF GLAZED ENTRANCE, WINDOW, AND CURTAIN WALL PRODUCTS VARY WIDELY. KAWNEER DOES NOT CONTROL THE SELECTION OF PRODUCT CONFIGURATIONS, OPERATING HARDWARE, OR GLAZING MATERIALS, AND ASSUMES NO RESPONSIBILITY THEREFOR.

Metric (SI) conversion figures are included throughout these details for reference.
Numbers in parentheses ( ) are millimeters unless otherwise noted.

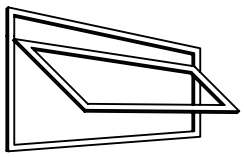
The following metric (SI) units are found in these details:

m - meter
cm - centimeter
mm - millimeter
s - second
Pa - pascal
MPa - megapascal

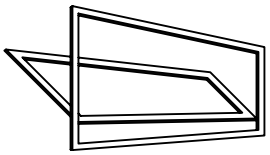
Kawneer reserves the right to change configurations without prior notice when deemed necessary for product improvement.

- Full range of projected open-in and open-out vents and hinged casements.
- 14.6 mm ISOPORT ® glass-reinforced nylon 6/6 thermal break provides:
    - Improved condensation resistance and thermal transmittance performance capability.
    - Rigid profile with composite structural performance.
    - Exterior / interior finish options.
- Meets or exceeds the highest performance levels of CSA standard CAN/CSA-A440 windows.
- Sash features mitred and clip, adhesive, stake joinery to provide rigid and weather tight corners.
- Operating sash uses tubular extrusions.
- Factory fabricated and assembled.
- Optional full rain screen capability.
- Accommodates 25 mm sealed glazing units.
- Glass installed and replaced from interior.
- Exterior pre-shim butyl glazing tapes.
- Interior EPDM rubber glazing gaskets.
- Lock-in glass stop.
- Optional insect screens.

PROJECTED VENTS

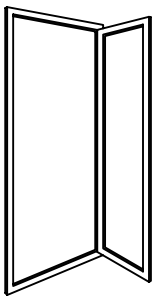


TOP PROJECTED
OPEN-OUT
(TPO)

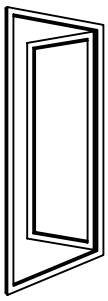


BOTTOM PROJECTED
OPEN-IN
(BPI)

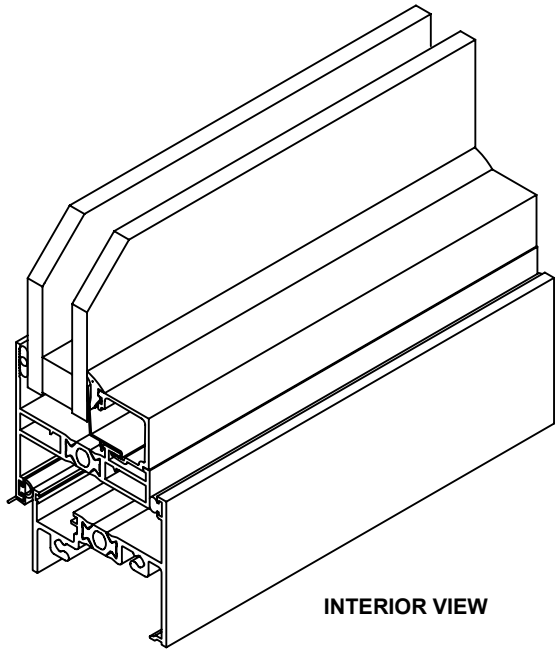
CASEMENTS



SIDE HINGED
OPEN-OUT
(SHO)



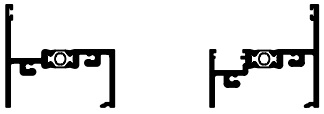
SIDE HINGED
OPEN-IN
(SHI)



INTERIOR VIEW

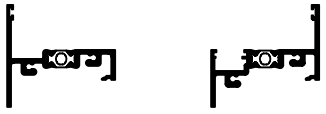
PERIMETER FRAME SECTIONS

Open in Open out



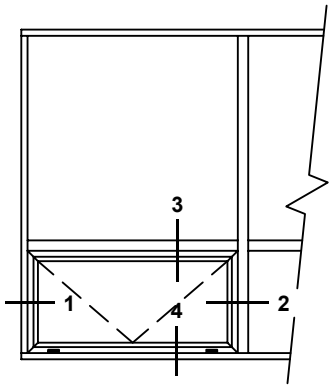
Long equal legs
(typical)

Open in Open out

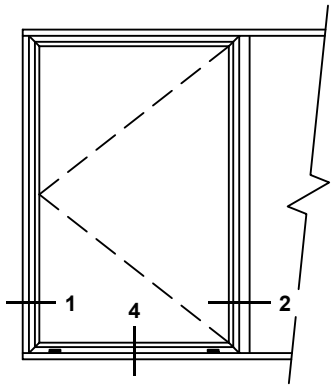


Short interior leg
(for curtainwall installation)

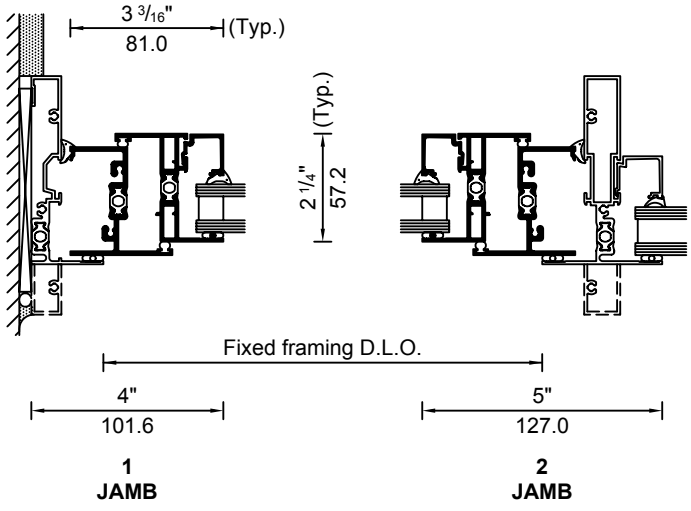
SCALE 1/4 FULL SIZE

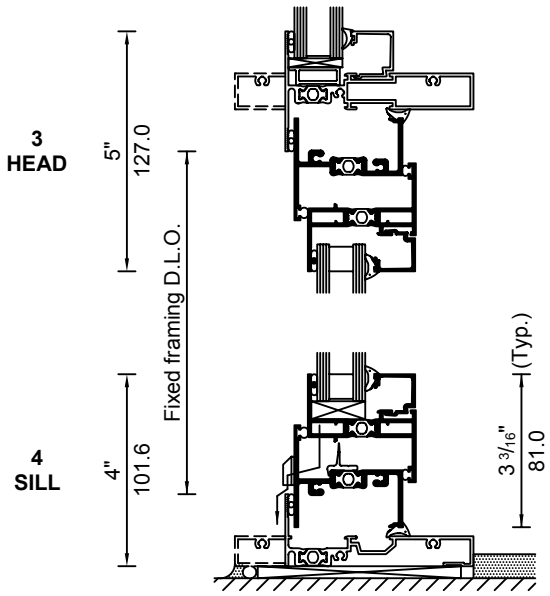


TYPE 801
BOTTOM PROJECTED
OPEN-IN (BPI)
VENTILATOR

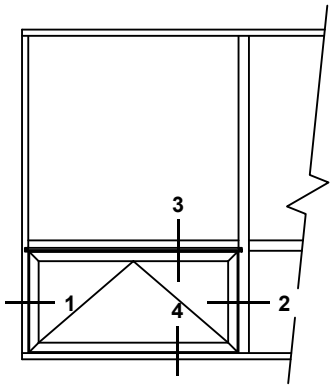


TYPE 813 R.H. SHOWN
TYPE 807 L.H. OPPOSITE
SIDE HINGED
OPEN-IN (SHI)
CASEMENT

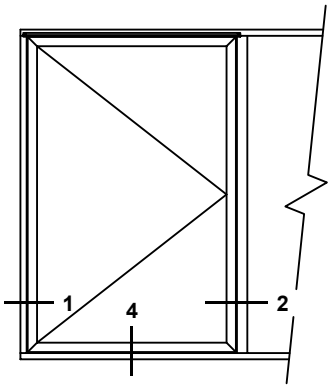




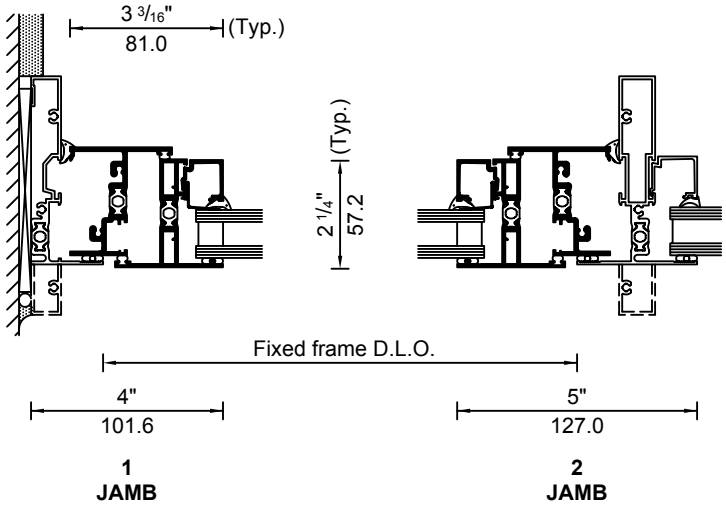
SCALE 1/4 FULL SIZE

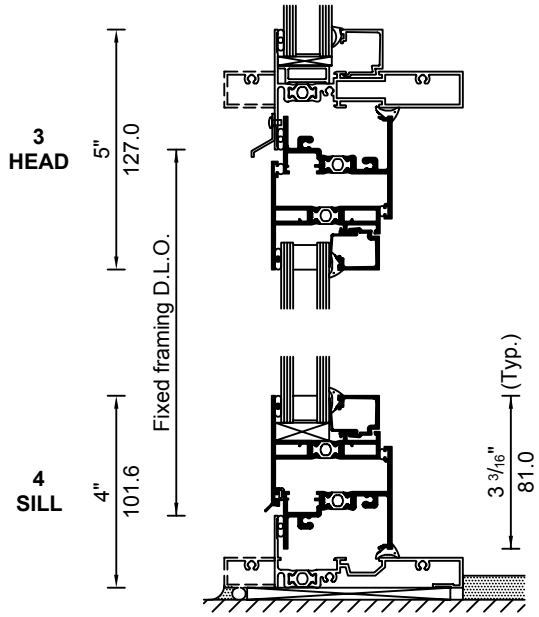


TYPE 802
TOP PROJECTED
OPEN-OUT (TPO)
VENTILATOR

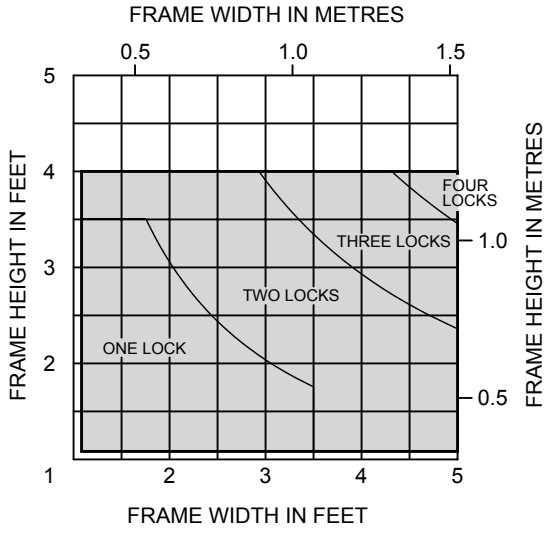


TYPE 814 R.H. SHOWN
TYPE 808 L.H. OPPOSITE
SIDE HINGED
OPEN-OUT (SHO)
CASEMENT



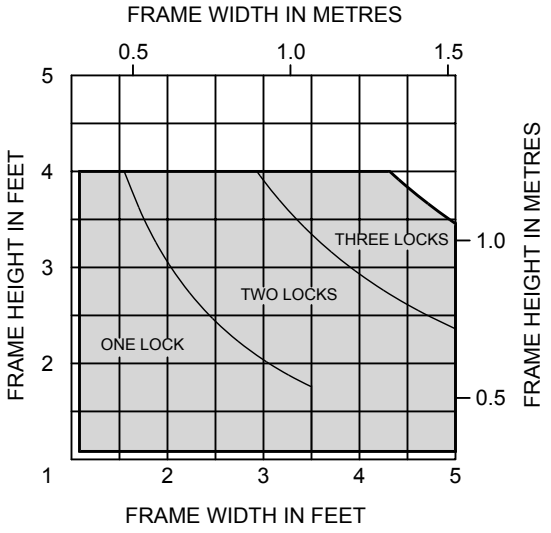


BPI VENTILATOR SIZE CHART



MINIMUM SIZE = 13-1/4" x 13-1/4"
MAXIMUM SIZE = 60" x 48"

TPO VENTILATOR SIZE CHART

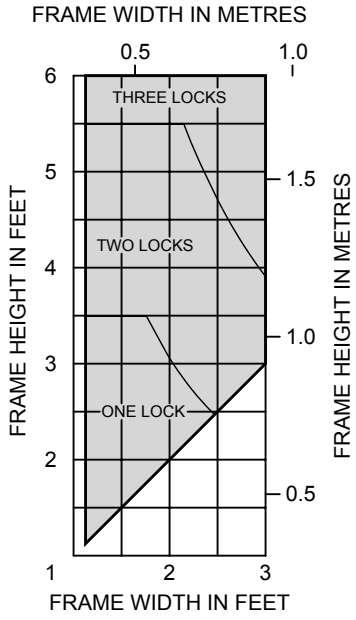


MINIMUM SIZE = 13-1/4" x 13-1/4"
MAXIMUM SIZE = See above.

Note: All TPO vents with pivot shoe operators are supplied with (2) claw handles. MINIMUM SIZE = 20-5/8" x 19"

For vents 21" to 31" wide - max. opening = 1.75"
For vents 32" to 60" wide - max. opening = 7.25"

SHI/SHO CASEMENT SIZE CHART

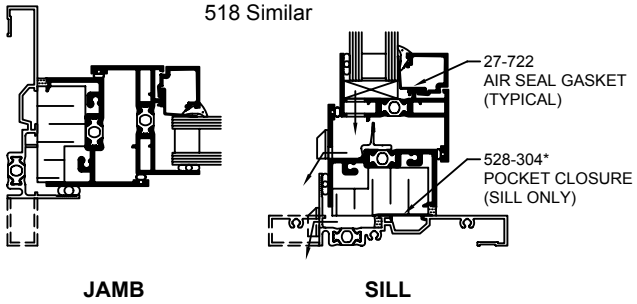


MINIMUM SIZE = 13-1/4" x 13-1/4"
MAXIMUM SIZE = 36" x 72"

Note: All SHO casements with roto operators, MINIMUM SIZE = 16-3/4" x 16-3/4"

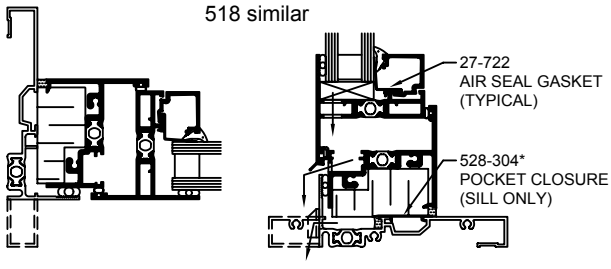
RAIN SCREEN WINDOW

OPEN-IN
516 Shown
518 Similar



JAMB **SILL**

OPEN-OUT
516 Shown
518 similar



JAMB **SILL**

***Note:** Use 528-304 pocket filler and full perimeter wet seal at interior when rain screen vent frame installation is required.

For some regions and projects there may be minimum energy efficiency requirements for the building envelope, and its components, including windows. The shading coefficient (SC) and the thermal transmittance (U - value) of the window is then required to determine whether the building design complies with the specified energy requirements. Shading coefficient depends on the glass selected and should be obtained from the glass supplier. The U - value of the window varies with the type of glass and sealed unit edge construction, the window frame, and the relative areas of these components.

The window thermal transmittance values (U - values) shown in the chart below are based on CSA - A440.2 "Energy Performance Evaluation of Windows and Sliding Glass Doors". U - values of the center of glass, edge of glass and frame areas were computed using the VISION and FRAME thermal simulation programs. Overall window U - values were calculated using the following relationship:

$$U_w = (U_c\ A_c + U_e\ A_e + U_f\ A_f\ )/A_w$$

where

U_w = U-value of complete window product

U_c = calculated center of glass U-value

U_e = calculated edge of glass U-value

U_f = calculated frame U-value

A_c = center of glass area

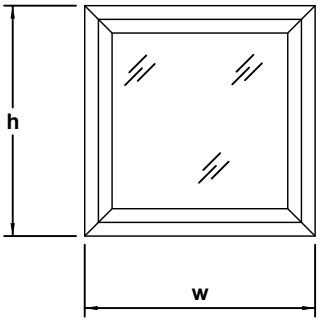
A_e = edge of glass area

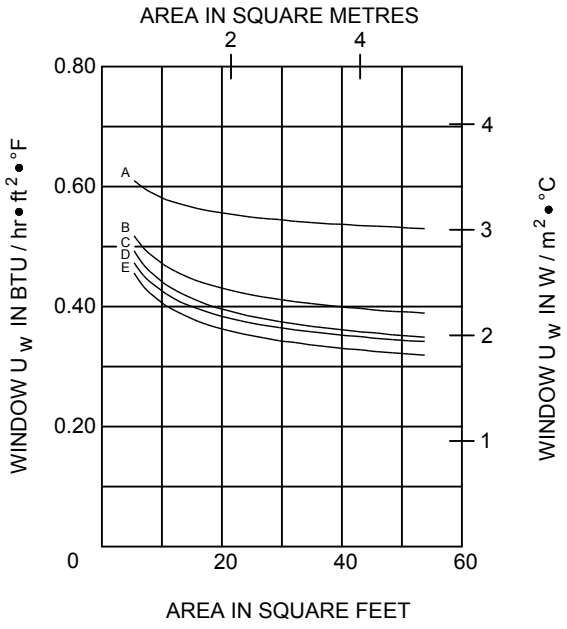
A_f = frame area

A_w = total window area

OVERALL WINDOW U-VALUE (U_w)

For window configurations as shown with height (h) equal to width (w).





SEALED UNIT GLAZING TYPE

A = 6mm clear / 1/2" air / 6mm clear / metal spacer

B = 6mm clear / 1/2" air / 6mm low-e [1] / metal spacer

C = 6mm clear / 1/2" argon / 6mm low-e [1] / metal spacer

D = 6mm clear / 1/2" argon / 6mm low-e [1] / Helima thermally broken spacer

E = 6mm clear / 1/2" argon / 6mm low-e [2] / Helima thermally broken spacer

1 - low-e coating emittance = 0.10
2 - low-e coating emittance = 0.03

NOTES: THE ABOVE SEALED UNIT GLAZING OPTIONS ARE PRESENTED FOR THE PURPOSES OF ILLUSTRATING THERMAL PERFORMANCE CAPABILITIES.

FOR WINDOWS WITH HEIGHT NOT EQUAL TO WIDTH, WHEN ADDING INTERMEDIATE VERTICALS OR HORIZONTALS, OR DIFFERENT GLASS INFILL, THE OVERALL WINDOW U - VALUE MAY VARY.

THE SPECIFIER SHOULD SELECT GLASS TO MEET THE PERFORMANCE REQUIREMENTS OF THE PROJECT.

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E.C. 97911-32

Features

- Thermally broken, insulated, modular, insert ventilator
- Meets the highest performance levels of CSA Standard CAN / CSA-A440
- Rain screen element over ventilator prevents direct rain contact with the ventilator weathering
- Air movement results from natural air circulation
- Highly effective ventilator seal
- No operating hardware required
- Optional keyed lock
- Fingertip control of opening and closing
- Visually the same open or closed
- Can be installed in any Kawneer fixed frame with a depth of 4" (101.6) or more
- Factory fabricated and assembled
- Maximum Ventrow width is 5'-0" (1524)

LAWS AND BUILDING AND SAFETY CODES GOVERNING THE DESIGN AND USE OF GLAZED ENTRANCE, WINDOW, AND CURTAIN WALL PRODUCTS VARY WIDELY. KAWNEER DOES NOT CONTROL THE SELECTION OF PRODUCT CONFIGURATIONS, OPERATING HARDWARE, OR GLAZING MATERIALS, AND ASSUMES NO RESPONSIBILITY THEREFOR.

Metric (SI) conversion figures are included throughout these details for reference.
Numbers in parentheses ( ) are millimeters unless otherwise noted.

The following metric (SI) units are found in these details:

m – meter
cm – centimeter
mm – millimeter
s – second
Pa – pascal
MPa – megapascal

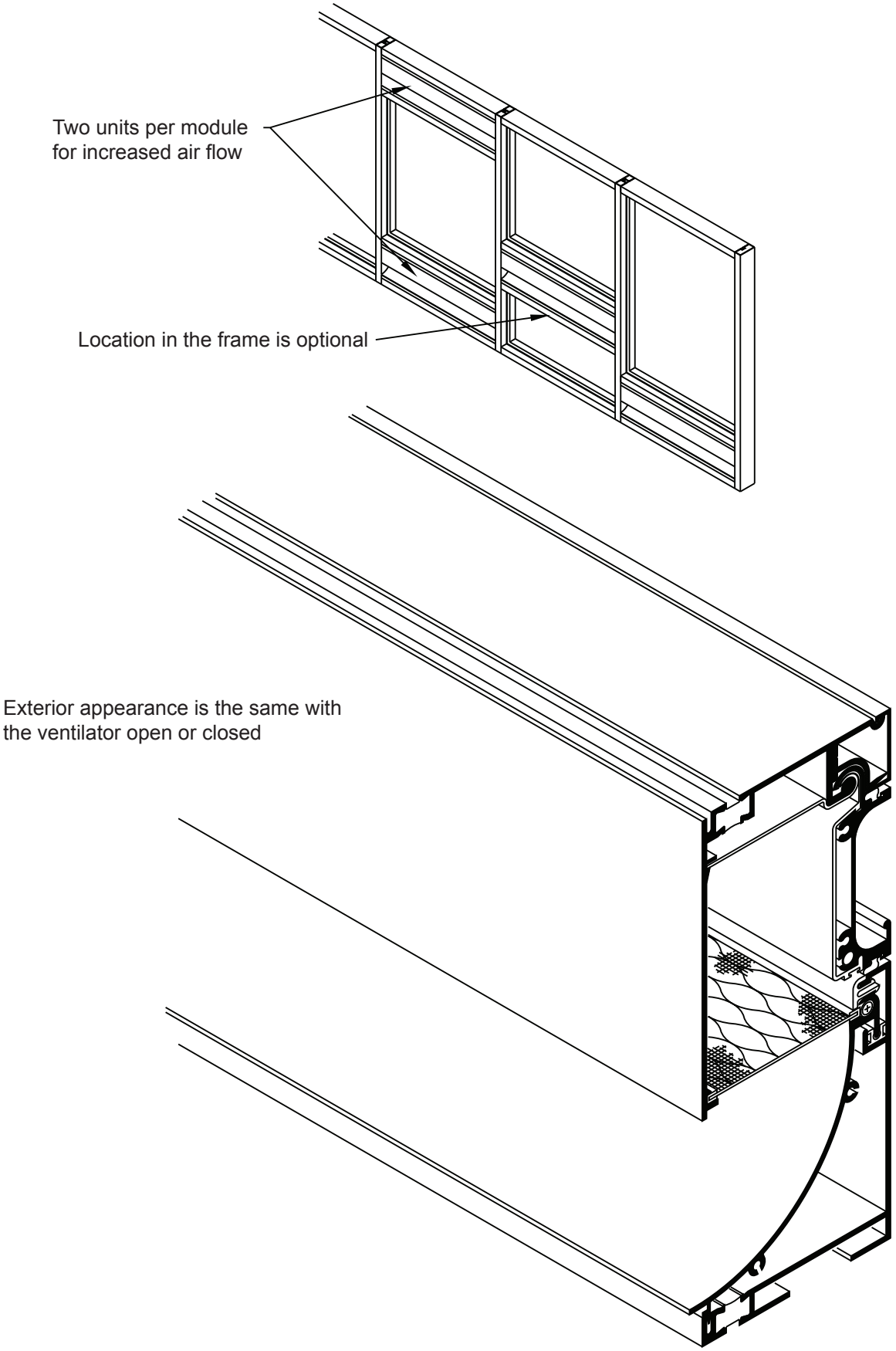
Kawneer reserves the right to change configurations without prior notice when deemed necessary for product improvement.

512 Ventrow Thermal Ventilator

AUGUST, 2016

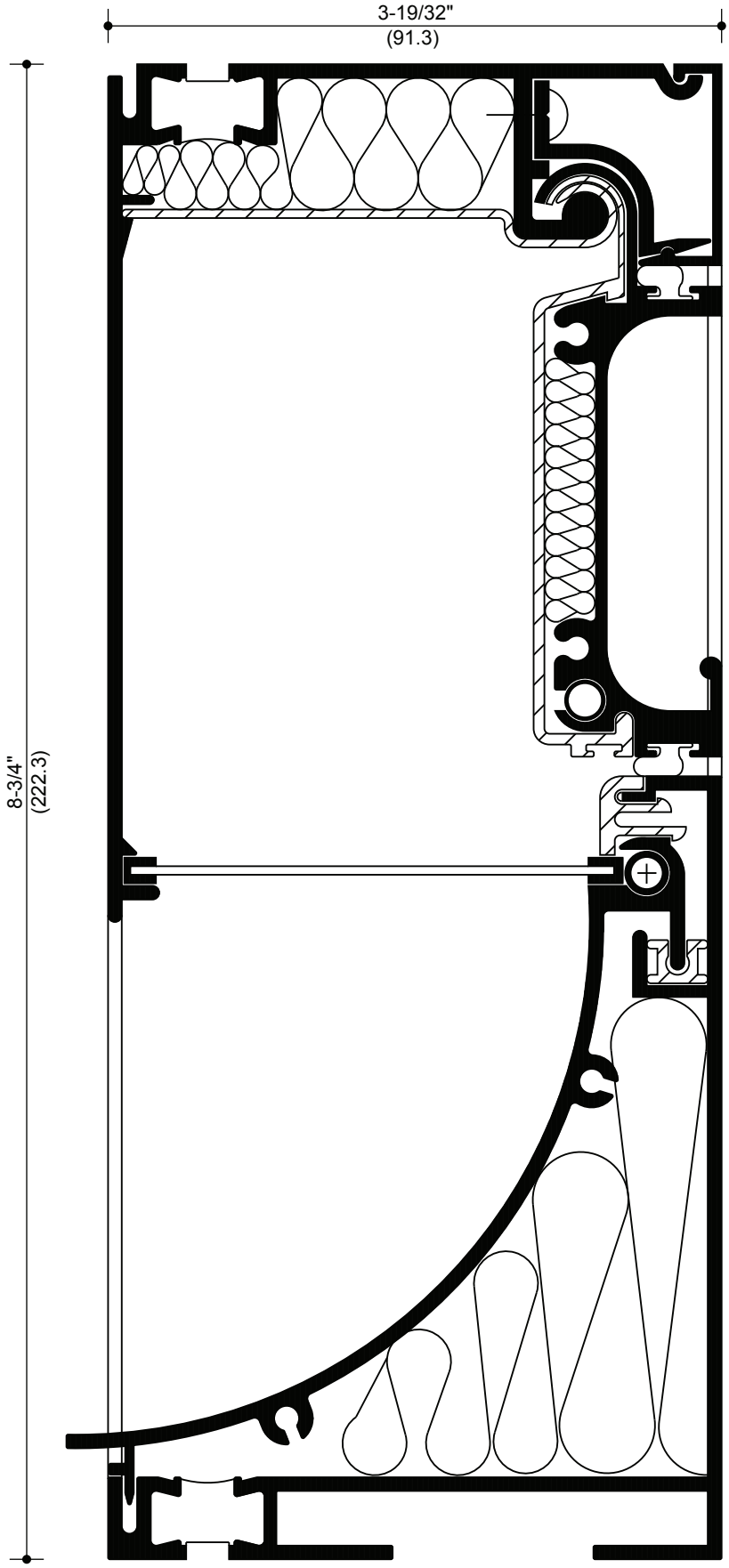
PICTORIAL VIEW

EC 97911-113

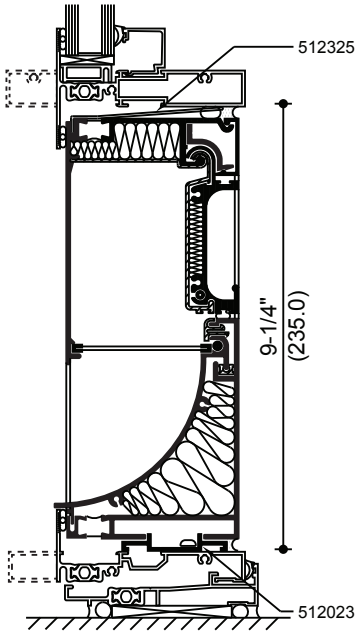


512 Ventrow Thermal Ventilator

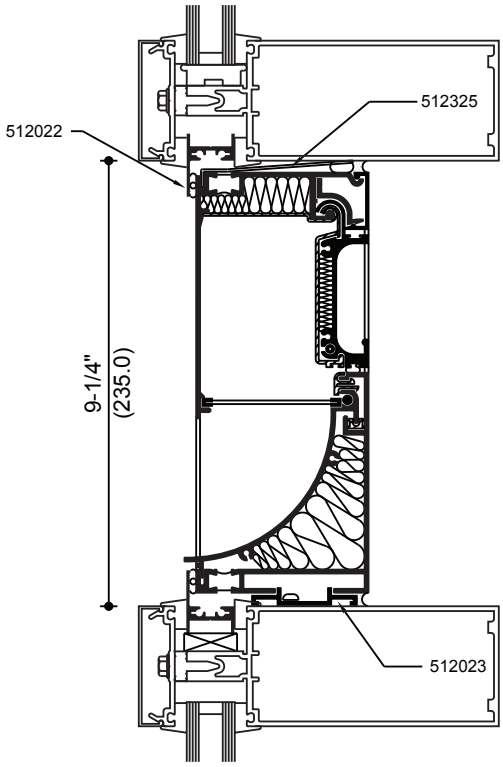
SCALE : FULL SIZE
(Nominal Dimensions Shown)



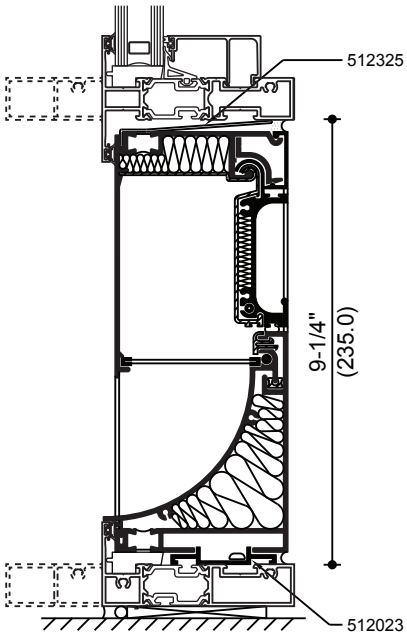
SCALE : 3" = 1'-0"
(Nominal Dimensions Shown)



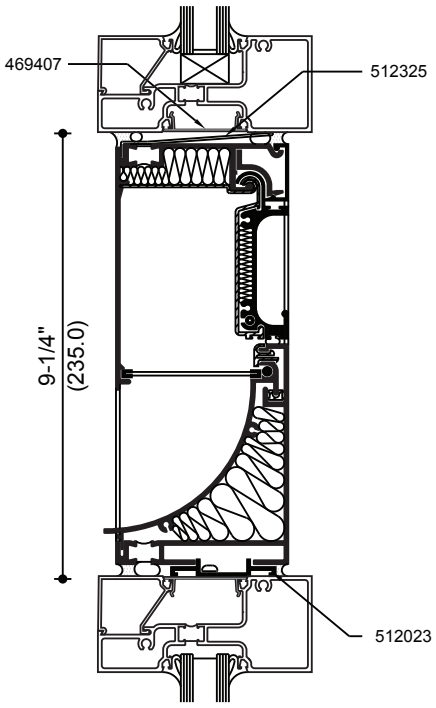
512 VENTROW INSTALLED IN
516 THERMAL WINDOW
(518 SIMILAR)



512 VENTROW INSTALLED IN
1600 SYSTEM™1 CURTAIN WALL

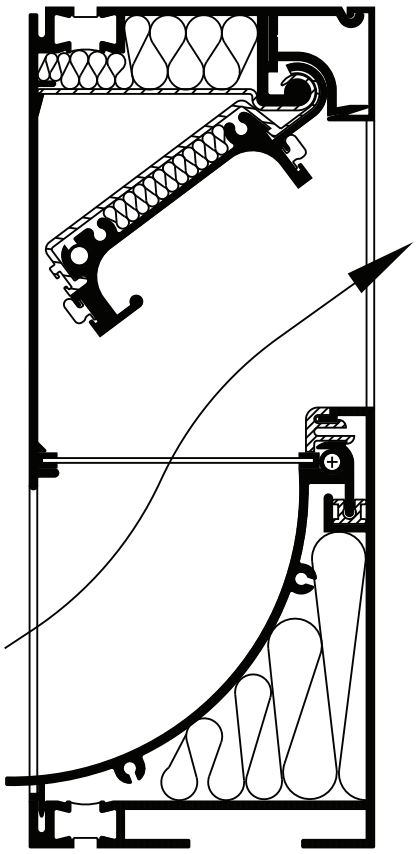


512 VENTROW INSTALLED IN
AA™6400 THERMAL WINDOW
(AA™6500 and AA™6600 SIMILAR)

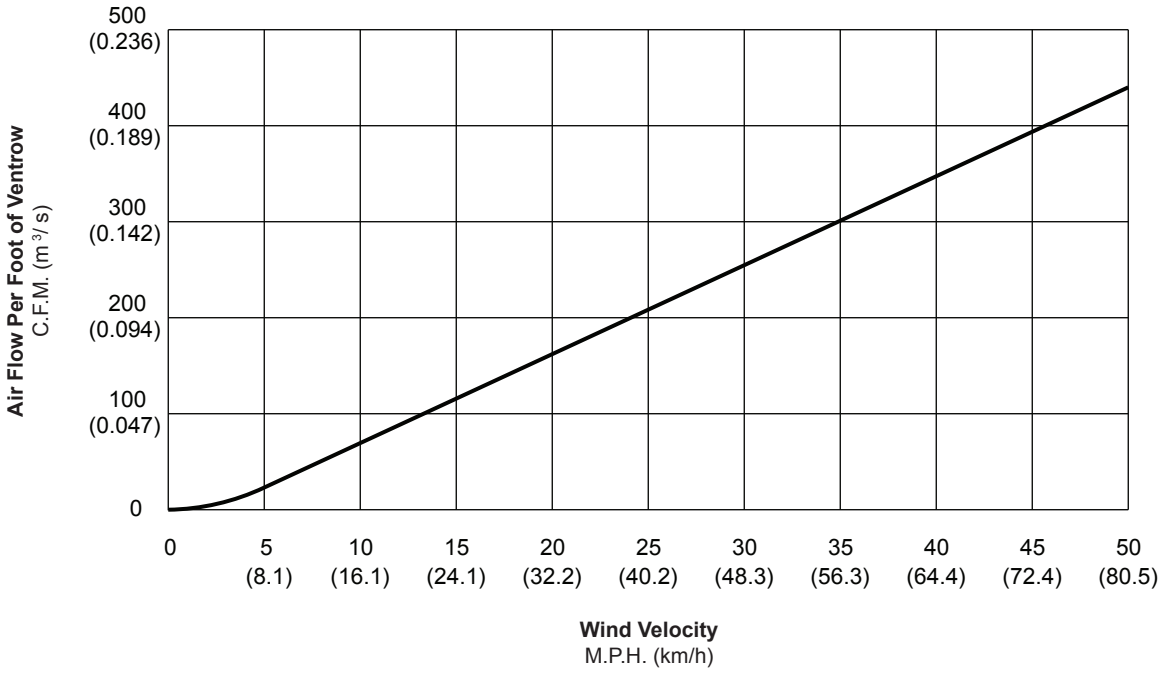


512 VENTROW INSTALLED IN
TRIFAB™ VG 451T FRAMING
(450 & 451 SIMILAR)

SCALE : 6" = 1'-0"
(Nominal Dimensions Shown)



Note: Maximum Ventrow width is 5'-0" (1524)



Air flow rates exceeding 15 m.p.h. were extrapolated from test results uning a shape factor of 0.40.

Architectes - Ces concepts ont été développés et modifiés afin de vous permettre de donner libre cours à votre créativité. Pour obtenir de l'assistance sur l'application de ces produits, veuillez contacter votre représentant Kawneer.
Les profilés et les types de fenêtres présentés dans ce manuel sont des produits standard pour Kawneer.

LES LOIS ET CODES DU BÂTIMENT ET DE LA SÉCURITÉ RÉGISSANT LA CONCEPTION ET L'UTILISATION DE PRODUITS POUR ENTRÉES VITRÉES, FENÊTRES ET MURS RIDEAUX VARIENT GRANDEMENT. KAWNEER NE PEUT S'IMPLIQUER DANS CHAQUE SÉLECTION OU CONFIGURATION DE PRODUITS, CHOIX DE QUINCAILLERIE OU DE VERRE, ET PAR CONSÉQUENT N'EN ASSUME AUCUNE RESPONSABILITÉ.

La conversion des unités de mesure en unités métriques (SI) est présentée tout au long de ces détails comme référence. Les nombres indiqués entre parenthèses ( ) sont des millimètres à moins d'indication contraire.

Vous trouverez à l'intérieur de ces détails les unités métriques (SI) suivantes:

m - mètre
cm - centimètre
mm - millimètre
s - seconde
Pa - pascal
MPa - mégapascal

Kawneer se réserve le droit de modifier les configurations sans préavis lorsque jugé nécessaire pour améliorer le produit.

CARACTÉRISTIQUES

La barrière thermique ISOWEB[MD] de 24 mm, en nylon 6/6 renforcé de verre, fournit:

- Une meilleure résistance à la condensation ainsi qu'une meilleure performance relative à la transmission thermique
- Des profilés rigides pour une meilleure performance structurale des sections assemblées
- Options de finis intérieur / extérieur

Rencontre ou dépasse les plus hauts niveaux de performance de la norme CAN/CSA-A440 pour fenêtres de l'ACNOR

Cavité de vitrage ventilée et drainée selon le principe de l'écran de pluie

Joints découpés assemblés à l'aide de vis et cannelures

Section de périmètre comprenant une patte intérieure en retrait pour recevoir les membranes d'étanchéité à l'air et/ou à la vapeur

Ailes de vitrage sur le même plan procurant un aspect affleurant

Peut recevoir des unités scellées de 25 mm et 44 mm d'épaisseur

Vitrage posé et remplacé de l'intérieur

Système de vitrage extérieur VISIONstrip[MD] de Tremco

Joint d'étanchéité à l'air en caoutchouc EPDM le long du périmètre de l'unité scellée de 25 mm

Joint d'étanchéité intérieur en caoutchouc EPDM préinstallé avant d'enclencher la parclose

Possibilité d'intégrer les fenêtres Ventrow

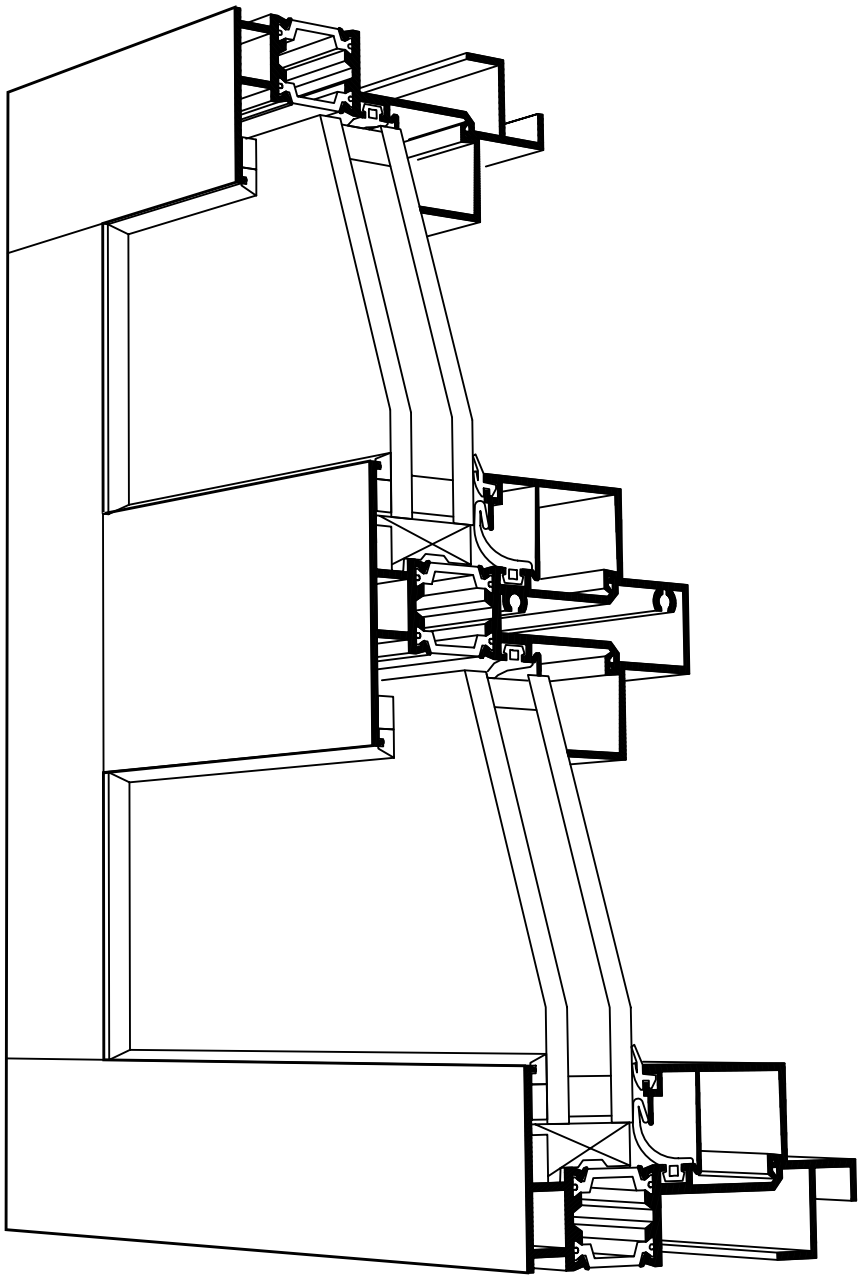
Peut recevoir la gamme complète de vantaux et de battants ouvrant vers l'intérieur ou vers l'extérieur de la série AA900 de Kawneer

- Coins du cadre et du vantail taillés en onglet à angle de 45°
- Profilés tubulaires accentués
- Fabriquée et assemblée en usine
- Quincaillerie de verrouillage à points multiples montée dans des rainures Euro
- Plusieurs styles de poignée de verrouillage et de finis
- Peut recevoir du vitrage triple

FENÊTRE ISOWEB[MD] SÉRIE 5500

E.C. 97911-22

VUE SCHÉMATIQUE



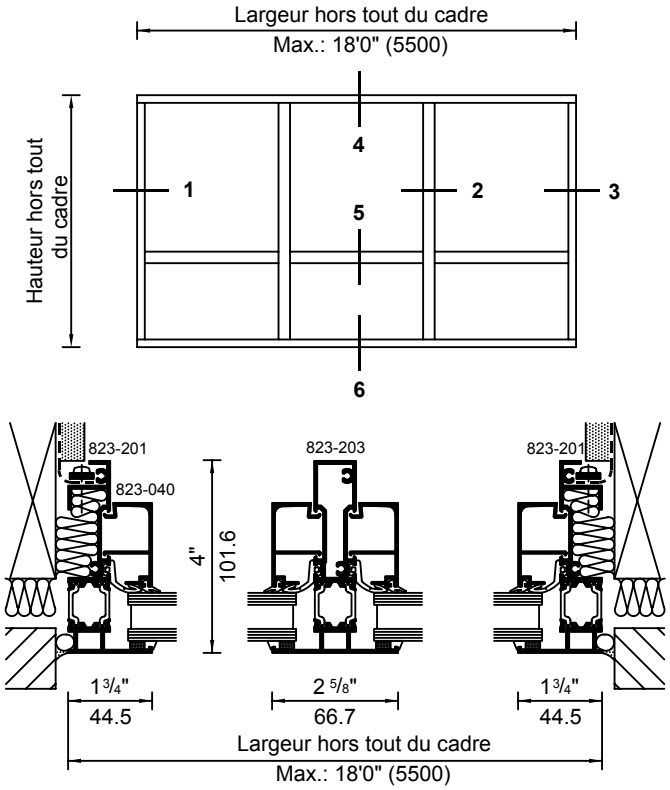
KAWNEER
UNE FILIALE D'ALCOA

FENÊTRE ISOWEB[MD] SÉRIE 5500

DÉTAILS DES CADRES FIXES

ÉCHELLE: 1/4 DE LA GRANDEUR RÉELLE

FENÊTRE SIMPLE AVEC MENEAUX VERTICAUX



1
JAMBAGE

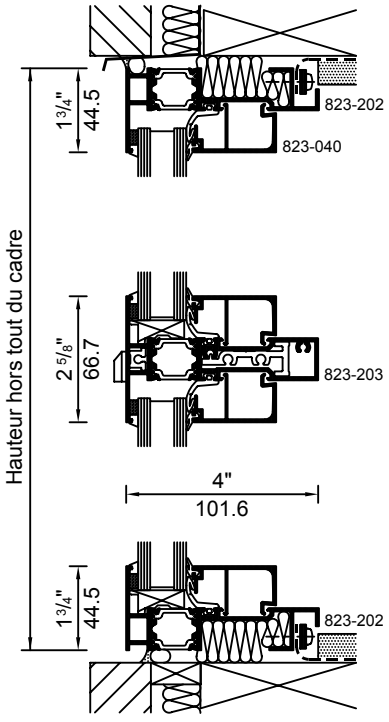
2
MENEAU TUBULAIRE

3
JAMBAGE

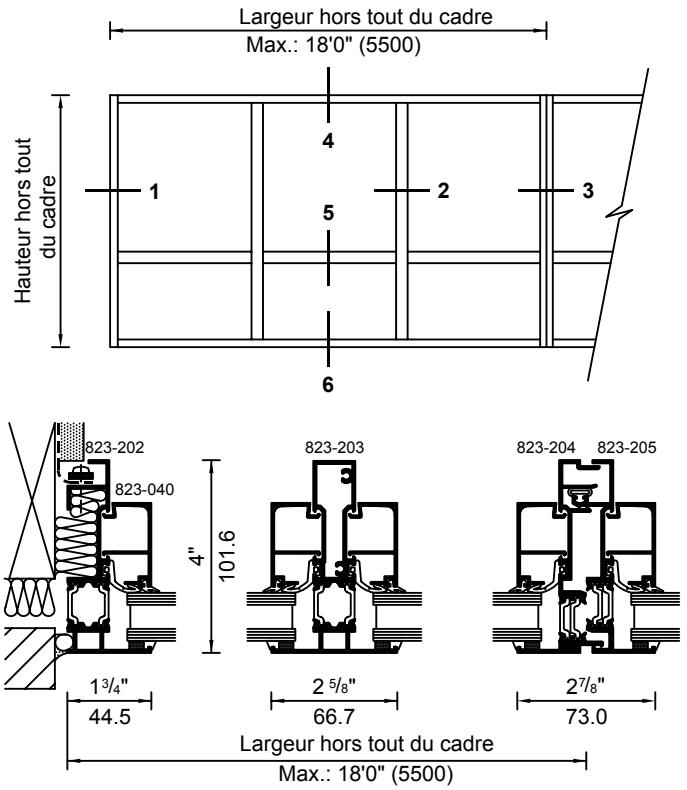
4
TÊTE

5
TRAVERSE INTERMÉDIAIRE

6
BASE



BANDE DE FENÊTRES MULTI-MODULAIRES



1
JAMBAGE

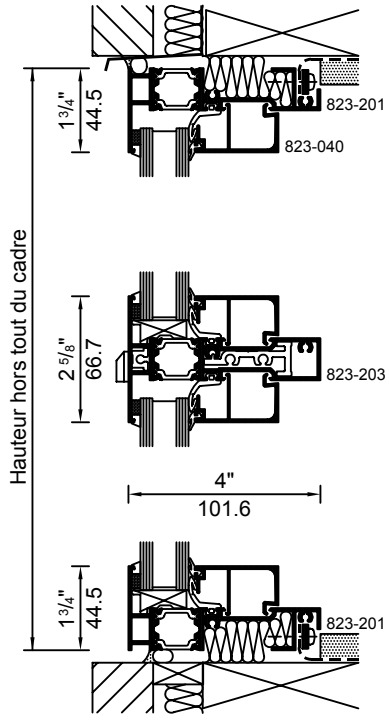
2
MENEAU TUBULAIRE

3
MENEAU JUMELÉ (BANDE DE FENÊTRES MULTI-MODULAIRES)

4
TÊTE

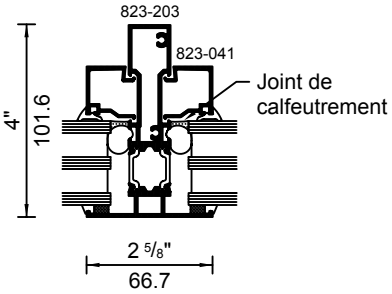
5
TRAVERSE INTERMÉDIAIRE

6
BASE

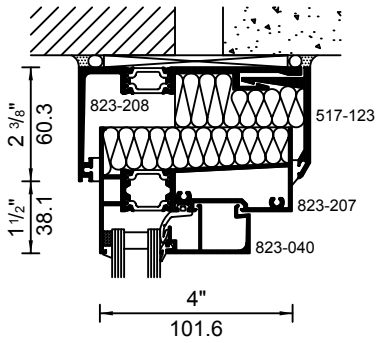


ÉCHELLE: 1/4 DE LA GRANDEUR RÉELLE

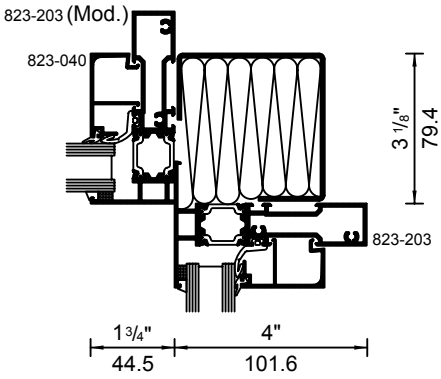
VITRAGE TRIPLE
(PEUT RECEVOIR DES UNITÉS SCELLÉES DE 44 mm)



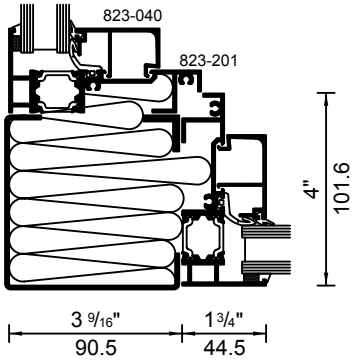
TÊTE ANTIFLEXION
(PERMET UN MOUVEMENT DE ± 5/8 po (15,9)



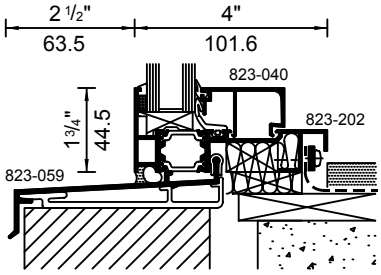
COIN INTÉRIEUR DE 90°

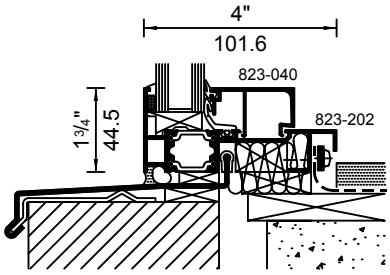


COIN EXTÉRIEUR DE 90°



DÉTAILS TYPIQUES DE LA BASE





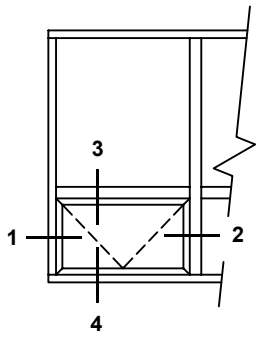
FENÊTRE ISOWEB[MD] SÉRIE 5500

DÉTAILS DES VANTAUX

ÉCHELLE: 1/4 DE LA GRANDEUR RÉELLE

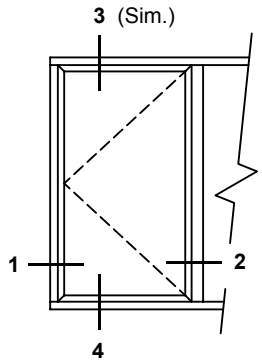
REMARQUE: LES CONFIGURATIONS TYPIQUES DES FENÊTRES SONT ILLUSTRÉES. POUR LES NIVEAUX DE RENDEMENT, LES GRANDEURS LIMITES ET LES OPTIONS OFFERTES, SE REPORTER À LA DOCUMENTATION SUR LA FENÊTRE ISOWEB[MD] AA[MC] 900.

VANTAIL À BASCULE OUVRANT VERS L'INTÉRIEUR (V.B.O.I.)

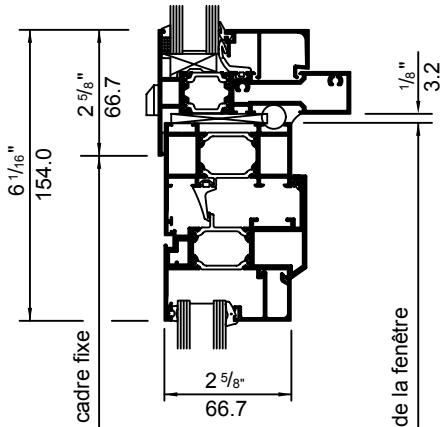


BATTANT MONTÉ SUR LE CÔTÉ ET OUVRANT VERS L'INTÉRIEUR (b.C.O.I.)

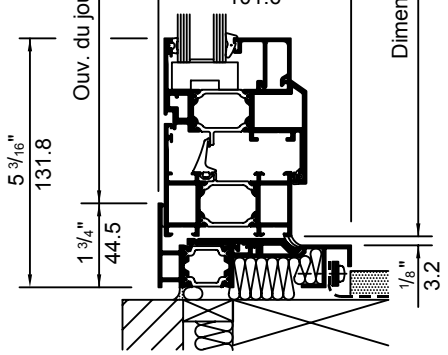
G. ILLUSTRÉE, DR. OPPOSÉE

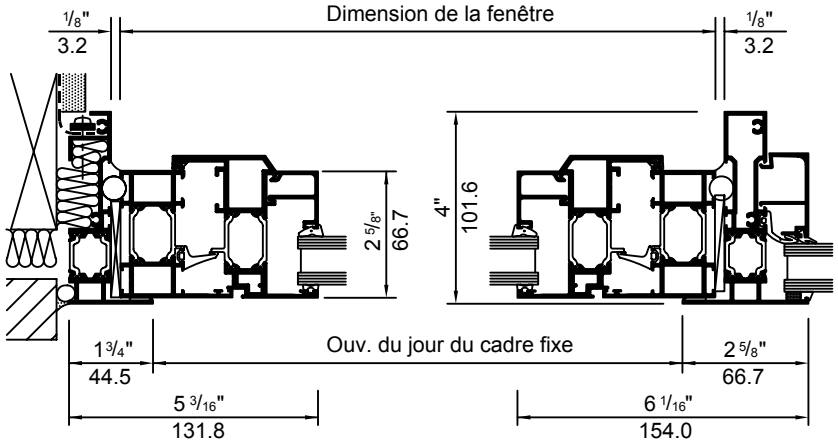


3 TÊTE DU VANTAIL



4 BASE DU VANTAIL





1 JAMBAGE DU VANTAIL

2 JAMBAGE DU VANTAIL

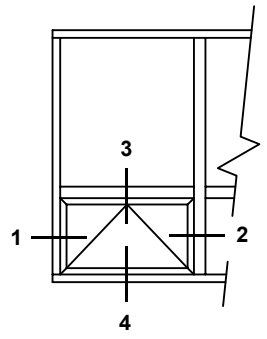
E.C. 97911-22

DÉTAILS DES VANTAUX

ÉCHELLE: ¼ DE LA GRANDEUR RÉELLE

REMARQUE: LES CONFIGURATIONS TYPIQUES DES FENÊTRES SONT ILLUSTRÉES. POUR LES NIVEAUX DE RENDEMENT, LES GRANDEURS LIMITES ET LES OPTIONS OFFERTES, SE REPORTER À LA DOCUMENTATION SUR LA FENÊTRE ISOWEB[MD] AA[MC] 900.

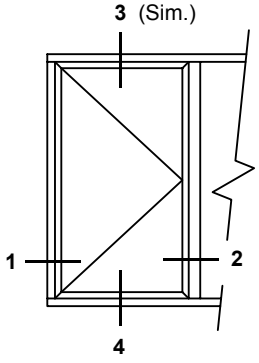
VANTAIL À BASCULE OUVRANT VERS L'EXTÉRIEUR (V.B.O.E.)



BATTANT MONTÉ SUR LE CÔTÉ ET OUVRANT VERS L'EXTÉRIEUR (b.C.O.E.)

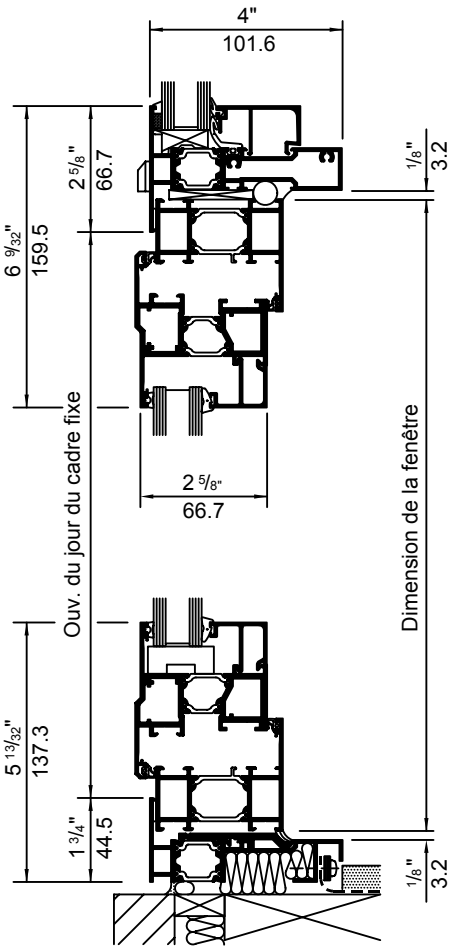
G. ILLUSTRÉE, DR. OPPOSÉE

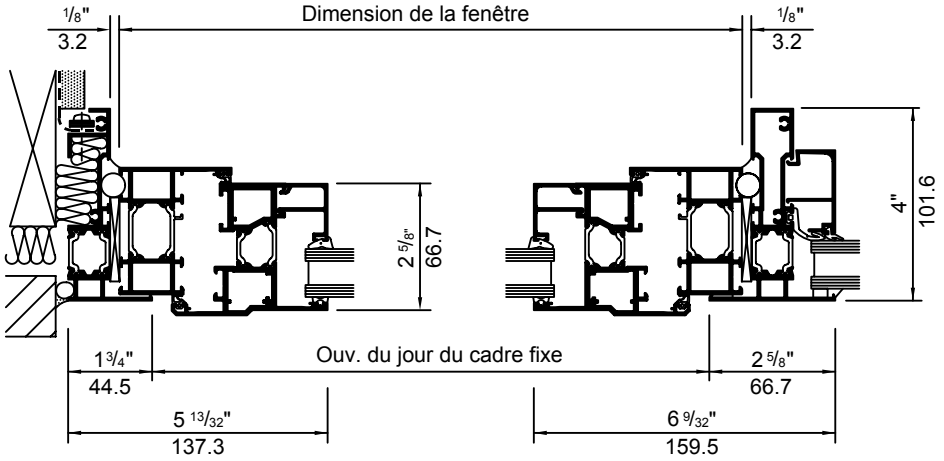
3 (Sim.)



3
TÊTE DU VANTAIL

4
BASE DU VANTAIL





1
JAMBAGE DU VANTAIL

2
JAMBAGE DU VANTAIL

Pour certaines régions et ouvrages il se peut qu'il y ait des exigences minimales d'efficacité énergétique pour l'enveloppe du bâtiment, ainsi que pour ses composantes, comprenant les fenêtres. Le facteur solaire (SC) et la transmission thermique (coefficient U) de la fenêtre sont alors requis pour déterminer si le concept du bâtiment est conforme aux exigences énergétiques spécifiées. Le facteur solaire dépend du verre choisi et devrait être obtenu du fournisseur du verre. Le coefficient U de la fenêtre varie selon le type de verre utilisé et le type de contour utilisé pour fabriquer l'unité scellée, le cadre de fenêtre et les aires relatives à ces composantes.

Les coefficients de transmission thermique de la fenêtre (coefficients U) présentés au tableau ci-dessous sont basés sur la norme CSA-A440.2 "Évaluation du rendement énergétique des fenêtres et des portes coulissantes en verre". Les coefficients U des aires du vitrage central, du contour du vitrage et des aires du cadre ont été calculés à l'aide des progiciels de simulation thermique VISION et FRAME. Les coefficients U de la fenêtre complète ont été établis au moyen des données suivantes:

$$U_w = (U_c\ A_c + U_e\ A_e + U_f\ A_f\ )/A_w$$

où

U_w = coefficient U de la fenêtre complète

U_c = coefficient U calculé du vitrage central

U_e = coefficient U calculé du contour du vitrage

U_f = coefficient U calculé du cadre de fenêtre

A_c = centre de l'aire du verre

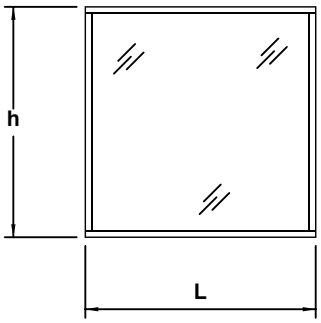
A_e = aire du contour du vitrage

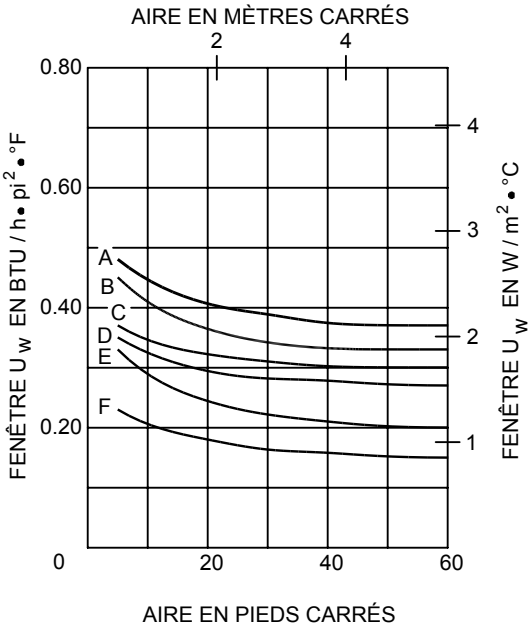
A_f = aire du cadre de fenêtre

A_w = aire totale de la fenêtre

COEFFICIENT GLOBAL U DE LA FENÊTRE COMPLÈTE (U_w)

Pour les configurations des fenêtres fixe et ouvrante comme illustrées dont la hauteur (h) est égale à la largeur (L).





TYPE DE VITRAGE AVEC UNITÉ SCELLÉE

A = clair 6 mm / air ½ po / 6 mm à faible émissivité[1] / intercalaire métallique

B = clair 6 mm / argon ½ po / 6 mm à faible émissivité[1] / intercalaire métallique

C = clair 6 mm / argon ½ po / 6 mm à faible émissivité[1] / intercalaire avec bordure chaude[3]

D = clair 6 mm / argon ½ po / 6 mm à faible émissivité[2] / intercalaire avec bordure chaude[3]

E = clair 6 mm / argon ½ po / 6 mm à faible émissivité[1] / argon ½ po / 6 mm à faible émissivité[1] / intercalaire métallique

F = clair 6 mm / argon ½ po / 6 mm à faible émissivité[2] / argon ½ po / 6 mm à faible émissivité[2] / intercalaire avec bordure chaude[3]

1 - enduit à faible émissivité (low-e) = 0,1
2 - enduit à faible émissivité (low-e) = 0,03
3 - espaceur Super "U"[MD] de Edgetech

REMARQUES: LES OPTIONS DE VITRAGE AVEC UNITÉS SCELLÉES DÉCRITES CI-DESSUS SONT PRÉSENTÉES DANS LE BUT D'ILLUSTRER LEURS DIFFÉRENTES PERFORMANCES ÉNERGÉTIQUES.

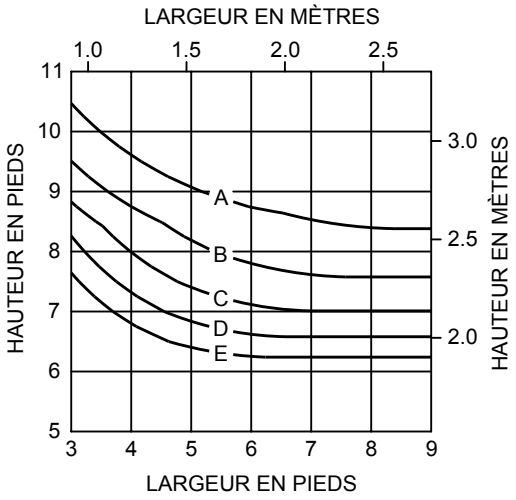
DANS LE CAS DE FENÊTRES DONT LA HAUTEUR N'EST PAS ÉGALE À LA LARGEUR, LORSQUE DES MENEAUX INTERMÉDIAIRES VERTICAUX ET/OU HORIZONTAUX SONT AJOUTÉS, OU DIFFÉRENTS PANNEAUX DE VERRE SONT UTILISÉS, LE COEFFICIENT U DE LA FENÊTRE PEUT VARIER.

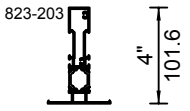
LE RÉDACTEUR DU CAHIER DES CHARGES DEVRAIT CHOISIR LE VERRE QUI SATISFAIT AUX EXIGENCES DE RENDEMENT DE L'OUVRAGE.

Les calculs des charges sont basés sur la norme CAN3-S157 "Calcul de la résistance mécanique des éléments en aluminium" en conformité avec le Code national du bâtiment du Canada et une flexion admissible du meneau de 1/175 de la travée.

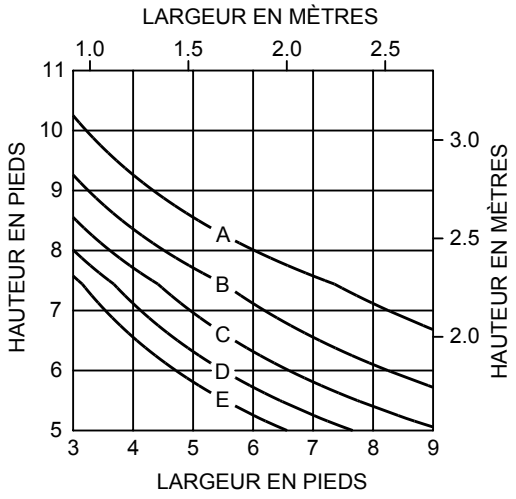
LIMITES DE CHARGE DUE À LA POUSSÉE DU VENT

SANS MENEAUX HORIZONTAUX



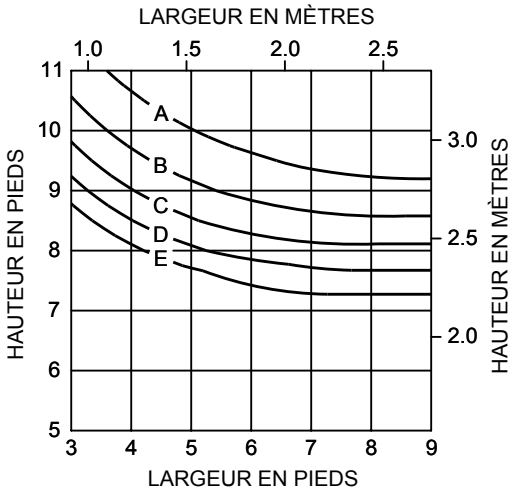


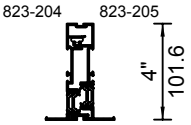
AVEC MENEAUX HORIZONTAUX



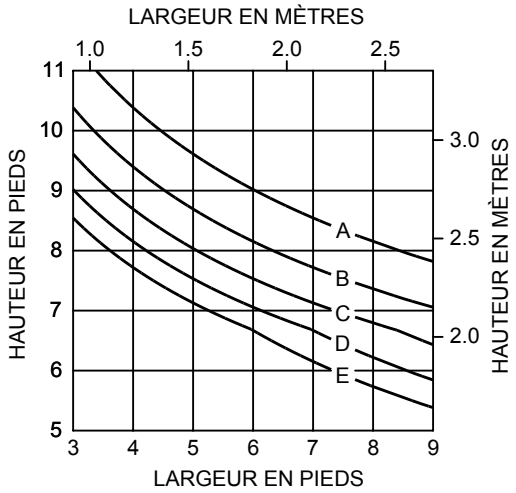
A = 15 lb/pi^2 (0,72 kPa)
B = 20 lb/pi^2 (0,96 kPa)
C = 25 lb/pi^2 (1,20 kPa)
D = 30 lb/pi^2 (1,44 kPa)
E = 35 lb/pi^2 (1,68 kPa)

SANS MENEAUX HORIZONTAUX

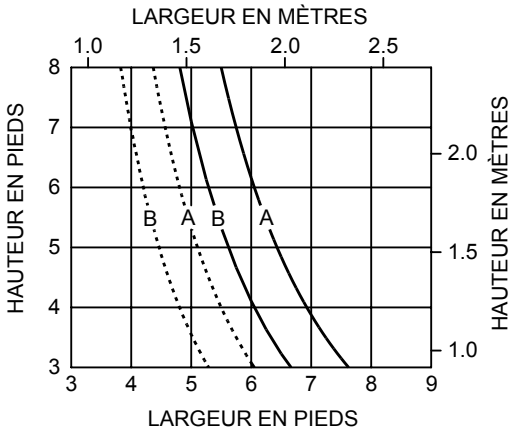




AVEC MENEAUX HORIZONTAUX



LIMITES DE CHARGE PERMANENTE

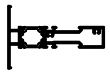


Traverse intermédiaire au-dessus d'un châssis ouvrant (Flexion maximale 1/16 po)

Traverse intermédiaire au-dessus d'un verre fixe (Flexion maximale 1/8 po)

Les courbes s'appliquent aux unités scellées reposant sur des blocs d'appui à 76 mm (3 po) des extrémités des unités.

Traverse intermédiaire 823-203



I = 0,17 po^4 (7,20 x 10^4 mm^4)
S = 0,20 po^3 (0,32 x 10^4 mm^3)

A - Unité scellée à double vitrage avec (2) panneaux de verre de 6 mm.

B - Unité scellée à triple vitrage avec (3) panneaux de verre de 6 mm.

Architects - These concepts have been expanded and modified to afford you design freedom.
Please contact your Kawneer representative for further assistance.
The extrusions and window types illustrated in this catalog are standard products for Kawneer.

LAWS AND BUILDING AND SAFETY CODES GOVERNING THE DESIGN AND USE OF GLAZED ENTRANCE, WINDOW, AND CURTAIN WALL PRODUCTS VARY WIDELY. KAWNEER DOES NOT CONTROL THE SELECTION OF PRODUCT CONFIGURATIONS, OPERATING HARDWARE, OR GLAZING MATERIALS, AND ASSUMES NO RESPONSIBILITY THEREFOR.

Metric (SI) conversion figures are included throughout these details for reference.
Numbers in parentheses ( ) are millimeters unless otherwise noted.

The following metric (SI) units are found in these details:

m - meter
cm - centimeter
mm - millimeter
s - second
Pa - pascal
MPa - megapascal

Kawneer reserves the right to change configurations without prior notice when deemed necessary for product improvement.

FEATURES

24mm ISOWEB® glass-reinforced nylon 6/6 thermal break provides:

- Improved condensation resistance and thermal transmittance performance capability
- Rigid profiles with composite structural performance
- Exterior / interior finish options

Meets or exceeds the highest performance levels of CSA standard CAN/CSA-A440 Windows

Vented and drained rain screen glazing cavity

Coped joinery with screw spline fastening

Recessed interior leg on perimeter section to accept air and / or vapour barrier membranes

Glazing flanges on same plane providing flush appearance

Distinctive "Top Hat" accent feature

Accommodates 25mm and 44mm sealed unit thicknesses

Glass installed and replaced from interior

Tremco VISIONstrip® exterior glazing system

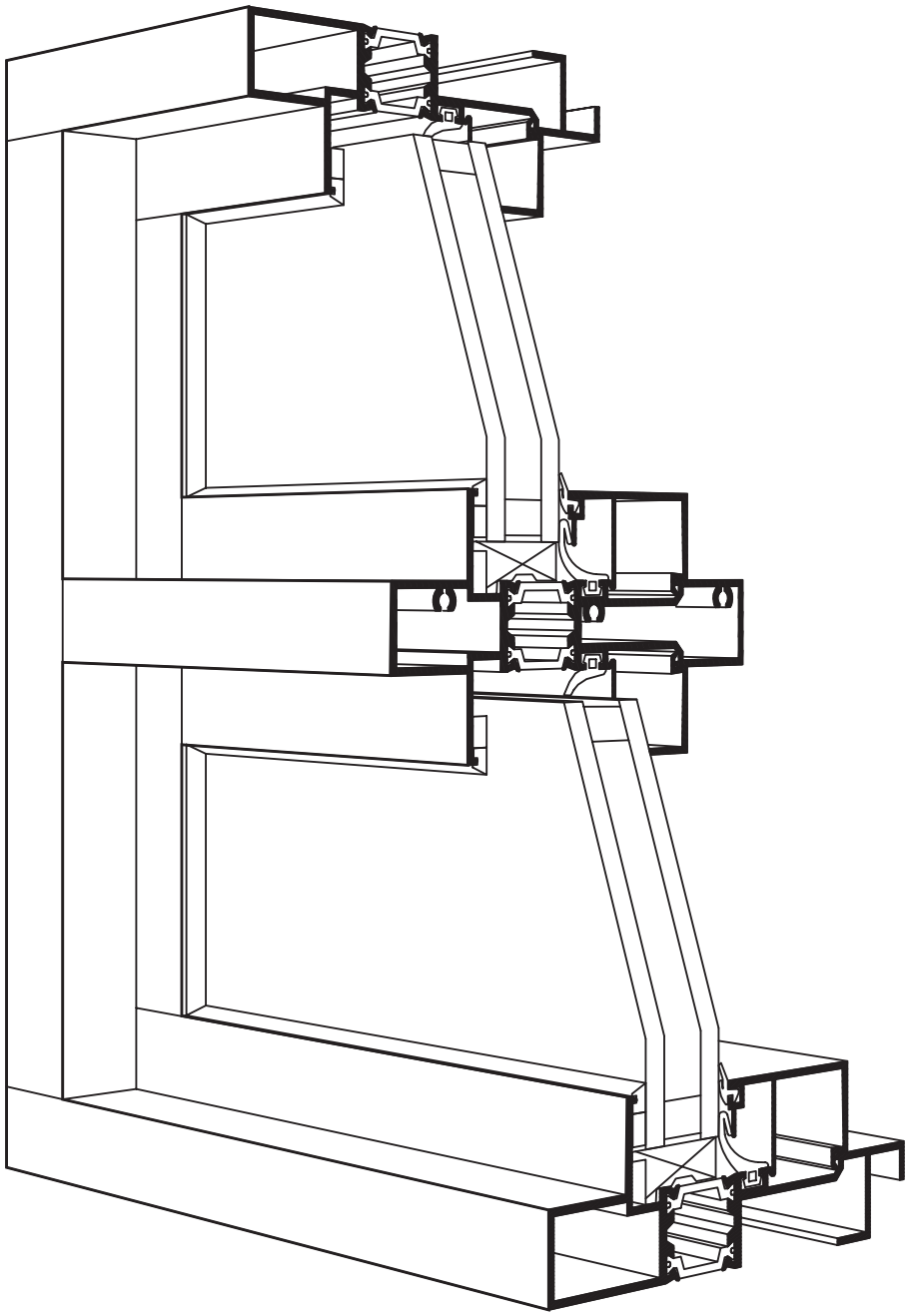
EPDM rubber air seal gasket along perimeter of 25mm sealed unit

EPDM rubber interior gasket pre-loaded to snap-in glass stop

Accepts Ventrow inserts

Accepts a full range of Kawneer's series AA900 project-in, project-out and casements vents

- 45° mitered vent and frame corners
- Accentuated tubular profiles
- Factory fabricated and assembled
- Euro-groove multi-point locking hardware
- Multiple locking handle styles and finishes
- Triple glazing available

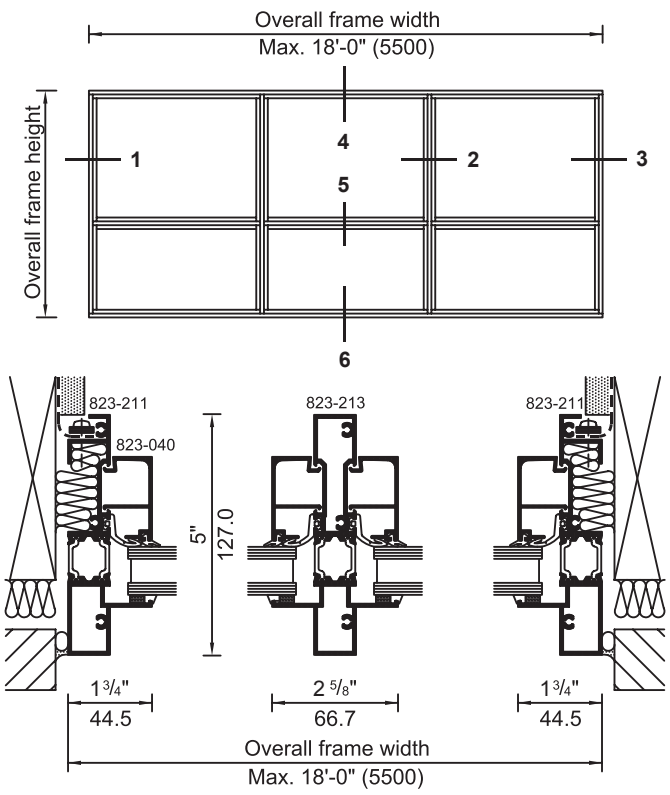


5525 ISOWEB® WINDOW

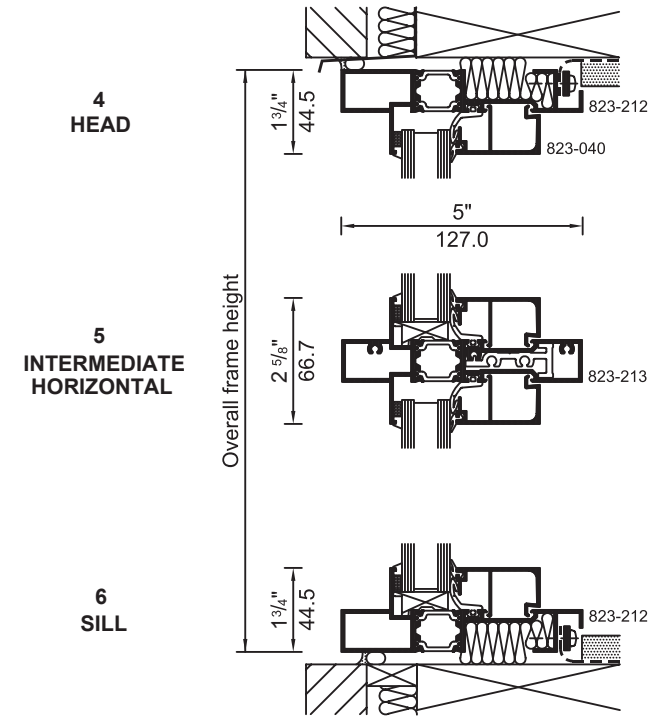
FIXED FRAMING DETAILS

SCALE 1/4 FULL SIZE

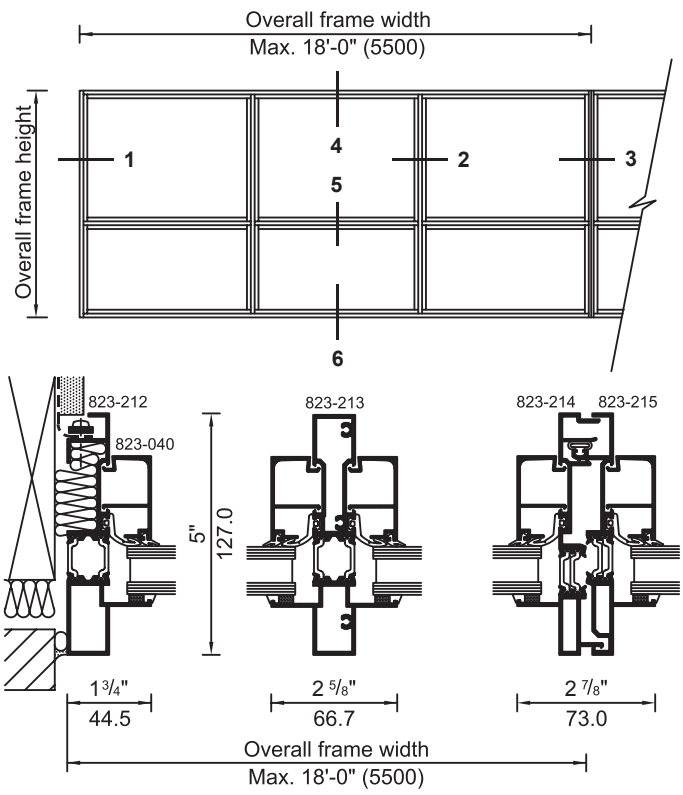
PUNCHED OPENING WITH VERTICALS



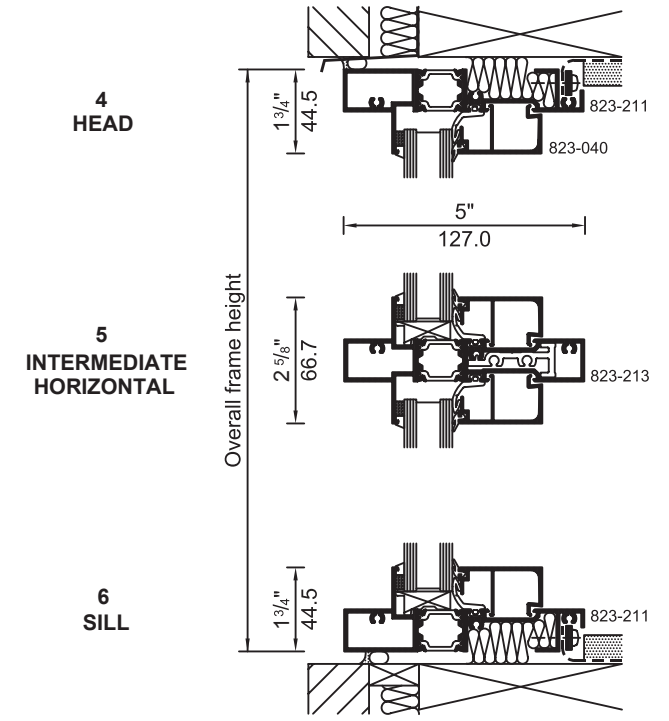
1 JAMB | **2 TUBULAR MULLION** | **3 JAMB**



MULTI-MODULAR STRIP WINDOW

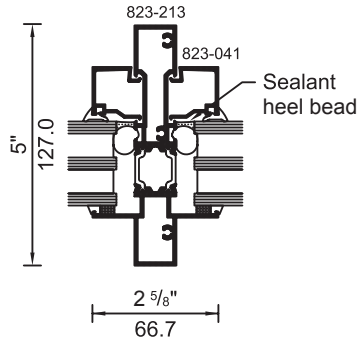


1 JAMB | **2 TUBULAR MULLION** | **3 MULTI-MODULAR COUPLING MULLION**

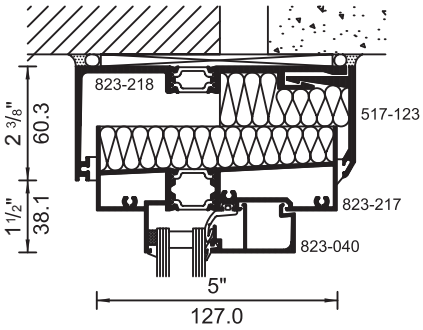


SCALE 1/4 FULL SIZE

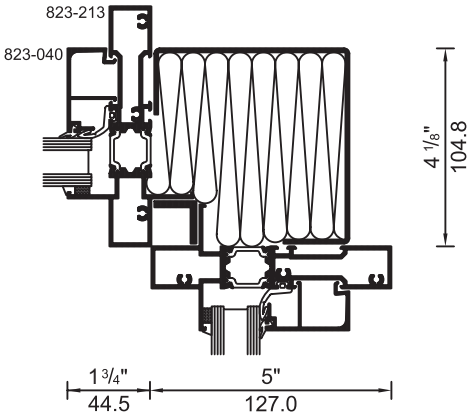
TRIPLE GLAZING
(ACCEPTS 44mm SEALED UNITS)



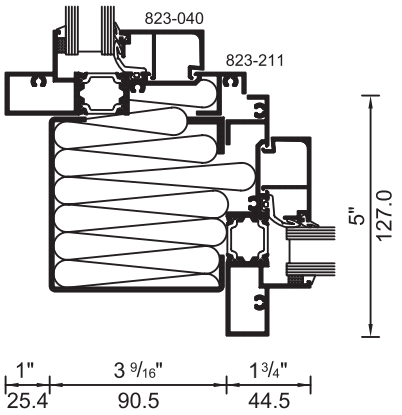
DEFLECTION HEAD
(ALLOWS ± 5/8" (15.9) MOVEMENT)



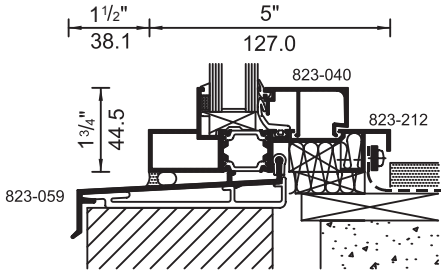
90° INSIDE CORNER

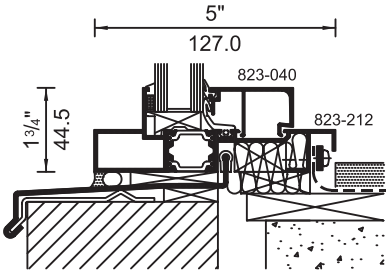


90° OUTSIDE CORNER



TYPICAL SILL DETAILS

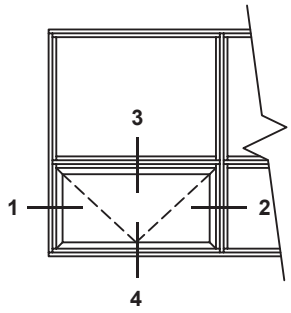




SCALE 1/4 FULL SIZE

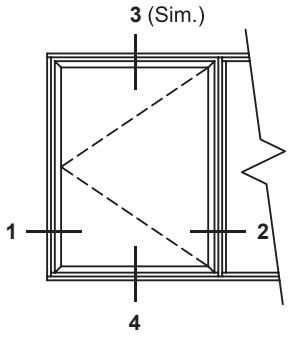
NOTE: TYPICAL WINDOW CONFIGURATIONS SHOWN, REFER TO AA™ 900 ISOWEB® WINDOW PRODUCT LITERATURE FOR PERFORMANCE RATINGS, SIZE LIMITATIONS AND AVAILABLE OPTIONS.

OPEN-IN VENT (BPI)



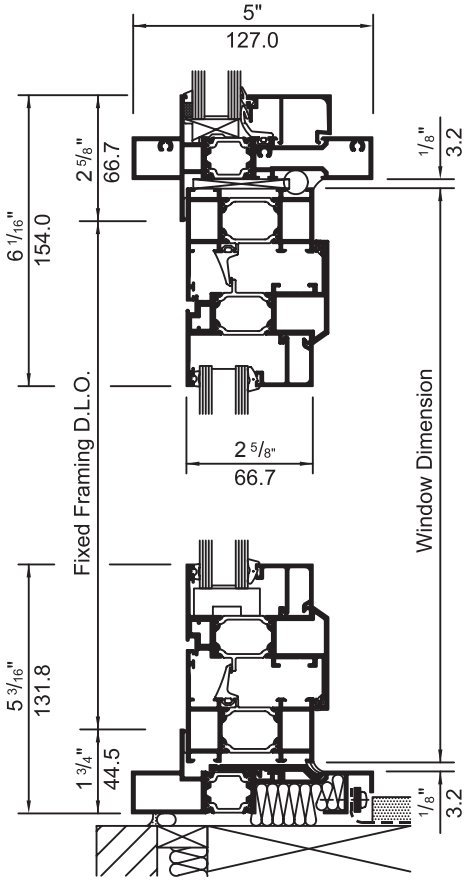
OPEN-IN CASEMENT (SPI)

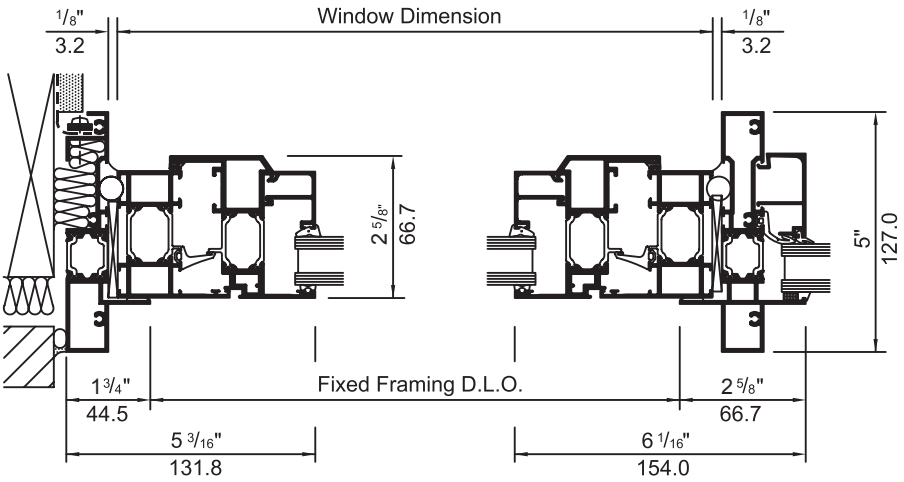
L. H. SHOWN, R. H. OPPOSITE



3 VENT HEAD

4 VENT SILL





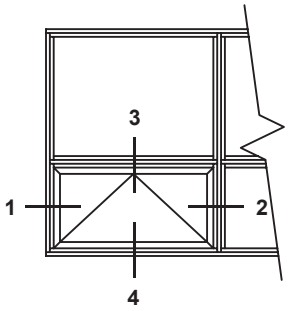
1 VENT JAMB

2 VENT JAMB

SCALE 1/4 FULL SIZE

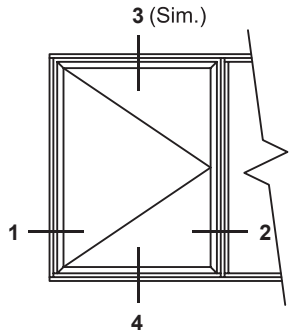
NOTE: TYPICAL WINDOW CONFIGURATIONS SHOWN, REFER TO AA™ 900 ISOWEB® WINDOW PRODUCT LITERATURE FOR PERFORMANCE RATINGS, SIZE LIMITATIONS AND AVAILABLE OPTIONS.

OPEN-OUT VENT (TPO)

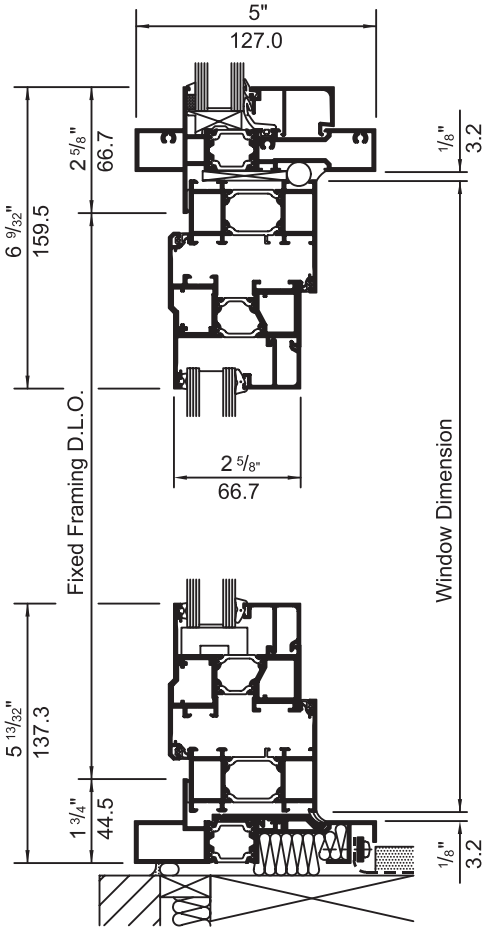


OPEN-OUT CASEMENT (SPO)

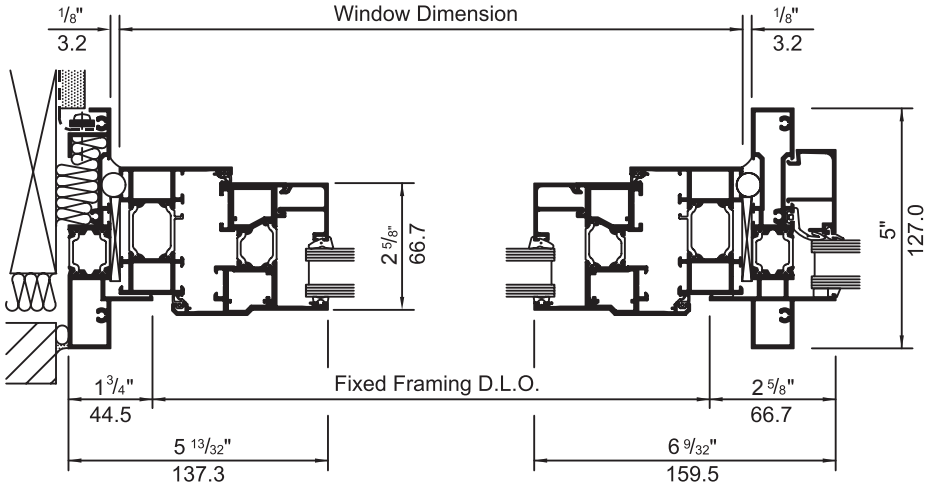
R. H. SHOWN, L. H. OPPOSITE



3 VENT HEAD



4 VENT SILL



1 VENT JAMB

2 VENT JAMB

For some regions and projects there may be minimum energy efficiency requirements for the building envelope, and its components, including windows. The shading coefficient (SC) and the thermal transmittance (U - value) of the window is then required to determine whether the building design complies with the specified energy requirements. Shading coefficient depends on the glass selected and should be obtained from the glass supplier. The U - value of the window varies with the type of glass and sealed unit edge construction, the window frame, and the relative areas of these components.

The window thermal transmittance values (U - values) shown in the chart below are based on CSA - A440.2 "Energy Performance Evaluation of Windows and Sliding Glass Doors." U - values of the center of glass, edge of glass, and frame areas were computed using the VISION and FRAME thermal simulation programs. Overall window U - values were calculated using the following relationship:

$$U_w = (U_c\ A_c + U_e\ A_e + U_f\ A_f\ )/A_w$$

where

U_w = U-value of complete window product

U_c = calculated center of glass U-value

U_e = calculated edge of glass U-value

U_f = calculated frame U-value

A_c = center of glass area

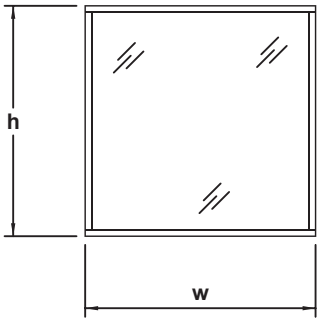
A_e = edge of glass area

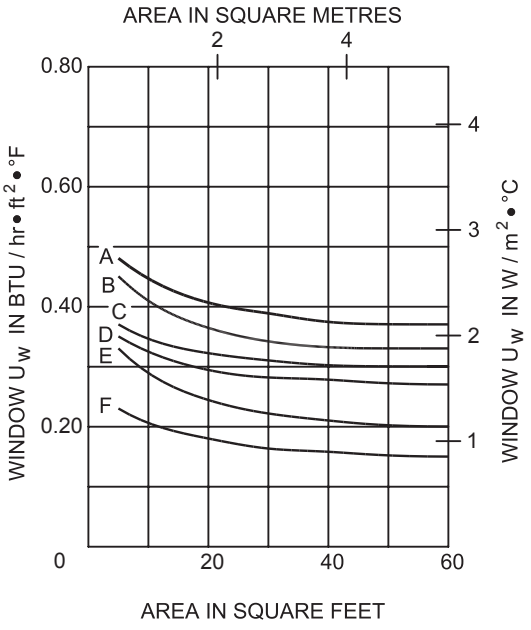
A_f = frame area

A_w = total window area

OVERALL WINDOW U-VALUE (U_w)

For fixed and operating window configurations as shown with height (h) equal to width (w).





SEALED UNIT GLAZING TYPE

A = 6mm clear / ½" air / 6mm low-e [1] / metal spacer

B = 6mm clear / ½" argon / 6mm low-e [1] / metal spacer

C = 6mm clear / ½" argon / 6mm low-e [1] / warm edge spacer [3]

D = 6mm clear / ½" argon / 6mm low-e [2] / warm edge spacer [3]

E = 6mm clear / ½" argon / 6mm low-e [1] / ½" argon / 6mm low-e [1] / metal spacer

F = 6mm clear / ½" argon / 6mm low-e [2] / ½" argon / 6mm low-e [2] / warm edge spacer [3]

1 - low-e coating emittance = 0.1
2 - low-e coating emittance = 0.03
3 - Edgetech Super "U" Spacer ®

NOTES: THE ABOVE SEALED UNIT GLAZING OPTIONS ARE PRESENTED FOR THE PURPOSES OF ILLUSTRATING THERMAL PERFORMANCE CAPABILITIES.

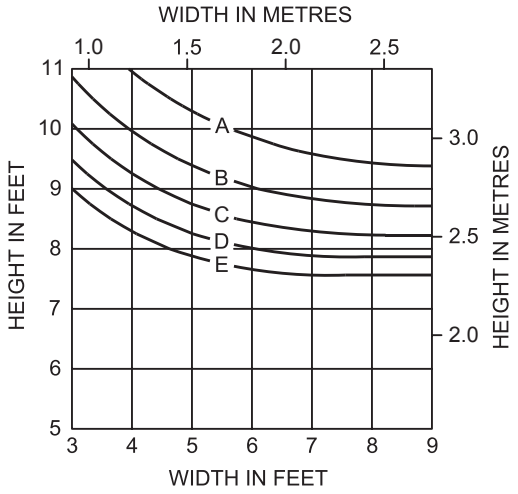
FOR WINDOWS WITH HEIGHT NOT EQUAL TO WIDTH, WHEN ADDING INTERMEDIATE VERTICALS OR HORIZONTALS, OR DIFFERENT GLASS INFILL, THE OVERALL WINDOW U - VALUE MAY VARY.

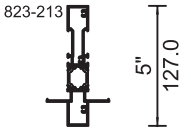
THE SPECIFIER SHOULD SELECT GLASS TO MEET THE PERFORMANCE REQUIREMENTS OF THE PROJECT.

Calculations are based on CAN3-S157 "Strength Design in Aluminum" in accordance with the National Building Code of Canada and an allowable deflection of 1/175 of mullion span.

