

Features

- 350 Tuffline® has 3-1/2" (88.9) vertical stile, 3-3/8" (85.8) top and 6-3/4" (171.5) bottom rail
- 500 Tuffline® has 5" (127) vertical stile, 5" (127) top and 6-3/4" (171.5) bottom rail
- Door is 2" (50.8) deep and has 3/16" (4.8) walls
- Dual moment welded corner construction
- Single acting
- Infills range from 1/4" (6.4) to 1" (25.4)
- Heavy duty offset pivots, butt hinges or continuous geared hinge
- MS locks or panic hardware
- Surface mounted or concealed closers
- Architects Classic push/pulls
- Double weatherstripping at meeting stiles; single exterior pile and interior twin-fin polymeric adjustable astragal
- Frame is 2" (50.8) x 4-1/2" (114.3) and includes 3/16" (4.8) wall thickness at all hardware attachment points
- Polymeric bulb weatherstripping in door frames
- Permanodic® anodized finishes option
- Painted finishes in standard and custom choices

Optional Features

- Paneline® exit device or Paneline® MEL exit device
- Various bottom and cross rails
- Optional 3/16" (4.8) wall thickness throughout frame

Product Applications

- 350 Tuffline® - constructed for unequalled strength and designed for high traffic and high abuse applications such as schools, universities and sports stadiums
- 500 Tuffline® - offers the same performance features as the 350 Tuffline® except in a wide stile design

For specific product applications,
consult your Kawneer representative.

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350/500 TUFFLINE® ENTRANCE DETAILS (Standard Frame)7

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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

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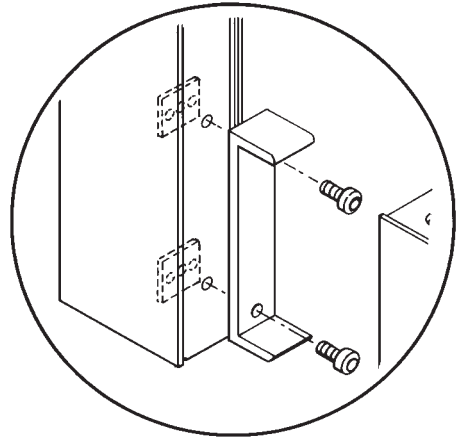
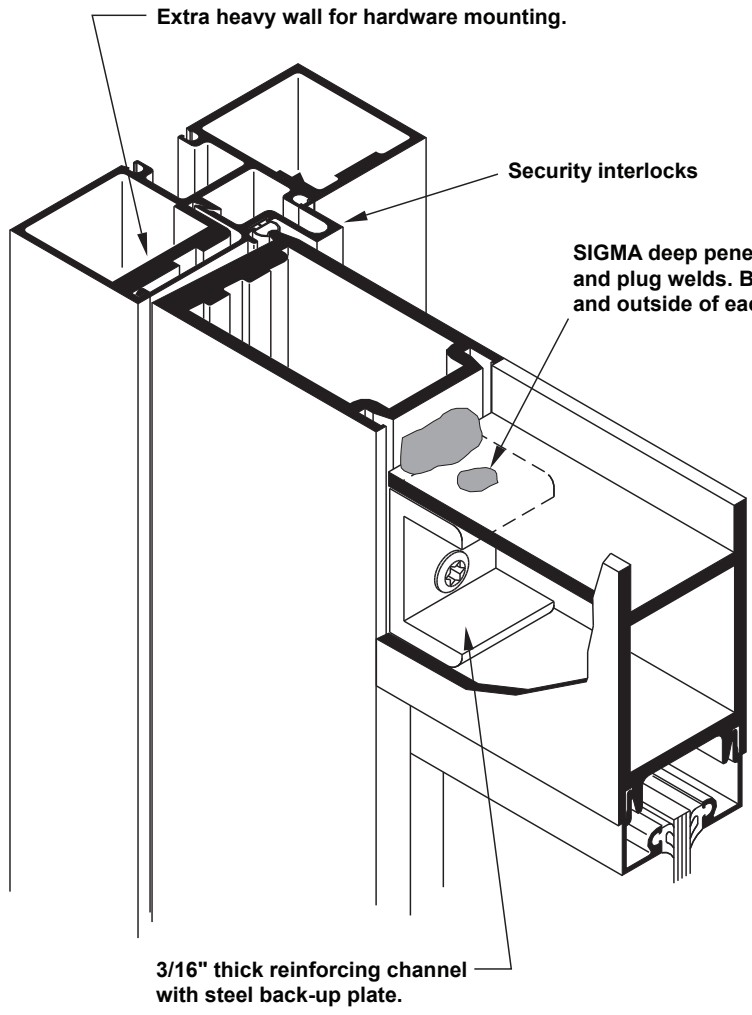
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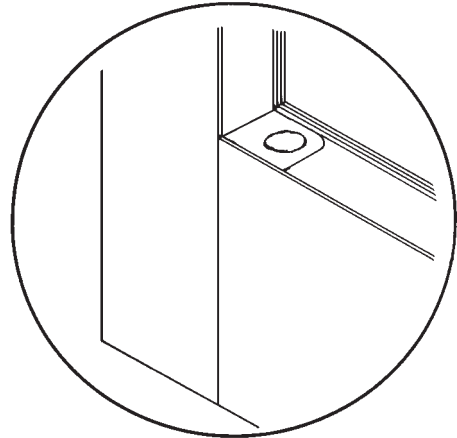
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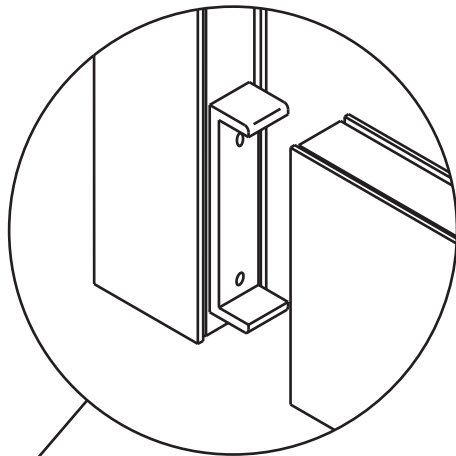
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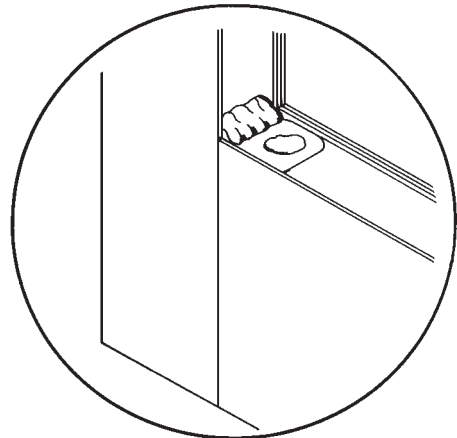
#1 **MECHANICAL FASTENING** is accomplished by attaching a 5/16" (7.9) thick extruded aluminum channel clip to the vertical stile with 1/4"-20 heat strengthened bolts and 3/16" thick steel nut plates for a high strength welding base for attachment horizontal member.