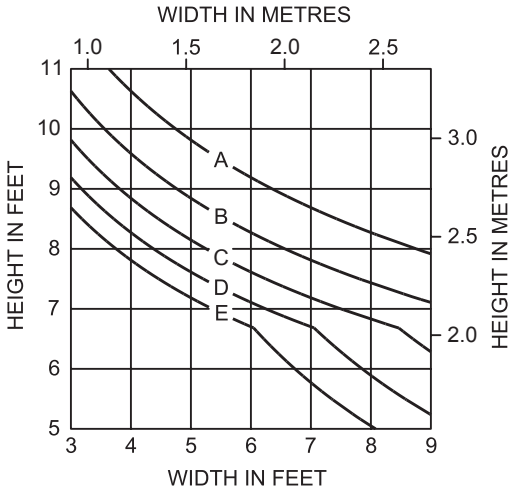
WINDLOAD LIMITATIONS

WITHOUT HORIZONTALS



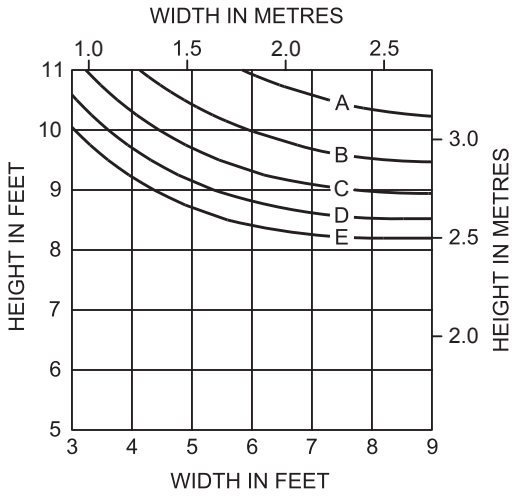


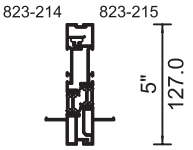
WITH HORIZONTALS



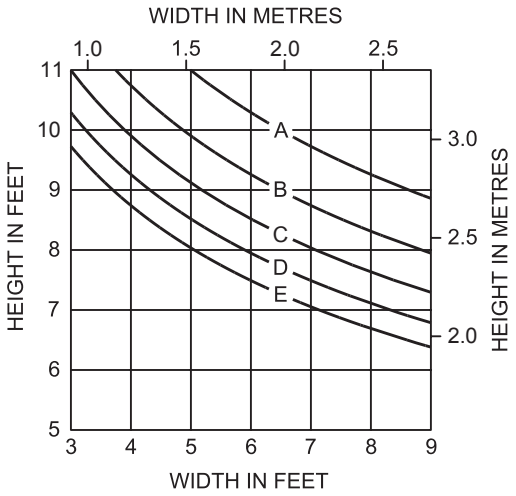
A = 15 p.s.f. (0.72 kPa.)
B = 20 p.s.f. (0.96 kPa.)
C = 25 p.s.f. (1.20 kPa.)
D = 30 p.s.f. (1.44 kPa.)
E = 35 p.s.f. (1.68 kPa.)

WITHOUT HORIZONTALS

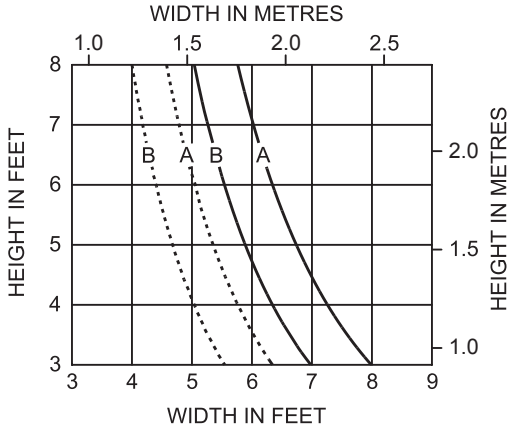




WITH HORIZONTALS



DEADLOAD LIMITATIONS

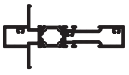


Intermediate Horizontal Over Ventilator (Maximum Deflection 1/16")

Intermediate Horizontal Over Fixed Lite (Maximum Deflection 1/8")

Curves are for sealed units with setting blocks 3" (76 mm) from the ends of the lite.

Intermediate Horizontal 823-213



$I = 0.20\ in^4 (8.24 \times 10^4 mm^4)$
$S = 0.25\ in^3 (0.41 \times 10^4 mm^3)$

A - **Double glazed sealed unit with (2) 6mm lites.**

B - **Triple glazed sealed unit with (3) 6mm lites**

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E.C. 97911-104

LAWS AND BUILDING AND SAFETY CODES GOVERNING THE DESIGN AND USE OF GLAZED ENTRANCE, WINDOW, AND CURTAIN WALL PRODUCTS VARY WIDELY. KAWNEER DOES NOT CONTROL THE SELECTION OF PRODUCT CONFIGURATIONS, OPERATING HARDWARE, OR GLAZING MATERIALS, AND ASSUMES NO RESPONSIBILITY THEREFOR.

Metric (SI) conversion figures are included throughout these details for reference. Numbers in parentheses ( ) are millimeters unless otherwise noted.

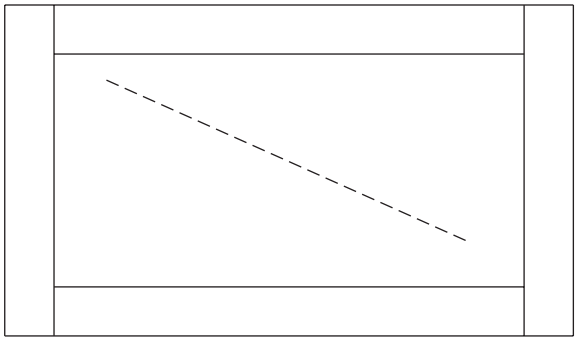
The following metric (SI) units are found in these details:

m – meter
cm – centimeter
mm – millimeter
s – second
Pa – pascal
MPa – megapascal

Kawneer reserves the right to change configurations without prior notice when deemed necessary for product improvement.

Features

- Architectural Grade Window
- Non-Thermally Broken Frames
- Screw and Spline Frame Corner Joinery
- Factory Silicone Glazed
- Interior Applied Glazing Bead with Bulb Gasket
- Architectural Anodized Finishes and Applied Coatings
- Two Year Manufacturer's Warranty



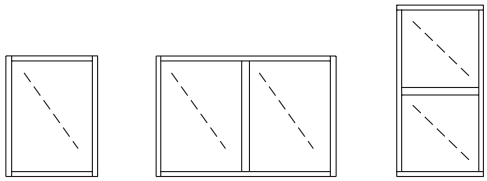
Fixed Window

Exterior Interior

For specific product applications,
Consult your Kawneer representative.

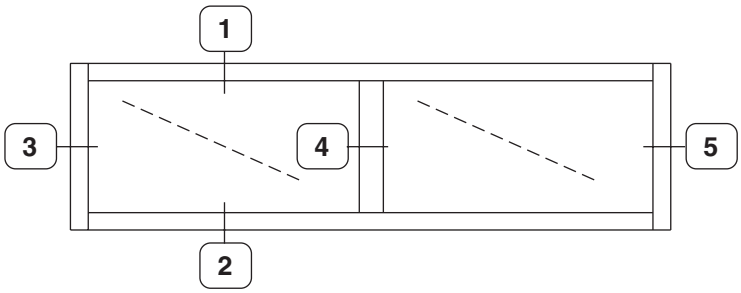
7225 Non-Thermal Windows

FIXED WINDOW

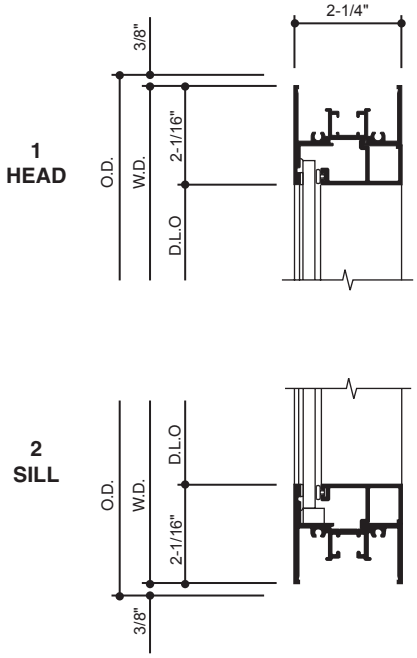
CLASS and GRADE	Architectual Grade AW-PG100-FW
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S. 2 / A440 (NAFS)
FRAME DEPTH	2-1/4" Overall Frame Depth
TYPICAL WALL THICKNESS	.090 and .125 Nominal
TYPICAL MAXIMUM SIZE	60" x 99"
TYPICAL MINIMUM SIZE	12" x 12"
TYPICAL CONFIGURATIONS	
STANDARD INFILL OPTIONS	1/4" and 1"
STANDARD HARDWARE	Not Applicable
OPTIONAL HARDWARE	Not Applicable
OTHER OPTIONS	Unequal Leg Frames Exterior and/or Interior Applied Muntins Perimeters and Sills Exterior Pannings and Interior Trims Structural Mullions Vertically or Horizontally Stacked Access Panels and Blinds Silicone Field Glazed upon Request

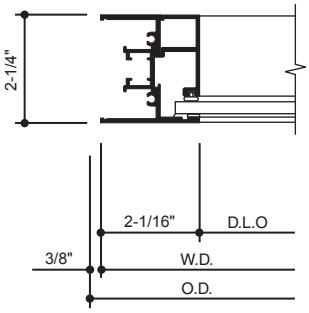
PERFORMANCE	Air Infiltration Cfm/ft²	Water Resistance PSF	Design Load PSF	Thermal Transmittance "U" Value	Condensation Resistance CRF	Sound Transmittance STC
	.10 @ 6.24 psf	15	100	n/a	n/a	n/a

SCALE : 3" = 1'-0"

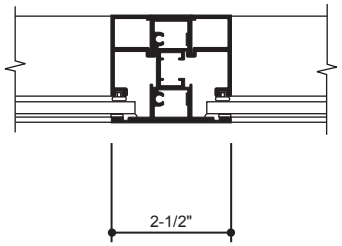


TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations

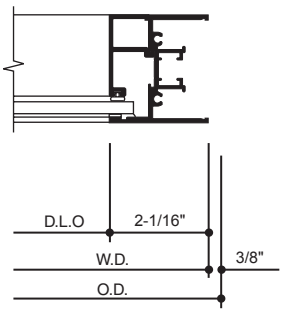




3
JAMB



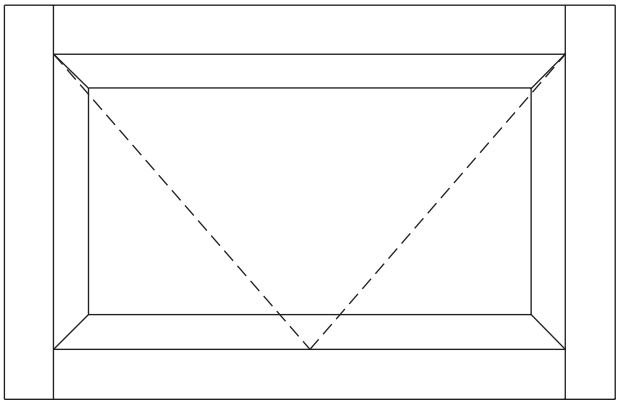
4
VERTICAL
MULLION



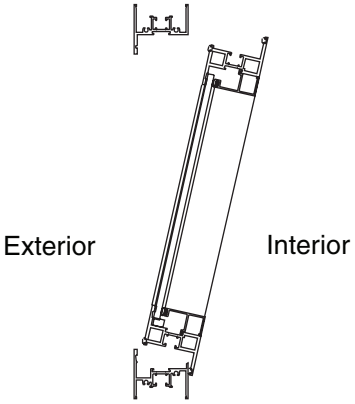
5
JAMB

Features

- Architectural Grade Window
- Non-Thermally Broken Frames
- Mitered, Clipped and Staked Vent Corner Joinery
- Screw and Spline Frame Corner Joinery
- Factory Silicone Glazed
- Interior Applied Glazing Bead with Bulb Gasket
- Architectural Anodized Finishes and Applied Coatings
- Two Year Manufacturer's Warranty
- Compatible with Storefront and Curtain Wall Systems



Project-In Window



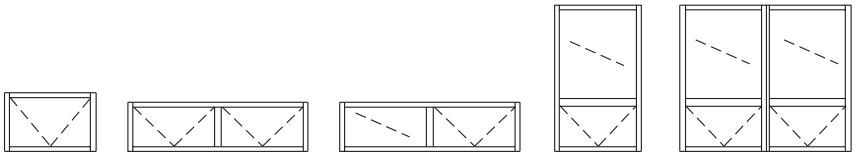
For specific product applications,
Consult your Kawneer representative.

7225 Non-Thermal Windows

JULY, 2016

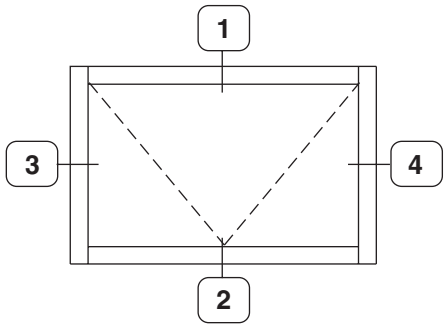
PROJECT-IN WINDOW

EC 97911-104

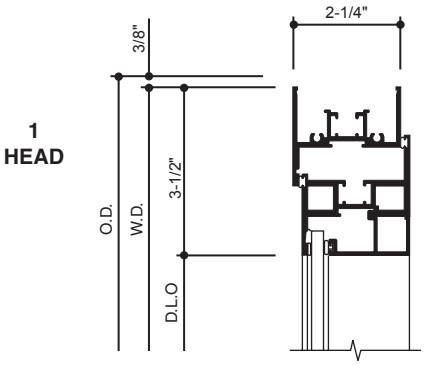
CLASS and GRADE	Architectual Grade AP-HC90 / AP-AW90 / AP-PG90-AP
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S. 2 / A440 (NAFS)
FRAME DEPTH	2-1/4" Overall Frame Depth
TYPICAL WALL THICKNESS	.090 and .125 Nominal
TYPICAL MAXIMUM SIZE	60" x 48"
TYPICAL MINIMUM SIZE	17" x 17"
TYPICAL CONFIGURATIONS	
STANDARD INFILL OPTIONS	1/4" and 1"
STANDARD HARDWARE	Stainless Steel 4-Bar Hinges Cast White Bronze Cam Locks
OPTIONAL HARDWARE	Access Control Locks Limit Stop Pole and Pole Ring
OTHER OPTIONS	Unequal Leg Frames Exterior and/or Interior Applied Muntins Insect Screens Perimeters and Sills Exterior Pannings and Interior Trims Structural Mullions Vertically or Horizontally Stacked Access Panels and Blinds Silicone Field Glazed upon Request

PERFORMANCE	Air Infiltration Cfm/ft²	Water Resistance PSF	Design Load PSF	Thermal Transmittance "U" Value	Condensation Resistance CRF	Sound Transmittance STC
	.10 @ 6.24 psf	15	90	n/a	n/a	n/a

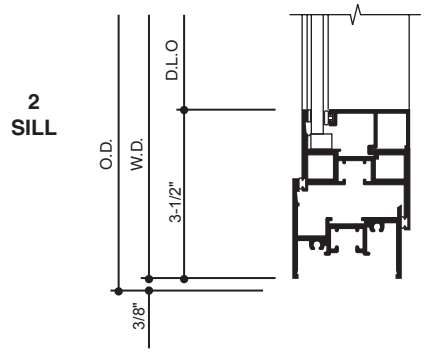
SCALE : 3" = 1'-0"



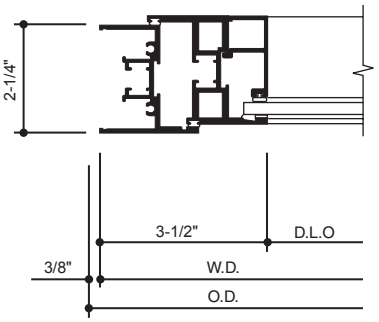
TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations



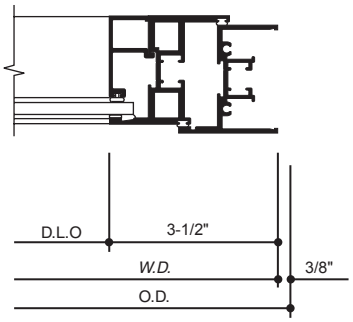
1
HEAD



2
SILL

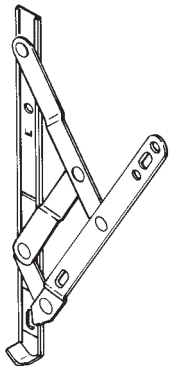


3
JAMB



4
JAMB

STAINLESS STEEL 4 BAR HINGES

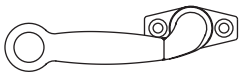


A standard hinge for ventilators providing approximately 45° to 60° openings depending on size. An optional limit stop is available to restrict hinge travel and limit vent opening.

STANDARD CAM HANDLE

Cast white bronze cam handles are standard for the manual operation and locking of ventilators.

CAM HANDLE WITH POLE RING

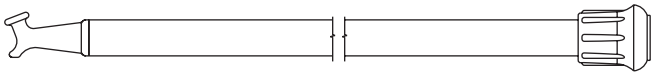


Cast white bronze cam handles with pole ring provide manual operation of ventilators located above reach.
These handles are operated with a sash pole.

POLE RING

Cast white bronze pole ring is used in conjunction with locking hardware for sash pole operation of ventilators.

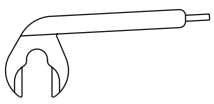
SASH POLE



HANGER FOR SASH POLE

A 3/4" diameter aluminum sash pole with a cast white bronze pull down hook and black rubber tip.
Available in 6 ft. and 12 ft. lengths with optional cast white bronze pole hanger.

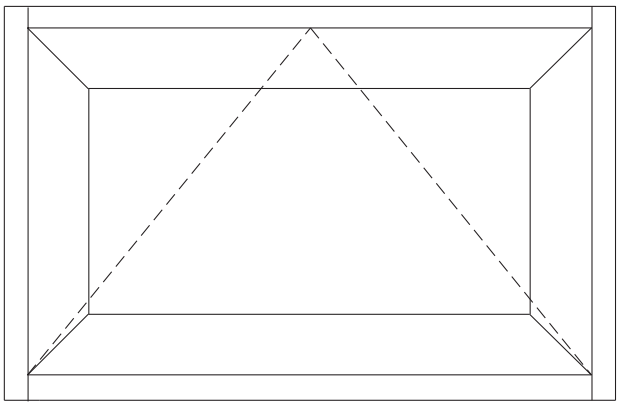
ACCESS CONTROL LOCK



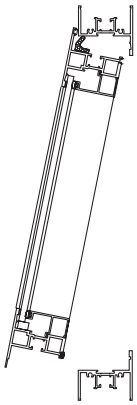
In lieu of the standard cam handles cast white bronze access control locks are offered for managed control of vent operations. Lock is operated with a manganese bronze removable handle.

Features

- Architectural Grade Window
- Non-Thermally Broken Frames
- Mitered, Clipped and Staked Vent Corner Joinery
- Screw and Spline Frame Corner Joinery
- Factory Silicone Glazed
- Interior Applied Glazing Bead with Bulb Gasket
- Architectural Anodized Finishes and Applied Coatings
- Two Year Manufacturer's Warranty
- Compatible with Storefront and Curtain Wall Systems



Project-Out Window

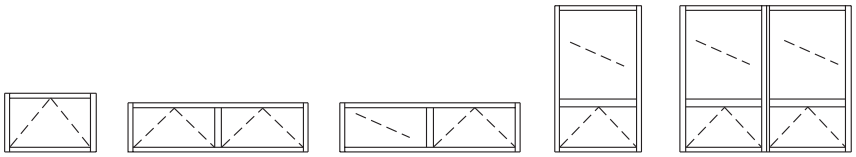


Exterior Interior

For specific product applications,
Consult your Kawneer representative.

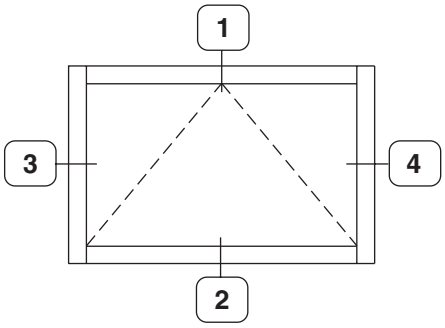
7225 Non-Thermal Windows

PROJECT-OUT WINDOW

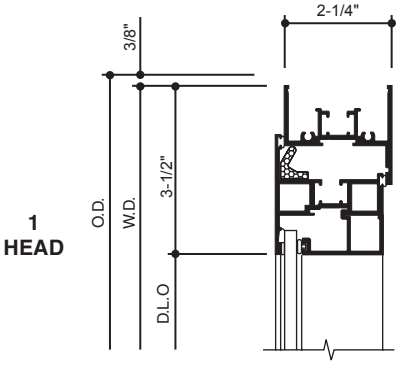
CLASS and GRADE	Architectual Grade AP-HC90 / AP-AW90 / AW-PG90-AP
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S. 2 / A440 (NAFS)
FRAME DEPTH	2-1/4" Overall Frame Depth
TYPICAL WALL THICKNESS	.090 and .125 Nominal
TYPICAL MAXIMUM SIZE	60" x 89"
TYPICAL MINIMUM SIZE	17" x 17"
TYPICAL CONFIGURATIONS	
STANDARD INFILL OPTIONS	1/4" and 1"
STANDARD HARDWARE	Stainless Steel 4-Bar Hinges Cast White Bronze Cam Locks 88SS Support Arm (Units over 50" in height)
OPTIONAL HARDWARE	Access Control Locks Hook Bolt Lock Handle Pivot Shoe Roto-Operator Scissors Arm Roto-Operator Limit Stop Pole and Pole Ring
OTHER OPTIONS	Unequal Leg Frames Exterior and/or Interior Applied Muntins Insect Screens Perimeters and Sills Exterior Pannings and Interior Trims Structural Mullions Vertically or Horizontally Stacked Access Panels and Blinds Silicone Field Glazed upon Request

PERFORMANCE	Air Infiltration Cfm/ft^2	Water Resistance PSF	Design Load PSF	Thermal Transmittance "U" Value	Condensation Resistance CRF	Sound Transmittance STC
	.10 @ 6.24 psf	15	90	n/a	n/a	n/a

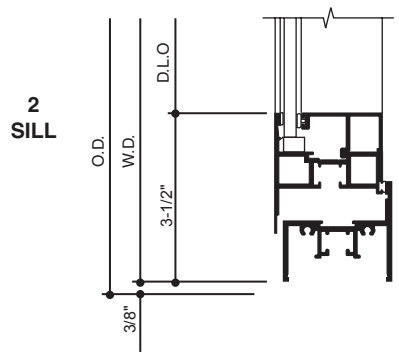
SCALE : 3" = 1'-0"



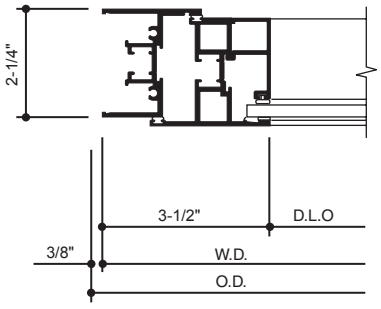
TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations



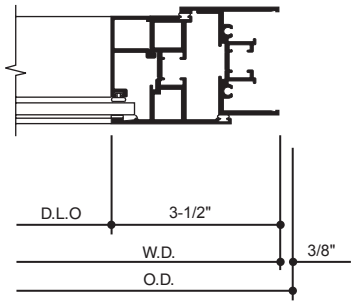
1
HEAD



2
SILL

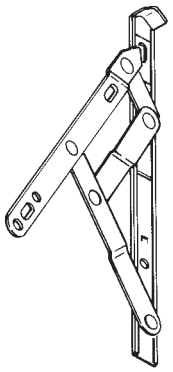


3
JAMB



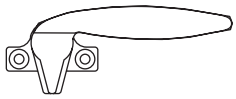
4
JAMB

STAINLESS STEEL 4 BAR HINGES



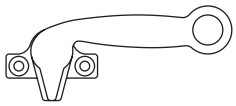
A standard hinge for ventilators providing approximately 45° to 60° openings depending on size. An optional limit stop is available to restrict hinge travel and limit vent opening.

STANDARD CAM HANDLE



Cast white bronze cam handles are standard for the manual operation and locking of ventilators.

CAM HANDLE WITH POLE RING

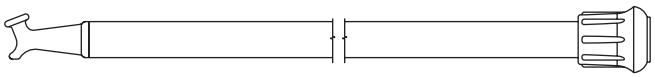


Cast white bronze cam handles with pole ring provide manual operation of ventilators located above reach.
These handles are operated with a sash pole.

POLE RING

Cast white bronze pole ring is used in conjunction with locking hardware for sash pole operation of ventilators.

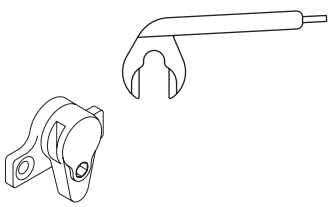
SASH POLE



HANGER FOR SASH POLE

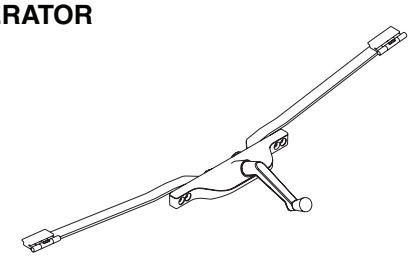
A 3/4" diameter aluminum sash pole with a cast white bronze pull down hook and black rubber tip.
Available in 6 ft. and 12 ft. lengths with optional cast white bronze pole hanger.

ACCESS CONTROL LOCK



In lieu of the standard cam handles cast white bronze access control locks are offered for managed control of vent operations. Lock is operated with a manganese bronze removable handle.

PIVOT-SHOE ROTO-OPERATOR

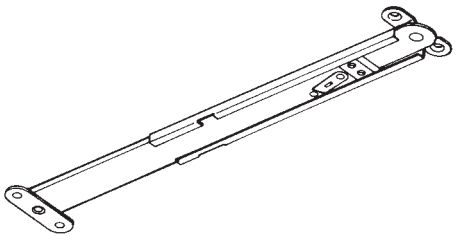


Optional pivot shoe roto operator is located on the center line of the bottom horizontal frame.
Standard finish shall be brushed copper nickel to match US-25-D.

HOOK BOLT LOCK

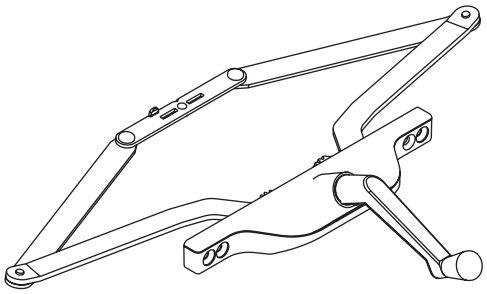
For use with pivot-shoe roto operator in lieu of cam handles.
Standard finish shall be US-25-D clear white bronze.

88SS SUPPORT ARM



Support arms are used when window height exceeds 50-1/2". When fully extended, the hardware automatically retains the ventilator in an open position.

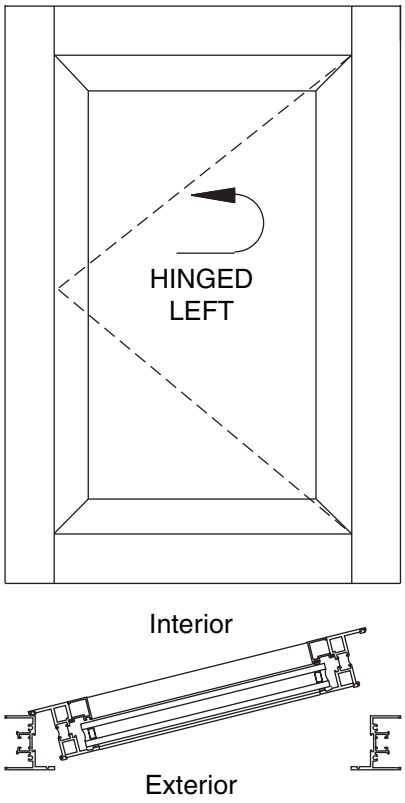
SCISSORS ARM ROTO OPERATOR



Optional scissor arm roto operator is located on the center line of the bottom horizontal frame.
Standard finish shall be brushed copper nickel to match US-25-D.

Features

- Architectural Grade Window
- Non-Thermally Broken Frames
- Mitered, Clipped and Staked Vent Corner Joinery
- Screw and Spline Frame Corner Joinery
- Factory Silicone Glazed
- Interior Applied Glazing Bead with Bulb Gasket
- Architectural Anodized Finishes and Applied Coatings
- Two Year Manufacturer's Warranty
- Compatible with Storefront and Curtain Wall Systems

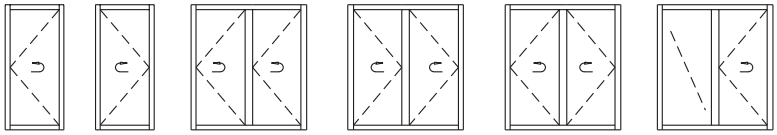


Inswing Casement Window

For specific product applications,
Consult your Kawneer representative.

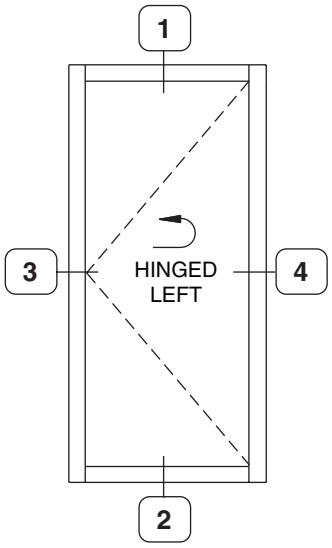
7225 Non-Thermal Windows

INSWING CASEMENT WINDOW

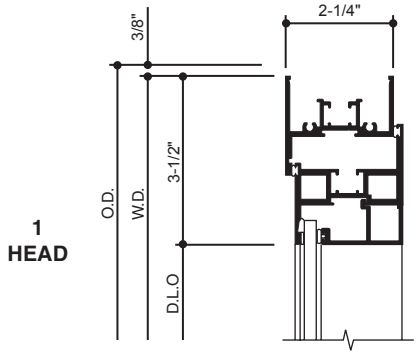
CLASS and GRADE	Architectual Grade C-HC90 / C-AW90 / AW-PG90-C
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S. 2 / A440 (NAFS)
FRAME DEPTH	2-1/4" Overall Frame Depth
TYPICAL WALL THICKNESS	.090 and .125 Nominal
TYPICAL MAXIMUM SIZE	36" x 60"
TYPICAL MINIMUM SIZE	17" x 17"
TYPICAL CONFIGURATIONS	
STANDARD INFILL OPTIONS	1/4" and 1"
STANDARD HARDWARE	Stainless Steel 4-Bar Hinges Cast White Bronze Cam Locks
OPTIONAL HARDWARE	Access Control Locks Limit Stop Pole and Pole Ring Butt Hinges Keyed Limit Arm Friction Adjustor
OTHER OPTIONS	Unequal Leg Frames Exterior and/or Interior Applied Muntins Insect Screens Perimeters and Sills Exterior Pannings and Interior Trims Structural Mullions Vertically or Horizontally Stacked Access Panels and Blinds Silicone Field Glazed upon Request

PERFORMANCE	Air Infiltration Cfm/ft²	Water Resistance PSF	Design Load PSF	Thermal Transmittance "U" Value	Condensation Resistance CRF	Sound Transmittance STC
	.10 @ 6.24 psf	15	90	n/a	n/a	n/a

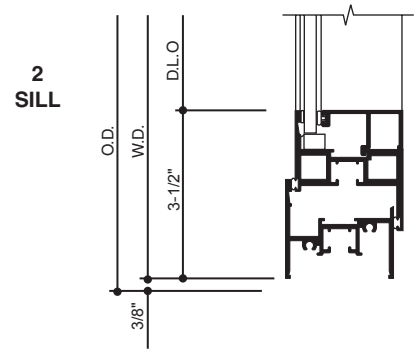
SCALE : 3" = 1'-0"



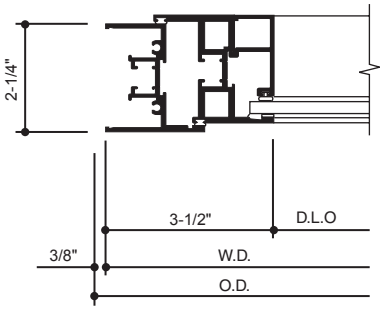
TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations



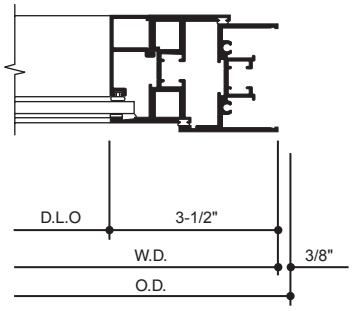
1
HEAD



2
SILL

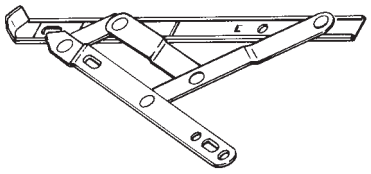


3
JAMB



4
JAMB

STAINLESS STEEL 4 BAR HINGES

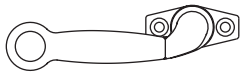


A standard hinge for ventilators providing approximately 45° to 60° openings depending on size. An optional limit stop is available to restrict hinge travel and limit vent opening.

STANDARD CAM HANDLE

Cast white bronze cam handles are standard for the manual operation and locking of ventilators.

CAM HANDLE WITH POLE RING

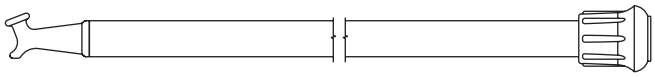


Cast white bronze cam handles with pole ring provide manual operation of ventilators located above reach.
These handles are operated with a sash pole.

POLE RING

Cast white bronze pole ring is used in conjunction with locking hardware for sash pole operation of ventilators.

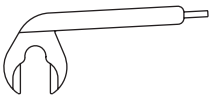
SASH POLE

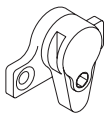


HANGER FOR SASH POLE

A 3/4" diameter aluminum sash pole with a cast white bronze pull down hook and black rubber tip.
Available in 6 ft. and 12 ft. lengths with optional cast white bronze pole hanger.

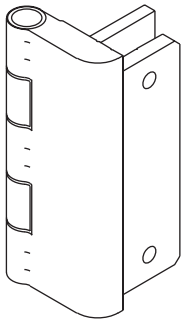
ACCESS CONTROL LOCK





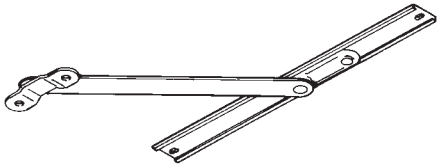
In lieu of the standard cam handles cast white bronze access control locks are offered for managed control of vent operations. Lock is operated with a manganese bronze removable handle.

BUTT HINGES



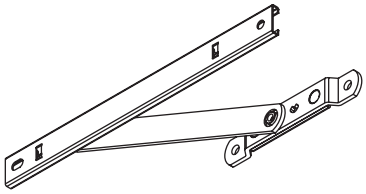
An optional hinge for ventilators providing a full 90° opening. Butt hinges shall be finished to match the window.

FRICTION ADJUSTOR



Friction adjustors shall be used with butt hinges for additional friction for control of the ventilator.

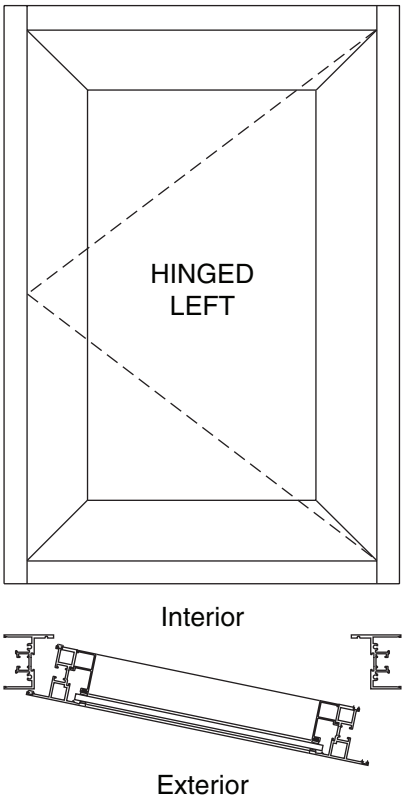
KEYED LIMIT ARM



Key released limit arms may be used to restrict ventilator opening when used with butt hinges.

Features

- Architectural Grade Window
- Non-Thermally Broken Frames
- Mitered, Clipped and Staked Vent Corner Joinery
- Screw and Spline Frame Corner Joinery
- Factory Silicone Glazed
- Interior Applied Glazing Bead with Bulb Gasket
- Architectural Anodized Finishes and Applied Coatings
- Two Year Manufacturer's Warranty
- Compatible with Storefront and Curtain Wall Systems

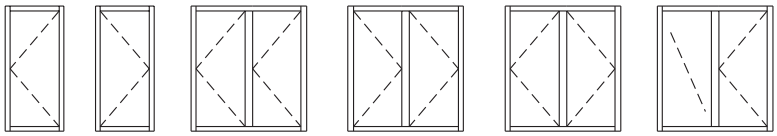


Outswing Casement
Window

For specific product applications,
Consult your Kawneer representative.

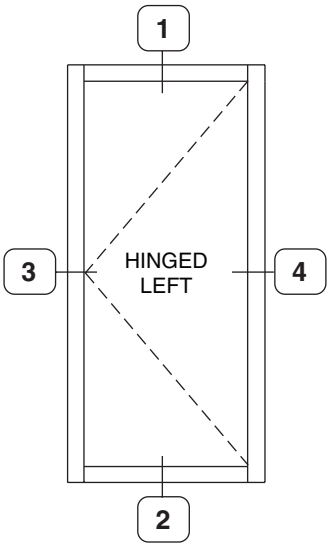
7225 Non-Thermal Windows

OUTSWING CASEMENT WINDOW

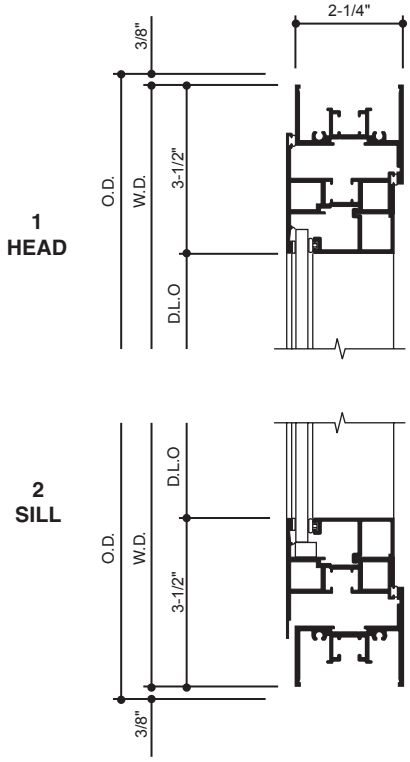
CLASS and GRADE	Architectual Grade C-HC90 / C-AW90 / AW-PG90-C
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S. 2 / A440 (NAFS)
FRAME DEPTH	2-1/4" Overall Frame Depth
TYPICAL WALL THICKNESS	.090 and .125 Nominal
TYPICAL MAXIMUM SIZE	36" x 60"
TYPICAL MINIMUM SIZE	17" x 17"
TYPICAL CONFIGURATIONS	
STANDARD INFILL OPTIONS	1/4" and 1"
STANDARD HARDWARE	Stainless Steel 4-Bar Hinges Cast White Bronze Cam Locks
OPTIONAL HARDWARE	Butt Hinges Access Control Locks Hook Bolt Lock or Multi-Point Lock Limit Stop Pole and Pole Ring Friction Adjustor Keyed Limit Arm Roto Operator
OTHER OPTIONS	Unequal Leg Frames Exterior and/or Interior Applied Muntins Insect Screens Perimeters and Sills Exterior Pannings and Interior Trims Structural Mullions Vertically or Horizontally Stacked Access Panel and Blinds Silicone Field Glazed upon Request

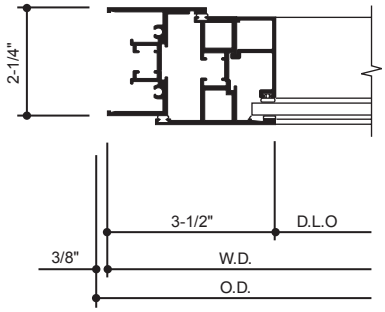
PERFORMANCE	Air Infiltration Cfm/ft²	Water Resistance PSF	Design Load PSF	Thermal Transmittance "U" Value	Condensation Resistance CRF	Sound Transmittance STC
	.10 @ 6.24 psf	15	90	n/a	n/a	n/a

SCALE : 3" = 1'-0"

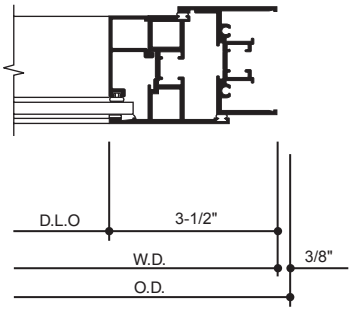


TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations



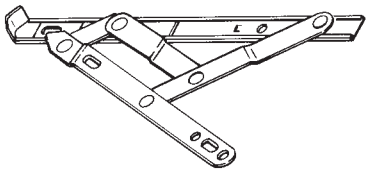


3
JAMB



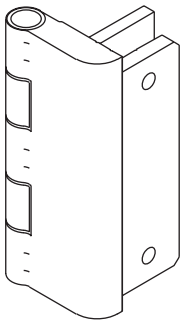
4
JAMB

STAINLESS STEEL 4 BAR HINGES



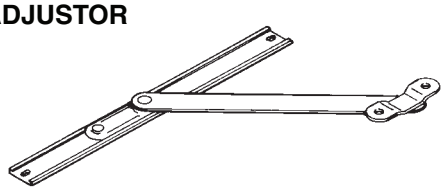
A standard hinge for ventilators providing approximately 45° to 60° openings depending on size.An optional limit stop is available to restrict hinge travel and limit vent opening.

BUTT HINGES



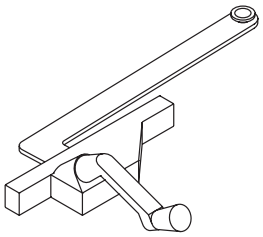
An optional hinge for ventilators providing a full 90° opening. Butt Hinges shall be finished to match the window.

FRICTION ADJUSTOR



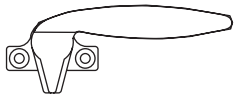
Friction adjustors shall be used with butt hinges for additional friction for control of the ventilator.

ROTO OPERATOR



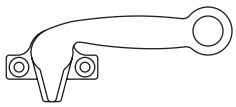
Roto operators are used with butt hinges only and located at the bottom horizontal frame. Standard finish shall be brushed copper nickel to match US-25-D.

STANDARD CAM HANDLE



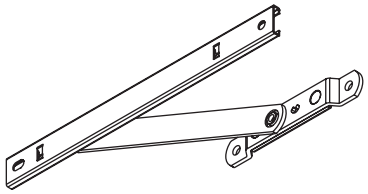
Cast white bronze cam handles are standard for the manual operation and locking of ventilators.

CAM HANDLE WITH POLE RING



Cast white bronze cam handles with pole ring provide manual operation of ventilators located above reach.
These handles are operated with a sash pole.

KEYED LIMIT ARM

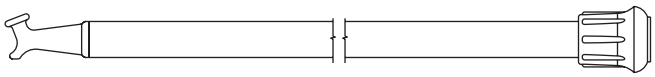


Key released limit arms may be used to restrict ventilator opening when used with butt hinges.

POLE RING

Cast white bronze pole ring is used in conjunction with locking hardware for sash pole operation of ventilators.

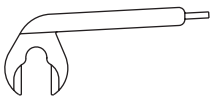
SASH POLE



HANGER FOR SASH POLE

A 3/4" diameter aluminum sash pole with a cast white bronze pull down hook and black rubber tip.
Available in 6 ft. and 12 ft. lengths with optional cast white bronze pole hanger.

ACCESS CONTROL LOCK



In lieu of the standard cam handles cast white bronze access control locks are offered for managed control of vent operations. Lock is operated with a manganese bronze removable handle.

HOOK BOLT LOCK

Optional hook bolt lock in lieu of cam handle. Standard finish shall be US-25-D clear white bronze.

MULTI-POINT LOCK

Optional single locking handle for concealed multi-point locks located on the vertical frame. Standard finish shall be US-25-D clear white bronze.

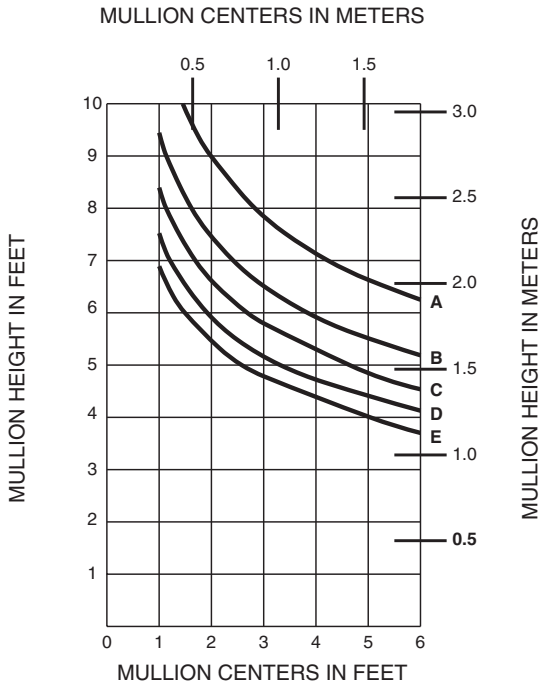
ESCAPE WINDOW SIGN

Vinyl escape window sign. Colors are white letters on red background.

RESCUE WINDOW SIGN

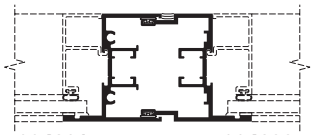
Vinyl rescue window sign with lettering on both sides. Colors are black letters on a yellow background.

WIND LOAD CHARTS:
THESE CHARTS ARE BASED ON A MAXIMUM DEFLECTION OF L\175 AND\OR A MAXIMUM STRESS OF 15,152 PSI (104 MPa).

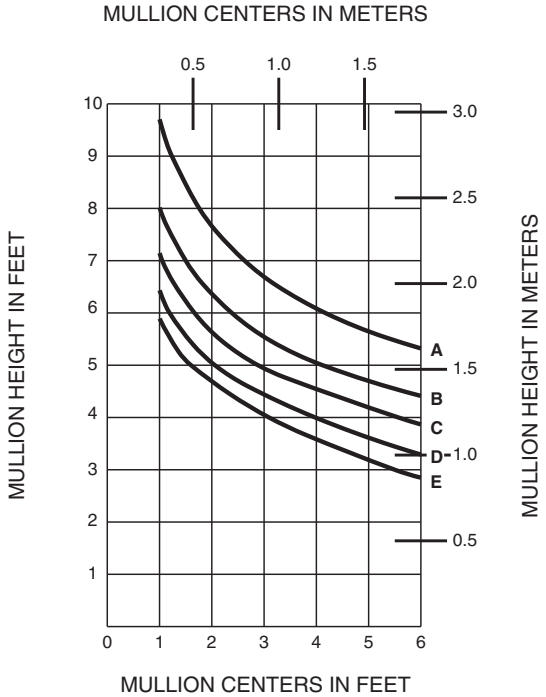


UNITS WITH HORIZONTALS

A = 20 PSF (958)
B = 35 PSF (1436)
C = 50 PSF (2394)
D = 70 PSF (3352)
E = 90 PSF (4309)

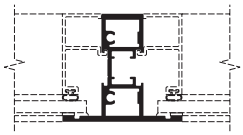


224031 **224033**



UNITS WITH HORIZONTALS

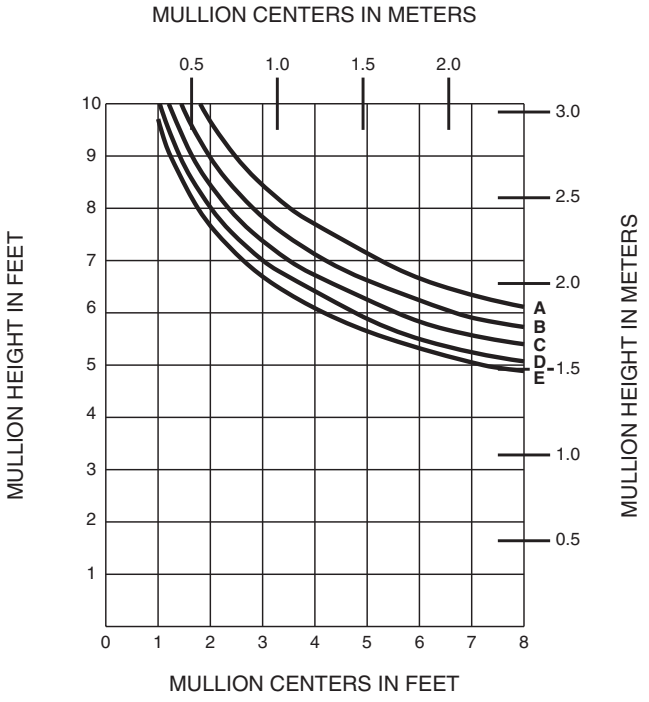
A = 20 PSF (958)
B = 35 PSF (1436)
C = 50 PSF (2394)
D = 70 PSF (3352)
E = 90 PSF (4309)



224038

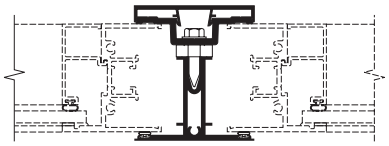
WIND LOAD CHARTS:

THESE CHARTS ARE BASED ON A MAXIMUM DEFLECTION OF L\175 AND\OR A MAXIMUM STRESS OF 15,152 PSI (104 MPa).

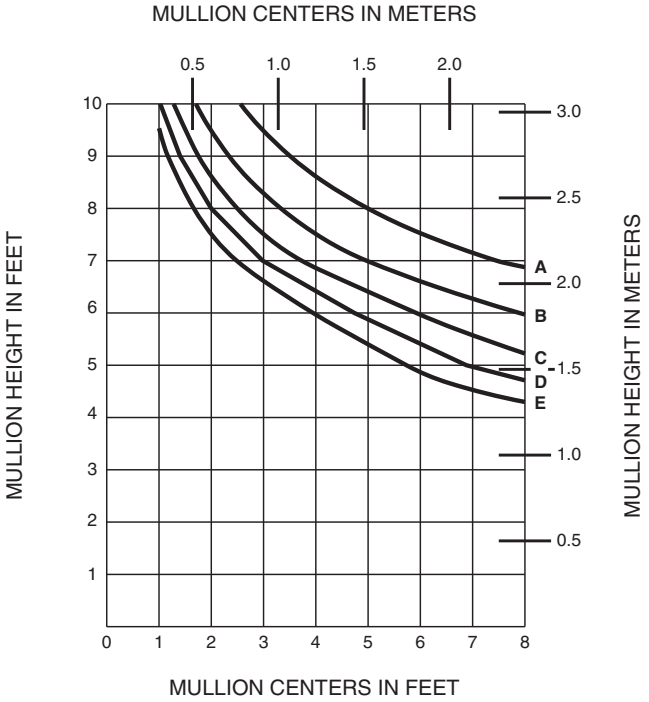


UNITS WITH HORIZONTALS

A = 20 PSF (958)
B = 25 PSF (1197)
C = 30 PSF (1436)
D = 35 PSF (1676)
E = 40 PSF (1915)

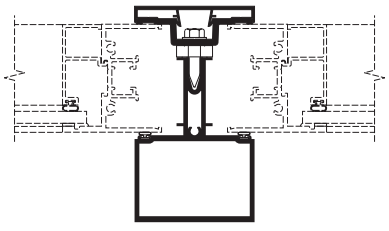


224070



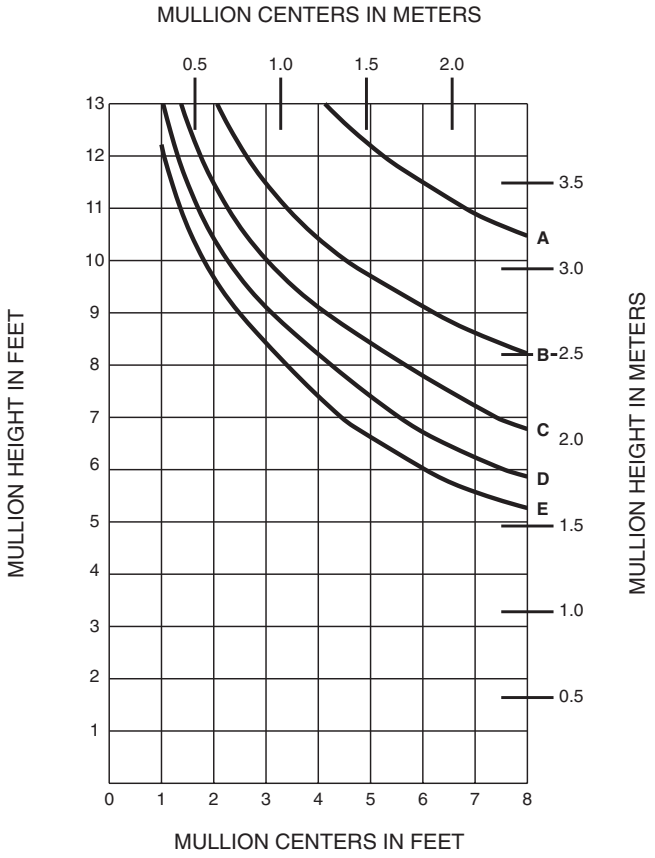
UNITS WITH HORIZONTALS

A = 30 PSF (1436)
B = 45 PSF (2155)
C = 60 PSF (2873)
D = 75 PSF (3591)
E = 90 PSF (4309)



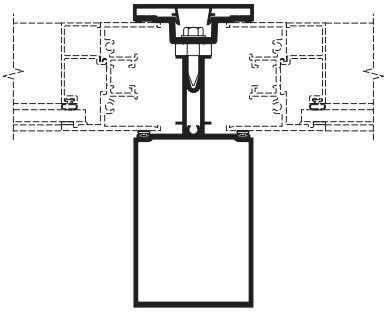
224071

WIND LOAD CHARTS:
THESE CHARTS ARE BASED ON A MAXIMUM DEFLECTION OF L\175 AND\OR A MAXIMUM STRESS OF 15,152 PSI (104 MPa).

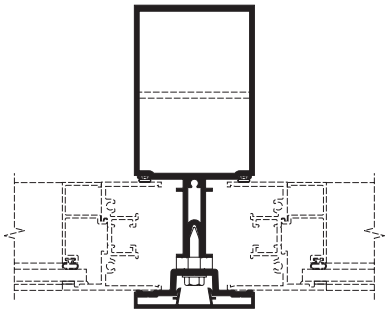


UNITS WITH HORIZONTALS

A = 20 PSF (958)
B = 40 PSF (1915)
C = 60 PSF (2873)
D = 80 PSF (3830)
E = 100 PSF (4788)



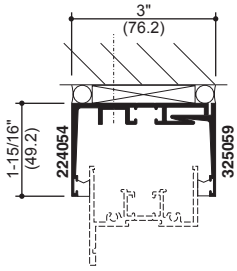
224072



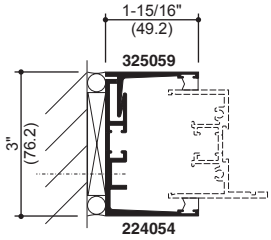
NOTE:
MULLION PROJECTION TO THE INTERIOR AVAILABLE

SCALE : 3" = 1'-0"

EQUAL LEG SILLS

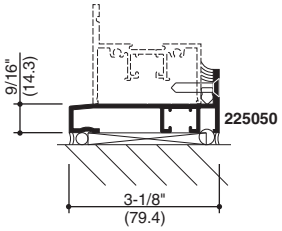


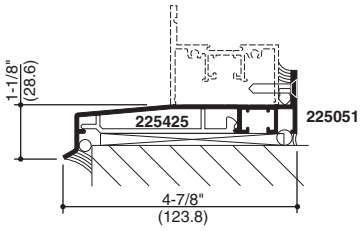
HEAD RECEPTOR

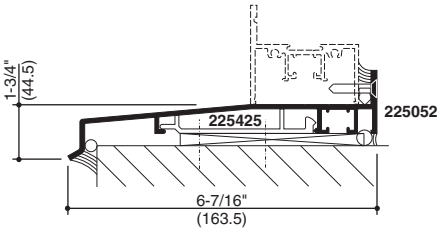


JAMB RECEPTOR

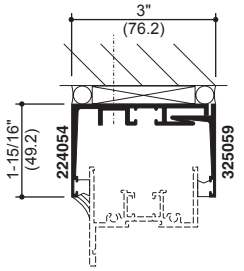
FULL DEPTH SILLS



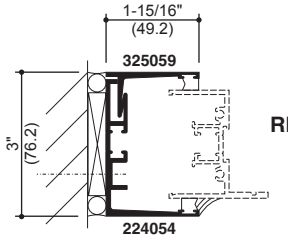




UNEQUAL LEG SILLS

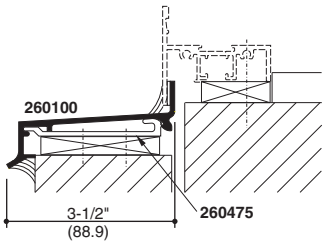


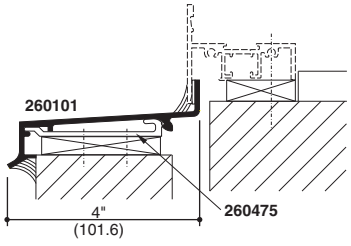
HEAD RECEPTOR

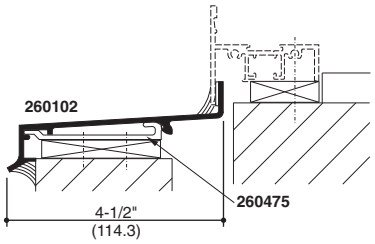


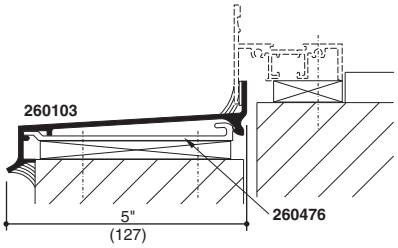
JAMB RECEPTOR

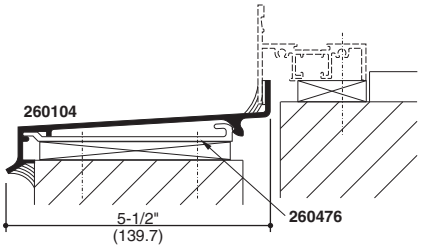
UNEQUAL LEG SILLS



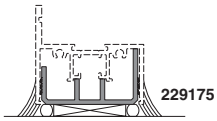




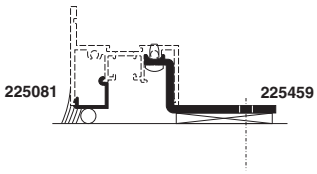




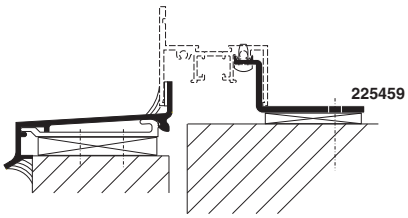
SCALE : 3" = 1'-0"



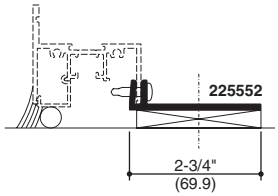
PVC PERIMETER
(Continuous)
Head and Jamb Similar



STRAP ANCHOR
with SEALANT BACK-UP



STRAP ANCHOR
with SUB SILL



F-ANCHOR STRAP
Equal Leg Frame Only

LAWS AND BUILDING AND SAFETY CODES GOVERNING THE DESIGN AND USE OF GLAZED ENTRANCE, WINDOW, AND CURTAIN WALL PRODUCTS VARY WIDELY. KAWNEER DOES NOT CONTROL THE SELECTION OF PRODUCT CONFIGURATIONS, OPERATING HARDWARE, OR GLAZING MATERIALS, AND ASSUMES NO RESPONSIBILITY THEREFOR.

Metric (SI) conversion figures are included throughout these details for reference. Numbers in parentheses ( ) are millimeters unless otherwise noted.

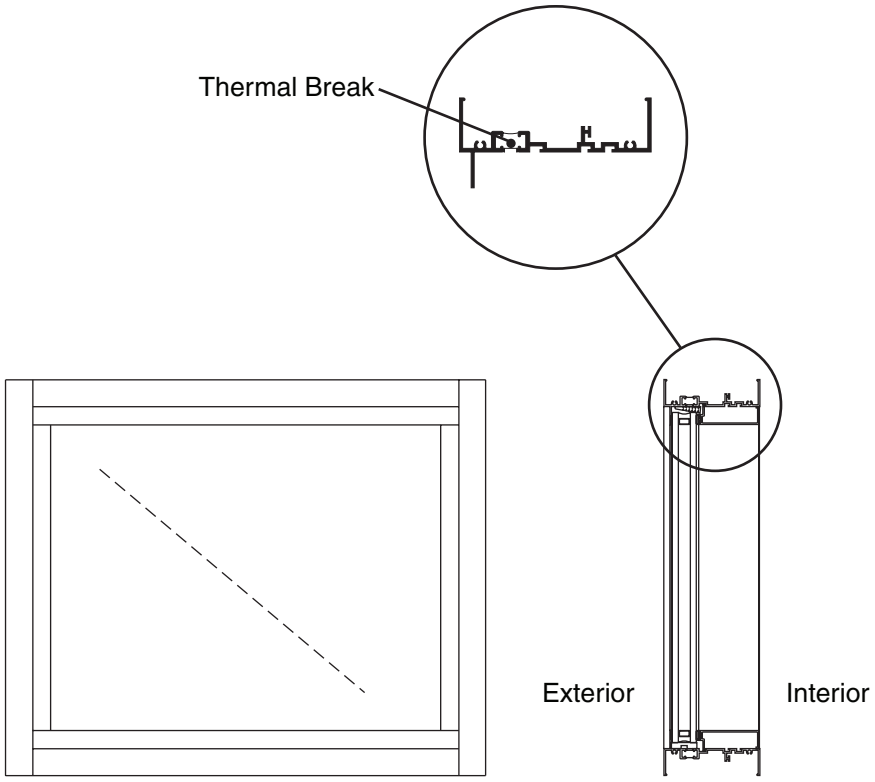
The following metric (SI) units are found in these details:

m – meter
cm – centimeter
mm – millimeter
s – second
Pa – pascal
MPa – megapascal

Kawneer reserves the right to change configurations without prior notice when deemed necessary for product improvement.

Features

- Architectural Grade Window
- Series 8410TL Standard Design
- IsoLock™ Thermal Break
- Screw and Spline Frame Corner Joinery
- Factory Silicone Glazed
- Interior Applied Glazing Bead with Bulb Gasket
- Architectural Anodized Finishes and Applied Coatings
- Two Year Manufacturer's Warranty

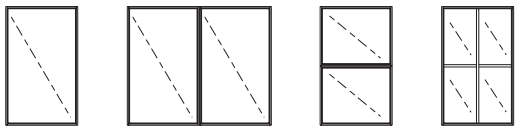


Fixed Window

For specific product applications,
Consult your Kawneer representative.

8400TL Thermal Windows

8410TL FIXED

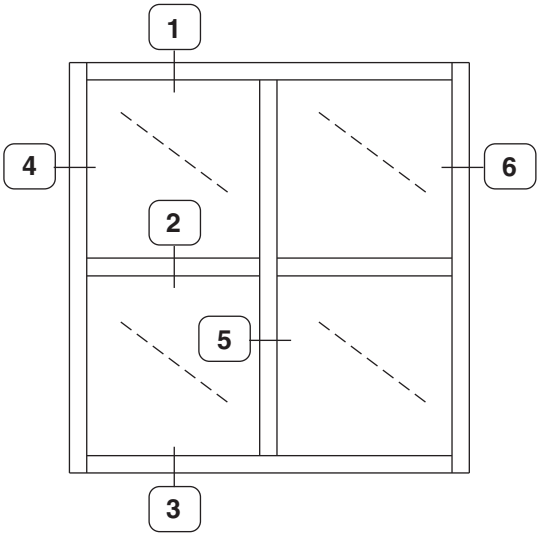
CLASS and GRADE	Architectural Grade Window F-HC100 / F-AW100 / AW-PG100-FW
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S. 2 / A440 (NAFS)
FRAME DEPTH	4" Overall Frame Depth
TYPICAL WALL THICKNESS	.070 Nominal
TYPICAL MAXIMUM SIZE	60" x 99"
TYPICAL MINIMUM SIZE	12" x 12"
TYPICAL CONFIGURATIONS	
STANDARD INFILL OPTIONS	1/4", 3/4" with Glazed-in Muntin Grid, 1", and 1-1/2"
STANDARD HARDWARE	Not Applicable
OPTIONAL HARDWARE	Not Applicable
OTHER OPTIONS	Exterior Glazed-in Muntin Grids Exterior Glazing Offset Glazing Perimeters and Sills Exterior Pannings and Interior Trims True Intermediate Mullions Structural Mullions Vertically or Horizontally Stacked

PERFORMANCE	Air Infiltration Cfm/ft²	Water Resistance PSF	Design Load PSF	Thermal Transmittance "U" Value	Condensation Resistance CRF	Sound Transmittance STC
	.30 @ 6.24 psf	15	100	.60	58	n/a

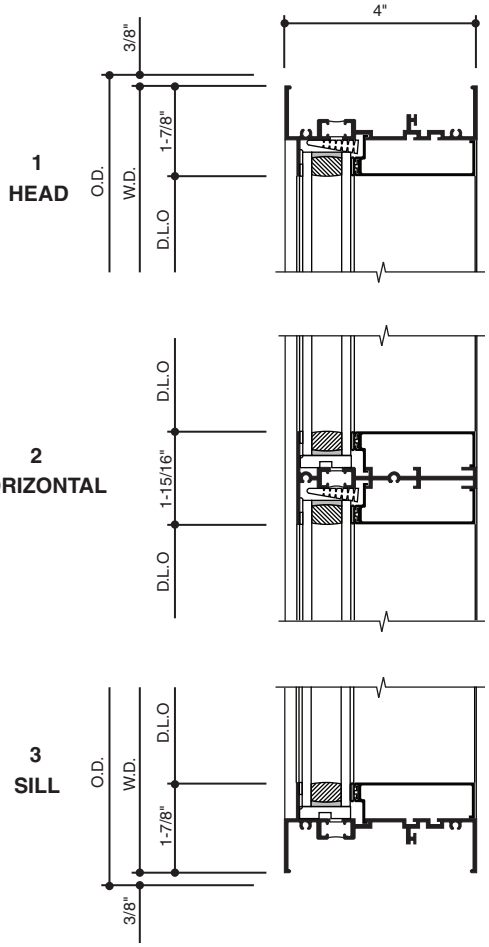
Note: Thermal values are based upon 1" clear insulating glass.

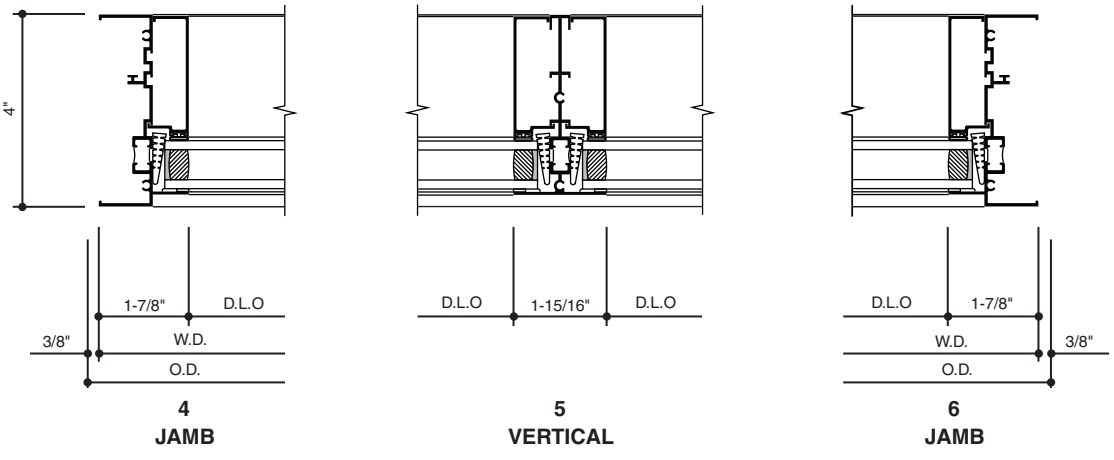
SCALE : 3" = 1'-0"

8410TL FIXED WINDOW
Standard Design



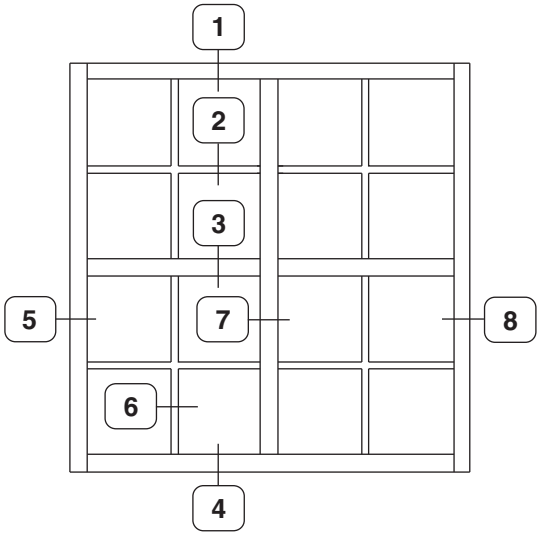
TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations





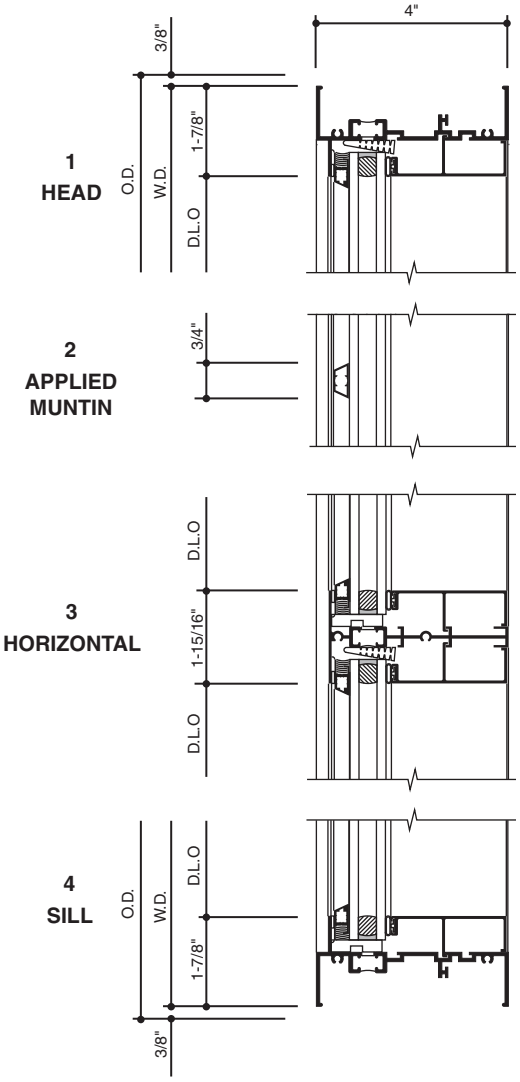
SCALE : 3" = 1'-0"

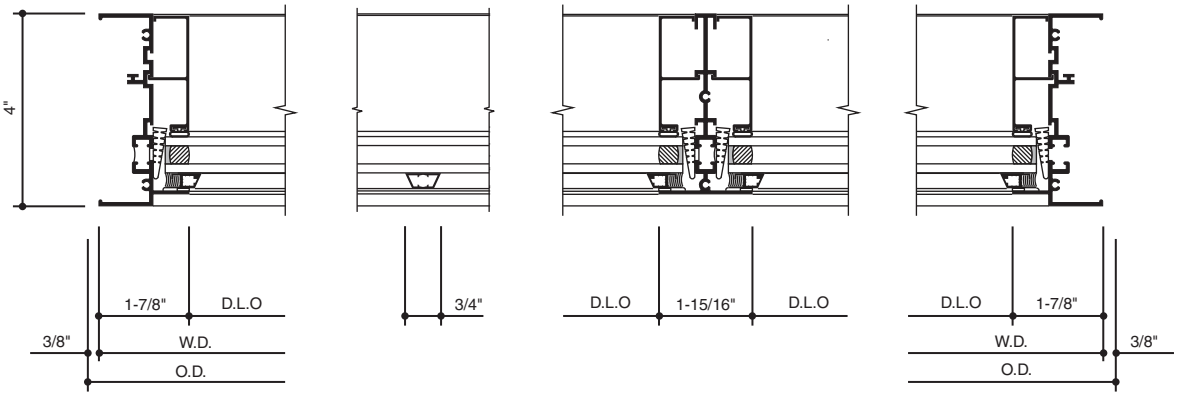
8410TL FIXED WINDOW with Glazed-in Muntin Grid



TYPICAL ELEVATION

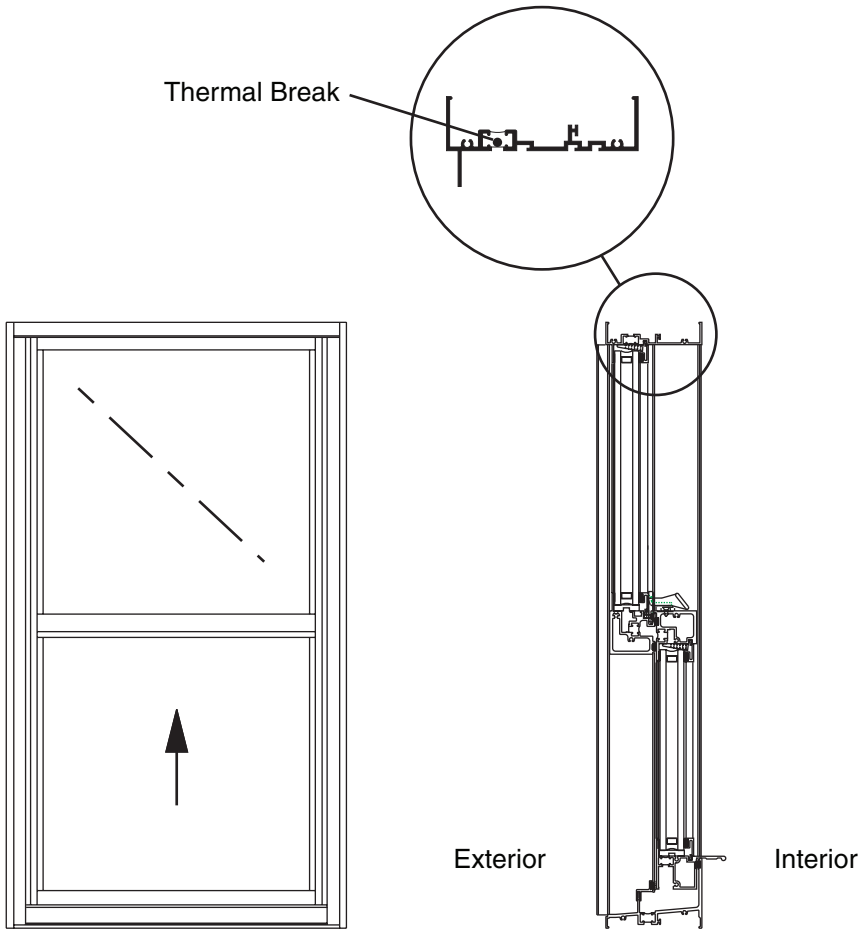
Log onto www.kawneer.com for other configurations





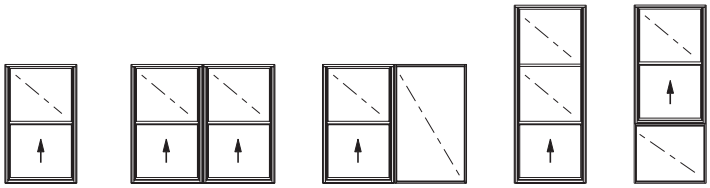
Features

- Architectural Grade Window
- Series 8430TL Standard Design
- IsoLock™ Thermal Break
- Screw and Spline Frame and Sash Corner Joinery
- Factory Silicone Glazed
- Interior Applied Glazing Bead with Bulb Gasket
- Architectural Anodized Finishes and Applied Coatings
- Two Year Manufacturer's Warranty



Single Hung Window

For specific product applications,
Consult your Kawneer representative.

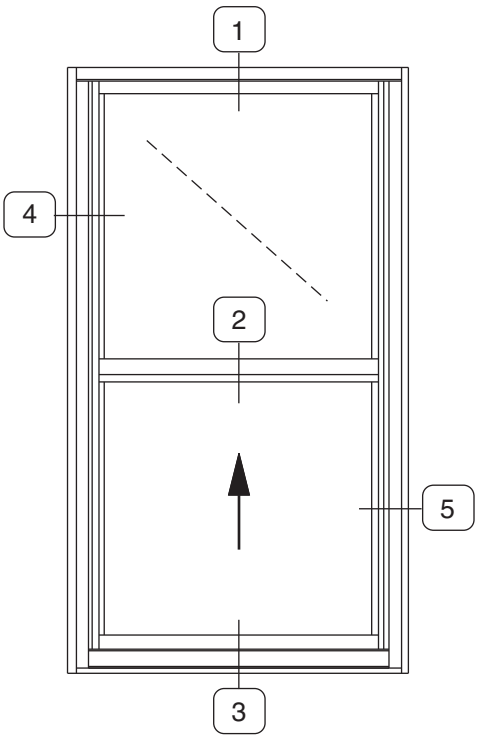
CLASS and GRADE	Architectural Grade Window H-HC70 / H-AW70 / AW-PG70-H
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S. 2 / A440 (NAFS)
FRAME DEPTH	4" Overall Frame Depth
TYPICAL WALL THICKNESS	.070 Nominal
TYPICAL MAXIMUM SIZE	60" x 99"
TYPICAL MINIMUM SIZE	20" x 33"
TYPICAL CONFIGURATIONS	
STANDARD INFILL OPTIONS	1/4", 3/4" with Glazed-in Muntin Grid, and 1"
STANDARD HARDWARE	Heavy Duty Balances Cast White Bronze Sweep Locks
OPTIONAL HARDWARE	Aluminum Auto Lock
OTHER OPTIONS	Exterior Glazed-in Muntin Grids Perimeters and Sills Exterior Pannings and Interior Trims True Intermediate Mullions Structural Mullions Vertically or Horizontally Stacked Sill for 10 PSF or 15 PSF Water Performance Insect Screens

PERFORMANCE	Air Infiltration Cfm/ft^2	Water Resistance PSF	Design Load PSF	Thermal Transmittance "U" Value	Condensation Resistance CRF	Sound Transmittance STC
	.30 @ 6.24 psf	10 / 15	70	.70	49	34

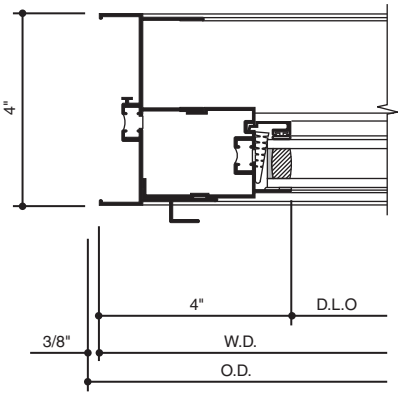
Note: Thermal and STC values are based upon 1" clear insulating glass.

SCALE : 3" = 1'-0"

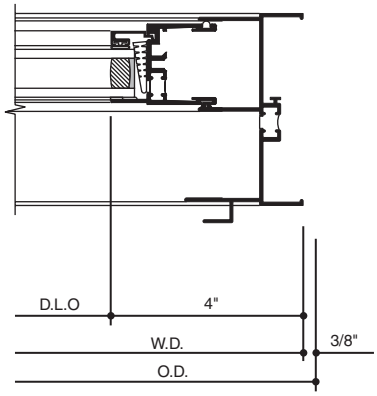
8430TL SINGLE HUNG WINDOW
Standard Design



TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations

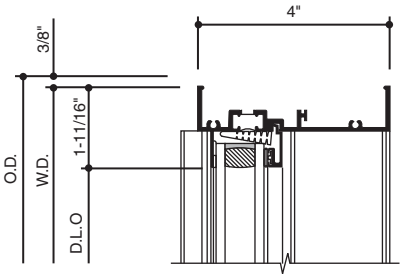


4
JAMB

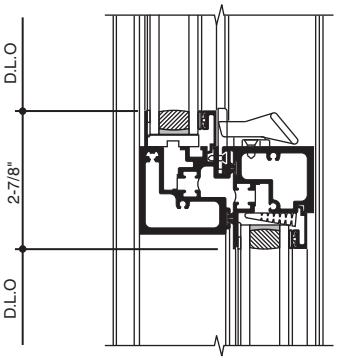


5
JAMB

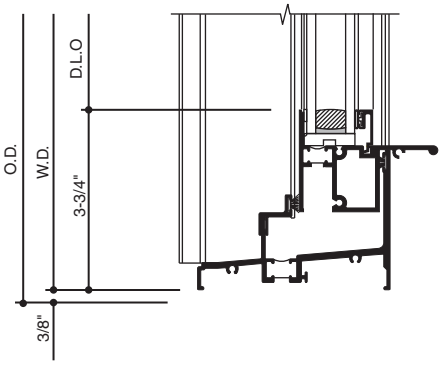
1
HEAD



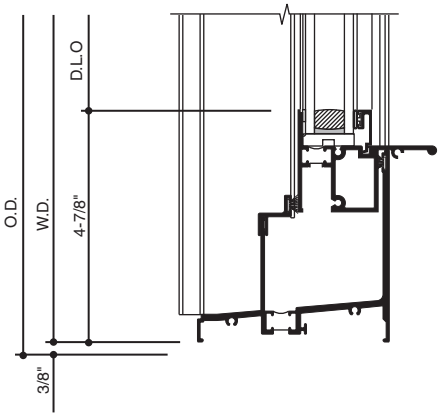
2
HORIZONTAL



3
SILL
10 PSF

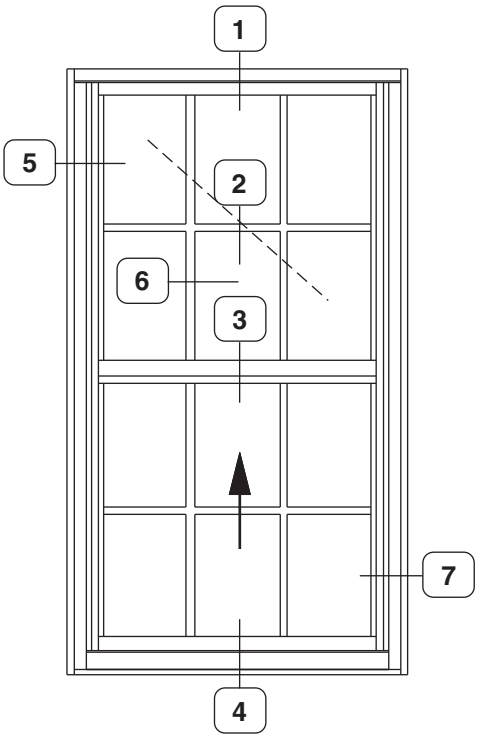


3A
SILL
15 PSF



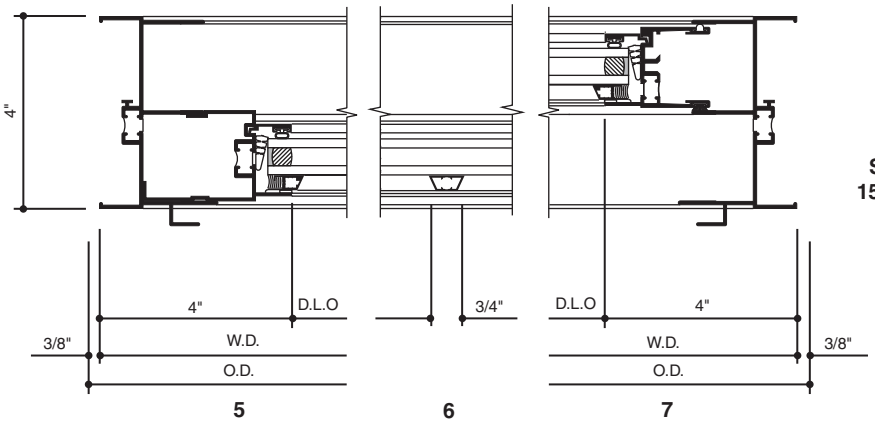
SCALE : 3" = 1'-0"

8430TL SINGLE HUNG WINDOW with Glazed-in Muntin Grid

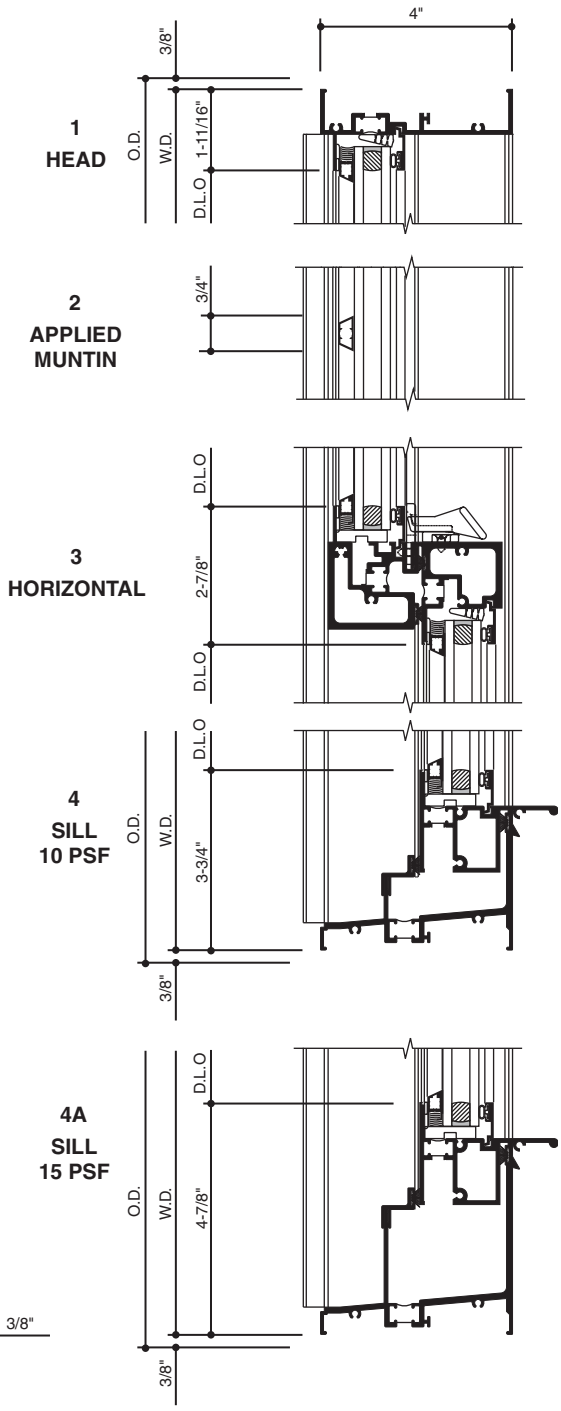


TYPICAL ELEVATION

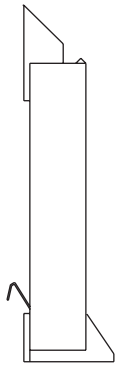
Log onto www.kawneer.com for other configurations



5 JAMB **6 APPLIED MUNTIN** **7 JAMB**

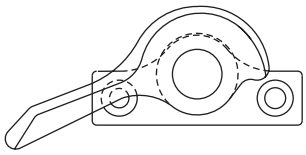


HEAVY DUTY BLOCK AND TACKLE BALANCES



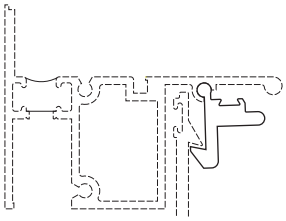
Heavy duty balances are concealed in the left and right jambs. Balances are sized according to sash dimensions and sash weight.

STANDARD SWEEP LOCK



Cast white bronze sweep locks and keepers secure the operating sash at the center meeting rails.

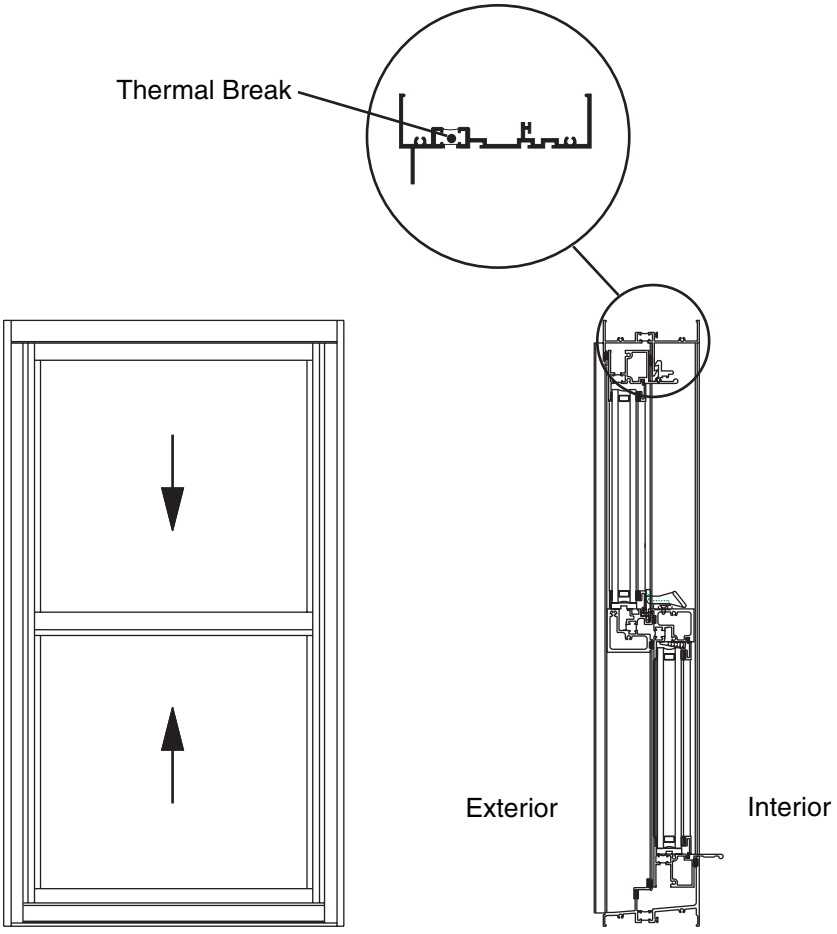
ALUMINUM AUTO LOCK



Aluminum auto locks are integral to the sash lift rail and used in lieu of cast white bronze auto locks. These locks are used in conjunction with sweep locks for additional security.

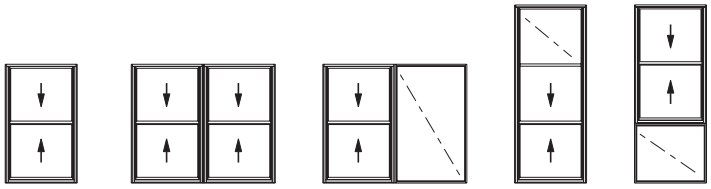
Features

- Architectural Grade Window
- Series 8450TL Standard Design
- IsoLock™ Thermal Break
- Screw and Spline Frame and Sash Corner Joinery
- Factory Silicone Glazed
- Interior Applied Glazing Bead with Bulb Gasket
- Architectural Anodized Finishes and Applied Coatings
- Two Year Manufacturer's Warranty



Double Hung Window

For specific product applications,
Consult your Kawneer representative.

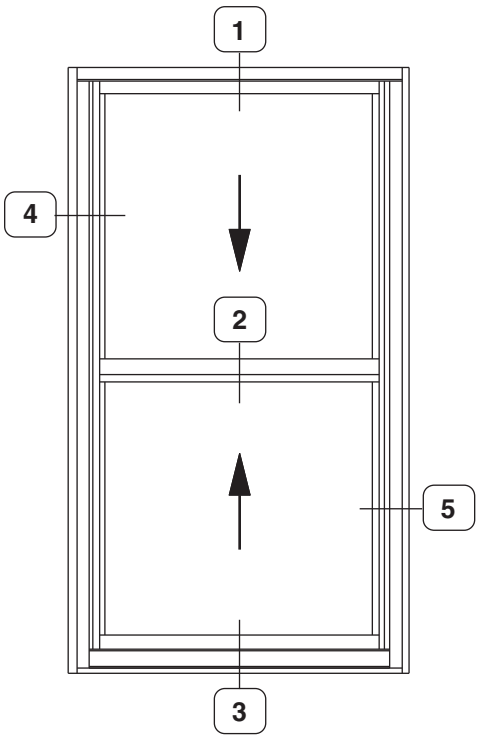
CLASS and GRADE	Architectural Grade Window H-HC70 / H-AW70 / AW-PG70-H
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S. 2 / A440 (NAFS)
FRAME DEPTH	4" Overall Frame Depth
TYPICAL WALL THICKNESS	.070 Nominal
TYPICAL MAXIMUM SIZE	60" x 99"
TYPICAL MINIMUM SIZE	20" x 33"
TYPICAL CONFIGURATIONS	
STANDARD INFILL OPTIONS	1/4", 3/4" with Glazed-in Muntin Grid, and 1"
STANDARD HARDWARE	Heavy Duty Balances Cast White Bronze Sweep Locks Aluminum Auto Lock (Upper Sash Only)
OPTIONAL HARDWARE	Aluminum Auto Lock at Sill
OTHER OPTIONS	Exterior Glazed-in Muntin Grids Perimeters and Sills Exterior Pannings and Interior Trims True Intermediate Mullions Structural Mullions Vertically or Horizontally Stacked Sill for 10 PSF or 15 PSF Water Performance Insect Screens

PERFORMANCE	Air Infiltration Cfm/ft^2	Water Resistance PSF	Design Load PSF	Thermal Transmittance "U" Value	Condensation Resistance CRF	Sound Transmittance STC
	.30 @ 6.24 psf	10 / 15	70	.74	50	33

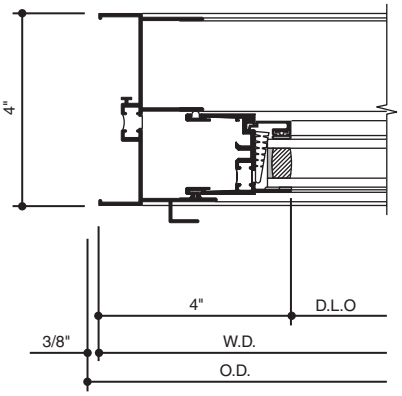
Note: Thermal and STC values are based upon 1" clear insulating glass.

SCALE : 3" = 1'-0"

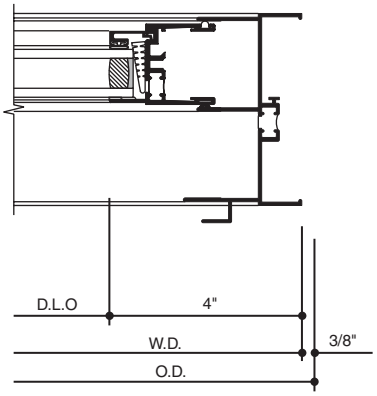
8450TL DOUBLE HUNG WINDOW
Standard Design



TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations

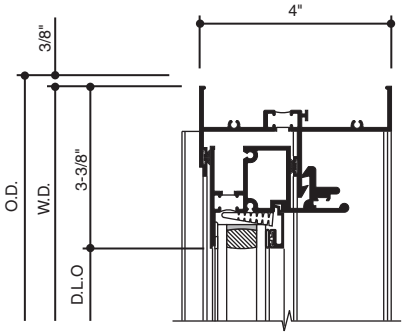


4
JAMB

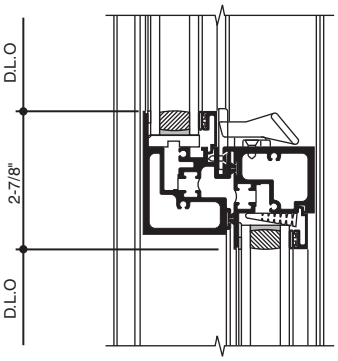


5
JAMB

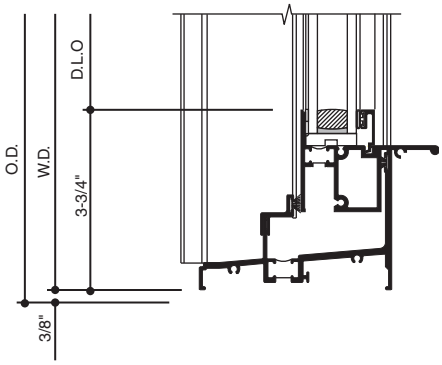
1
HEAD



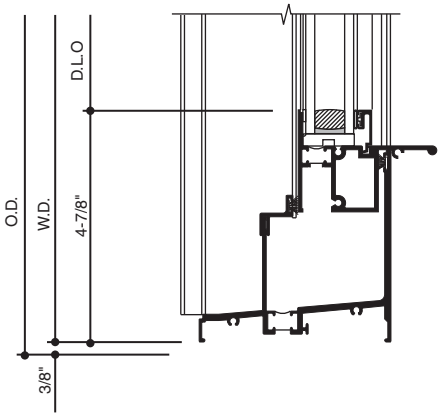
2
HORIZONTAL



3
SILL
10 PSF

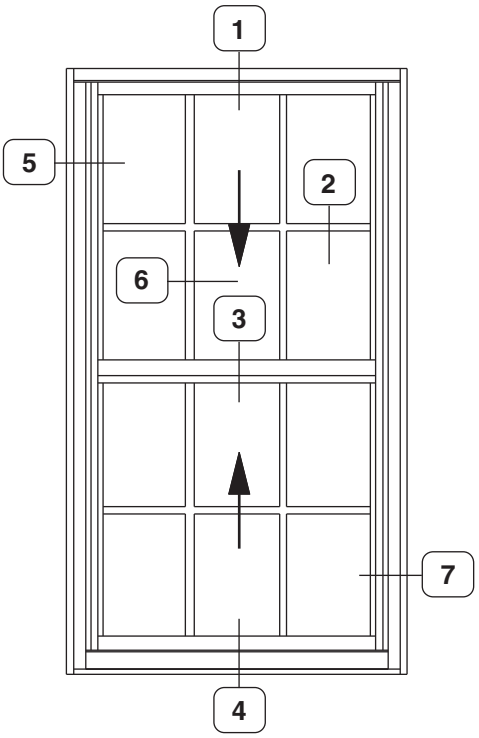


3A
SILL
15 PSF



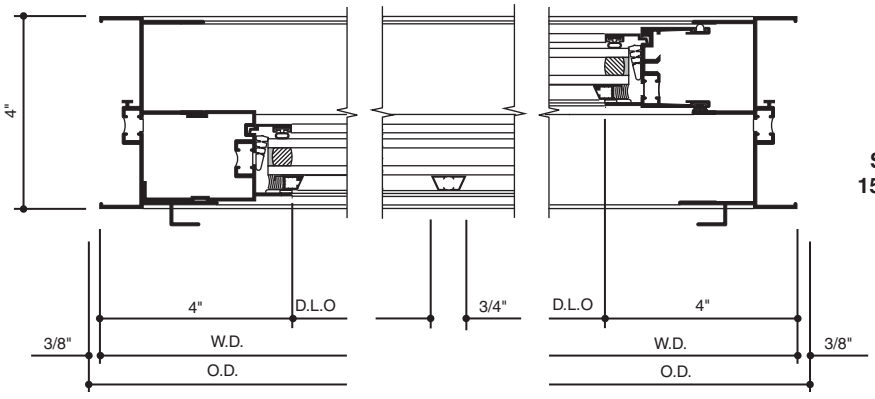
SCALE : 3" = 1'-0"

8450TL DOUBLE HUNG WINDOW with Glazed-in Muntin Grid

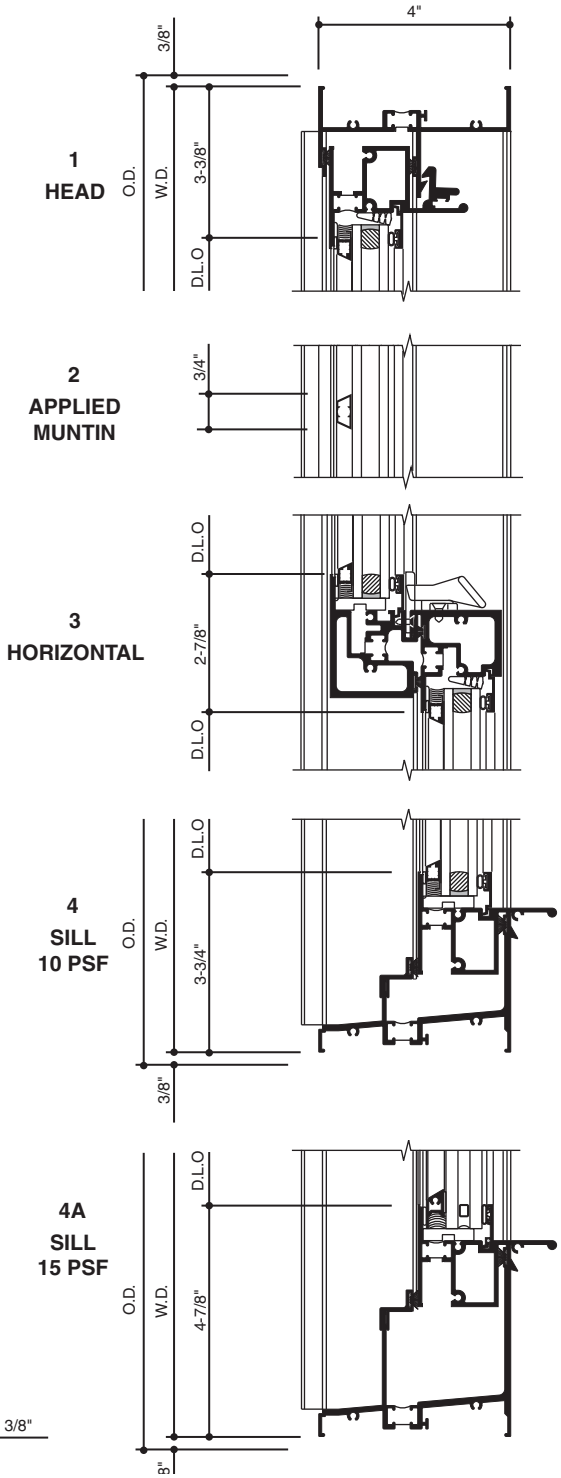


TYPICAL ELEVATION

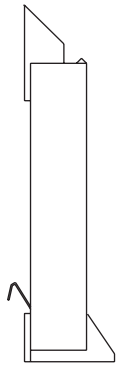
Log onto www.kawneer.com for other configurations



5 JAMB **6 APPLIED MUNTIN** **7 JAMB**

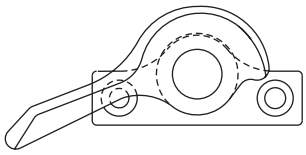


HEAVY DUTY BLOCK AND TACKLE BALANCES



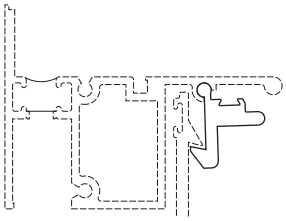
Heavy duty balances are concealed in the left and right jambs. Balances are sized according to sash dimensions and sash weight.