#2 **SIGMA* DEEP PENETRATION PLUG WELDS** are made top and bottom after the horizontal is properly positioned over the channel clip to help provide the strongest door corner joint currently available.



DUAL MOMENT WELDED CORNER CONSTRUCTION



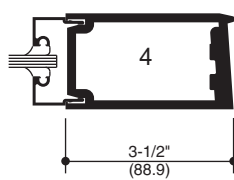
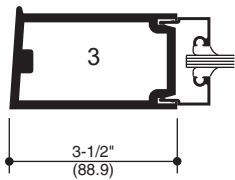
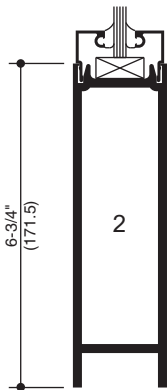
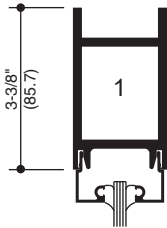
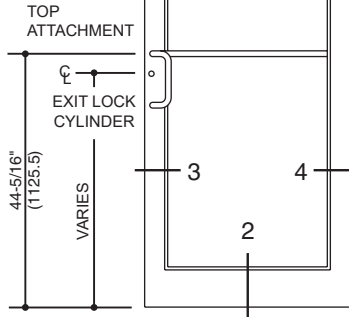
#3 **SIGMA* FILLET WELDS** along both top and bottom webs of the rail extrusion complete the welded corner construction.

* An arc welding process known as Shielded Inert Gas Metal Arc (SIGMA) or also known as Metal Inert Gas (MIG).

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350 TUFFLINE® MEDIUM STILE

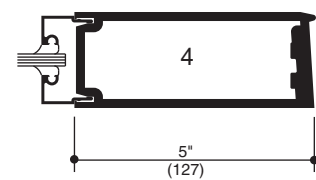
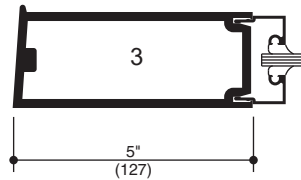
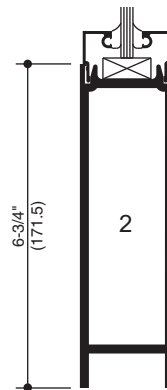
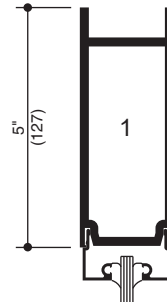
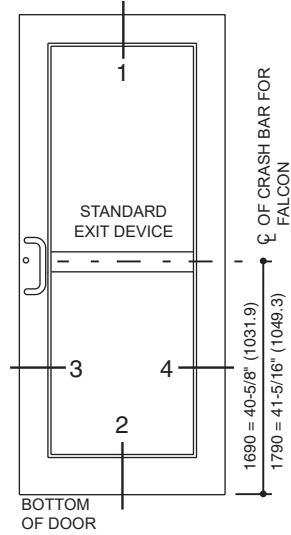
STANDARD LOCATIONS