STANDARD SWEEP LOCK



Cast white bronze sweep locks and keepers secure the operating sash at the center meeting rails.

ALUMINUM AUTO LOCK



Aluminum auto locks are integral to the sash lift rail and used in lieu of cast white bronze auto locks. These locks are used in conjunction with sweep locks for additional security.

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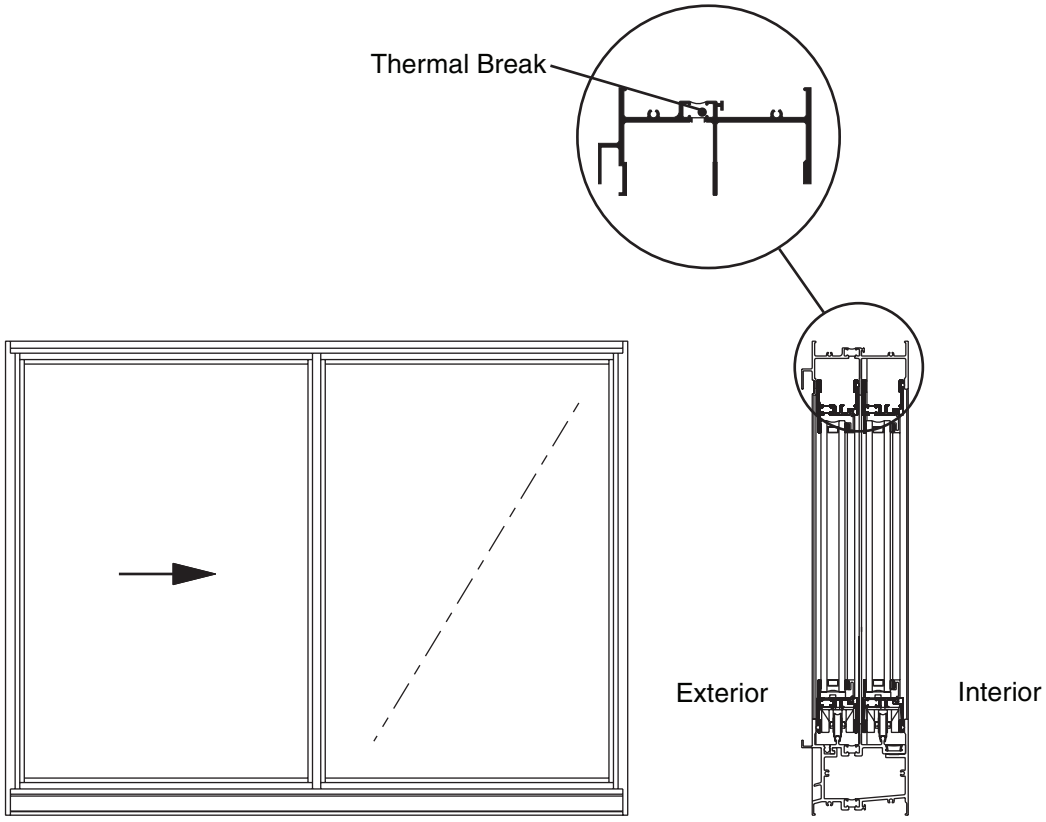
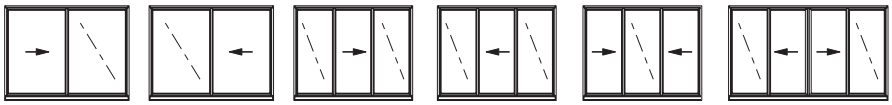
Features

- Architectural Grade Window
- Series 8470TL Standard Design
- IsoLock™ Thermal Break
- Screw and Spline Frame and Sash Corner Joinery
- Factory Silicone Glazed
- Interior Applied Glazing Bead with Bulb Gasket
- Architectural Anodized Finishes and Applied Coatings
- Two Year Manufacturer's Warranty



Horizontal Sliding Window

For specific product applications,
Consult your Kawneer representative.

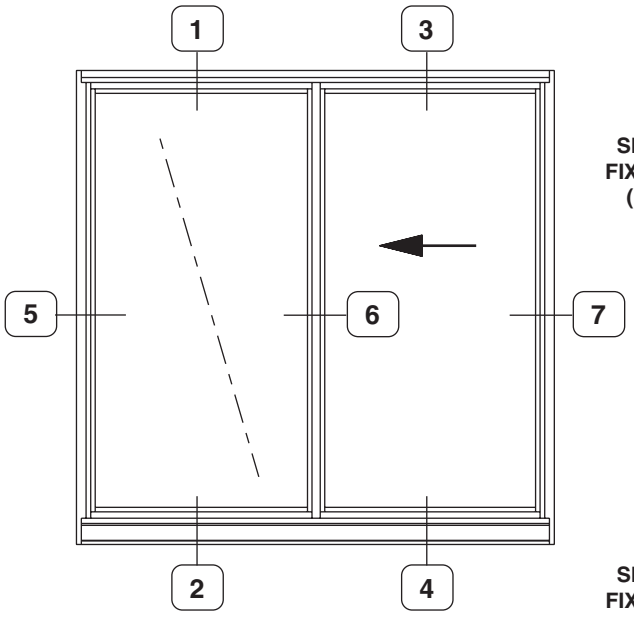
CLASS and GRADE	Architectural Grade Window HS-HC70 / HS-AW70 / AW-PG70-HS
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S. 2 / A440 (NAFS)
FRAME DEPTH	4" Overall Frame Depth
TYPICAL WALL THICKNESS	.070 to .125 Nominal
TYPICAL MAXIMUM SIZE	99" x 79" (OX,XO,XX) 148" x 79" (OXO,XOX) 198" x 79" (OXXO)
TYPICAL MINIMUM SIZE	32" x 20" (OX,XO,XX) 48" x 20" (OXO,XOX) 64" x 20" (OXXO)
TYPICAL CONFIGURATIONS	
STANDARD INFILL OPTIONS	1/4", 3/4" with Glazed-in Muntin Grid, and 1"
STANDARD HARDWARE	Steel Roller Assembly Cast White Bronze Sweep Locks
OPTIONAL HARDWARE	Aluminum Auto Lock
OTHER OPTIONS	Exterior Glazed-in Muntin Grids Perimeters and Sills Exterior Pannings and Interior Trims True Intermediate Mullions Structural Mullions Vertically or Horizontally Stacked Sill for 10 PSF or 15 PSF Water Performance Insect Screens Standard and Heavy Duty Interlock

PERFORMANCE	Air Infiltration Cfm/ft²	Water Resistance PSF	Design Load PSF	Thermal Transmittance "U" Value	Condensation Resistance CRF	Sound Transmittance STC
	.30 @ 6.24 psf	10 / 15	70	.74	51	34

Note: Thermal and STC values are based upon 1" clear insulating glass.

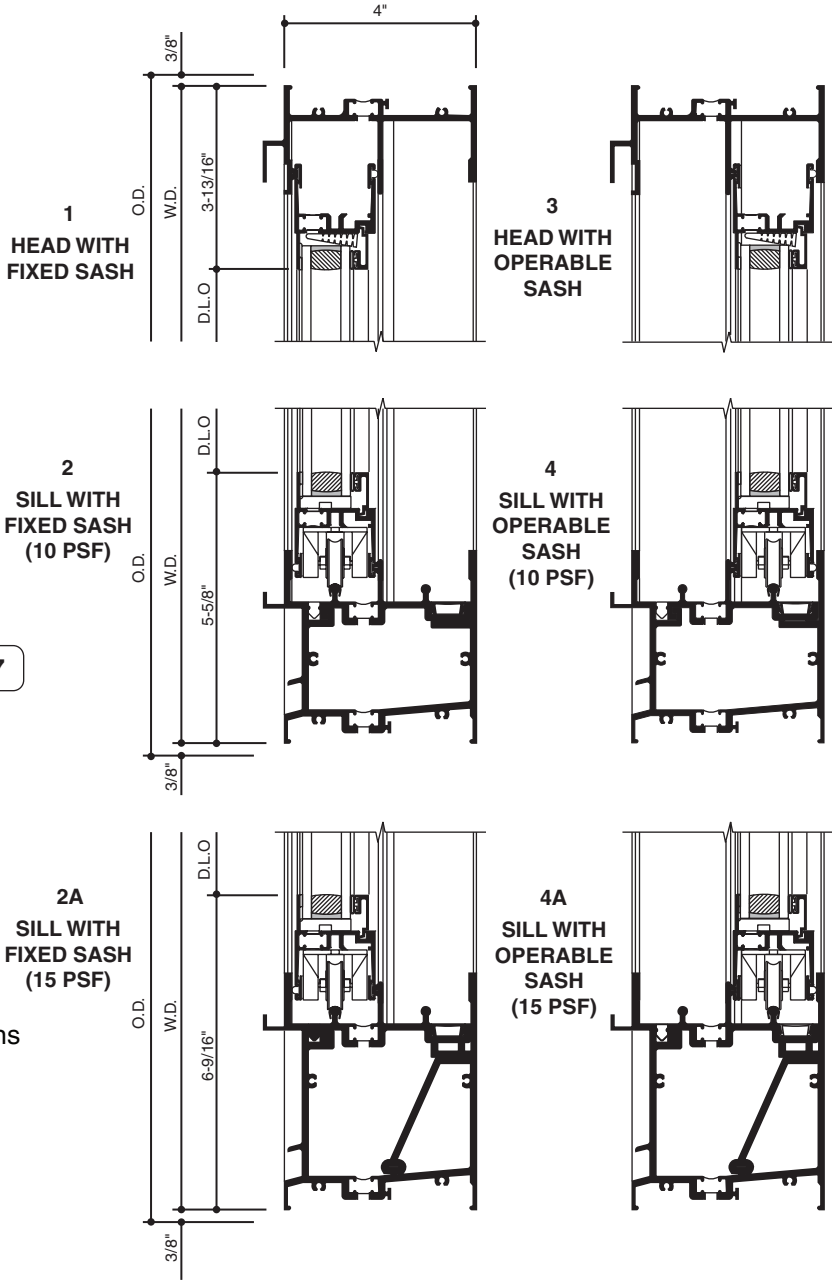
SCALE : 3" = 1'-0"

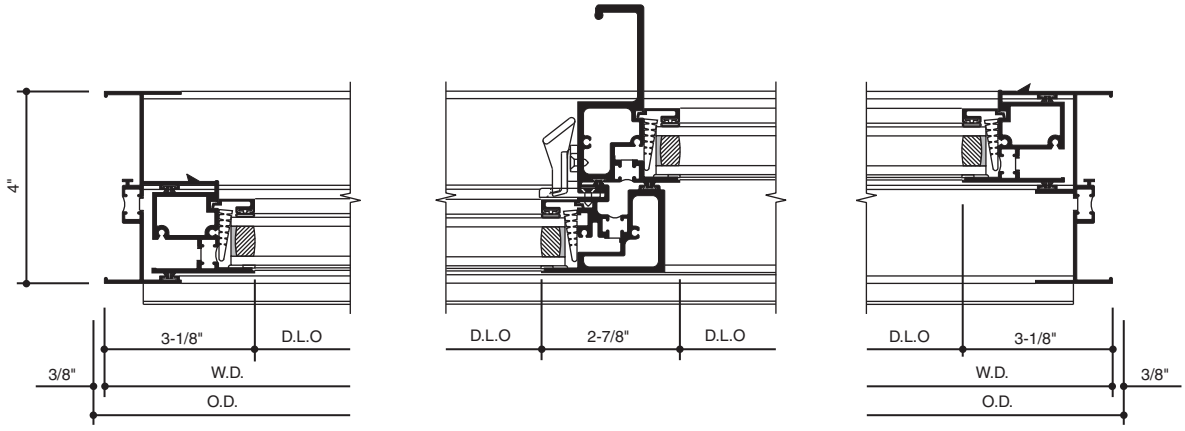
8470TL HORIZONTAL SLIDER
Standard Design



TYPICAL ELEVATION

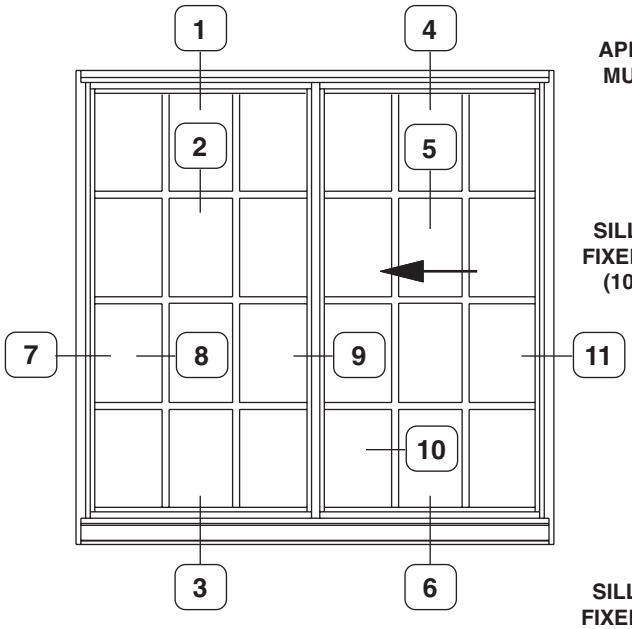
Log onto www.kawneer.com for other configurations





SCALE : 3" = 1'-0"

8470TL HORIZONTAL SLIDER with Glazed-in Muntin Grid



TYPICAL ELEVATION

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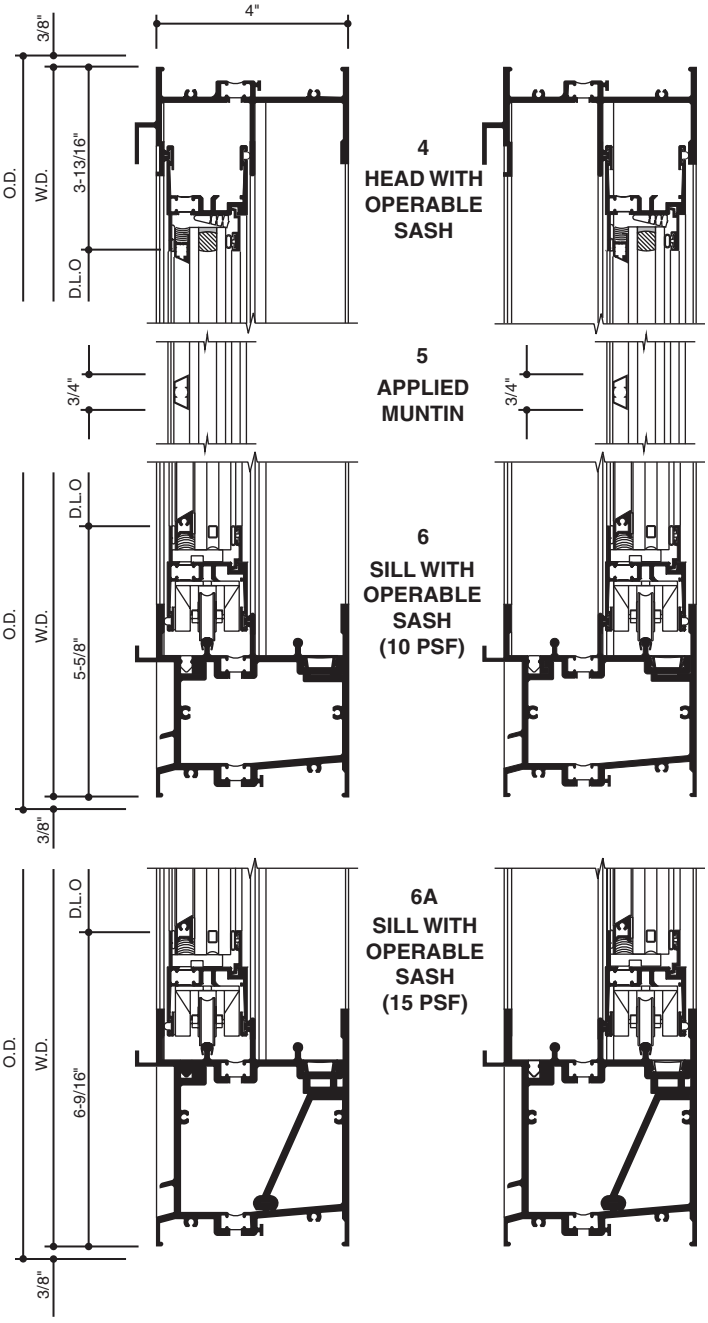
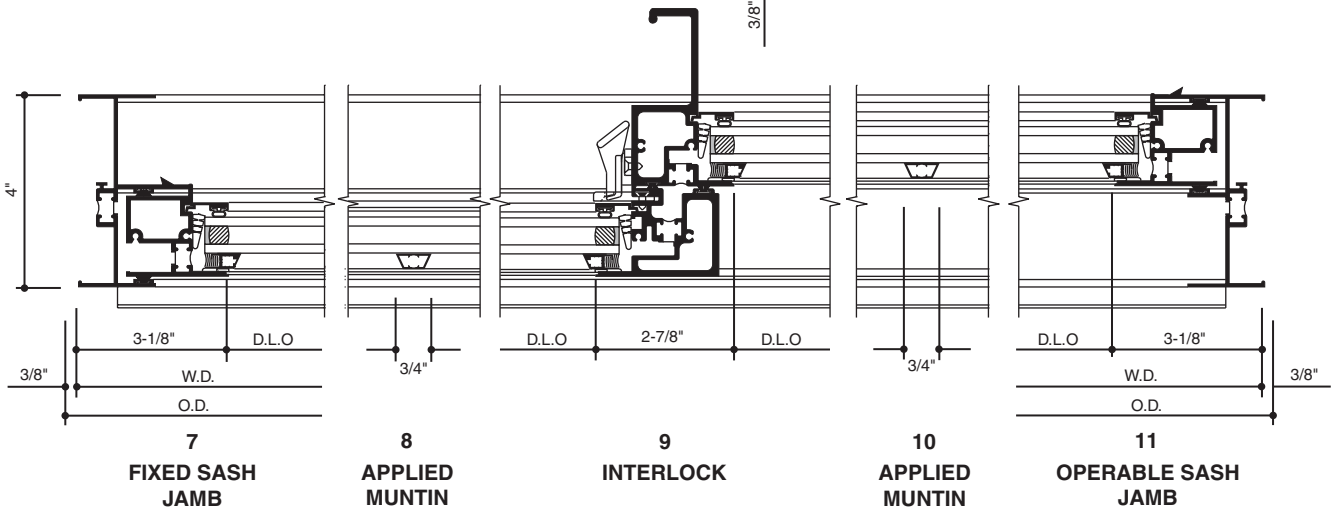
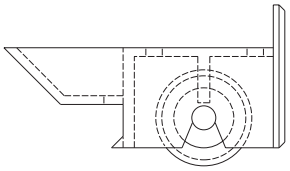


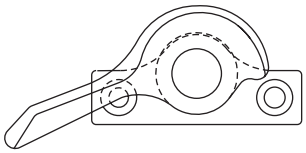


STEEL ROLLER ASSEMBLY



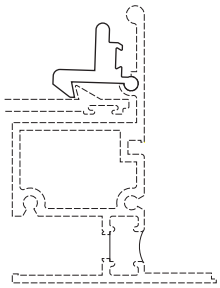
Steel ball bearing roller and glass filled nylon housing provide smooth and lasting operation.

STANDARD SWEEP LOCK



Cast white bronze sweep locks and keepers secure the operating sash at the center meeting rails.

ALUMINUM AUTO LOCK

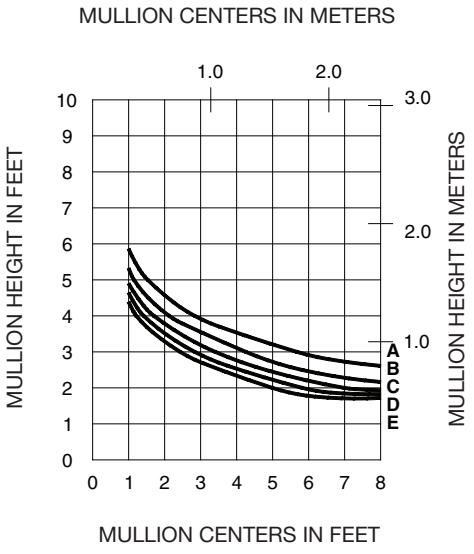


Aluminum auto locks are integral to the handle rail. These locks are used in conjunction with sweep locks for additional security.

WIND LOAD CHARTS:

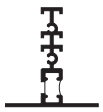
THESE CHARTS ARE BASED ON A MAXIMUM DEFLECTION OF L\175 AND\OR A MAXIMUM STRESS OF 15,152 PSI (104 MPa).

A = 30 PSF (1436)
B = 40 PSF (1915)
C = 50 PSF (2394)
D = 60 PSF (2874)
E = 70 PSF (3352)



WITH HORIZONTALS

VERTICAL MULLION



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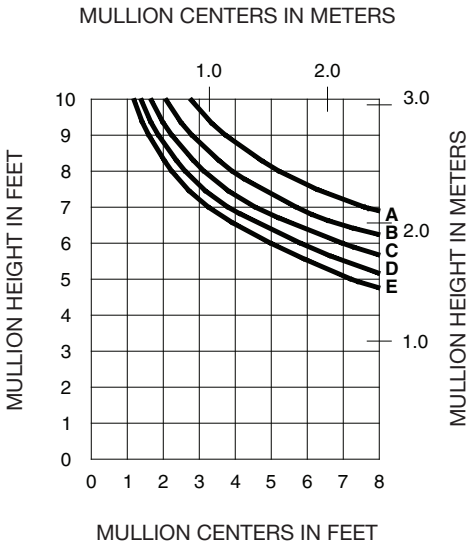
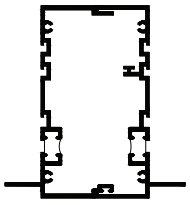


WITH HORIZONTALS

8410
FIXED WINDOW



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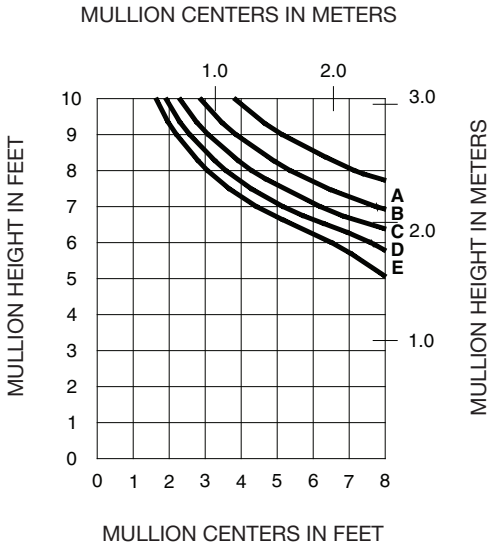
WIND LOAD CHARTS:

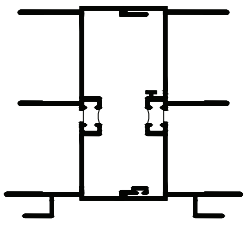
THESE CHARTS ARE BASED ON A MAXIMUM DEFLECTION OF L\175 AND\OR A MAXIMUM STRESS OF 15,152 PSI (104 MPa).

A = 30 PSF (1436)
B = 40 PSF (1915)
C = 50 PSF (2394)
D = 60 PSF (2874)
E = 70 PSF (3352)



WITH HORIZONTALS

8430 SINGLE HUNG
8450 DOUBLE HUNG



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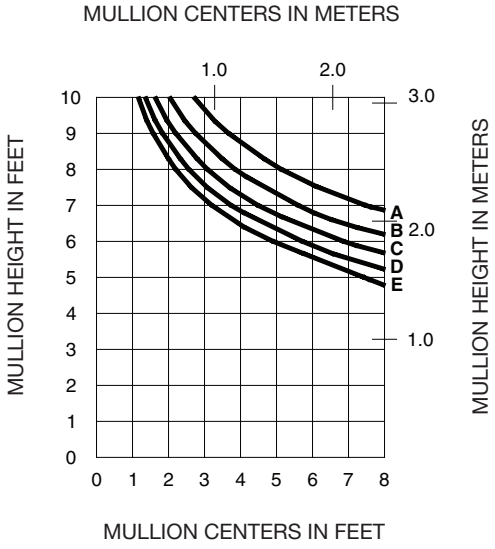
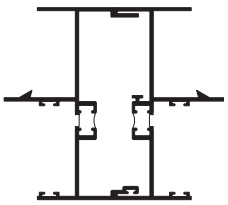


WITH HORIZONTALS

8470
HORIZONTAL SLIDER

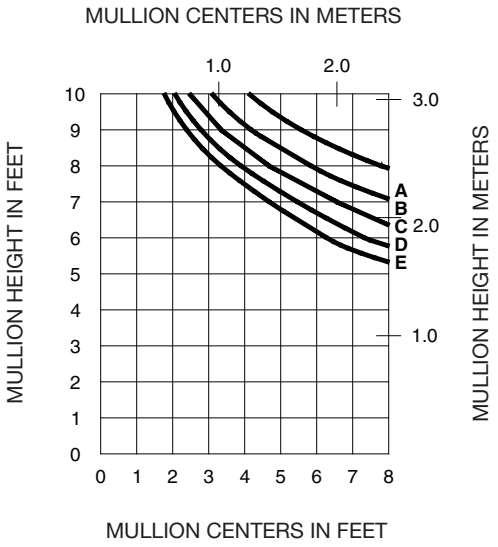


245268 245269

WIND LOAD CHARTS:

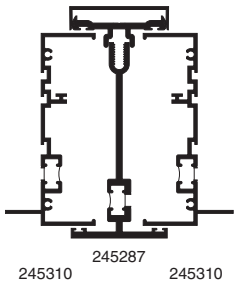
THESE CHARTS ARE BASED ON A MAXIMUM DEFLECTION OF L\175 AND\OR A MAXIMUM STRESS OF 15,152 PSI (104 MPa).

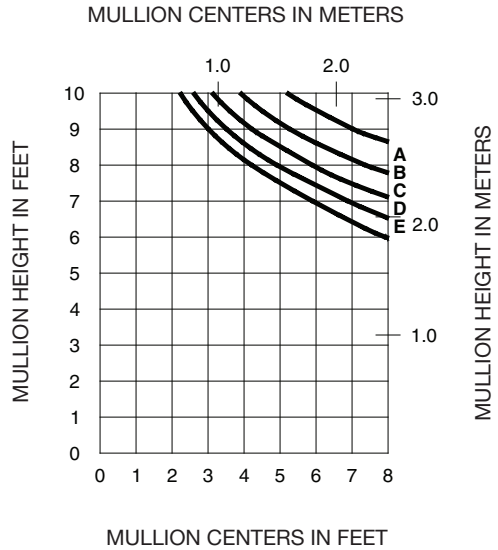
A = 30 PSF (1436)
B = 40 PSF (1915)
C = 50 PSF (2394)
D = 60 PSF (2874)
E = 70 PSF (3352)



WITH HORIZONTALS

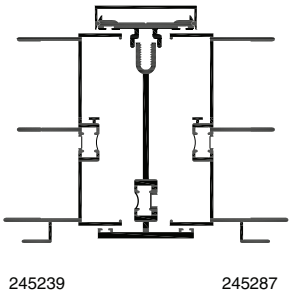
8410 FIXED WINDOW





WITH HORIZONTALS

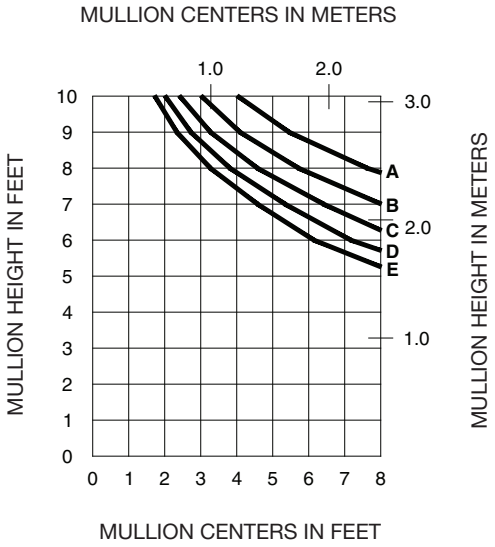
8430 SINGLE HUNG
8450 DOUBLE HUNG



WIND LOAD CHARTS:

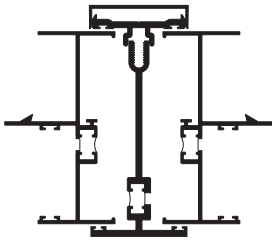
THESE CHARTS ARE BASED ON A MAXIMUM DEFLECTION OF L\175 AND\OR A MAXIMUM STRESS OF 15,152 PSI (104 MPa).

A = 30 PSF (1436)
B = 40 PSF (1915)
C = 50 PSF (2394)
D = 60 PSF (2874)
E = 70 PSF (3352)



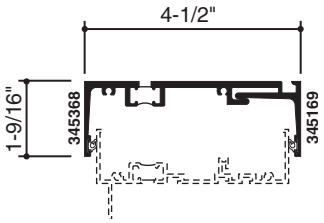
WITH HORIZONTALS

8470
HORIZONTAL SLIDER

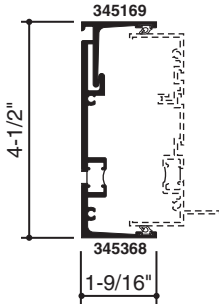


245287
245269 245269

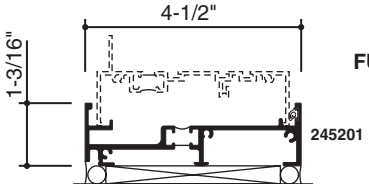
SCALE : 3" = 1'-0"



HEAD RECEPTOR

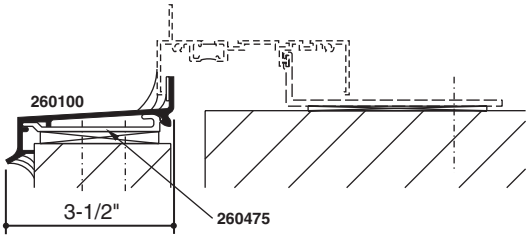


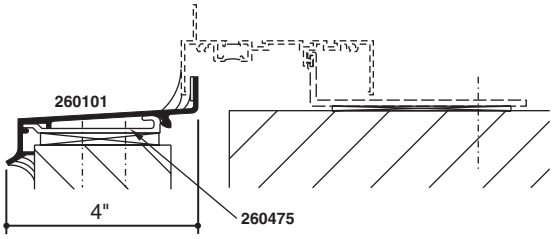
JAMB RECEPTOR

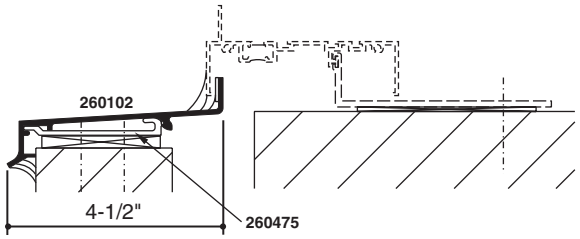


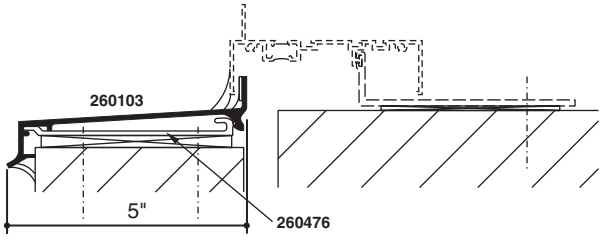
FULL DEPTH SILL

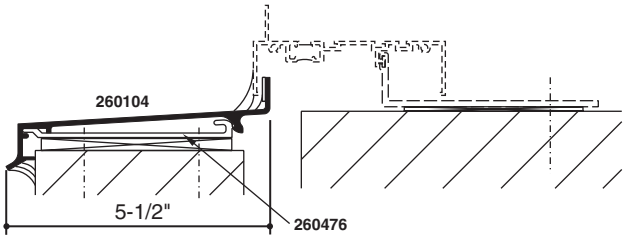
SUB SILLS



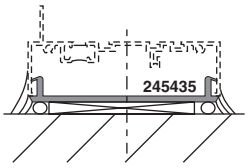




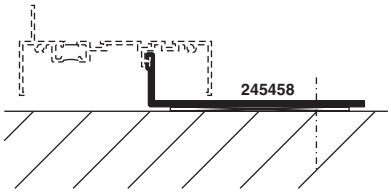




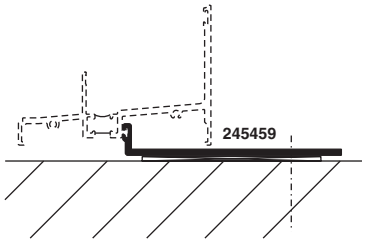
SCALE : 3" = 1'-0"



PVC PERIMETER
(Head and Jamb Similar)

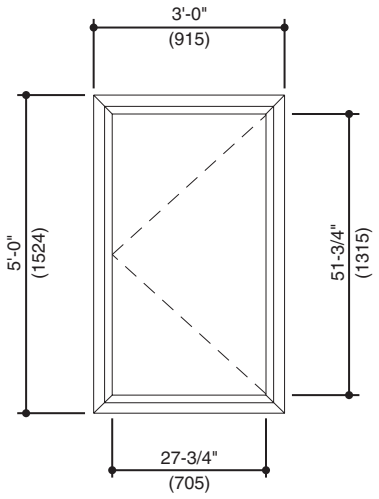


STRAP ANCHOR
WITH FIXED WINDOW



STRAP ANCHOR
WITH HUNG WINDOW

Generic Project Specific U-factor Example Calculation
(Percent of Glass will vary on specific products depending on sitelines)



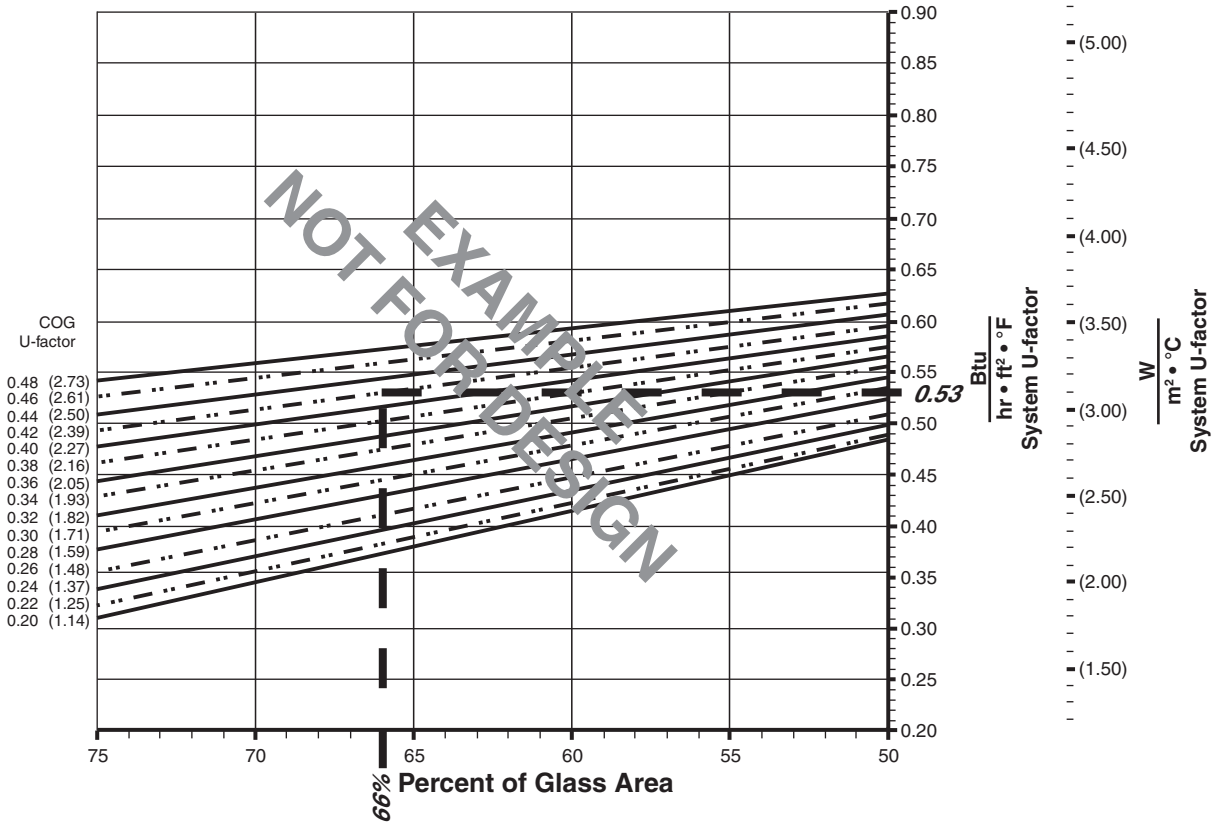
Example Glass U-Factor = 0.42 Btu/hr • ft² • °F

Total Daylight Opening = 27-3/4" • 51-3/4" = 9.97ft²

Total Projected Area = 3'-0" • 5'-0" = 15 ft²

Percent of Glass = (Total Daylight Opening ÷ Total Projected Area)100
= (9.97 ÷ 15)100 = 66%

System U-factor vs Percent of Glass Area

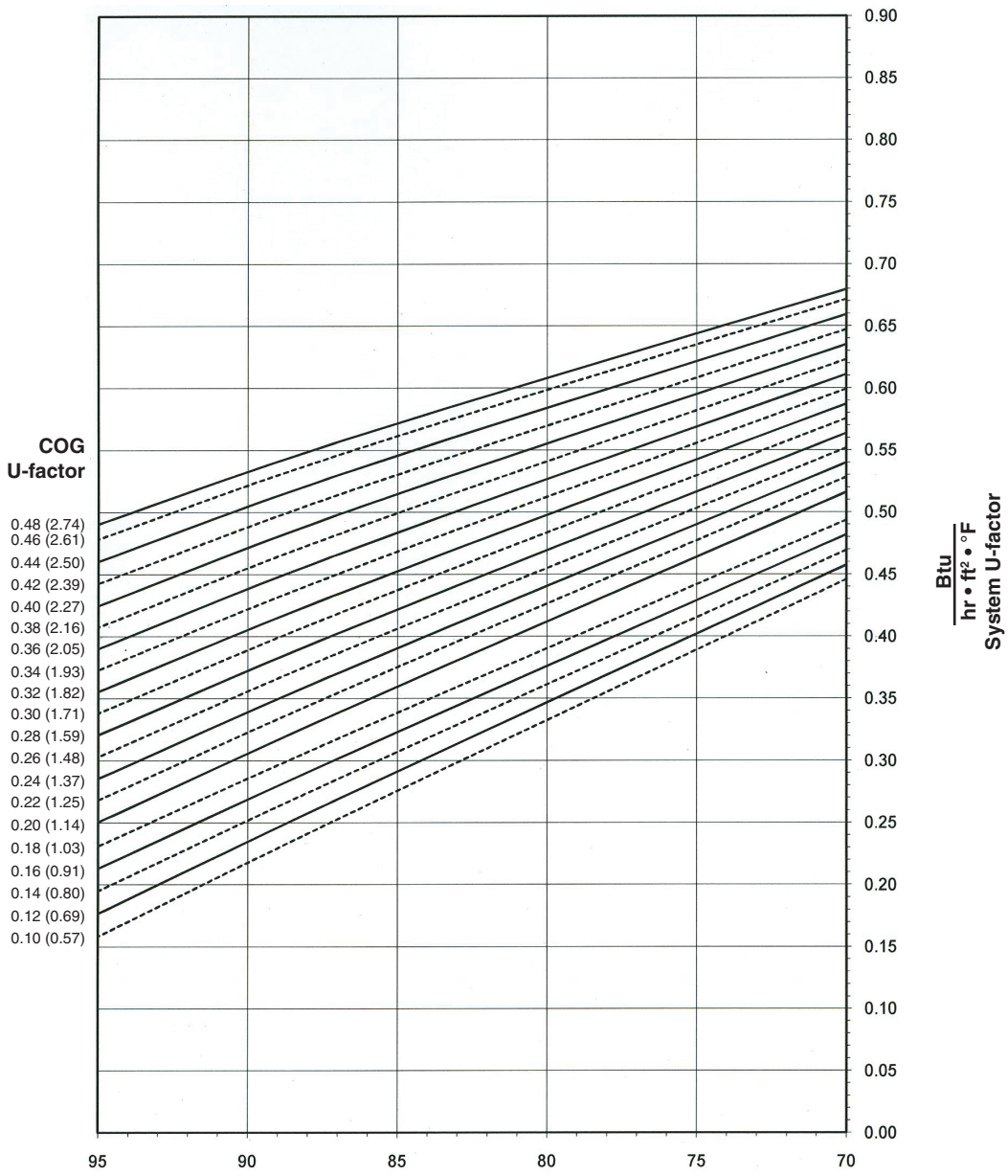


Based on 66% glass and center of glass (COG) U-factor of 0.42
System U-factor is equal to 0.53 Btu/hr • ft² • °F

FIXED WINDOW WITH 1" GLAZING

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

System U-factor vs Percent of Glass Area

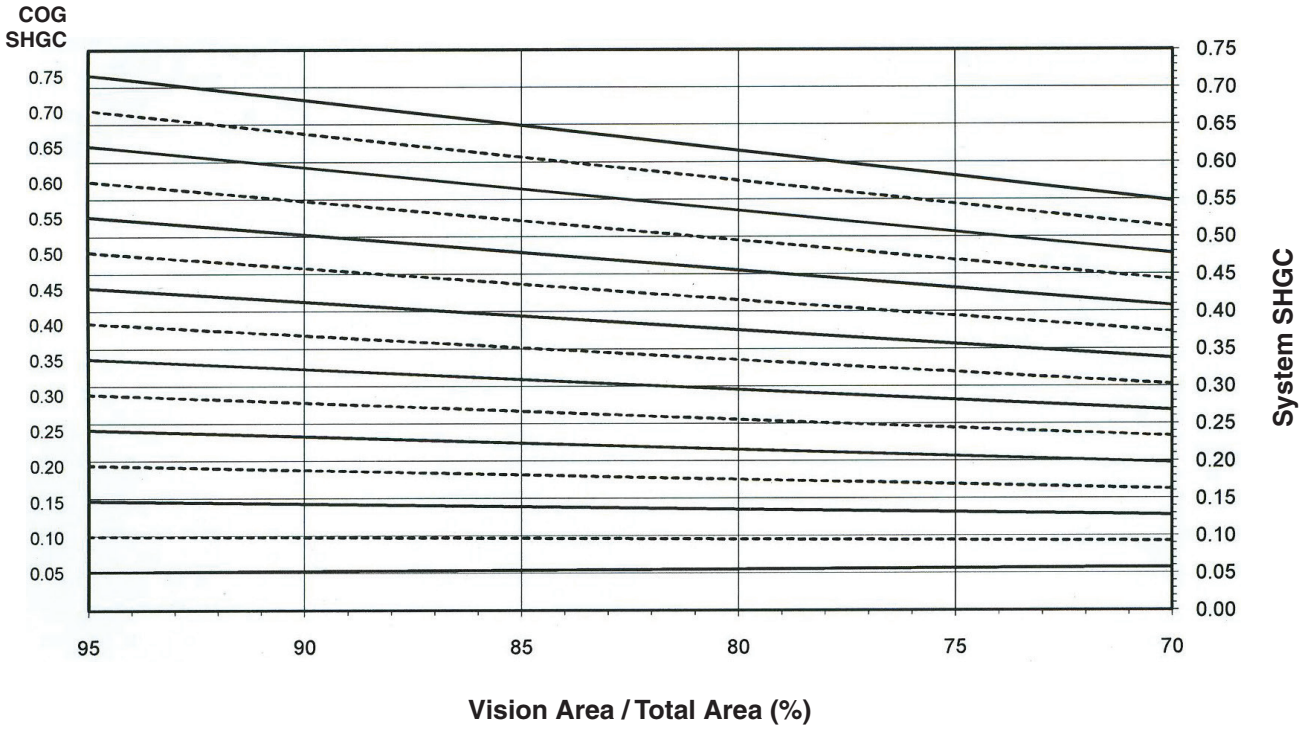


Percent of Glass Area = Vision Area/Total Area
Daylight Opening / Projected Area

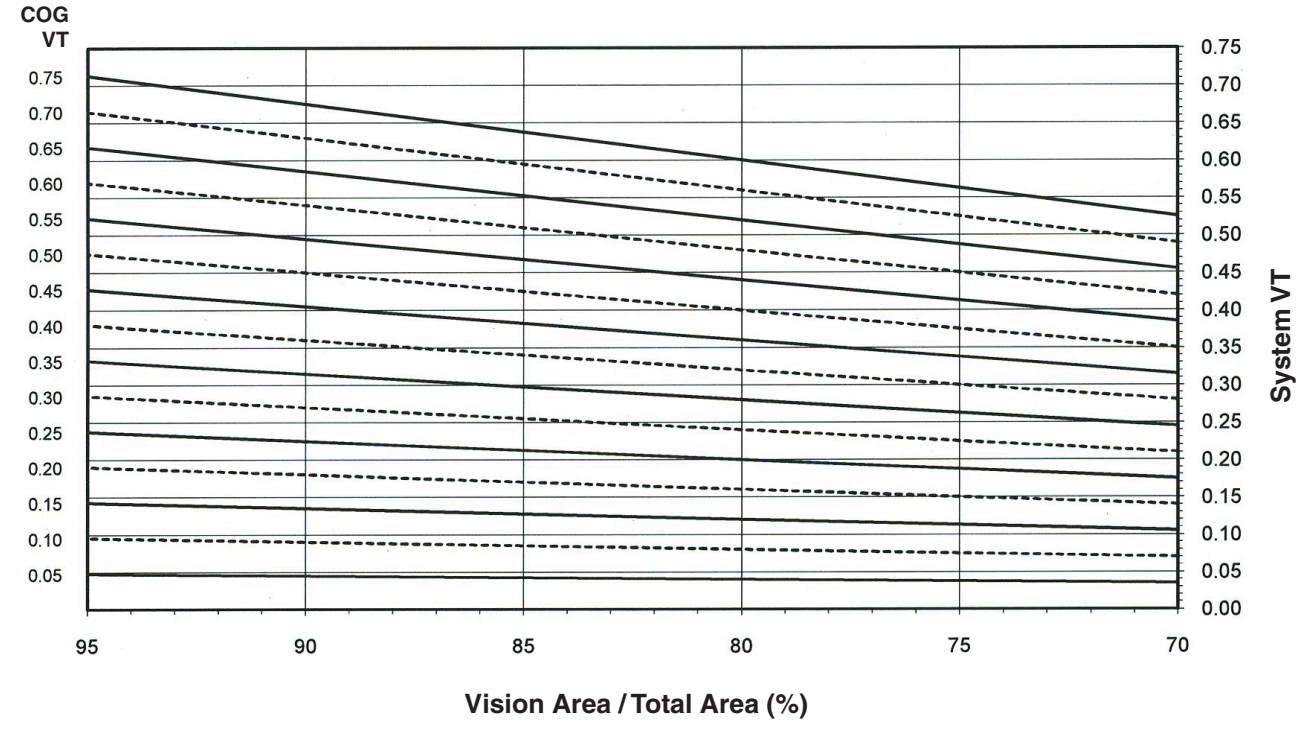
Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

FIXED WINDOW WITH 1" GLAZING

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



Thermal Transmittance [1] (BTU/hr • ft [2] • °F)

Glass U-Factor [3]	Overall U-Factor [4]
0.48	0.56
0.46	0.55
0.44	0.54
0.42	0.52
0.40	0.50
0.38	0.49
0.36	0.47
0.34	0.46
0.32	0.44
0.30	0.43
0.28	0.41
0.26	0.39
0.24	0.38
0.22	0.36
0.20	0.35
0.18	0.33
0.16	0.31
0.14	0.29
0.12	0.28
0.10	0.26

FIXED WINDOW WITH 1" GLAZING

NOTE: For glass values that are not listed, linear interpolation is permitted.

1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 1200mm wide by 1500mm high (47-1/4" by 59-1/16").

SHGC Matrix [2]

Glass SHGC [3]	Overall SHGC [4]
0.75	0.66
0.70	0.61
0.65	0.57
0.60	0.53
0.55	0.48
0.50	0.44
0.45	0.40
0.40	0.36
0.35	0.31
0.30	0.27
0.25	0.23
0.20	0.18
0.15	0.14
0.10	0.10
0.05	0.05

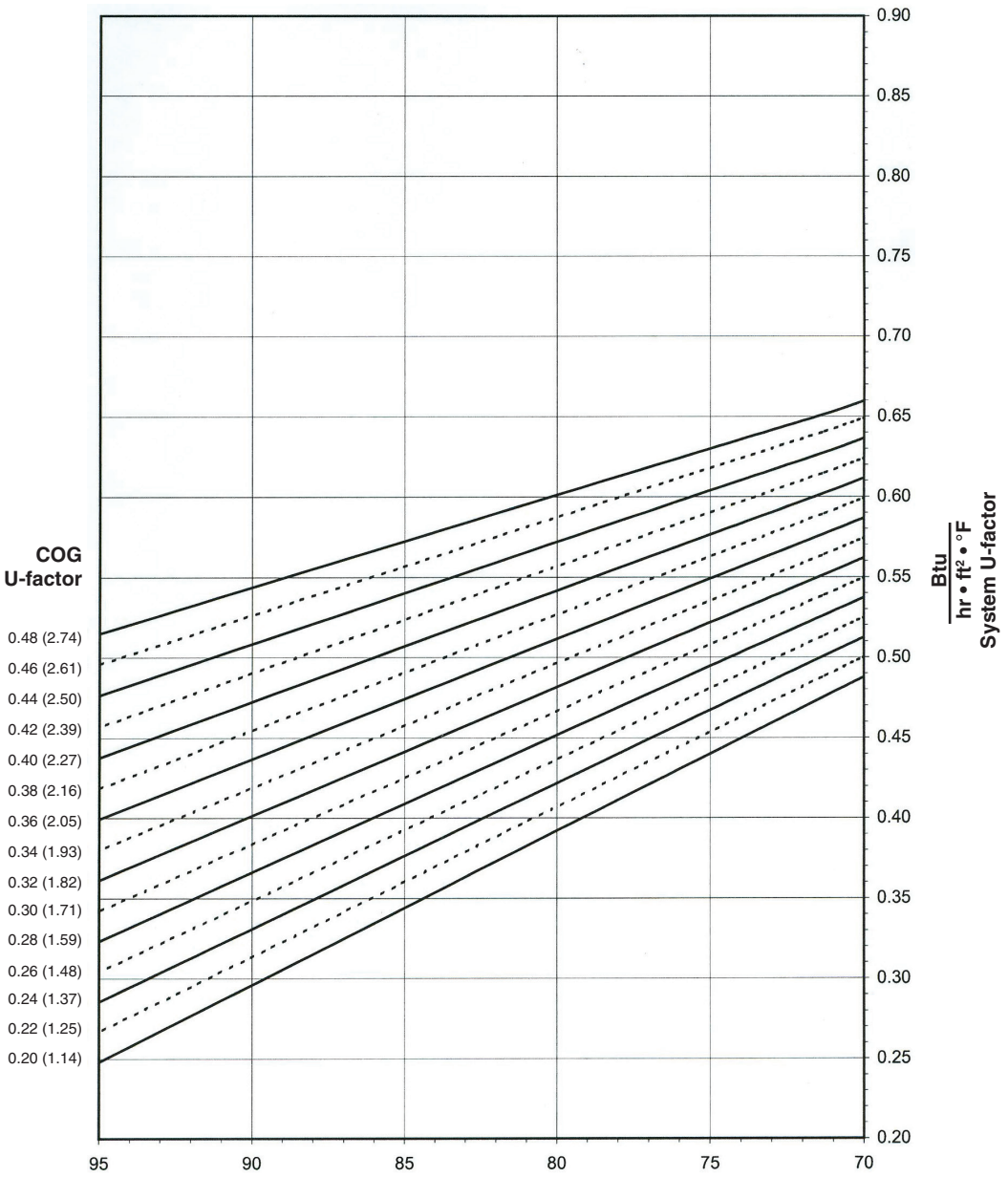
Visible Transmittance [2]

Glass VT [3]	Overall VT [4]
0.75	0.65
0.70	0.60
0.65	0.56
0.60	0.52
0.55	0.47
0.50	0.43
0.45	0.39
0.40	0.34
0.35	0.30
0.30	0.26
0.25	0.22
0.20	0.17
0.15	0.13
0.10	0.09
0.05	0.04

SINGLE HUNG VERTICAL SLIDER WITH 1" GLAZING

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

System U-factor vs Percent of Glass Area

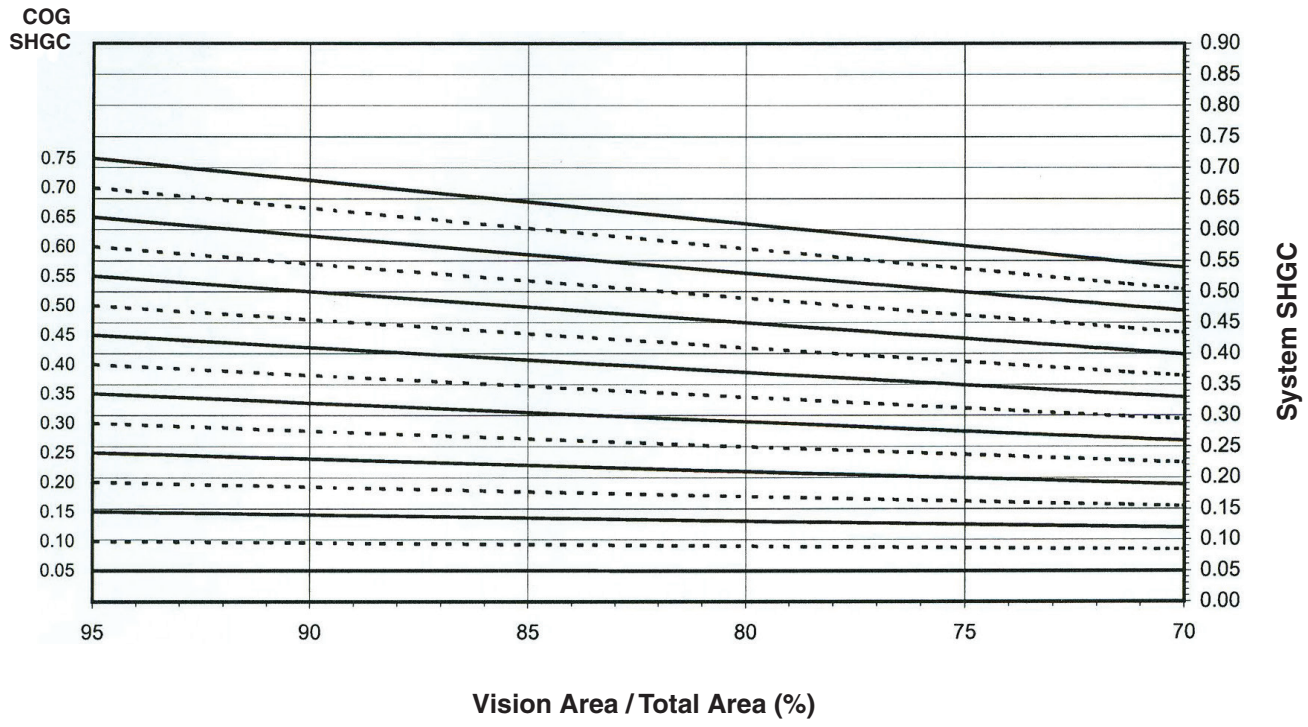


Percent of Glass Area = Vision Area/Total Area
Daylight Opening / Projected Area

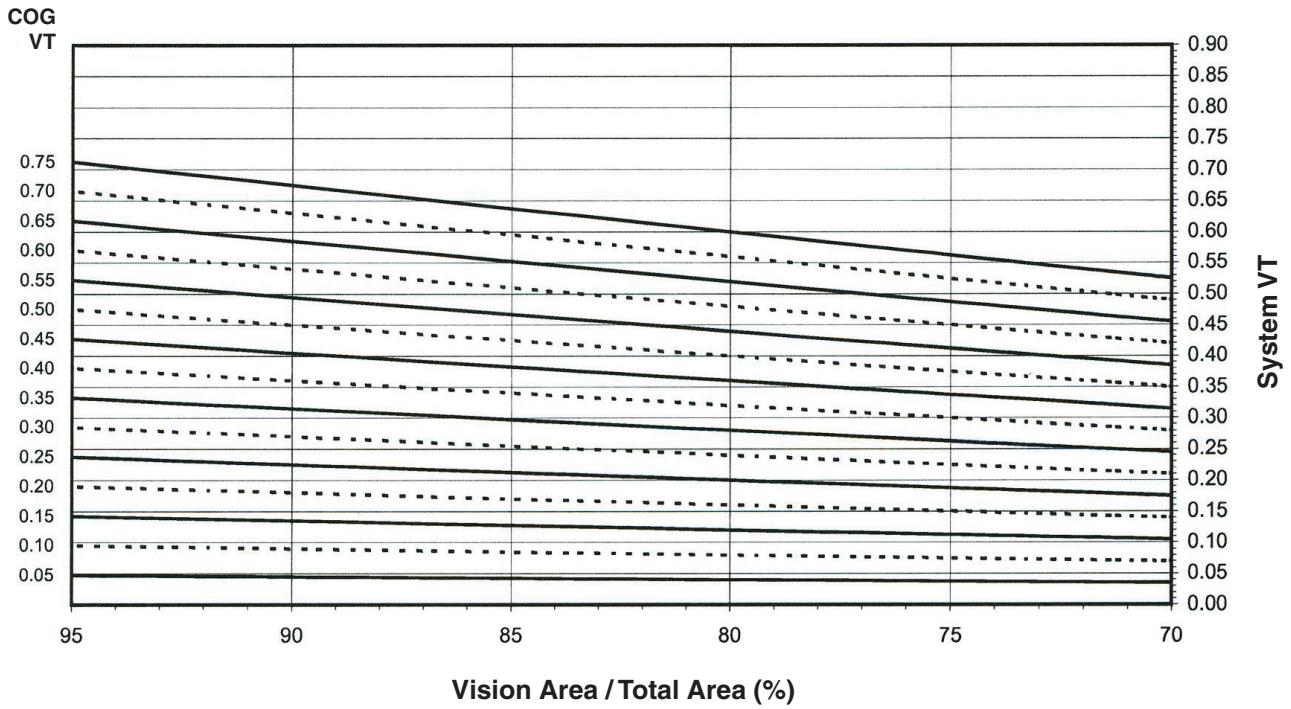
Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

SINGLE HUNG VERTICAL SLIDER WITH 1" GLAZING

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



Thermal Transmittance [1] (BTU/hr • ft [2] • °F)

Glass U-Factor [3]	Overall U-Factor [4]
0.48	0.65
0.46	0.64
0.44	0.63
0.42	0.61
0.40	0.60
0.38	0.59
0.36	0.58
0.34	0.56
0.32	0.55
0.30	0.54
0.28	0.53
0.26	0.51
0.24	0.50
0.22	0.49
0.20	0.47

SINGLE HUNG VERTICAL SLIDER WITH 1" GLAZING

NOTE: For glass values that are not listed, linear interpolation is permitted.

1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 1200mm wide by 1500mm high (47-1/4" by 59-1/16").

SHGC Matrix [2]

Glass SHGC [3]	Overall SHGC [4]
0.75	0.55
0.70	0.51
0.65	0.48
0.60	0.44
0.55	0.41
0.50	0.37
0.45	0.33
0.40	0.30
0.35	0.26
0.30	0.23
0.25	0.19
0.20	0.16
0.15	0.12
0.10	0.08
0.05	0.05

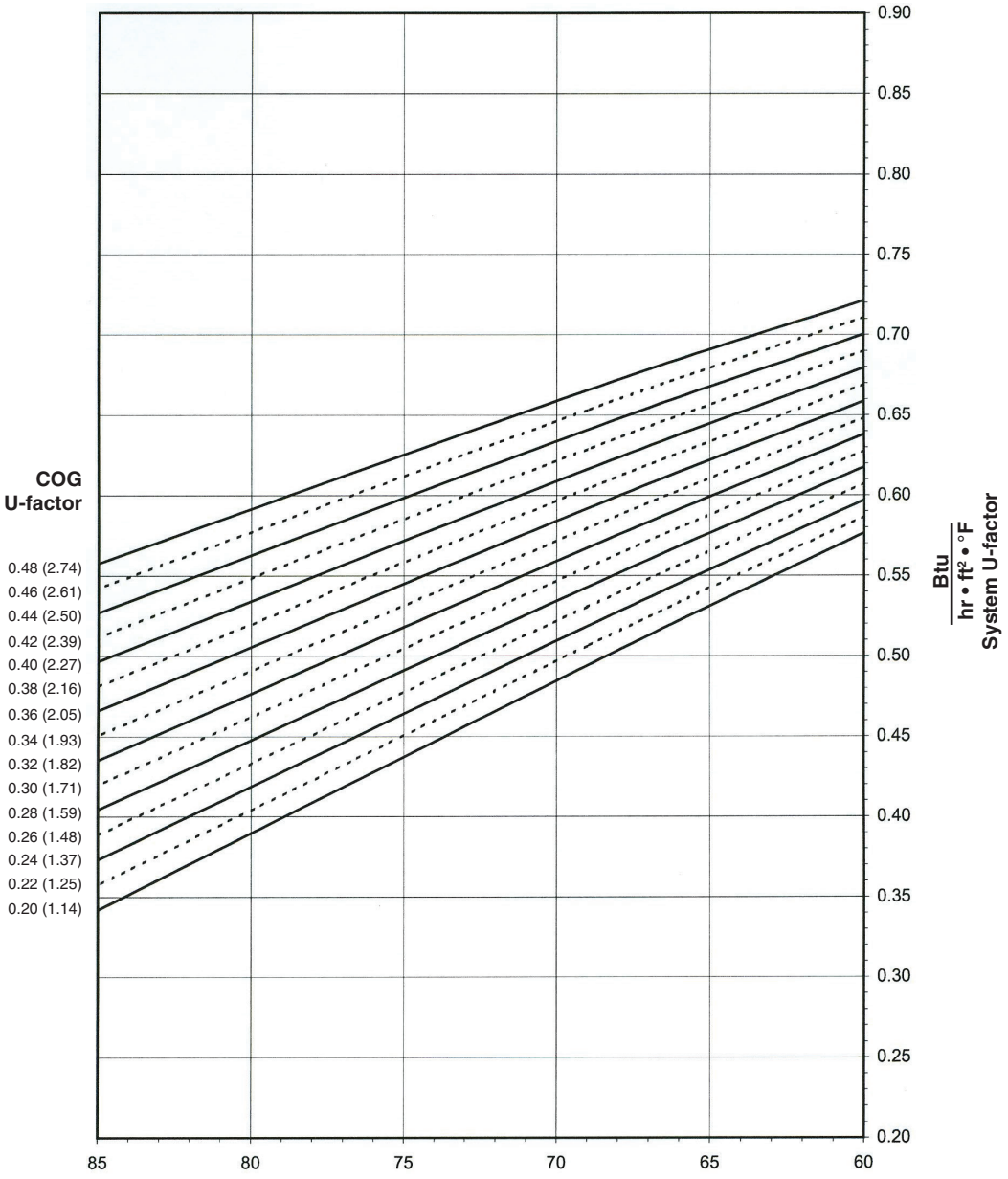
Visible Transmittance [2]

Glass VT [3]	Overall VT [4]
0.75	0.54
0.70	0.50
0.65	0.46
0.60	0.43
0.55	0.39
0.50	0.36
0.45	0.32
0.40	0.29
0.35	0.25
0.30	0.21
0.25	0.18
0.20	0.14
0.15	0.11
0.10	0.07
0.05	0.04

DOUBLE HUNG VERTICAL SLIDER WITH 1" GLAZING

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

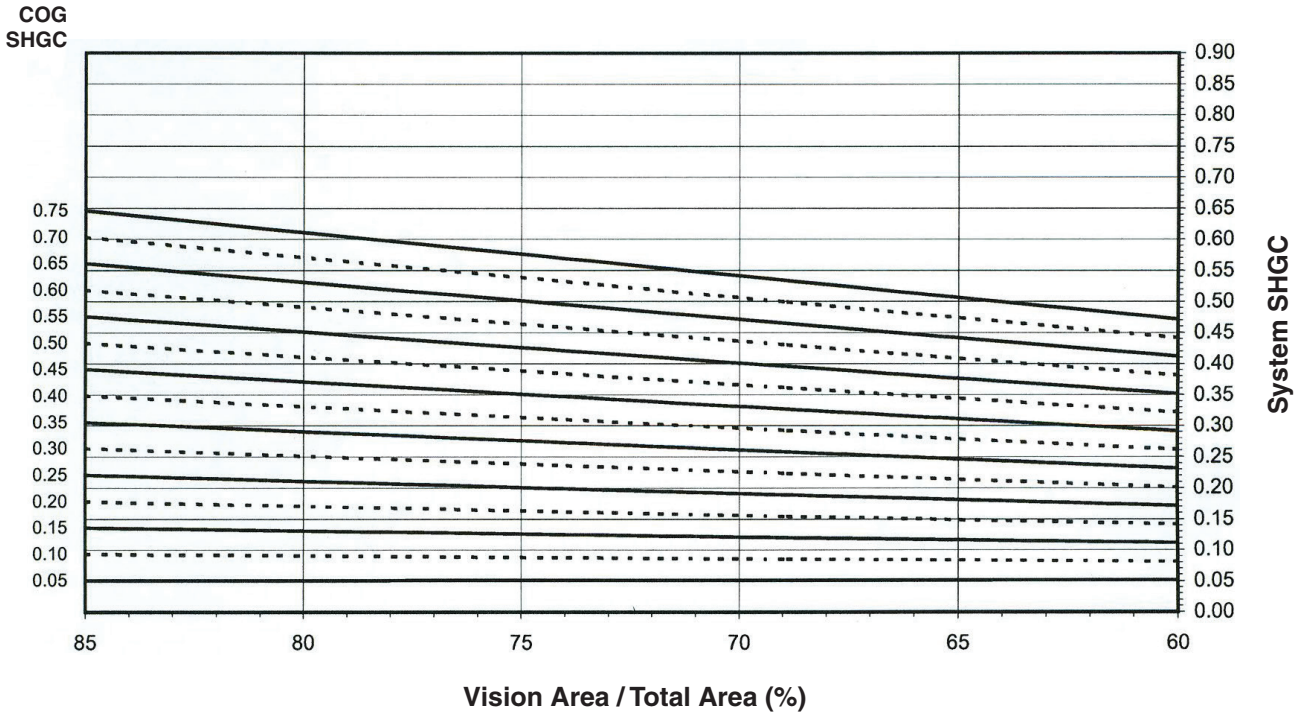
System U-factor vs Percent of Glass Area



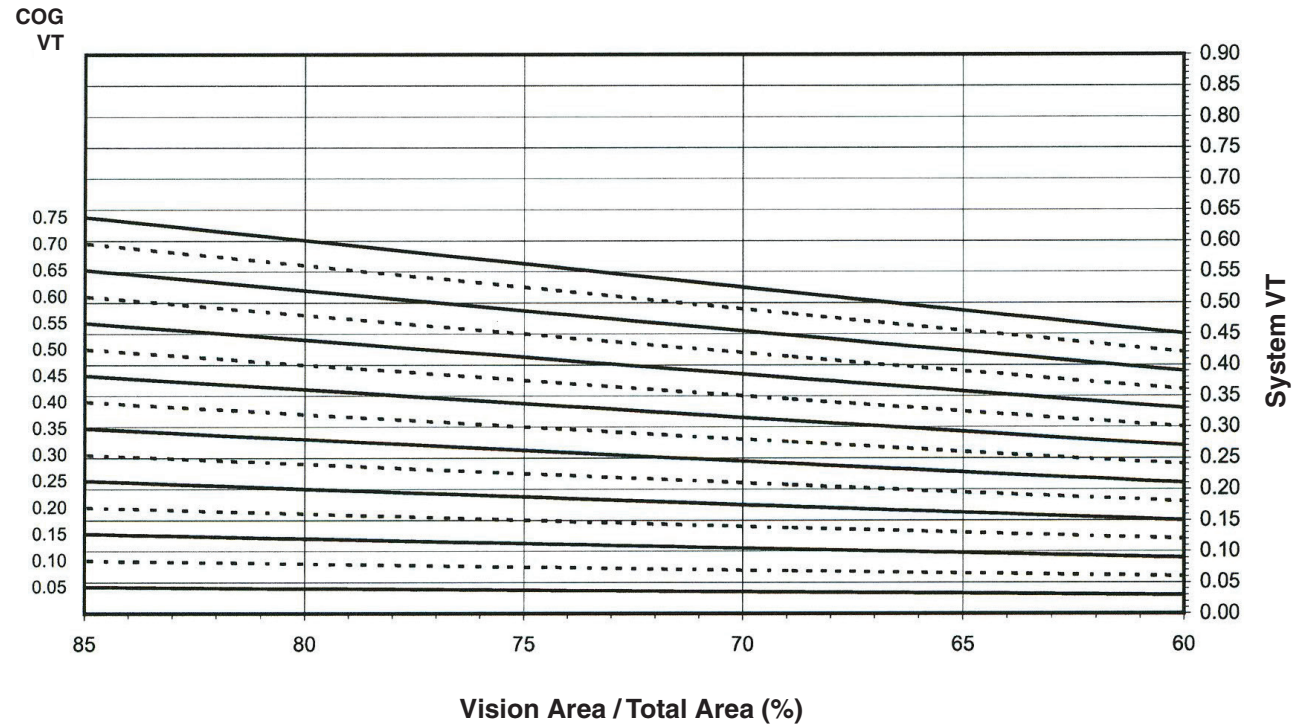
Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

DOUBLE HUNG VERTICAL SLIDER WITH 1" GLAZING

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



DOUBLE HUNG VERTICAL SLIDER WITH 1" GLAZING

Thermal Transmittance [1] (BTU/hr • ft [2] • °F)

Glass U-Factor [3]	Overall U-Factor [4]
0.48	0.67
0.46	0.65
0.44	0.64
0.42	0.63
0.40	0.62
0.38	0.60
0.36	0.59
0.34	0.58
0.32	0.57
0.30	0.56
0.28	0.54
0.26	0.53
0.24	0.52
0.22	0.51
0.20	0.49

NOTE: For glass values that are not listed, linear interpolation is permitted.

1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 1200mm wide by 1500mm high (47-1/4" by 59-1/16").

SHGC Matrix [2]

Glass SHGC [3]	Overall SHGC [4]
0.75	0.53
0.70	0.50
0.65	0.47
0.60	0.43
0.55	0.40
0.50	0.36
0.45	0.33
0.40	0.29
0.35	0.26
0.30	0.22
0.25	0.19
0.20	0.15
0.15	0.12
0.10	0.09
0.05	0.05

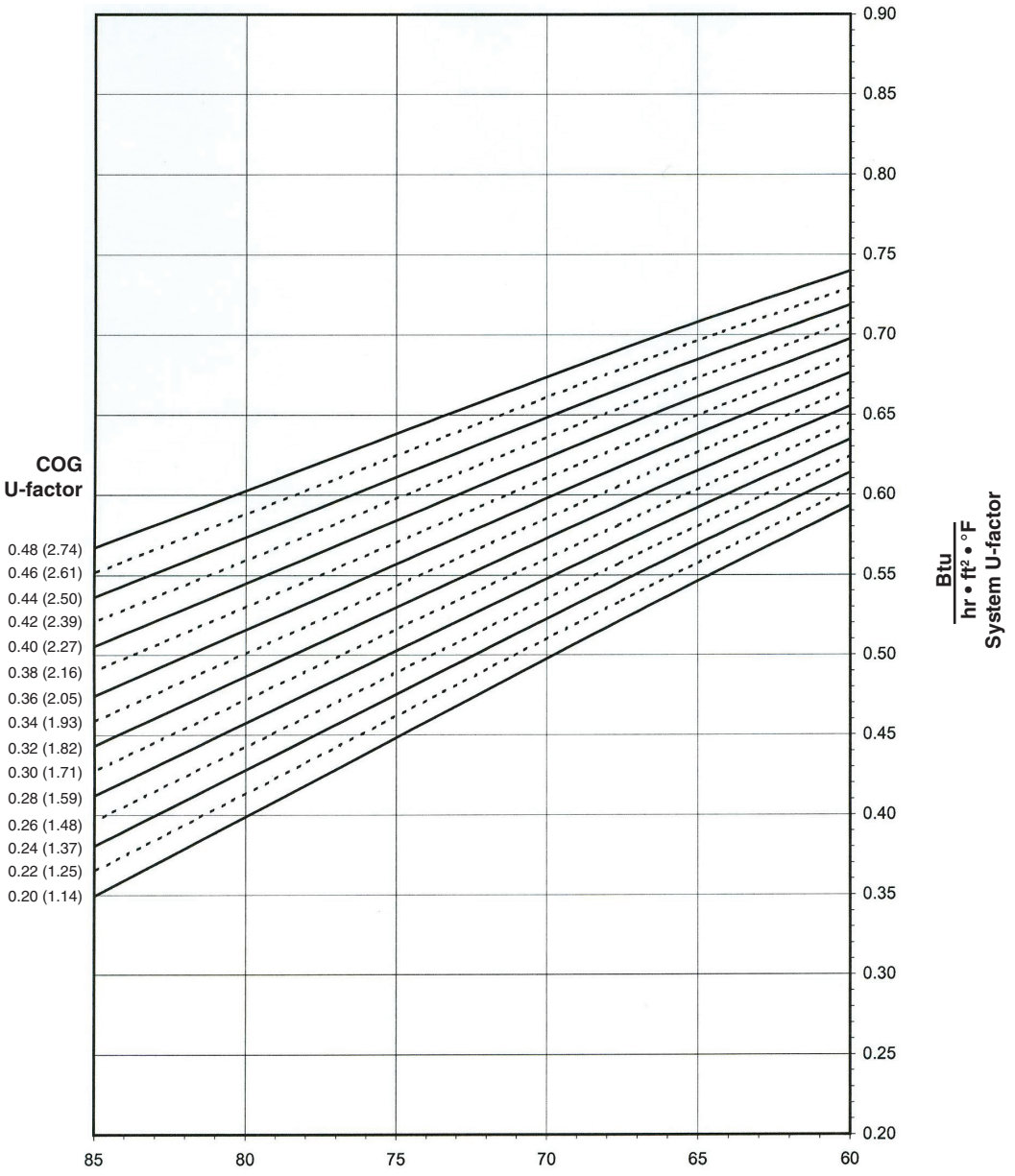
Visible Transmittance [2]

Glass VT [3]	Overall VT [4]
0.75	0.52
0.70	0.48
0.65	0.45
0.60	0.41
0.55	0.38
0.50	0.35
0.45	0.31
0.40	0.28
0.35	0.24
0.30	0.21
0.25	0.17
0.20	0.14
0.15	0.10
0.10	0.07
0.05	0.03

HORIZONTAL SLIDER WITH 1" GLAZING

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

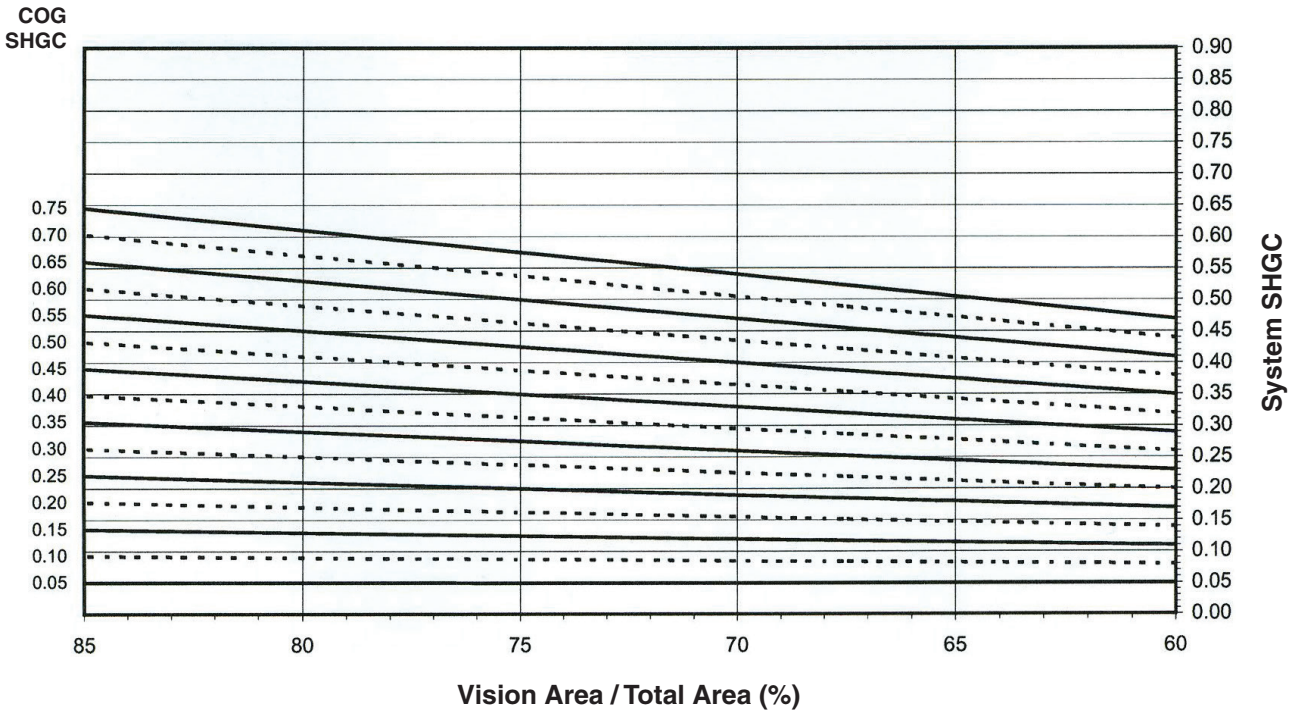
System U-factor vs Percent of Glass Area



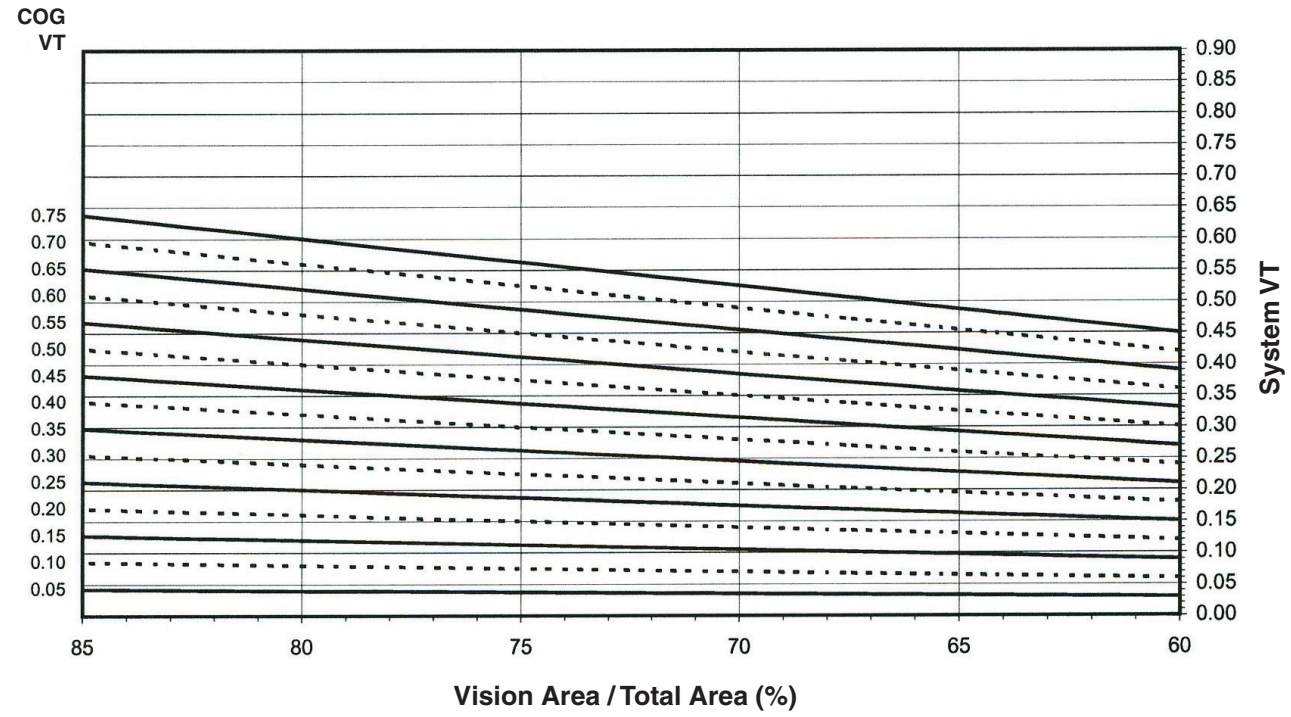
Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

HORIZONTAL SLIDER WITH 1" GLAZING

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



HORIZONTAL SLIDER WITH 1" GLAZING

Thermal Transmittance [1] (BTU/hr • ft [2] • °F)

Glass U-Factor [3]	Overall U-Factor [4]
0.48	0.69
0.46	0.68
0.44	0.67
0.42	0.65
0.40	0.64
0.38	0.63
0.36	0.62
0.34	0.61
0.32	0.59
0.30	0.58
0.28	0.57
0.26	0.56
0.24	0.54
0.22	0.53
0.20	0.52

NOTE: For glass values that are not listed, linear interpolation is permitted.

1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 1500mm wide by 1200mm high (59-1/16" by 47-1/4").

SHGC Matrix [2]

Glass SHGC [3]	Overall SHGC [4]
0.75	0.52
0.70	0.49
0.65	0.46
0.60	0.42
0.55	0.39
0.50	0.35
0.45	0.32
0.40	0.29
0.35	0.25
0.30	0.22
0.25	0.18
0.20	0.15
0.15	0.12
0.10	0.08
0.05	0.05

Visible Transmittance [2]

Glass VT [3]	Overall VT [4]
0.75	0.51
0.70	0.47
0.65	0.44
0.60	0.41
0.55	0.37
0.50	0.34
0.45	0.30
0.40	0.27
0.35	0.24
0.30	0.20
0.25	0.17
0.20	0.14
0.15	0.10
0.10	0.07
0.05	0.03

LAWS AND BUILDING AND SAFETY CODES GOVERNING THE DESIGN AND USE OF GLAZED ENTRANCE, WINDOW, AND CURTAIN WALL PRODUCTS VARY WIDELY. KAWNEER DOES NOT CONTROL THE SELECTION OF PRODUCT CONFIGURATIONS, OPERATING HARDWARE, OR GLAZING MATERIALS, AND ASSUMES NO RESPONSIBILITY THEREFOR.

Metric (SI) conversion figures are included throughout these details for reference.
Numbers in parentheses ( ) are millimeters unless otherwise noted.

The following metric (SI) units are found in these details:

m – meter
cm – centimeter
mm – millimeter
s – second
Pa – pascal
MPa – megapascal

Kawneer reserves the right to change configurations without prior notice when deemed necessary for product improvement.

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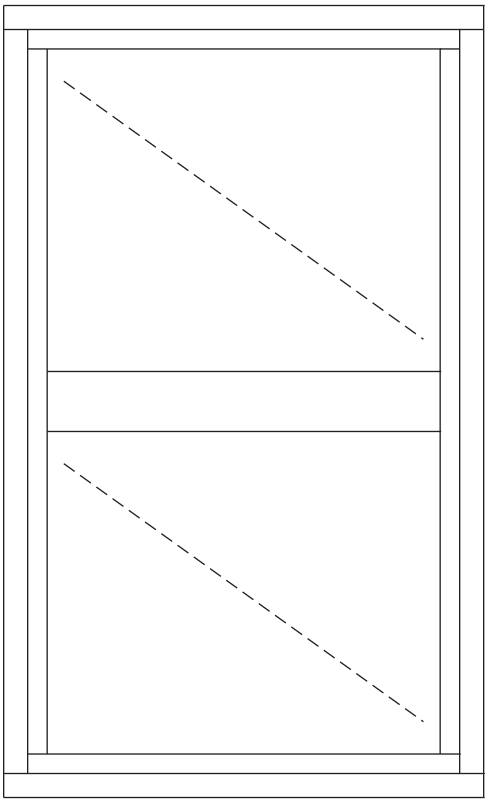
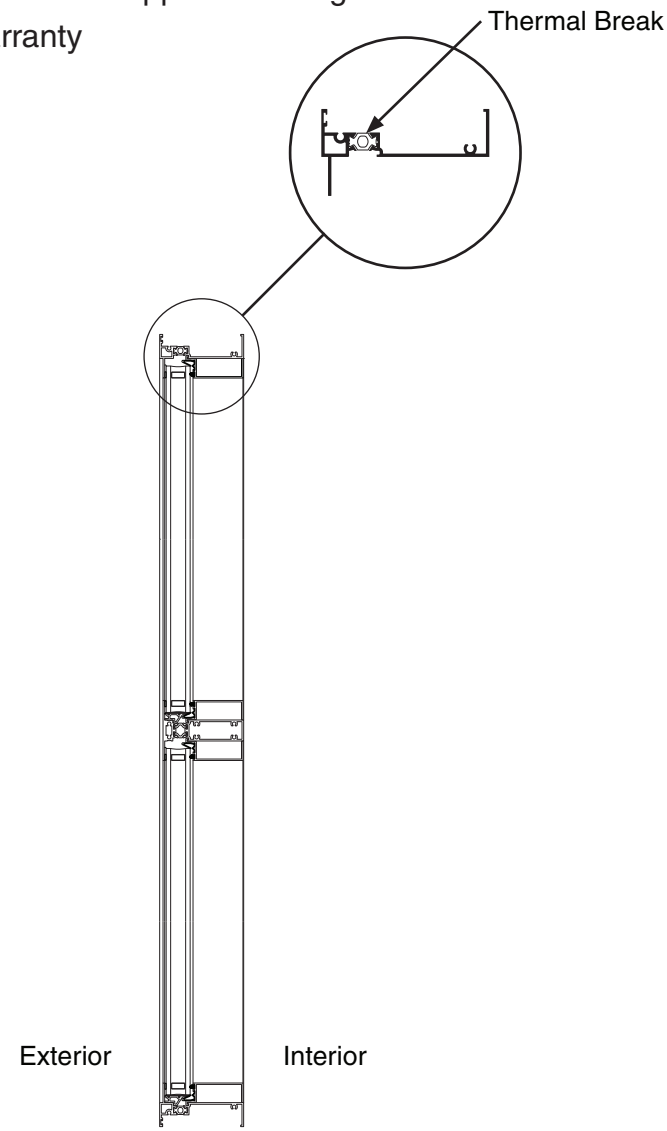
Standard Features

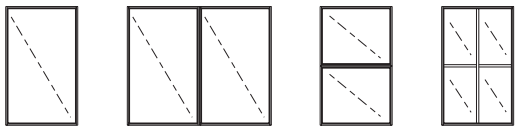
- High Performance Commercial Window
- IsoPort™ Thermal Break
- Screw and Spline Frame Corner Joinery
- Factory Silicone Glazed
- Interior Applied Glazing Bead
- Architectural Anodized Finishes and Applied Coatings
- Two Year Manufacturer's Warranty





Fixed Window

For specific product applications,
Consult your Kawneer representative.

CLASS and GRADE	CLASS CW-PG50-FW / AW-PG50-FW
OPTIONAL CLASS and GRADE	CLASS AW-PG70-FW
TESTING STANDARD	AAMA / WDMA / CSA / 101 / I.S.2 / A440-08 (NAFS-08)
FRAME DEPTH	3-1/2" Overall Frame Depth
TYPICAL WALL THICKNESS	.070" Nominal
TYPICAL MAX. VENT SIZE	60" x 99"
TYPICAL MIN. VENT SIZE	15" x 15"
TYPICAL CONFIGURATIONS	
STANDARD INFILL OPTIONS	1"
STANDARD HARDWARE	Not Applicable
OPTIONAL HARDWARE	Not Applicable
OTHER OPTIONS	Between the Glass Muntin Grids Exterior Applied Muntin Grids Perimeters and Sills Exterior Pannings and Interior Trims True Intermediate Muntin Structural Mullions Vertically or Horizontally Stacked Strap Anchors Nailing Fin Flange

FIXED WINDOW PRODUCT PERFORMANCE

Air Infiltration NAFS-08	Water Resistance NAFS-08	Design Load NAFS-08	Thermal Transmittance AAMA 507 NFRC 100	Condensation Resistance* AAMA 1503	Condensation Temperature Index* CSA A440.2	Sound Transmittance** ASTM E 1425 ASTM E 1332
≤ 0.10 Cfm/ft²	CW - 10 PSF AW - 15 PSF	50 PSF 70 PSF	"U" Factor 0.33 to 0.56	CRF frame - 67 CRF glass - 71	I frame - 60 I glass - 62	STC - 36 OITC - 28

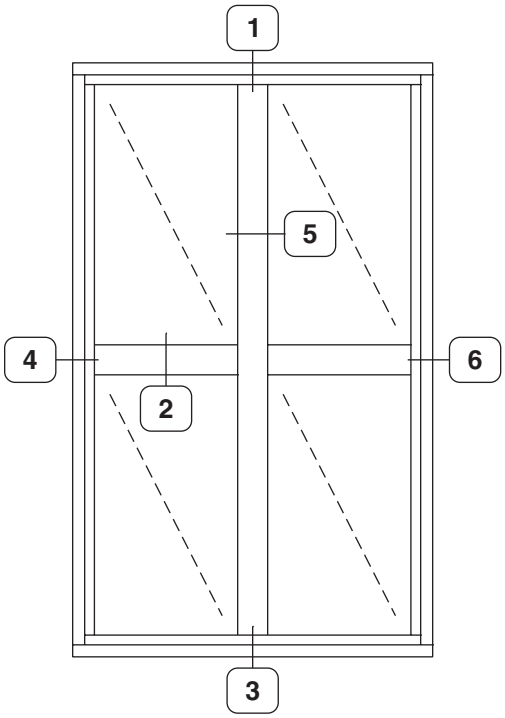
Note: "U" Values based on computer simulations utilizing Insulating Glass, Low E Coatings and Warm Edge Spacers. See Thermal Charts for various glass types.

* CRF and Temperature index based on high performance Low E Glass and Warm Edge Spacers.

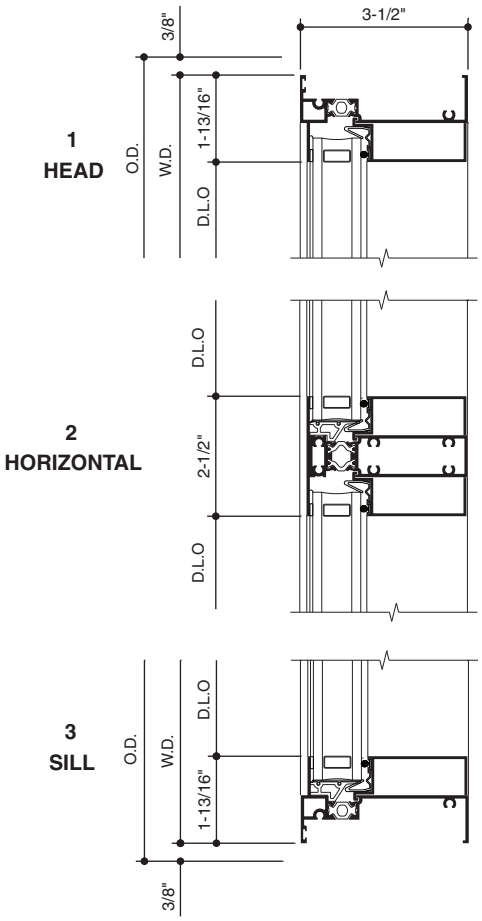
** Acoustical test based on laminated glass.

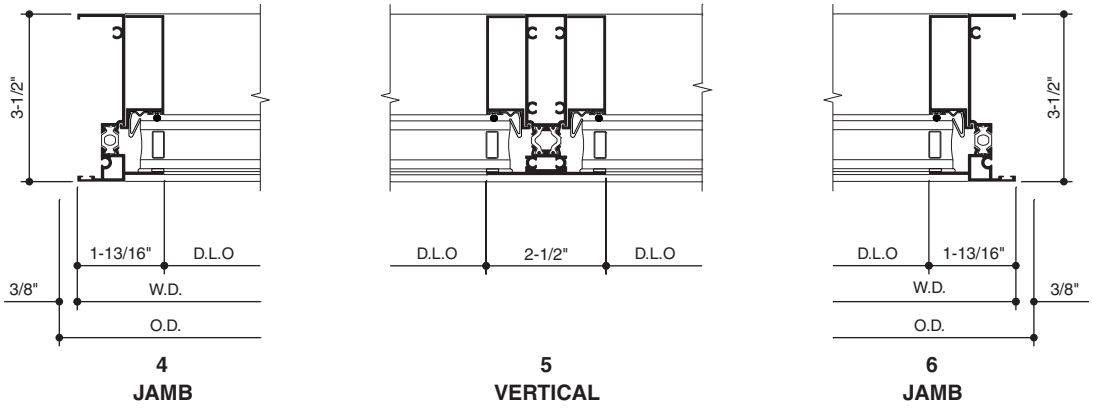
SCALE : 3" = 1'-0"

AA™3350 IsoPort™ FIXED WINDOW
Standard Design



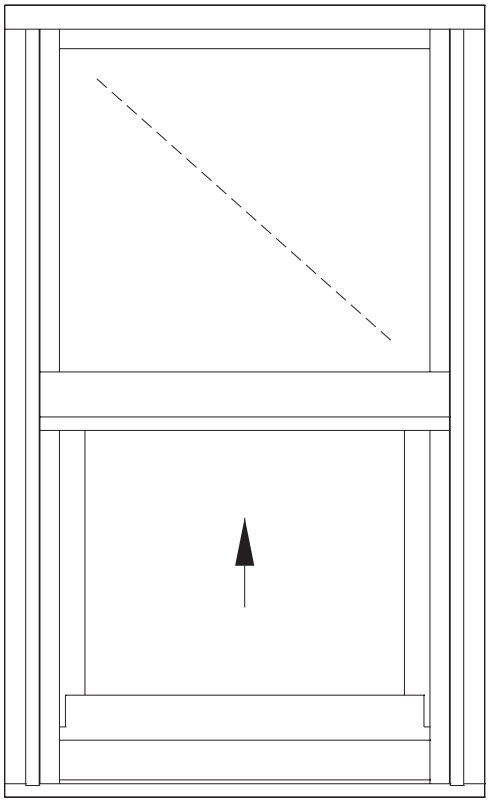
TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations



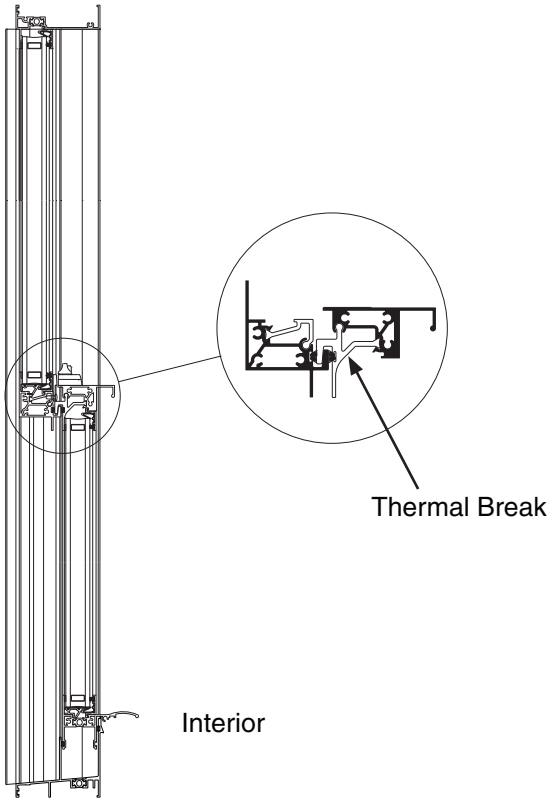


Standard Features

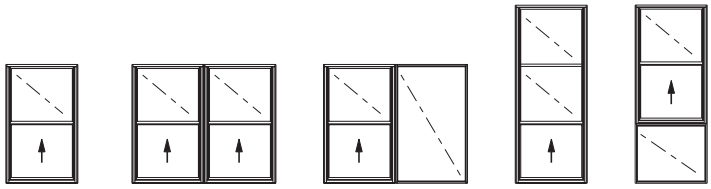
- High Performance Commercial Window
- IsoPort™ Thermal Break
- Screw and Spline Frame and Sash Corner Joinery
- Factory Silicone Glazed
- Interior Applied Glazing Bead
- Architectural Anodized Finishes and Applied Coatings
- Two Year Manufacturer's Warranty



Single Hung Window



For specific product applications,
Consult your Kawneer representative.

CLASS and GRADE	CLASS CW-PG50-H / AW-PG50-H
OPTIONAL CLASS and GRADE	CLASS AW-PG70-H (MAX. SIZE 52" X 99")
TEST STANDARD	AAMA / WDMA / CSA / 101 / I.S.2 / A440-08 (NAFS-08)
FRAME DEPTH	3-1/2" Overall Frame Depth
TYPICAL WALL THICKNESS	.070" Nominal
TYPICAL MAXIMUM SIZE	60" x 99" (AW), 56" x 91" (CW)
TYPICAL MINIMUM SIZE	20" x 32-1/2" (10 PSF Sill), 20" x 33-1/2" (15 PSF Sill)
TYPICAL CONFIGURATIONS	
STANDARD INFILL OPTIONS	1"
STANDARD HARDWARE	Heavy Duty Balances Zinc Die Cast Sweep Locks Sash Stops
OPTIONAL HARDWARE	Sill Auto Lock
OTHER OPTIONS	Between the Glass Muntin Grids Exterior Applied Muntin Grids Perimeters and Sills Exterior Pannings and Interior Trims Structural Mullions Vertically or Horizontally Stacked Strap Anchors Sill for 10 PSF or 15 PSF Water Performance Insect Screens Nailing Fin Flange

SINGLE HUNG WINDOW PRODUCT PERFORMANCE

Air Infiltration NAFS-08	Water Resistance NAFS-08	Design Load NAFS-08	Thermal Transmittance AAMA 507 NFRC 100	Condensation Resistance* AAMA 1503	Condensation Temperature Index* CSA A440.2	Sound Transmittance** ASTM E 1425 ASTM E 1332
≤ 0.30 Cfm/ft^2	CW - 10 PSF AW - 15 PSF	50 PSF 70 PSF	"U" Factor 0.38 to 0.57	CRF frame - 57 CRF glass - 60	I frame - 39 I glass - 58	STC - 36 OITC - 30

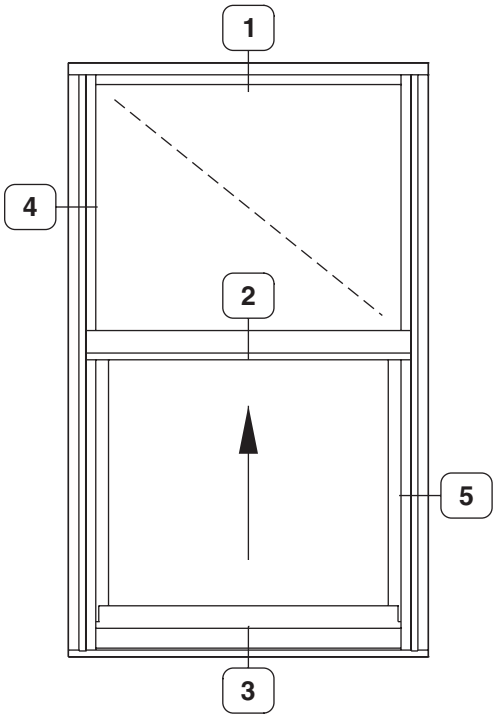
Note: "U" Values based on computer simulations utilizing Insulating Glass, Low E Coatings and Warm Edge Spacers. See Thermal Charts for various glass types.