LOCK STILE

PIVOT STILE

500 TUFFLINE® WIDE STILE



LOCK STILE

PIVOT STILE

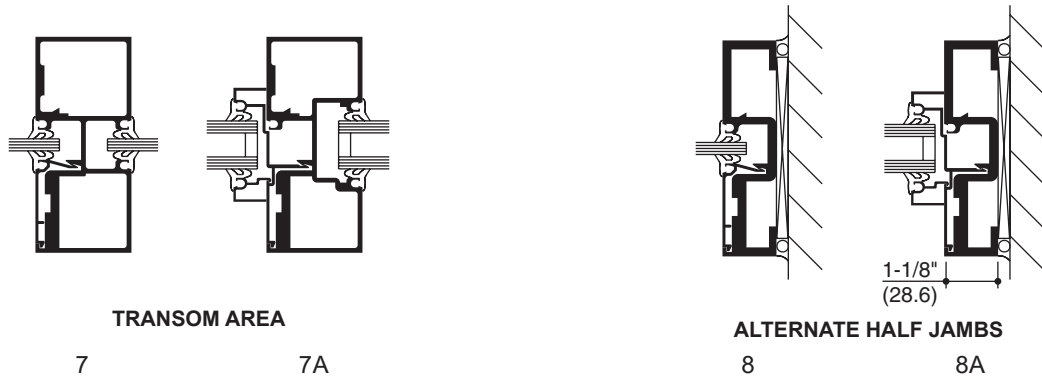
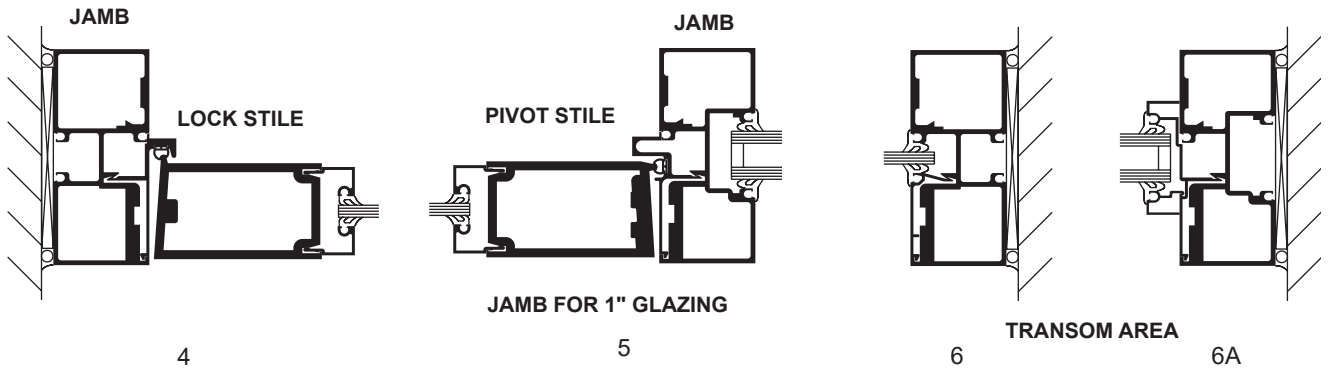
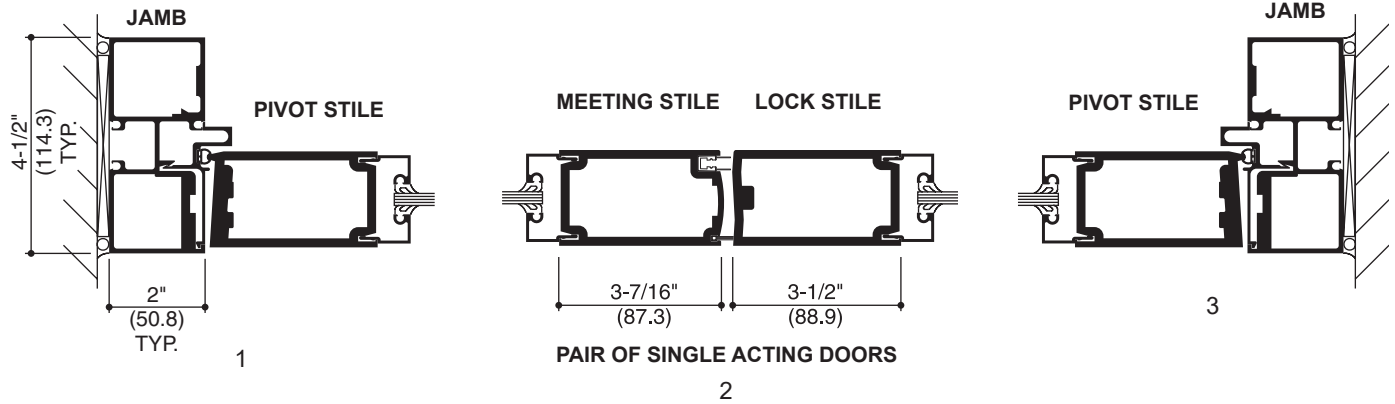
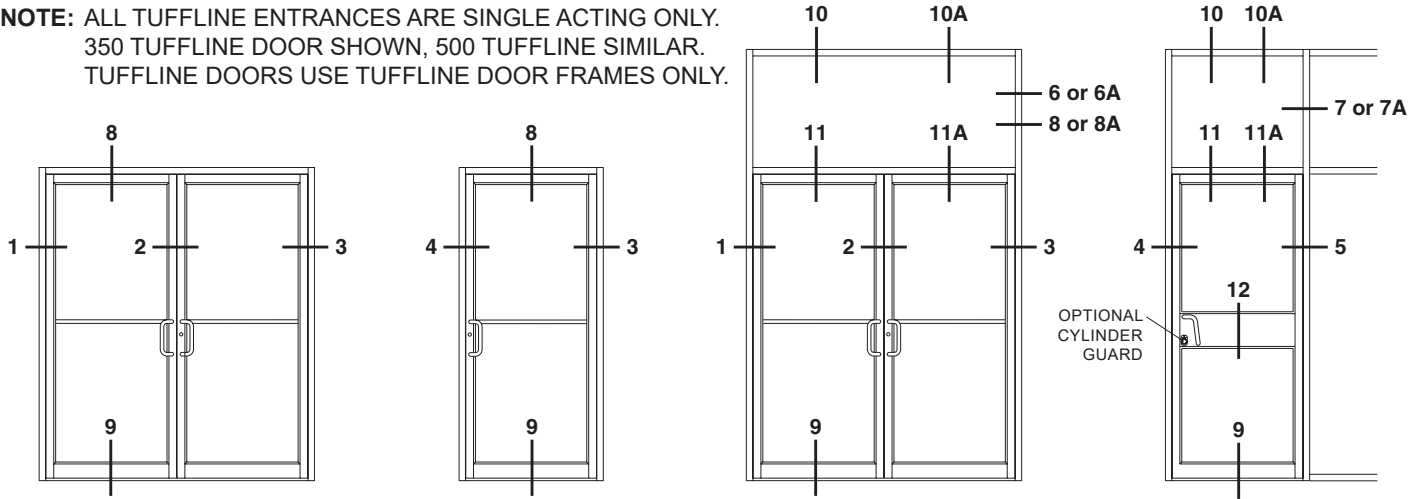
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NOTE: ALL TUFFLINE ENTRANCES ARE SINGLE ACTING ONLY.
 350 TUFFLINE DOOR SHOWN, 500 TUFFLINE SIMILAR.
 TUFFLINE DOORS USE TUFFLINE DOOR FRAMES ONLY.

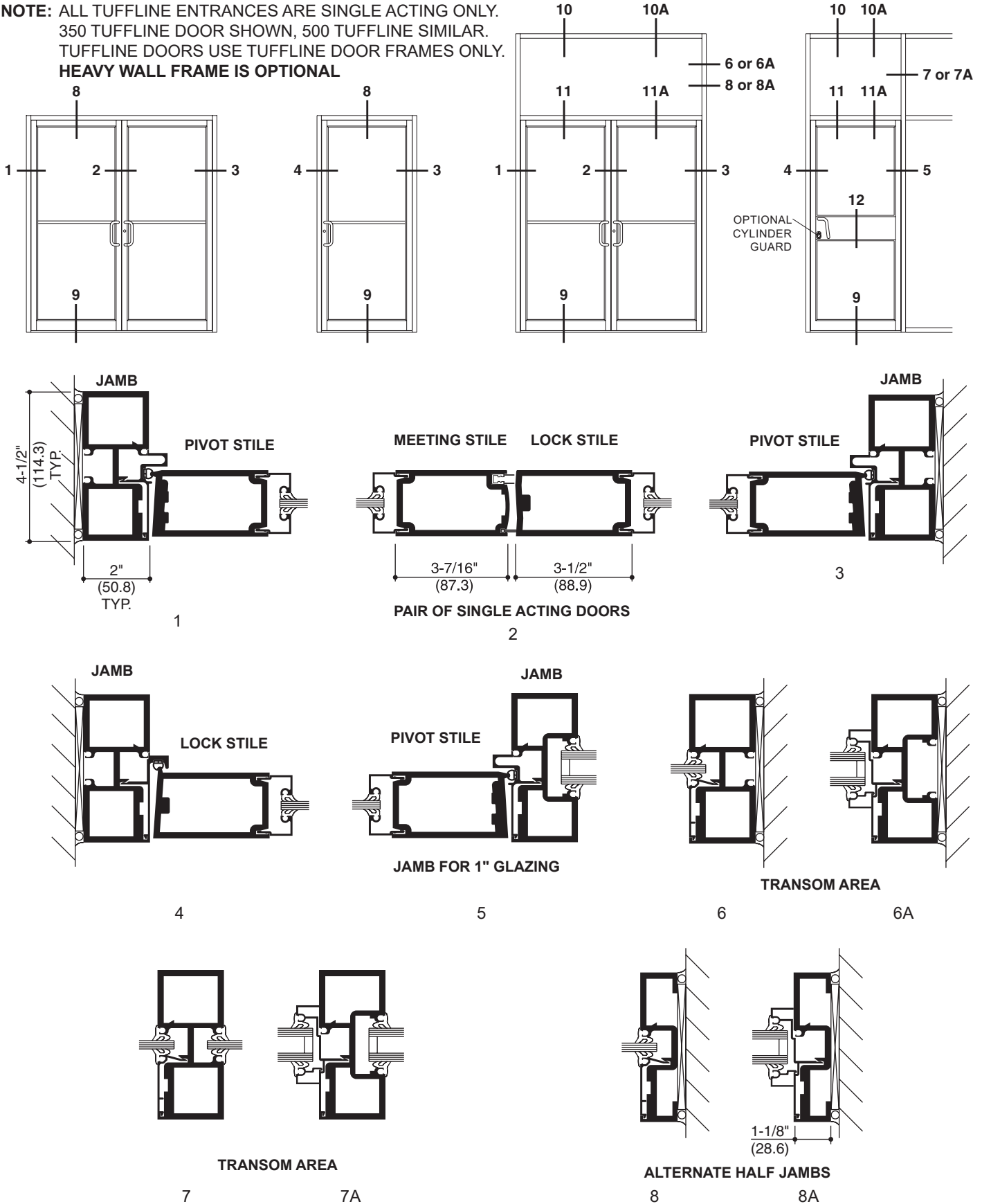


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HEAVY WALL FRAME IS OPTIONAL