* CRF and Temperature index based on high performance Low E Glass and Warm Edge Spacers.

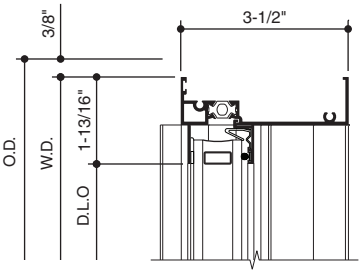
** Acoustical test based on laminated glass.

SCALE : 3" = 1'-0"

AA™3350 IsoPort™ SINGLE HUNG WINDOW
Commercial Window, Class CW-PG50-H



TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations



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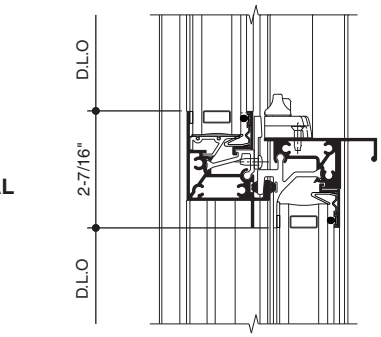
HEAD



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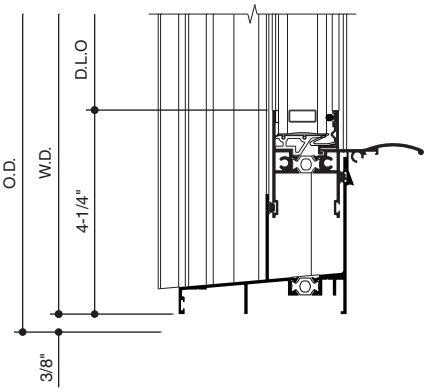
HORIZONTAL



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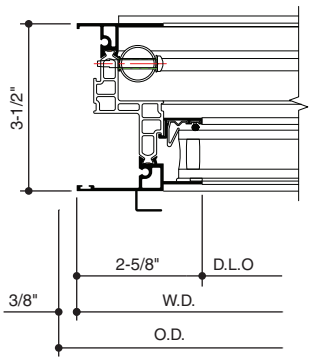
SILL
10 PSF



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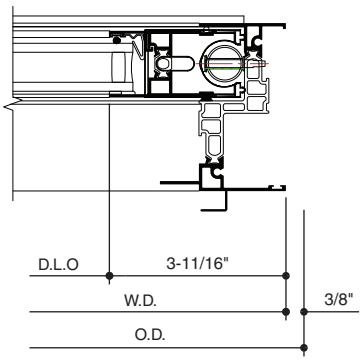
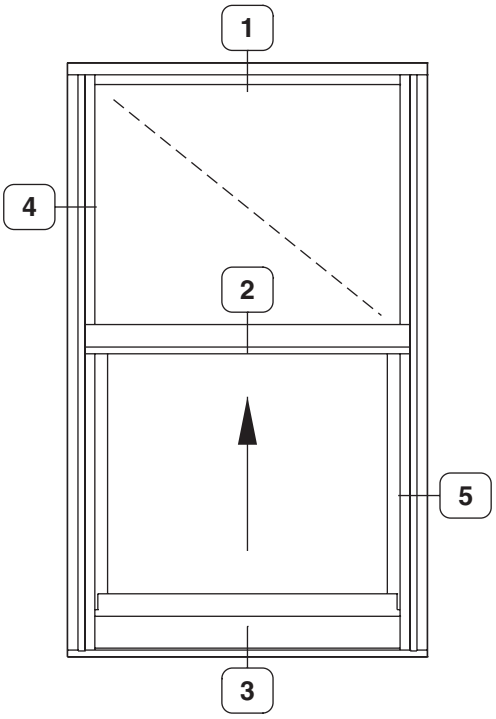
JAMB



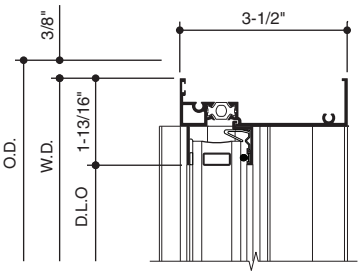
5
JAMB

SCALE : 3" = 1'-0"

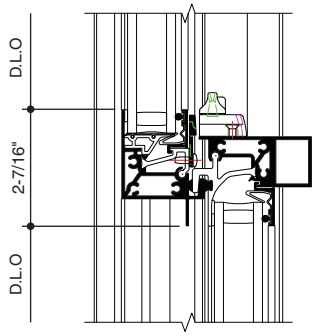
AA™3350 IsoPort™ SINGLE HUNG WINDOW
Architectural Window, Class AW-PG50-H
Class AW-PG70-H (Optional)



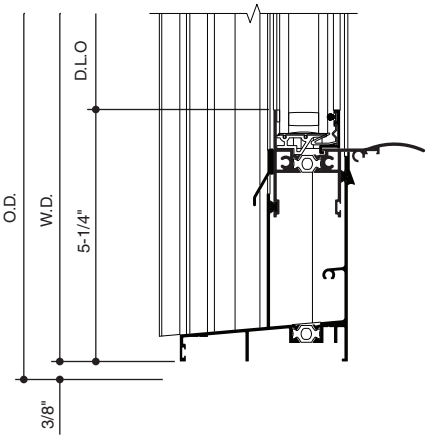
TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations



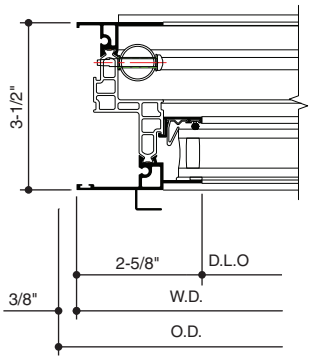
1
HEAD



2
HORIZONTAL



3
SILL
15 PSF



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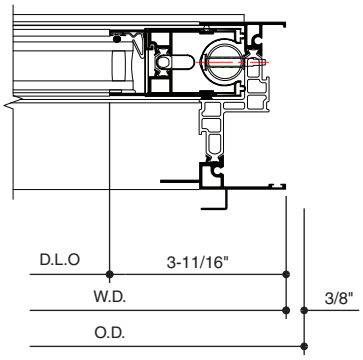
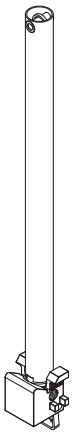
JAMB



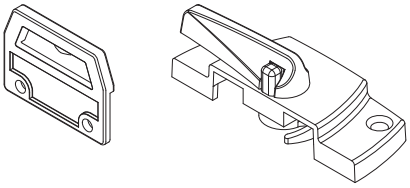
5
JAMB

HEAVY DUTY BALANCES



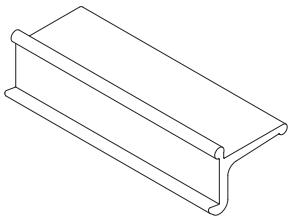
A class 5 adjustable spring balance with excellent operating forces capable of balancing heavier sash weights. The balance utilizes stainless steel components and is cycle tested for longevity.

ZINC SWEEP LOCK AND KEEPER



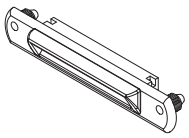
Zinc die cast sweep locks and keepers with a durable black powder coat finish and cycle tested for longevity. Includes a push button lock feature providing added security.

AUTO LOCK



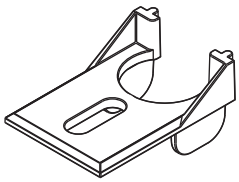
An optional black rigid PVC spring operated auto lock conveniently located under the sash lift handle. The lock automatically engages the integral sill keeper upon closing the sash.

COVERED WEEPS



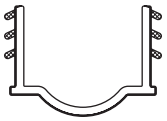
A polycarbonate weep with an integral hinged cover to allow maximum drainage of infiltrating water with a positive closing cover to block drafts and insects. The weep is available in black, white and silver finishes.

SASH CAMS



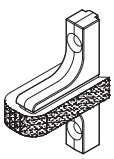
Adjustable glass filled nylon cams located left and right on the sash ensure proper alignment and smooth operation.

SASH STOPS



Black PVC sash stops are inserted into the vertical jambs without exposed fasteners to prevent excessive sash travel.

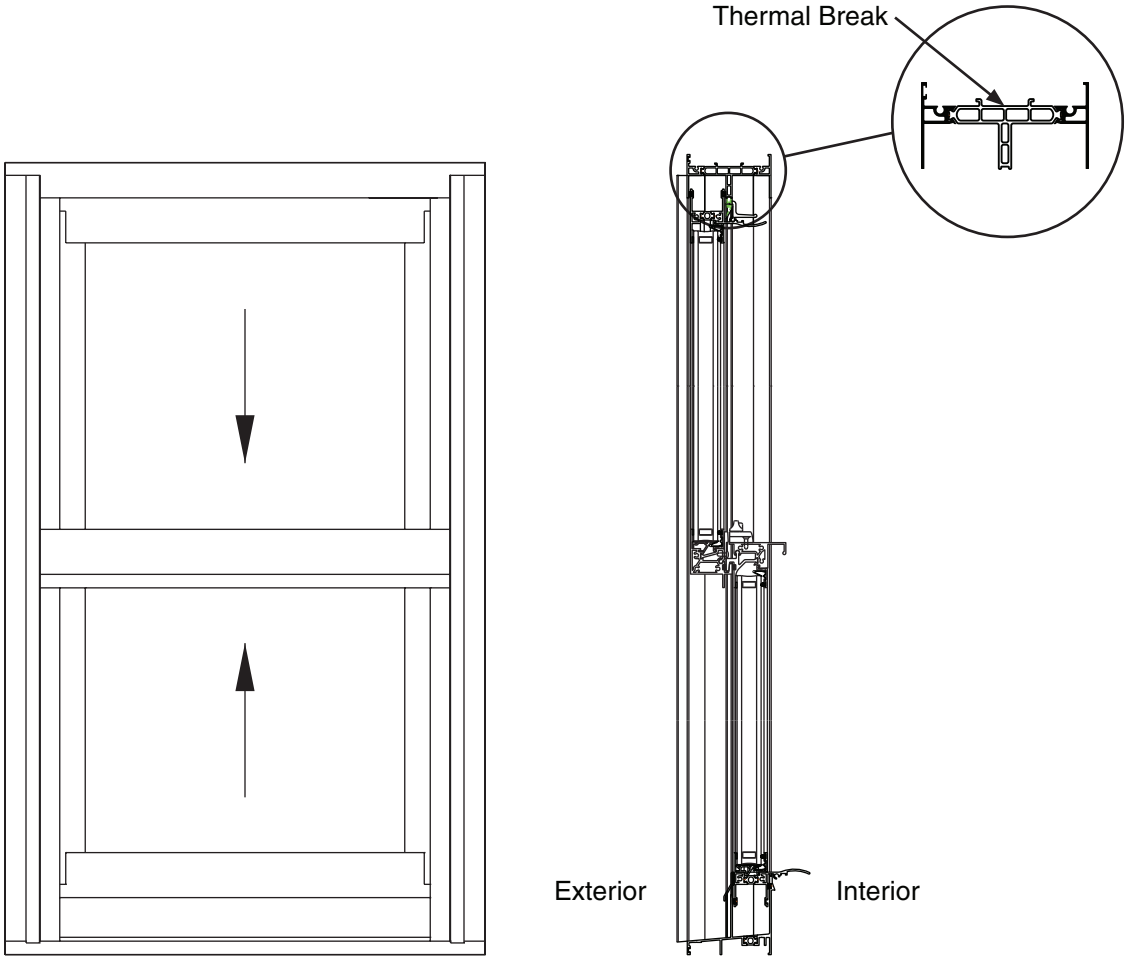
WEATHERING BLOCK



Weathering blocks located left and right at the meeting rails significantly improve resistance to air and water infiltration.

Standard Features

- High Performance Commercial Window
- IsoPort™ Thermal Break
- Screw and Spline Frame and Sash Corner Joinery
- Factory Silicone Glazed
- Interior Applied Glazing Bead
- Architectural Anodized Finishes and Applied Coatings
- Two Year Manufacturer's Warranty

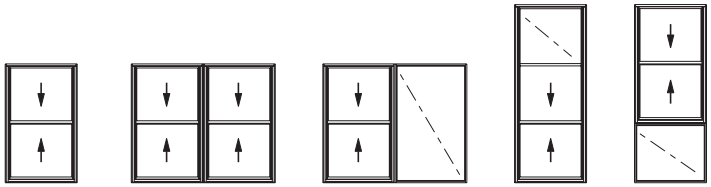


Double Hung Window

For specific product applications,
Consult your Kawneer representative.

AA™3350 IsoPort™ Window

DOUBLE HUNG WINDOW

CLASS and GRADE	CLASS CW-PG50-H / AW-PG50-H
OPTIONAL CLASS and GRADE	CLASS AW-PG70-H (MAXIMUM SIZE 52" x 99")
TESTING STANDARD	AAMA / WDMA / CSA / 101 / I.S.2 / A440-08 (NAFS-08)
FRAME DEPTH	3-1/2" Overall Frame Depth
TYPICAL WALL THICKNESS	.070" Nominal
TYPICAL MAXIMUM SIZE	60" x 99" (AW), 56" x 91" (CW)
TYPICAL MINIMUM SIZE	20" x 34" (10 PSF Sill), 20" x 35" (15 PSF Sill)
TYPICAL CONFIGURATIONS	
STANDARD INFILL OPTIONS	1"
STANDARD HARDWARE	Heavy Duty Balances Zinc Die Cast Sweep Locks Sash Stops Upper Sash Auto Lock
OPTIONAL HARDWARE	Sill Auto Lock
OTHER OPTIONS	Between the Glass Muntin Grids Exterior Applied Muntin Grids Perimeters and Sills Exterior Pannings and Interior Trims Structural Mullions Vertically or Horizontally Stacked Strap Anchors Sill for 10 PSF or 15 PSF Water Performance Insect Screens Nailing Fin Flange

DOUBLE HUNG WINDOW PRODUCT PERFORMANCE

Air Infiltration NAFS-08	Water Resistance NAFS-08	Design Load NAFS-08	Thermal Transmittance AAMA 507 NFRC 100	Condensation Resistance* AAMA 1503	Condensation Temperature Index* CSA A440.2	Sound Transmittance** ASTM E 1425 ASTM E 1332
≤ 0.30 Cfm/ft²	CW - 10 PSF AW - 15 PSF	50 PSF 70 PSF	"U" Factor 0.39 to 0.57	CRF frame - 57 CRF glass - 60	I frame - 33 I glass - 60	STC - 34 OITC - 29

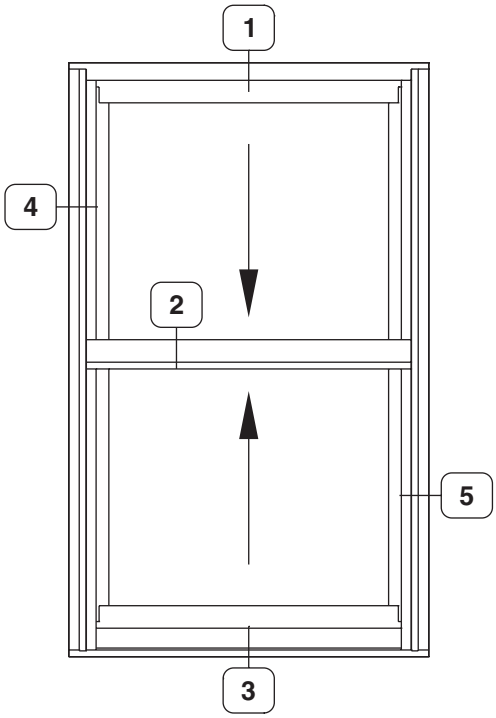
Note: "U" Values based on computer simulations utilizing Insulating Glass, Low E Coatings and Warm Edge Spacers. See Thermal Charts for various glass types.

* CRF and Temperature index based on high performance Low E Glass and Warm Edge Spacers.

** Acoustical test based on laminated glass.

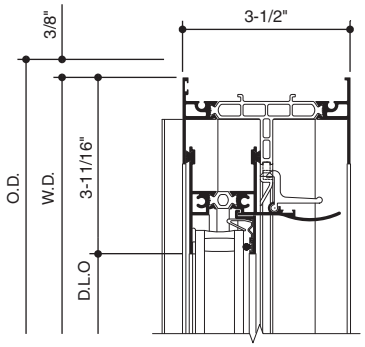
SCALE : 3" = 1'-0"

AA™3350 IsoPort™ DOUBLE HUNG WINDOW
Commercial Window, Class CW-PG50-H

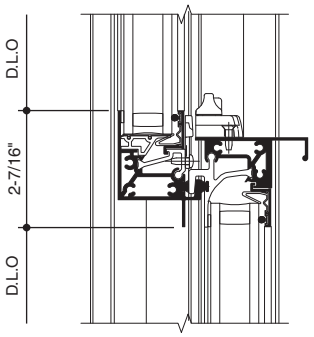


TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations

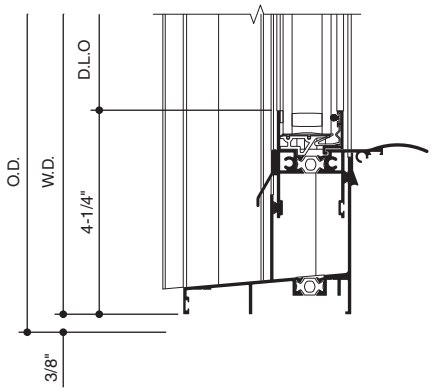
1
HEAD

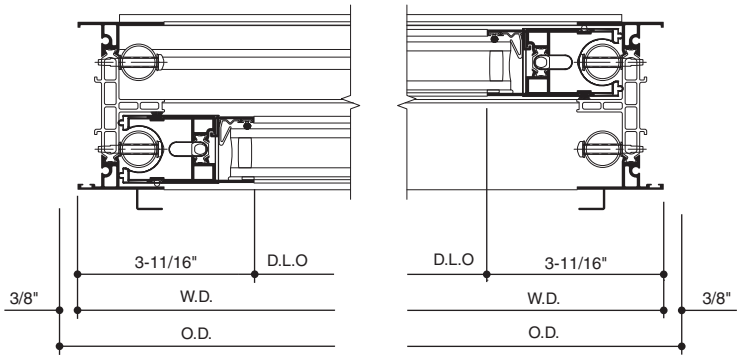


2
HORIZONTAL



3
SILL
10 PSF



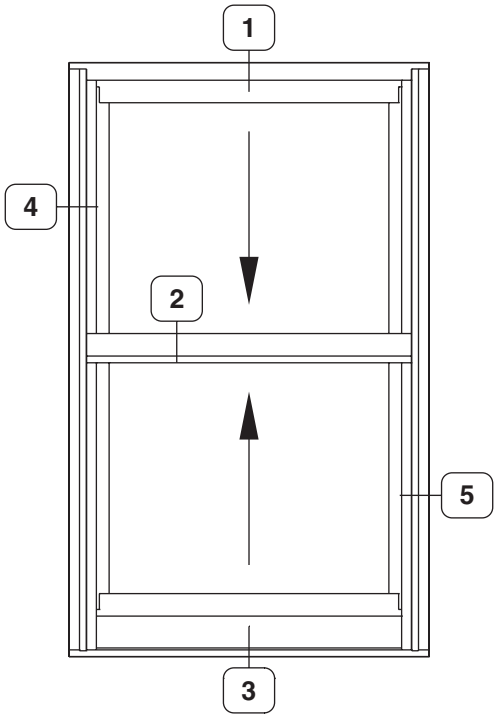


4
JAMB

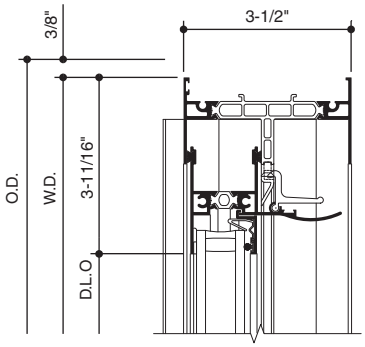
5
JAMB

SCALE : 3" = 1'-0"

AA™3350 IsoPort™ DOUBLE HUNG WINDOW
Architectural Window, Class AW-PG50-H
Class AW-PG70-H (Optional)



TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations



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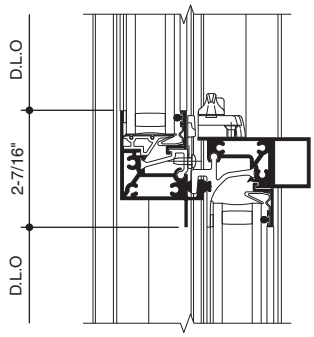
HEAD



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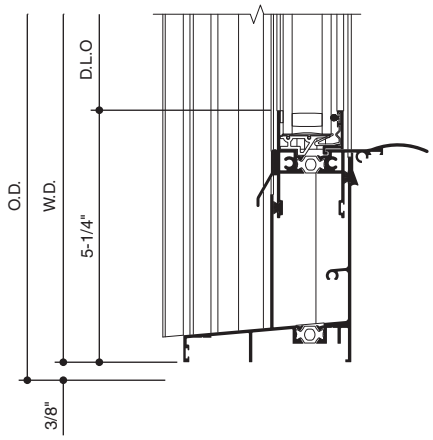
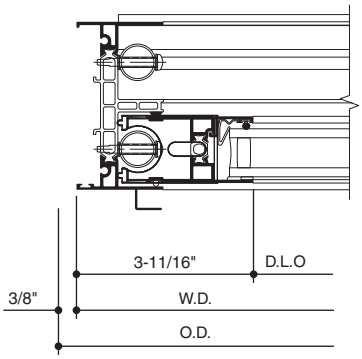
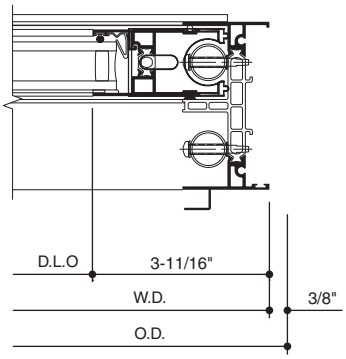
HORIZONTAL



3
SILL
15 PSF

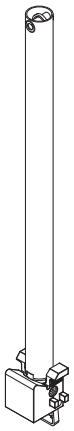


4
JAMB



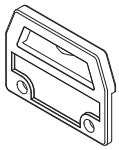
5
JAMB

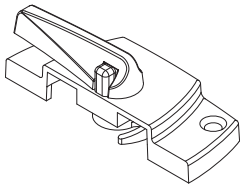
HEAVY DUTY BALANCES



A class 5 adjustable spring balance with excellent operating forces capable of balancing heavier sash weights. The balance utilizes stainless steel components and is cycle tested for longevity.

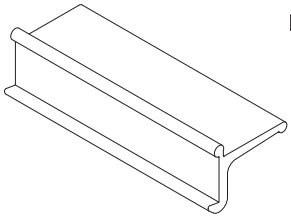
ZINC SWEEP LOCK AND KEEPER

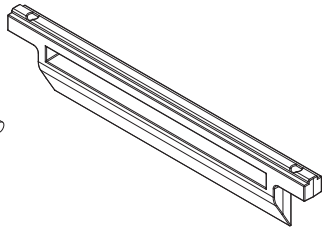




Zinc die cast sweep locks and keepers with a durable black powder coat finish and cycle tested for longevity. Includes a push button lock feature providing added security.

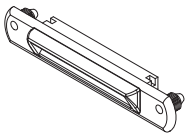
AUTO LOCK AND KEEPER





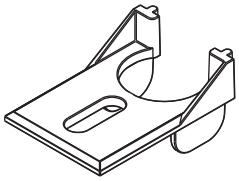
A black rigid PVC spring operated auto lock located on the upper sash. The lock automatically engages the head keeper securing the upper sash in the closed position. The auto lock is an option for the lower sash.

COVERED WEEPS



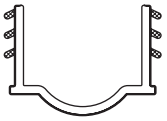
A polycarbonate weep with an integral hinged cover to allow maximum drainage of infiltrating water with a positive closing cover to block drafts and insects. The weep is available in black, white and silver finishes.

SASH CAMS



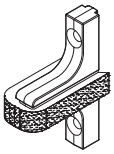
Adjustable glass filled nylon cams located left and right on the sash ensure proper alignment and smooth operation.

SASH STOPS



Black PVC sash stops are inserted into the vertical jambs without exposed fasteners to prevent excessive sash travel.

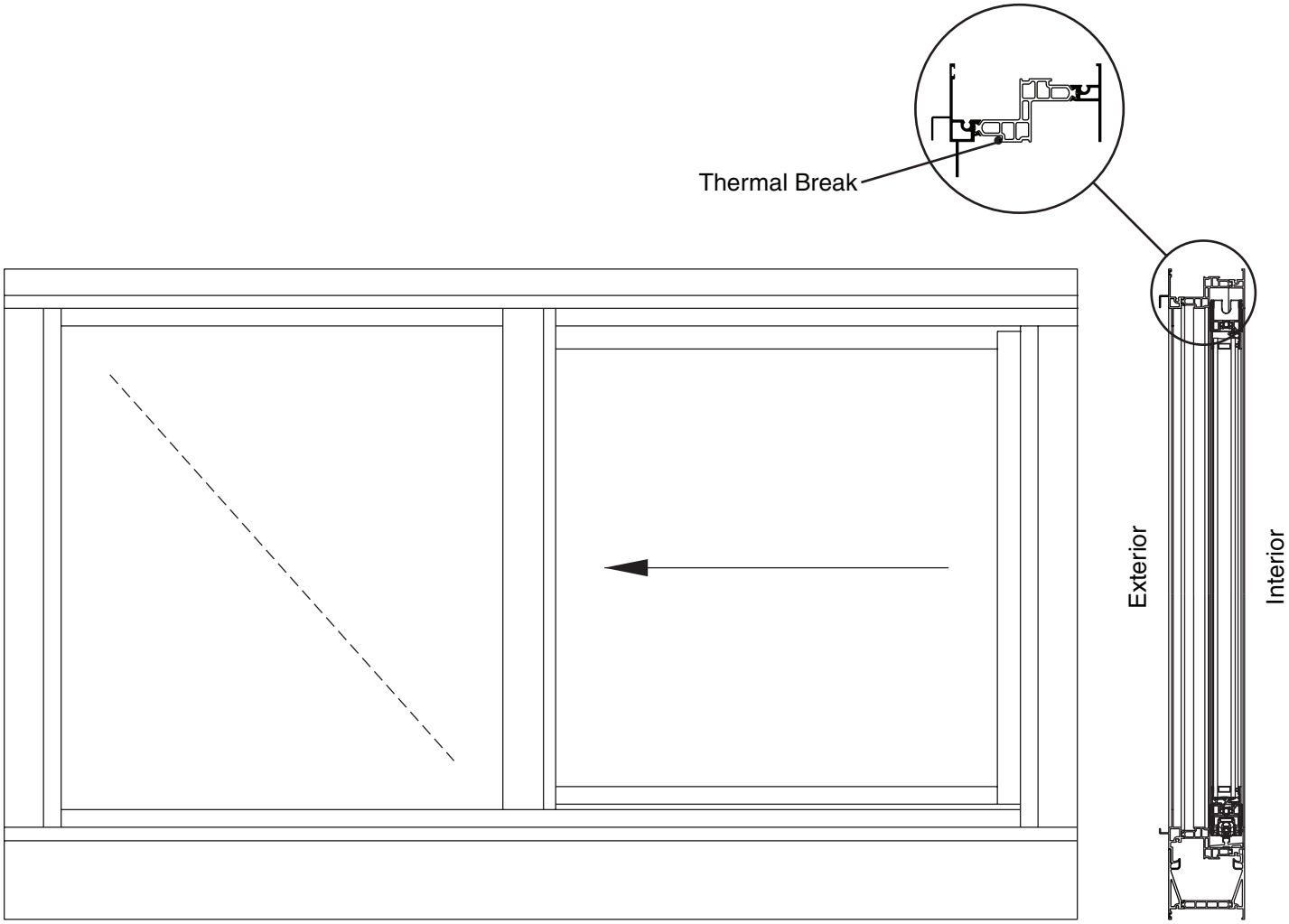
WEATHERING BLOCK



Weathering blocks located left and right at the meeting rails significantly improve resistance to air and water infiltration.

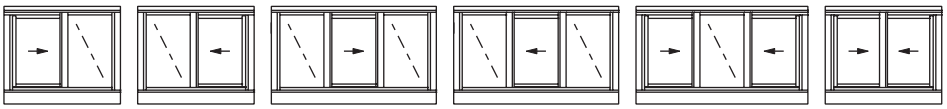
Standard Features

- High Performance Window
- IsoPort™ Thermal Break
- Screw and Spline Frame and Sash Corner Joinery
- Factory Silicone Glazed
- Interior Applied Glazing Bead with Bulb Gasket
- Architectural Anodized Finishes and Applied Coatings
- Two Year Manufacturer's Warranty



Horizontal Sliding Window

For specific product applications,
Consult your Kawneer representative.

CLASS and GRADE	Class CW-PG50-HS / AW-PG50-HS
OPTIONAL CLASS and GRADE	Class AW-PG70-HS (Max Size: 99" x 71" OX)
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S. 2 / A440-08 (NAFS-08)
FRAME DEPTH	3-1/2" Overall Frame Depth
TYPICAL WALL THICKNESS	.070" Nominal
TYPICAL MAXIMUM SIZE	99" x 79" (OX,XO,XX) 148-1/2" x 79" (OXO,XOX)
TYPICAL MINIMUM SIZE	32" x 20" (OX,XO,XX) 48" x 20" (OXO,XOX)
TYPICAL CONFIGURATIONS	
STANDARD INFILL OPTIONS	1"
STANDARD HARDWARE	Composite Adjustable Tandem Roller Zinc Die Cast Sweep Lock
OPTIONAL HARDWARE	PVC Auto Lock
OTHER OPTIONS	Between the Glass Muntin Grids Exterior Applied Muntin Grids Perimeters and Sills Exterior Pannings and Interior Trims Structural Mullions Vertically or Horizontally Stacked Sill for 10 PSF or 15 PSF Water Performance Insect Screens

HORIZONTAL SLIDER WINDOW PRODUCT PERFORMANCE

Air Infiltration NAFS-08	Water Resistance NAFS-08	Design Load NAFS-08	Thermal Transmittance AAMA 507 NFRC 100	Condensation Resistance* AAMA 1503	Condensation Temperature Index* CSA A440.2	Sound Transmittance** ASTM E 1425 ASTM E 1332
≤ 0.30 Cfm/ft^2	CW - 10 PSF AW - 15 PSF	50 PSF 70 PSF	"U" Factor 0.37 to 0.54	CRF frame - 66 CRF glass - 66	I frame - 45 I glass - 62	STC - 37 OITC - 29

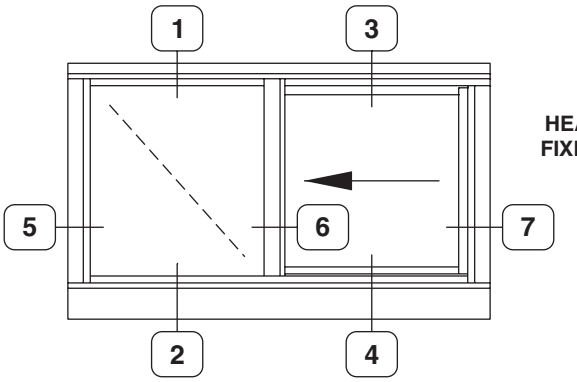
Note: "U" Values based on computer simulations utilizing Insulating Glass, Low E Coatings and Warm Edge Spacers. See Thermal Charts for various glass types.

* CRF and Temperature index based on high performance Low E Glass and Warm Edge Spacers.

** Acoustical test based on laminated glass.

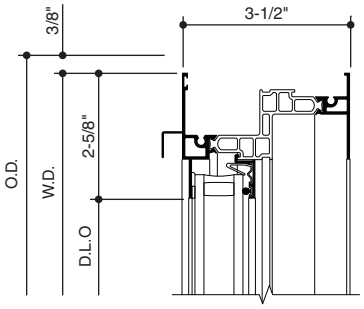
SCALE : 3" = 1'-0"

AA™3350 IsoPort™ OX HORIZONTAL SLIDER Commercial Window, Class CW-PG50-HS

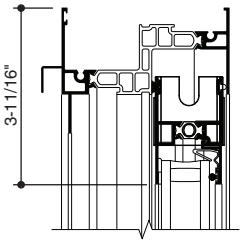


TYPICAL ELEVATION
Log onto www.kawneer.com
for other configurations

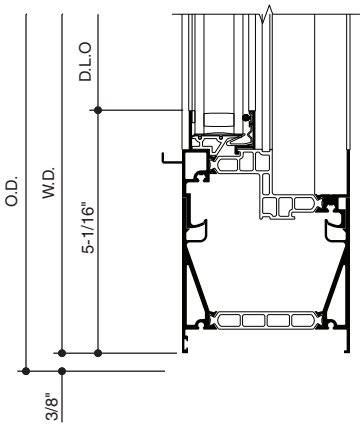
1
HEAD WITH FIXED SASH



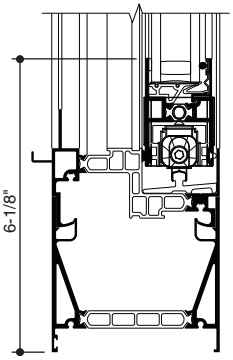
3
HEAD WITH OPERABLE SASH

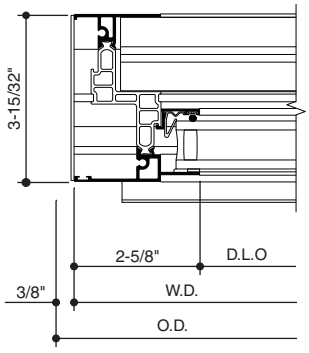


2
SILL WITH FIXED SASH (10 PSF)

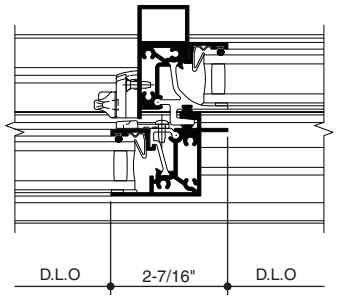


4
SILL WITH OPERABLE SASH (10 PSF)

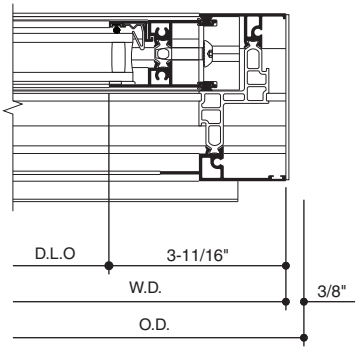




5
FIXED SASH JAMB



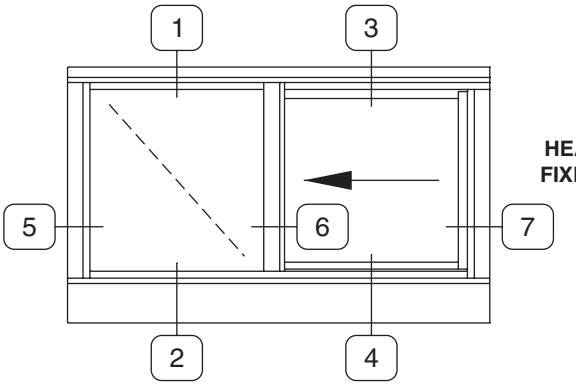
6
INTERLOCK



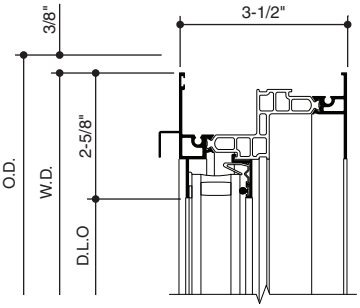
7
OPERABLE SASH JAMB

SCALE : 3" = 1'-0"

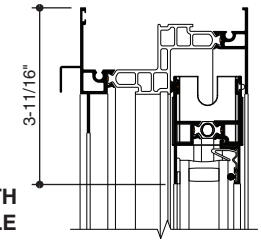
AA™3350 IsoPort™ OX HORIZONTAL SLIDER Architectural Window, Class AW-PG50-HS Class AW-PG70-HS (Optional)



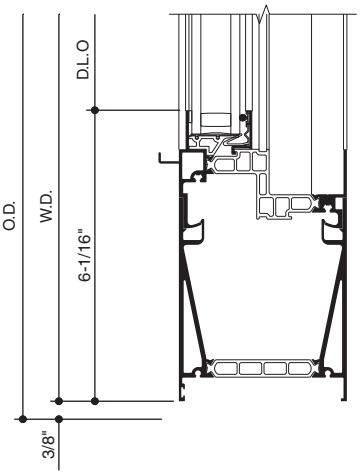
TYPICAL ELEVATION
Log onto www.kawneer.com
for other configurations



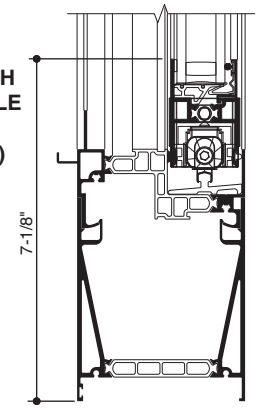
1
HEAD WITH FIXED SASH



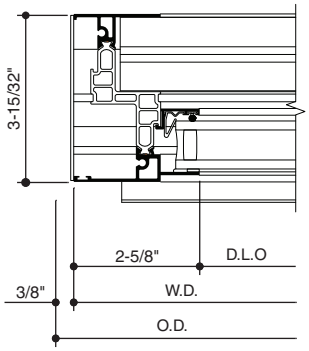
3
HEAD WITH OPERABLE SASH



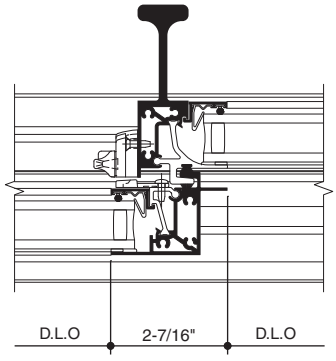
2
SILL WITH FIXED SASH (15 PSF)



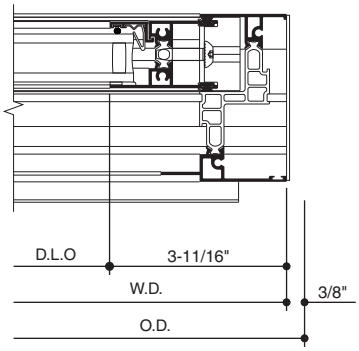
4
SILL WITH OPERABLE SASH (15 PSF)



5
FIXED SASH JAMB

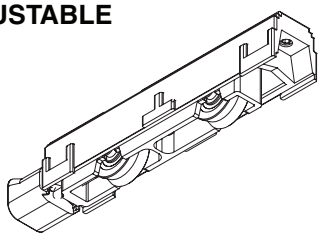


6
INTERLOCK



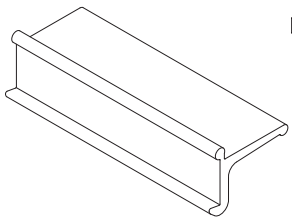
7
OPERABLE SASH JAMB

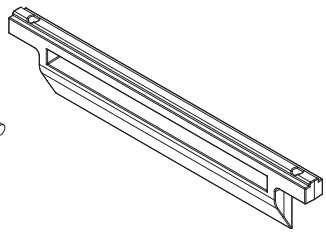
COMPOSITE ADJUSTABLE TANDEM ROLLER



Glass filled nylon housing, die cast zamak roller support, precision sealed ball bearing rollers with nylon tires.

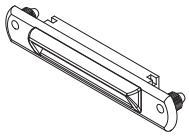
PVC AUTO LOCK AND KEEPER





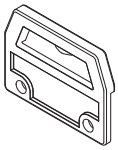
A black rigid PVC, spring operated auto lock, located on the jamb. The lock automatically engages the jamb keeper securing the sash in the closed position. The auto lock is standard for the exterior sash of the XX configuration only.

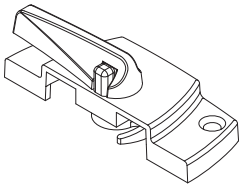
COVERED WEEP



A polycarbonate weep with an integral hinged cover to allow maximum drainage of infiltrating water with a positive closing cover to block drafts and insects. The weep is available in black, white and silver finishes.

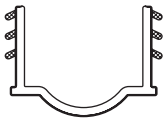
ZINC SWEEP LOCK AND KEEPER





Zinc die cast sweep locks and keepers with a durable black powder coat finish and cycle tested for longevity. Includes a push button lock feature providing added security.

SASH STOPS

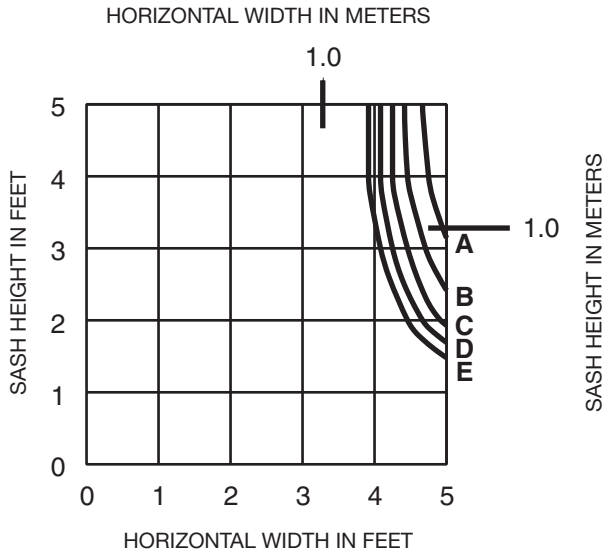


Black PVC sash stops are inserted into the head without exposed fasteners to prevent excessive sash travel.

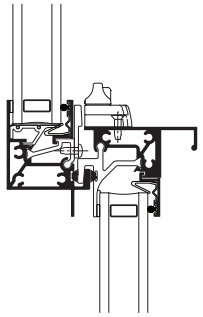
WIND LOAD CHARTS:

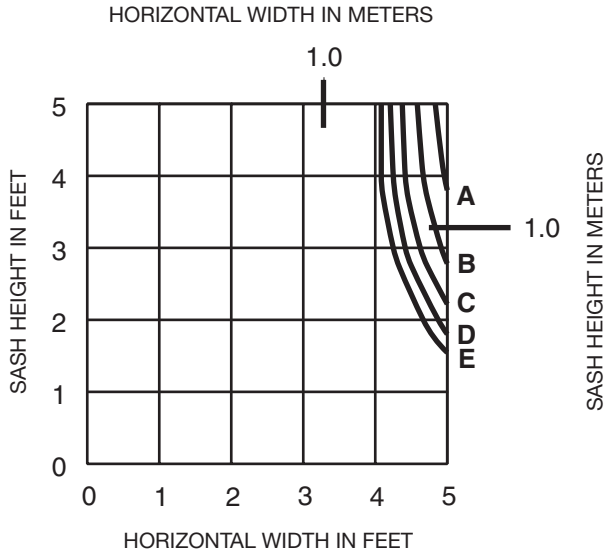
THESE CHARTS ARE BASED ON A MAXIMUM DEFLECTION OF L\175 AND\OR A MAXIMUM STRESS OF 15,152 psi (104 MPa). If the design wind load is determined through the analytical procedures of ASCE/SEI 7-10 or earlier editions, the load shall be based on the nominal loads used in allowable stress design. A 4/3 increase in allowable stress has not been used to develop these curves.

A = 40 PSF (1915)
B = 50 PSF (2394)
C = 60 PSF (2873)
D = 70 PSF (3352)
E = 80 PSF (3830)

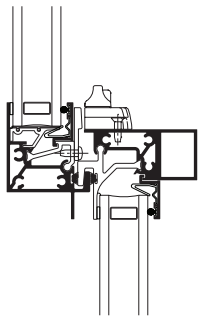


SINGLE HUNG INTERMEDIATE CW-RATED





SINGLE HUNG INTERMEDIATE AW-RATED



WIND LOAD CHARTS:

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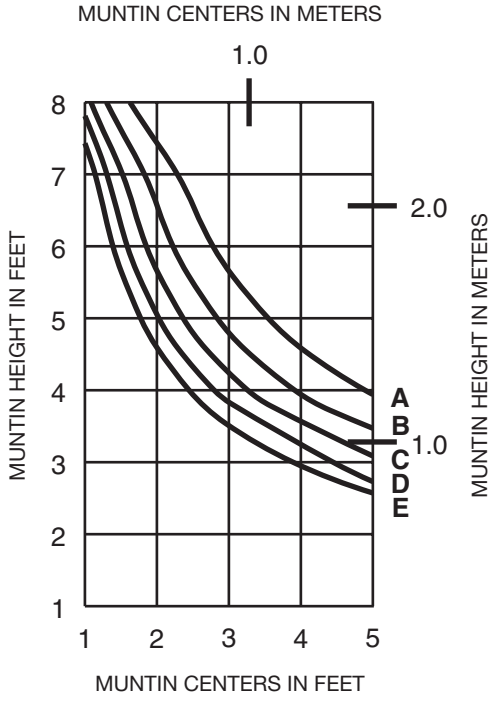
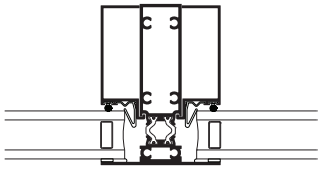
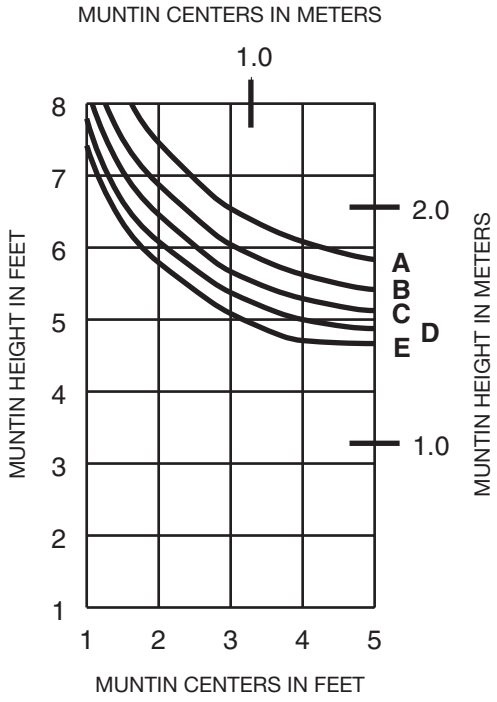
A = 40 PSF (1915)
B = 50 PSF (2394)
C = 60 PSF (2873)
D = 70 PSF (3352)
E = 80 PSF (3830)



WITH HORIZONTALS

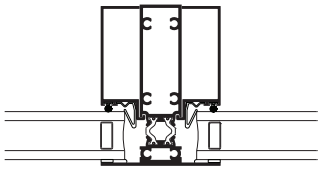
TRUE MUNTIN FOR FIXED WINDOW





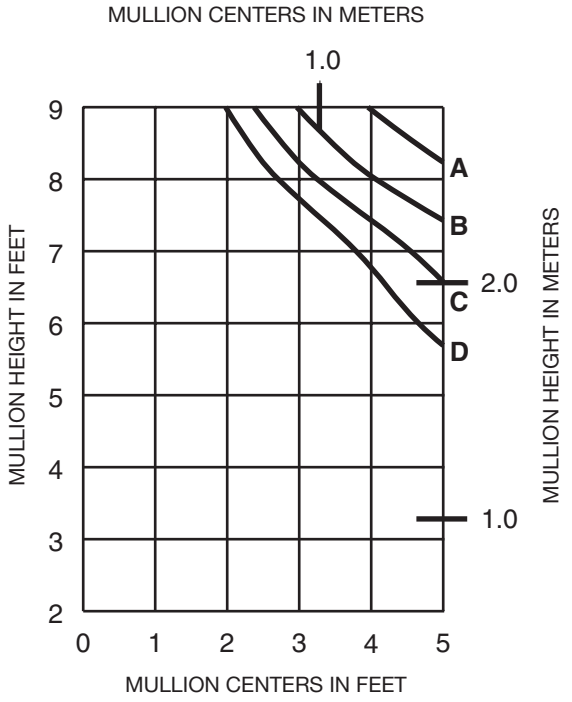
WITHOUT HORIZONTALS

TRUE MUNTIN FOR FIXED WINDOW

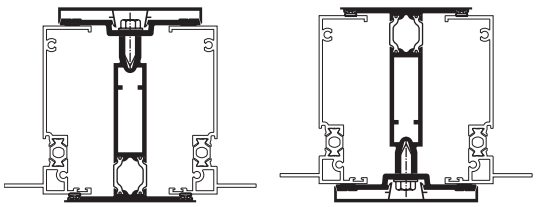


WIND LOAD CHARTS:

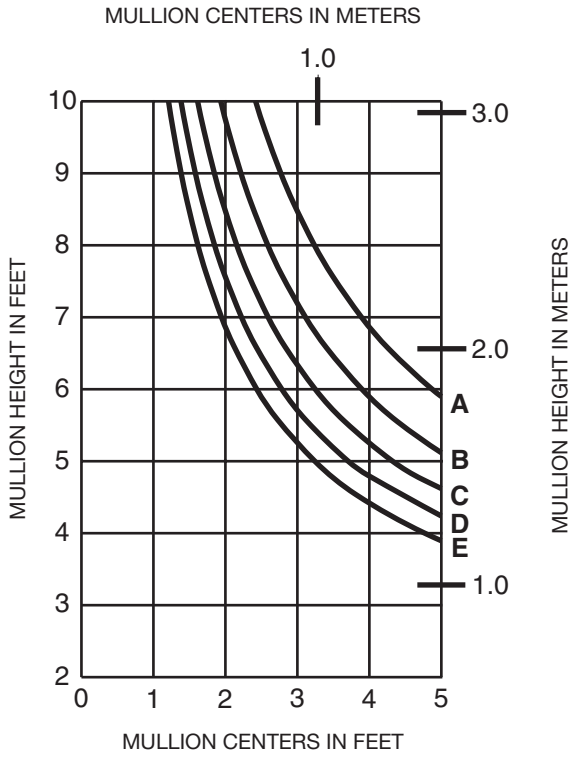
THESE CHARTS ARE BASED ON A MAXIMUM DEFLECTION OF L\175 AND\OR A MAXIMUM STRESS OF 15,152 psi (104 MPa). If the design wind load is determined through the analytical procedures of ASCE/SEI 7-10 or earlier editions, the load shall be based on the nominal loads used in allowable stress design. A 4/3 increase in allowable stress has not been used to develop these curves.



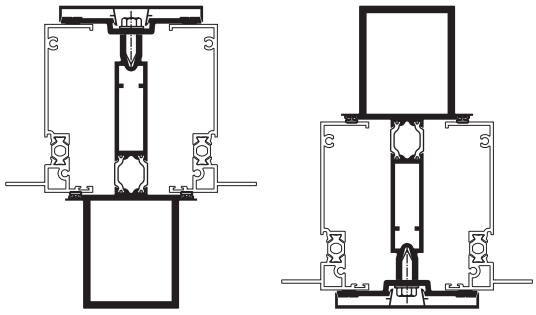
SHALLOW THREE PIECE MULLION



A = 30 PSF (1436)
B = 40 PSF (1915)
C = 50 PSF (2394)
D = 60 PSF (2873)



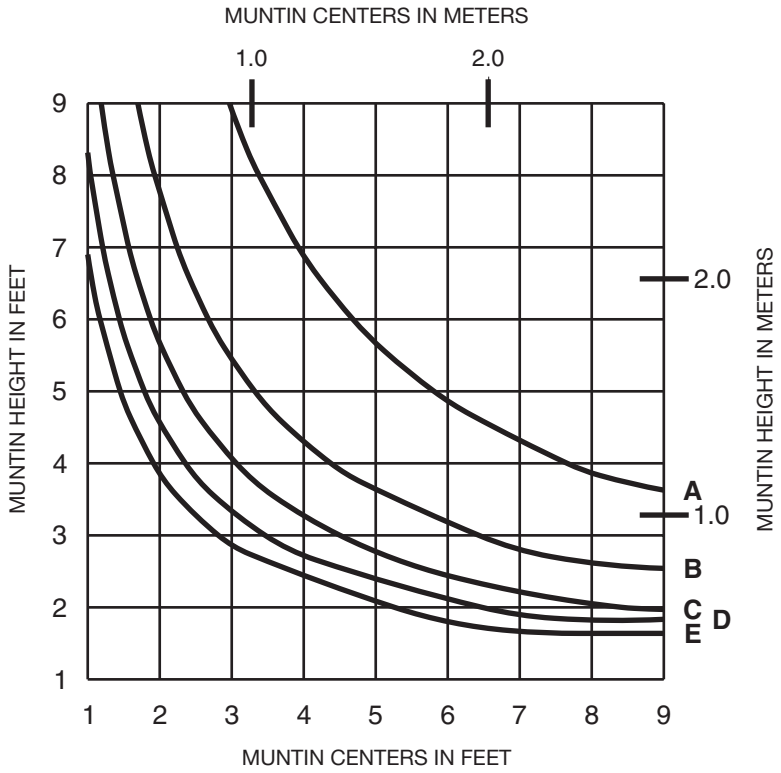
DEEP THREE PIECE MULLION



A = 40 PSF (1915)
B = 50 PSF (2394)
C = 60 PSF (2873)
D = 70 PSF (3352)
E = 80 PSF (3830)

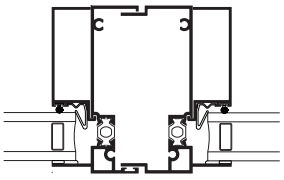
WIND LOAD CHARTS:

THESE CHARTS ARE BASED ON A MAXIMUM DEFLECTION OF L\175 AND\OR A MAXIMUM STRESS OF 15,152 psi (104 MPa). If the design wind load is determined through the analytical procedures of ASCE/SEI 7-10 or earlier editions, the load shall be based on the nominal loads used in allowable stress design. A 4/3 increase in allowable stress has not been used to develop these curves.



WITH HORIZONTALS

VERTICAL STACK JAMBS
FIXED / FIXED



A = 20 PSF (958)
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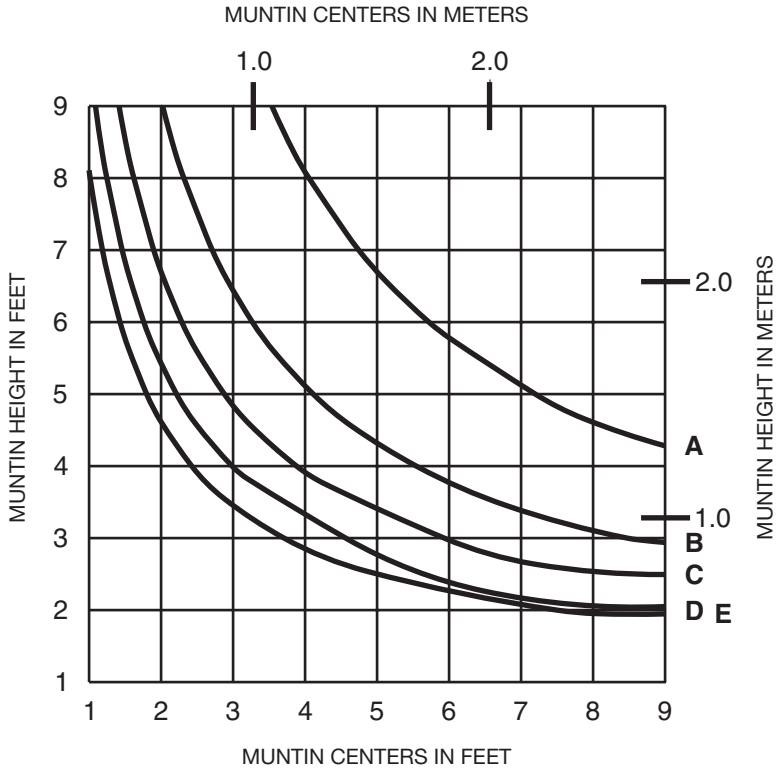
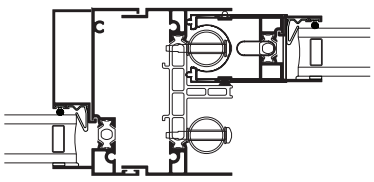
E = 80 PSF (3830)



WITH HORIZONTALS

VERTICAL STACK JAMBS
FIXED / DOUBLE HUNG



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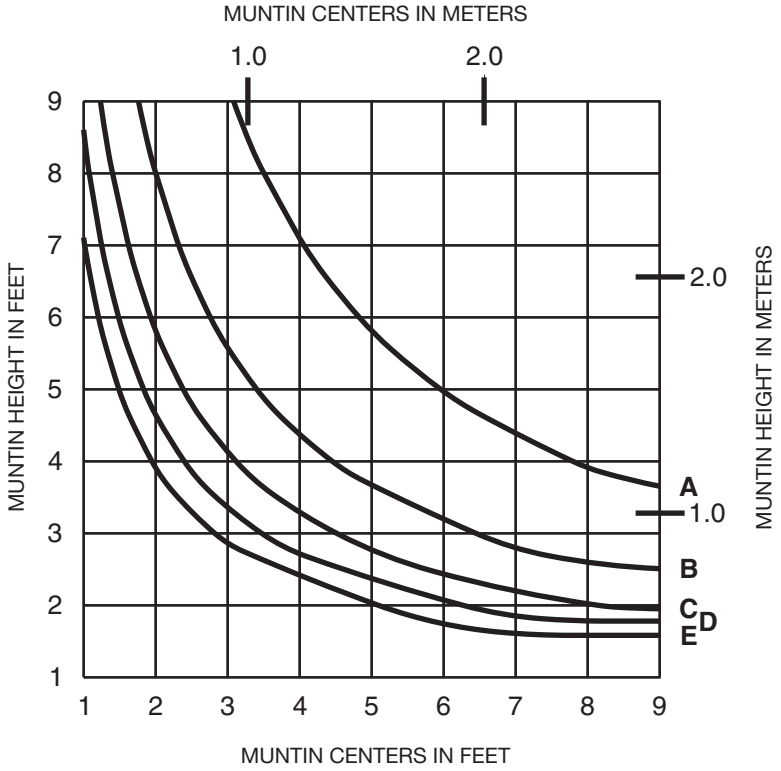
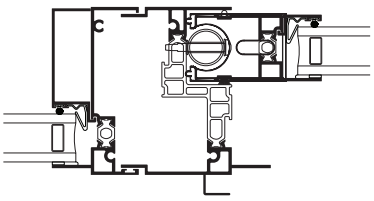


WITH HORIZONTALS

VERTICAL STACK JAMBS
FIXED / SINGLE HUNG



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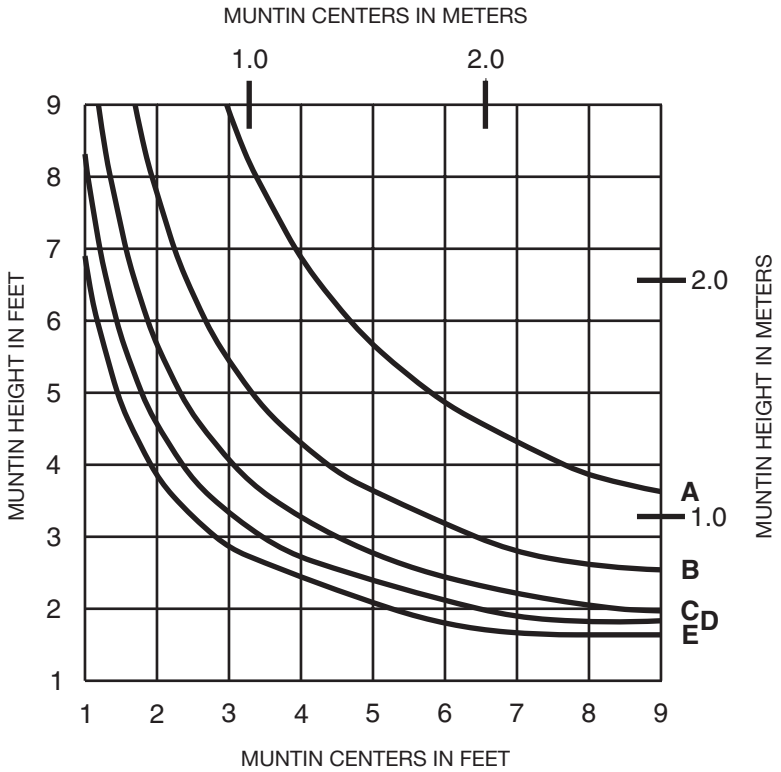
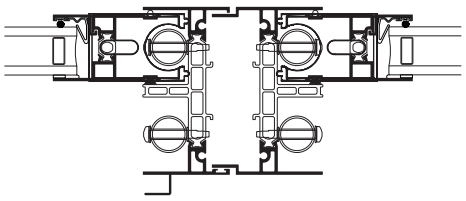


WITH HORIZONTALS

VERTICAL STACK JAMBS
DOUBLE HUNG / DOUBLE HUNG



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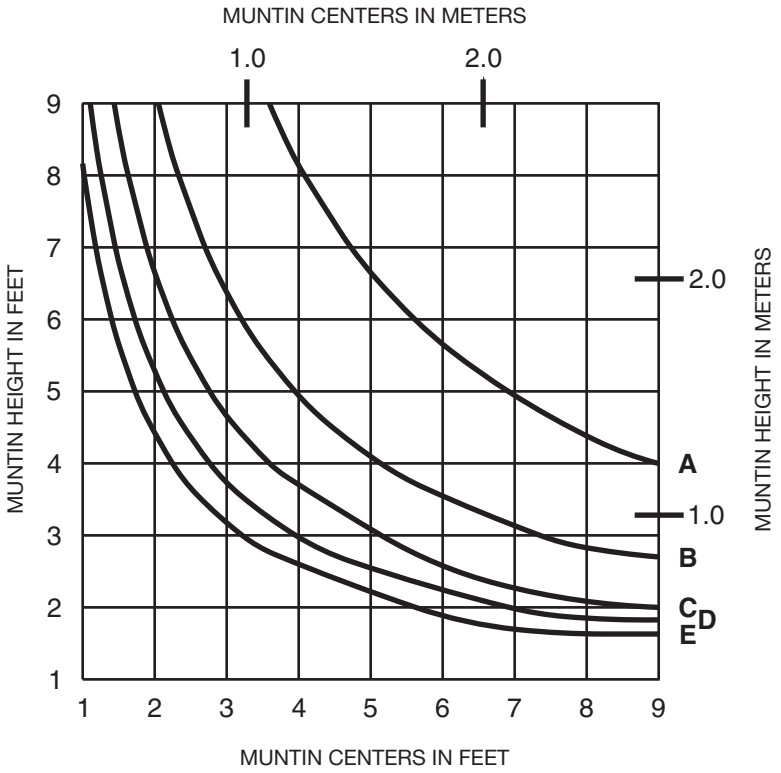
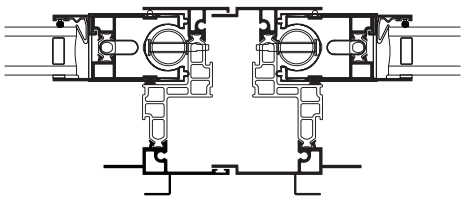


WITH HORIZONTALS

VERTICAL STACK JAMBS
SINGLE HUNG / SINGLE HUNG



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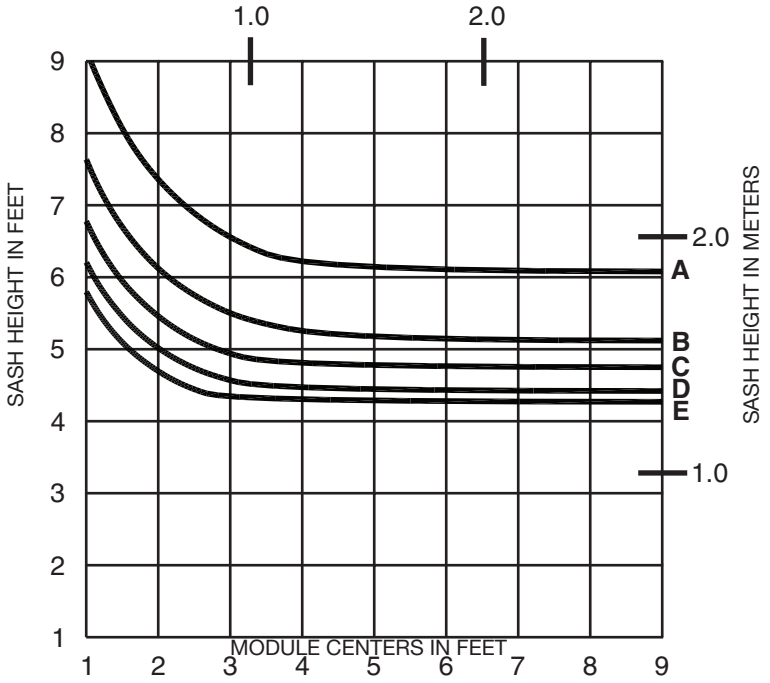
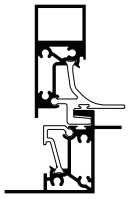
MODULE CENTERS IN METERS



WITHOUT HORIZONTALS

LOCK STILE
HORIZONTAL SLIDER



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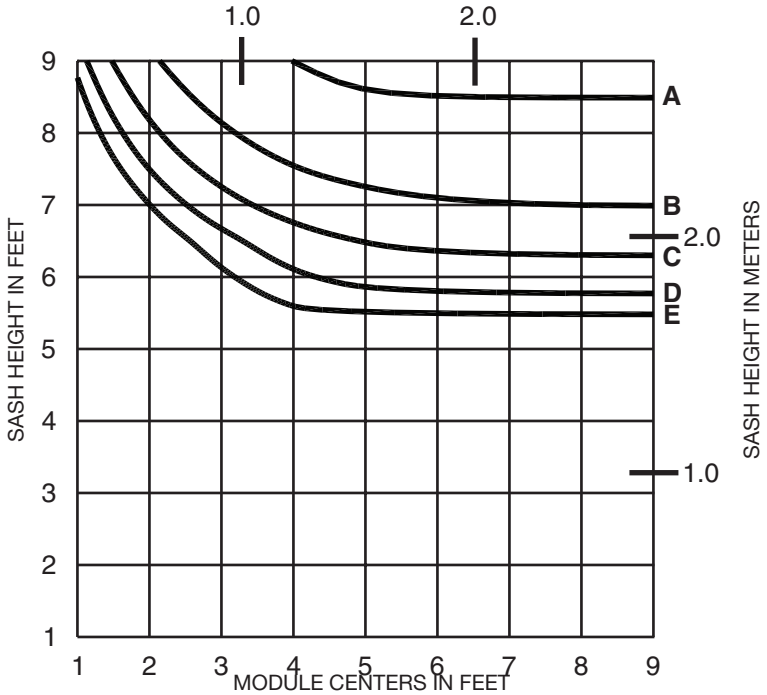
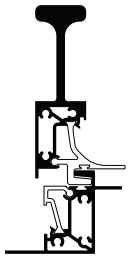
MODULE CENTERS IN METERS



WITHOUT HORIZONTALS

LOCK STILE
HORIZONTAL SLIDER



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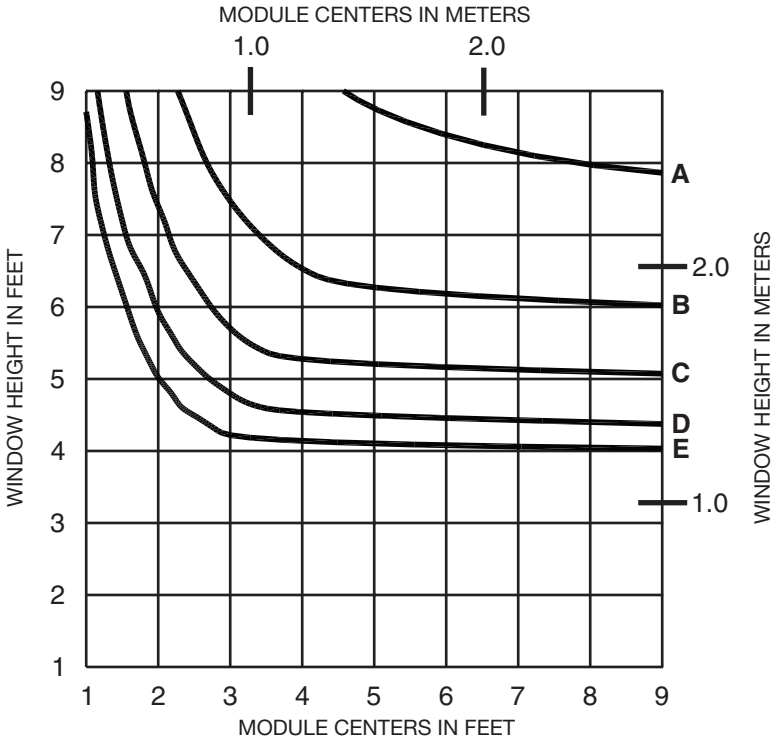
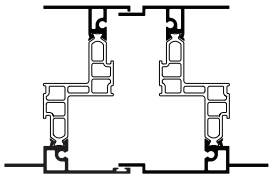


WITHOUT HORIZONTALS

VERTICAL STACK JAMBS
HORIZONTAL SLIDER



A = 20 PSF (958)
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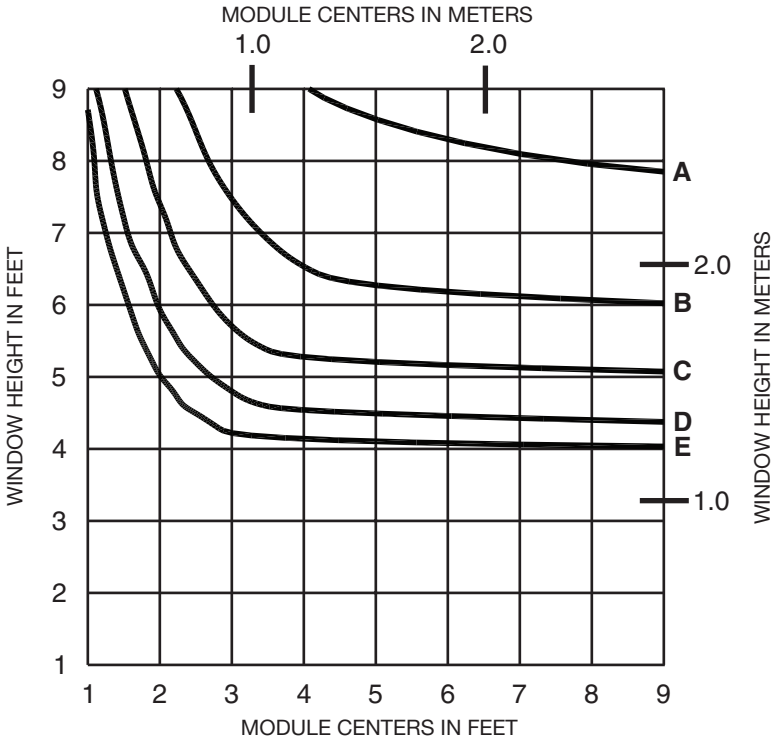
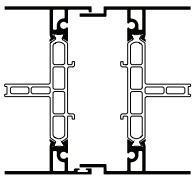


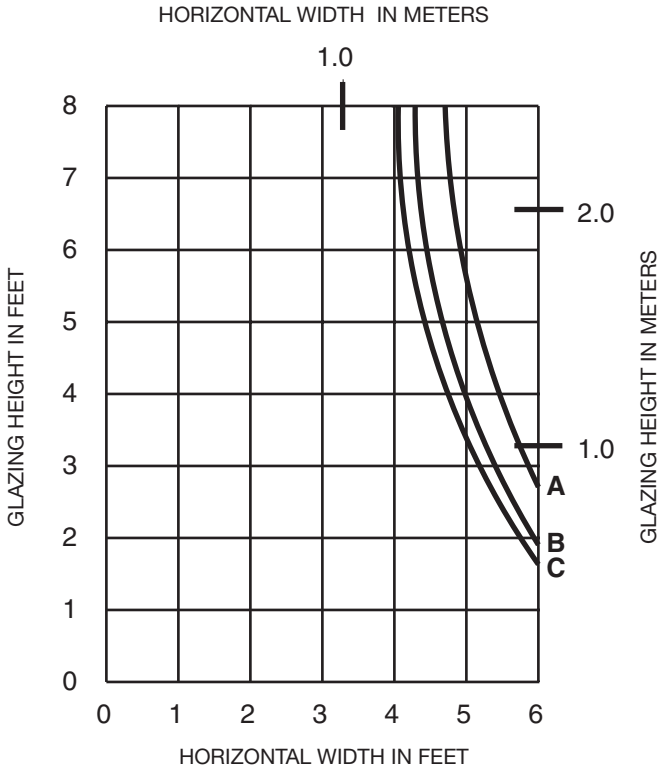
WITHOUT HORIZONTALS

"XX" VERTICAL STACK JAMBS
HORIZONTAL SLIDER

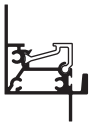


DEADLOAD CHARTS:

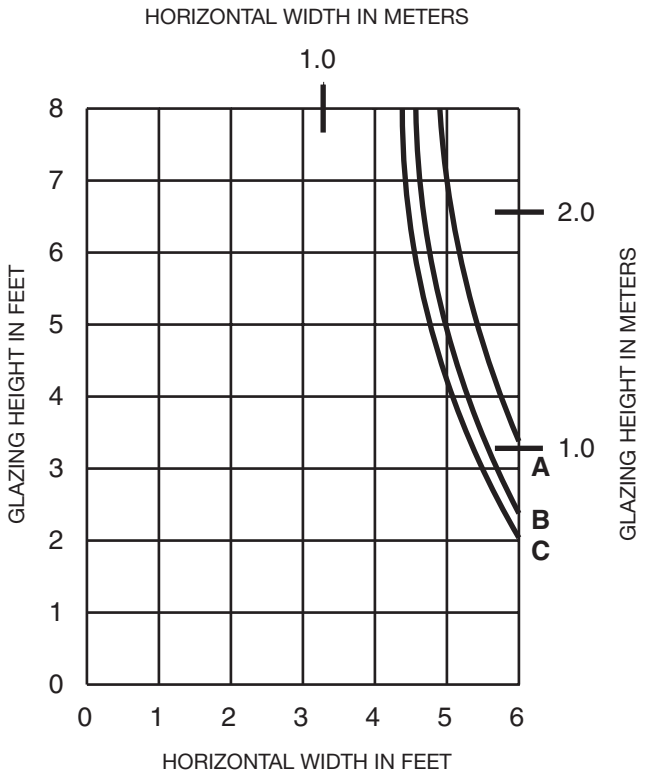
HORIZONTAL DEADLOAD LIMITATIONS ARE BASED UPON 1/8" (3.2) MAXIMUM ALLOWABLE DEFLECTION AT THE CENTER OF AN INTERMEDIATE HORIZONTAL MEMBER. THE ACCOMPANYING CHARTS ARE CALCULATED FOR THE GLASS TYPES INDICATED SUPPORTED ON TWO SETTING BLOCKS AT EIGHT POINT LOADING BUT NO MORE THAN 6" FROM THE EDGE OF GLASS.



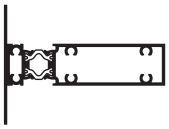
SINGLE HUNG OR DOUBLE HUNG HORIZONTAL



GLASS TYPE:
A = 1/8" - 3/4" A.S. - 1/8"
B = 3/16" - 5/8" A.S. - 3/16"
C = 1/4" - 1/2" A.S. - 1/4"



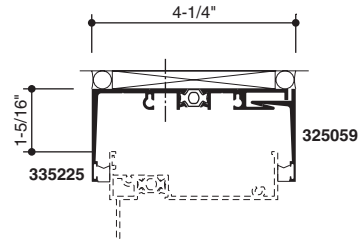
TRUE HORIZONTAL MUNTIN FOR FIXED WINDOW



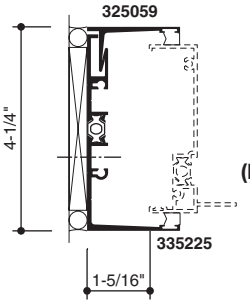
GLASS TYPE:
A = 1/8" - 3/4" A.S. - 1/8"
B = 3/16" - 5/8" A.S. - 3/16"
C = 1/4" - 1/2" A.S. - 1/4"

SCALE : 3" = 1'-0"

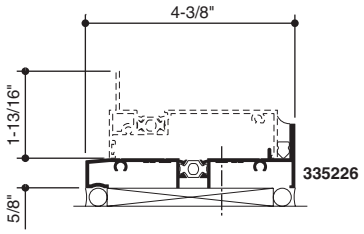
TYPICAL RECEPTOR SYSTEM



HEAD RECEPTOR (Interior Installation)

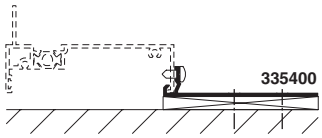


JAMB RECEPTOR (Interior Installation)

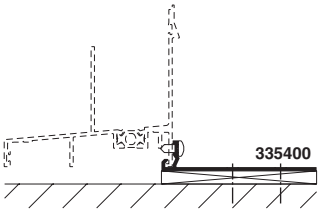


FULL DEPTH SILL

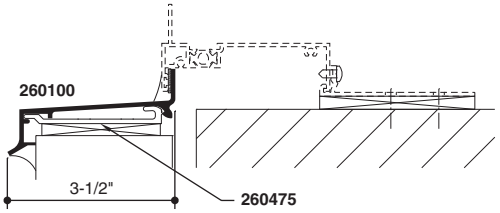
ANCHORING



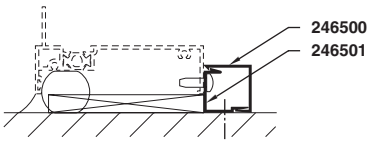
STRAP ANCHOR WITH FIXED WINDOW



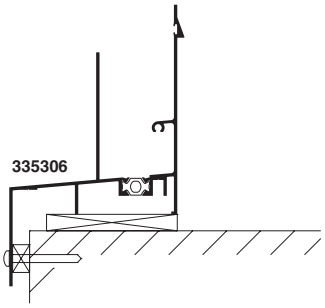
STRAP ANCHOR WITH HUNG WINDOW



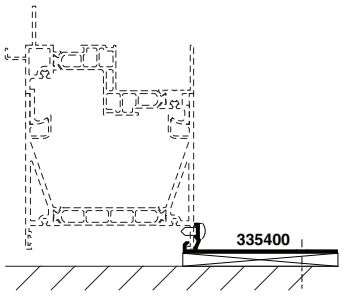
UNEQUAL LEG SILL



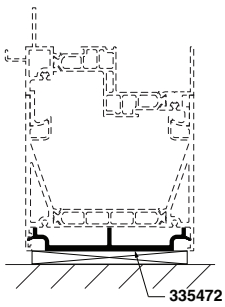
INTERIOR SNAP TRIM ANCHORING



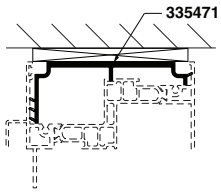
FLANGE / NAILING FIN



STRAP ANCHOR WITH HORIZONTAL SLIDER

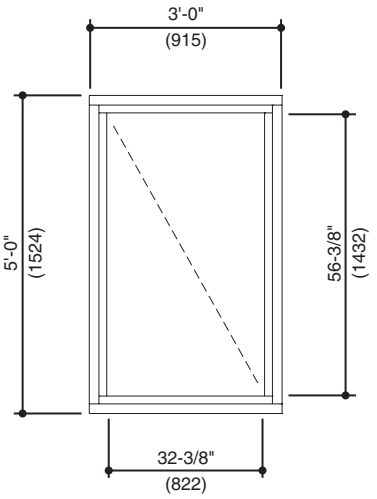


PVC PERIMETER (Head and Jamb of XX Slider and Female Stack Jambs of Double Hung similar)



PVC PERIMETER (Typical at Head and Jamb of XO/OX/XOX/OXO Slider and Female Stack Jambs of Single Hung similar)

Project Specific U-Factor Example Calculation



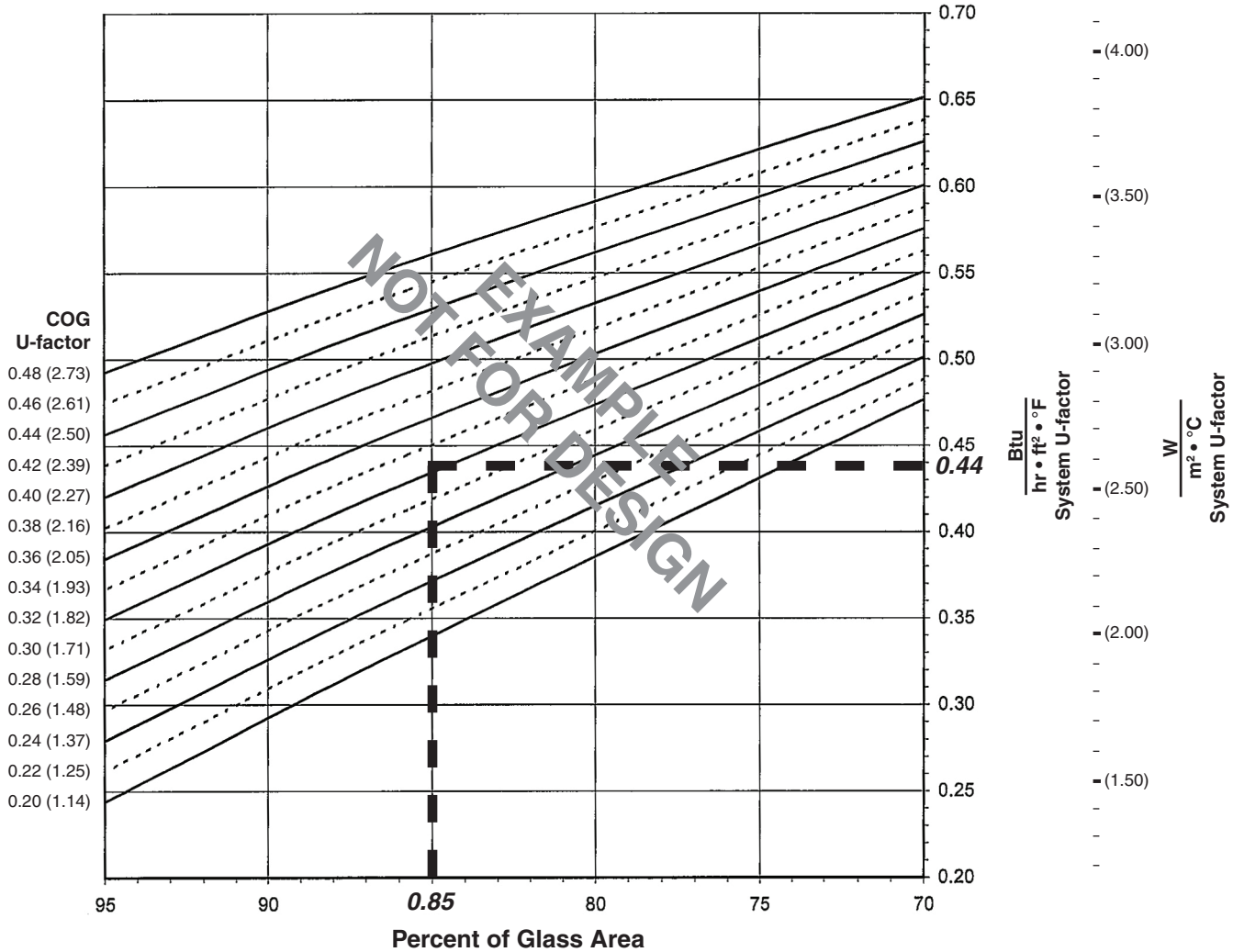
Example Glass U-Factor = 0.42 Btu/hr • ft² • °F

Total Daylight Opening = 32-3/8" • 56-3/8" = 12.67ft²

Total Projected Area = 3'-0" • 5'-0" = 15 ft²

Percent of Glass = (Total Daylight Opening ÷ Total Projected Area)100
= (12.67 ÷ 15)100 = 85%

System U-factor vs Percent of Glass Area

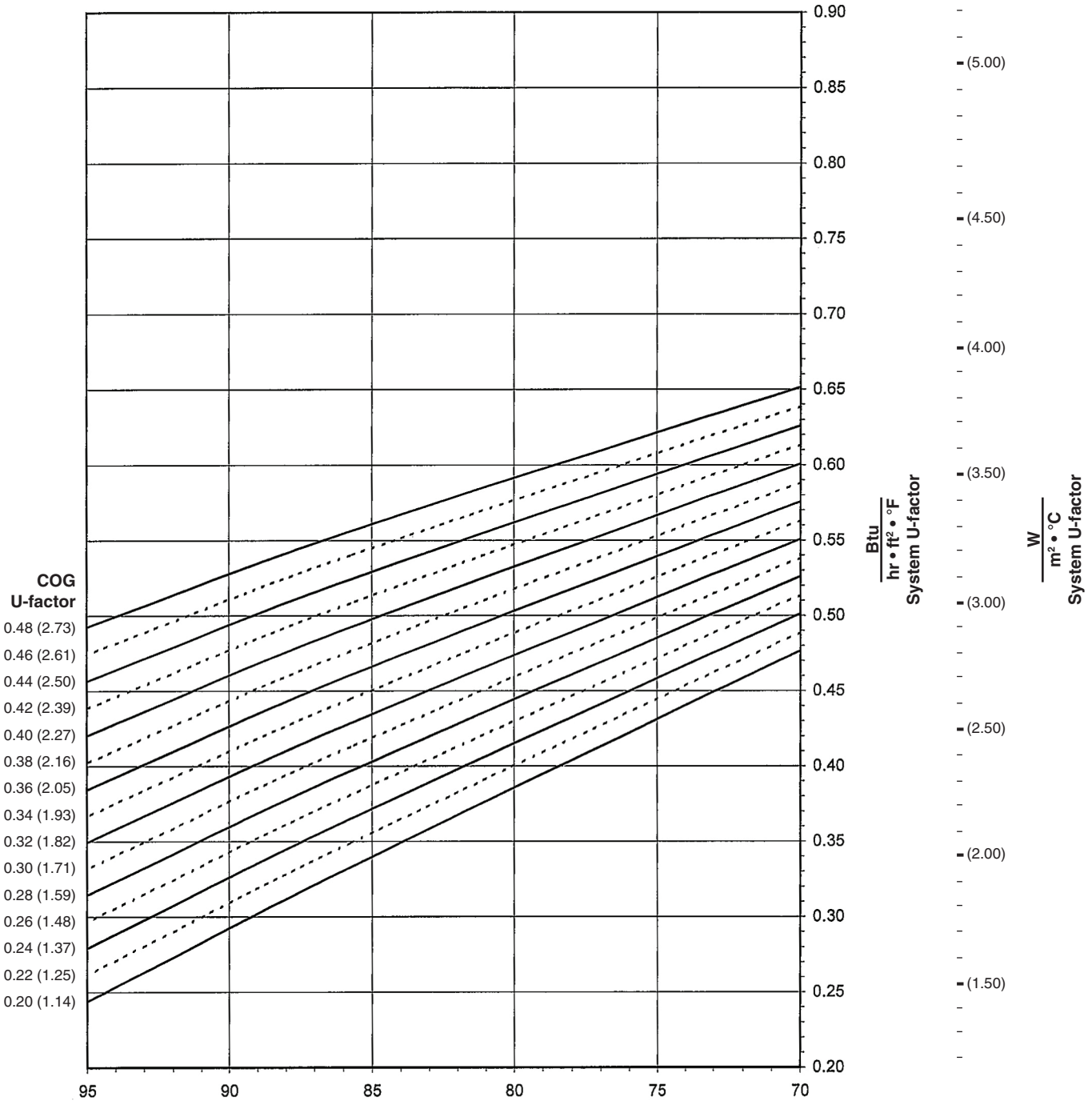


Based on 85% glass and center of glass (COG) U-factor of 0.42
System U-factor is equal to 0.44 Btu/hr • ft² • °F

AA™3350 IsoPort™ FIXED WINDOW

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

System U-factor vs Percent of Glass Area

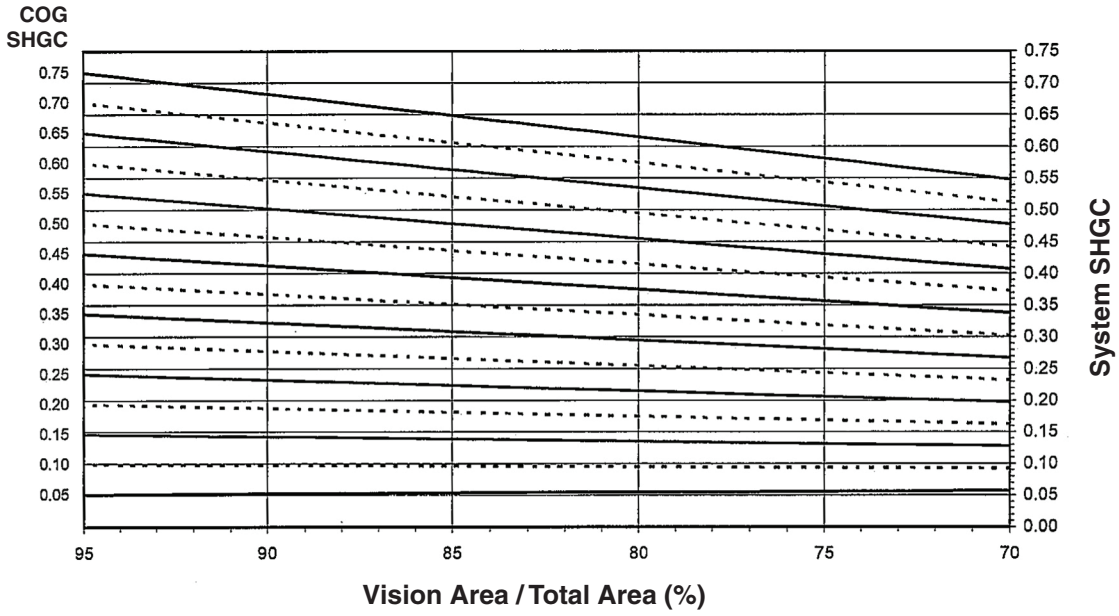


Percent of Glass Area = Vision Area/Total Area
Daylight Opening / Projected Area

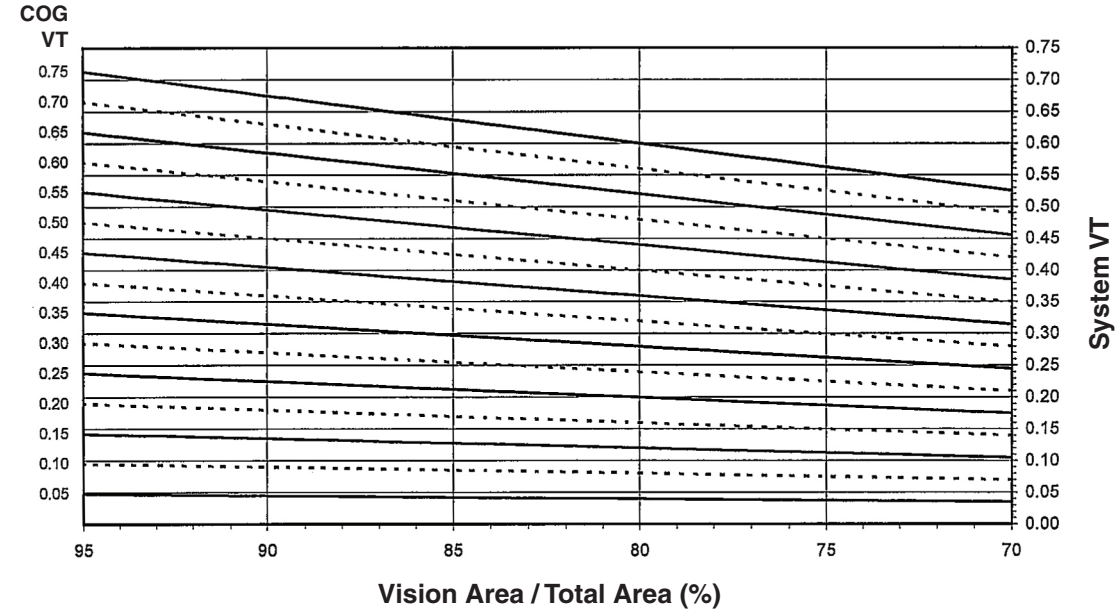
Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

AA™3350 IsoPort™ FIXED WINDOW

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



AA™3350 IsoPort™ FIXED WINDOW

Thermal Transmittance[1] (BTU/hr • ft [2] • °F)

Glass U-Factor [3]	Overall U-Factor [4]
0.48	0.56
0.46	0.54
0.44	0.52
0.42	0.51
0.40	0.49
0.38	0.48
0.36	0.46
0.34	0.44
0.32	0.43
0.30	0.41
0.28	0.40
0.26	0.38
0.24	0.36
0.22	0.35
0.20	0.33

SHGC Matrix [2]

Glass SHGC [3]	Overall Glass U-Factor [4]
0.75	0.65
0.70	0.61
0.65	0.57
0.60	0.53
0.55	0.48
0.50	0.44
0.45	0.40
0.40	0.35
0.35	0.31
0.30	0.27
0.25	0.23
0.20	0.18
0.15	0.14
0.10	0.10
0.05	0.05

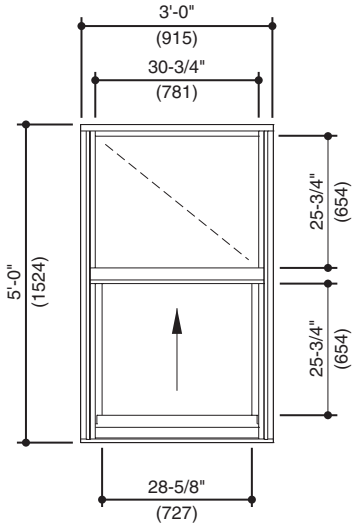
Visible Transmittance [2]

Glass VT [3]	Overall VT [4]
0.75	0.64
0.70	0.60
0.65	0.56
0.60	0.51
0.55	0.47
0.50	0.43
0.45	0.39
0.40	0.34
0.35	0.30
0.30	0.26
0.25	0.21
0.20	0.17
0.15	0.13
0.10	0.09
0.05	0.04

NOTE: For glass values that are not listed, linear interpolation is permitted.

1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 1200mm wide by 1500mm high (47-1/4" by 59-1/16").