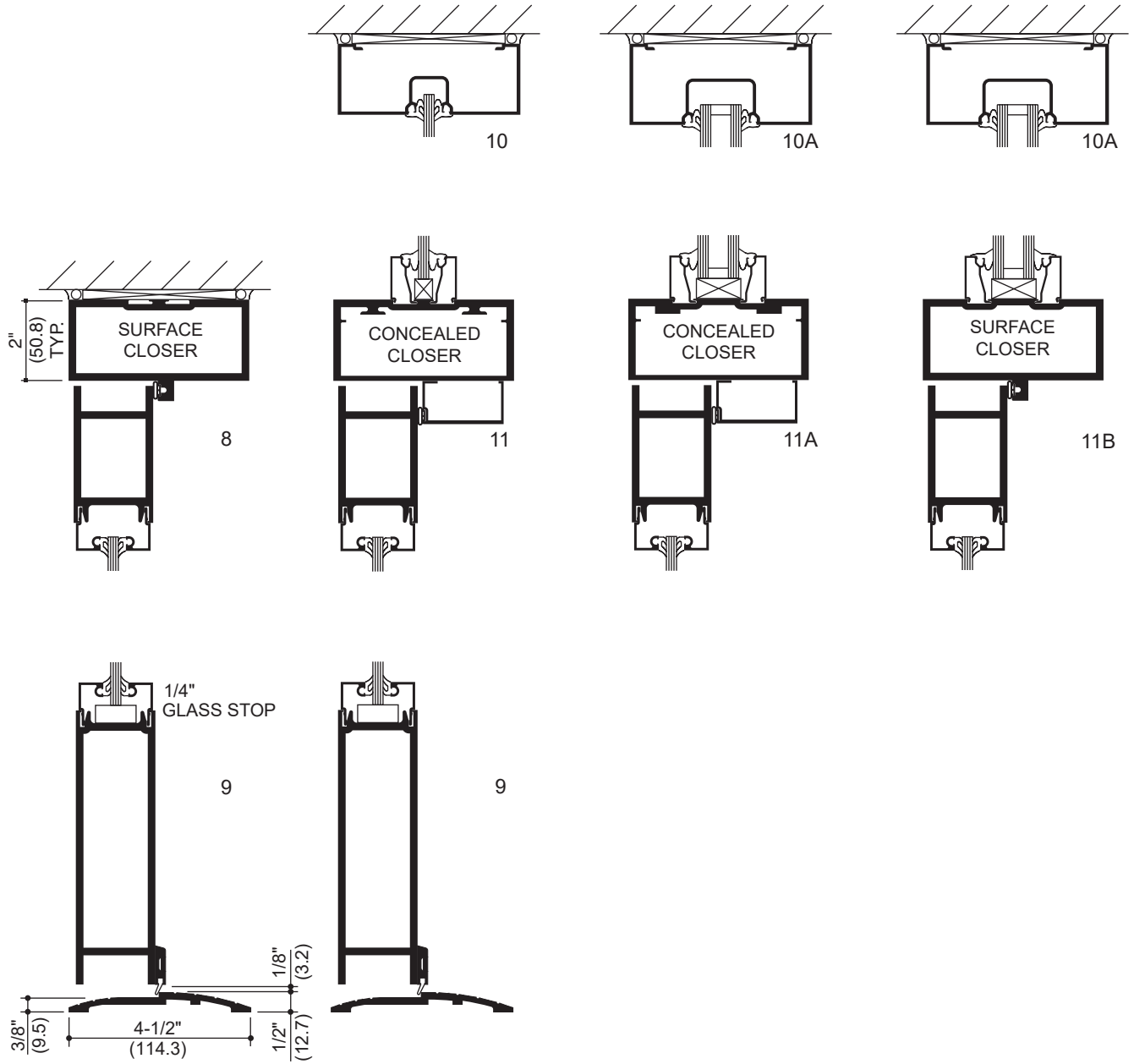
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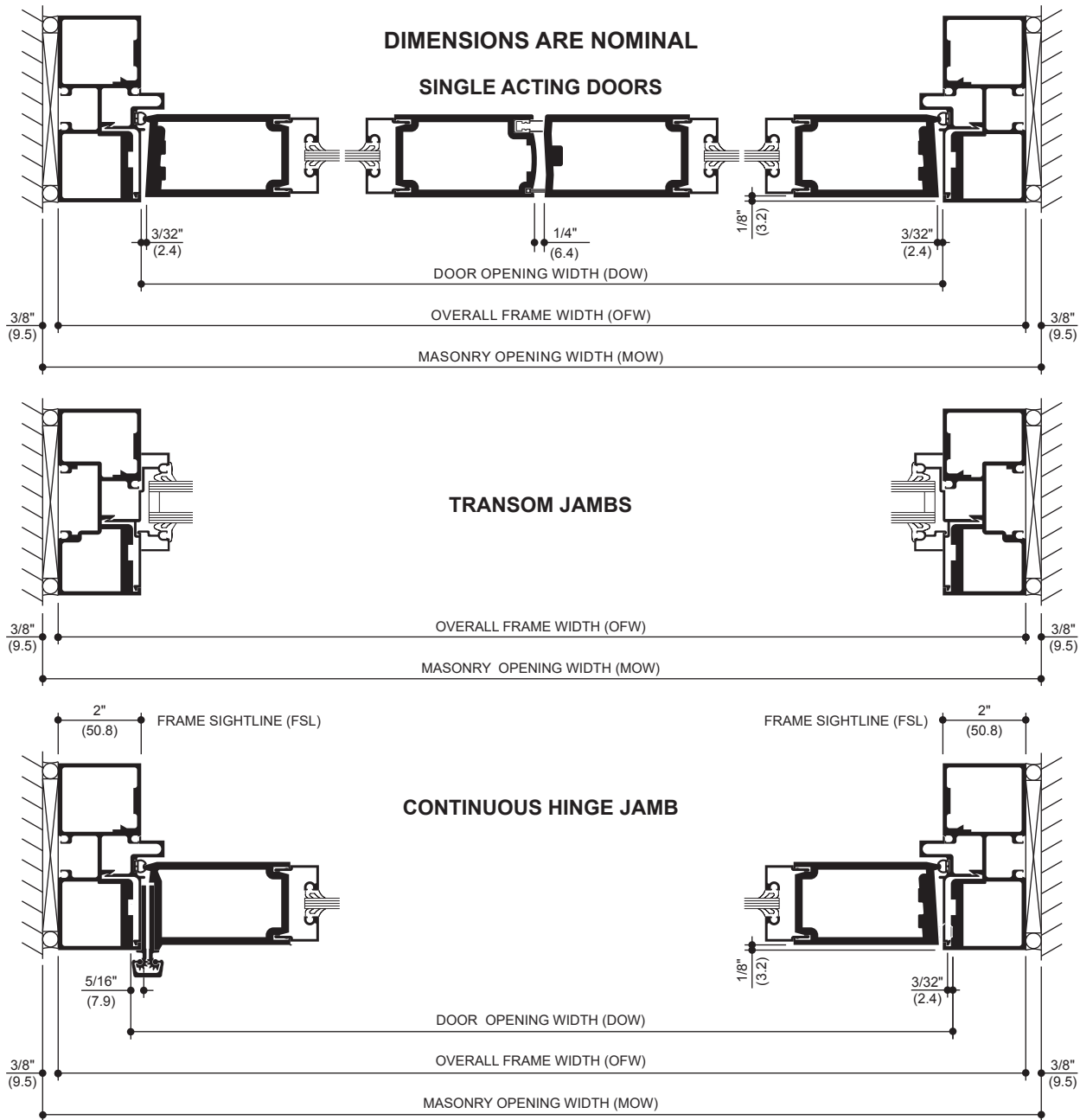
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STANDARD SIZES (TUFFLINE DOOR FRAME)