Generic Project Specific U-factor Example Calculation
(Percent of Glass will vary on specific products depending on sitelines)



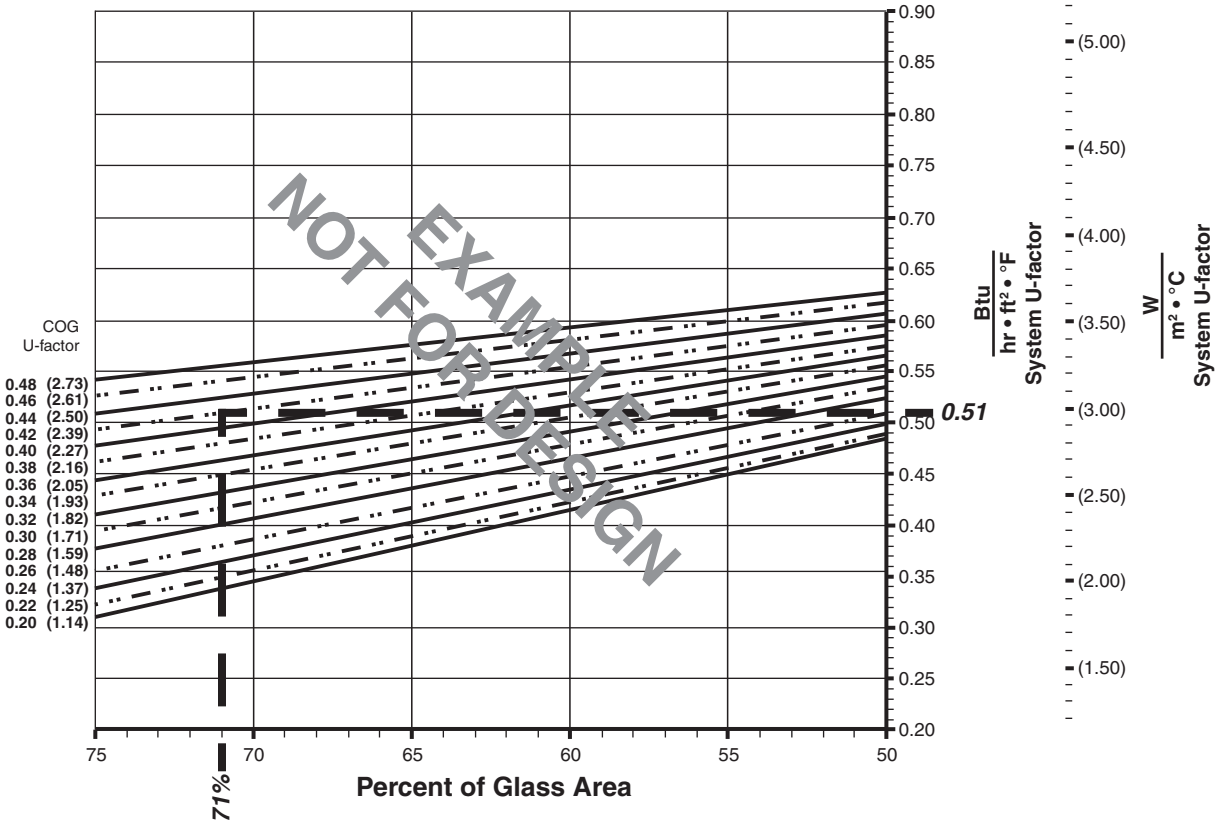
Example Glass U-Factor = 0.42 Btu/hr • ft² • °F

Total Daylight Opening = (30-3/4" • 25-3/4") + (28-5/8" • 25-3/4") = 10.62 ft²

Total Projected Area = 3'-0" • 5'-0" = 15 ft²

Percent of Glass = (Total Daylight Opening ÷ Total Projected Area)100
= (10.62 ÷ 15)100 = 71%

System U-factor vs Percent of Glass Area

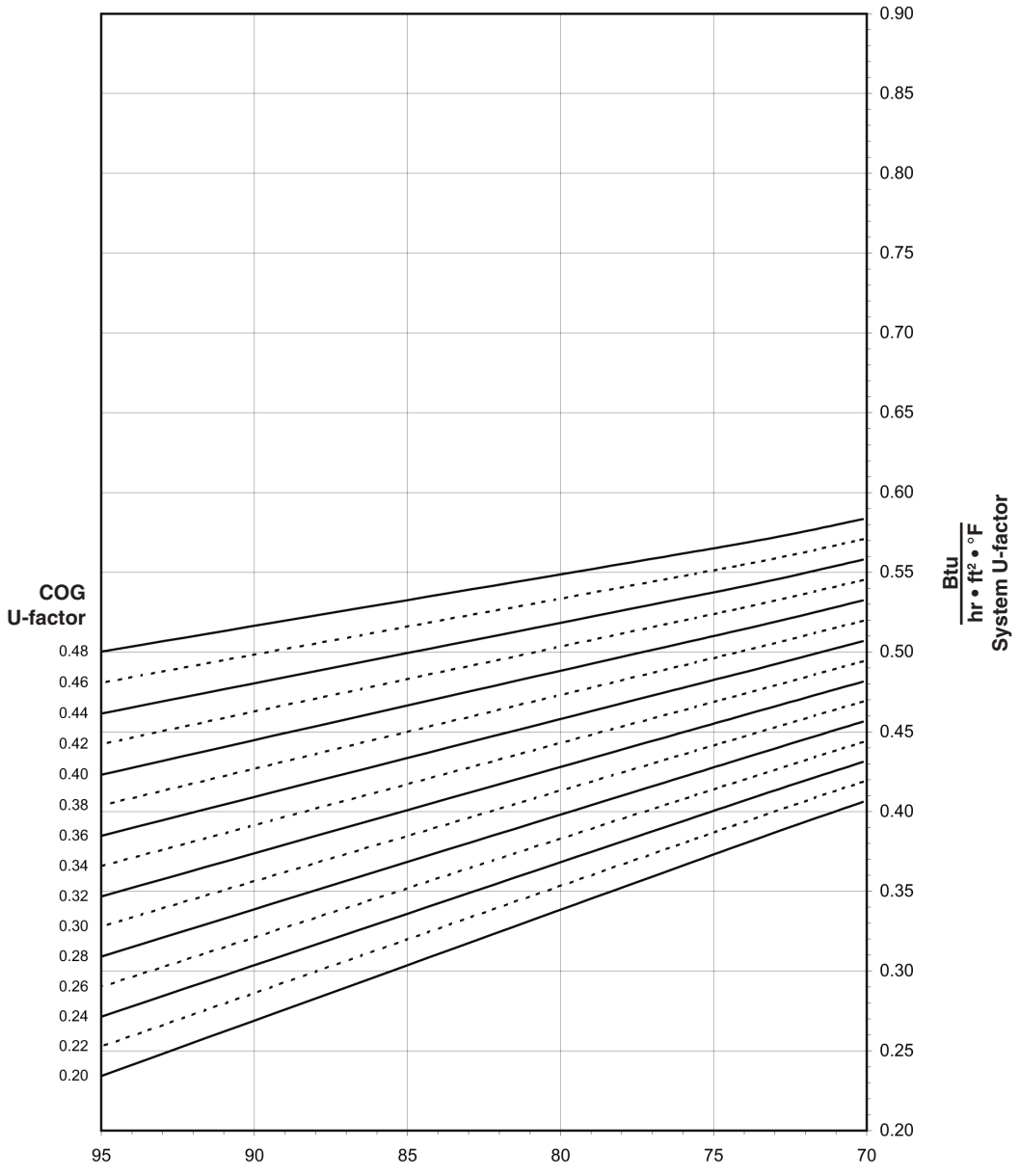


Based on 71% glass and center of glass (COG) U-factor of 0.42
System U-factor is equal to 0.51 Btu/hr • ft² • °F

AA™3350 IsoPort™ SINGLE HUNG WINDOW

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

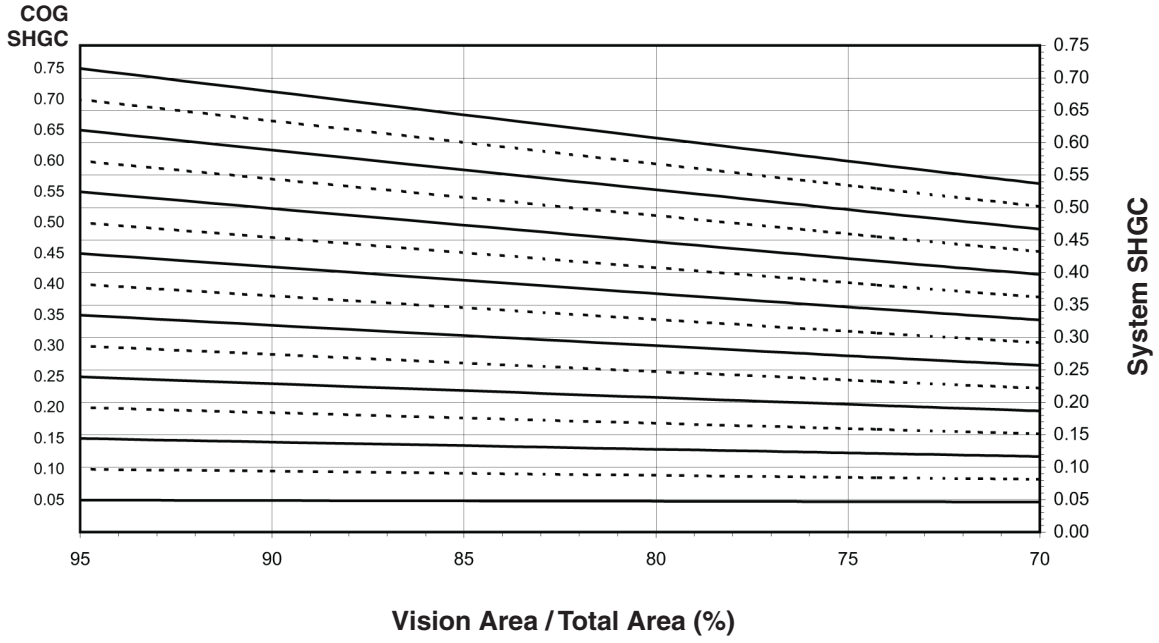
System U-factor vs Percent of Glass Area



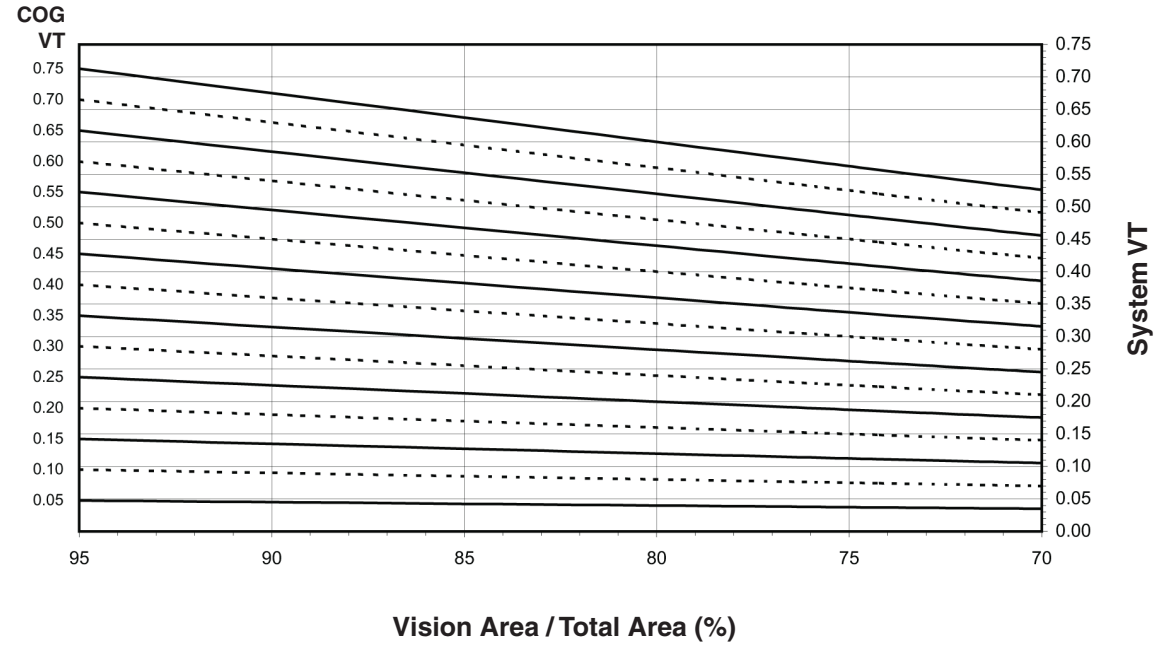
Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

AA™3350 IsoPort™ SINGLE HUNG WINDOW

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



AA™3350 IsoPort™ SINGLE HUNG WINDOW

Thermal Transmittance[1] (BTU/hr • ft [2] • °F)

	Glass U-Factor [3]	Overall U-Factor [4]
With Aluminum Spacer	0.48	0.57
	0.46	0.55
	0.44	0.54
	0.42	0.53
	0.40	0.51
	0.38	0.50
	0.36	0.49
	0.34	0.47
	0.32	0.46
	0.30	0.45
	0.28	0.43
	0.26	0.42
	0.24	0.40
	0.22	0.39
	0.20	0.38
With Warm Edge Spacer	0.38	0.47
	0.36	0.45
	0.34	0.44
	0.32	0.42
	0.30	0.41
	0.28	0.40
	0.26	0.39
	0.24	0.37
	0.22	0.35
	0.20	0.34

AA™3350 IsoPort™ SINGLE HUNG WINDOW

SHGC Matrix [2]

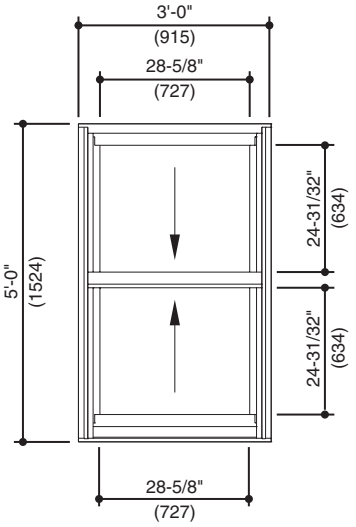
Glass SHGC [3]	Overall Glass U-Factor [4]
0.75	0.57
0.70	0.53
0.65	0.49
0.60	0.46
0.55	0.42
0.50	0.38
0.45	0.34
0.40	0.31
0.35	0.27
0.30	0.23
0.25	0.20
0.20	0.16
0.15	0.12
0.10	0.08
0.05	0.05

Visible Transmittance [2]

Glass VT [3]	Overall VT [4]
0.75	0.56
0.70	0.52
0.65	0.48
0.60	0.45
0.55	0.41
0.50	0.37
0.45	0.33
0.40	0.30
0.35	0.26
0.30	0.22
0.25	0.19
0.20	0.15
0.15	0.11
0.10	0.07
0.05	0.04

NOTE: For glass values that are not listed, linear interpolation is permitted.
1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 1200mm wide by 1500mm high (47-1/4" by 59-1/16").

Generic Project Specific U-factor Example Calculation
(Percent of Glass will vary on specific products depending on sitelines)



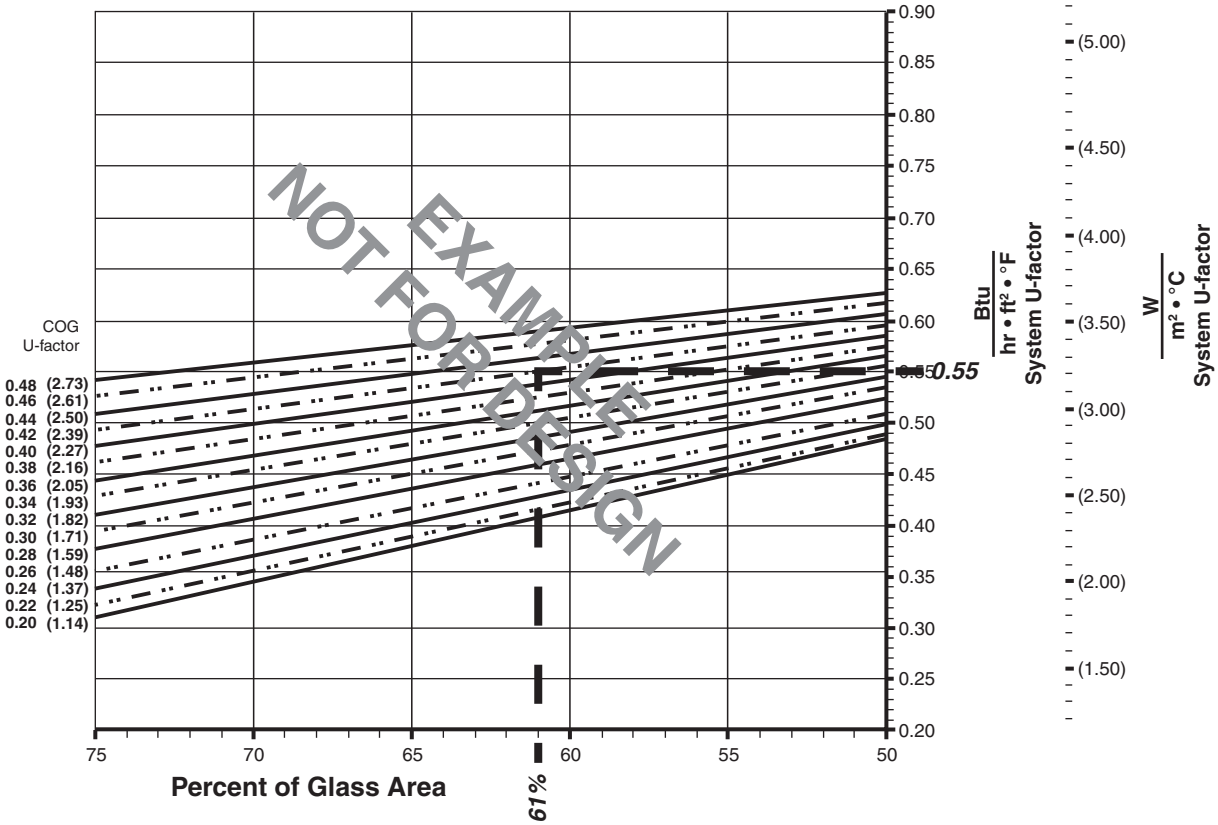
Example Glass U-Factor = 0.42 Btu/hr • ft² • °F

Total Daylight Opening = (28-5/8" • 24-31/32") + (28-5/8" • 24-31/32") = 9.21 ft²

Total Projected Area = 3'-0" • 5'-0" = 15 ft²

Percent of Glass = (Total Daylight Opening ÷ Total Projected Area)100
= (9.21 ÷ 15)100 = 61%

System U-factor vs Percent of Glass Area

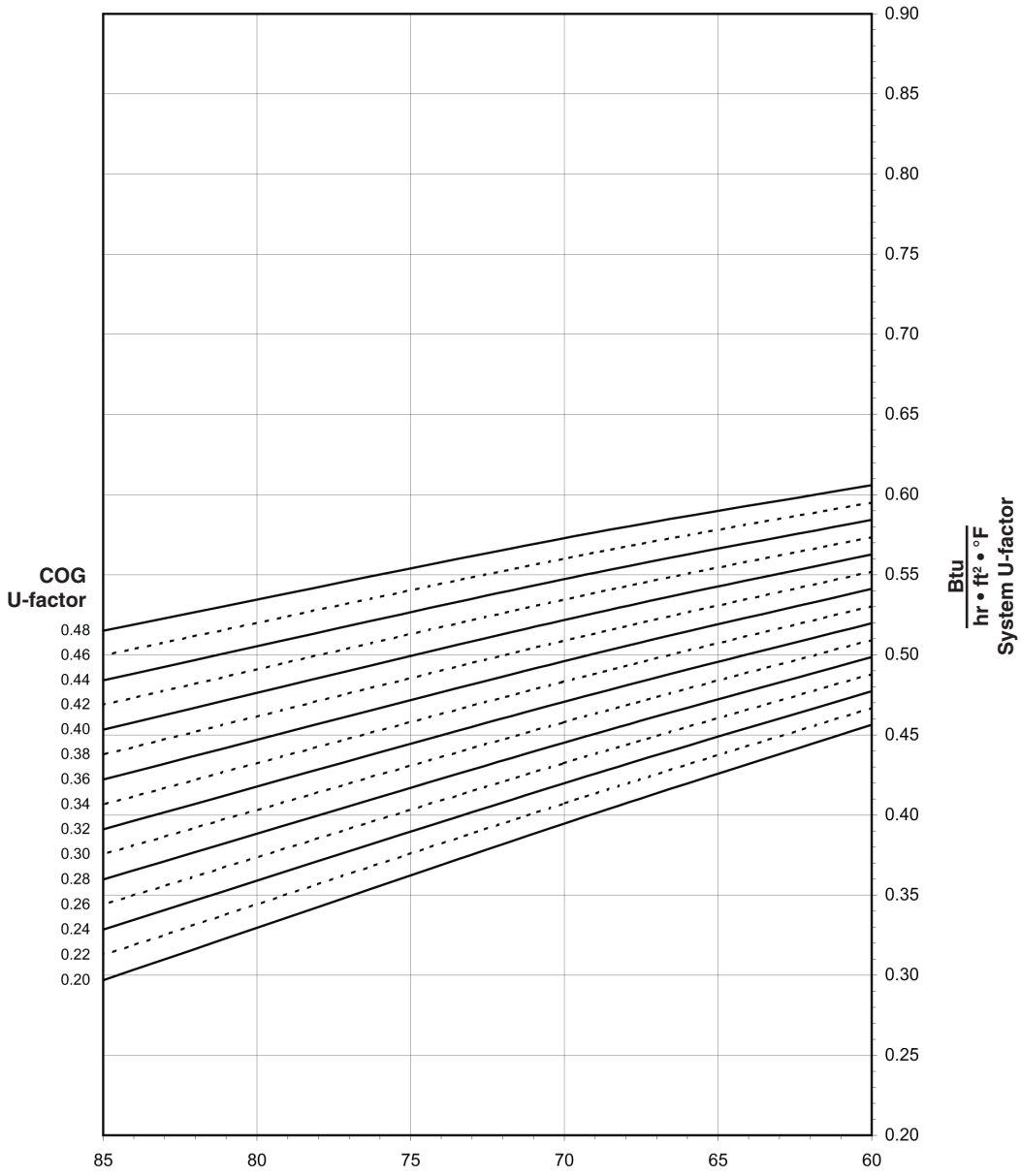


Based on 61% glass and center of glass (COG) U-factor of 0.42
System U-factor is equal to 0.55 Btu/hr • ft² • °F

AA™3350 IsoPort™ DOUBLE HUNG WINDOW

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

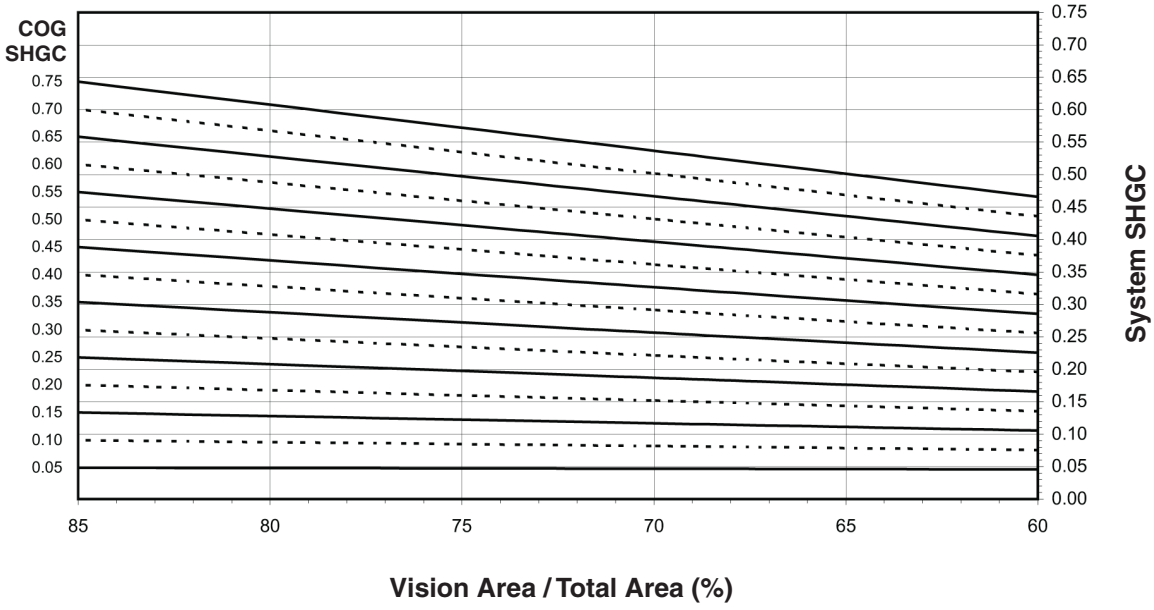
System U-factor vs Percent of Glass Area



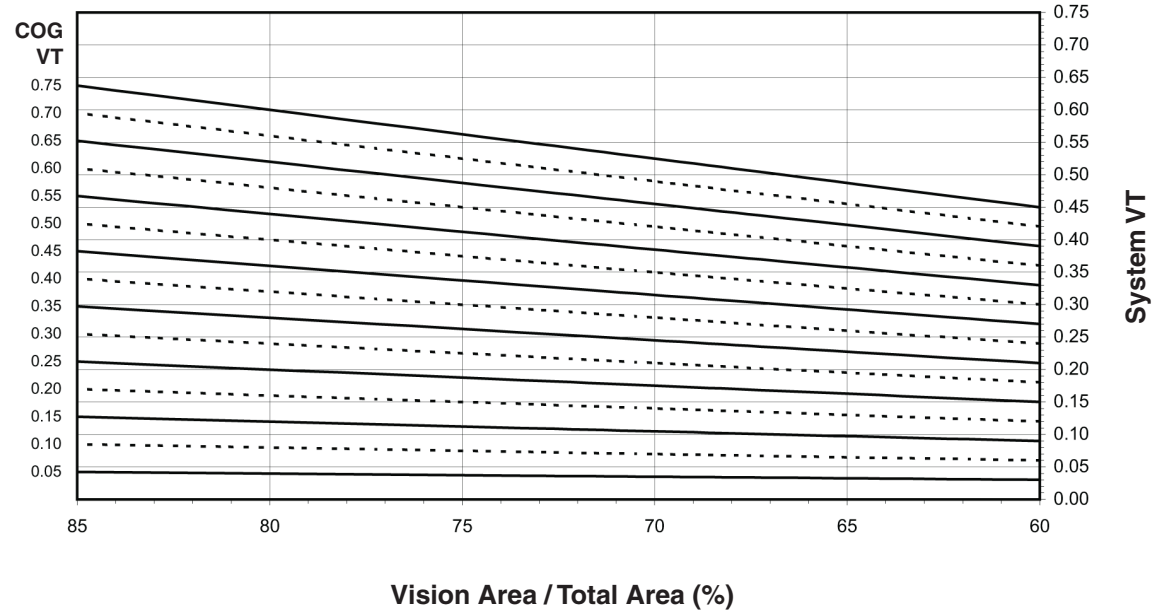
Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

AA™3350 IsoPort™ DOUBLE HUNG WINDOW

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



AA™3350 IsoPort™ DOUBLE HUNG WINDOW

Thermal Transmittance[1] (BTU/hr • ft [2] • °F)

	Glass U-Factor [3]	Overall U-Factor [4]
With Aluminum Spacer	0.48	0.57
	0.46	0.56
	0.44	0.55
	0.42	0.53
	0.40	0.52
	0.38	0.51
	0.36	0.50
	0.34	0.48
	0.32	0.47
	0.30	0.46
	0.28	0.44
	0.26	0.43
	0.24	0.42
	0.22	0.41
	0.20	0.39
With Warm Edge Spacer	0.38	0.48
	0.36	0.46
	0.34	0.45
	0.32	0.44
	0.30	0.42
	0.28	0.41
	0.26	0.40
	0.24	0.38
	0.22	0.37
	0.20	0.36

AA™3350 IsoPort™ DOUBLE HUNG WINDOW

SHGC Matrix [2]

Glass SHGC [3]	Overall Glass U-Factor [4]
0.75	0.54
0.70	0.50
0.65	0.47
0.60	0.43
0.55	0.40
0.50	0.39
0.45	0.33
0.40	0.29
0.35	0.26
0.30	0.22
0.25	0.19
0.20	0.15
0.15	0.12
0.10	0.08
0.05	0.05

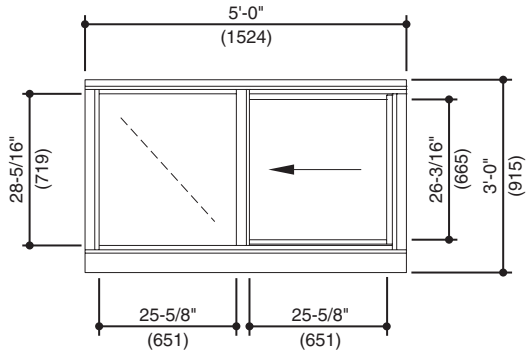
Visible Transmittance [2]

Glass VT [3]	Overall VT [4]
0.75	0.53
0.70	0.49
0.65	0.46
0.60	0.42
0.55	0.39
0.50	0.35
0.45	0.32
0.40	0.28
0.35	0.25
0.30	0.21
0.25	0.18
0.20	0.14
0.15	0.11
0.10	0.07
0.05	0.04

NOTE: For glass values that are not listed, linear interpolation is permitted.

1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 1200mm wide by 1500mm high (47-1/4" by 59-1/16").

Generic Project Specific U-factor Example Calculation
(Percent of Glass will vary on specific products depending on sitelines)



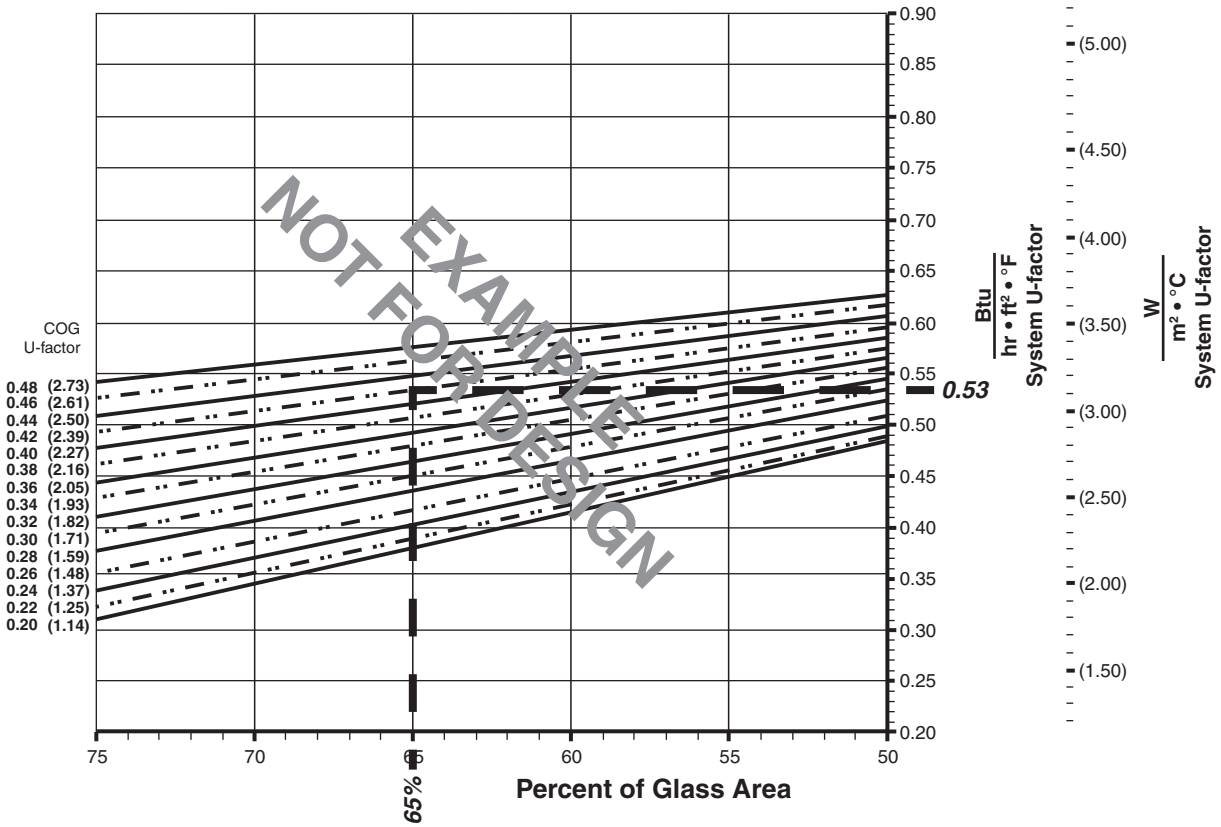
Example Glass U-Factor = 0.42 Btu/hr • ft² • °F

Total Daylight Opening = (25-5/8" • 28-5/16") + (25-5/8" • 26-3/16") = 9.70 ft²

Total Projected Area = 3'-0" • 5'-0" = 15 ft²

Percent of Glass = (Total Daylight Opening ÷ Total Projected Area)100
= (9.70 ÷ 15)100 = 65%

System U-factor vs Percent of Glass Area

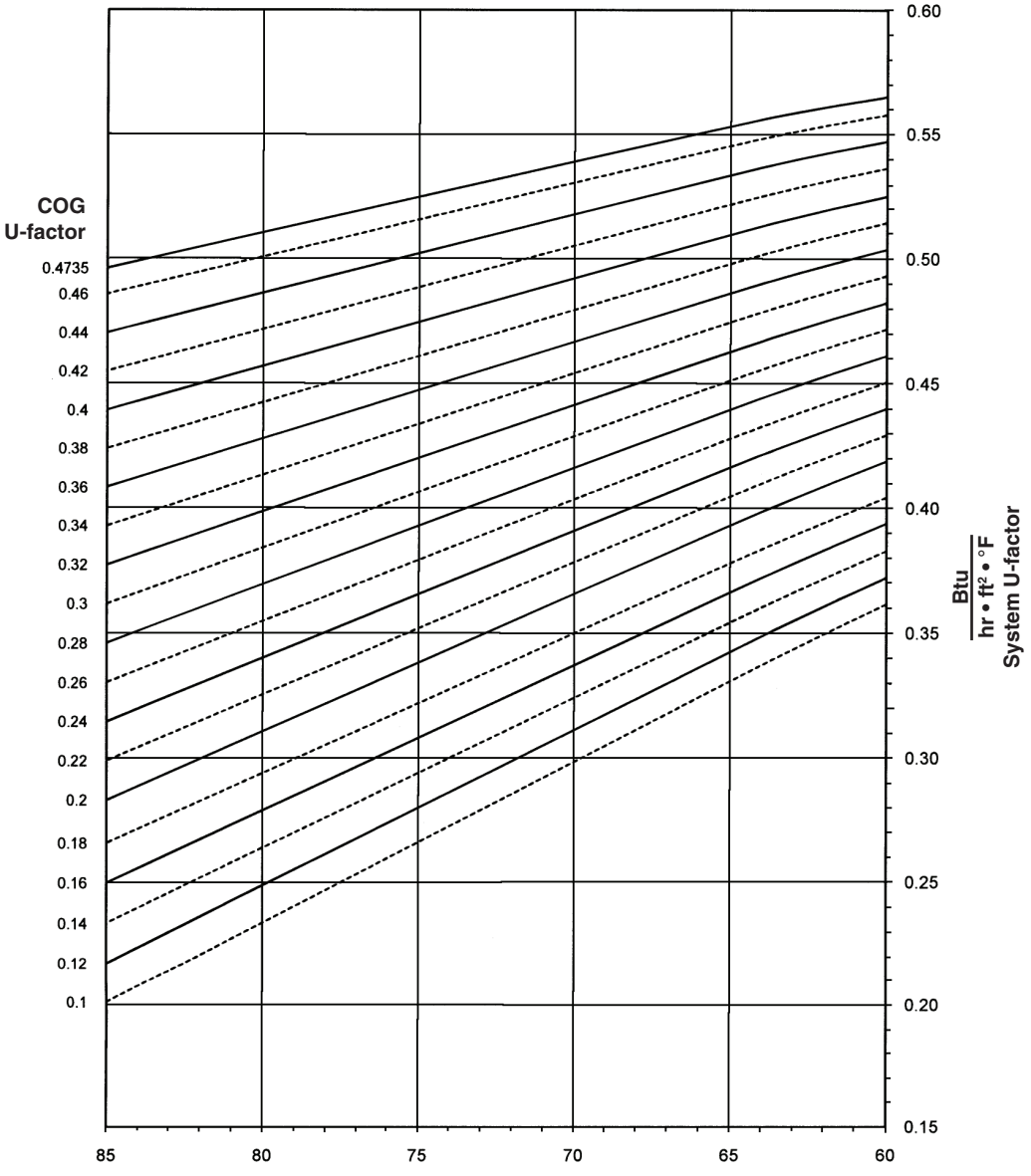


Based on 65% glass and center of glass (COG) U-factor of 0.42
System U-factor is equal to 0.53 Btu/hr • ft² • °F

AA™3350 IsoPort™ OX HORIZONTAL SLIDER WINDOW

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

System U-factor vs Percent of Glass Area

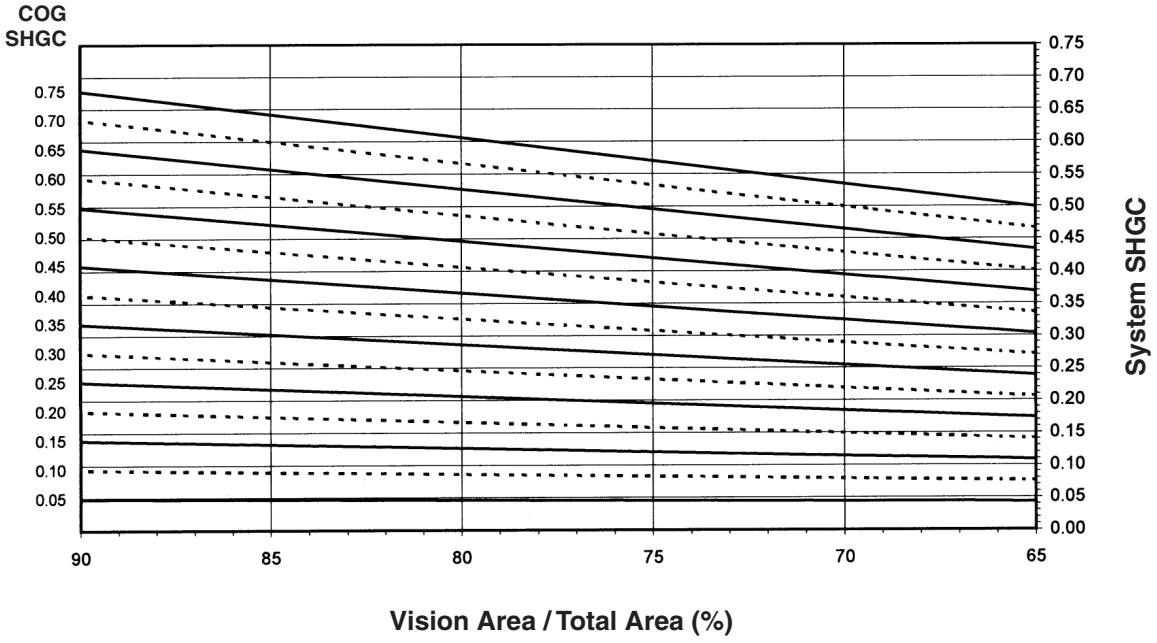


Percent of Glass Area = Vision Area/Total Area
Daylight Opening / Projected Area

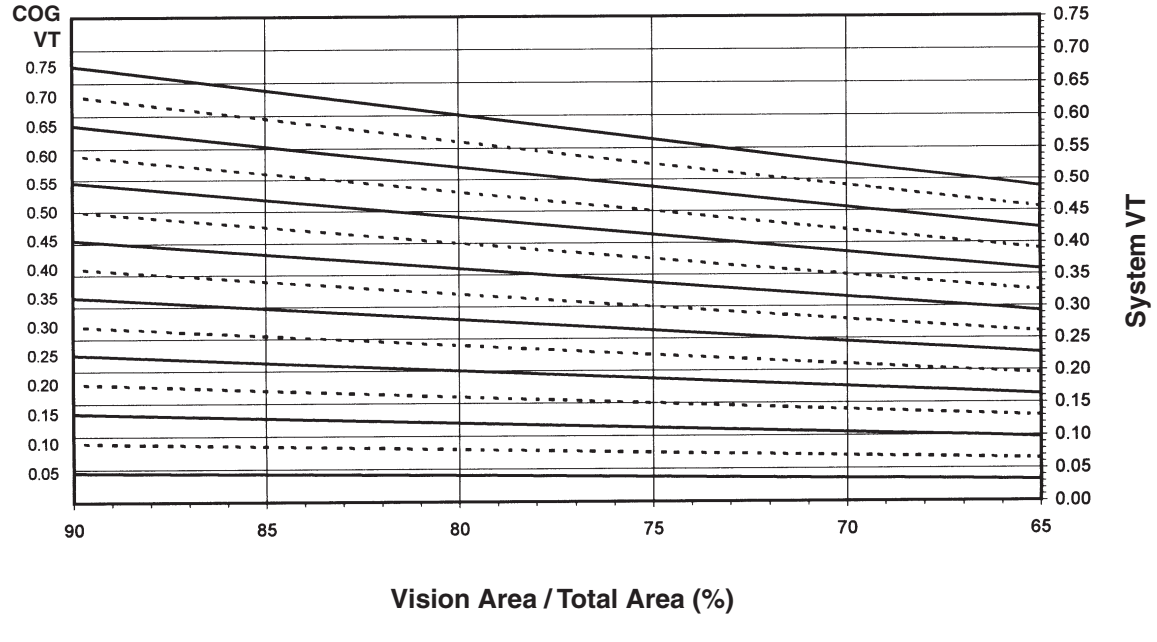
Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

AA™3350 IsoPort™ OX HORIZONTAL SLIDER WINDOW

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



AA™3350 IsoPort™ OX HORIZONTAL SLIDER WINDOW

Thermal Transmittance[1] (BTU/hr • ft [2] • °F)

	Glass U-Factor [3]	Overall U-Factor [4]
With Aluminum Spacer	0.47	0.54
	0.46	0.53
	0.44	0.52
	0.42	0.50
	0.40	0.49
	0.38	0.48
	0.36	0.47
	0.34	0.46
	0.32	0.44
	0.30	0.43
	0.28	0.42
	0.26	0.41
	0.24	0.39
	0.22	0.38
	0.20	0.37
	0.18	0.35
	0.16	0.34
	0.14	0.33
	0.12	0.32
	0.10	0.30

AA™3350 IsoPort™ OX HORIZONTAL SLIDER WINDOW

SHGC Matrix [2]

Glass SHGC [3]	Overall Glass U-Factor [4]
0.75	0.53
0.70	0.50
0.65	0.46
0.60	0.43
0.55	0.39
0.50	0.36
0.45	0.32
0.40	0.29
0.35	0.25
0.30	0.22
0.25	0.18
0.20	0.15
0.15	0.11
0.10	0.08
0.05	0.04

Visible Transmittance [2]

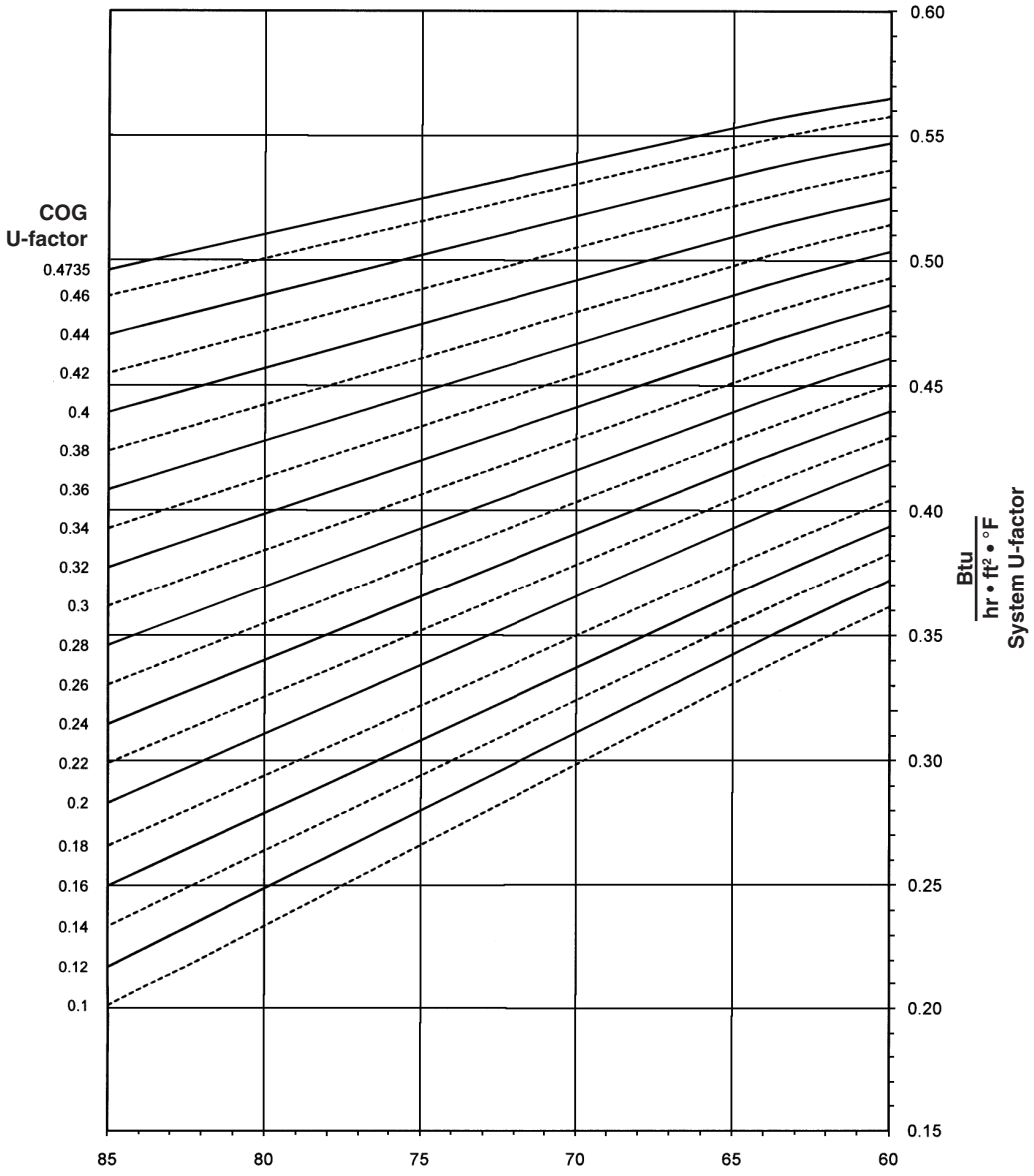
Glass VT [3]	Overall VT [4]
0.75	0.52
0.70	0.49
0.65	0.45
0.60	0.42
0.55	0.38
0.50	0.35
0.45	0.31
0.40	0.28
0.35	0.24
0.30	0.21
0.25	0.17
0.20	0.14
0.15	0.10
0.10	0.07
0.05	0.03

NOTE: For glass values that are not listed, linear interpolation is permitted.
1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 1500mm wide by 1200mm high (59-1/16" by 47-1/4").

AA™3350 IsoPort™ XX HORIZONTAL SLIDER WINDOW

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

System U-factor vs Percent of Glass Area

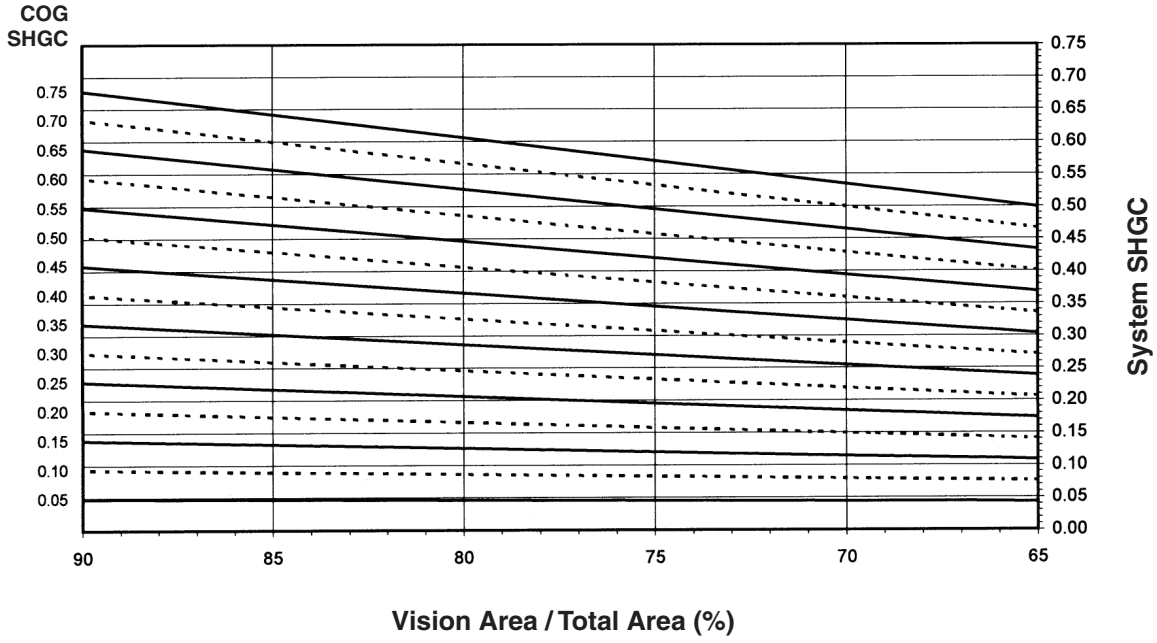


Percent of Glass Area = Vision Area/Total Area
Daylight Opening / Projected Area

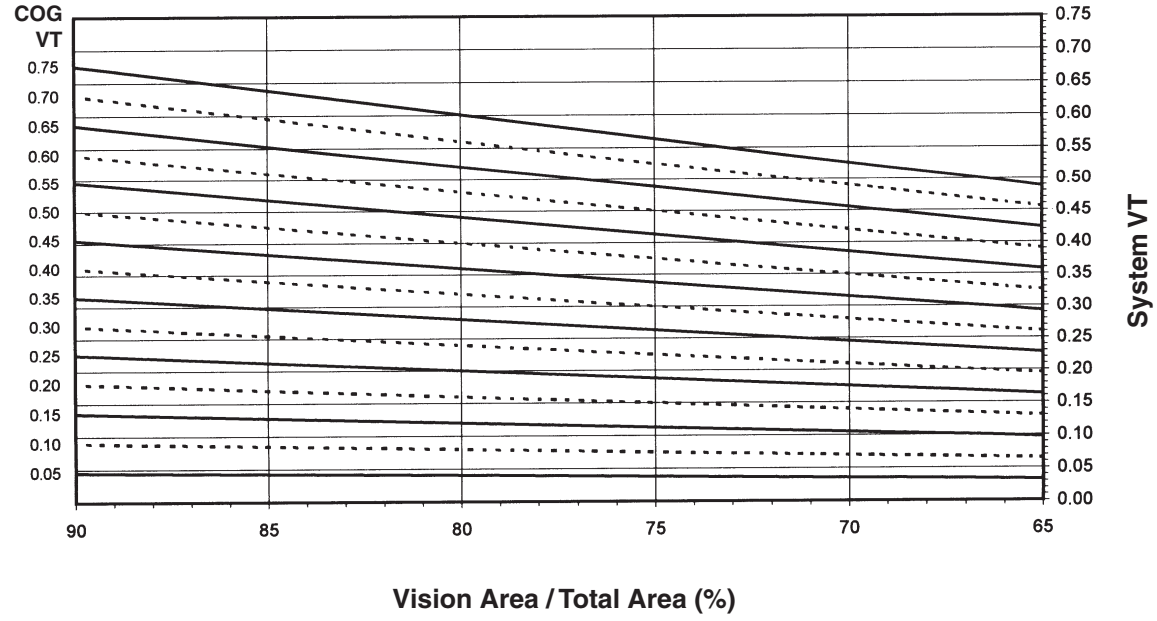
Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

AA™3350 IsoPort™ XX HORIZONTAL SLIDER WINDOW

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



AA™3350 IsoPort™ XX HORIZONTAL SLIDER WINDOW

Thermal Transmittance[1] (BTU/hr • ft [2] • °F)

	Glass U-Factor [3]	Overall U-Factor [4]
With Aluminum Spacer	0.47	0.56
	0.46	0.55
	0.44	0.54
	0.42	0.52
	0.40	0.51
	0.38	0.50
	0.36	0.49
	0.34	0.48
	0.32	0.47
	0.30	0.45
	0.28	0.44
	0.26	0.43
	0.24	0.42
	0.22	0.41
	0.20	0.40
	0.18	0.38
	0.16	0.37
	0.14	0.36
	0.12	0.35
	0.10	0.34

AA™3350 IsoPort™ XX HORIZONTAL SLIDER WINDOW

SHGC Matrix [2]

Glass SHGC [3]	Overall Glass U-Factor [4]
0.75	0.51
0.70	0.47
0.65	0.44
0.60	0.41
0.55	0.37
0.50	0.34
0.45	0.31
0.40	0.28
0.35	0.24
0.30	0.21
0.25	0.18
0.20	0.14
0.15	0.11
0.10	0.08
0.05	0.04

Visible Transmittance [2]

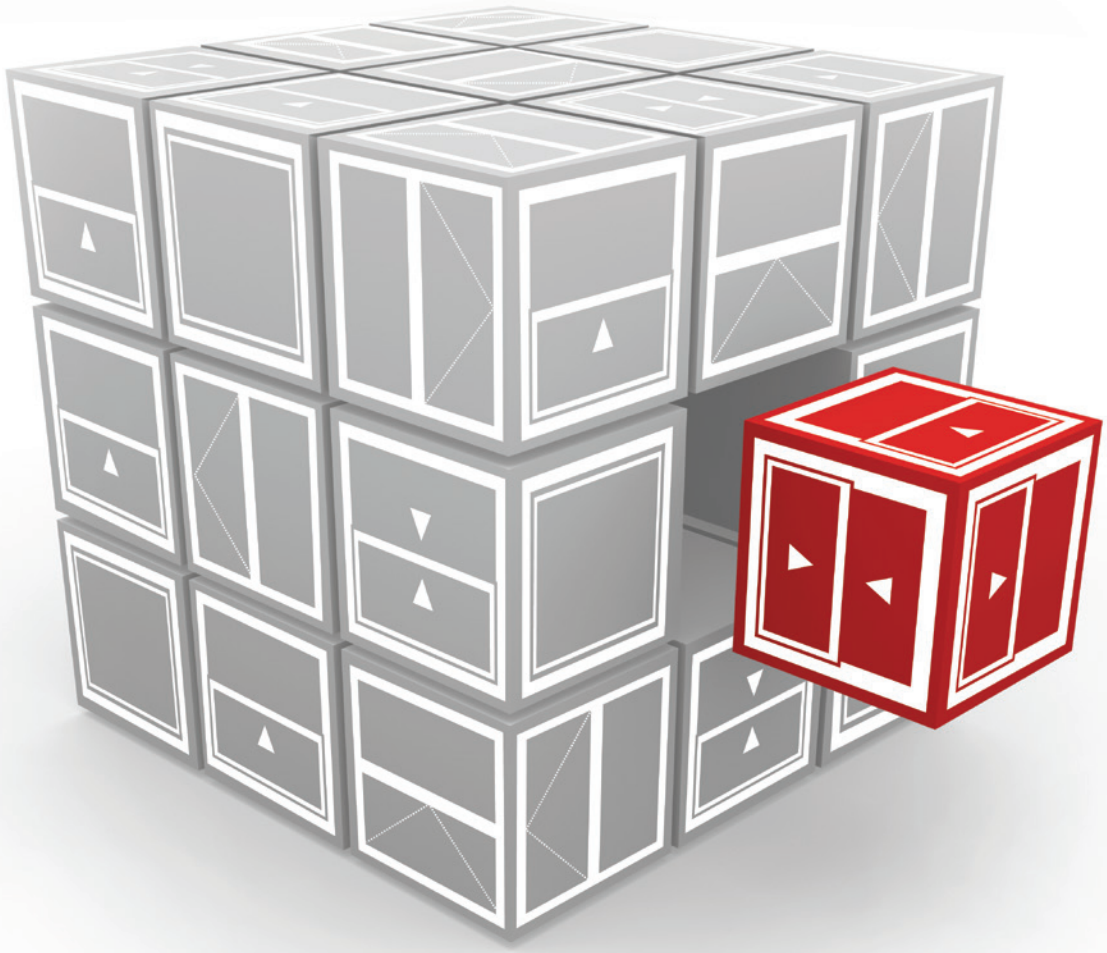
Glass VT [3]	Overall VT [4]
0.75	0.50
0.70	0.46
0.65	0.43
0.60	0.40
0.55	0.36
0.50	0.33
0.45	0.30
0.40	0.26
0.35	0.23
0.30	0.20
0.25	0.17
0.20	0.13
0.15	0.10
0.10	0.07
0.05	0.03

NOTE: For glass values that are not listed, linear interpolation is permitted.

1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 1500mm wide by 1200mm high (59-1/16" by 47-1/4").

OptiQ™ Ultra Thermal Windows AA™5450 Series

The industry's smartest window raises the bar for design flexibility and thermal performance



With best-in-class thermal performance, OptiQ™ Ultra Thermal Windows continue to set the standard for thermal intelligence. The result of a continuing partnership with the U.S. Department of Energy, the AA™5450 Series Window with fixed, single hung, double hung and sliding configurations reaches new levels of thermal performance, thanks to multiple unique features integrated into the design. This thermal intelligence allows the complete family of OptiQ™ Ultra Thermal Windows to maintain thermal continuity, reduce thermal transmission and help retain interior comfort.

Energy codes are becoming increasingly stringent, making high-performing building products a necessity, not a luxury. The AA™5450 Series Window meets or exceeds the minimum requirements for architectural window performance class*, delivers best-in-class thermal performance and offers more aesthetic choices for new and retrofit construction. Made from aluminum, this ultra thermal window will never rot, warp or buckle due to moisture and weather exposure. Leveraging the ground-breaking design features and multiple customization options found in all the OptiQ™ Ultra Thermal Windows, the AA™5450 Series Window slides into place and raises the bar for design flexibility and thermal performance.

*AAMA/WDMA/CSA 101.IS2.A440 (NAFS) and AAMA 910

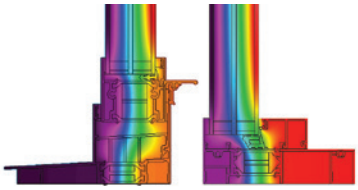
KAWNEER
AN ARCONIC COMPANY

Performance

OptiQ™ Ultra Thermal Windows have been the industry's thermal intelligence standard for years. That tradition continues with the complete range of AA™5450 Series Windows – from sliding to fixed, single hung and double hung. The AW rated AA™5450 Series Windows deliver the highest levels of thermal performance in the industry. Superior thermal efficiency also makes the window ideal for buildings seeking Leadership in Energy and Environmental Design certification with the U.S. Green Building Council.

CLASS & GRADE* – FUNCTION
AW-PG50-FW – FIXED
AW-PG50-H – SINGLE HUNG
AW-PG50-H – DOUBLE HUNG
AW-PG50-HS – XX DOUBLE SLIDE
AW-PG40-HS – OX SINGLE SLIDE

Thermal simulations showing temperature variations from exterior/ cold side to interior/warm side



Hung window with triple glazing

Fixed window with triple glazing

The versatile AA™5450 Series Window leverages innovative OptiQ™ Ultra Thermal Window features, including a polyamide thermal break that allows it to achieve higher thermal performance than traditional thermally broken products. Performance is further enhanced by accommodating 1" (25.4 mm) double pane or 1-1/2" (38.1 mm) triple pane insulating glass, while the alignment of the insulating glass unit with the thermal break allows the window to maintain thermal continuity. Reduced sightlines also decrease thermal conductivity and transfer, while wider thermal break profiles allow for increased space between interior and exterior metal.

Insulating foam strips and interior gaskets further reduce thermal transmission. Additionally, the AA™5450 Series Window provides outstanding condensation resistance – an important performance feature in applications such as hospitals and schools where condensation and mold are significant concerns.

Performance Test Standards

Air Infiltration	ASTM E283
Water	ASTM E331, E547
Structural – Uniform Wind Load	ASTM E330
Thermal Cycling	AAMA 501.5
Thermal Transmittance – U-Factor	AAMA 1503, 507; NFRC 100
Condensation Resistance (CRF, I, CR)	AAMA 1503; CSA A440.2; NFRC 500
Overall Solar Heat Gain Coefficient (SHGC, VT)	AAMA 507; NFRC 200
Sound Transmission (STC, OITC)	ASTM E90, E1425; AAMA 1801

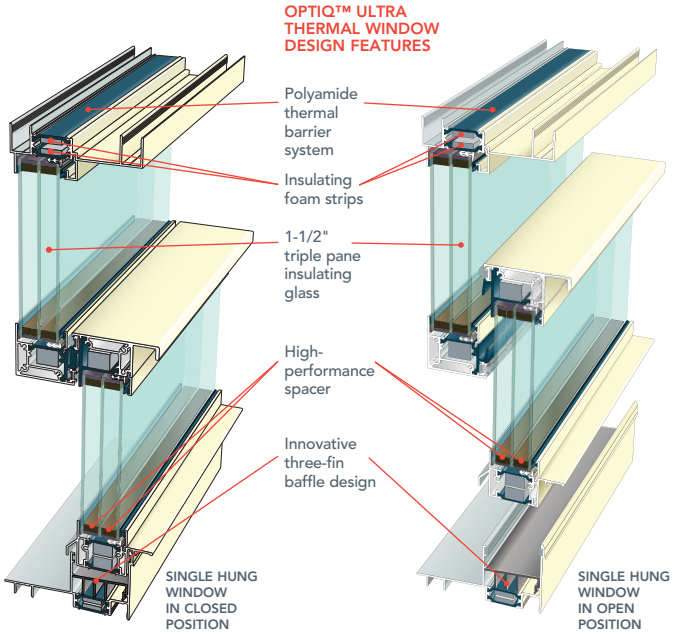
Aesthetics and Flexibility

The AA™5450 Series Window combines intelligence and good looks to deliver inspired aesthetics. The 4-5/8" (117.48 mm) frame depth provides high thermal performance, while its minimal sightlines provide a sleek appearance. A dual color option offers the flexibility to vary interior and exterior finishes, which enables designers to coordinate and accent multiple environments while also controlling costs.

This versatile window is available in several configurations, including fixed, single hung, double hung and sliding, which provide various ventilation levels to meet a wide range of building conditions. To satisfy thermal requirements across many geographic regions, the AA™5450 Series Window has the ability to add or remove thermal options based on performance and cost requirements.

A variety of removable interior stops accommodates multiple infill thicknesses with no disassembly required for reglazing. Additionally, the factory-fabricated and glazed window is built with durable hardware. Hung windows include white bronze sweep locks and keepers, and continuous sash lifts are standard along with Class 5 spiral balances for simple operation. Sliding windows incorporate composite adjustable tandem rollers for easy opening.

A beveled face design option for single hung and double hung configurations make the AA™5450 Series window an ideal solution for renovation or replication projects seeking a historic look.



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555 Guthridge Court
Norcross, GA 30092

kawneer.com
770 . 449 . 5555

KAWNEER
AN ARCONIC COMPANY

LAWS AND BUILDING AND SAFETY CODES GOVERNING THE DESIGN AND USE OF GLAZED ENTRANCE, WINDOW, AND CURTAIN WALL PRODUCTS VARY WIDELY. KAWNEER DOES NOT CONTROL THE SELECTION OF PRODUCT CONFIGURATIONS, OPERATING HARDWARE, OR GLAZING MATERIALS, AND ASSUMES NO RESPONSIBILITY THEREFOR.

Metric (SI) conversion figures are included throughout these details for reference. Numbers in parentheses ( ) are millimeters unless otherwise noted.

The following metric (SI) units are found in these details:

m – meter
cm – centimeter
mm – millimeter
s – second
Pa – pascal
MPa – megapascal

Kawneer reserves the right to change configurations without prior notice when deemed necessary for product improvement.

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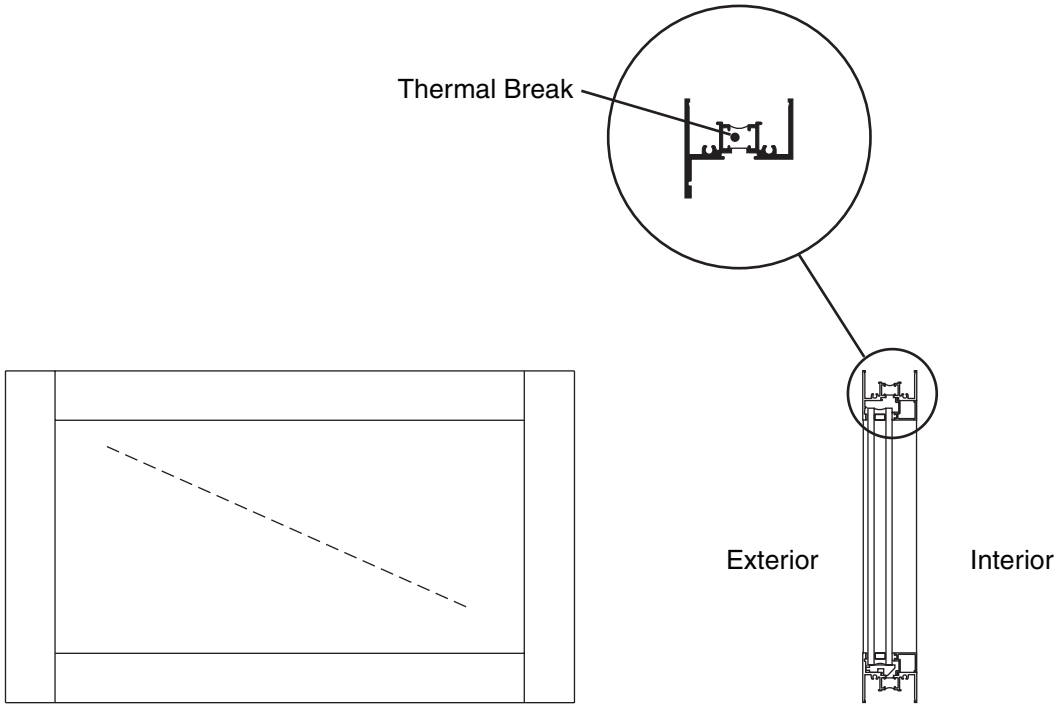
EC 97911-104

Features

- Architectural Grade Window
- IsoLock™ Thermal Break
- Screw and Spline Frame Corner Joinery
- Factory Silicone Glazed
- Interior Applied Glazing Bead with Bulb Gasket
- Architectural Anodized Finishes and Applied Coatings
- Two Year Manufacturer's Warranty

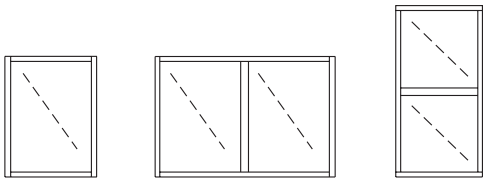


Fixed Window

For specific product applications,
Consult your Kawneer representative.

8225TL Thermal Windows

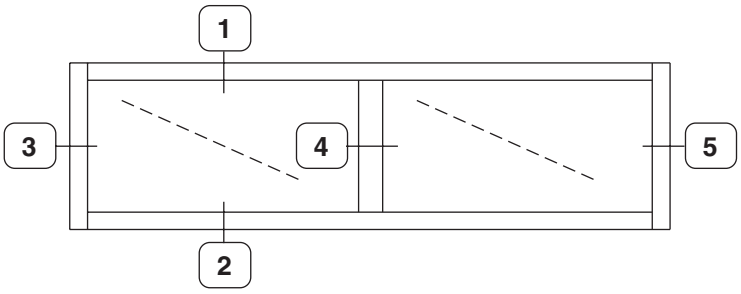
FIXED WINDOW

CLASS and GRADE	Architectual Grade AW-PG100-FW
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S. 2 / A440 (NAFS)
FRAME DEPTH	2-1/4" Overall Frame Depth
TYPICAL WALL THICKNESS	.090 and .125 Nominal
TYPICAL MAXIMUM SIZE	60" x 99"
TYPICAL MINIMUM SIZE	12" x 12"
TYPICAL CONFIGURATIONS	
STANDARD INFILL OPTIONS	1/4" and 1"
STANDARD HARDWARE	Not Applicable
OPTIONAL HARDWARE	Not Applicable
OTHER OPTIONS	Unequal Leg Frames Exterior and/or Interior Applied Muntins Perimeters and Sills Exterior Pannings and Interior Trims Structural Mullions Vertically or Horizontally Stacked Access Panels and Blinds Silicone Field Glazing upon Request

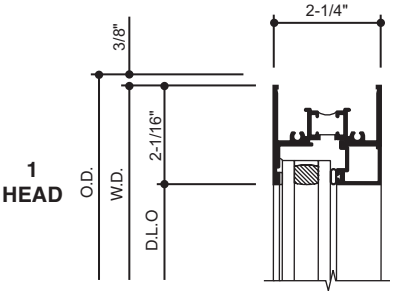
PERFORMANCE	Air Infiltration Cfm/ft²	Water Resistance PSF	Design Load PSF	Thermal Transmittance "U" Value	Condensation Resistance CRF	Sound Transmittance STC
	.10 @ 6.24 psf	15	100	.58	59	34

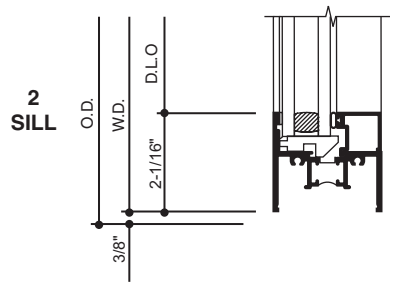
Note: Thermal values are based upon 1" clear insulating glass.

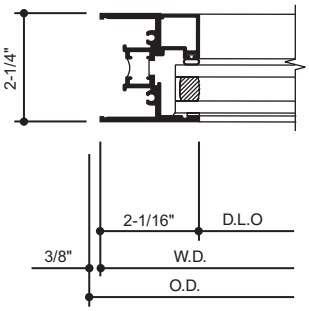
SCALE : 3" = 1'-0"



TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations







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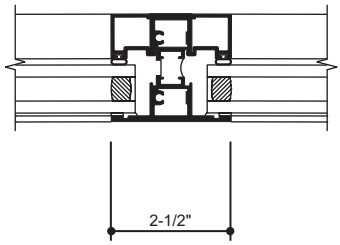

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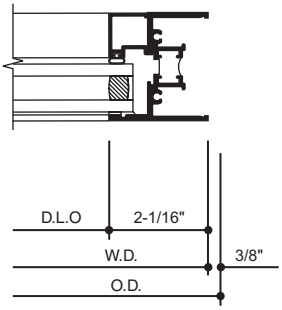
VERTICAL
MULLION



5
JAMB

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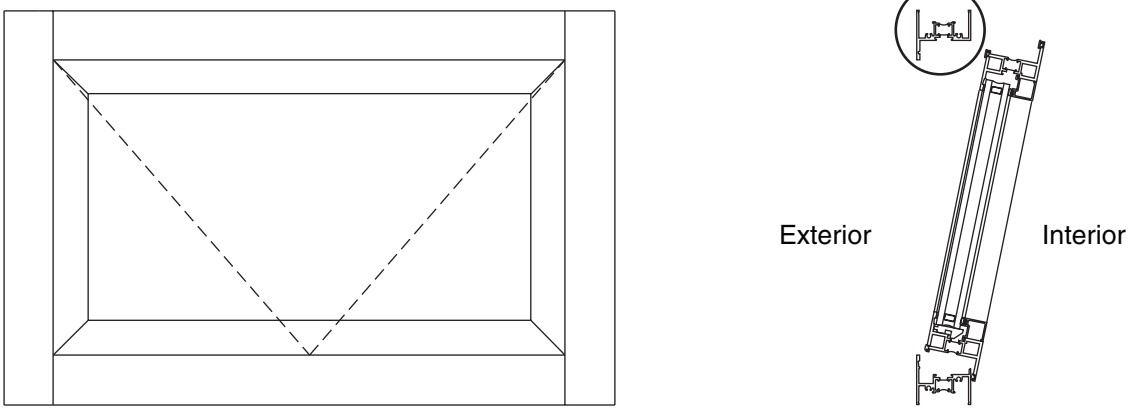
EC 97911-104

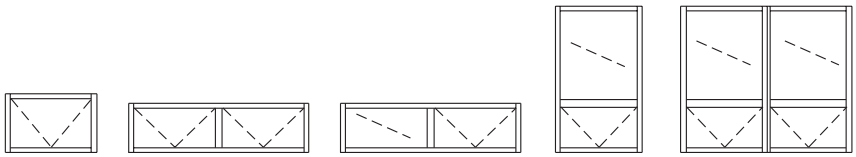
Features

- Architectural Grade Window
- IsoLock™ Thermal Break
- Mitered, Clipped and Staked Vent Corner Joinery
- Screw and Spline Frame Corner Joinery
- Factory Silicone Glazed
- Interior Applied Glazing Bead with Bulb Gasket
- Architectural Anodized Finishes and Applied Coatings
- Two Year Manufacturer's Warranty
- Compatible with Storefront and Curtain Wall Systems



Project-in Window

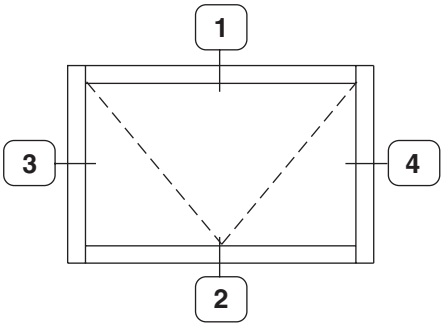
For specific product applications,
Consult your Kawneer representative.

CLASS and GRADE	Architectual Grade AP-HC90 / AP-AW90 / AP-PG90-AP
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S. 2 / A440 (NAFS)
FRAME DEPTH	2-1/4" Overall Frame Depth
TYPICAL WALL THICKNESS	.090 and .125 Nominal
TYPICAL MAXIMUM SIZE	60" x 48"
TYPICAL MINIMUM SIZE	17" x 17"
TYPICAL CONFIGURATIONS	
STANDARD INFILL OPTIONS	1/4" and 1"
STANDARD HARDWARE	Stainless Steel 4-Bar Hinges Cast White Bronze Cam Locks
OPTIONAL HARDWARE	Access Control Locks Limit Stop Pole and Pole Ring
OTHER OPTIONS	Unequal Leg Frames Exterior and/or Interior Applied Muntins Insect Screens Perimeters and Sills Exterior Pannings and Interior Trims Structural Mullions Vertically or Horizontally Stacked Access Panels and Blinds Silicone Field Glazing upon Request

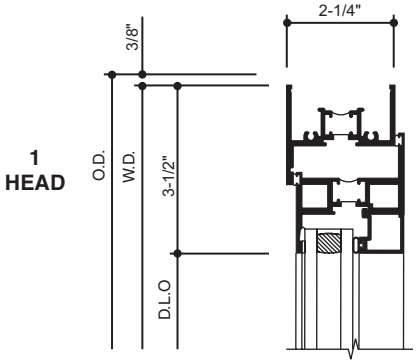
PERFORMANCE	Air Infiltration Cfm/ft^2	Water Resistance PSF	Design Load PSF	Thermal Transmittance "U" Value	Condensation Resistance CRF	Sound Transmittance STC
	.10 @ 6.24 psf	15	90	.62	56	n/a

Note: Thermal values are based upon 1" clear insulating glass.

SCALE : 3" = 1'-0"



TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations



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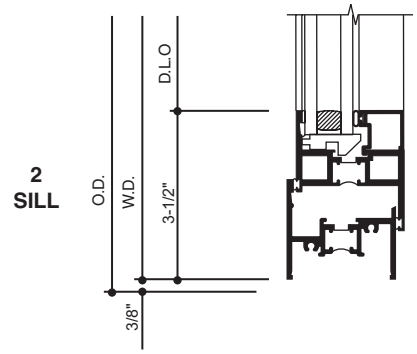

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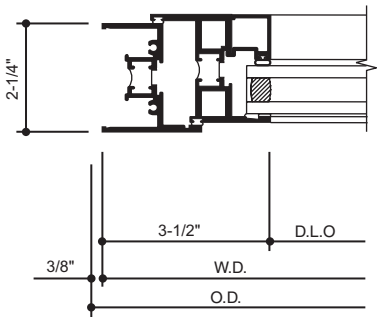

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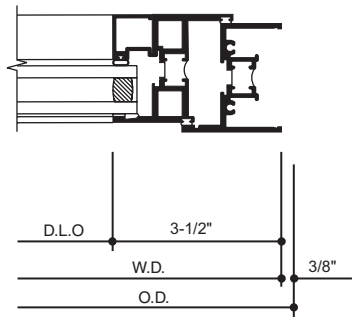
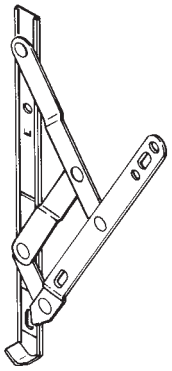


4
JAMB

STAINLESS STEEL 4 BAR HINGES

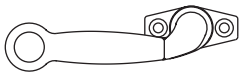


A standard hinge for ventilators providing approximately 45° to 60° openings depending on size. An optional limit stop is available to restrict hinge travel and limit vent opening.

STANDARD CAM HANDLE

Cast white bronze cam handles are standard for the manual operation and locking of ventilators.

CAM HANDLE WITH POLE RING

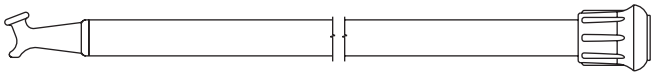


Cast white bronze cam handles with pole ring provide manual operation of ventilators located above reach.
These handles are operated with a sash pole.

POLE RING

Cast white bronze pole ring is used in conjunction with locking hardware for sash pole operation of ventilators.

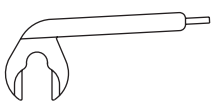
SASH POLE



HANGER FOR SASH POLE

A 3/4" diameter aluminum sash pole with a cast white bronze pull down hook and black rubber tip.
Available in 6 ft. and 12 ft. lengths with optional cast white bronze Pole Hanger.

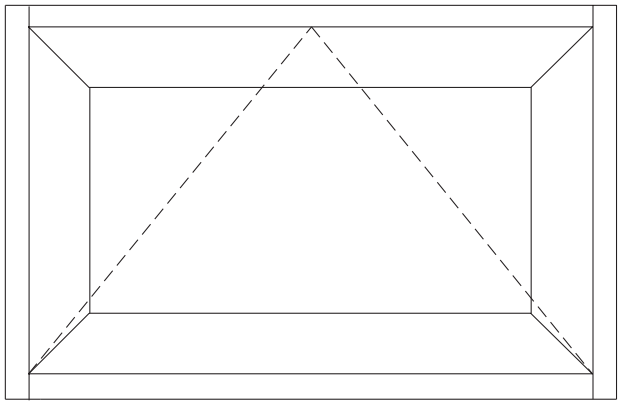
ACCESS CONTROL LOCK

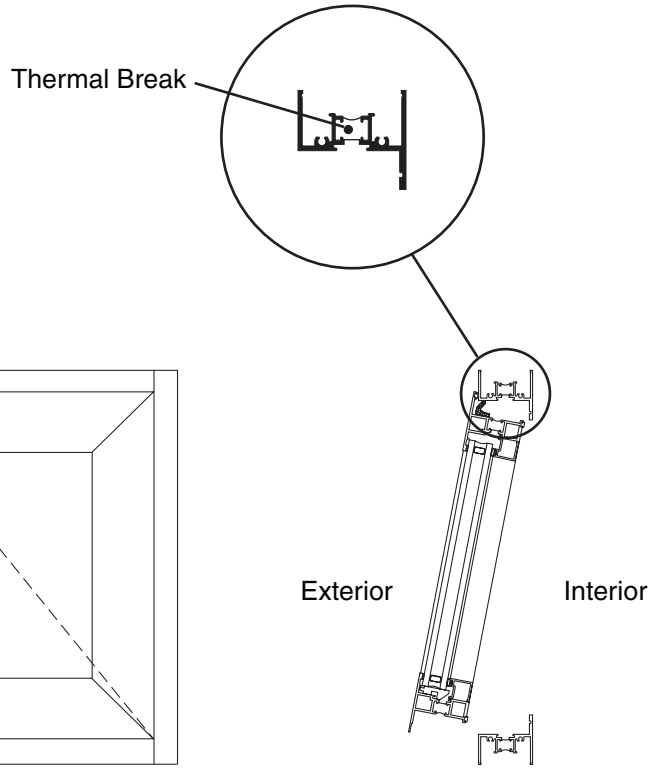


In lieu of the standard cam handles cast white bronze access control locks are offered for managed control of vent operations. Lock is operated with a manganese bronze removable handle.

Features

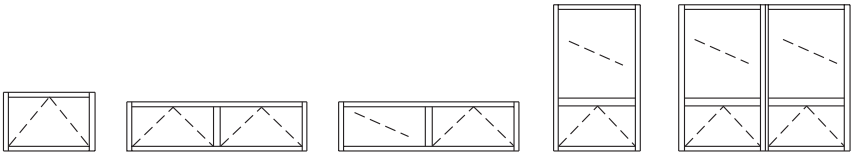
- Architectural Grade Window
- IsoLock™ Thermal Break
- Mitered, Clipped and Staked Vent Corner Joinery
- Screw and Spline Frame Corner Joinery
- Factory Silicone Glazed
- Interior Applied Glazing Bead with Bulb Gasket
- Architectural Anodized Finishes and Applied Coatings
- Two Year Manufacturer's Warranty
- Compatible with Storefront and Curtain Wall Systems





Project-out Window

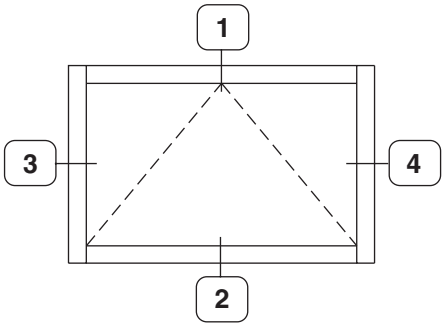
For specific product applications,
Consult your Kawneer representative.

CLASS and GRADE	Architectual Grade AP-HC90 / AP-AW90 / AW-PG90-AP
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S. 2 / A440 (NAFS)
FRAME DEPTH	2-1/4" Overall Frame Depth
TYPICAL WALL THICKNESS	.090 and .125 Nominal
TYPICAL MAXIMUM SIZE	60" x 89"
TYPICAL MINIMUM SIZE	17" x 17"
TYPICAL CONFIGURATIONS	
STANDARD INFILL OPTIONS	1/4" and 1"
STANDARD HARDWARE	Stainless Steel 4-Bar Hinges Cast White Bronze Cam Locks 88SS Support Arm (Units over 50" in height)
OPTIONAL HARDWARE	Access Control Locks Hook Bolt Lock Handle Pivot Shoe Roto-Operator Scissors Arm Roto-Operator Limit Stop Pole and Pole Ring
OTHER OPTIONS	Unequal Leg Frames Exterior and/or Interior Applied Muntins Insect Screens Perimeters and Sills Exterior Pannings and Interior Trims Structural Mullions Vertically or Horizontally Stacked Access Panels and Blinds Silicone Field Glazing upon Request

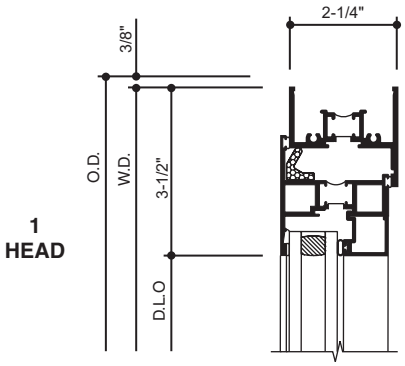
PERFORMANCE	Air Infiltration Cfm/ft^2	Water Resistance PSF	Design Load PSF	Thermal Transmittance "U" Value	Condensation Resistance CRF	Sound Transmittance STC
	.10 @ 6.24 psf	15	90	.60	56	33

Note: Thermal values are based upon 1" clear insulating glass.

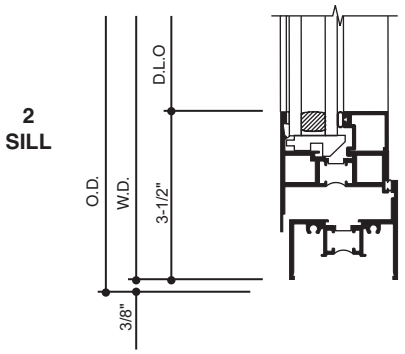
SCALE : 3" = 1'-0"



TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations



1
HEAD



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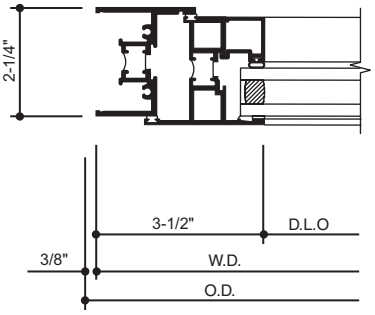
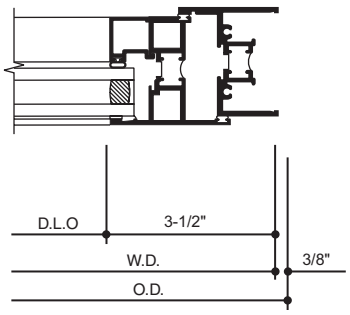
SILL

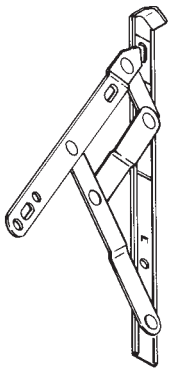


3
JAMB



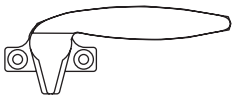
4
JAMB

STAINLESS STEEL 4 BAR HINGES



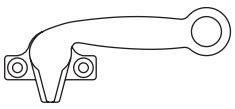
A standard hinge for ventilators providing approximately 45° to 60° openings depending on size. An optional limit stop is available to restrict hinge travel and limit vent opening.

STANDARD CAM HANDLE



Cast white bronze cam handles are standard for the manual operation and locking of ventilators.

CAM HANDLE WITH POLE RING

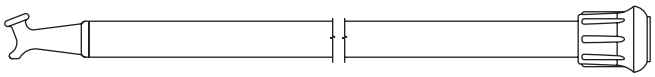


Cast white bronze cam handles with pole ring provide manual operation of ventilators located above reach.
These handles are operated with a sash pole.

POLE RING

Cast white bronze pole ring is used in conjunction with locking hardware for sash pole operation of ventilators.

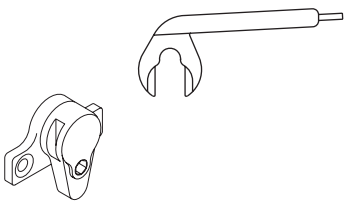
SASH POLE



HANGER FOR SASH POLE

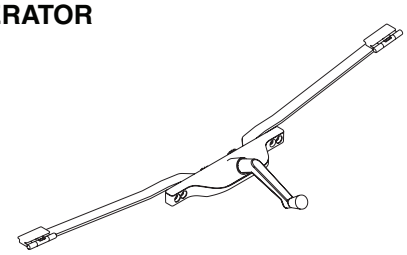
A 3/4" diameter aluminum sash pole with a cast white bronze pull down hook and black rubber tip.
Available in 6 ft. and 12 ft. lengths with optional cast white bronze pole hanger.

ACCESS CONTROL LOCK



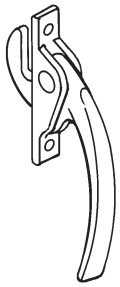
In lieu of the standard cam handles cast white bronze access control locks are offered for managed control of vent operations. Lock is operated with a manganese bronze removable handle.

PIVOT-SHOE ROTO-OPERATOR



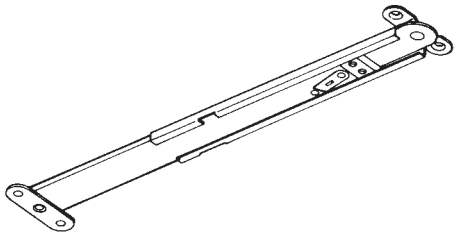
Optional pivot shoe roto operator is located on the center line of the bottom horizontal frame.
Standard finish shall be brushed copper nickel to match US-25-D.

HOOK BOLT LOCK



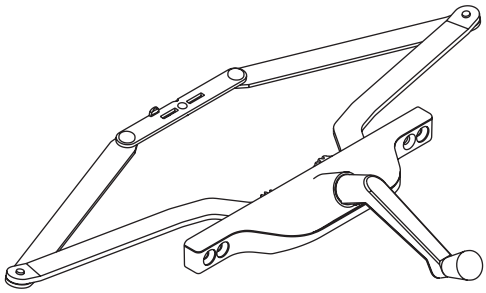
For use with pivot-shoe roto operator in lieu of cam handles.
Standard finish shall be US-25-D clear white bronze.

88SS SUPPORT ARM



Support arms are used when window height exceeds 50-1/2". When fully extended, the hardware automatically retains the ventilator in an open position.

SCISSORS ARM ROTO OPERATOR



Optional scissor arm roto operator is located on the center line of the bottom horizontal frame.
Standard finish shall be brushed copper nickel to match US-25-D.

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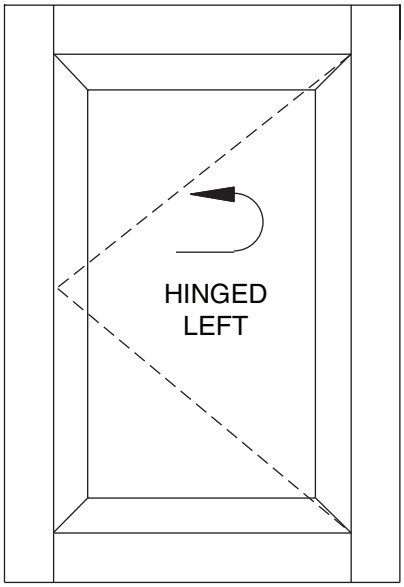
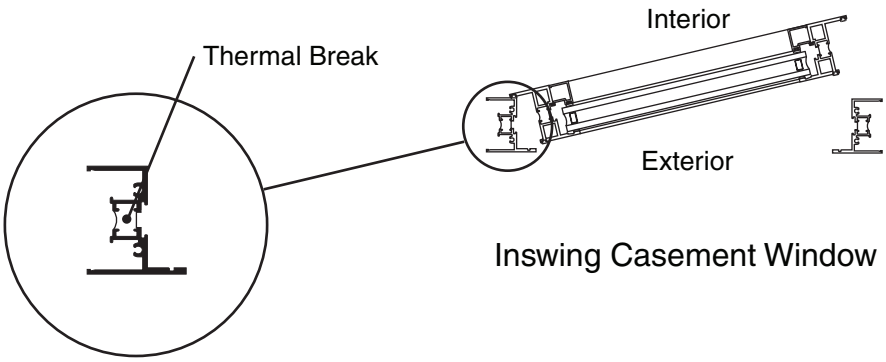
EC 97911-104

Features

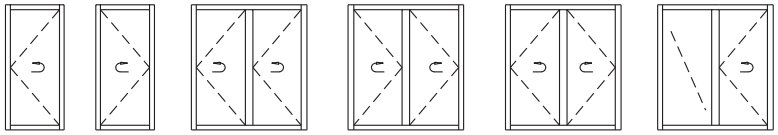
- Architectural Grade Window
- IsoLock™ Thermal Break
- Mitered, Clipped and Staked Vent Corner Joinery
- Screw and Spline Frame Corner Joinery
- Factory Silicone Glazed
- Interior Applied Glazing Bead with Bulb Gasket
- Architectural Anodized Finishes and Applied Coatings
- Two Year Manufacturer's Warranty
- Compatible with Storefront and Curtain Wall Systems





Inswing Casement Window

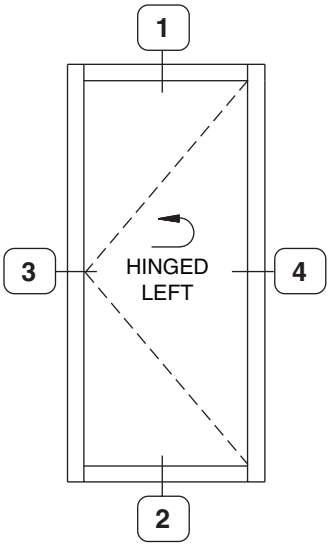
For specific product applications,
Consult your Kawneer representative.

CLASS and GRADE	Architectual Grade C-HC90 / C-AW90 / AW-PG90-C
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S. 2 / A440 (NAFS)
FRAME DEPTH	2-1/4" Overall Frame Depth
TYPICAL WALL THICKNESS	.090 and .125 Nominal
TYPICAL MAXIMUM SIZE	36" x 60"
TYPICAL MINIMUM SIZE	17" x 17"
TYPICAL CONFIGURATIONS	
STANDARD INFILL OPTIONS	1/4" and 1"
STANDARD HARDWARE	Stainless Steel 4-Bar Hinges Cast White Bronze Cam Locks
OPTIONAL HARDWARE	Access Control Locks Limit Stop Pole and Pole Ring Butt Hinges Friction Adjustor Keyed Limit Arm
OTHER OPTIONS	Unequal Leg Frames Exterior and/or Interior Applied Muntins Insect Screens Perimeters and Sills Exterior Pannings and Interior Trims Structural Mullions Vertically or Horizontally Stacked Access Panels and Blinds Silicone Field Glazing upon Request

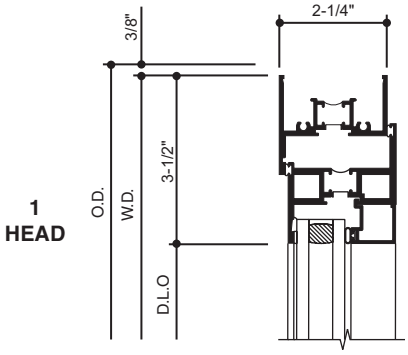
PERFORMANCE	Air Infiltration Cfm/ft²	Water Resistance PSF	Design Load PSF	Thermal Transmittance "U" Value	Condensation Resistance CRF	Sound Transmittance STC
	.10 @ 6.24 psf	15	90	.58	52	n/a

Note: Thermal values are based upon 1" clear insulating glass.

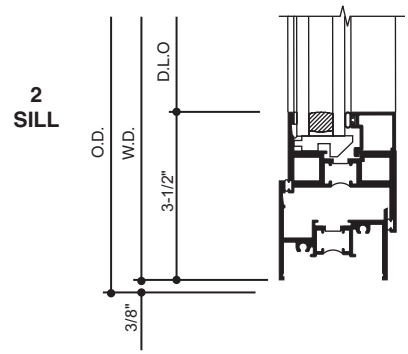
SCALE : 3" = 1'-0"



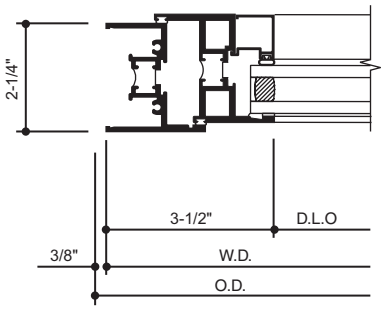
TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations



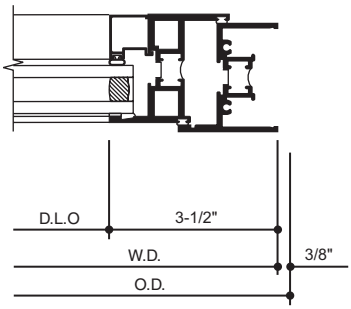
1
HEAD



2
SILL

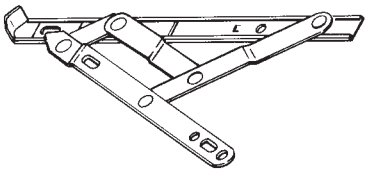


3
JAMB



4
JAMB

STAINLESS STEEL 4 BAR HINGES

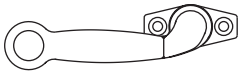


A standard hinge for ventilators providing approximately 45° to 60° openings depending on size. An optional limit stop is available to restrict hinge travel and limit vent opening.

STANDARD CAM HANDLE

Cast white bronze cam handles are standard for the manual operation and locking of ventilators.

CAM HANDLE WITH POLE RING

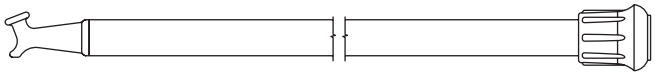


Cast white bronze cam handles with pole ring provide manual operation of ventilators located above reach.
These handles are operated with a sash pole.

POLE RING

Cast white bronze pole ring is used in conjunction with locking hardware for sash pole operation of ventilators.

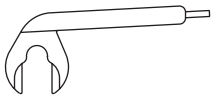
SASH POLE



HANGER FOR SASH POLE

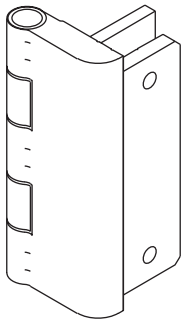
A 3/4" diameter aluminum sash pole with a cast white bronze pull down hook and black rubber tip.
Available in 6 ft. and 12 ft. lengths with optional cast white bronze pole hanger.

ACCESS CONTROL LOCK



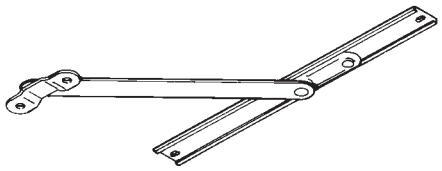
In lieu of the standard cam handles cast white bronze access control locks are offered for managed control of vent operations. Lock is operated with a manganese bronze removable handle.

BUTT HINGES



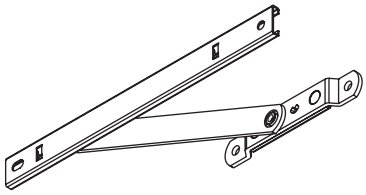
An optional hinge for ventilators providing a full 90° opening. Butt Hinges shall be finished to match the window.

FRICTION ADJUSTOR



Friction adjustors shall be used with butt hinges for additional friction for control of the ventilator.

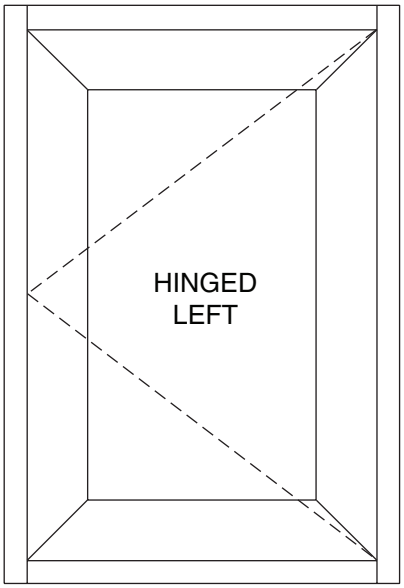
KEYED LIMIT ARM

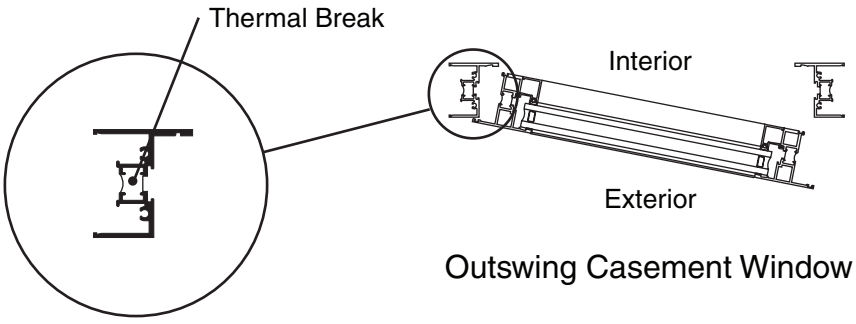


Key released limit arms may be used to restrict ventilator opening when used with butt hinges.

Features

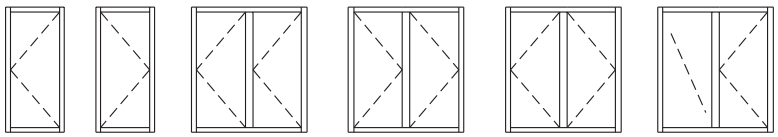
- Architectural Grade Window
- IsoLock™ Thermal Break
- Mitered, Clipped and Staked Vent Corner Joinery
- Screw and Spline Frame Corner Joinery
- Factory Silicone Glazed
- Interior Applied Glazing Bead with Bulb Gasket
- Architectural Anodized Finishes and Applied Coatings
- Two Year Manufacturer's Warranty
- Compatible with Storefront and Curtain Wall Systems





Outswing Casement Window

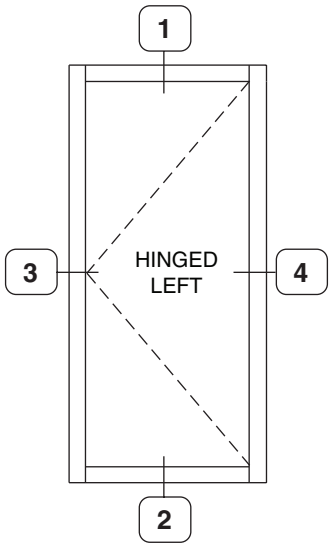
For specific product applications,
Consult your Kawneer representative.

CLASS and GRADE	Architectual Grade C-HC90 / C-AW90 / AW-PG90-C
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S. 2 / A440 (NAFS)
FRAME DEPTH	2-1/4" Overall Frame Depth
TYPICAL WALL THICKNESS	.090 and .125 Nominal
TYPICAL MAXIMUM SIZE	36" x 60"
TYPICAL MINIMUM SIZE	17" x 17"
TYPICAL CONFIGURATIONS	
STANDARD INFILL OPTIONS	1/4" and 1"
STANDARD HARDWARE	Stainless Steel 4-Bar Hinges Cast White Bronze Cam Locks
OPTIONAL HARDWARE	Butt Hinges Access Control Locks Hook Bolt Lock or Multi-Point Lock Limit Stop Pole and Pole Ring Friction Adjustor Keyed Limit Arm Roto Operator
OTHER OPTIONS	Unequal Leg Frames Exterior and/or Interior Applied Muntins Insect Screens Perimeters and Sills Exterior Pannings and Interior Trims Structural Mullions Vertically or Horizontally Stacked Access Panel and Blinds Silicone Field Glazing upon Request

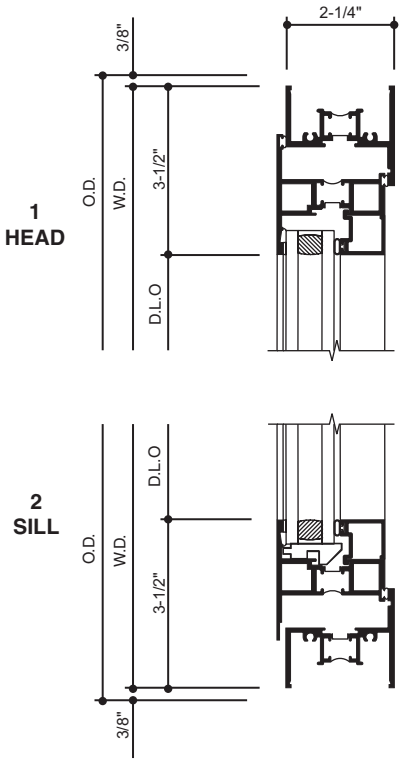
PERFORMANCE	Air Infiltration Cfm/ft^2	Water Resistance PSF	Design Load PSF	Thermal Transmittance "U" Value	Condensation Resistance CRF	Sound Transmittance STC
	.10 @ 6.24 psf	15	90	.60	50	37

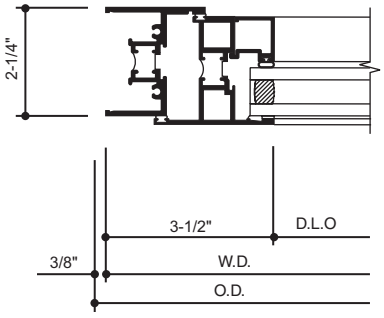
Note: Thermal values are based upon 1" clear insulating glass.

SCALE : 3" = 1'-0"

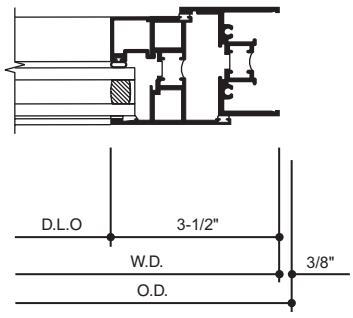


TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations



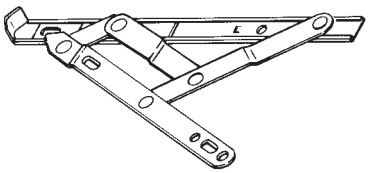


3
JAMB



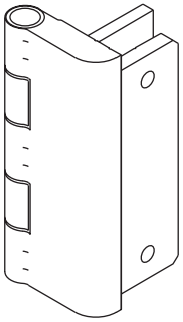
4
JAMB

STAINLESS STEEL 4 BAR HINGES



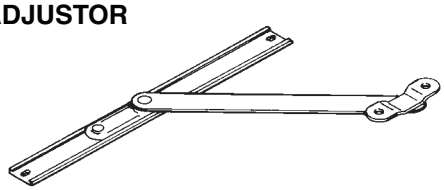
A standard hinge for ventilators providing approximately 45° to 60° openings depending on size. An optional limit stop is available to restrict hinge travel and limit vent opening.

BUTT HINGES



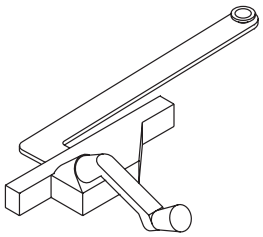
An optional hinge for ventilators providing a full 90° opening. Butt hinges shall be finished to match the window.

FRICTION ADJUSTOR



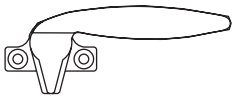
Friction adjustors shall be used with butt hinges for additional friction for control of the ventilator.

ROTO OPERATOR



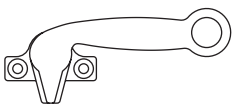
Roto operators are used with butt hinges only and located at the bottom horizontal frame. Standard finish shall be brushed copper nickel to match US-25-D.

STANDARD CAM HANDLE



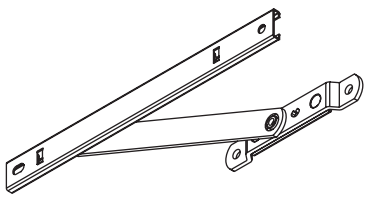
Cast white bronze cam handles are standard for the manual operation and locking of ventilators.

CAM HANDLE WITH POLE RING



Cast white bronze cam handles with pole ring provide manual operation of ventilators located above reach.
These handles are operated with a sash pole.

KEYED LIMIT ARM

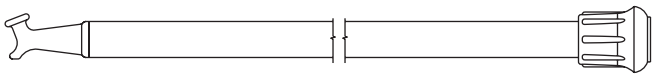


Key released limit arms may be used to restrict ventilator opening when used with butt hinges.

POLE RING

Cast white bronze pole ring is used in conjunction with locking hardware for sash pole operation of ventilators.

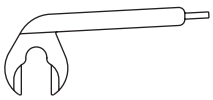
SASH POLE



HANGER FOR SASH POLE

A 3/4" diameter aluminum sash pole with a cast white bronze pull down hook and black rubber tip.
Available in 6 ft. and 12 ft. lengths with optional cast white bronze pole hanger.

ACCESS CONTROL LOCK



In lieu of the standard cam handles cast white bronze access control locks are offered for managed control of vent operations. Lock is operated with a manganese bronze removable handle.

HOOK BOLT LOCK

Optional hook bolt lock in lieu of cam handle. Standard finish shall be US-25-D clear white bronze.

MULTI-POINT LOCK

Optional single locking handle for concealed multi-point locks located on the vertical frame. Standard finish shall be US-25-D clear white bronze.

ESCAPE WINDOW SIGN

Vinyl escape window sign. Colors are white letters on red background.

RESCUE WINDOW SIGN

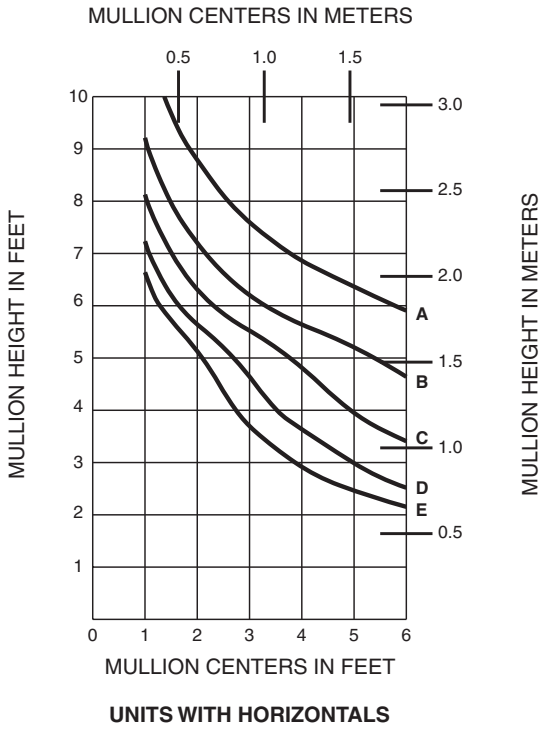
Vinyl rescue window sign with lettering on both sides. Colors are black letters on a yellow background.

BLANK PAGE

EC 97911-104

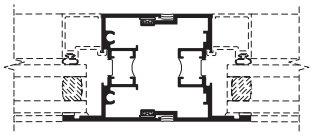
WIND LOAD CHARTS:

THESE CHARTS ARE BASED ON A MAXIMUM DEFLECTION OF L\175 AND\OR A MAXIMUM STRESS OF 15,152 PSI (104 MPa).

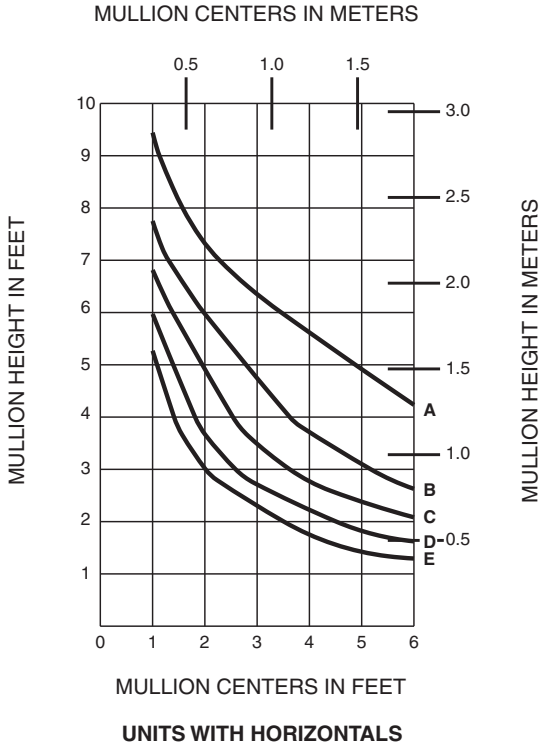


UNITS WITH HORIZONTALS

A = 20 PSF (958)
B = 35 PSF (1436)
C = 50 PSF (2394)
D = 70 PSF (3352)
E = 90 PSF (4309)

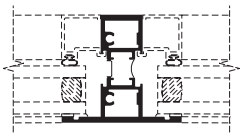


224131 **224133**



UNITS WITH HORIZONTALS

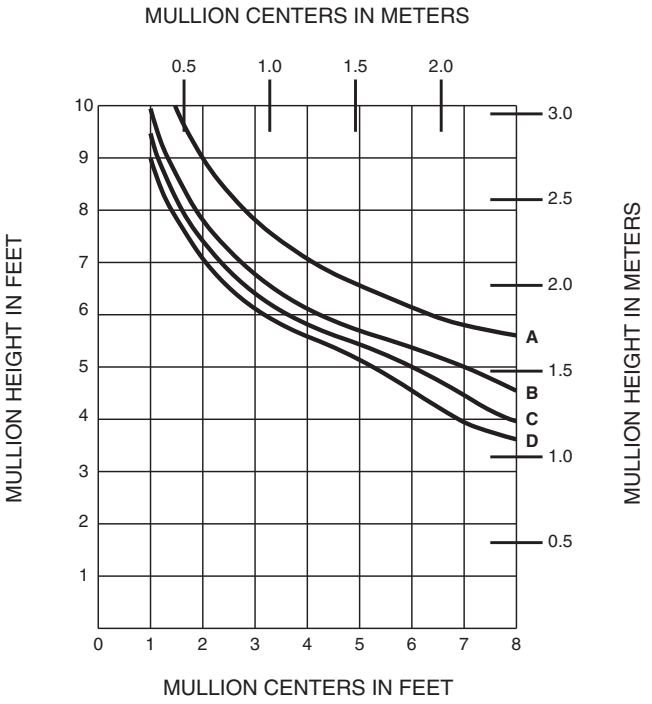
A = 20 PSF (958)
B = 35 PSF (1436)
C = 50 PSF (2394)
D = 70 PSF (3352)
E = 90 PSF (4309)



224138

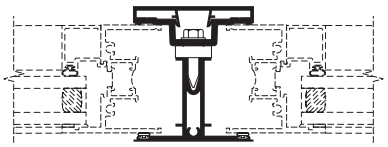
WIND LOAD CHARTS:

THESE CHARTS ARE BASED ON A MAXIMUM DEFLECTION OF L\175 AND\OR A MAXIMUM STRESS OF 15,152 PSI (104 MPa).



UNITS WITH HORIZONTALS

A = 20 PSF (958)
B = 25 PSF (1197)
C = 30 PSF (1436)
D = 40 PSF (1915)



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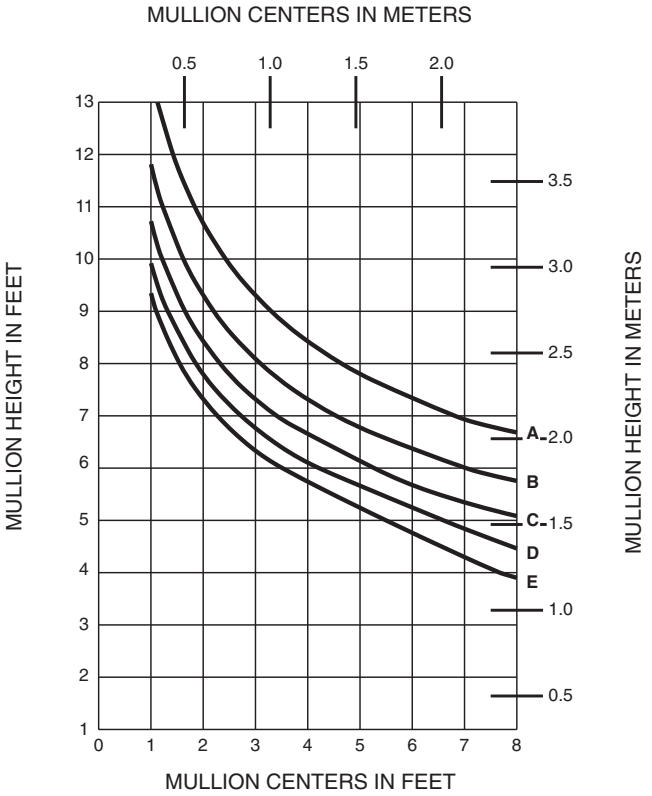
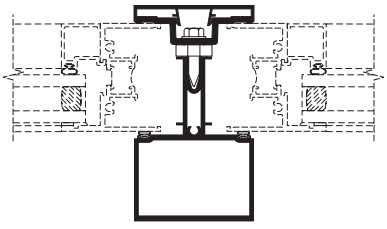


UNITS WITH HORIZONTALS

A = 30 PSF (1436)
B = 45 PSF (2155)
C = 60 PSF (2873)
D = 75 PSF (3591)
E = 90 PSF (4309)



224071

WIND LOAD CHARTS:

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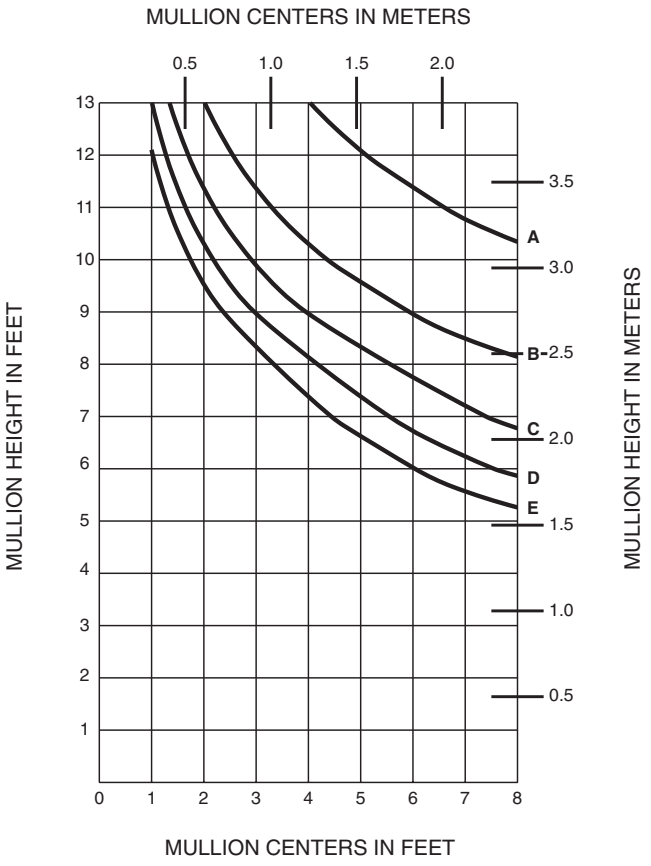
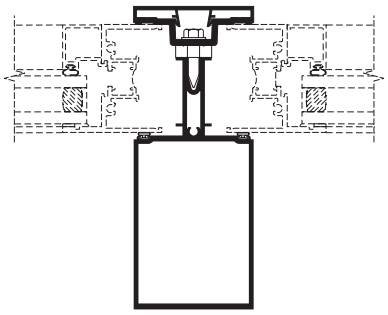
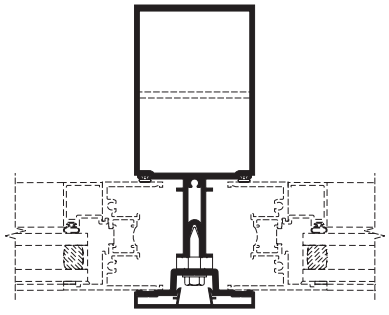


UNITS WITH HORIZONTALS

A = 20 PSF (958)
B = 40 PSF (1915)
C = 60 PSF (2873)
D = 80 PSF (3830)
E = 100 PSF (4788)



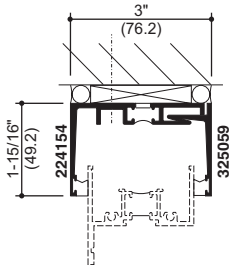
224072



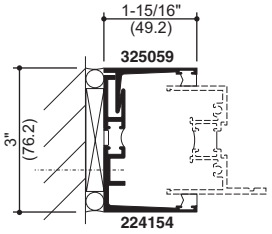
NOTE:
MULLION PROJECTION TO THE INTERIOR AVAILABLE

SCALE : 3" = 1'-0"

EQUAL LEG SILLS

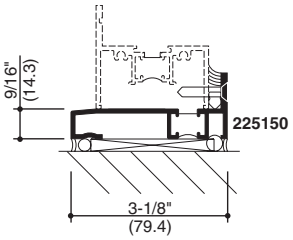


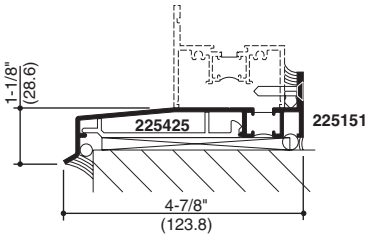
HEAD RECEPTOR

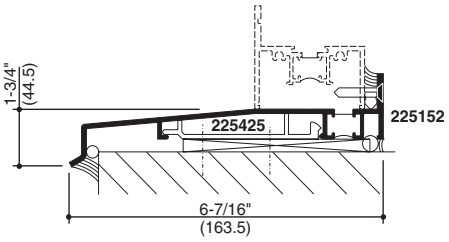


JAMB RECEPTOR

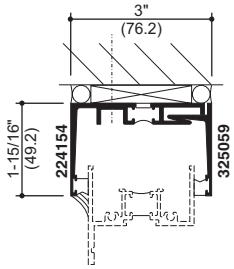
FULL DEPTH SILLS



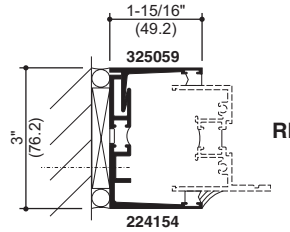




UNEQUAL LEG SILLS

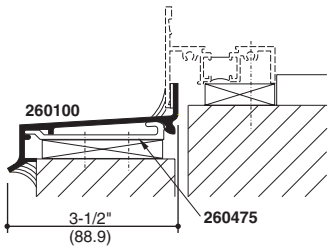


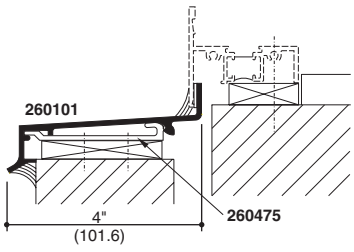
HEAD RECEPTOR

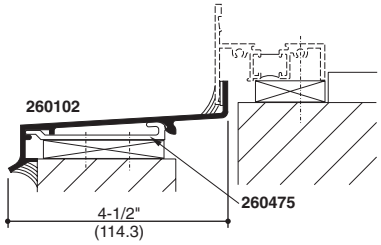


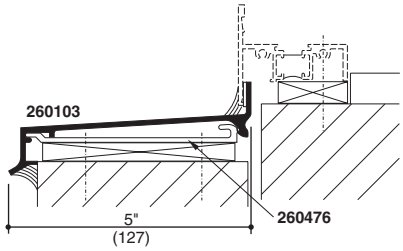
JAMB RECEPTOR

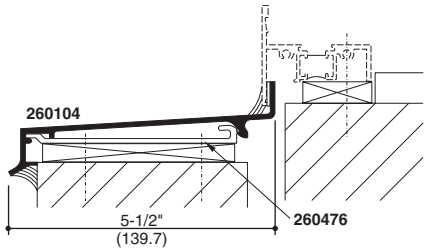
UNEQUAL LEG SILLS



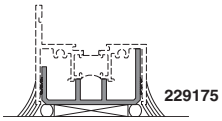




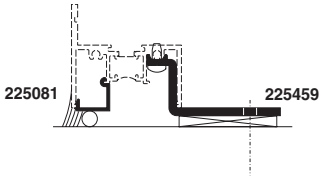




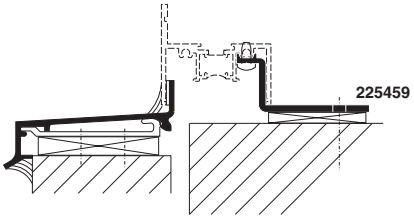
SCALE : 3" = 1'-0"



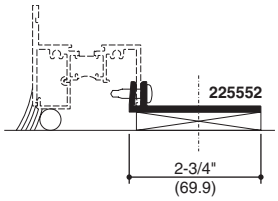
PVC PERIMETER
(Continuous)
Head and Jamb Similar



STRAP ANCHOR
with SEALANT BACK-UP

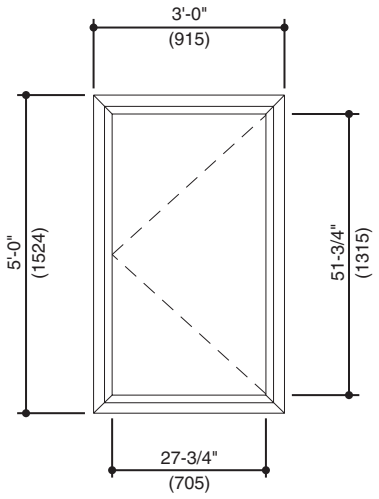


STRAP ANCHOR
with SUB SILL



F-ANCHOR STRAP
Equal Leg Frame Only

Generic Project Specific U-factor Example Calculation
(Percent of Glass will vary on specific products depending on sitelines)



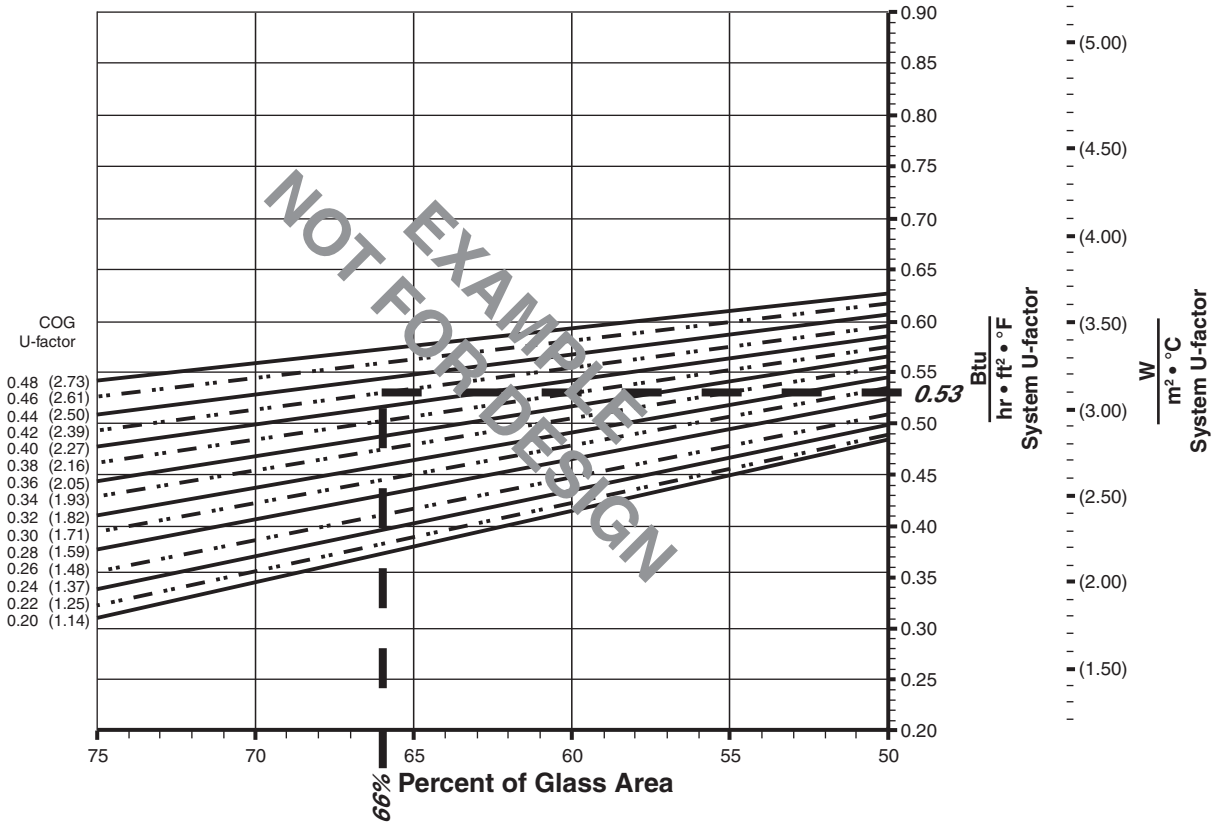
Example Glass U-Factor = 0.42 Btu/hr • ft² • °F

Total Daylight Opening = 27-3/4" • 51-3/4" = 9.97ft²

Total Projected Area = 3'-0" • 5'-0" = 15 ft²

Percent of Glass = (Total Daylight Opening ÷ Total Projected Area)100
= (9.97 ÷ 15)100 = 66%

System U-factor vs Percent of Glass Area

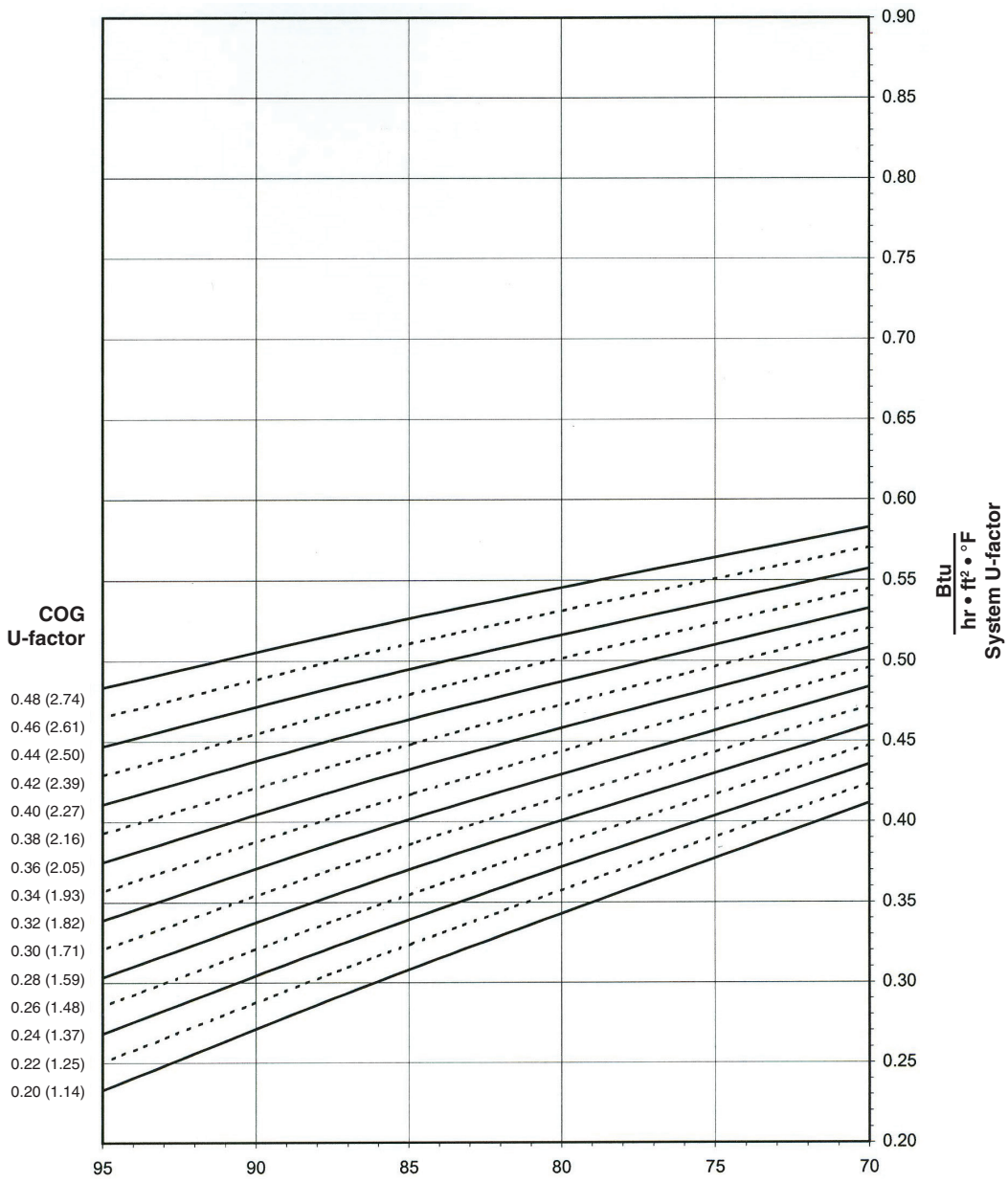


Based on 66% glass and center of glass (COG) U-factor of 0.42
System U-factor is equal to 0.53 Btu/hr • ft² • °F

FIXED WINDOW WITH 1" GLAZING

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

System U-factor vs Percent of Glass Area

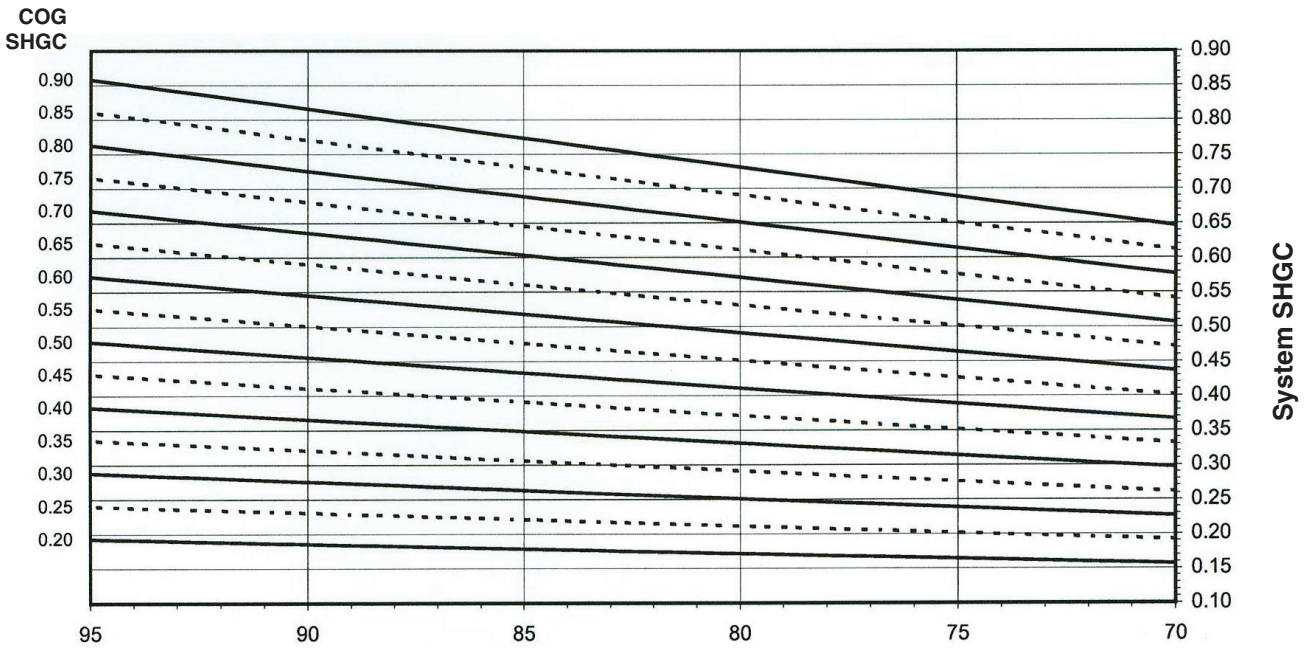


Percent of Glass Area = Vision Area/Total Area
Daylight Opening / Projected Area

Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

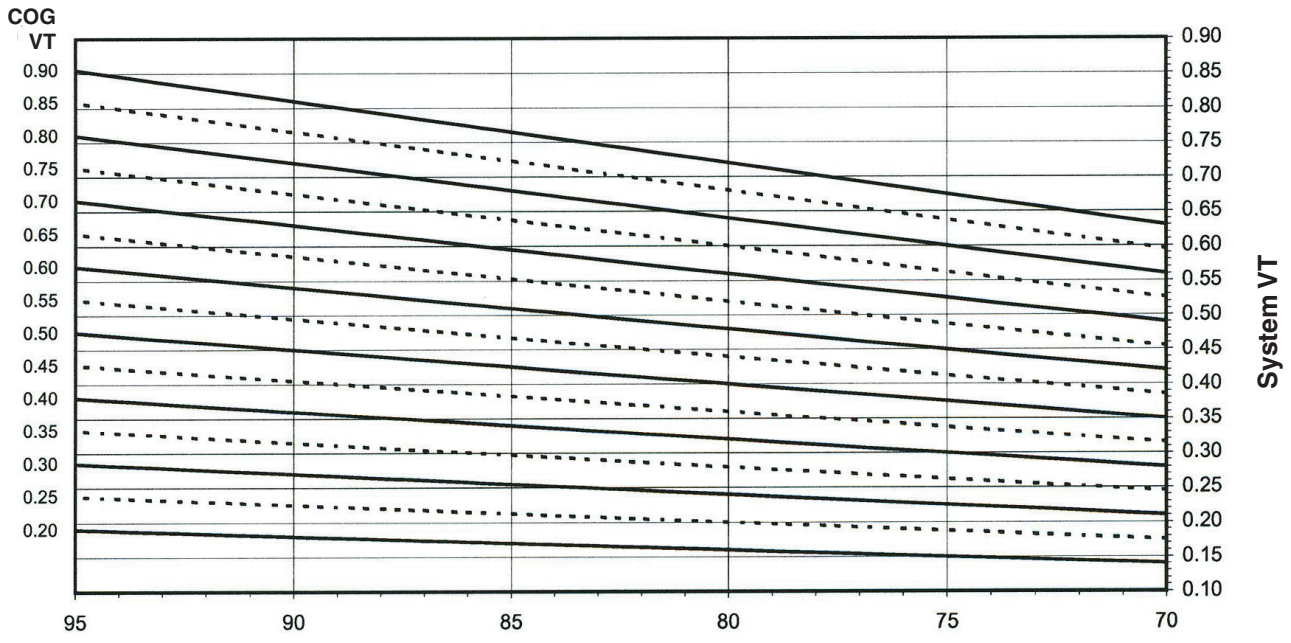
FIXED WINDOW WITH 1" GLAZING

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



Vision Area / Total Area (%)

System Visible Transmittance (VT) vs Percent of Vision Area



Vision Area / Total Area (%)

Thermal Transmittance [1] (BTU/hr • ft [2] • °F)

Glass U-Factor [3]	Overall U-Factor [4]
0.48	0.53
0.46	0.51
0.44	0.50
0.42	0.48
0.40	0.46
0.38	0.45
0.36	0.43
0.34	0.42
0.32	0.40
0.30	0.39
0.28	0.37
0.26	0.36
0.24	0.34
0.22	0.32
0.20	0.31

FIXED WINDOW WITH 1" GLAZING

NOTE: For glass values that are not listed, linear interpolation is permitted.

1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 1200mm wide by 1500mm high (47-1/4" by 59-1/16").

SHGC Matrix [2]

Glass SHGC [3]	Overall SHGC [4]
0.90	0.77
0.85	0.73
0.80	0.69
0.75	0.65
0.70	0.60
0.65	0.56
0.60	0.52
0.55	0.48
0.50	0.43
0.45	0.39
0.40	0.35
0.35	0.31
0.30	0.26
0.25	0.22
0.20	0.18

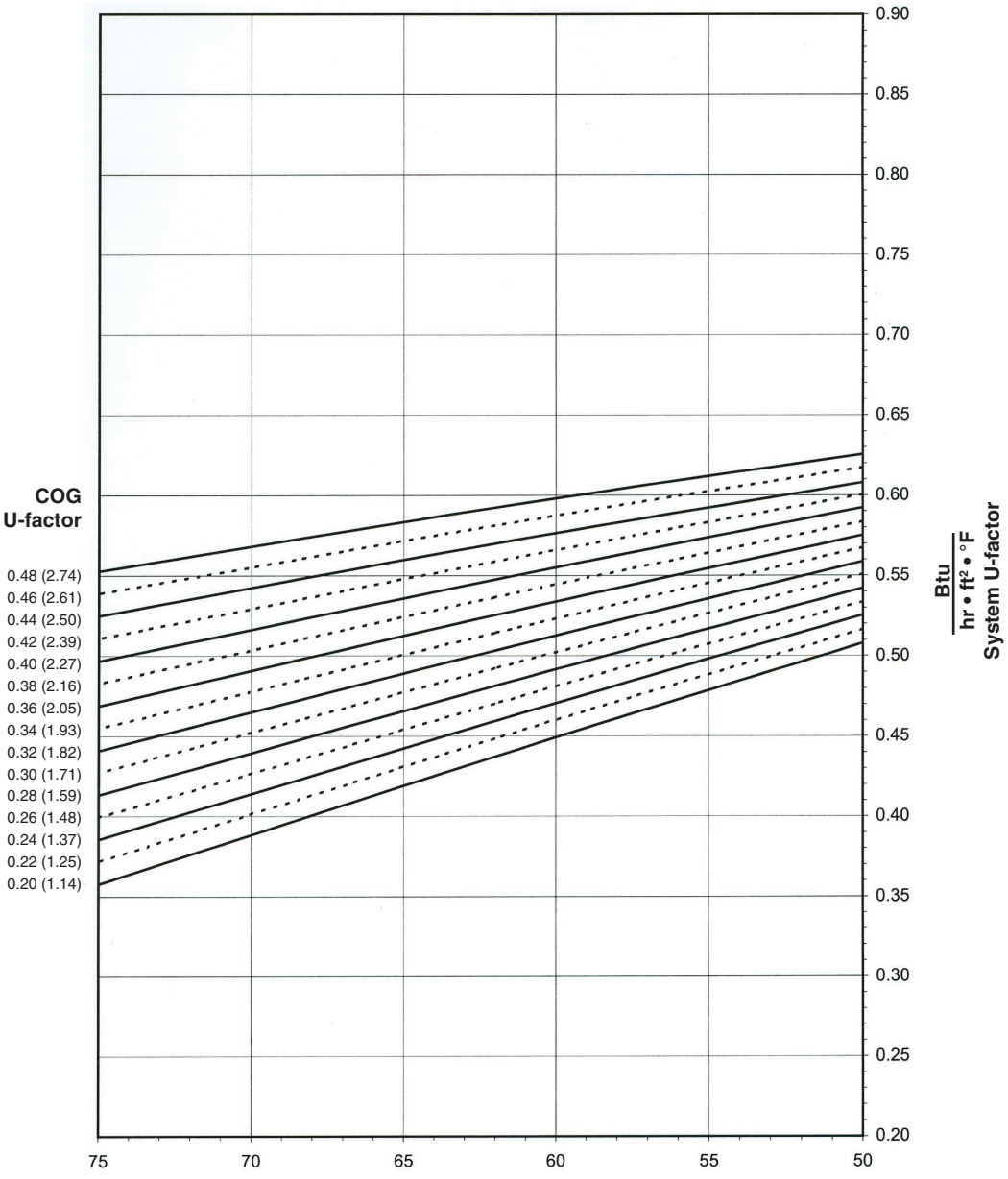
Visible Transmittance [2]

Glass VT [3]	Overall VT [4]
0.90	0.76
0.85	0.72
0.80	0.68
0.75	0.64
0.70	0.59
0.65	0.55
0.60	0.51
0.55	0.47
0.50	0.42
0.45	0.38
0.40	0.34
0.35	0.30
0.30	0.25
0.25	0.21
0.20	0.17

PROJECT-IN WINDOW WITH 1" GLAZING

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

System U-factor vs Percent of Glass Area

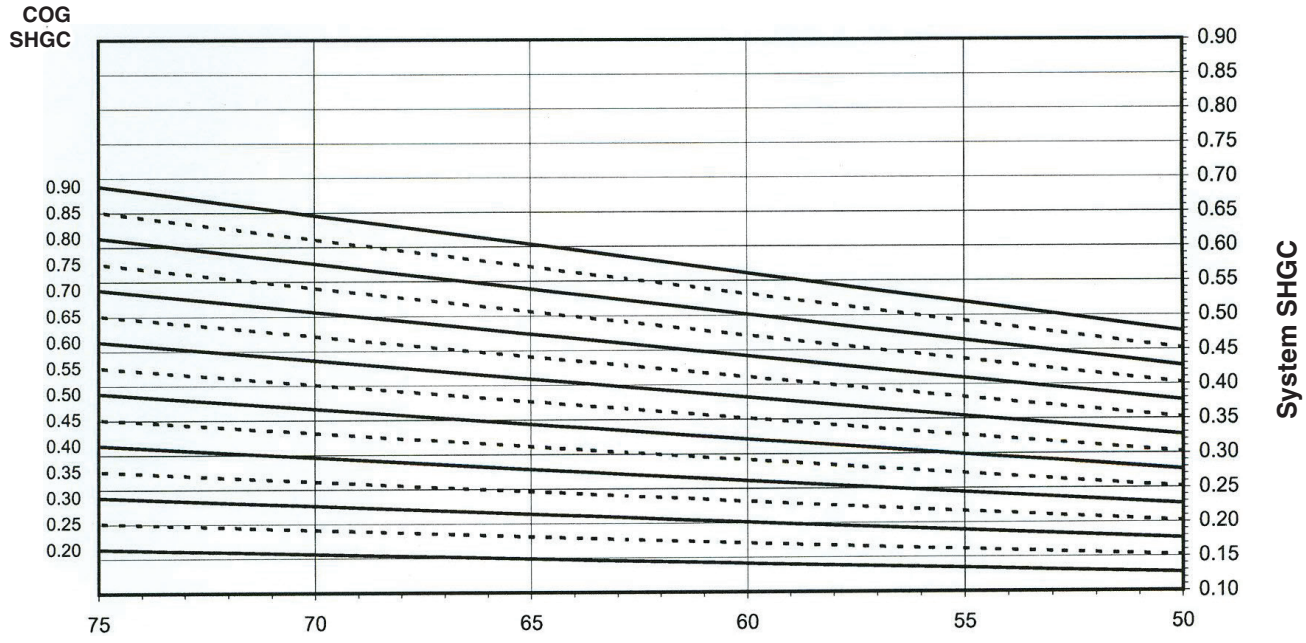


Percent of Glass Area = Vision Area/Total Area
Daylight Opening / Projected Area

Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

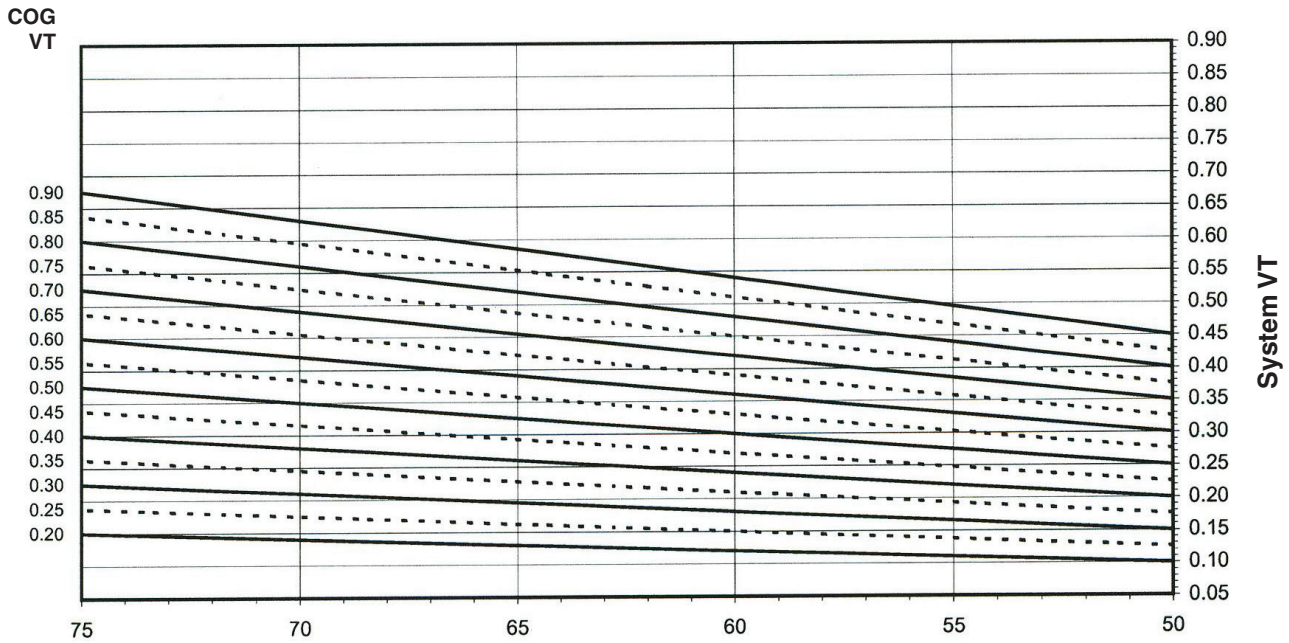
PROJECT-IN WINDOW WITH 1" GLAZING

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



Vision Area / Total Area (%)

System Visible Transmittance (VT) vs Percent of Vision Area



Vision Area / Total Area (%)

Thermal Transmittance [1] (BTU/hr • ft [2] • °F)

Glass U-Factor [3]	Overall U-Factor [4]
0.48	0.59
0.46	0.58
0.44	0.57
0.42	0.56
0.40	0.55
0.38	0.54
0.36	0.53
0.34	0.51
0.32	0.50
0.30	0.49
0.28	0.48
0.26	0.47
0.24	0.46
0.22	0.45
0.20	0.44

PROJECT-IN WINDOW WITH 1" GLAZING

NOTE: For glass values that are not listed, linear interpolation is permitted.

1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 1500mm wide by 600mm high (59-1/16" by 23-5/8").

SHGC Matrix [2]

Glass SHGC [3]	Overall SHGC [4]
0.90	0.58
0.85	0.55
0.80	0.52
0.75	0.49
0.70	0.45
0.65	0.42
0.60	0.39
0.55	0.36
0.50	0.33
0.45	0.30
0.40	0.27
0.35	0.24
0.30	0.21
0.25	0.18
0.20	0.14

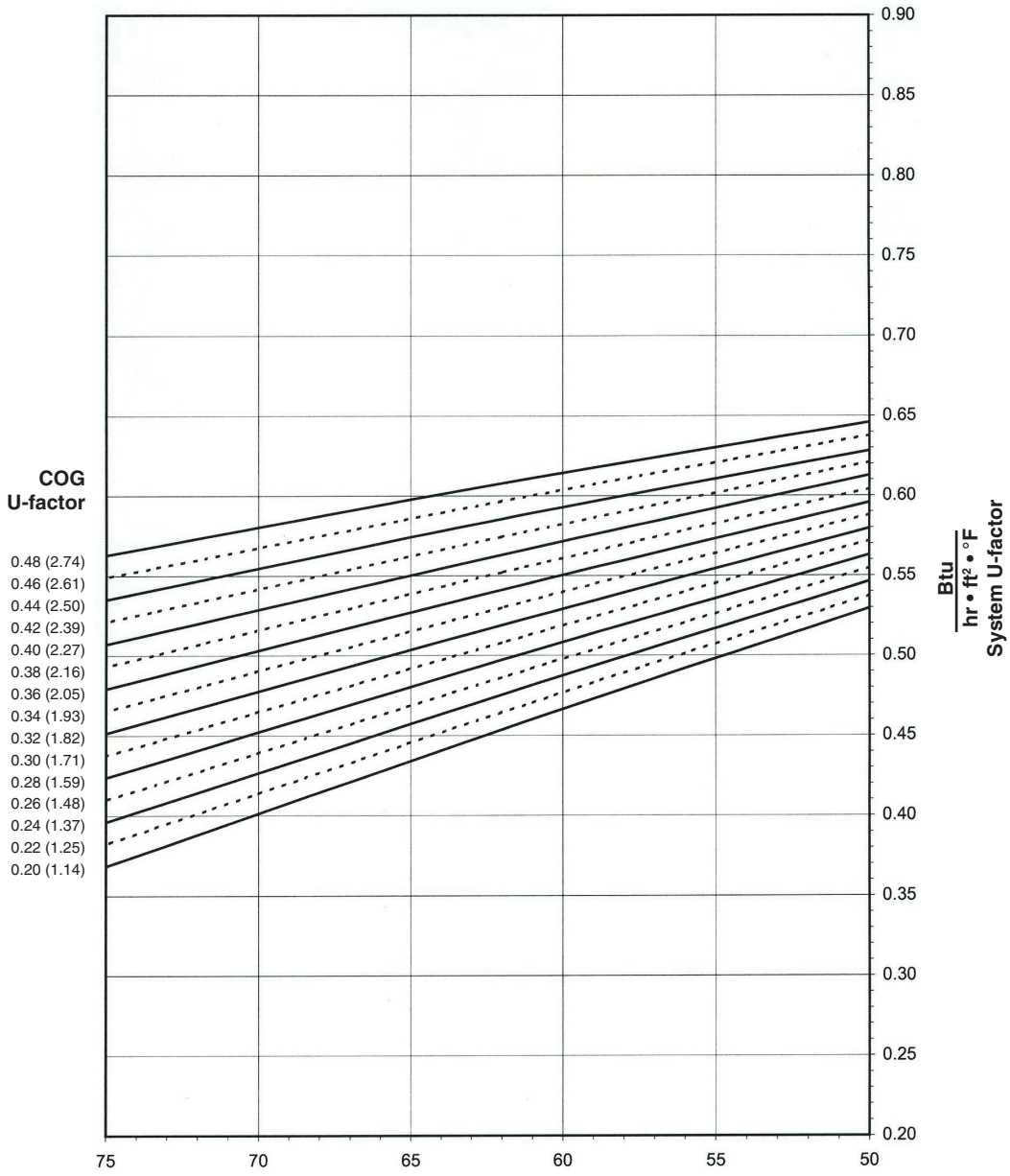
Visible Transmittance [2]

Glass VT [3]	Overall VT [4]
0.90	0.56
0.85	0.53
0.80	0.50
0.75	0.47
0.70	0.43
0.65	0.40
0.60	0.37
0.55	0.34
0.50	0.31
0.45	0.28
0.40	0.25
0.35	0.22
0.30	0.19
0.25	0.16
0.20	0.12

PROJECT-OUT WINDOW WITH 1" GLAZING

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

System U-factor vs Percent of Glass Area

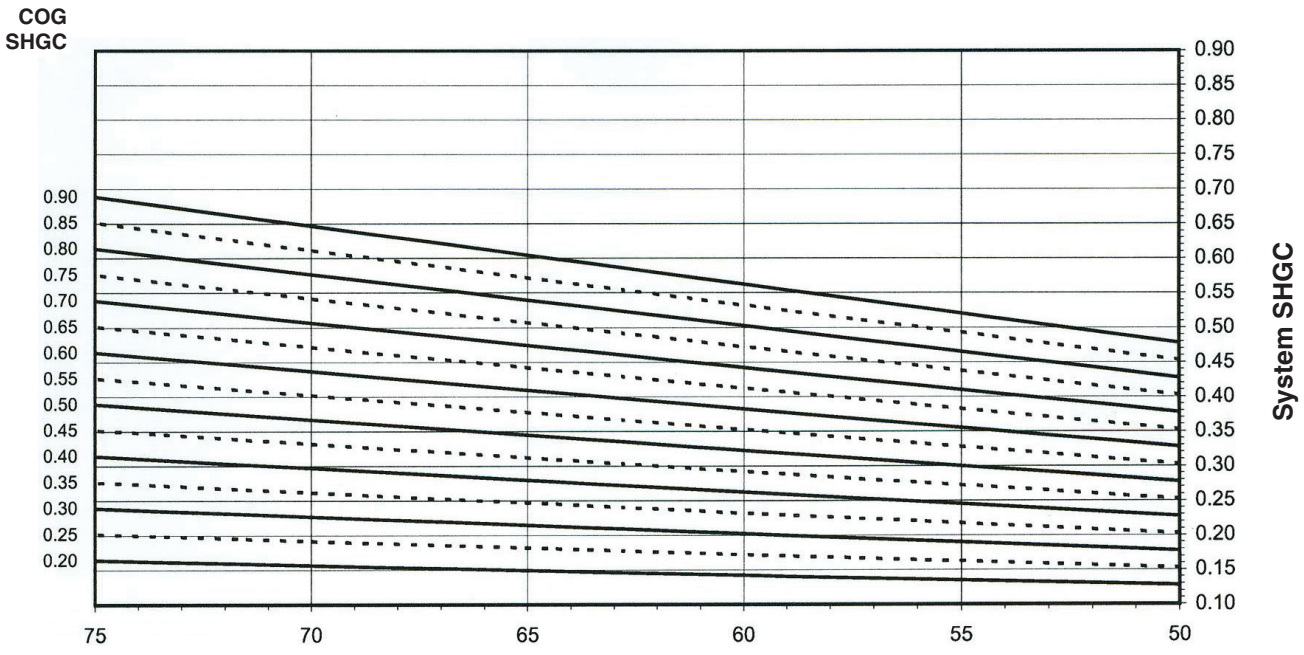


Percent of Glass Area = Vision Area/Total Area
Daylight Opening / Projected Area

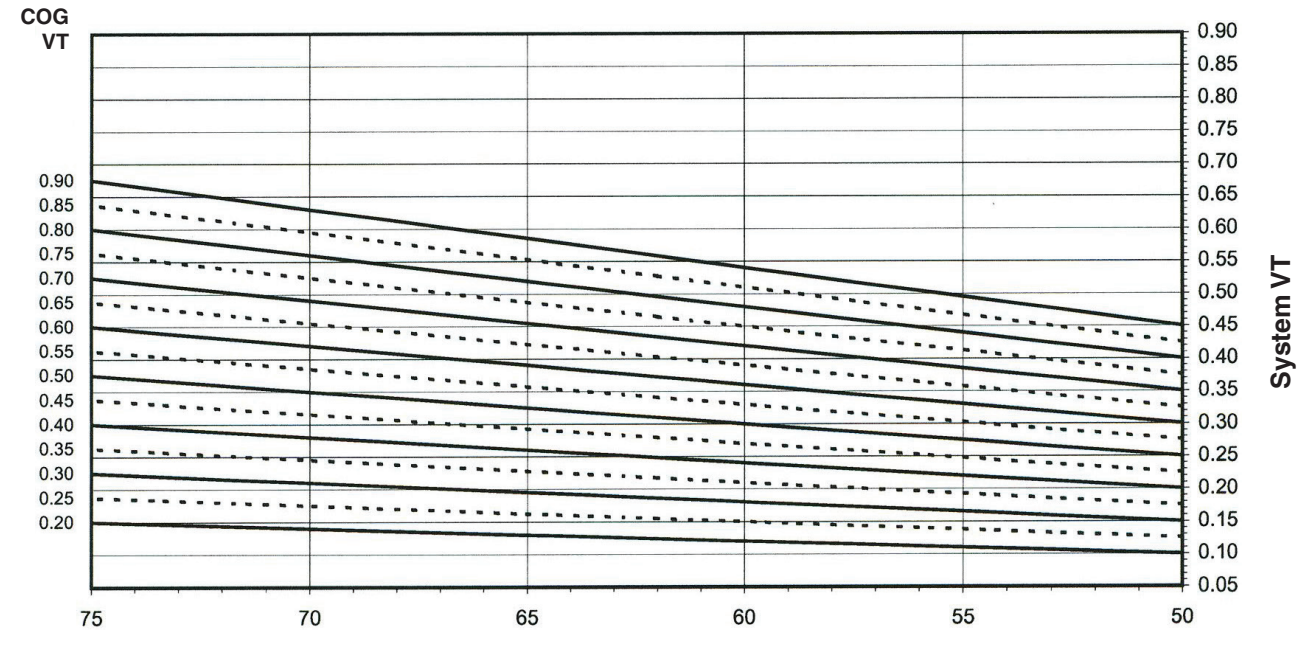
Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

PROJECT-OUT WINDOW WITH 1" GLAZING

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



Thermal Transmittance [1] (BTU/hr • ft [2] • °F)

Glass U-Factor [3]	Overall U-Factor [4]
0.48	0.61
0.46	0.60
0.44	0.59
0.42	0.57
0.40	0.56
0.38	0.55
0.36	0.54
0.34	0.53
0.32	0.52
0.30	0.51
0.28	0.50
0.26	0.49
0.24	0.48
0.22	0.46
0.20	0.45

PROJECT-OUT WINDOW WITH 1" GLAZING

NOTE: For glass values that are not listed, linear interpolation is permitted.

1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 1500mm wide by 600mm high (59-1/16" by 23-5/8").

SHGC Matrix [2]

Glass SHGC [3]	Overall SHGC [4]
0.90	0.58
0.85	0.55
0.80	0.52
0.75	0.49
0.70	0.46
0.65	0.42
0.60	0.39
0.55	0.36
0.50	0.33
0.45	0.30
0.40	0.27
0.35	0.24
0.30	0.21
0.25	0.18
0.20	0.15

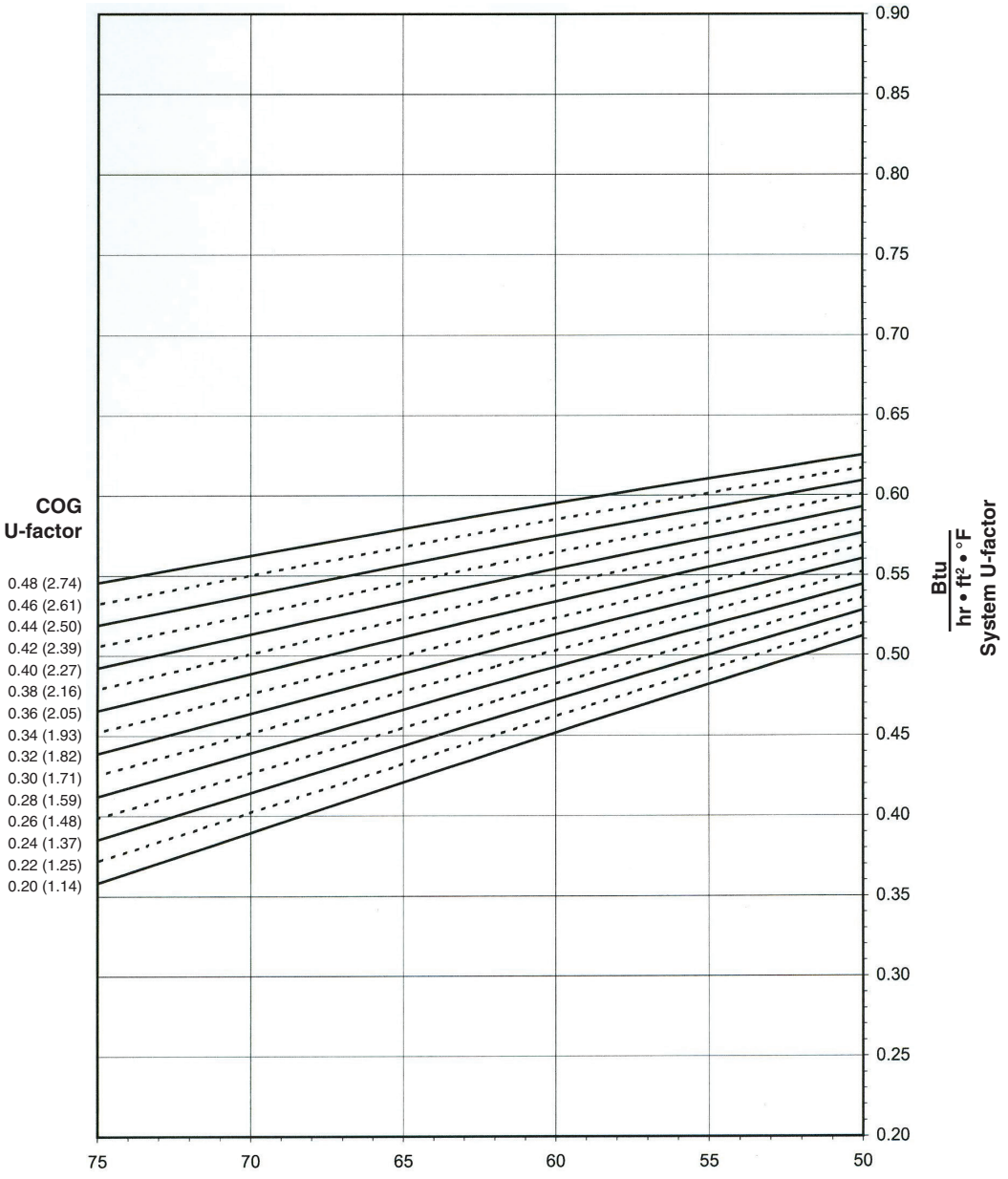
Visible Transmittance [2]

Glass VT [3]	Overall VT [4]
0.90	0.56
0.85	0.53
0.80	0.50
0.75	0.47
0.70	0.43
0.65	0.40
0.60	0.37
0.55	0.34
0.50	0.31
0.45	0.28
0.40	0.25
0.35	0.22
0.30	0.19
0.25	0.16
0.20	0.12

INSWING CASEMENT WINDOW WITH 1" GLAZING

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

System U-factor vs Percent of Glass Area

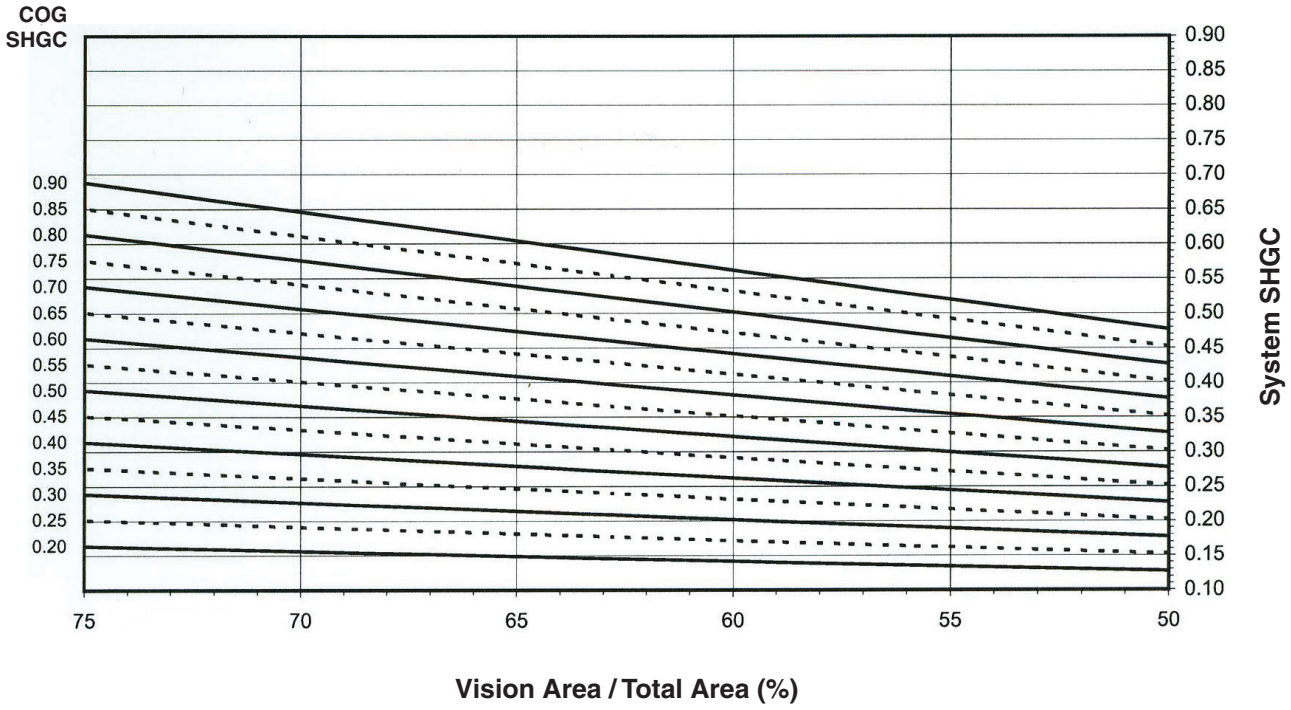


Percent of Glass Area = Vision Area/Total Area
Daylight Opening / Projected Area

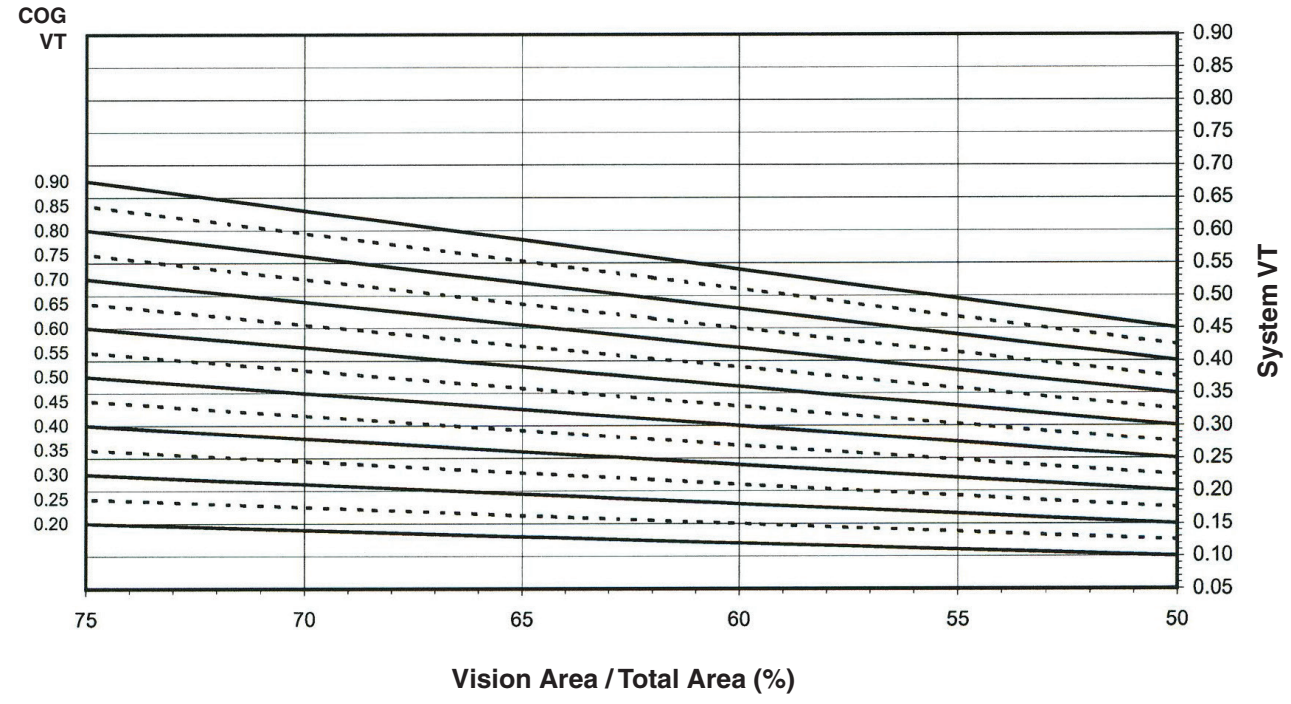
Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

INSWING CASEMENT WINDOW WITH 1" GLAZING

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



Thermal Transmittance [1] (BTU/hr • ft [2] • °F)

Glass U-Factor [3]	Overall U-Factor [4]
0.48	0.59
0.46	0.58
0.44	0.57
0.42	0.56
0.40	0.55
0.38	0.54
0.36	0.52
0.34	0.51
0.32	0.50
0.30	0.49
0.28	0.48
0.26	0.47
0.24	0.46
0.22	0.45
0.20	0.44

INSWING CASEMENT WINDOW WITH 1" GLAZING

NOTE: For glass values that are not listed, linear interpolation is permitted.

1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 600mm wide by 1500mm high (23-5/8" by 59-1/16").

SHGC Matrix [2]

Glass SHGC [3]	Overall SHGC [4]
0.90	0.58
0.85	0.55
0.80	0.52
0.75	0.49
0.70	0.45
0.65	0.42
0.60	0.39
0.55	0.36
0.50	0.33
0.45	0.30
0.40	0.27
0.35	0.24
0.30	0.21
0.25	0.18
0.20	0.14

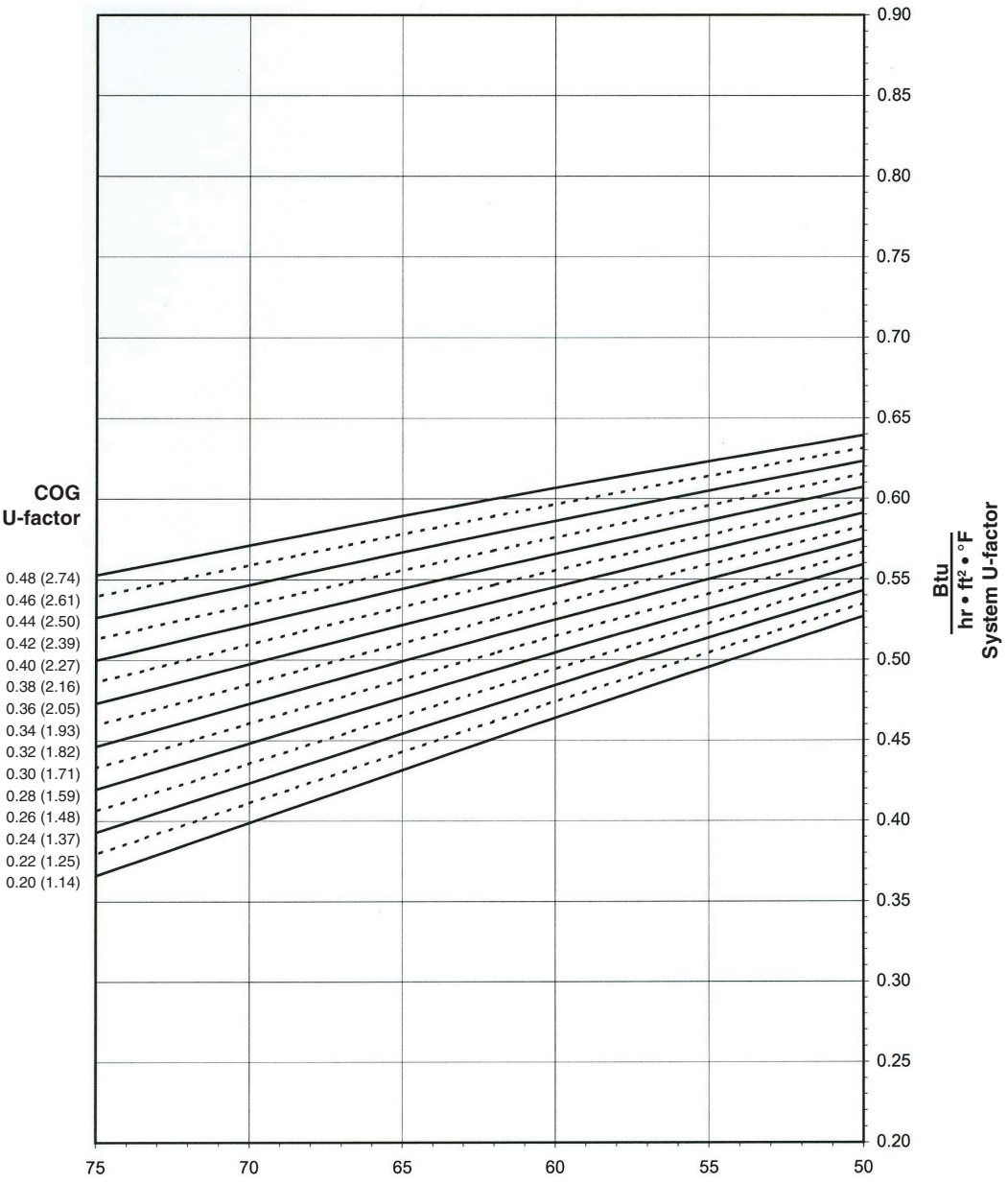
Visible Transmittance [2]

Glass VT [3]	Overall VT [4]
0.90	0.56
0.85	0.53
0.80	0.50
0.75	0.47
0.70	0.43
0.65	0.40
0.60	0.37
0.55	0.34
0.50	0.31
0.45	0.28
0.40	0.25
0.35	0.22
0.30	0.19
0.25	0.16
0.20	0.12

OUTSWING CASEMENT WINDOW WITH 1" GLAZING

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

System U-factor vs Percent of Glass Area

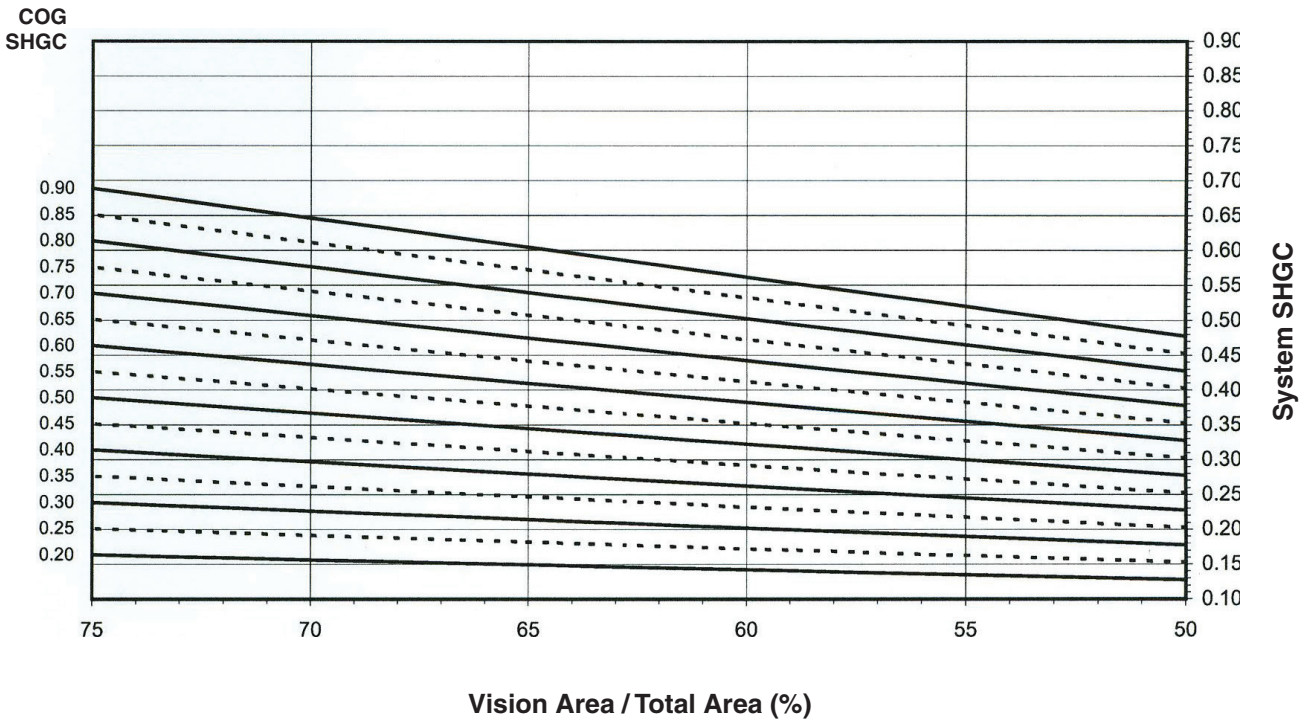


Percent of Glass Area = Vision Area/Total Area
Daylight Opening / Projected Area

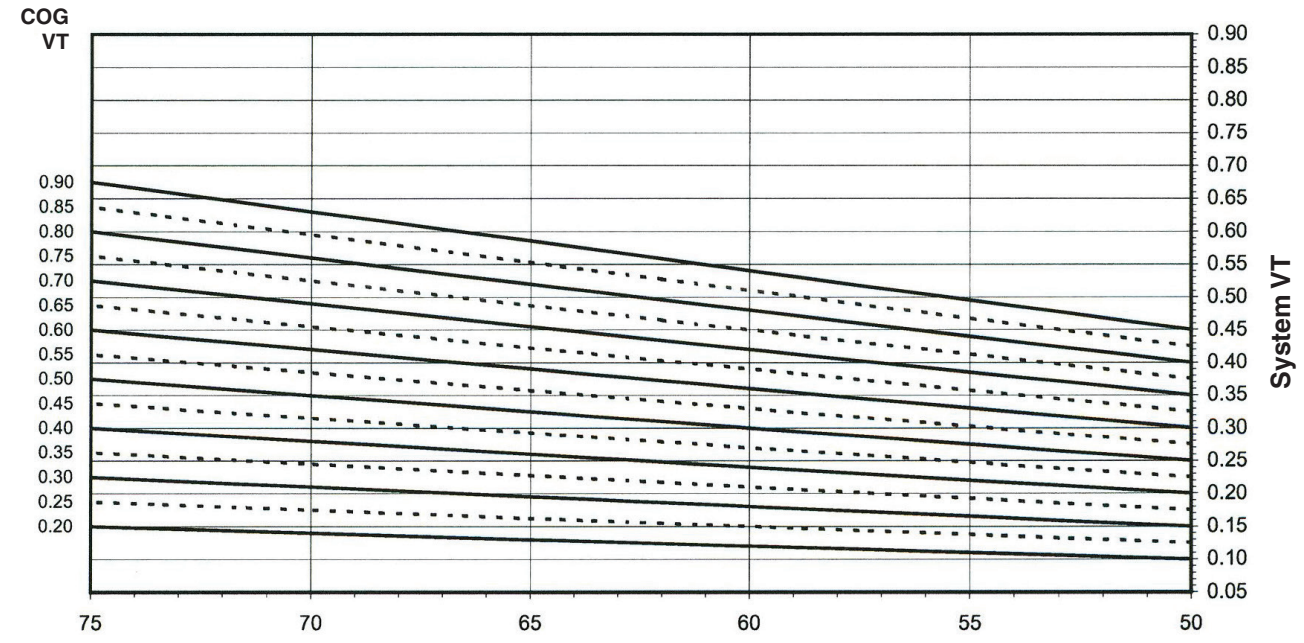
Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

OUTSWING CASEMENT WINDOW WITH 1" GLAZING

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



Thermal Transmittance [1] (BTU/hr • ft [2] • °F)

Glass U-Factor [3]	Overall U-Factor [4]
0.48	0.60
0.46	0.59
0.44	0.58
0.42	0.57
0.40	0.56
0.38	0.55
0.36	0.54
0.34	0.53
0.32	0.51
0.30	0.50
0.28	0.49
0.26	0.48
0.24	0.47
0.22	0.46
0.20	0.45

OUTSWING CASEMENT WINDOW WITH 1" GLAZING

NOTE: For glass values that are not listed, linear interpolation is permitted.

1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 600mm wide by 1500mm high (23-5/8" by 59-1/16").

SHGC Matrix [2]

Glass SHGC [3]	Overall SHGC [4]
0.90	0.58
0.85	0.55
0.80	0.52
0.75	0.49
0.70	0.45
0.65	0.42
0.60	0.39
0.55	0.36
0.50	0.33
0.45	0.30
0.40	0.27
0.35	0.24
0.30	0.21
0.25	0.18
0.20	0.14

Visible Transmittance [2]

Glass VT [3]	Overall VT [4]
0.90	0.56
0.85	0.53
0.80	0.50
0.75	0.47
0.70	0.43
0.65	0.40
0.60	0.37
0.55	0.34
0.50	0.31
0.45	0.38
0.40	0.25
0.35	0.22
0.30	0.19
0.25	0.16
0.20	0.12

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EC 97911-104

LAWS AND BUILDING AND SAFETY CODES GOVERNING THE DESIGN AND USE OF GLAZED ENTRANCE, WINDOW, AND CURTAIN WALL PRODUCTS VARY WIDELY. KAWNEER DOES NOT CONTROL THE SELECTION OF PRODUCT CONFIGURATIONS, OPERATING HARDWARE, OR GLAZING MATERIALS, AND ASSUMES NO RESPONSIBILITY THEREFOR.

Metric (SI) conversion figures are included throughout these details for reference.
Numbers in parentheses ( ) are millimeters unless otherwise noted.

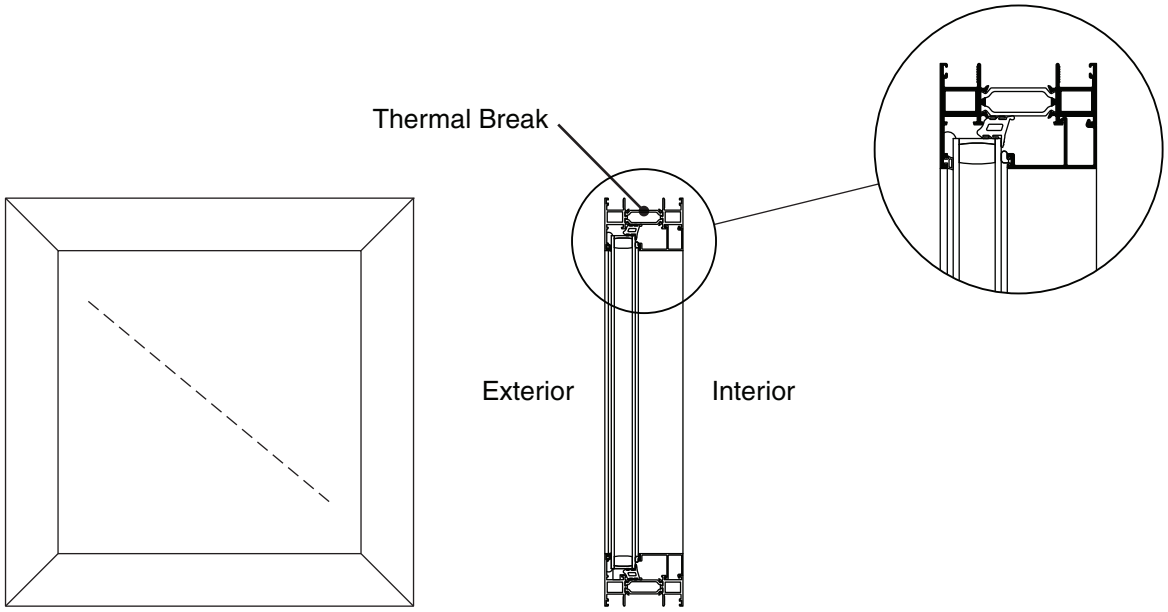
The following metric (SI) units are found in these details:

m – meter
cm – centimeter
mm – millimeter
s – second
Pa – pascal
MPa – megapascal

Kawneer reserves the right to change configurations without prior notice when deemed necessary for product improvement.

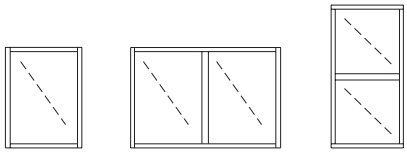
Standard Features

- Architectural Grade Window
- Tested to US and Canadian Standards
- Polyamide Thermal Break
- Tubular Profiles
- 45° Mitered Frame Corners
- Staked Corner Joinery
- Factory Silicone Glazed
- Interior Applied Glazing Bead
- Architectural Anodized Finishes and Applied Coatings
- Interior and Exterior Dual Finish Options

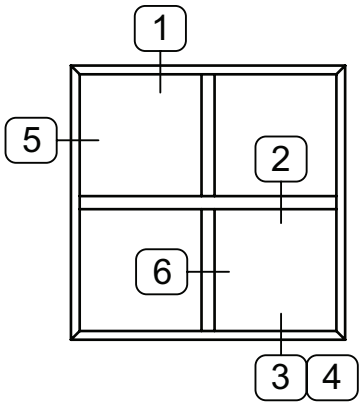


Fixed Window

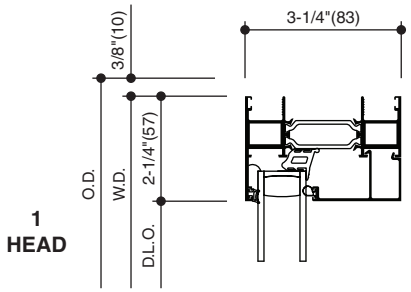
For specific product applications,
Consult your Kawneer representative.

CLASS and GRADE	Architectural Class AW-PG80-FW
TESTING STANDARD	AAMA / WDMA CSA 101 / I.S.2 / A440-05 / A440-08
FRAME DEPTH	3-1/4" Overall Frame Depth
TYPICAL WALL THICKNESS	.080 Nominal Frame
TYPICAL MAXIMUM SIZE	60" x 99"
TYPICAL MINIMUM SIZE	17" x 17"
TYPICAL CONFIGURATIONS	
INFILL OPTIONS	1" and 1-3/4" (Other infill options available upon request.)
STANDARD HARDWARE	Not Applicable
OPTIONAL HARDWARE	Not Applicable
OTHER OPTIONS	Structural Mullions Vertically or Horizontally Stacked Receptor and Sub Sill Panning Internal Blinds Exterior or Interior Muntins

SCALE : 3" = 1'-0"
(Nominal Dimensions Shown)



TYPICAL ELEVATION



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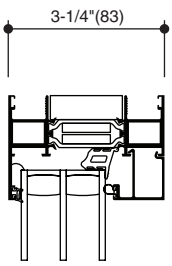

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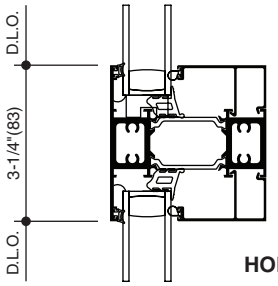

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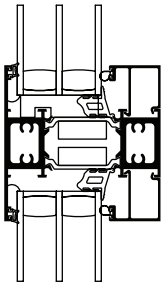

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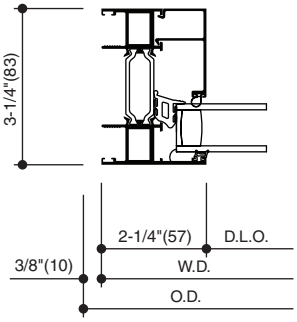

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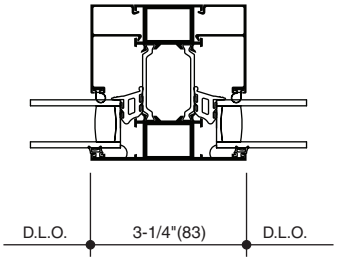

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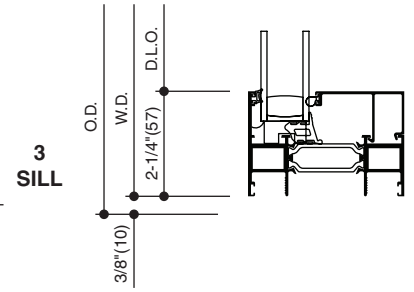

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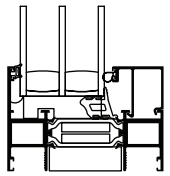

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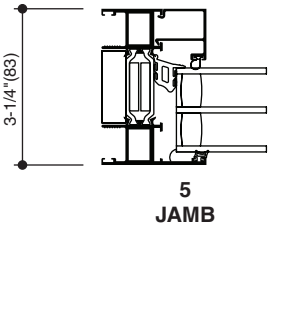

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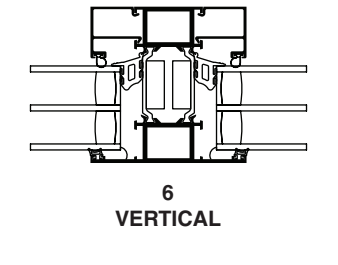

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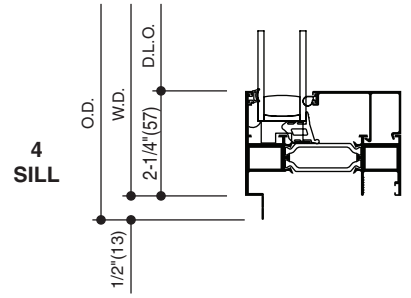

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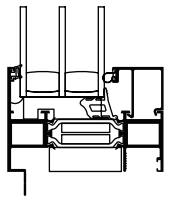
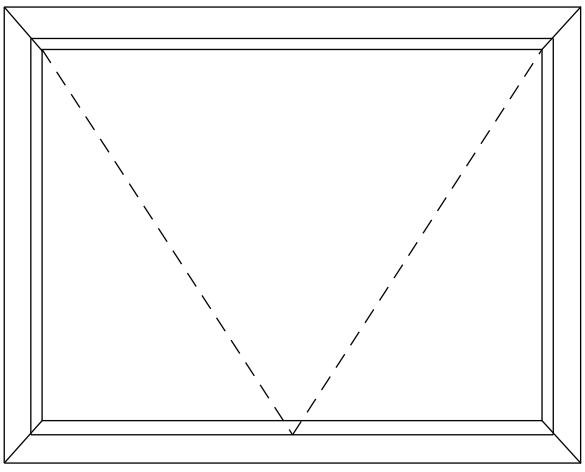


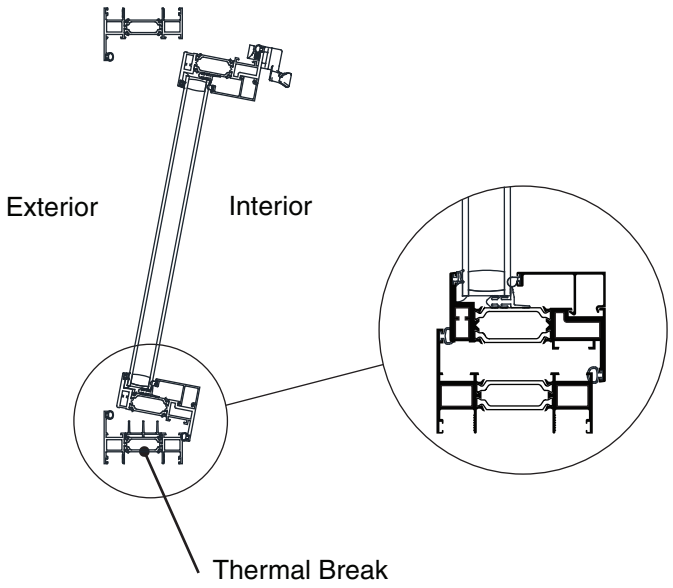
4
SILL

Standard Features

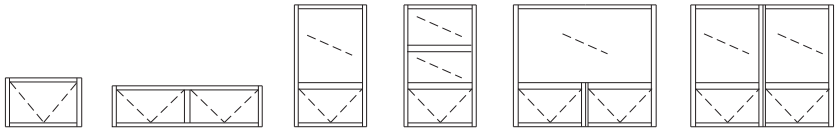
- Architectural Grade Window
- Tested to US and Canadian Standards
- Polyamide Thermal Break
- Tubular Profiles
- 45° Mitered Vent and Frame Corners
- Staked Corner Joinery
- Factory Silicone Glazed
- Adjustable EURO-Groove Mounted Hardware
- Interior Applied Glazing Bead
- Architectural Anodized Finishes and Applied Coatings
- Interior and Exterior Dual Finish Options



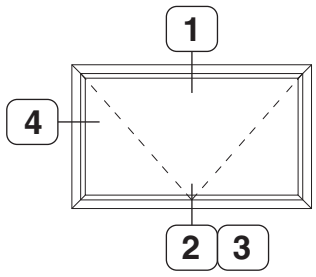
Project-In Window



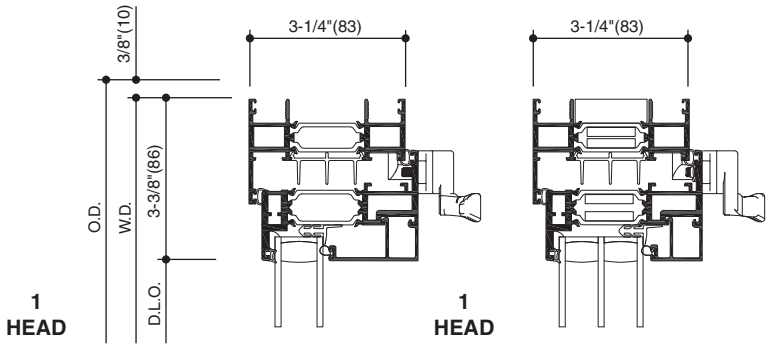
For specific product applications,
Consult your Kawneer representative.

CLASS and GRADE	Architectural Grade AW-PG80-AP
TESTING STANDARD	AAMA / WDMA CSA 101 / I.S.2 / A440-05 / A440-08
FRAME DEPTH	3-1/4" Overall Frame Depth
TYPICAL WALL THICKNESS	.080 Nominal Frame / .125" Nominal Vent
TYPICAL MAX. VENT SIZE	60" x 36"
TYPICAL MIN. VENT SIZE	24" x 19"
TYPICAL CONFIGURATIONS	
INFILL OPTIONS	1" and 1-3/4" (Other infill options available upon request.)
STANDARD HARDWARE	Stainless Steel 4-Bar Hinges Cast White Bronze Cam Handles
OPTIONAL HARDWARE	Access Control Locks Pole and Pole Ring Limit Stop
OTHER OPTIONS	Structural Mullions Vertically or Horizontally Stacked Insect Screens Receptor and Sub Sill Panning Internal Blinds Exterior or Interior Muntins

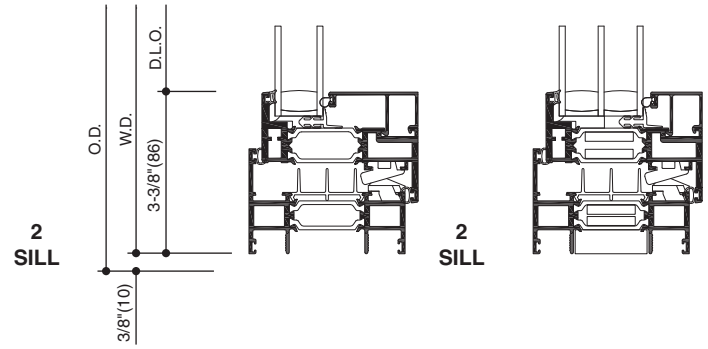
SCALE : 3" = 1'-0"
(Nominal Dimensions Shown)



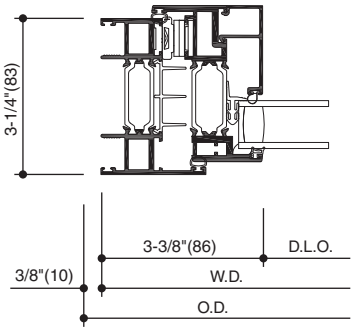
TYPICAL ELEVATION



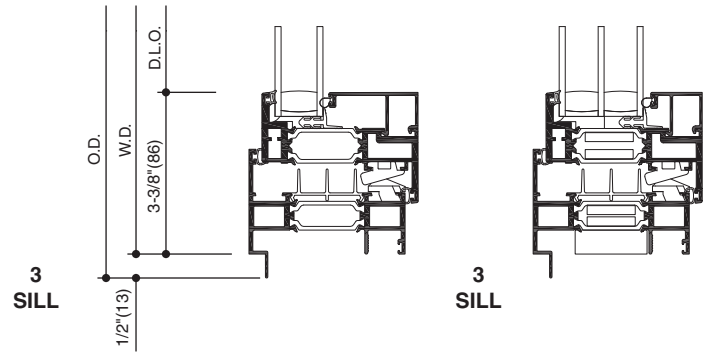
1 HEAD **1 HEAD**



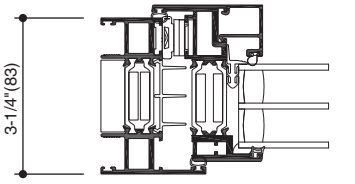
2 SILL **2 SILL**



4 JAMB

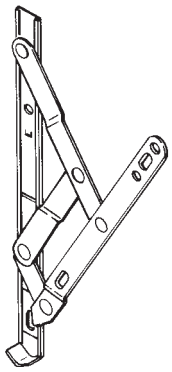


3 SILL **3 SILL**



4 JAMB

STAINLESS STEEL 4 BAR HINGES

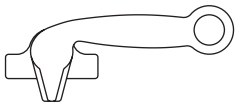


A standard hinge for ventilators providing approximately 45° to 60° openings depending on size. An optional limit stop is available to restrict hinge travel and limit vent opening.

CAM HANDLE

Cast white bronze cam handles are an alternative to standard multi-point locking for the operation and locking of ventilators.

CAM HANDLE WITH POLE RING

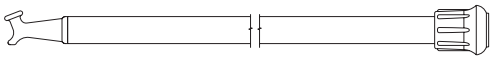


Cast white bronze cam handles with pole ring provide manual operation of ventilators located above reach.
These handles are operated with a sash pole.

POLE RING

Cast white bronze pole ring is used in conjunction with locking hardware for sash pole operation of ventilators.

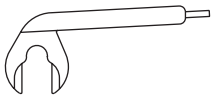
SASH POLE

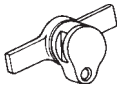


HANGER FOR SASH POLE

A 3/4" diameter aluminum sash pole with a cast white bronze pull down hook and black rubber tip. Available in 6 ft. and 12 ft. lengths with optional cast white bronze Pole Hanger.

ACCESS CONTROL LOCK

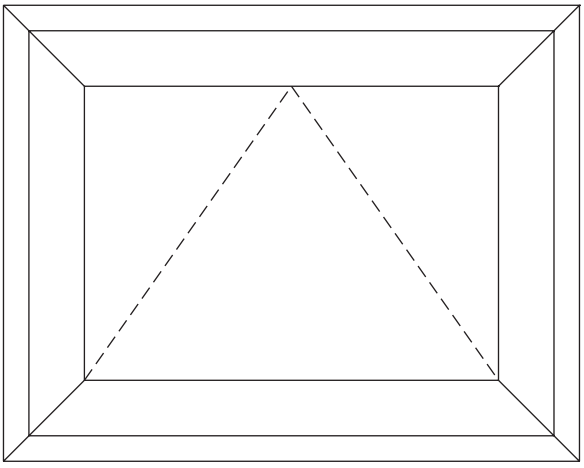




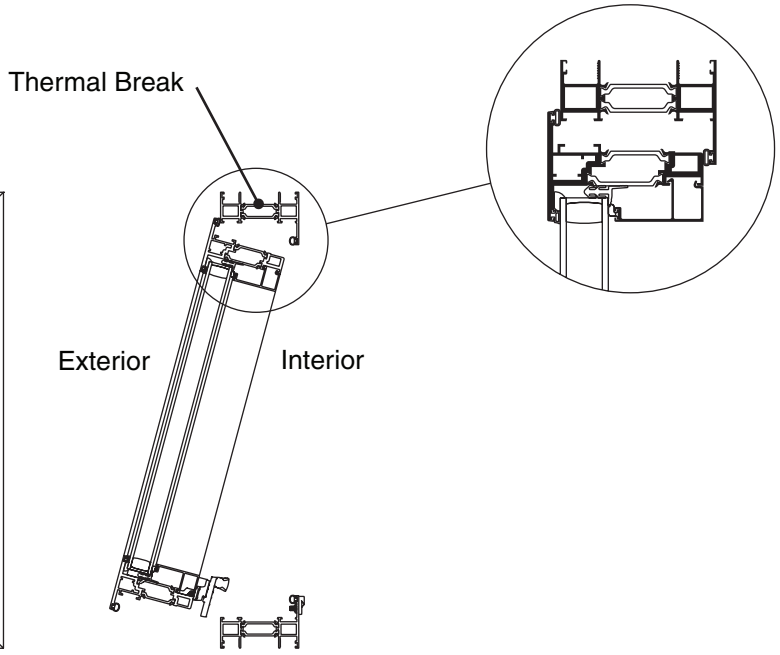
In lieu of cam handles and multi-point locking cast white bronze access control locks are offered for managed control of vent operations.
Lock is operated with a manganese bronze removable handle.

Standard Features

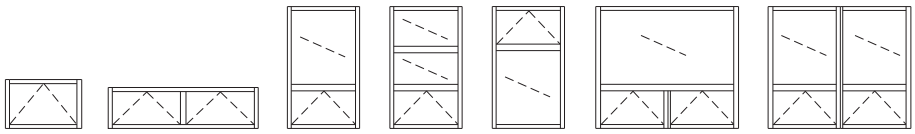
- Architectural Grade Window
- Tested to US and Canadian Standards
- Polyamide Thermal Break
- Tubular Profiles
- 45° Mitered Vent and Frame Corners
- Staked Corner Joinery
- Factory Silicone Glazed
- Adjustable EURO-Groove Mounted Hardware
- Interior Applied Glazing Bead
- Architectural Anodized Finishes and Applied Coatings
- Interior and Exterior Dual Finish Options



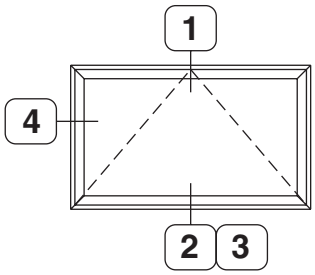
Project-out Window



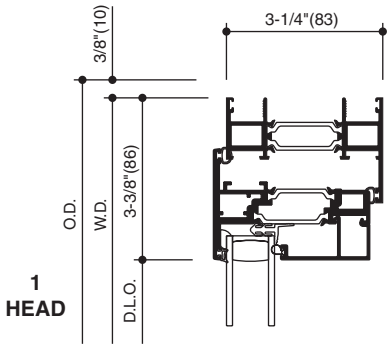
For specific product applications,
Consult your Kawneer representative.

CLASS and GRADE	Architectural Grade AW-PG80-AP
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S.2 / A440-05 / A440-08
FRAME DEPTH	3-1/4" Overall Frame Depth
TYPICAL WALL THICKNESS	.080 Nominal Frame / .125" Nominal Vent
TYPICAL MAX. VENT SIZE	60" x 36"
TYPICAL MIN. VENT SIZE	24" x 19"
INFILL OPTIONS	1" and 1-3/4" (Other infill options available upon request.)
TYPICAL CONFIGURATIONS	
STANDARD HARDWARE	Stainless Steel 4-Bar Hinges Cast White Bronze Cam Handles
OPTIONAL HARDWARE	Access Control Locks Pole and Pole Ring Limit Stop Roto Operator
OTHER OPTIONS	Structural Mullions Vertically or Horizontally Stacked Insect Screens Receptor and Sub Sill Panning Internal Blinds Exterior or Interior Muntins

SCALE : 3" = 1'-0"
(Nominal Dimensions Shown)



TYPICAL ELEVATION



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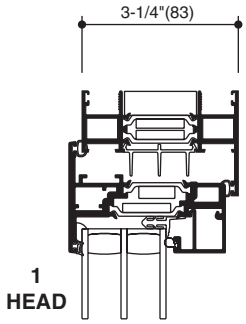

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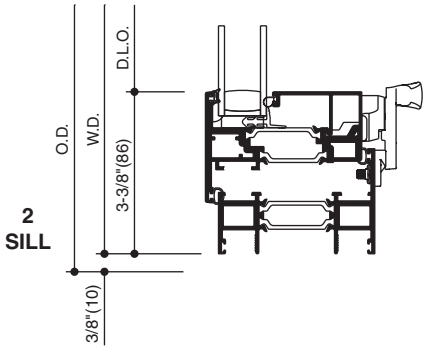

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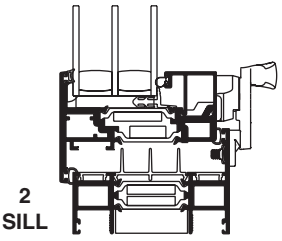

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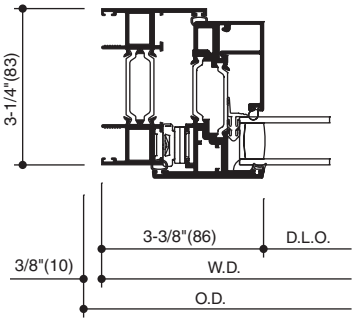

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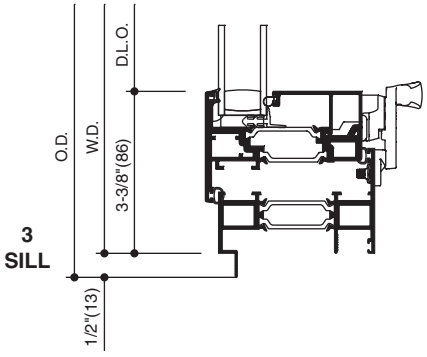
JAMB



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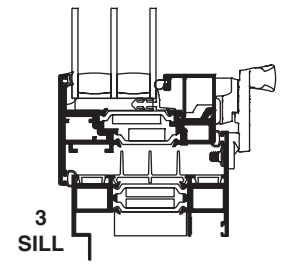
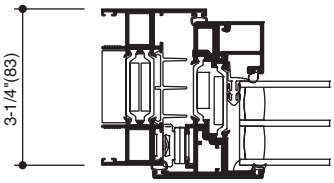
SILL

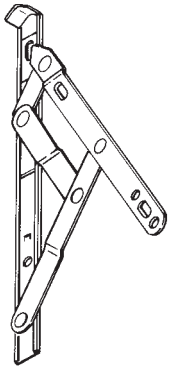


3
SILL



4
JAMB

STAINLESS STEEL 4 BAR HINGES

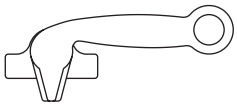


A standard hinge for ventilators providing approximately 45° to 60° openings depending on size. An optional limit stop is available to restrict hinge travel and limit vent opening.

CAM HANDLE

Cast white bronze cam handles are an alternative to standard multi-point locking for the operation and locking of ventilators.

CAM HANDLE WITH POLE RING

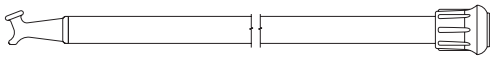


Cast white bronze cam handles with pole ring provide manual operation of ventilators located above reach.
These handles are operated with a sash pole.

POLE RING

Cast white bronze pole ring is used in conjunction with locking hardware for sash pole operation of ventilators.

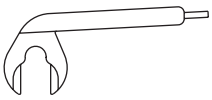
SASH POLE

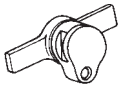


HANGER FOR SASH POLE

A 3/4" diameter aluminum sash pole with a cast white bronze pull down hook and black rubber tip. Available in 6 ft. and 12 ft. lengths with optional cast white bronze Pole Hanger.

ACCESS CONTROL LOCK

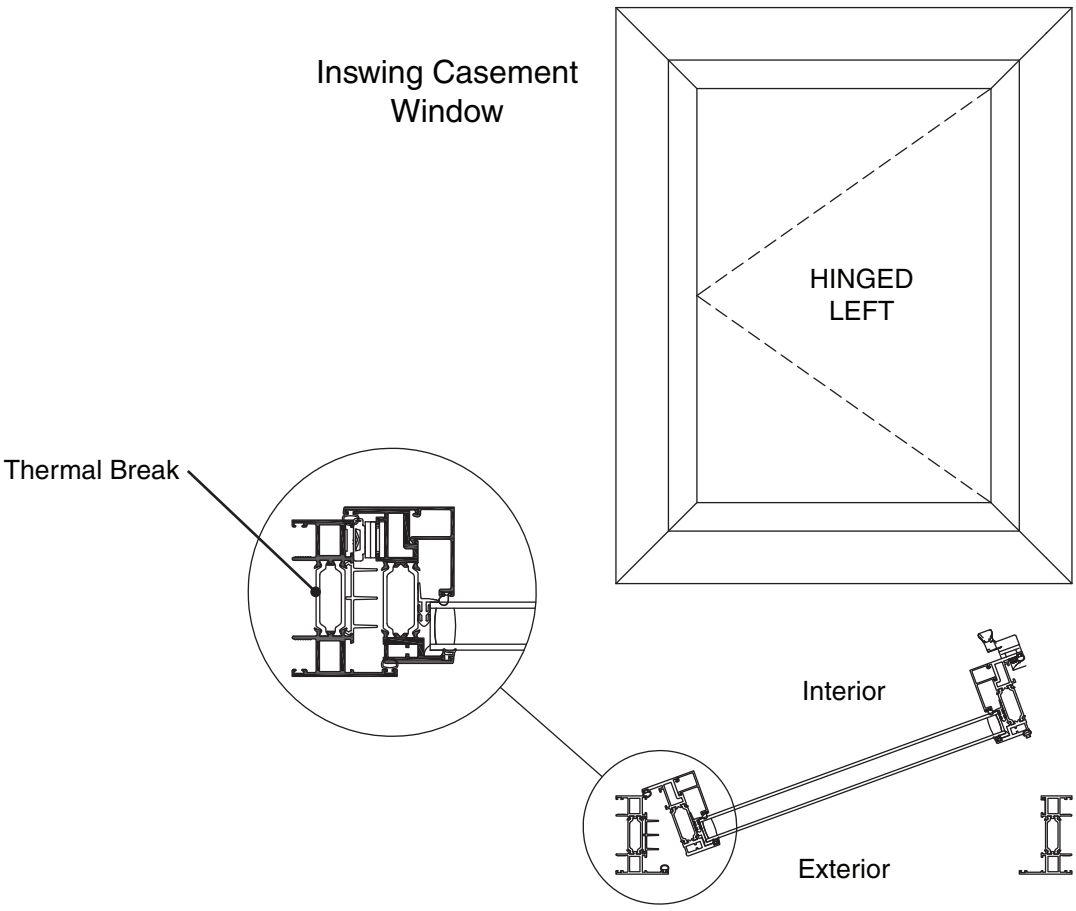




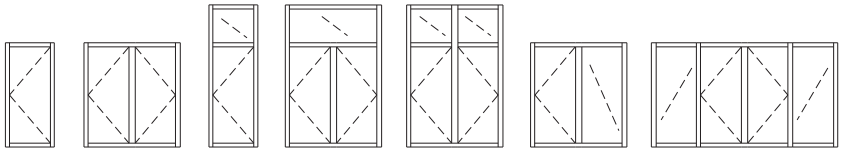
In lieu of cam handles and multi-point locking cast white bronze access control locks are offered for managed control of vent operations.
Lock is operated with a manganese bronze removable handle.

Standard Features

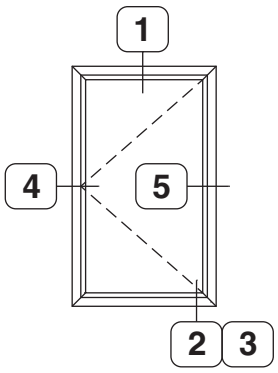
- Architectural Grade Window
- Tested to US and Canadian Standards
- Polyamide Thermal Break
- Tubular Profiles
- 45° Mitered Vent and Frame Corners
- Staked Corner Joinery
- Factory Silicone Glazed
- Adjustable EURO-Groove Mounted Hardware
- Interior Applied Glazing Bead
- Architectural Anodized Finishes and Applied Coatings
- Interior and Exterior Dual Finish Options



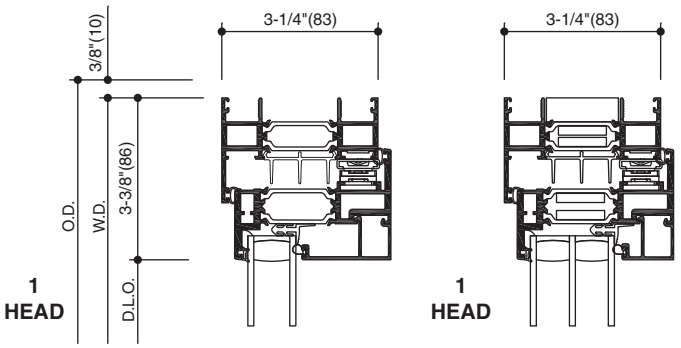
For specific product applications,
Consult your Kawneer representative.

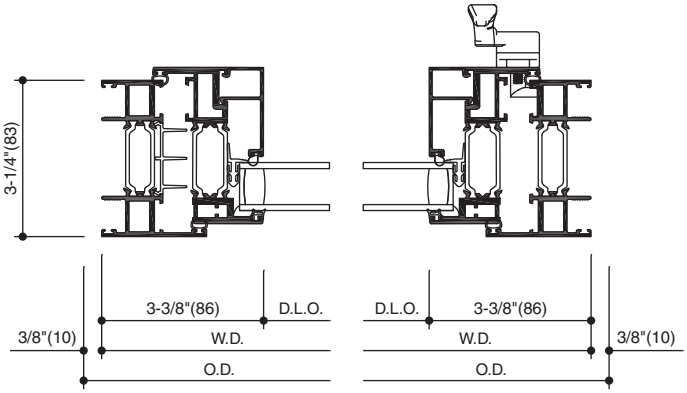
CLASS and GRADE	Architectural Grade AW-PG80-C
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S.2 / A440-05 / A440-08
FRAME DEPTH	3-1/4" Overall Frame Depth
TYPICAL WALL THICKNESS	.080 Nominal Frame / .125" Nominal Vent
TYPICAL MAX. VENT SIZE	36" x 60"
TYPICAL MIN. VENT SIZE	19" x 24"
TYPICAL CONFIGURATIONS	
INFILL OPTIONS	1" and 1-3/4" (Other infill options available upon request.)
STANDARD HARDWARE	Stainless Steel 4-Bar Hinges Cast White Bronze Cam Handles
OPTIONAL HARDWARE	Access Control Locks Pole and Pole Ring Limit Stop Butt Hinges with Friction Adjusters
OTHER OPTIONS	Structural Mullions Vertically or Horizontally Stacked Insect Screens Receptor and Sub Sill Panning Internal Blinds Exterior or Interior Muntins

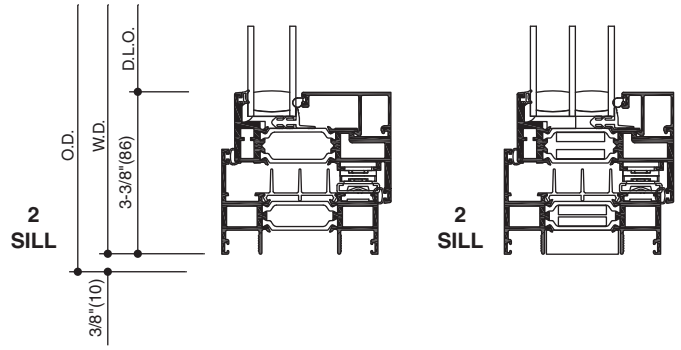
SCALE : 3" = 1'-0"
(Nominal Dimensions Shown)

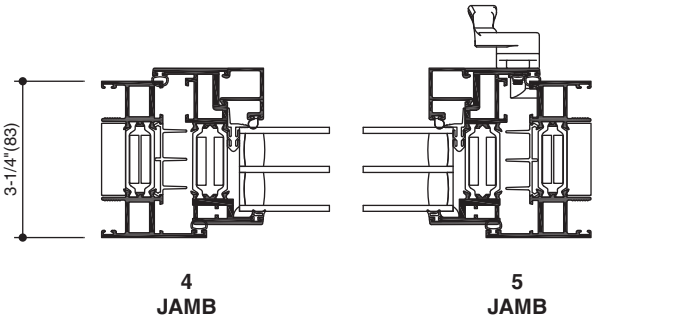


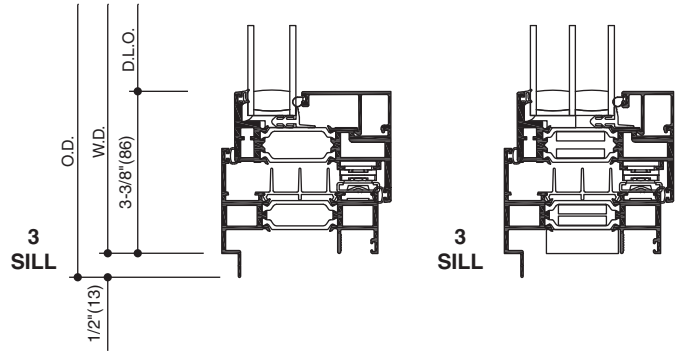
TYPICAL ELEVATION



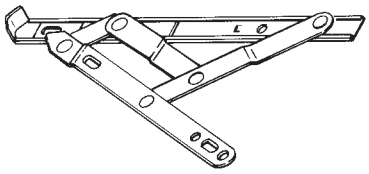








STAINLESS STEEL 4 BAR HINGES

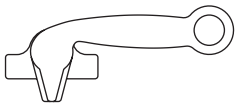


A standard hinge for ventilators providing approximately 45° to 60° openings depending on size. An optional limit stop is available to restrict hinge travel and limit vent opening.

CAM HANDLE

Cast white bronze cam handles are an alternative to standard multi-point locking for the operation and locking of ventilators.

CAM HANDLE WITH POLE RING

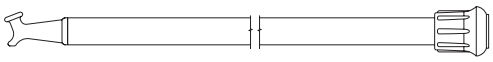


Cast white bronze cam handles with pole ring provide manual operation of ventilators located above reach.
These handles are operated with a sash pole.

POLE RING

Cast white bronze pole ring is used in conjunction with locking hardware for sash pole operation of ventilators.

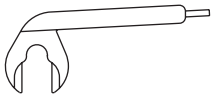
SASH POLE

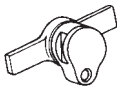


HANGER FOR SASH POLE

A 3/4" diameter aluminum sash pole with a cast white bronze pull down hook and black rubber tip. Available in 6 ft. and 12 ft. lengths with optional cast white bronze Pole Hanger.

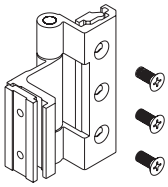
ACCESS CONTROL LOCK





In lieu of cam handles and multi-point locking cast white bronze access control locks are offered for managed control of vent operations.
Lock is operated with a manganese bronze removable handle.

BUTT HINGE



An optional hinge available in clear or bronze anodized finishes or painted to match window. Must be used with Friction Adjusters.

Standard Features

- Architectural Grade Window
- Tested to US and Canadian Standards
- Polyamide Thermal Break
- Tubular Profiles
- 45° Mitered Vent and Frame Corners
- Staked Corner Joinery
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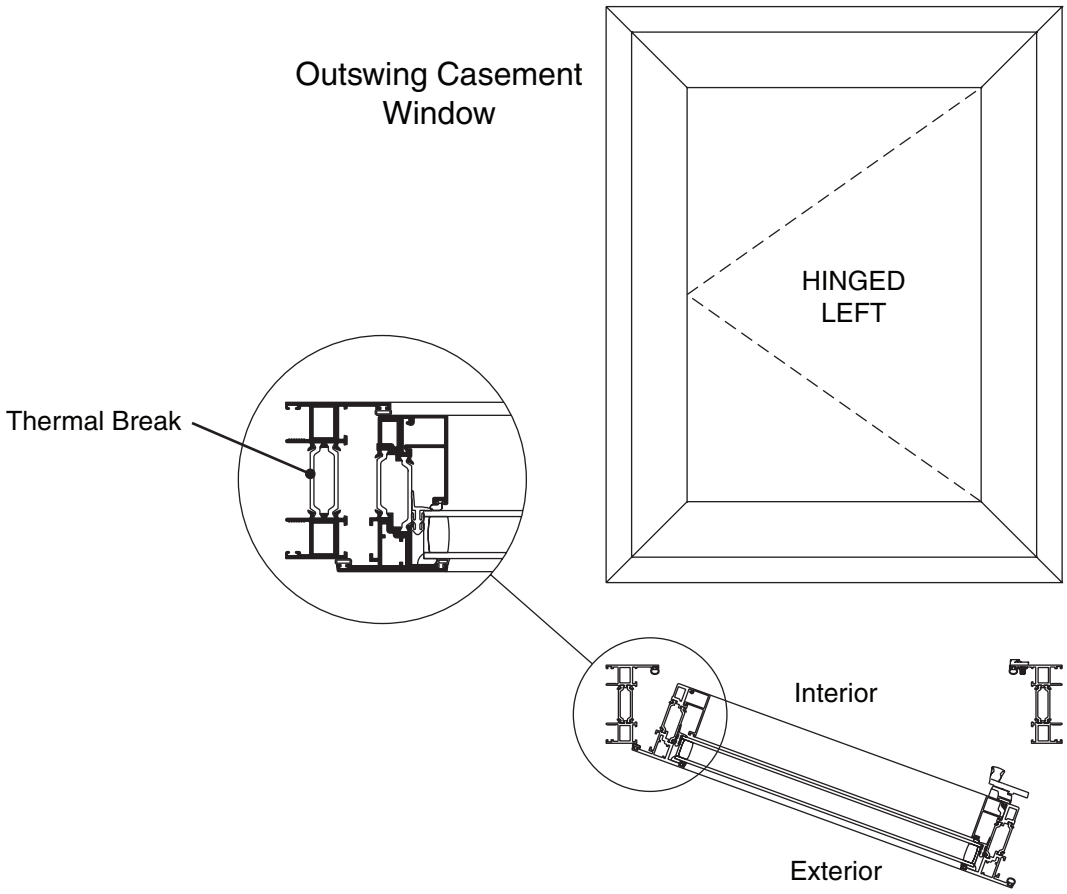

For specific product applications,
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CLASS and GRADE	Architectural Grade AW-PG80-C
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S.2 / A440-05 / A440-08
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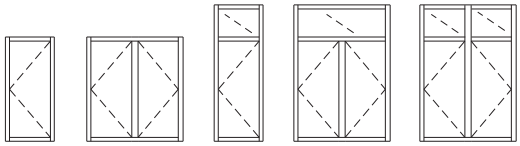
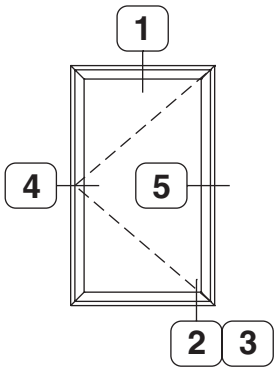
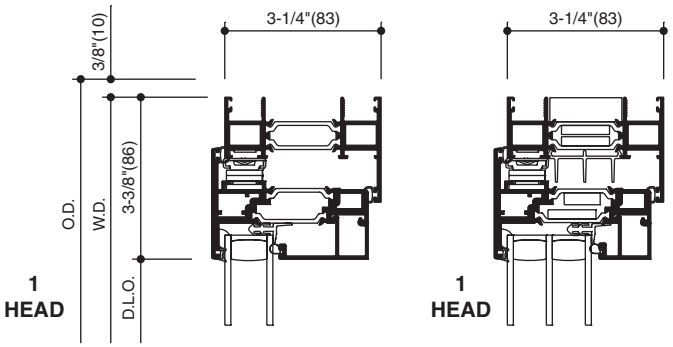
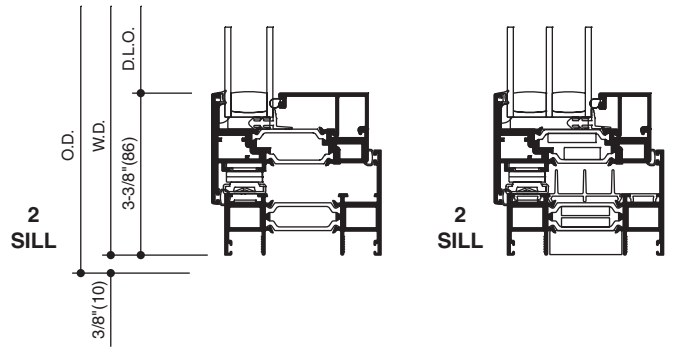
TYPICAL CONFIGURATIONS	
INFILL OPTIONS	1" and 1-3/4" (Other infill options available upon request.)
STANDARD HARDWARE	Stainless Steel 4-Bar Hinges Cast White Bronze Cam Handles
OPTIONAL HARDWARE	Access Control Locks Pole and Pole Ring Limit Stop Roto Operators Multi-Point Locks
OTHER OPTIONS	Structural Mullions Vertically or Horizontally Stacked Insect Screens Receptor and Sub Sill Panning Internal Blinds Exterior or Interior Muntins

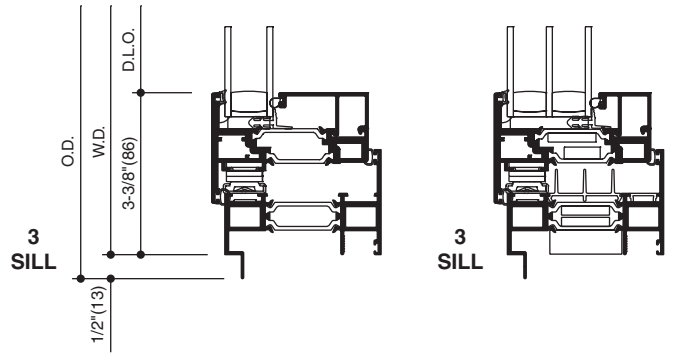
SCALE : 3" = 1'-0"
(Nominal Dimensions Shown)

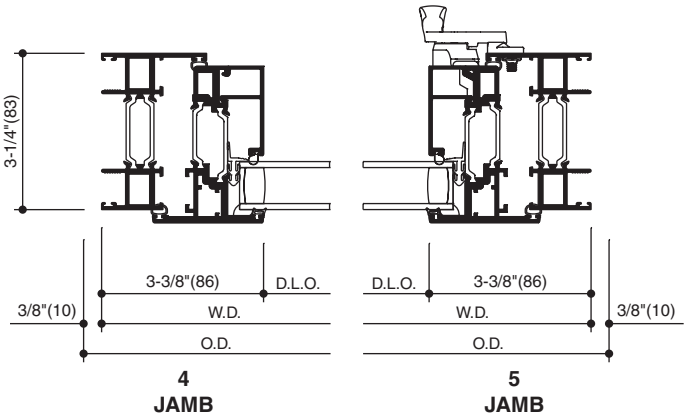


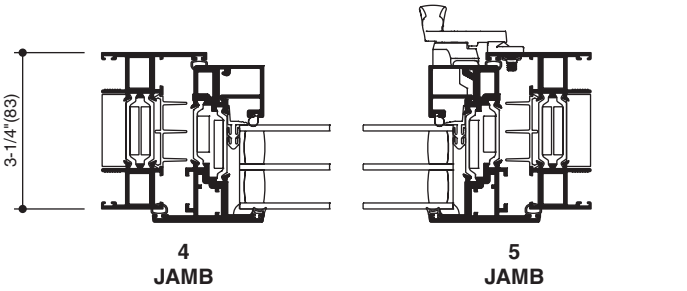
TYPICAL ELEVATION

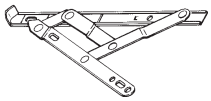
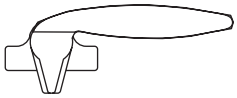
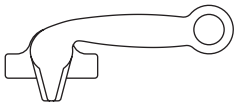
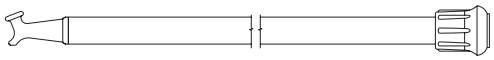
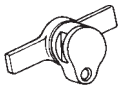




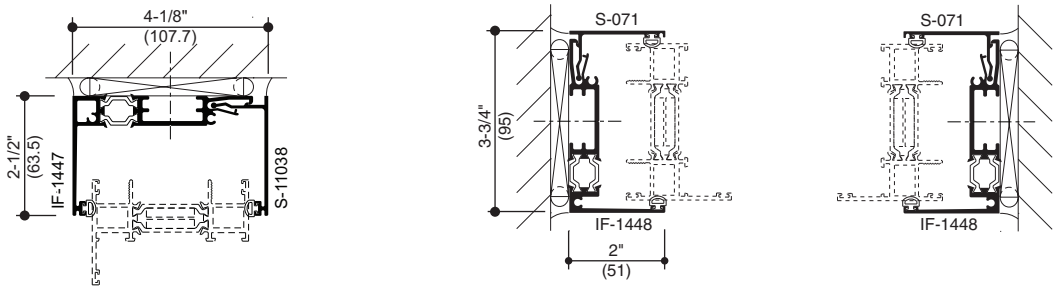




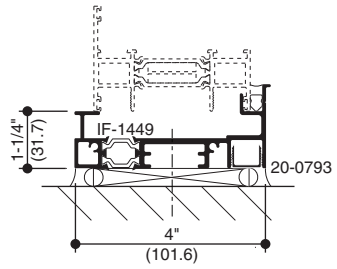


STAINLESS STEEL 4 BAR HINGES		A standard hinge for ventilators providing an opening of up to 45°. An optional limit stop is available to restrict hinge travel and limit vent opening.
CAM HANDLE		Cast white bronze cam handles are an alternative to standard multi-point locking for the operation and locking of ventilators.
CAM HANDLE WITH POLE RING		Cast white bronze cam handles with pole ring provide manual operation of ventilators located above reach. These handles are operated with a sash pole.
POLE RING		Cast white bronze pole ring is used in conjunction with locking hardware for sash pole operation of ventilators.
SASH POLE		A 3/4" diameter aluminum sash pole with a cast white bronze pull down hook and black rubber tip. Available in 6 ft. and 12 ft. lengths with optional cast white bronze Pole Hanger.
HANGER FOR SASH POLE		
ACCESS CONTROL LOCK	 	In lieu of cam handles and multi-point locking cast white bronze access control locks are offered for managed control of vent operations. Lock is operated with a manganese bronze removable handle.

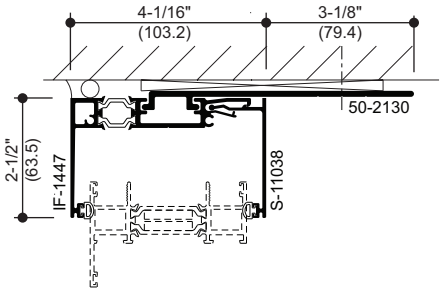
SCALE : 3" = 1'-0"
(Nominal Dimensions Shown)

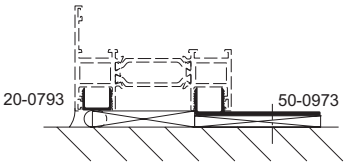


HEAD & JAMB RECEPTORS

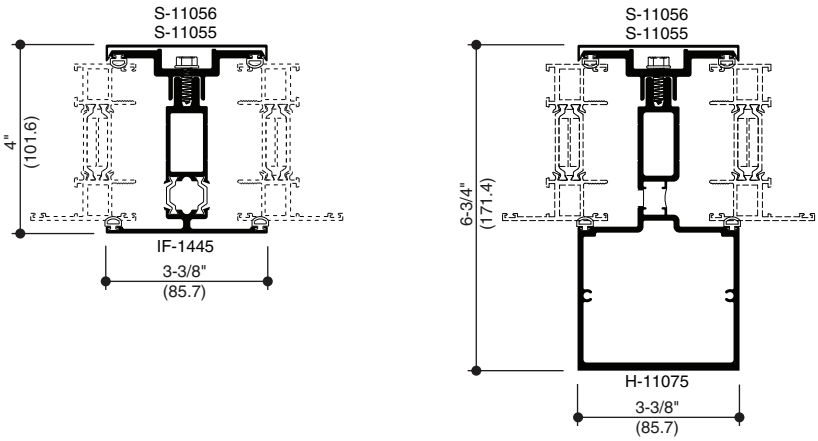


SUB SILL





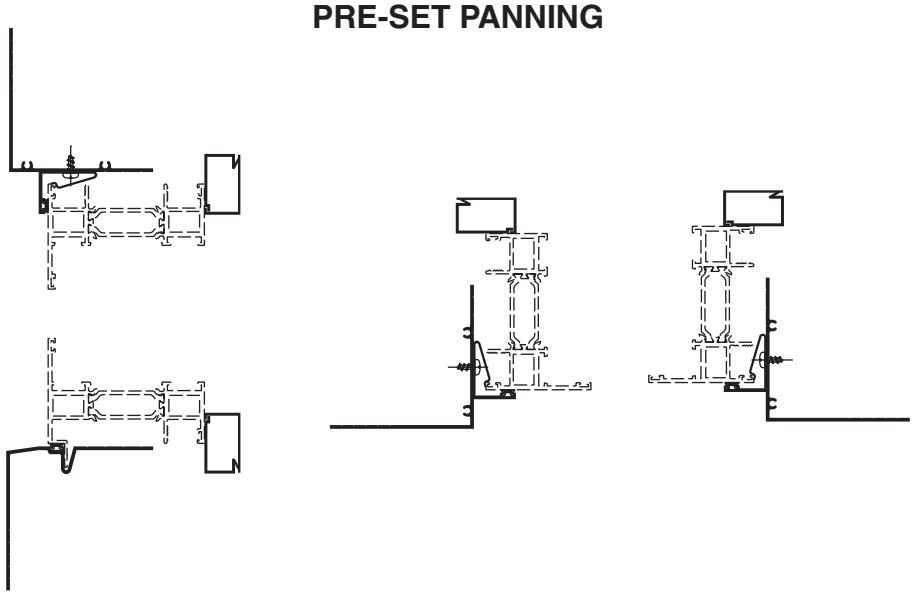
ANCHOR



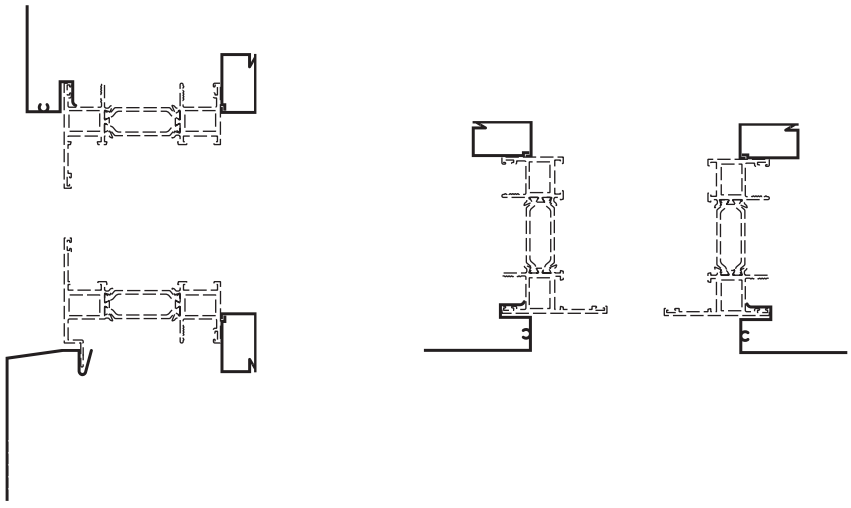
3-PIECE MULLIONS

SCALE : 3" = 1'-0"
(Nominal Dimensions Shown)
Note: 1" glazing infill shown, 1-3/4" similar.

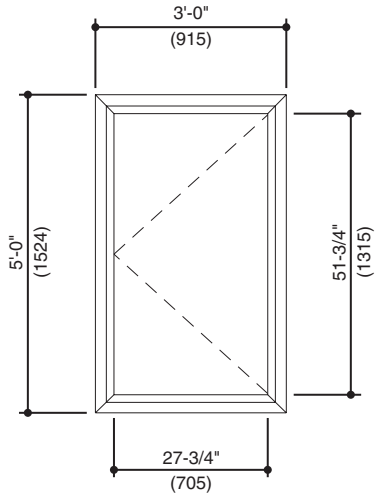
PRE-SET PANNING



WRAP AROUND PANNING



Generic Project Specific U-factor Example Calculation
(Percent of Glass will vary on specific products depending on sitelines)



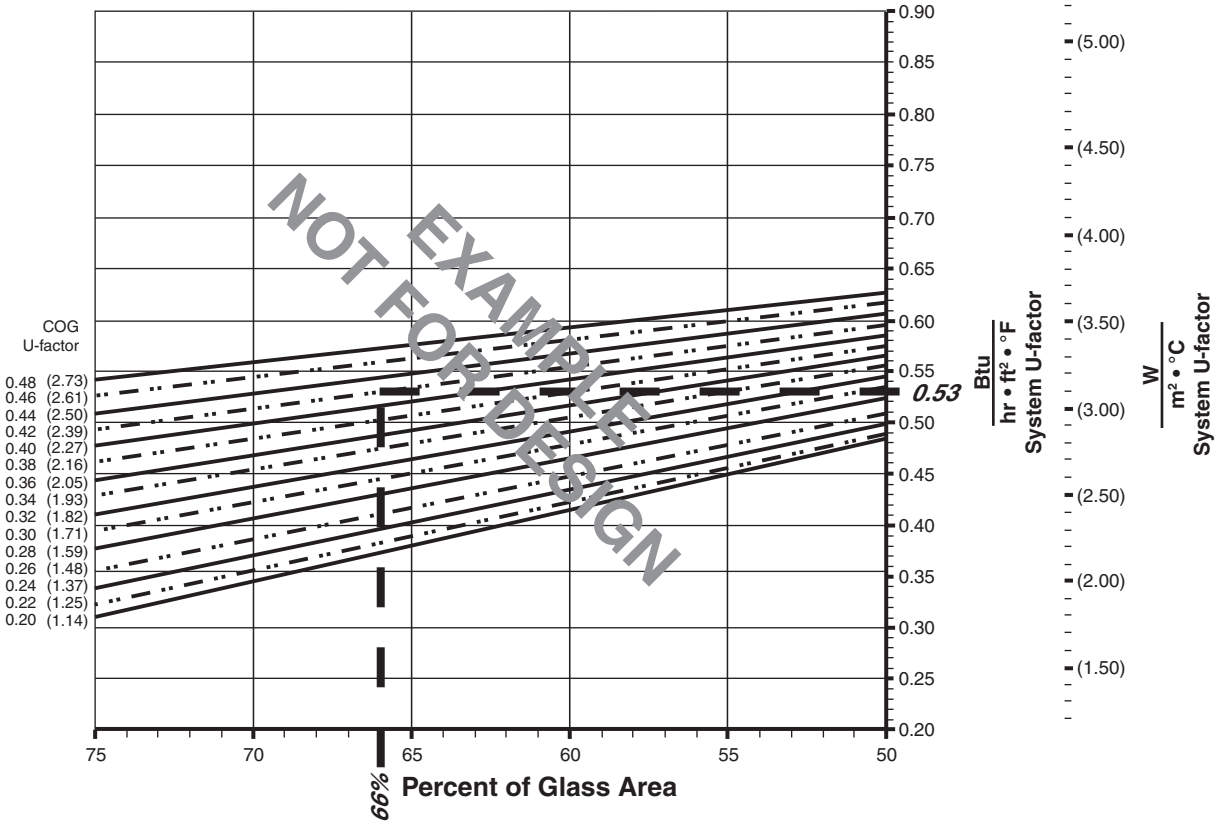
Example Glass U-Factor = 0.42 Btu/hr • ft² • °F

Total Daylight Opening = 27-3/4" • 51-3/4" = 9.97ft²

Total Projected Area = 3'-0" • 5'-0" = 15 ft²

Percent of Glass = (Total Daylight Opening ÷ Total Projected Area)100
= (9.97 ÷ 15)100 = 66%

System U-factor vs Percent of Glass Area

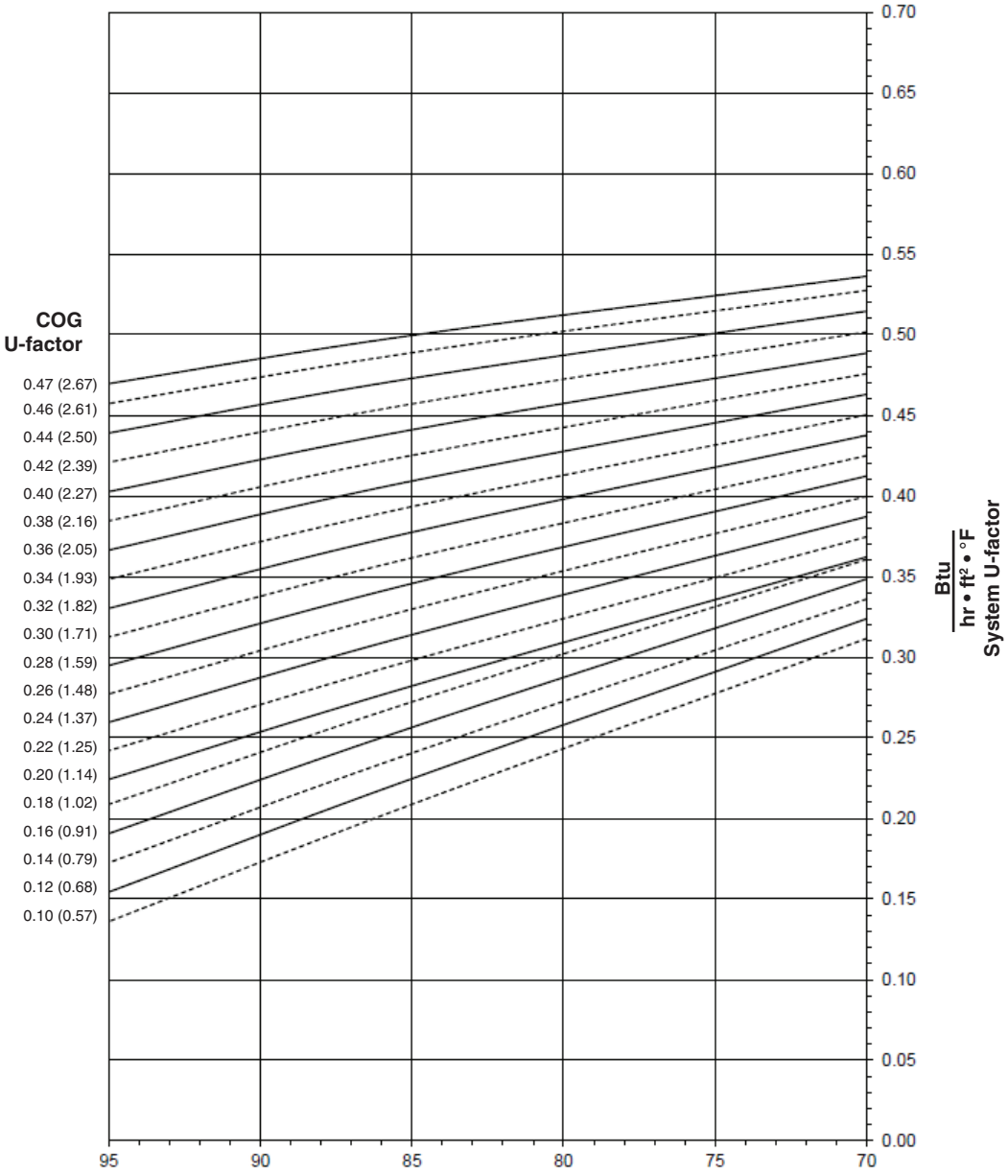


Based on 66% glass and center of glass (COG) U-factor of 0.42
System U-factor is equal to 0.53 Btu/hr • ft² • °F

FIXED WINDOW WITH 1" GLAZING

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

System U-factor vs Percent of Glass Area

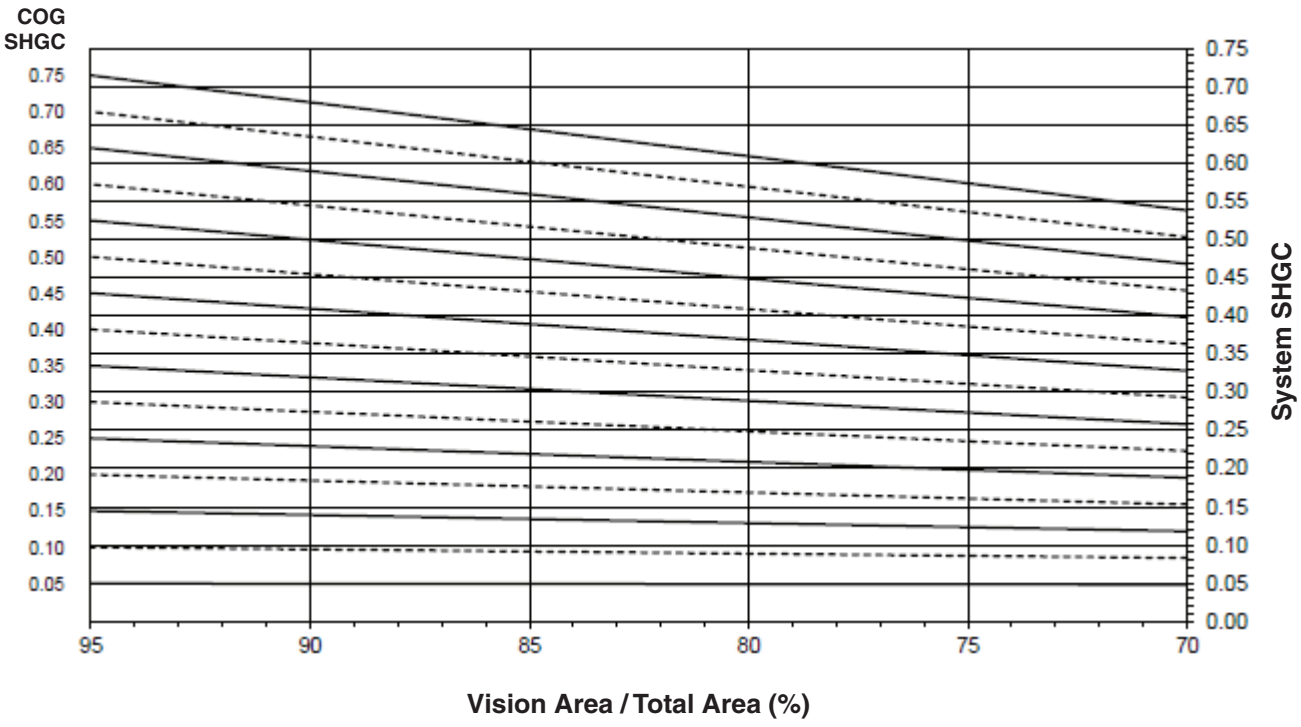


Percent of Glass Area = Vision Area/Total Area
Daylight Opening / Projected Area

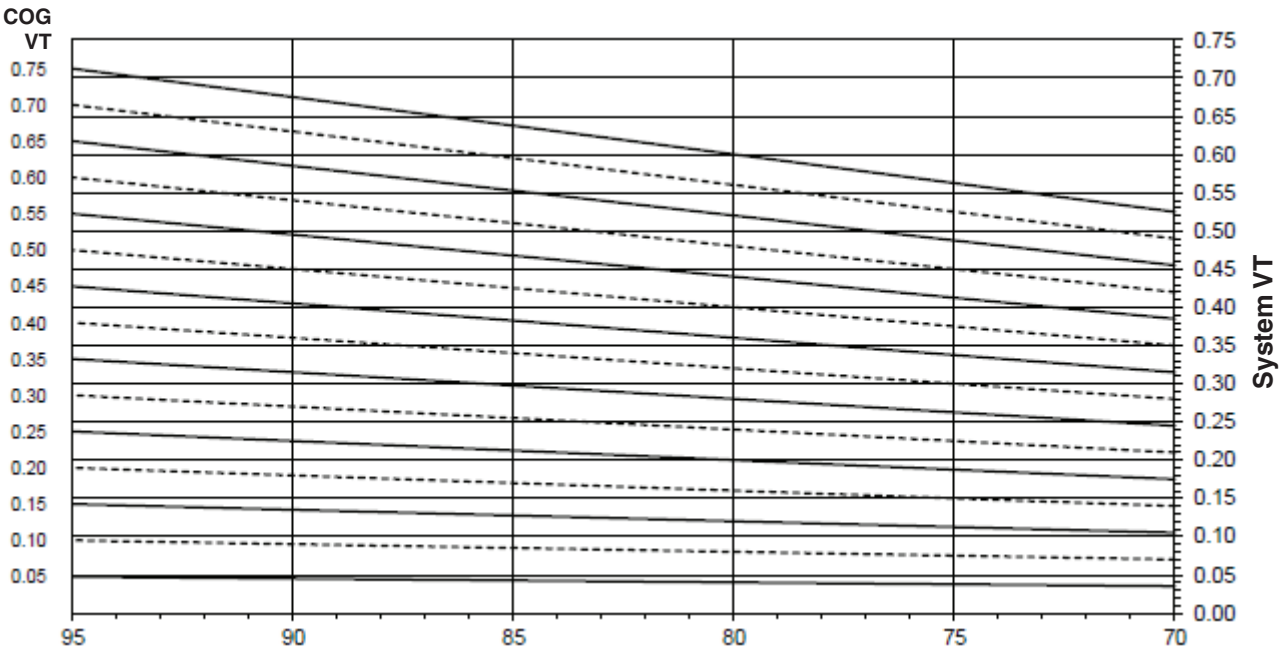
Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

FIXED WINDOW WITH 1" GLAZING

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



Thermal Transmittance [1] (BTU/hr • ft [2] • °F)

Glass U-Factor [3]	Overall U-Factor [4]
0.48	0.50
0.46	0.49
0.44	0.47
0.42	0.46
0.40	0.44
0.38	0.42
0.36	0.41
0.34	0.39
0.32	0.38
0.30	0.36
0.28	0.35
0.26	0.33
0.24	0.31
0.22	0.30
0.20	0.28
0.18	0.27
0.16	0.26
0.14	0.24
0.12	0.22
0.10	0.21

FIXED WINDOW WITH 1" GLAZING

NOTE: For glass values that are not listed, linear interpolation is permitted.

1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 1200mm wide by 1500mm high (47-1/4" by 59-1/16").

SHGC Matrix [2]

Glass SHGC [3]	Overall SHGC [4]
0.75	0.64
0.70	0.60
0.65	0.56
0.60	0.52
0.55	0.47
0.50	0.43
0.45	0.39
0.40	0.35
0.35	0.30
0.30	0.26
0.25	0.22
0.20	0.18
0.15	0.13
0.10	0.09
0.05	0.05

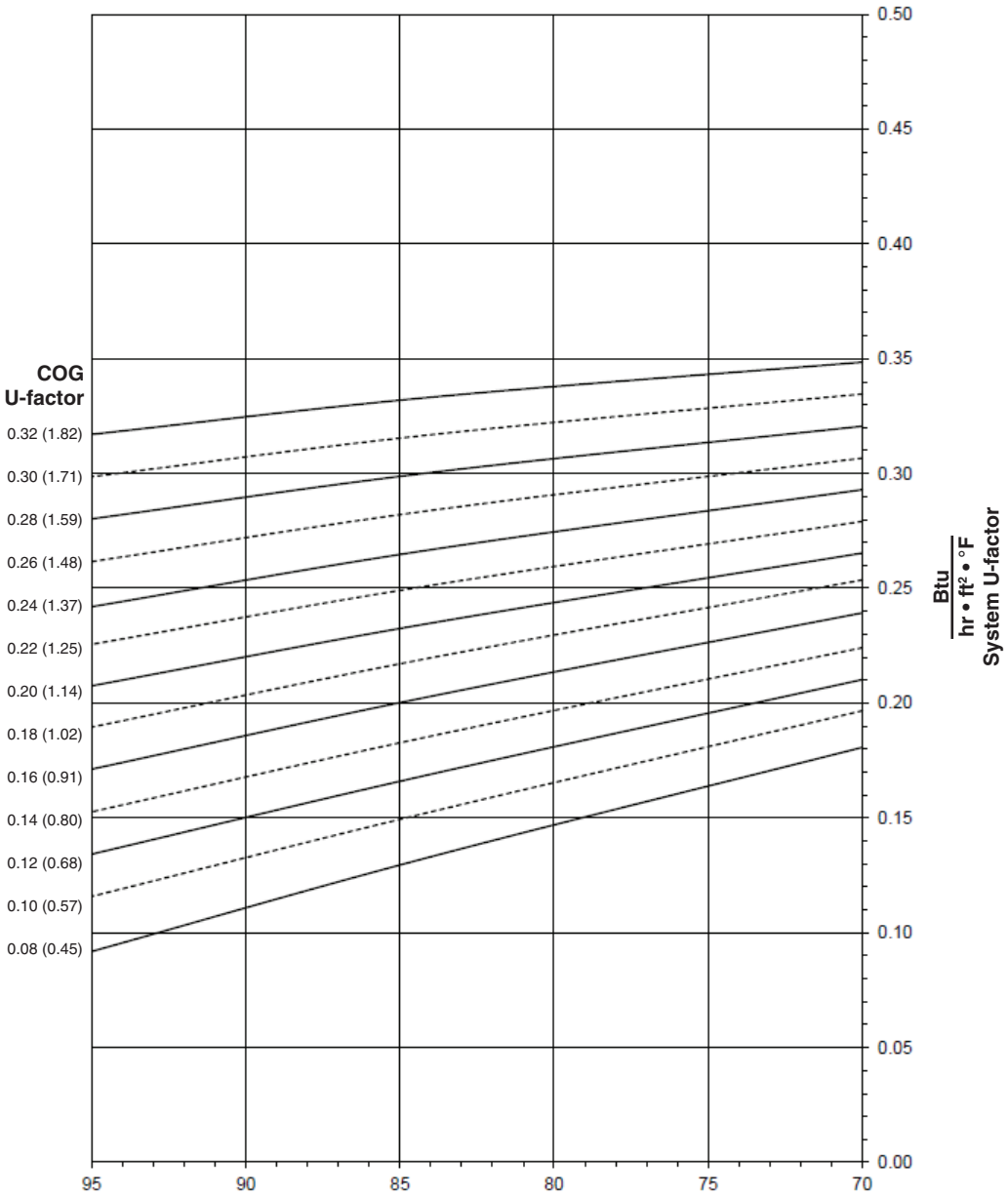
Visible Transmittance [2]

Glass VT [3]	Overall VT [4]
0.75	0.64
0.70	0.60
0.65	0.55
0.60	0.51
0.55	0.47
0.50	0.43
0.45	0.38
0.40	0.34
0.35	0.30
0.30	0.26
0.25	0.21
0.20	0.17
0.15	0.13
0.10	0.09
0.05	0.04

FIXED WINDOW WITH 1-3/4" GLAZING

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

System U-factor vs Percent of Glass Area

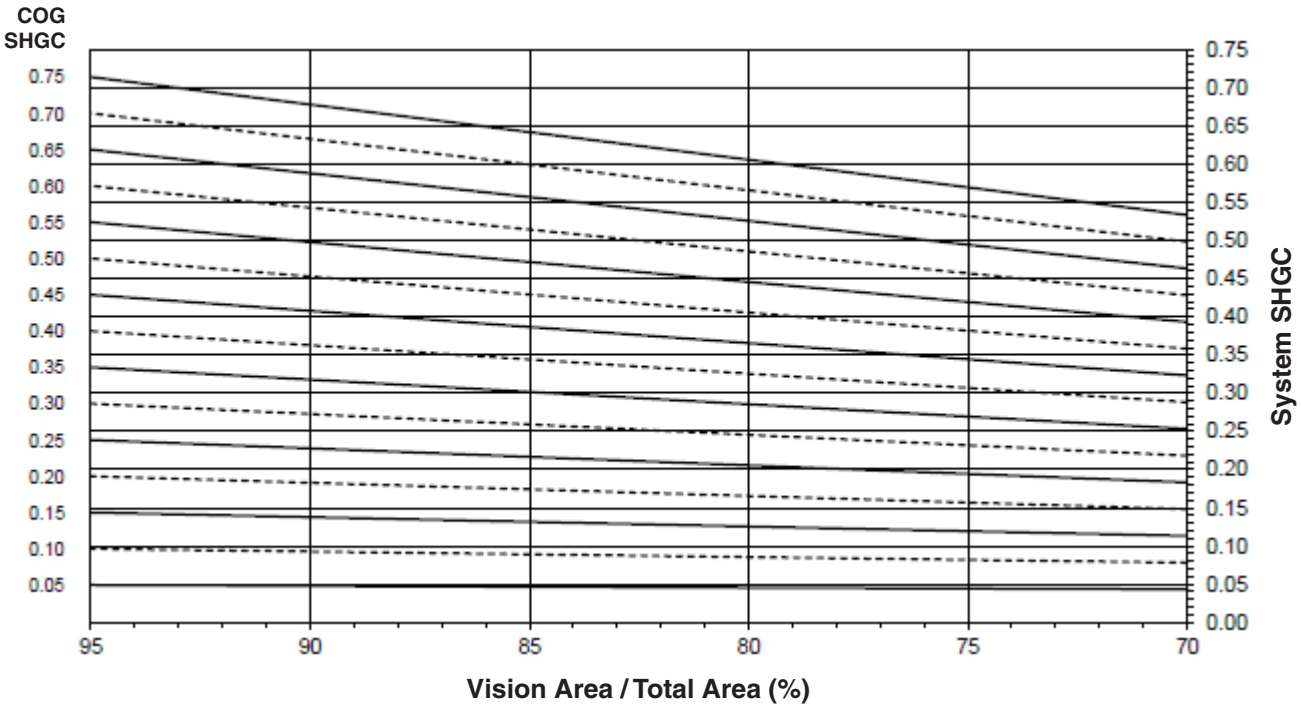


Percent of Glass Area = Vision Area/Total Area
Daylight Opening / Projected Area

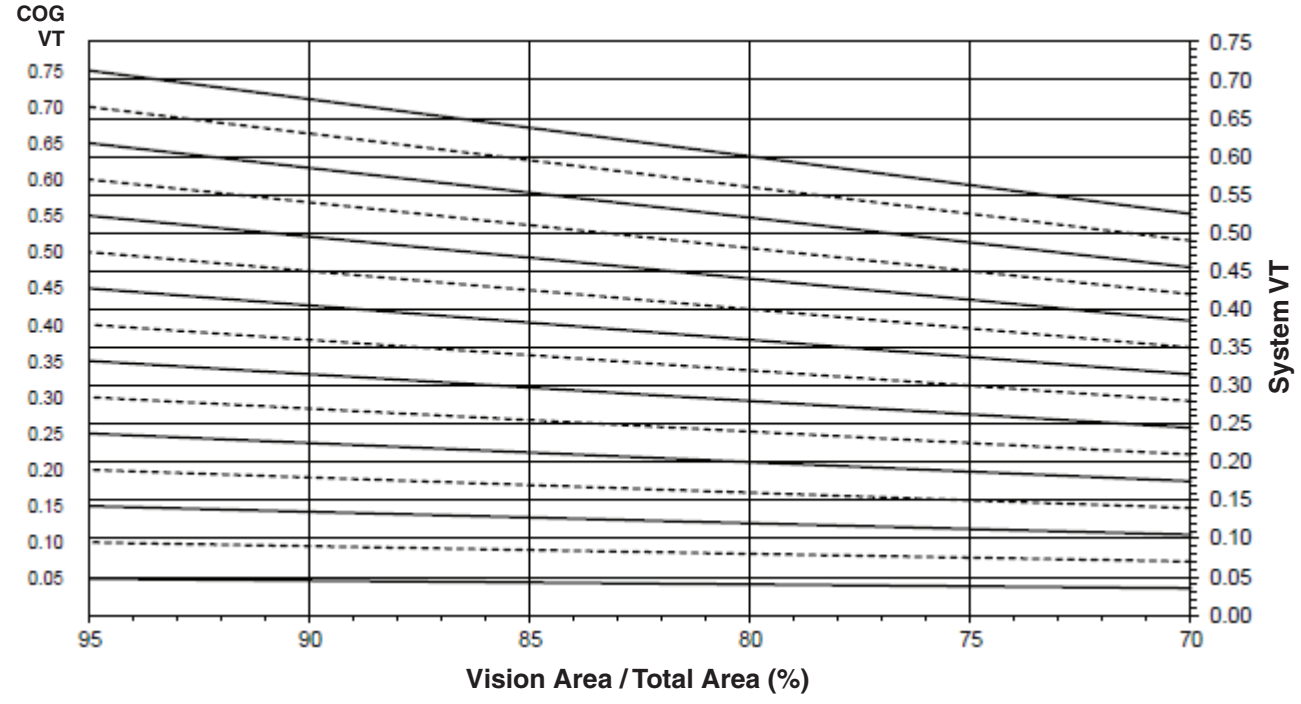
Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

FIXED WINDOW WITH 1-3/4" GLAZING

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



FIXED WINDOW WITH 1-3/4" GLAZING

Thermal Transmittance [1] (BTU/hr • ft [2] • °F)

Glass U-Factor [3]	Overall U-Factor [4]
0.32	0.33
0.30	0.32
0.28	0.30
0.26	0.28
0.24	0.27
0.22	0.25
0.20	0.23
0.18	0.22
0.16	0.20
0.14	0.19
0.12	0.17
0.10	0.15
0.08	0.13

NOTE: For glass values that are not listed, linear interpolation is permitted.

1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 1200mm wide by 1500mm high (47-1/4" by 59-1/16").

SHGC Matrix [2]

Glass SHGC [3]	Overall SHGC [4]
0.75	0.63
0.70	0.59
0.65	0.55
0.60	0.51
0.55	0.47
0.50	0.42
0.45	0.38
0.40	0.34
0.35	0.30
0.30	0.26
0.25	0.21
0.20	0.17
0.15	0.13
0.10	0.09
0.05	0.05

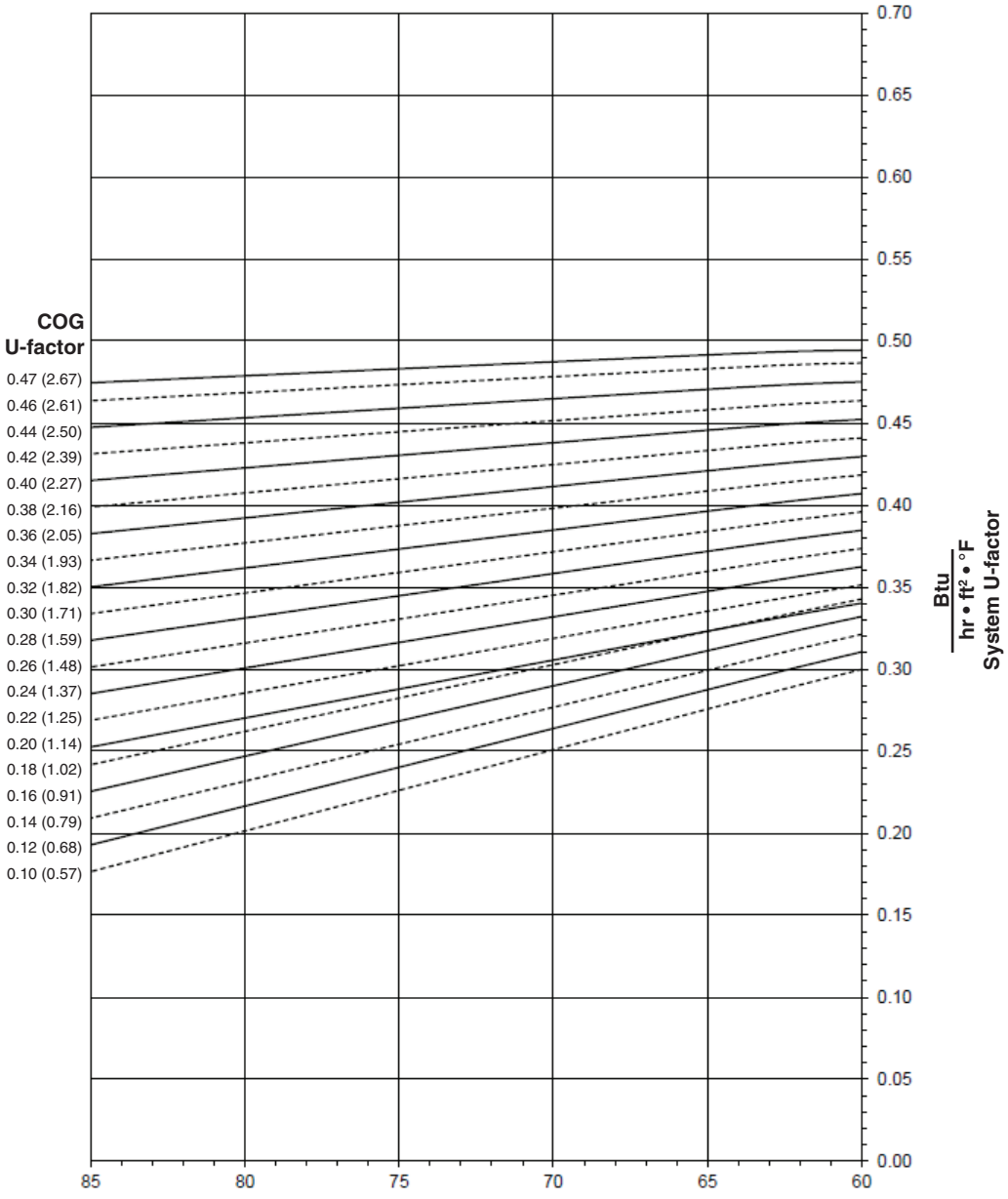
Visible Transmittance [2]

Glass VT [3]	Overall VT [4]
0.75	0.63
0.70	0.59
0.65	0.55
0.60	0.50
0.55	0.46
0.50	0.42
0.45	0.38
0.40	0.34
0.35	0.29
0.30	0.25
0.25	0.21
0.20	0.17
0.15	0.13
0.10	0.08
0.05	0.04

PROJECT-IN WINDOW WITH 1" GLAZING

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

System U-factor vs Percent of Glass Area

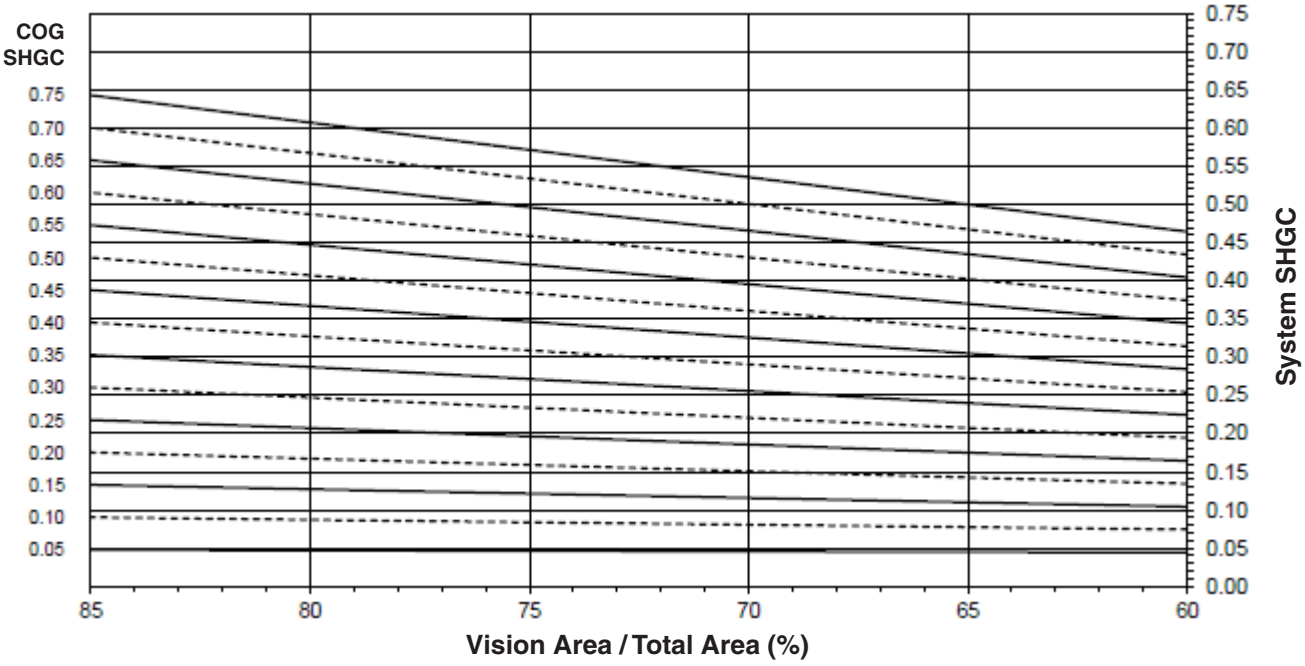


Percent of Glass Area = Vision Area/Total Area
Daylight Opening / Projected Area

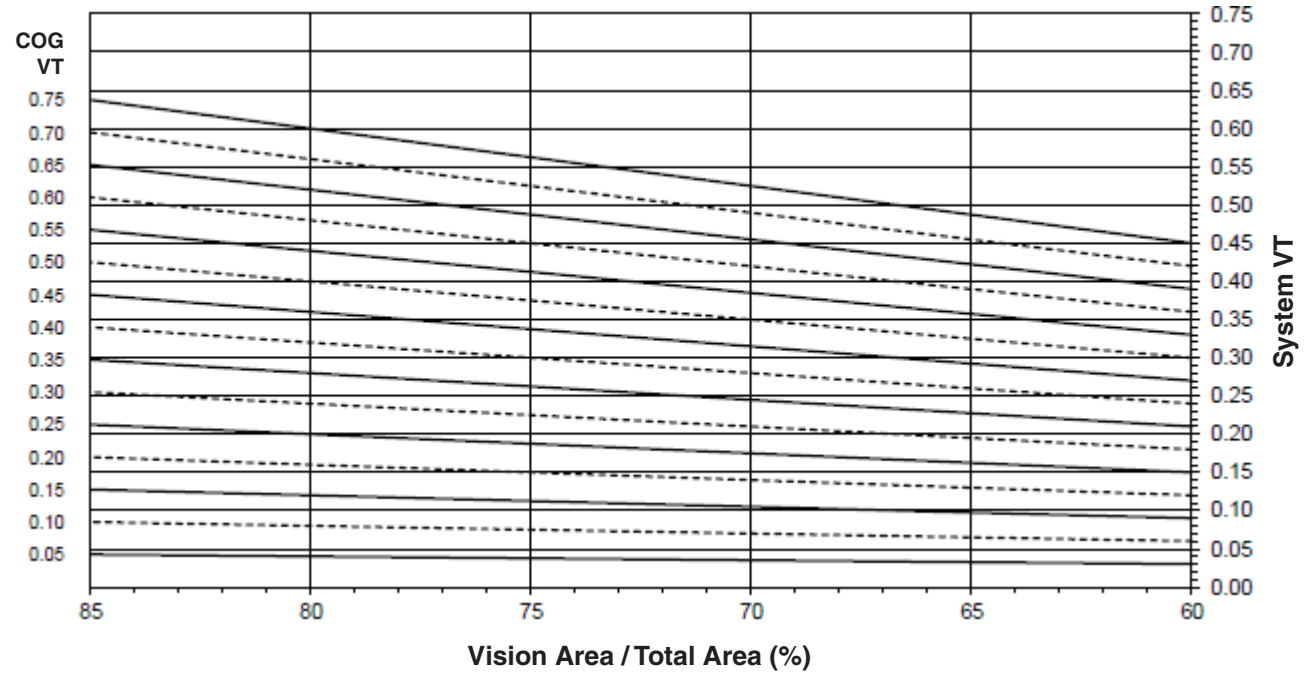
Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

PROJECT-IN WINDOW WITH 1" GLAZING

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



Thermal Transmittance [1] (BTU/hr • ft [2] • °F)

Glass U-Factor [3]	Overall U-Factor [4]
0.47	0.49
0.46	0.48
0.44	0.47
0.42	0.46
0.40	0.45
0.38	0.44
0.36	0.42
0.34	0.41
0.32	0.40
0.30	0.39
0.28	0.38
0.26	0.36
0.24	0.35
0.22	0.34
0.20	0.33
0.18	0.33
0.16	0.32
0.14	0.31
0.12	0.30
0.10	0.28

PROJECT-IN WINDOW WITH 1" GLAZING

NOTE: For glass values that are not listed, linear interpolation is permitted.

1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 1500mm wide by 600mm high (59-1/16" by 23-5/8").

SHGC Matrix [2]

Glass SHGC [3]	Overall SHGC [4]
0.75	0.49
0.70	0.46
0.65	0.42
0.60	0.39
0.55	0.36
0.50	0.33
0.45	0.30
0.40	0.27
0.35	0.23
0.30	0.20
0.25	0.17
0.20	0.14
0.15	0.11
0.10	0.08
0.05	0.04

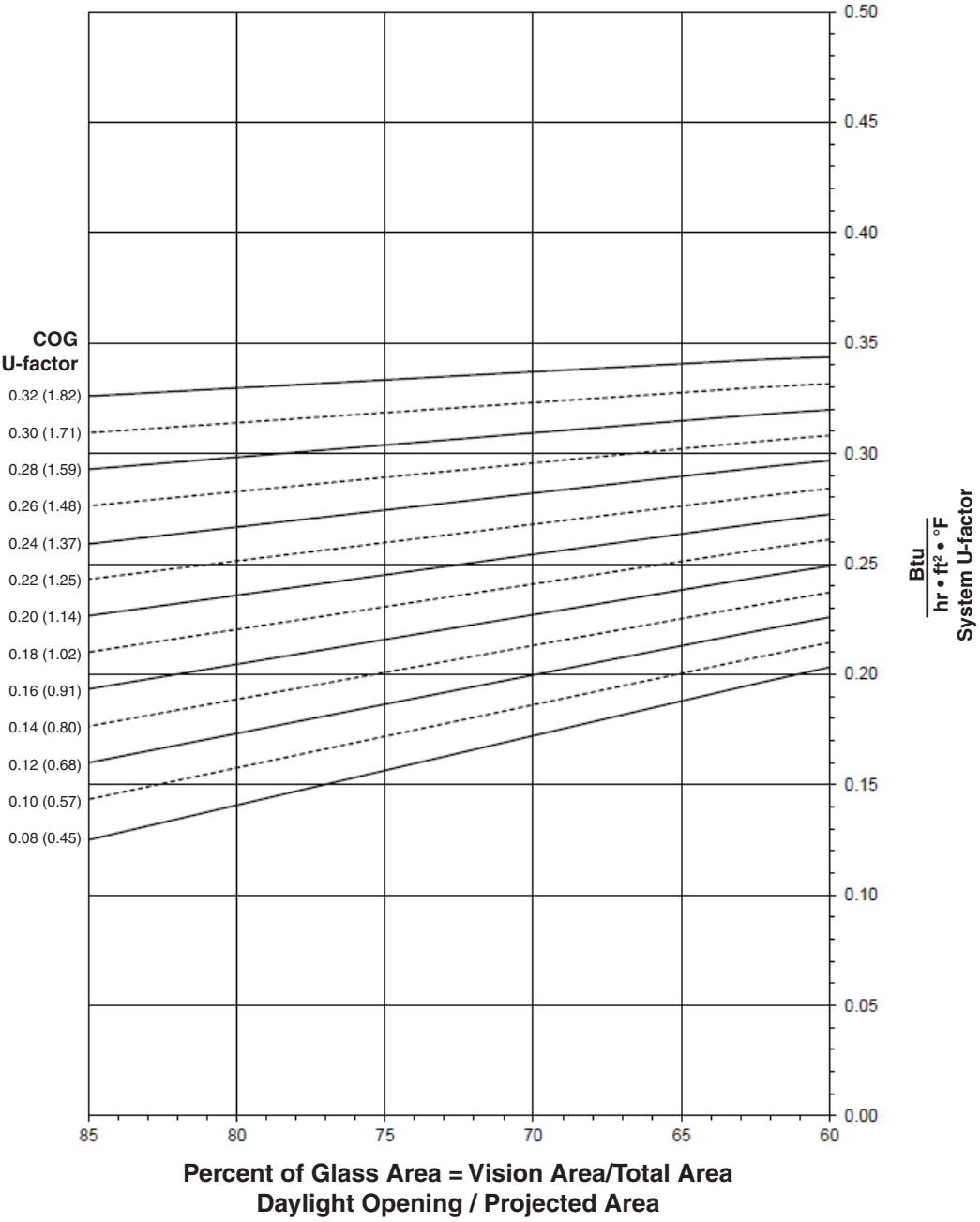
Visible Transmittance [2]

Glass VT [3]	Overall VT [4]
0.75	0.47
0.70	0.44
0.65	0.41
0.60	0.38
0.55	0.35
0.50	0.32
0.45	0.28
0.40	0.25
0.35	0.22
0.30	0.19
0.25	0.16
0.20	0.13
0.15	0.09
0.10	0.06
0.05	0.03

PROJECT-IN WINDOW WITH 1-3/4" GLAZING

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

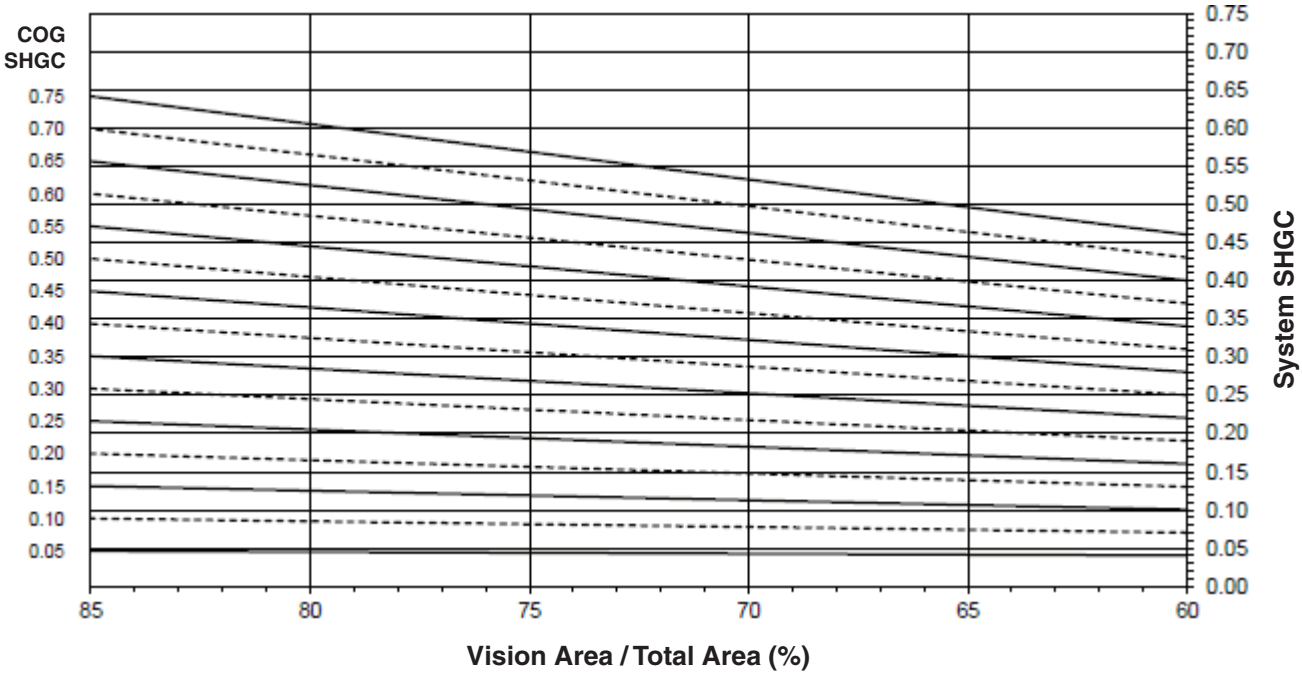
System U-factor vs Percent of Glass Area



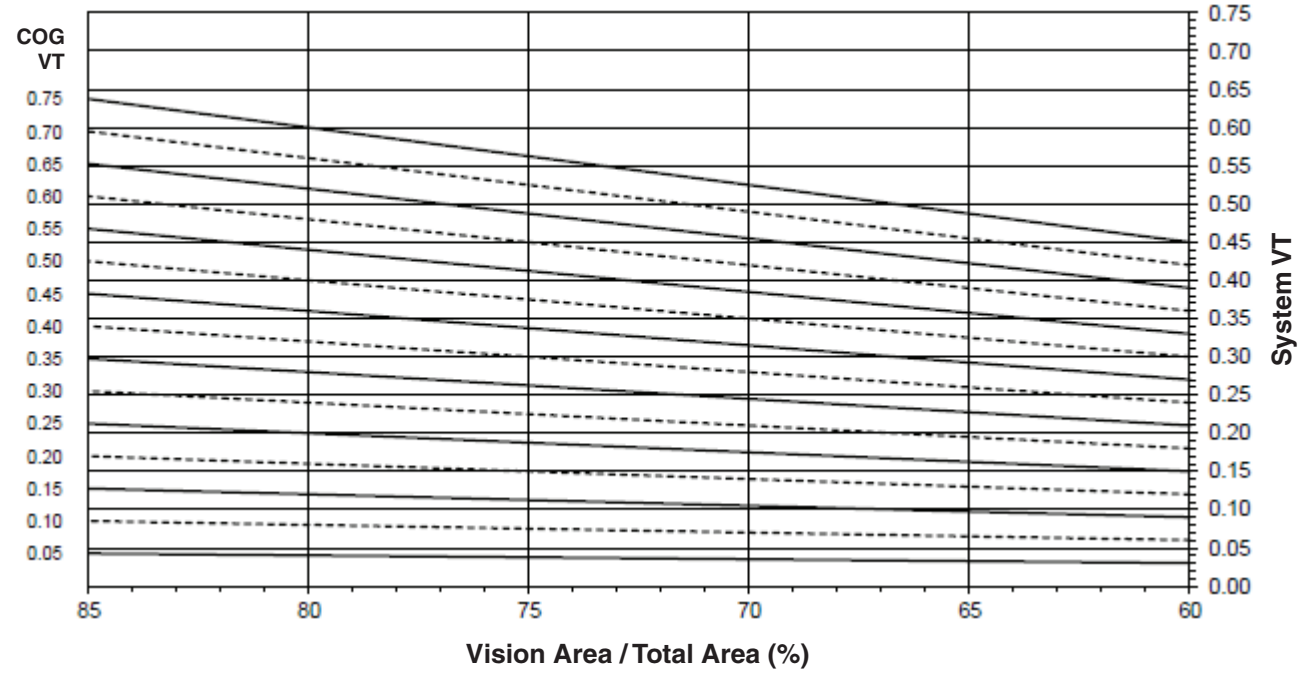
Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

PROJECT-IN WINDOW WITH 1-3/4" GLAZING

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



PROJECT-IN WINDOW WITH 1-3/4" GLAZING

Thermal Transmittance [1] (BTU/hr • ft [2] • °F)

Glass U-Factor [3]	Overall U-Factor [4]
0.32	0.34
0.30	0.33
0.28	0.32
0.26	0.30
0.24	0.29
0.22	0.28
0.20	0.27
0.18	0.25
0.16	0.24
0.14	0.23
0.12	0.22
0.10	0.21
0.08	0.19

NOTE: For glass values that are not listed, linear interpolation is permitted.

1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 1500mm wide by 600mm high (59-1/16" by 23-5/8").

SHGC Matrix [2]

Glass SHGC [3]	Overall SHGC [4]
0.75	0.48
0.70	0.45
0.65	0.42
0.60	0.39
0.55	0.36
0.50	0.33
0.45	0.29
0.40	0.26
0.35	0.23
0.30	0.20
0.25	0.17
0.20	0.14
0.15	0.10
0.10	0.07
0.05	0.04

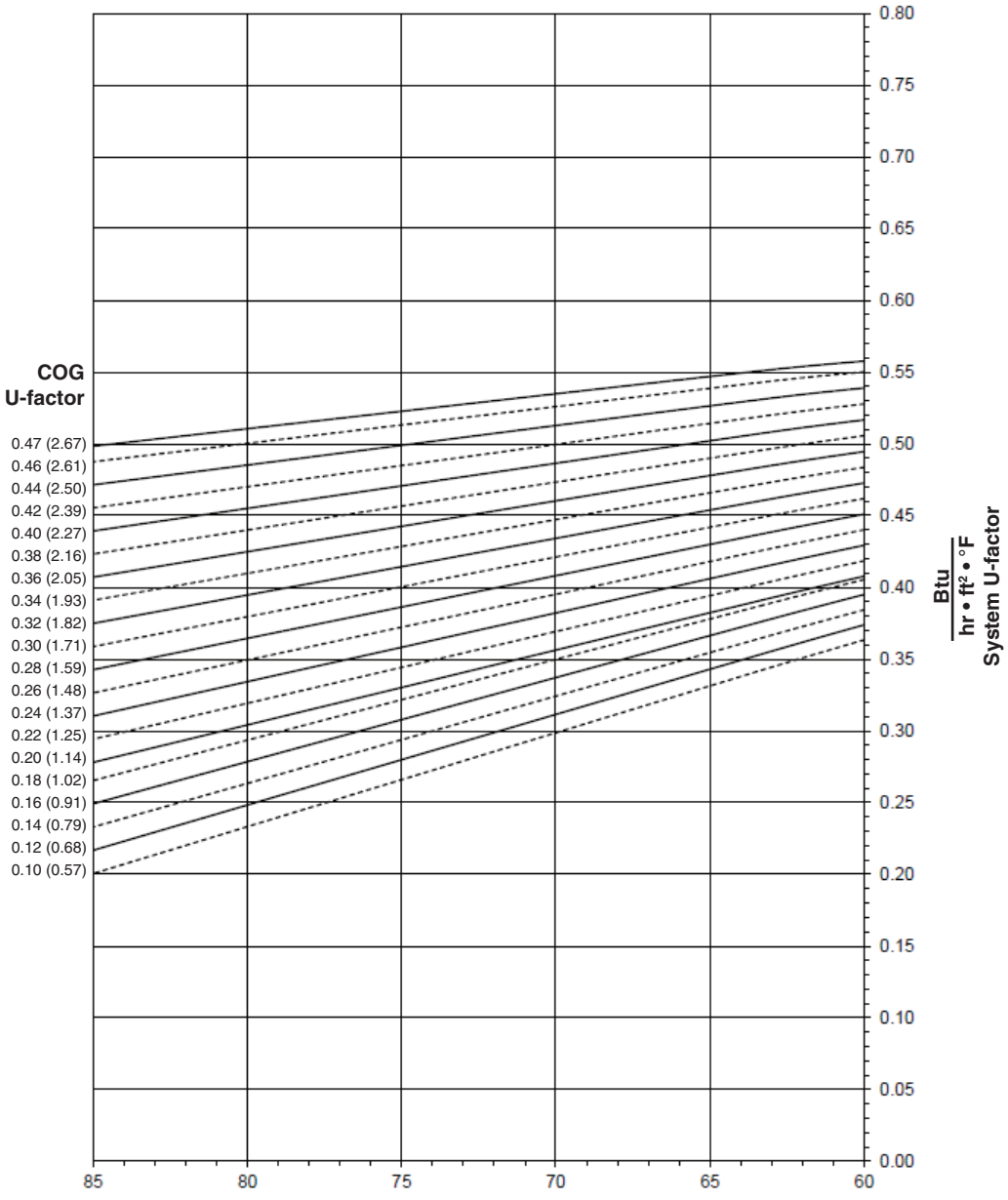
Visible Transmittance [2]

Glass VT [3]	Overall VT [4]
0.75	0.47
0.70	0.44
0.65	0.41
0.60	0.38
0.55	0.35
0.50	0.32
0.45	0.28
0.40	0.25
0.35	0.22
0.30	0.19
0.25	0.16
0.20	0.13
0.15	0.09
0.10	0.06
0.05	0.03

PROJECT-OUT WINDOW WITH 1" GLAZING

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

System U-factor vs Percent of Glass Area

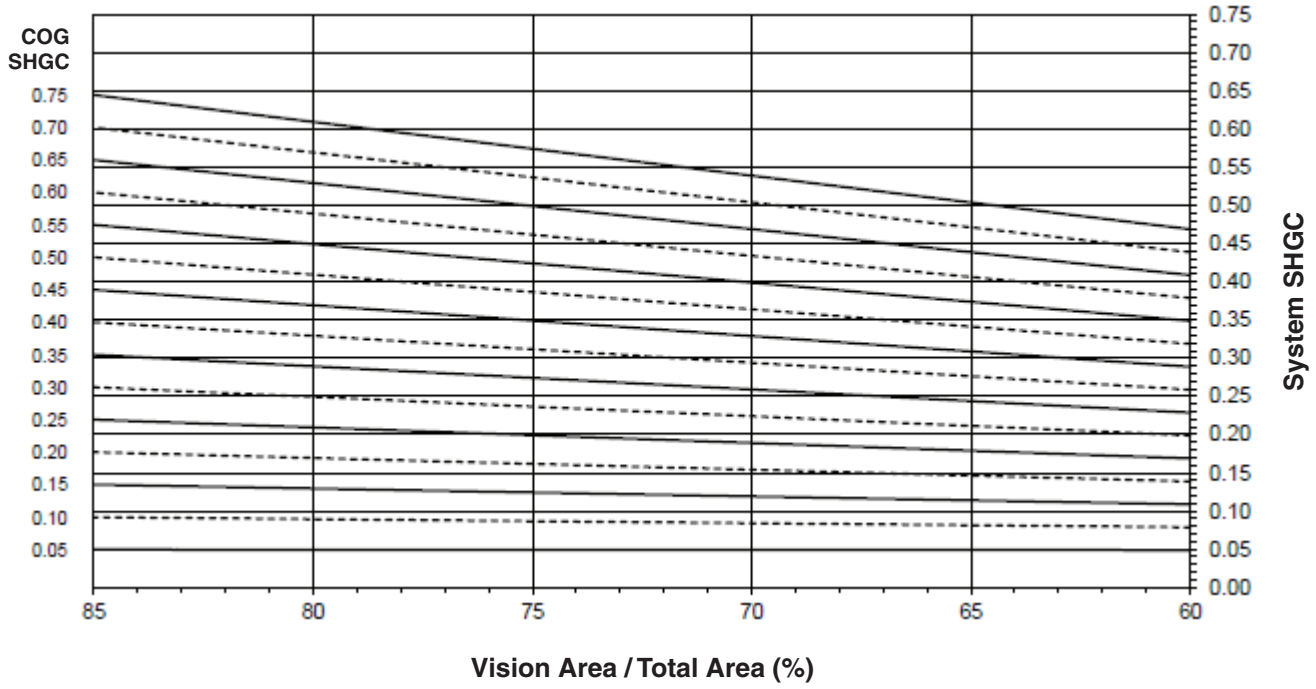


Percent of Glass Area = Vision Area/Total Area
Daylight Opening / Projected Area

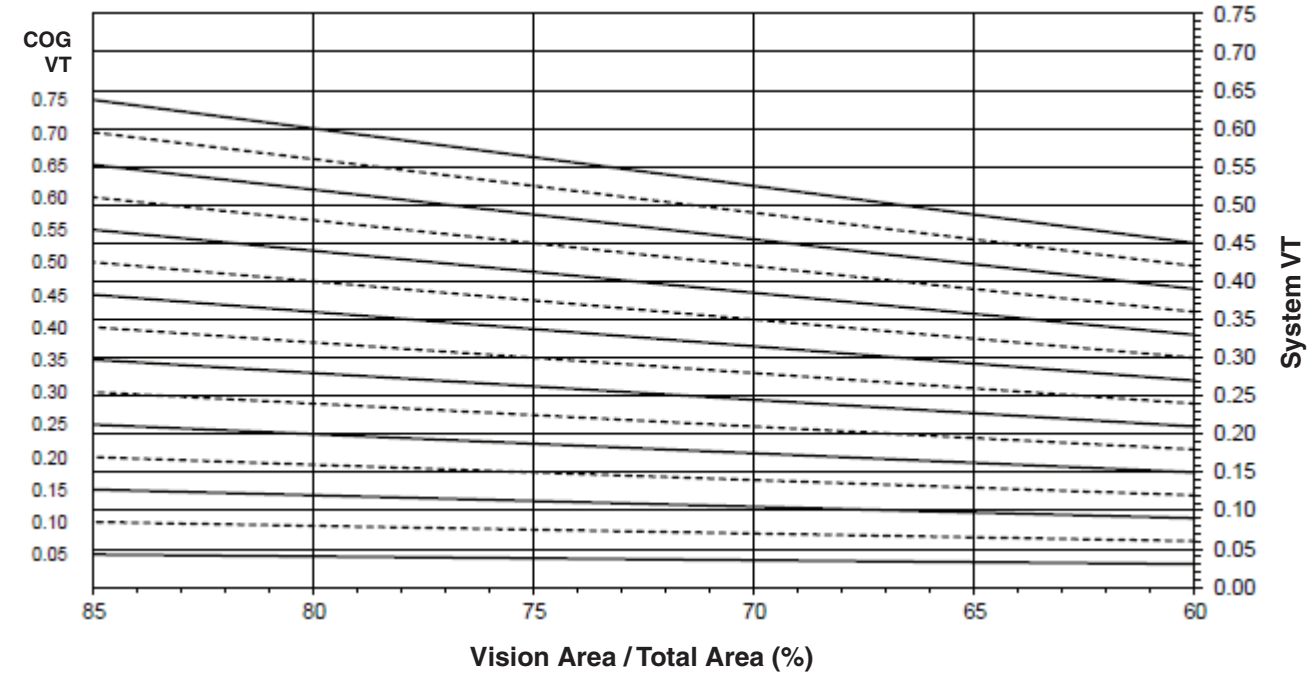
Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

PROJECT-OUT WINDOW WITH 1" GLAZING

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



Thermal Transmittance [1] (BTU/hr • ft [2] • °F)

Glass U-Factor [3]	Overall U-Factor [4]
0.48	0.55
0.46	0.54
0.44	0.53
0.42	0.52
0.40	0.51
0.38	0.50
0.36	0.48
0.34	0.47
0.32	0.46
0.30	0.45
0.28	0.44
0.26	0.43
0.24	0.41
0.22	0.40
0.20	0.39
0.18	0.39
0.16	0.38
0.14	0.37
0.12	0.35
0.10	0.34

PROJECT-OUT WINDOW WITH 1" GLAZING

NOTE: For glass values that are not listed, linear interpolation is permitted.

1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 1500mm wide by 600mm high (59-1/16" by 23-5/8").

SHGC Matrix [2]

Glass SHGC [3]	Overall SHGC [4]
0.75	0.49
0.70	0.46
0.65	0.43
0.60	0.40
0.55	0.37
0.50	0.33
0.45	0.30
0.40	0.27
0.35	0.24
0.30	0.21
0.25	0.18
0.20	0.14
0.15	0.11
0.10	0.08
0.05	0.05

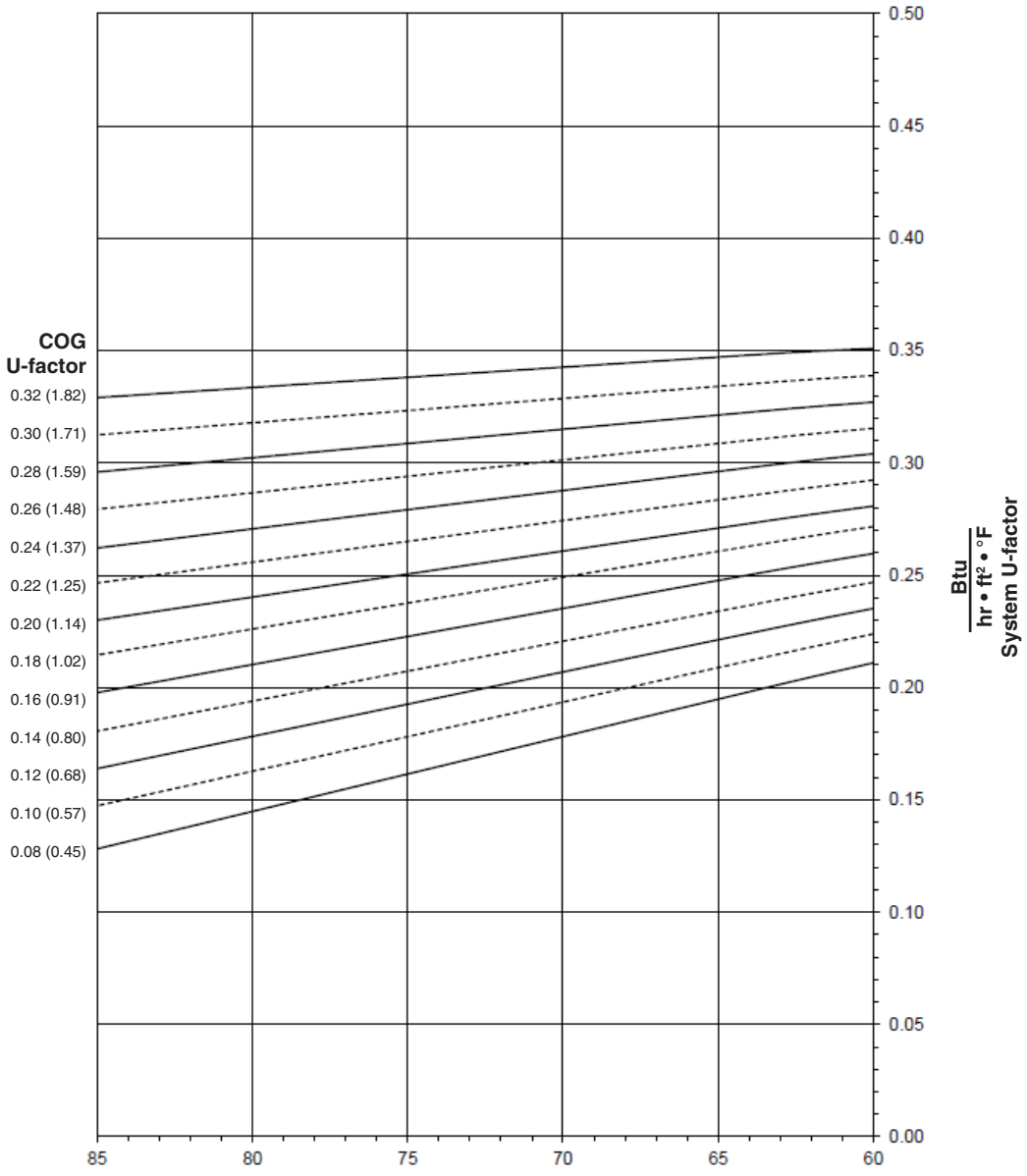
Visible Transmittance [2]

Glass VT [3]	Overall VT [4]
0.75	0.47
0.70	0.44
0.65	0.41
0.60	0.38
0.55	0.35
0.50	0.32
0.45	0.28
0.40	0.25
0.35	0.22
0.30	0.19
0.25	0.16
0.20	0.13
0.15	0.09
0.10	0.06
0.05	0.03

PROJECT-OUT WINDOW WITH 1-3/4" GLAZING

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

System U-factor vs Percent of Glass Area

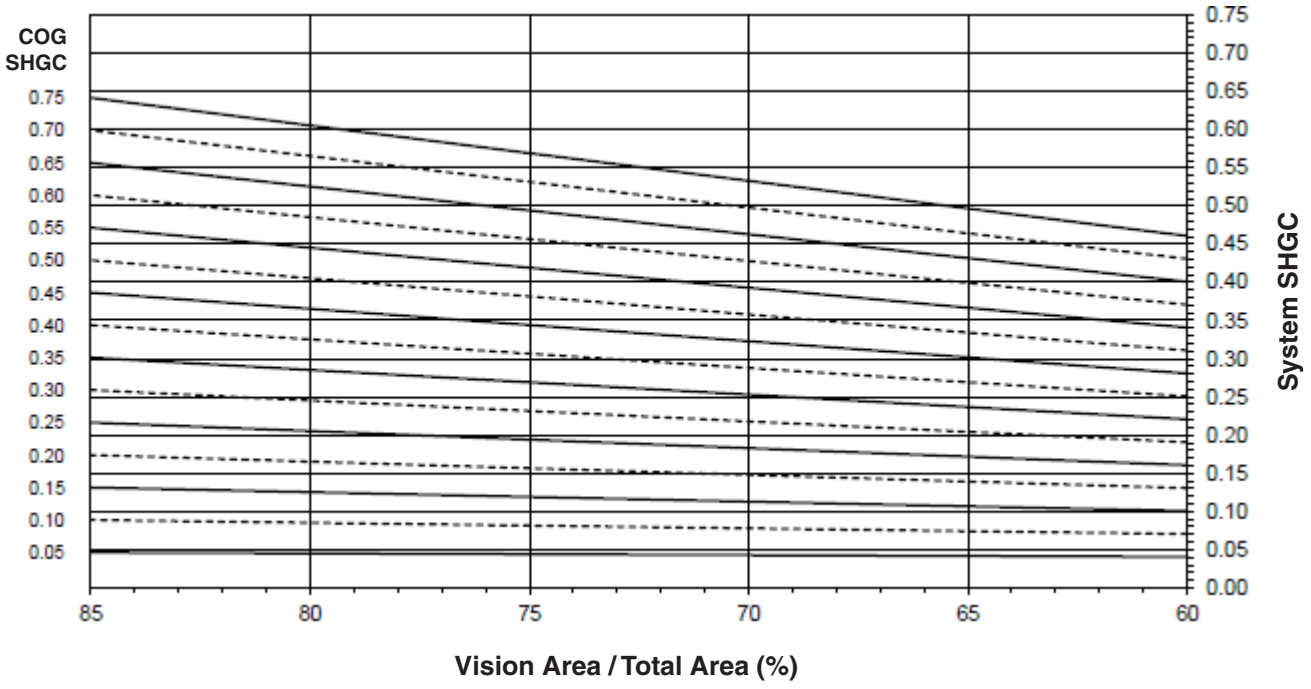


Percent of Glass Area = Vision Area/Total Area
Daylight Opening / Projected Area

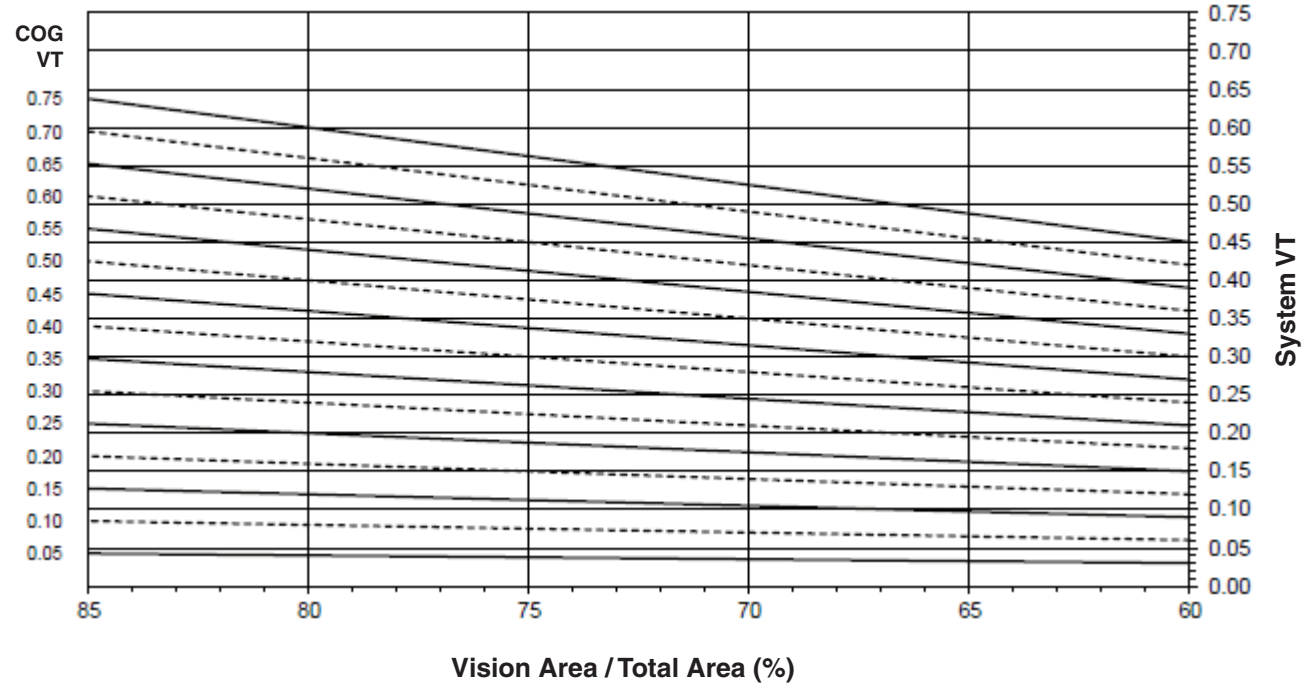
Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

PROJECT-OUT WINDOW WITH 1-3/4" GLAZING

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



PROJECT-OUT WINDOW WITH 1-3/4" GLAZING

Thermal Transmittance [1] (BTU/hr • ft [2] • °F)

Glass U-Factor [3]	Overall U-Factor [4]
0.32	0.35
0.30	0.34
0.28	0.32
0.26	0.31
0.24	0.30
0.22	0.29
0.20	0.27
0.18	0.26
0.16	0.25
0.14	0.24
0.12	0.23
0.10	0.21
0.08	0.20

NOTE: For glass values that are not listed, linear interpolation is permitted.

1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 1500mm wide by 600mm high (59-1/16" by 23-5/8").

SHGC Matrix [2]

Glass SHGC [3]	Overall SHGC [4]
0.75	0.48
0.70	0.45
0.65	0.42
0.60	0.39
0.55	0.36
0.50	0.33
0.45	0.29
0.40	0.26
0.35	0.23
0.30	0.20
0.25	0.17
0.20	0.14
0.15	0.10
0.10	0.07
0.05	0.04

Visible Transmittance [2]

Glass VT [3]	Overall VT [4]
0.75	0.47
0.70	0.44
0.65	0.41
0.60	0.38
0.55	0.35
0.50	0.32
0.45	0.28
0.40	0.25
0.35	0.22
0.30	0.19
0.25	0.16
0.20	0.13
0.15	0.09
0.10	0.06
0.05	0.03

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EC 97911-104

LAWS AND BUILDING AND SAFETY CODES GOVERNING THE DESIGN AND USE OF GLAZED ENTRANCE, WINDOW, AND CURTAIN WALL PRODUCTS VARY WIDELY. KAWNEER DOES NOT CONTROL THE SELECTION OF PRODUCT CONFIGURATIONS, OPERATING HARDWARE, OR GLAZING MATERIALS, AND ASSUMES NO RESPONSIBILITY THEREFOR.

Metric (SI) conversion figures are included throughout these details for reference.
Numbers in parentheses ( ) are millimeters unless otherwise noted.

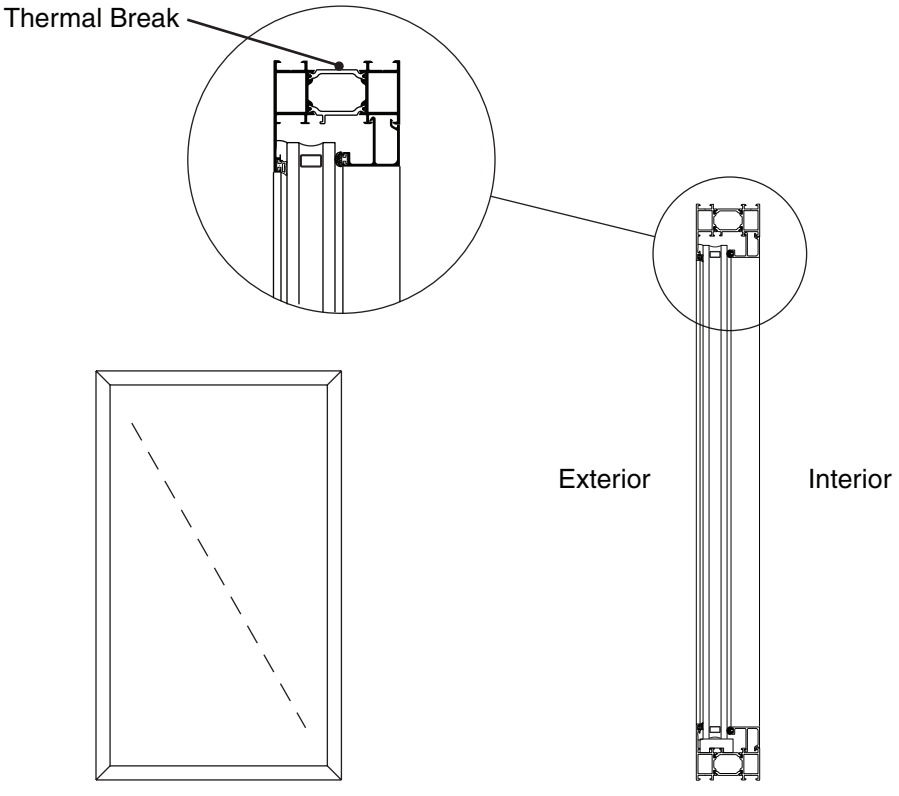
The following metric (SI) units are found in these details:

m – meter
cm – centimeter
mm – millimeter
s – second
Pa – pascal
MPa – megapascal

Kawneer reserves the right to change configurations without prior notice when deemed necessary for product improvement.

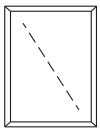
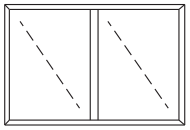
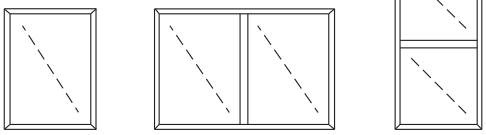
Standard Features

- Heavy Commercial Grade Window
- Tested to US and Canadian Standards
- IsoWeb™ Polyamide Thermal Break
- Tubular Profiles
- 45° Mitered Frame Corners
- Unique Mechanically Clipped or Staked Corner Joinery
- Factory Silicone Glazed or Field Dry Glazed
- Interior Applied Glazing Bead
- Architectural Anodized Finishes and Applied Coatings
- Interior and Exterior Dual Finish Options
- Two Year Manufacturer's Warranty
- Compatible with Storefront and Curtain Wall Systems



Fixed Window

For specific product applications,
Consult your Kawneer representative.

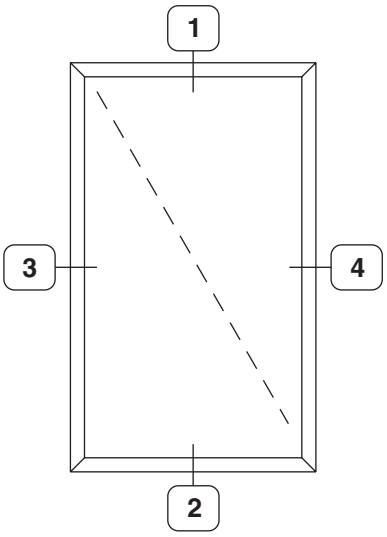
CLASS and GRADE	Heavy Commercial Grade FW-HC90 / FW-AW90 
OPTIONAL CLASS and GRADE	Heavy Commercial Grade FW-HC80 / FW-AW80 
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S.2 / A440-05 / A440-08 / A440-00
FRAME DEPTH	2-5/8" Overall Frame Depth
TYPICAL WALL THICKNESS	.070" Nominal Frame
TYPICAL MAX. SIZE	60" x 99"
TYPICAL MIN. SIZE	17" x 17"
TYPICAL CONFIGURATIONS	
INFILL OPTIONS	1" Standard (Other Infill Options Available Upon Request)
STANDARD HARDWARE	Not Applicable
OPTIONAL HARDWARE	Not Applicable
OTHER OPTIONS	Structural Mullions Vertically or Horizontally Stacked

SINGLE FIXED WINDOW

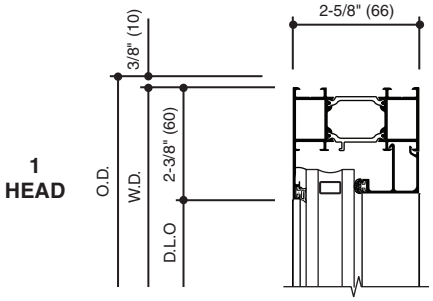
PERFORMANCE	Air Infiltration	Water Resistance	Design Load	Thermal Transmittance AAMA 1503	Condensation Resistance AAMA 1503 CAN/CSA-A440	Sound Transmittance
US Standard	.10 Cfm/ft² @ 6.24 psf	15 PSF	90 PSF	.34 "U" Value	67 CRF (Frame)	38 STC
Canadian Standard	0.25 (m³/h)/m @ 300 Pa (Fixed)	720 Pa (B7)	4320 Pa (C5)	.34 "U" Value	60.9 I (Frame)	38 STC

Note: Thermal values are based upon 1" Low-E, Argon filled insulating glass.
STC value is based upon 1" laminated insulating glass.

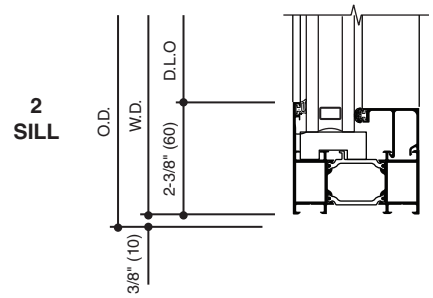
SCALE : 3" = 1'-0"
(Nominal Dimensions Shown)



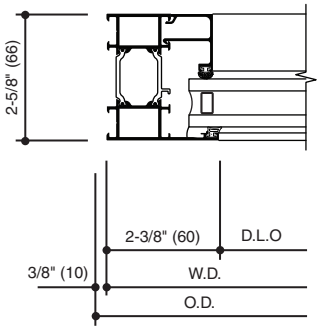
TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations



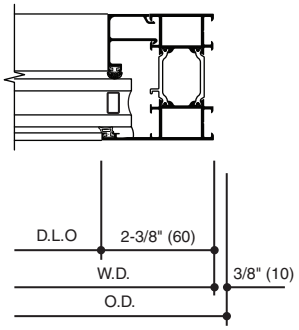
1
HEAD



2
SILL



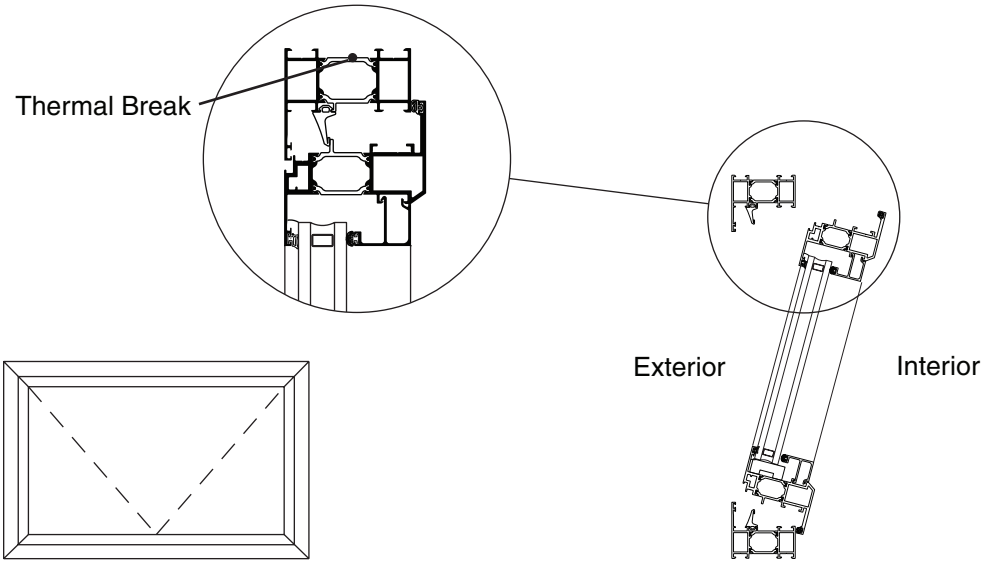
3
JAMB



4
JAMB

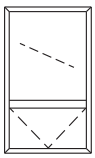
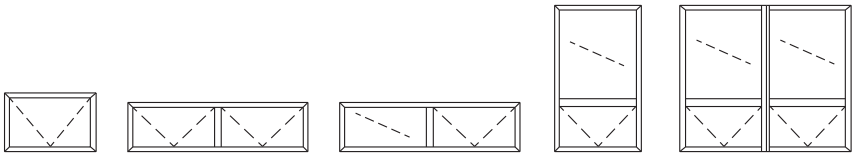
Standard Features

- Heavy Commercial Grade Window
- Tested to US and Canadian Standards
- IsoWeb™ Polyamide Thermal Break
- Accentuated Tubular Profiles
- 45° Mitered Vent and Frame Corners
- Unique Mechanically Clipped or Staked Corner Joinery
- Factory Silicone Glazed or Field Dry Glazed
- Integral Air Seal
- Adjustable EURO-Groove Mounted Hardware
- Single Handle Multi-Point Locking
- Multiple Locking Handle Styles and Finishes
- Interior Applied Glazing Bead
- Architectural Anodized Finishes and Applied Coatings
- Interior and Exterior Dual Finish Options
- Two Year Manufacturer's Warranty
- Compatible with Storefront and Curtain Wall Systems



Project-in Window

For specific product applications,
Consult your Kawneer representative.

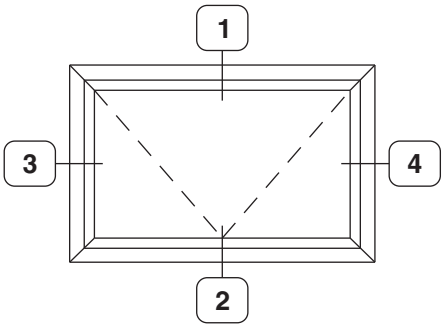
CLASS and GRADE	Heavy Commercial Grade AP-HC90 / AP-AW90 
OPTIONAL CLASS and GRADE	Heavy Commercial Grade FW-HC80 / FW-AW80 
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S.2 / A440-05 / A440-00
FRAME DEPTH	2-5/8" Overall Frame Depth
TYPICAL WALL THICKNESS	.070" Nominal Frame / .090" Nominal Vent
TYPICAL MAX. WINDOW SIZE	60" x 36" (72" x 48" with limitations - Consult Kawneer Engineering)
TYPICAL MIN. WINDOW SIZE	17" x 17"
TYPICAL CONFIGURATIONS	
INFILL OPTIONS	1" Standard (Other Infill Options Available Upon Request)
STANDARD HARDWARE	Stainless Steel 4-Bar Hinges Single Handle Multi-Point Locking
OPTIONAL HARDWARE	Cast White Bronze Cam Handles Access Control Locks Pole and Pole Ring Limit Stop
OTHER OPTIONS	Structural Mullions Vertically or Horizontally Stacked Insect Screens

SINGLE PROJECT-IN WINDOW

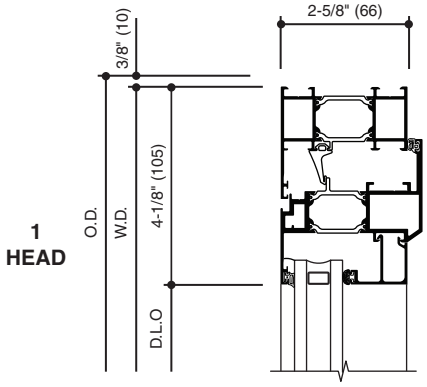
PERFORMANCE	Air Infiltration	Water Resistance	Design Load	Thermal Transmittance AAMA 1503	Condensation Resistance AAMA 1503 CAN/CSA-A440	Sound Transmittance
US Standard	.10 Cfm/ft² @ 6.24 psf	15 PSF	90 PSF	.43 "U" Value	64 CRF (Frame)	36 STC
Canadian Standard	0.55 (m³/h)/m @300 Pa (A3)	720 Pa (B7)	3840 Pa (C5)	.43 "U" Value	50.2 I (Frame)	36 STC

Note: Thermal values are based upon 1" Low E, Argon filled insulating glass.
STC value is based upon 1" laminated insulating glass.

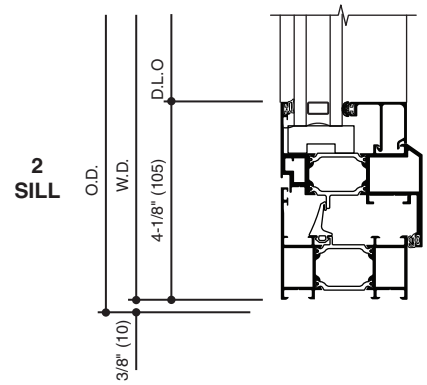
SCALE : 3" = 1'-0"
(Nominal Dimensions Shown)



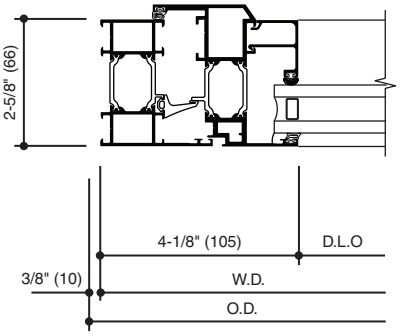
TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations



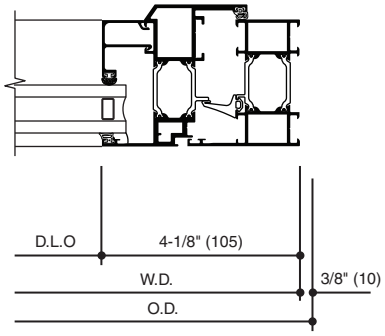
1
HEAD



2
SILL

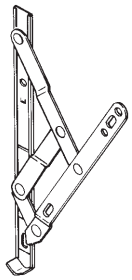


3
JAMB



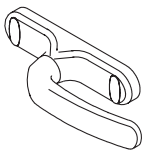
4
JAMB

STAINLESS STEEL 4 BAR HINGES



A standard hinge for ventilators providing approximately 45° to 60° openings depending on size. An optional limit stop is available to restrict hinge travel and limit vent opening.

STANDARD MULTI-POINT LOCKING

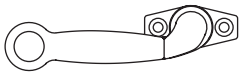


Single handle multi-point locking is standard providing any number of concealed EURO-Groove mounted locking points around the ventilator perimeter. Stylish handles are available in black, white and silver painted finishes as well as chrome, satin and polished brass.

CAM HANDLE

Cast white bronze cam handles are an alternative to standard multi-point locking for the operation and locking of ventilators.

CAM HANDLE WITH POLE RING

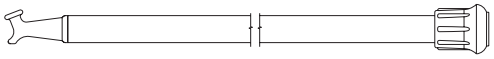


Cast white bronze cam handles with pole ring provide manual operation of ventilators located above reach.
These handles are operated with a sash pole.

POLE RING

Cast white bronze pole ring is used in conjunction with locking hardware for sash pole operation of ventilators.

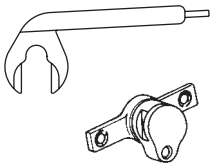
SASH POLE



HANGER FOR SASH POLE

A 3/4" diameter aluminum sash pole with a cast white bronze pull down hook and black rubber tip.
Available in 6 ft. and 12 ft. lengths with optional cast white bronze Pole Hanger.

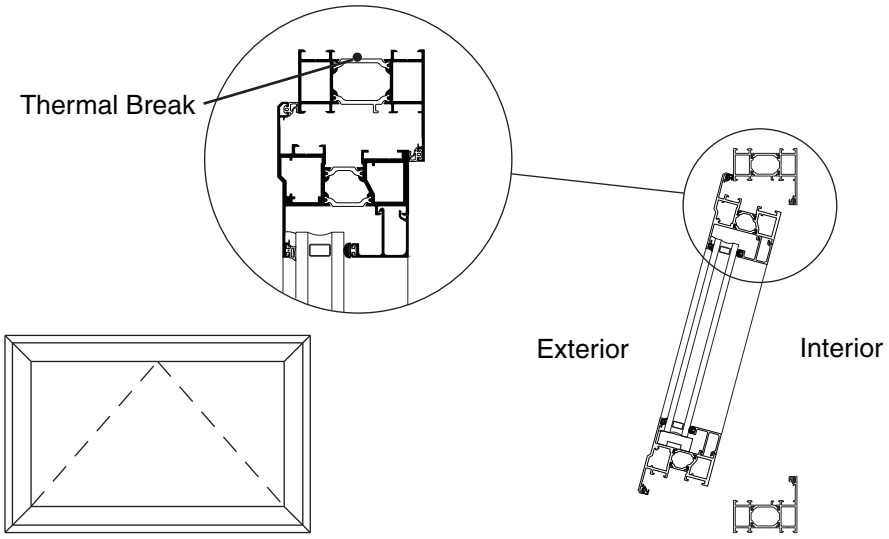
ACCESS CONTROL LOCK



In lieu of cam handles and multi-point locking cast white bronze access control locks are offered for managed control of vent operations.
Lock is operated with a manganese bronze removable handle.

Standard Features

- Heavy Commercial Grade Window
- Tested to US and Canadian Standards
- IsoWeb™ Polyamide Thermal Break
- Accentuated Tubular Profiles
- 45° Mitered Vent and Frame Corners
- Unique Mechanically Clipped or Staked Corner Joinery
- Factory Silicone Glazed or Field Dry Glazed
- Adjustable EURO-Groove Mounted Hardware
- Single Handle Multi-Point Locking
- Multiple Locking Handle Styles and Finishes
- Interior Applied Glazing Bead
- Architectural Anodized Finishes and Applied Coatings
- Interior and Exterior Dual Finish Options
- Two Year Manufacturer's Warranty
- Compatible with Storefront and Curtain Wall Systems

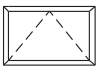
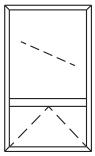
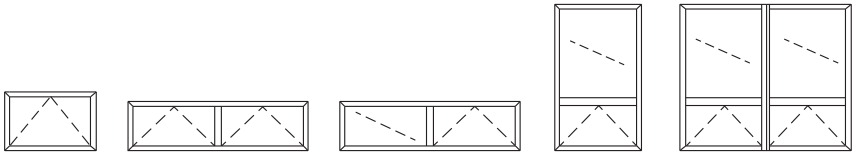


Project-out Window

For specific product applications,
Consult your Kawneer representative.

AA™ 900 Thermal Windows

PROJECT-OUT WINDOW

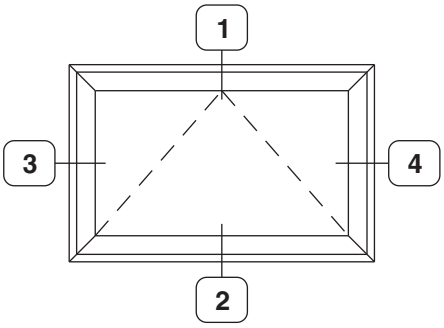
CLASS and GRADE	Heavy Commercial Grade AC-HC90 / AP-AW90 
OPTIONAL CLASS and GRADE	Heavy Commercial Grade AP-HC80 / AP-AW80 
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S.2 / A440-05 / A440-00
FRAME DEPTH	2-5/8" Overall Frame Depth
TYPICAL WALL THICKNESS	.070" Nominal Frame / .090" Nominal Vent
TYPICAL MAX. VENT SIZE	60" x 36" (72" x 48" with limitations - Consult Kawneer Engineering)
TYPICAL MIN. VENT SIZE	17" x 17"
TYPICAL CONFIGURATIONS	
INFILL OPTIONS	1" Standard (Other Infill Options Available Upon Request)
STANDARD HARDWARE	Stainless Steel 4-Bar Hinges Single Handle Multi-Point Locking
OPTIONAL HARDWARE	Cast White Bronze Cam Handles Access Control Locks Pole and Pole Ring Limit Stop Pivot-Shoe Roto Operator UCS Powered Operators
OTHER OPTIONS	Structural Mullions Vertically or Horizontally Stacked Insect Screens

SINGLE PROJECT-OUT WINDOW

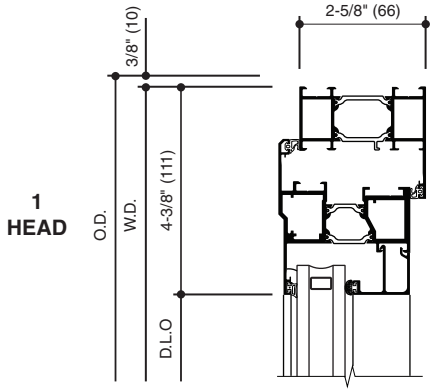
PERFORMANCE	Air Infiltration	Water Resistance	Design Load	Thermal Transmittance AAMA 1503	Condensation Resistance AAMA 1503 CAN/CSA-A440	Sound Transmittance
US Standard	.10 Cfm/ft² @ 6.24 psf	15 PSF	90 PSF	.47 "U" Value	61 CRF (Frame)	36 STC
Canadian Standard	0.55 (m³/h)/m @300 Pa (A3)	720 Pa (B7)	3840 Pa (C5)	.47 "U" Value	50.2 I (Frame)	36 STC

Note: Thermal values are based upon 1" Low E, Argon filled insulating glass.
STC value is based upon 1" laminated insulating glass.

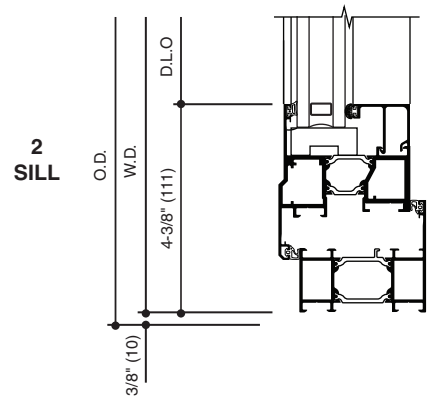
SCALE : 3" = 1'-0"
(Nominal Dimensions Shown)



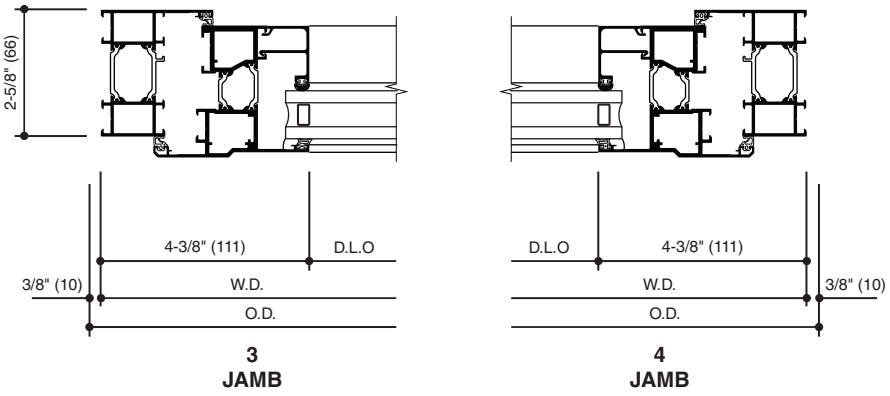
TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations



1
HEAD



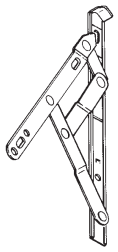
2
SILL



3
JAMB

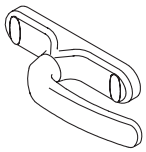
4
JAMB

STAINLESS STEEL 4 BAR HINGES



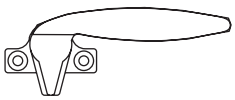
A standard hinge for ventilators providing approximately 45° to 60° openings depending on size. An optional limit stop is available to restrict hinge travel and limit vent opening.

STANDARD MULTI-POINT LOCKING



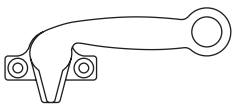
Single handle multi-point locking is standard providing any number of concealed EURO-Groove mounted locking points around the ventilator perimeter. Stylish handles are available in black, white and silver painted finishes as well as chrome, satin and polished brass.

CAM HANDLE



Cast white bronze cam handles are an alternative to standard multi-point locking for the operation and locking of ventilators.

CAM HANDLE WITH POLE RING

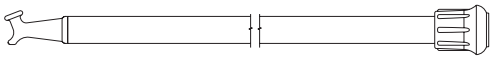


Cast white bronze cam handles with pole ring provide manual operation of ventilators located above reach.
These handles are operated with a sash pole.

POLE RING

Cast white bronze pole ring is used in conjunction with locking hardware for sash pole operation of ventilators.

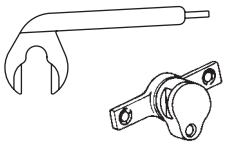
SASH POLE



HANGER FOR SASH POLE

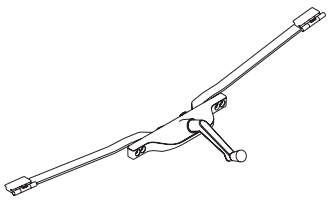
A 3/4" diameter aluminum sash pole with a cast white bronze pull down hook and black rubber tip.
Available in 6 ft. and 12 ft. lengths with optional cast white bronze Pole Hanger.

ACCESS CONTROL LOCK



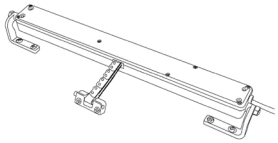
In lieu of cam handles and multi-point locking cast white bronze access control locks are offered for managed control of vent operations.
Lock is operated with a manganese bronze removable handle.

PIVOT-SHOE ROTO-OPERATOR



Optional pivot shoe roto operator is located on the center line of the bottom horizontal frame.
Standard finish shall be brushed copper nickel to match US-25-D.

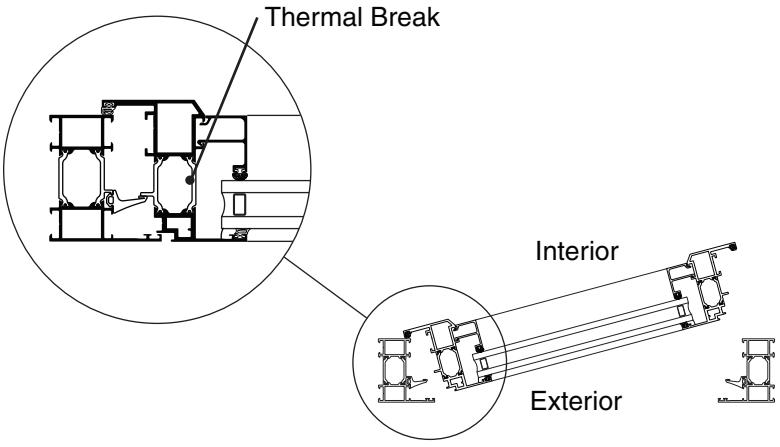
MOTORIZED ACTUATORS

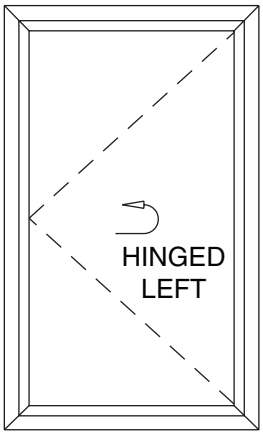


Chain operated motorized actuator. Suitable for bottom and top hinged windows. Available in white, black or gray finish.

Standard Features

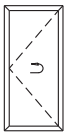
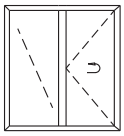
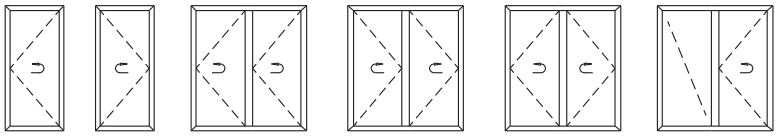
- Heavy Commercial Grade Window
- Tested to US and Canadian Standards
- IsoWeb™ Polyamide Thermal Break
- Accentuated Tubular Profiles
- 45° Mitered Vent and Frame Corners
- Unique Mechanically Clipped or Staked Corner Joinery
- Factory Silicone Glazed or Field Dry Glazed
- Integral Air Seal
- Adjustable EURO-Groove Mounted Hardware
- Single Handle Multi-Point Locking
- Multiple Locking Handle Styles and Finishes
- Interior Applied Glazing Bead
- Architectural Anodized Finishes and Applied Coatings
- Interior and Exterior Dual Finish Options
- Two Year Manufacturer's Warranty
- Compatible with Storefront and Curtain Wall Systems





Inswing Casement Window

For specific product applications,
Consult your Kawneer representative.

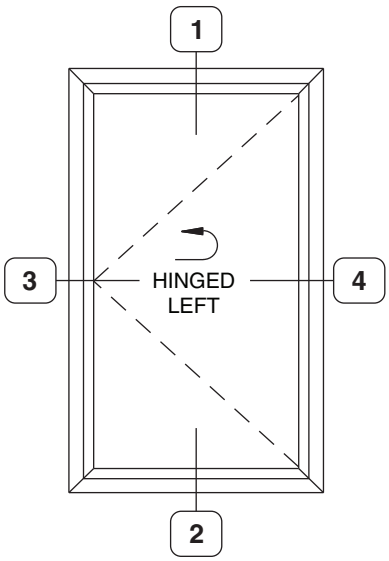
CLASS and GRADE	Heavy Commercial Grade C-HC90 / C-AW90 
OPTIONAL CLASS and GRADE	Heavy Commercial Grade C-HC80 / C-AW80 
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S.2 / A440-05 / A440-00
FRAME DEPTH	2-5/8" Overall Frame Depth
TYPICAL WALL THICKNESS	.070" Nominal Frame / .090" Nominal Vent
TYPICAL MAX. WINDOW SIZE	36" x 60" (48" x 72" with limitations - Consult Kawneer Engineering)
TYPICAL MIN. WINDOW SIZE	17" x 17"
TYPICAL CONFIGURATIONS	
INFILL OPTIONS	1" Standard (Other Infill Options Available Upon Request)
STANDARD HARDWARE	Stainless Steel 4-Bar Hinges Single Handle Multi-Point Locking
OPTIONAL HARDWARE	Cast White Bronze Cam Handles Access Control Locks Pole and Pole Ring Limit Stop Butt Hinges with Friction Adjusters
OTHER OPTIONS	Structural Mullions Vertically or Horizontally Stacked Insect Screens

SINGLE CASEMENT INSWING WINDOW

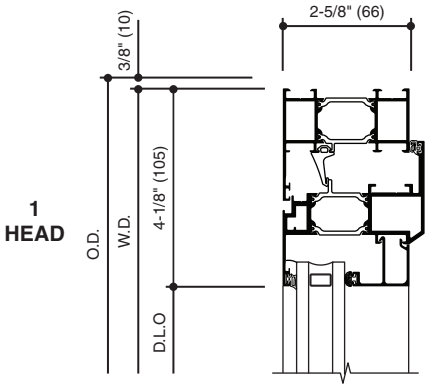
PERFORMANCE	Air Infiltration	Water Resistance	Design Load	Thermal Transmittance AAMA 1503	Condensation Resistance AAMA 1503 CAN/CSA-A440	Sound Transmittance
US Standard	.10 Cfm/ft² @ 6.24 psf	15 PSF	90 PSF	.43 "U" Value	64 CRF (Frame)	36 STC
Canadian Standard	0.5 (m³/h)/m @300 Pa (A3)	720 Pa (B7)	3840 Pa (C5)	.43 "U" Value	50.2 I (Frame)	36 STC

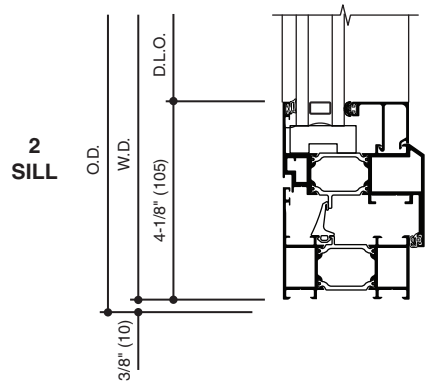
Note: Thermal values are based upon 1" Low E, Argon filled insulating glass.
STC value is based upon 1" laminated insulating glass.

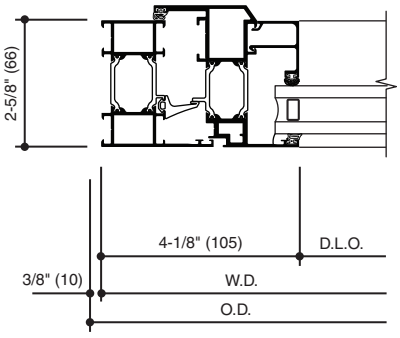
SCALE : 3" = 1'-0"
(Nominal Dimensions Shown)



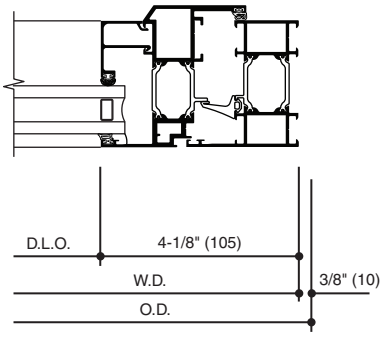
TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations





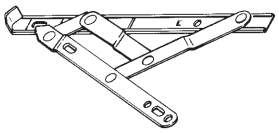


3
JAMB



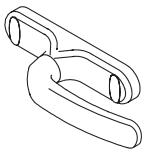
4
JAMB

STAINLESS STEEL 4 BAR HINGES



A standard hinge for ventilators providing up to 45° of open. An optional limit stop is available to restrict hinge travel and limit vent opening.

STANDARD MULTI-POINT LOCKING

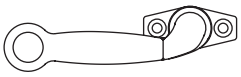


Single handle multi-point locking is standard providing any number of concealed EURO-Groove mounted locking points around the ventilator perimeter. Stylish handles are available in black, white and silver painted finishes as well as chrome, satin and polished brass.

CAM HANDLE

Cast white bronze cam handles are an alternative to standard multi-point locking for the operation and locking of ventilators.

CAM HANDLE WITH POLE RING

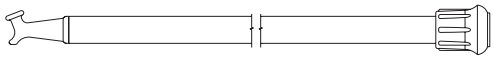


Cast white bronze cam handles with pole ring provide manual operation of ventilators located above reach.
These handles are operated with a sash pole.

POLE RING

Cast white bronze pole ring is used in conjunction with locking hardware for sash pole operation of ventilators.

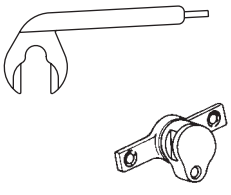
SASH POLE



A 3/4" diameter aluminum sash pole with a cast white bronze pull down hook and black rubber tip.
Available in 6 ft. and 12 ft. lengths with optional cast white bronze Pole Hanger.

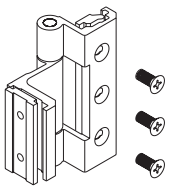
HANGER FOR SASH POLE

ACCESS CONTROL LOCK



In lieu of cam handles and multi-point locking cast white bronze access control locks are offered for managed control of vent operations.
Lock is operated with a manganese bronze removable handle.

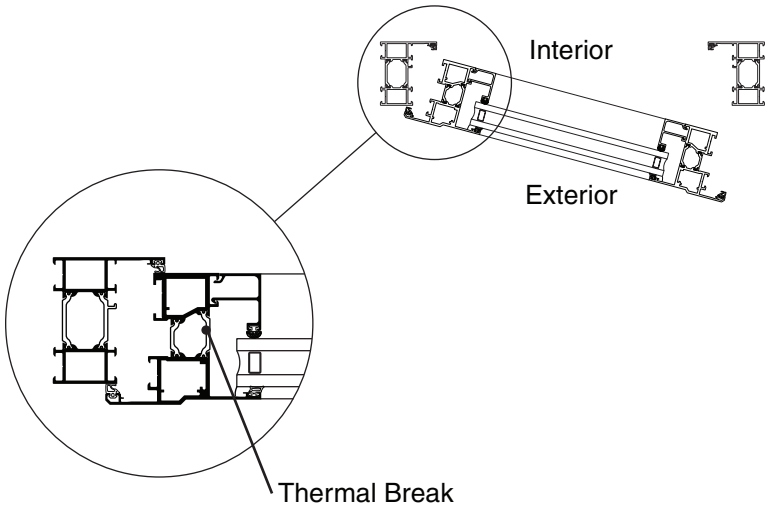
BUTT HINGE

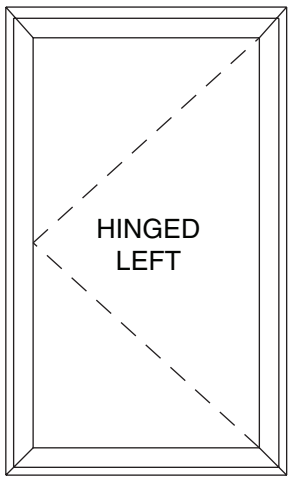


An optional hinge available in anodized finishes or painted to match window. Must be used with Friction Adjusters.

Standard Features

- Heavy Commercial Grade Window
- Tested to US and Canadian Standards
- IsoWeb™ Polyamide Thermal Break
- Accentuated Tubular Profiles
- 45° Mitered Vent and Frame Corners
- Unique Mechanically Clipped or Staked Corner Joinery
- Factory Silicone Glazed or Field Dry Glazed
- Adjustable EURO-Groove Mounted Hardware
- Single Handle Multi-Point Locking
- Multiple Locking Handle Styles and Finishes
- Interior Applied Glazing Bead
- Architectural Anodized Finishes and Applied Coatings
- Interior and Exterior Dual Finish Options
- Two Year Manufacturer's Warranty
- Compatible with Storefront and Curtain Wall Systems



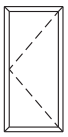
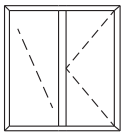
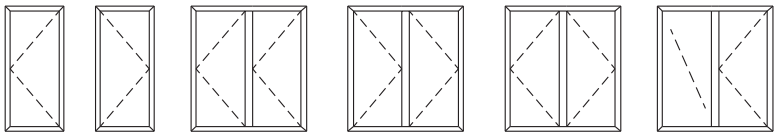


Outswing Casement Window

For specific product applications,
Consult your Kawneer representative.

AA™ 900 Thermal Windows

OUTSWING CASEMENT WINDOW

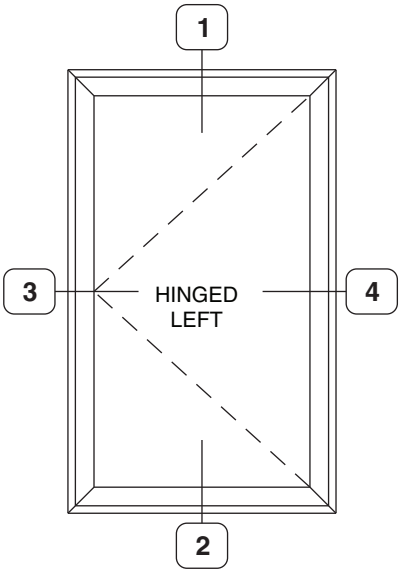
CLASS and GRADE	Heavy Commercial Grade C-HC90 / C-AW90 
OPTIONAL CLASS and GRADE	Heavy Commercial Grade C-HC70 / C-AW70 
TESTING STANDARD	AAMA / WDMA / CSA 101 / I.S.2 / A440-05 / A440-00
FRAME DEPTH	2-5/8" Overall Frame Depth
TYPICAL WALL THICKNESS	.070" Nominal Frame / .090" Nominal Vent
TYPICAL MAX. WINDOW SIZE	36" x 60" (48" x 72" with limitations - (Consult Kawneer Engineering)
TYPICAL MIN. WINDOW SIZE	17" x 17"
TYPICAL CONFIGURATIONS	
INFILL OPTIONS	1" Standard (Other Infill Options Available Upon Request)
STANDARD HARDWARE	Stainless Steel 4-Bar Hinges Single Handle Multi-Point Locking
OPTIONAL HARDWARE	Cast White Bronze Cam Handles Access Control Locks Pole and Pole Ring Limit Stop Butt Hinges Roto Operator
OTHER OPTIONS	Structural Mullions Vertically or Horizontally Stacked Insect Screens

SINGLE CASEMENT OUTSWING WINDOW

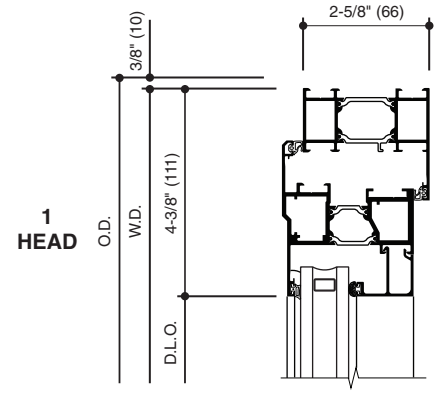
PERFORMANCE	Air Infiltration	Water Resistance	Design Load	Thermal Transmittance AAMA 1503	Condensation Resistance AAMA 1503 CAN/CSA-A440	Sound Transmittance
US Standard	.10 Cfm/ft² @ 6.24 psf	15 PSF	90 PSF	.47 "U" Value	61 CRF (Frame)	36 STC
Canadian Standard	0.55 (m³/h)/m @300 Pa (A3)	720 Pa (B7)	3360 Pa (C5)	.47 "U" Value	53.2 I (Frame)	36 STC

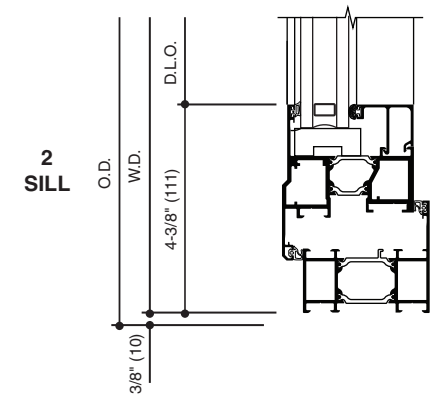
Note: Thermal values are based upon 1" Low E, Argon filled insulating glass.
STC value is based upon 1" laminated insulating glass.

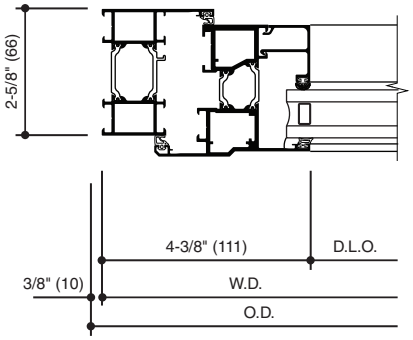
SCALE : 3" = 1'-0"
(Nominal Dimensions Shown)



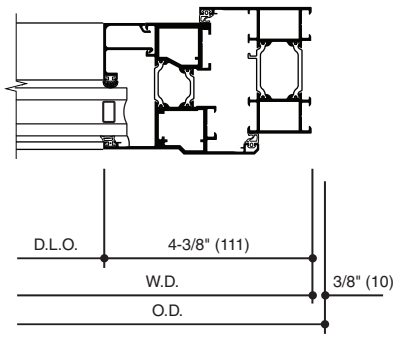
TYPICAL ELEVATION
Log onto www.kawneer.com for other configurations





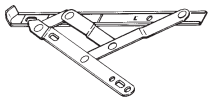


3
JAMB



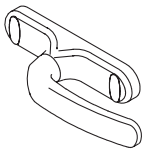
4
JAMB

STAINLESS STEEL 4 BAR HINGES



A standard hinge for ventilators providing up to 45° of open. An optional limit stop is available to restrict hinge travel and limit vent opening.

STANDARD MULTI-POINT LOCKING

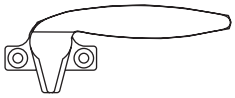


Single handle multi-point locking is standard providing any number of concealed EURO-Groove mounted locking points around the ventilator perimeter. Stylish handles are available in black, white and silver painted finishes as well as chrome, satin and polished brass.

MULTI-POINT LOCK

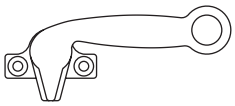
Optional single locking handle for concealed multi-point locks located on the vertical frame. Standard finish shall be US-25-D clear white bronze.

CAM HANDLE



Cast white bronze cam handles are an alternative to standard multi-point locking for the operation and locking of ventilators.

CAM HANDLE WITH POLE RING

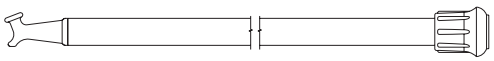


Cast white bronze cam handles with pole ring provide manual operation of ventilators located above reach.
These handles are operated with a sash pole.

POLE RING

Cast white bronze pole ring is used in conjunction with locking hardware for sash pole operation of ventilators.

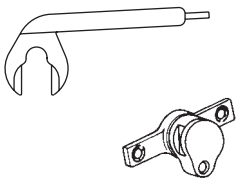
SASH POLE



HANGER FOR SASH POLE

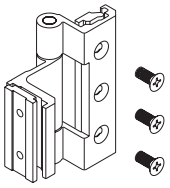
A 3/4" diameter aluminum sash pole with a cast white bronze pull down hook and black rubber tip.
Available in 6 ft. and 12 ft. lengths with optional cast white bronze Pole Hanger.

ACCESS CONTROL LOCK



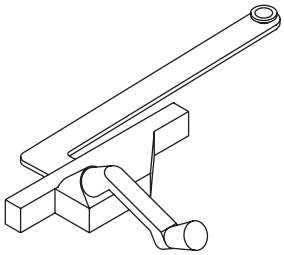
In lieu of cam handles and multi-point locking cast white bronze access control locks are offered for managed control of vent operations.
Lock is operated with a manganese bronze removable handle.

BUTT HINGE



An optional hinge available in anodized finishes or painted to match window. Must be used with Friction Adjusters.

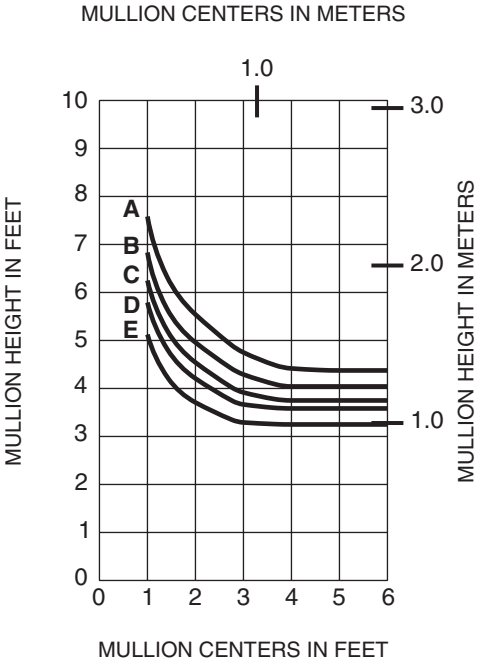
ROTO-OPERATOR



Roto operators are used with butt hinges only and located at the bottom horizontal frame. Standard finish shall be brushed copper nickel to match US-25-D.

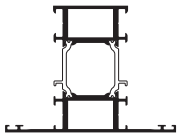
WIND LOAD CHARTS:

THESE CHARTS ARE BASED ON A MAXIMUM DEFLECTION OF L\175 AND\OR A MAXIMUM STRESS OF 15,152 psi (104 MPa). If the design wind load is determined through the analytical procedures of ASCE/SEI 7-10 or earlier editions, the load shall be based on the nominal loads used in allowable stress design. A 4/3 increase in allowable stress has not been used to develop these curves.

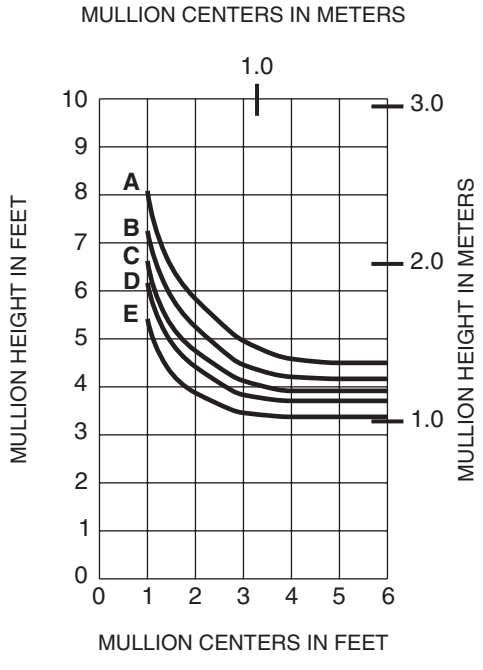


UNITS WITHOUT HORIZONTALS

A = 40 PSF (1915)
B = 50 PSF (2394)
C = 60 PSF (2873)
D = 70 PSF (3352)
E = 90 PSF (4309)



248202



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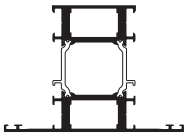

248203

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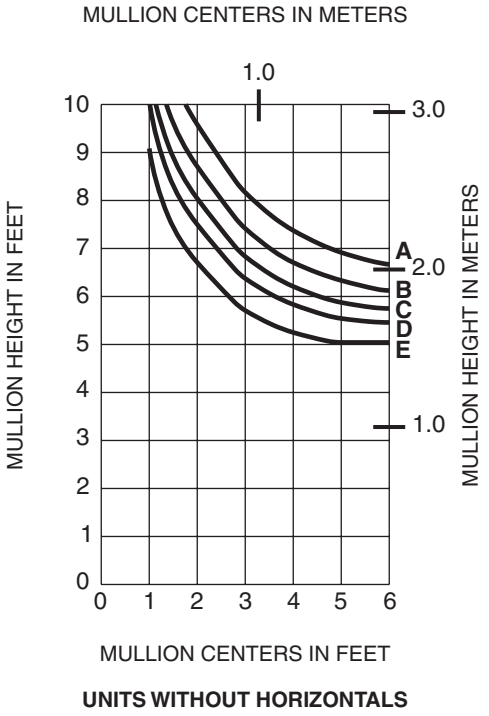

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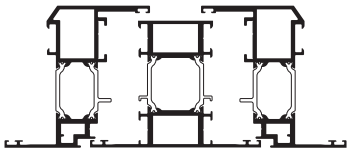
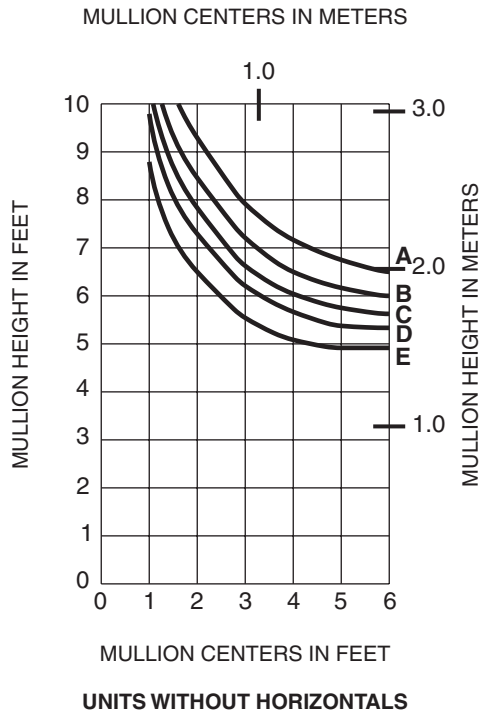


248207 248202 248207



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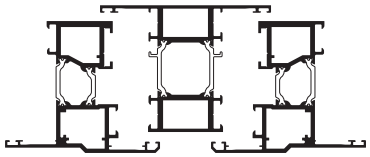

248206 248202 248206

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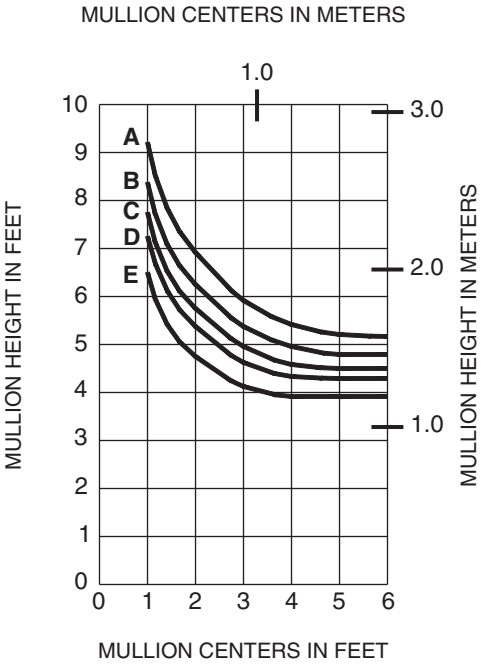

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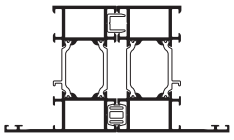

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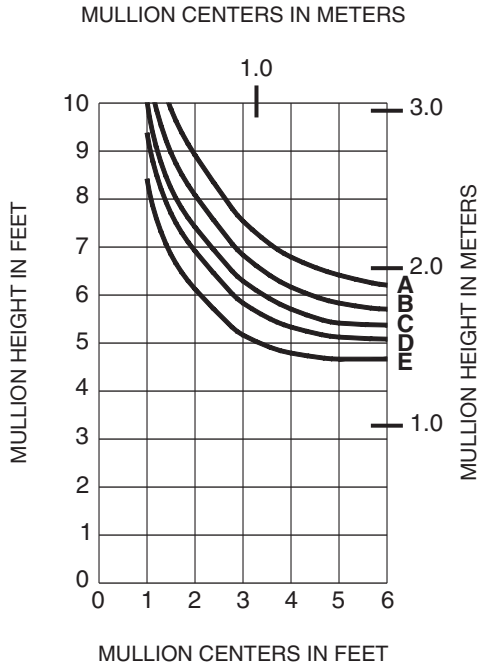

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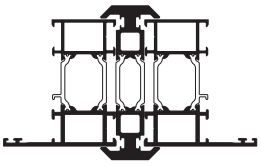

248200 248210 248200

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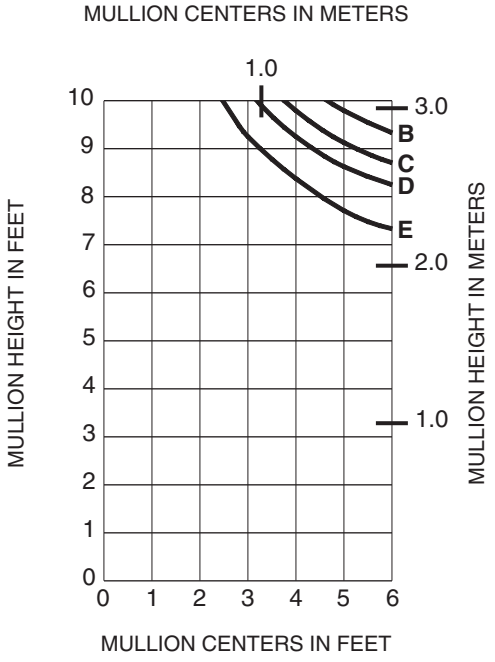

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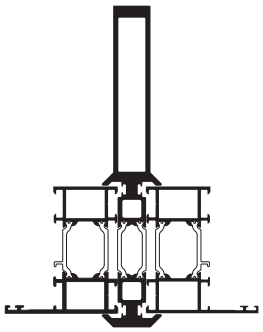
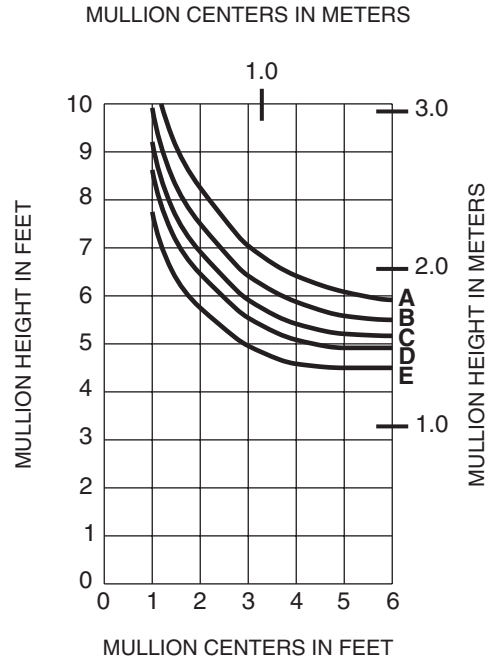


248200 248208 248200



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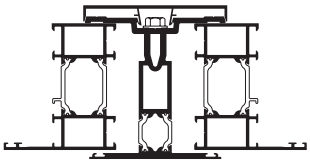

248200 248211 248200

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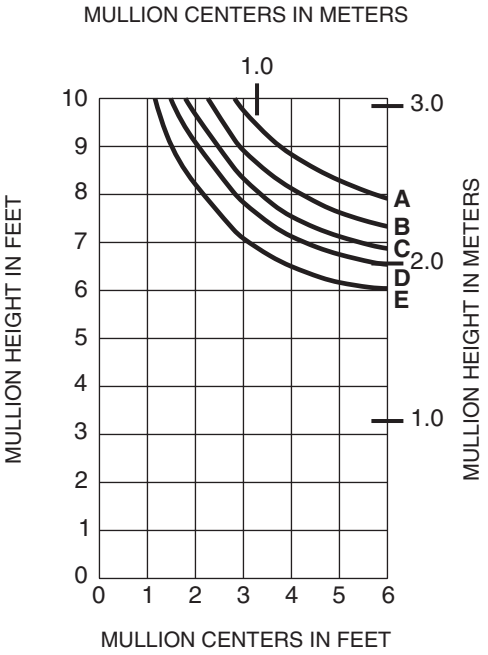

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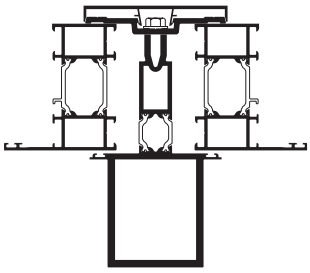
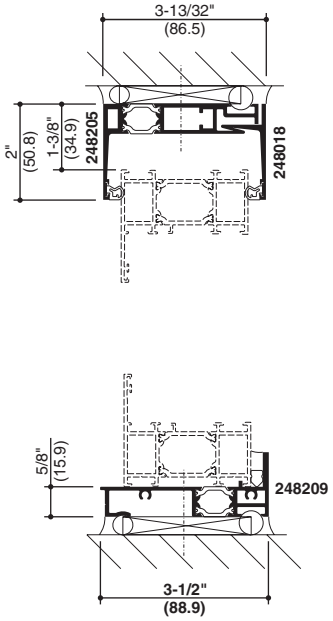
D = 70 PSF (3352)
E = 90 PSF (4309)

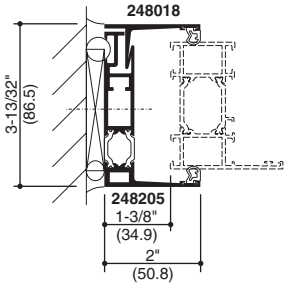


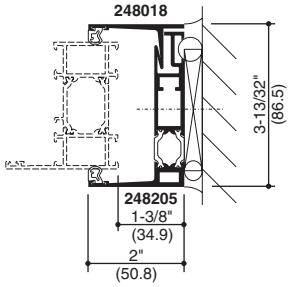
248200 248212 248200

SCALE : 3" = 1'-0"

TYPICAL RECEPTOR SYSTEM

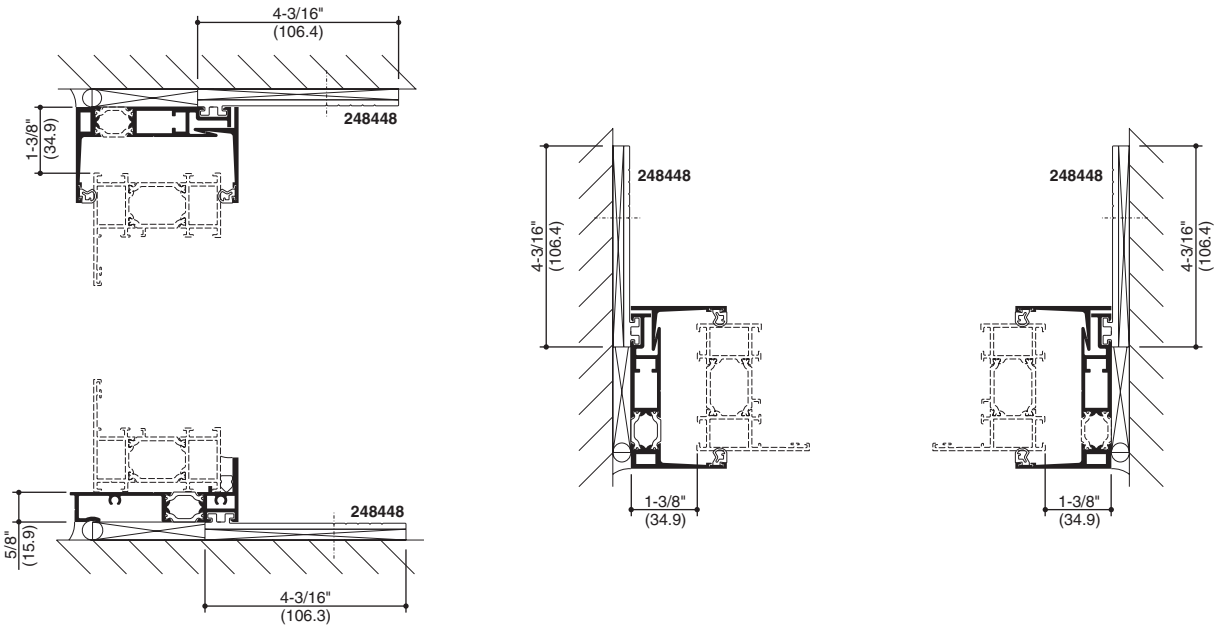




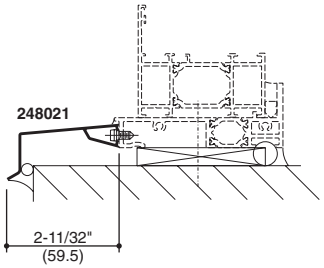


SCALE : 3" = 1'-0"
(Nominal Dimensions Shown)

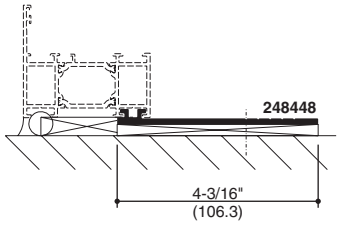
RECEPTOR SYSTEM WITH HEAVY DUTY SLIP-ON ANCHOR



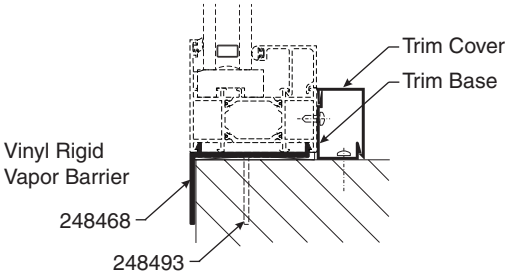
ANCHORS



TYPICAL SILL EXTENSION



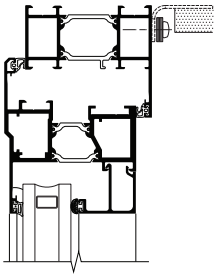
HEAVY DUTY SLIP-ON ANCHOR



Note: Refer to the "Window Panning and Trims" section for more typical trim details.

SCALE : 3" = 1'-0"

VAPOR BARRIER



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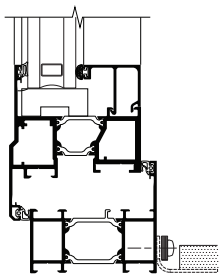
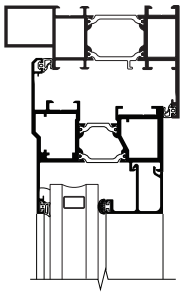


SILL

TOP HAT EXTENSION



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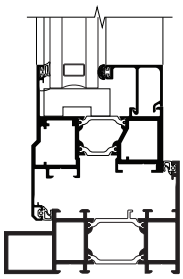
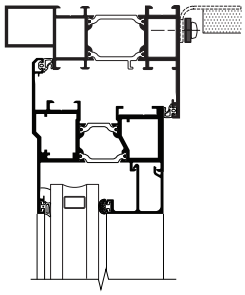


SILL

TOP HAT EXTENSION AND VAPOR BARRIER



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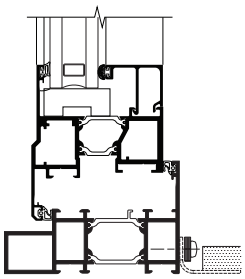
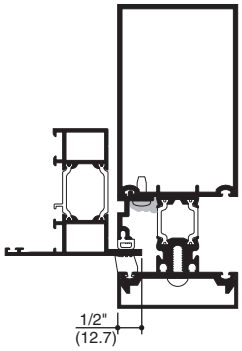
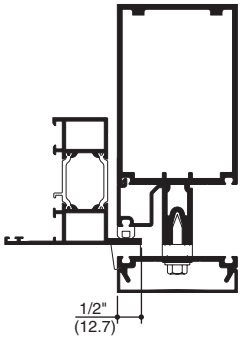


SILL

CURTAIN WALL ADAPTERS

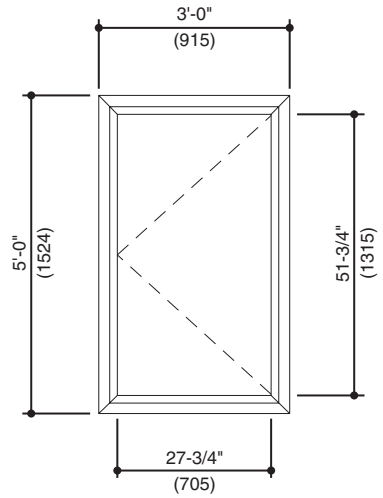


7500 WALL



1600 WALL

Generic Project Specific U-factor Example Calculation
(Percent of Glass will vary on specific products depending on sitelines)



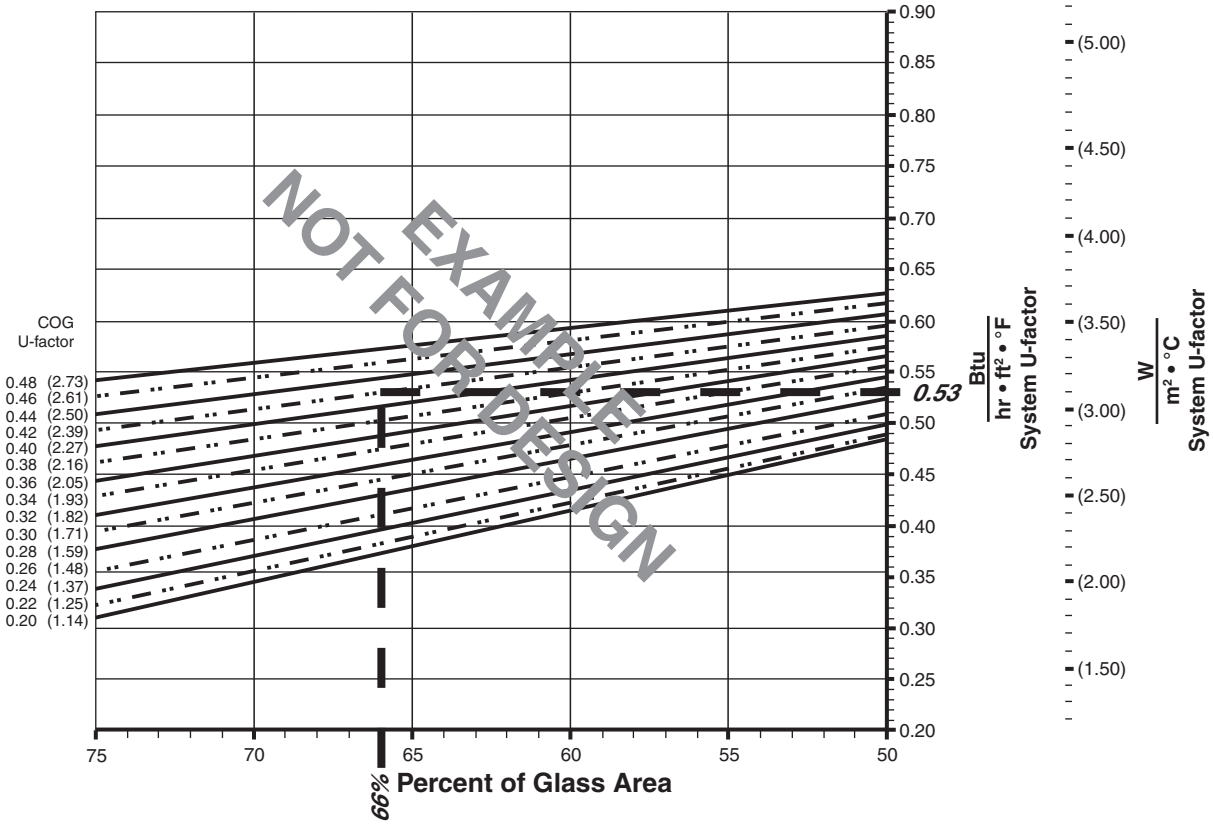
Example Glass U-Factor = 0.42 Btu/hr • ft² • °F

Total Daylight Opening = 27-3/4" • 51-3/4" = 9.97ft²

Total Projected Area = 3'-0" • 5'-0" = 15 ft²

Percent of Glass = (Total Daylight Opening ÷ Total Projected Area)100
= (9.97 ÷ 15)100 = 66%

System U-factor vs Percent of Glass Area

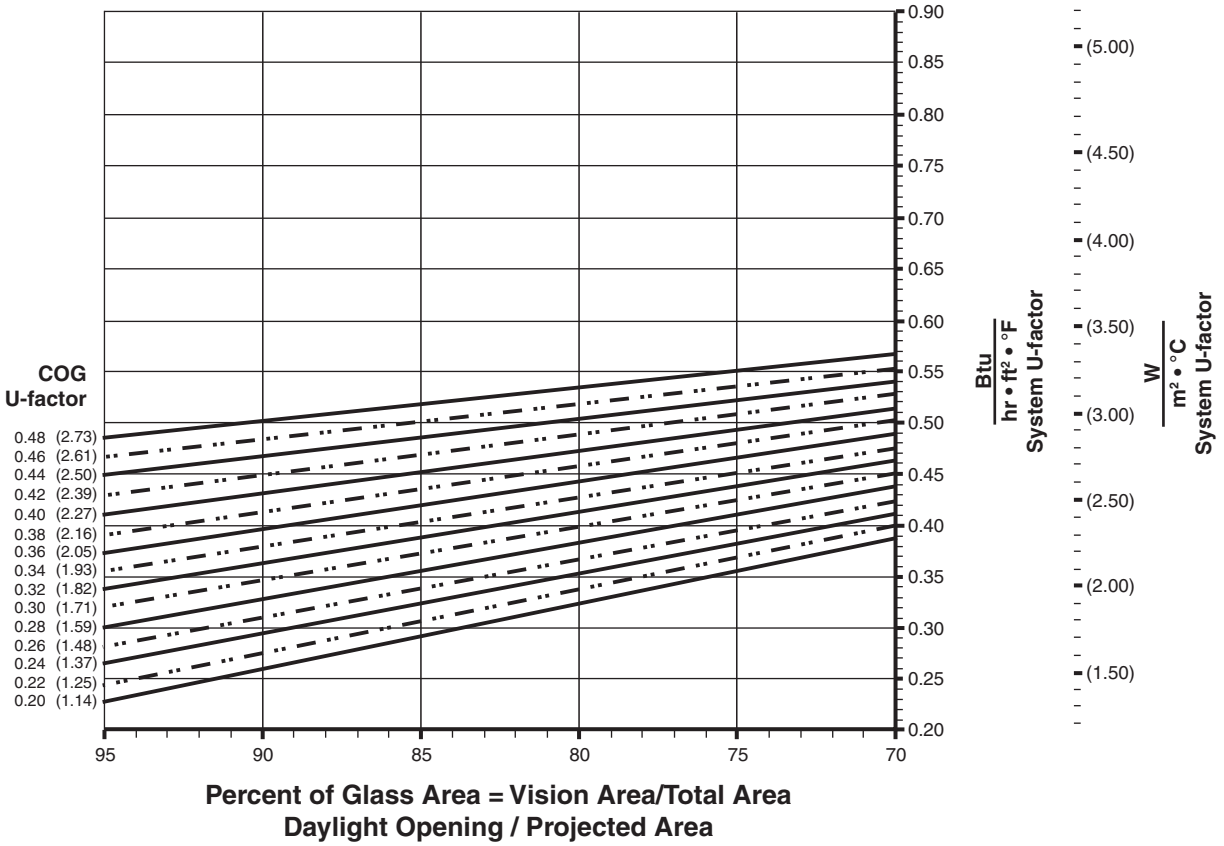


Based on 66% glass and center of glass (COG) U-factor of 0.42
System U-factor is equal to 0.53 Btu/hr • ft² • °F

AA™ 900 FIXED WINDOW

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

System U-factor vs Percent of Glass Area

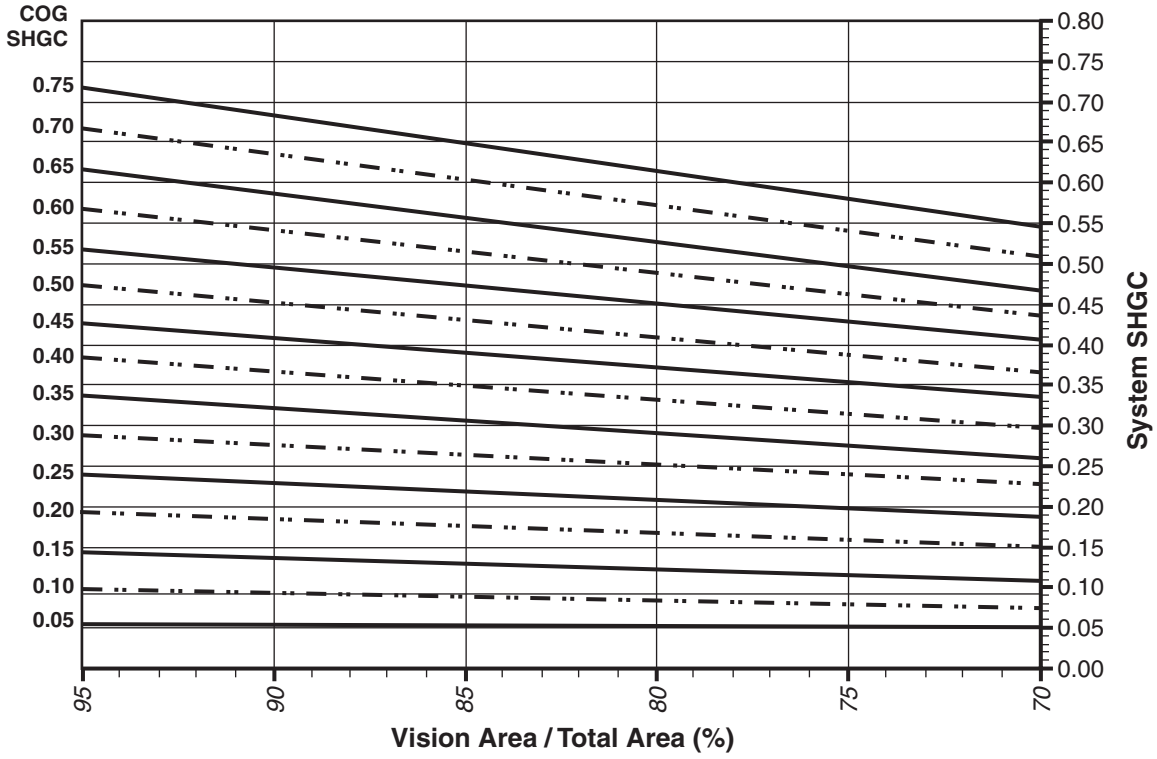


Percent of Glass Area = Vision Area/Total Area
Daylight Opening / Projected Area

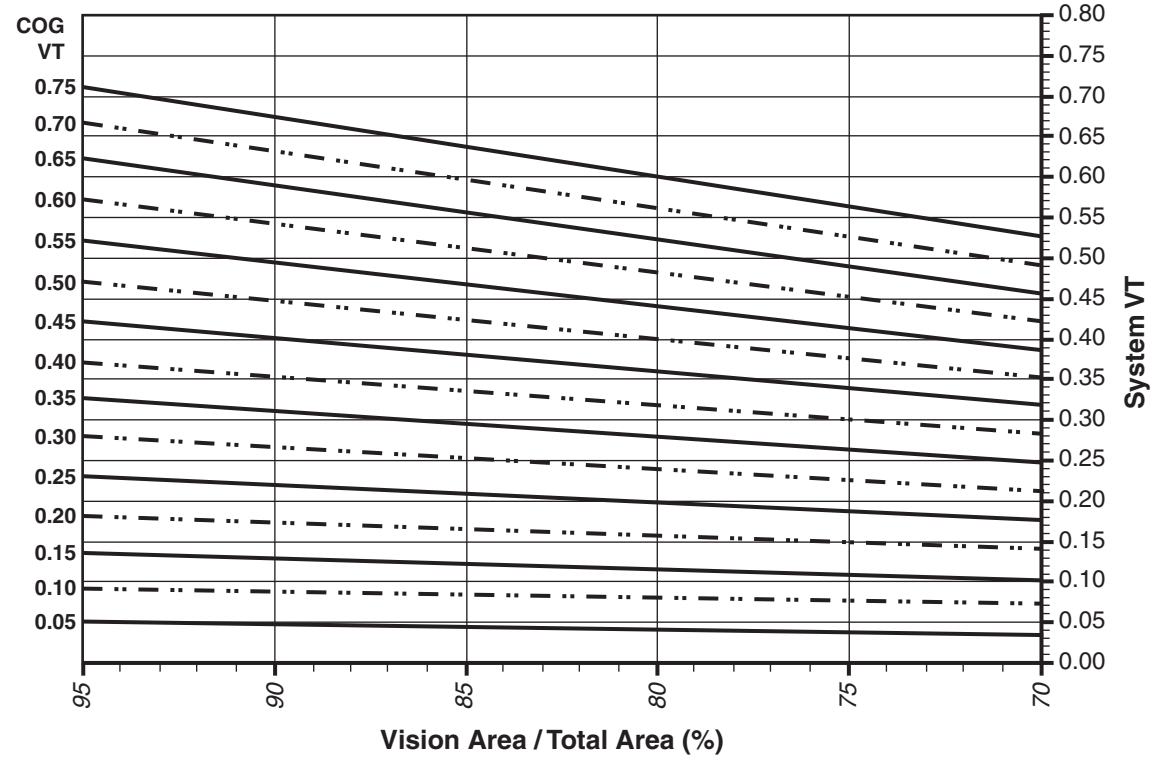
Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

AA™ 900 FIXED WINDOW

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



AA™ 900 FIXED WINDOW

Thermal Transmittance[1] (BTU/hr • ft [2] • °F)

Glass U-Factor [3]	Overall U-Factor [4]
0.48	0.52
0.46	0.51
0.44	0.49
0.42	0.48
0.40	0.46
0.38	0.45
0.36	0.43
0.34	0.42
0.32	0.40
0.30	0.38
0.28	0.37
0.26	0.35
0.24	0.34
0.22	0.32
0.20	0.31

SHGC Matrix [2]

Glass SHGC [3]	Overall Glass U-Factor [4]
0.75	0.63
0.70	0.59
0.65	0.55
0.60	0.51
0.55	0.47
0.50	0.42
0.45	0.38
0.40	0.34
0.35	0.30
0.30	0.26
0.25	0.22
0.20	0.17
0.15	0.13
0.10	0.09
0.05	0.05

Visible Transmittance [2]

Glass VT [3]	Overall VT [4]
0.75	0.62
0.70	0.58
0.65	0.54
0.60	0.50
0.55	0.46
0.50	0.42
0.45	0.37
0.40	0.33
0.35	0.29
0.30	0.25
0.25	0.21
0.20	0.17
0.15	0.12
0.10	0.08
0.05	0.04

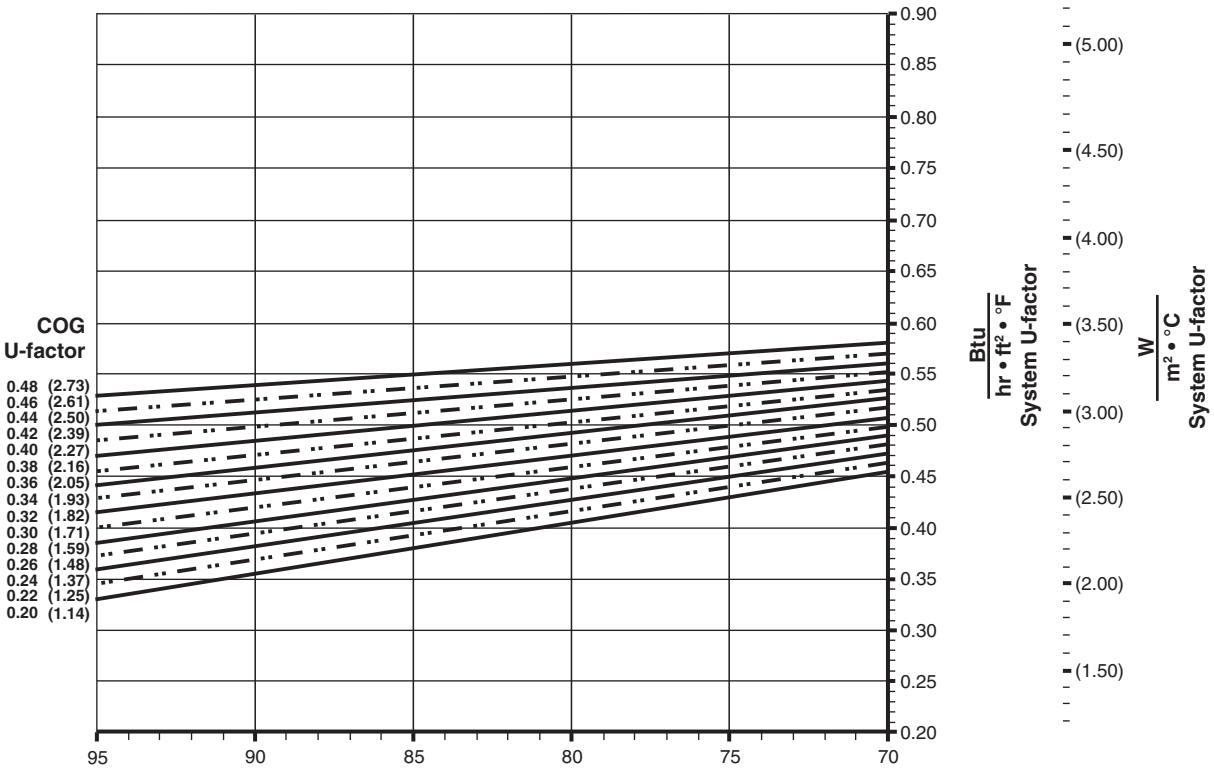
NOTE: For glass values that are not listed, linear interpolation is permitted.

1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 1200mm wide by 1500mm high (47-1/4" by 59-1/16").

AA™ 900 CASEMENT/PROJECT-IN WINDOW

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

System U-factor vs Percent of Glass Area

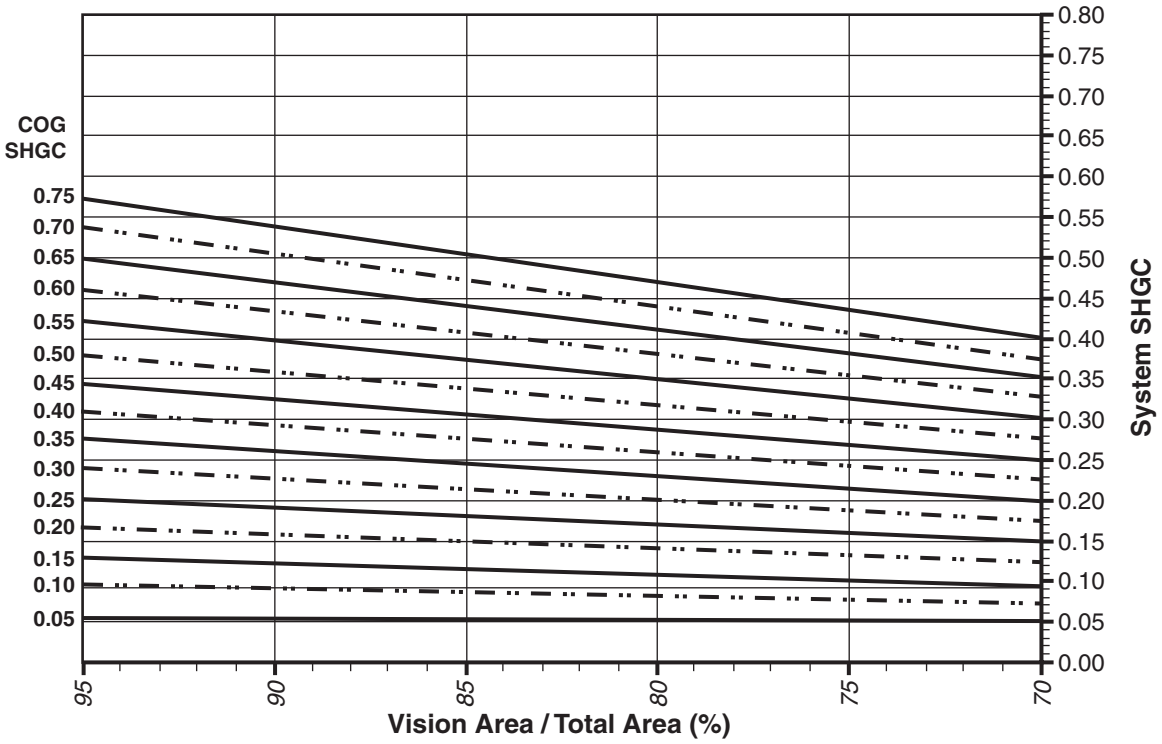


Percent of Glass Area = Vision Area/Total Area
Daylight Opening / Projected Area

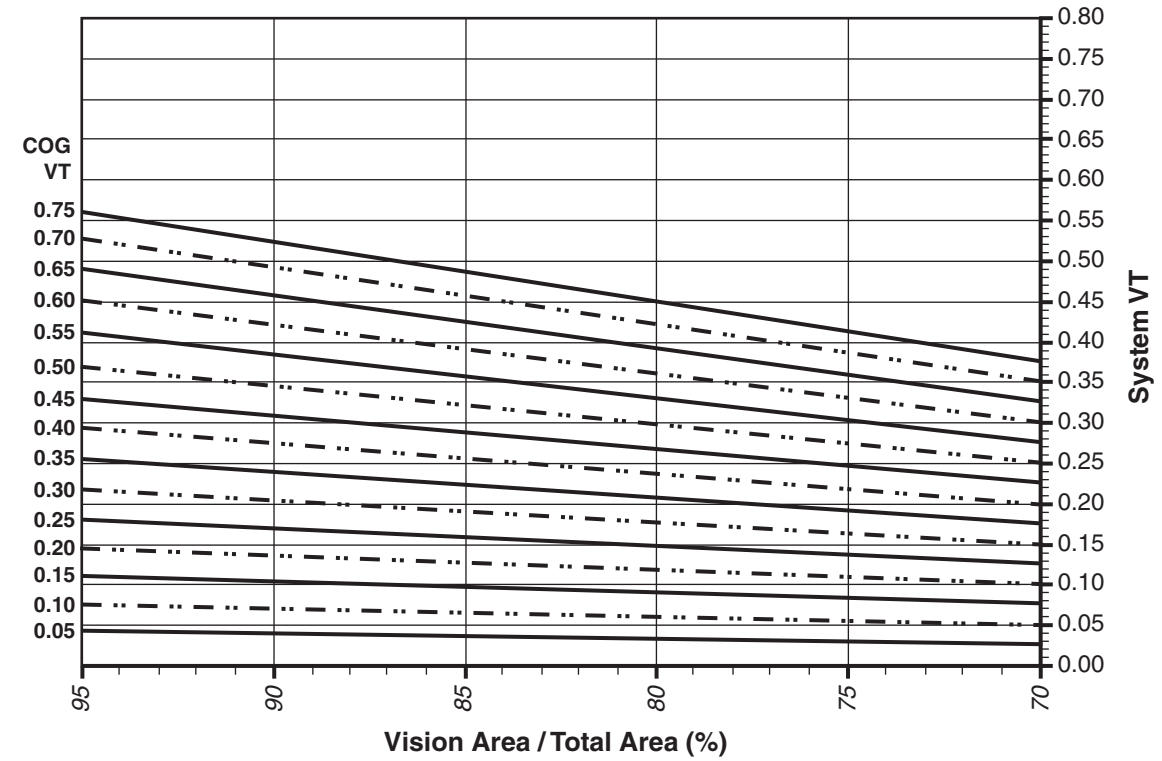
Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

AA™ 900 CASEMENT/PROJECT-IN WINDOW

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



AA™ 900 CASEMENT/PROJECT-IN WINDOW

Thermal Transmittance[1] (BTU/hr • ft [2] • °F)

Glass U-Factor [3]	Overall U-Factor [4]
0.48	0.57
0.46	0.56
0.44	0.55
0.42	0.54
0.40	0.53
0.38	0.52
0.36	0.51
0.34	0.50
0.32	0.49
0.30	0.48
0.28	0.47
0.26	0.46
0.24	0.45
0.22	0.44
0.20	0.43

SHGC Matrix [2]

Glass SHGC [3]	Overall Glass U-Factor [4]
0.75	0.43
0.70	0.41
0.65	0.38
0.60	0.35
0.55	0.33
0.50	0.30
0.45	0.27
0.40	0.24
0.35	0.22
0.30	0.19
0.25	0.16
0.20	0.13
0.15	0.11
0.10	0.08
0.05	0.05

Visible Transmittance [2]

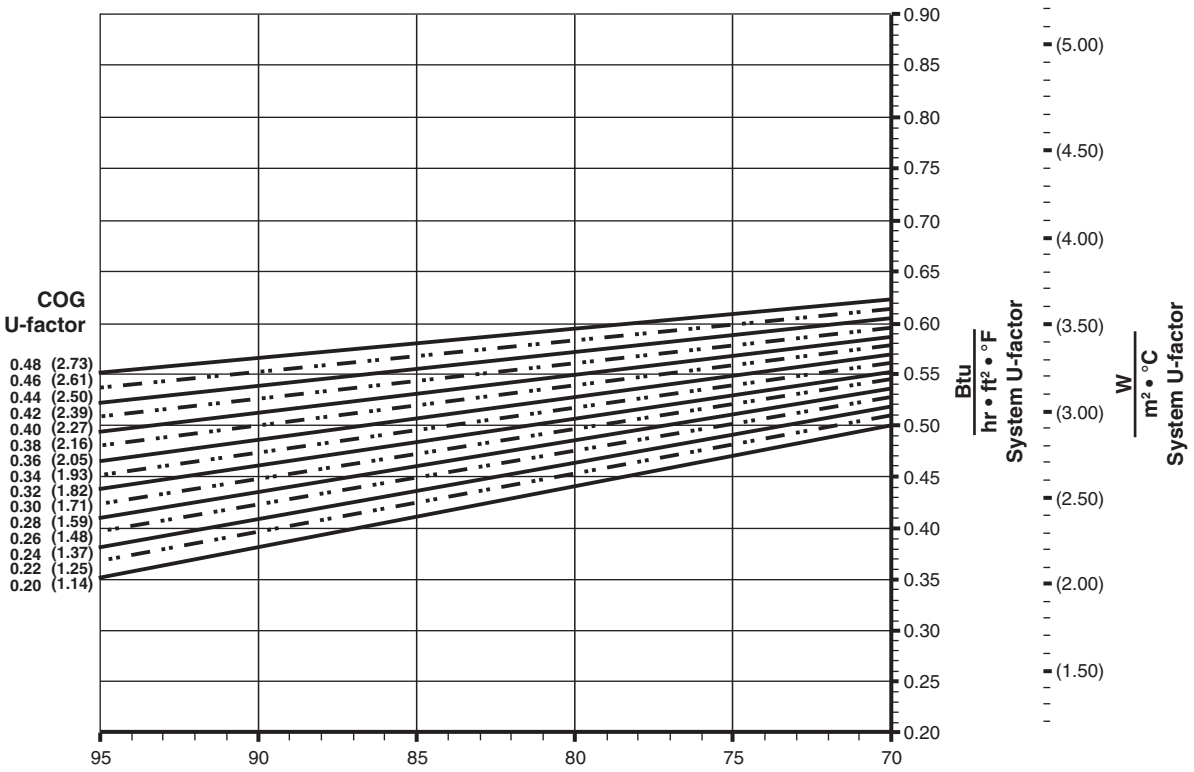
Glass VT [3]	Overall VT [4]
0.75	0.41
0.70	0.38
0.65	0.36
0.60	0.33
0.55	0.30
0.50	0.27
0.45	0.25
0.40	0.22
0.35	0.19
0.30	0.16
0.25	0.14
0.20	0.11
0.15	0.08
0.10	0.05
0.05	0.03

NOTE: For glass values that are not listed, linear interpolation is permitted.
1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 1200mm wide by 1500mm high (47-1/4" by 59-1/16").

AA™ 900 CASEMENT/PROJECT-OUT WINDOW

Note:
Values in parentheses are metric.
COG = Center of Glass.
Charts are generated per AMMA 507

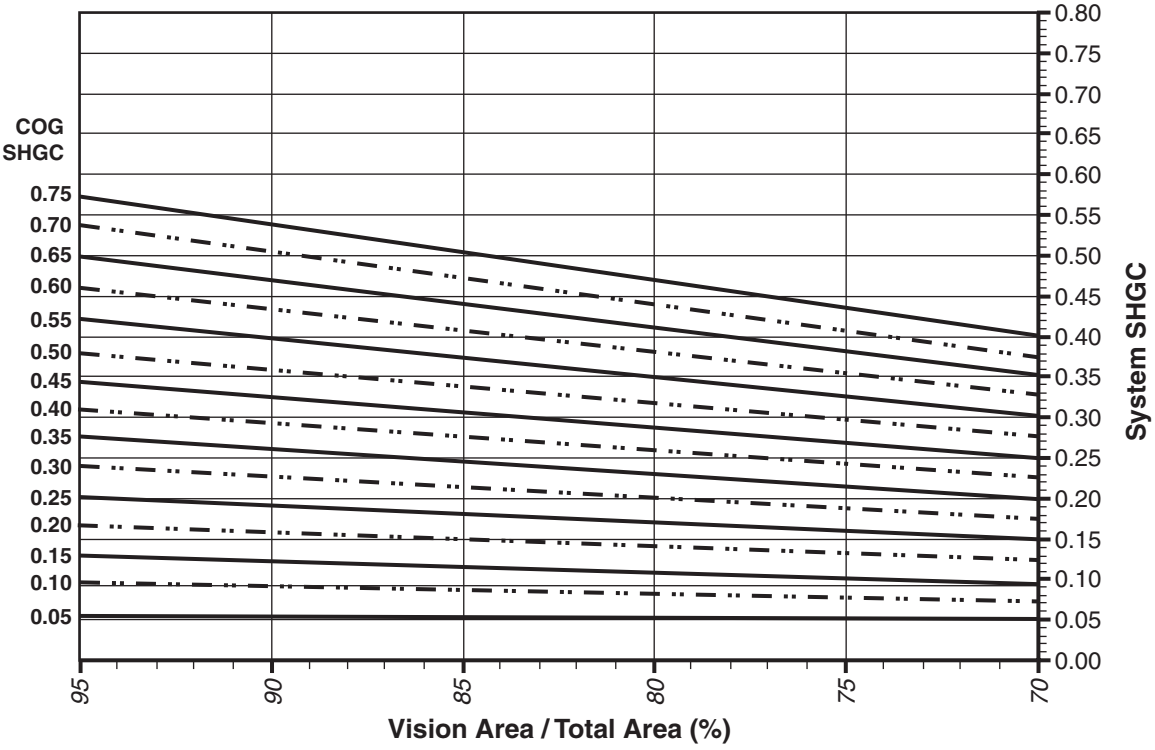
System U-factor vs Percent of Glass Area



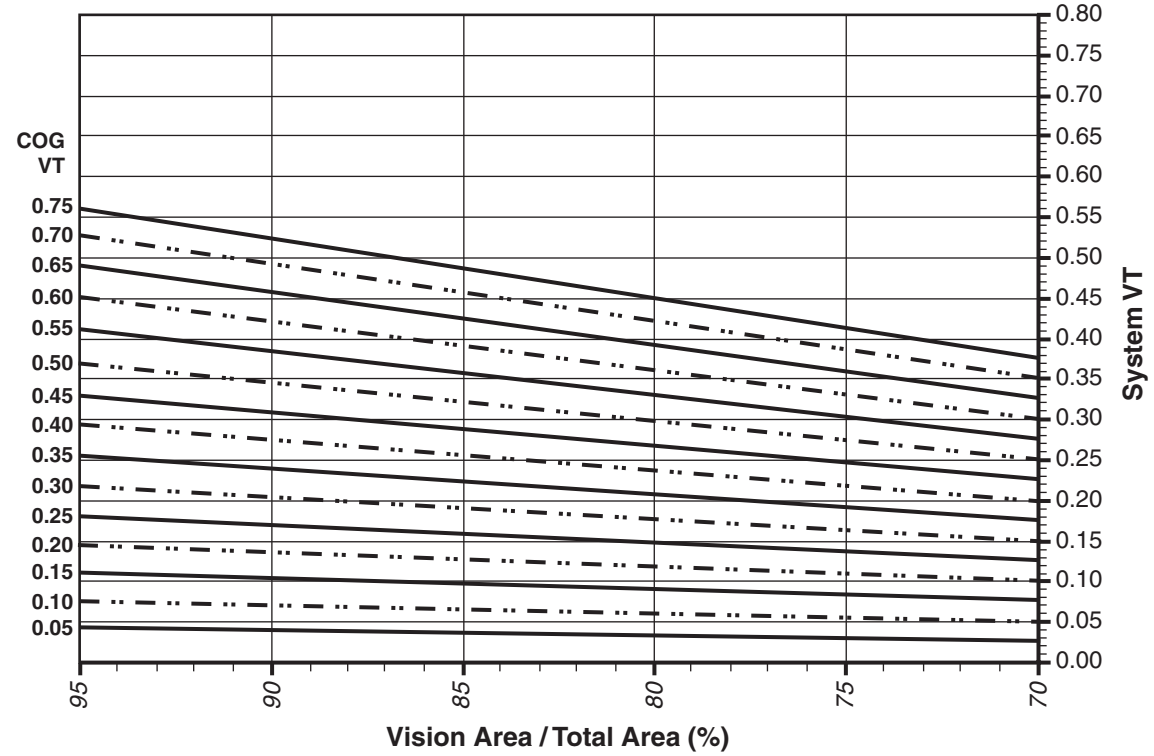
Notes for System U-factor, SHGC and VT charts:
For glass values that are not listed, linear interpolation is permitted.
Glass properties are based on center of glass values and are obtained from your glass supplier.

AA™ 900 CASEMENT/PROJECT-OUT WINDOW

System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



AA™ 900 CASEMENT/PROJECT-OUT WINDOW

Thermal Transmittance[1] (BTU/hr • ft [2] • °F)

Glass U-Factor [3]	Overall U-Factor [4]
0.48	0.61
0.46	0.60
0.44	0.59
0.42	0.59
0.40	0.58
0.38	0.57
0.36	0.56
0.34	0.55
0.32	0.54
0.30	0.53
0.28	0.52
0.26	0.51
0.24	0.50
0.22	0.49
0.20	0.48

SHGC Matrix [2]

Glass SHGC [3]	Overall Glass U-Factor [4]
0.75	0.42
0.70	0.39
0.65	0.37
0.60	0.34
0.55	0.32
0.50	0.29
0.45	0.26
0.40	0.24
0.35	0.21
0.30	0.18
0.25	0.16
0.20	0.13
0.15	0.10
0.10	0.08
0.05	0.05

Visible Transmittance [2]

Glass VT [3]	Overall VT [4]
0.75	0.40
0.70	0.37
0.65	0.34
0.60	0.32
0.55	0.29
0.50	0.26
0.45	0.24
0.40	0.21
0.35	0.19
0.30	0.16
0.25	0.13
0.20	0.11
0.15	0.08
0.10	0.05
0.05	0.03

NOTE: For glass values that are not listed, linear interpolation is permitted.

1. U-Factors are determined in accordance with NFRC 100.
2. SHGC and VT values are determined in accordance with NFRC 200.
3. Glass properties are based on center of glass values and are obtained from your glass supplier.
4. Overall U-Factor, SHGC, and VT Matricies are based on the standard NFRC specimen size of 1200mm wide by 1500mm high (47-1/4" by 59-1/16").