WITH AND WITHOUT TRANSOM

Door Opening Dimension (DOW)	
3' 0"	(914)
3' 6"	(1,067)
6' 0"	(1,829)

Overall Frame Dimension (OFW)	
3' 4"	(1,016)
3' 10"	(1,168)
6' 4"	(1,930)

Masonry Opening Dimension (MOW)	
3' 4-3/4"	(1,035)
3' 10-3/4"	(1,187)
6' 4-3/4"	(1,949)

WITH AND WITHOUT TRANSOM

OFW = DOW + 2 FSL

MOW = OFW + 3/4"

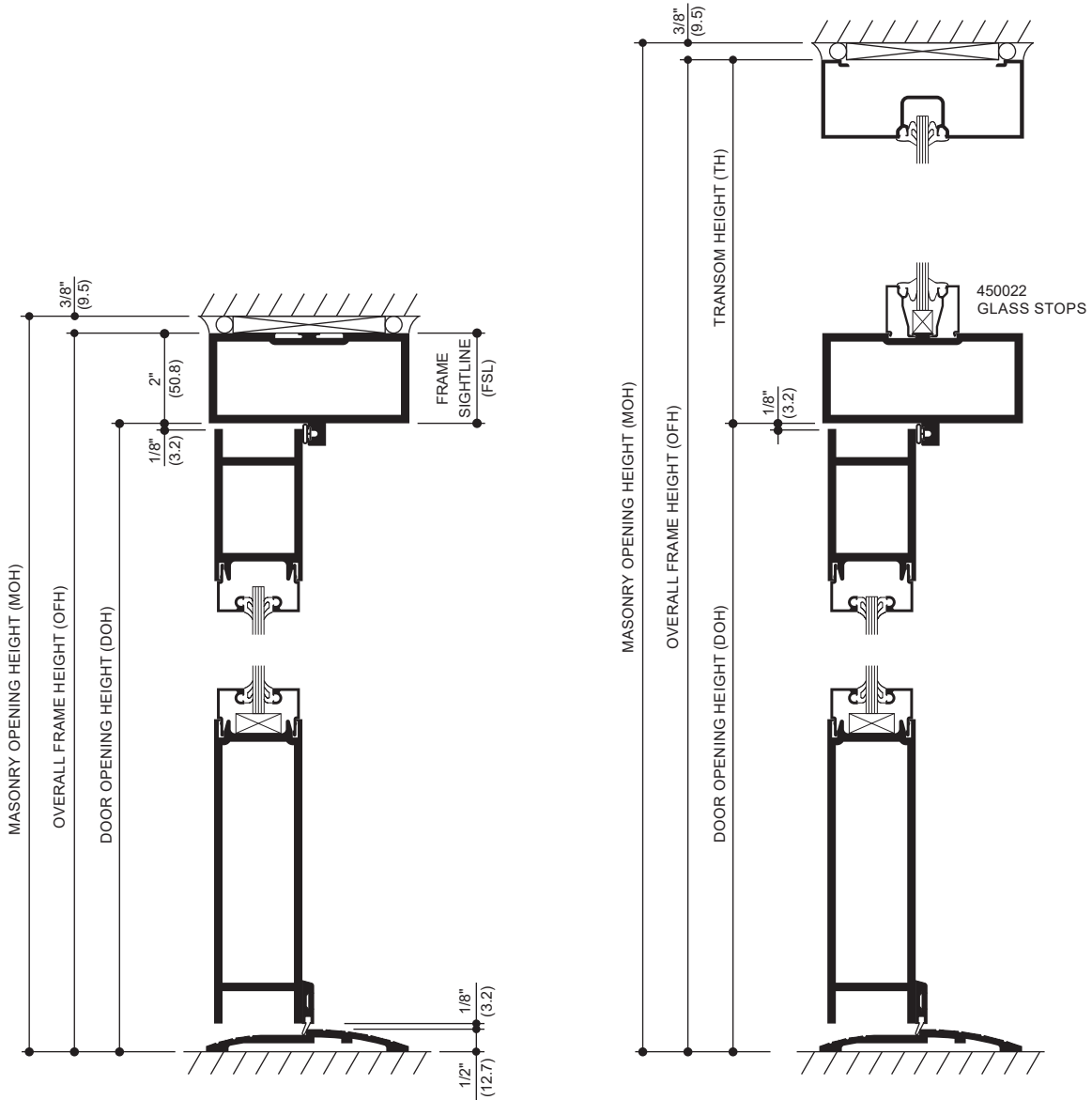
Note: Dimensions shown above reflect A1 Price Book standard stock door frame height with transom at 10' 3-1/2" (3,137).

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STANDARD SIZES (TUFLINE DOOR FRAME)

WITHOUT TRANSOM

Door Opening Dimension (DOH)	
7' 0"	(2,134)
7' 0"	(2,134)
7' 0"	(2,134)

Overall Frame Dimension (OFH)	
7' 2"	(2,184)
7' 2"	(2,184)
7' 2"	(2,184)

Masonry Opening Dimension (MOH)	
7' 2-3/8"	(2,194)
7' 2-3/8"	(2,194)
7' 2-3/8"	(2,194)

WITHOUT TRANSOM

OFH = DOH + FSL
 MOH = OFH + 3/8"

WITH TRANSOM

OFH = DOH + TH
 MOH = OFH + 3/8"

Note: Dimensions shown above reflect A1 Price Book standard stock door frame height with transom at 10' 3-1/2" (3,137).

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	STANDARD	OPTIONAL
Doors	Medium stile 350 Tuffline doors prepared for attachment hardware.	Wide stile 500 Tuffline door.
Door Sizes Std.	Standard sizes shown on pages 10 and 11.	Any size up to 4' 0" x 9' 0" (1,219 x 2,743).
Glass Stops	Square glass stops for 1/4" infill.	Square glass stops for 5/8" (15.9) or 1" (25.4) infill. Beveled glass stops for 1/4" (6.4) or 5/8" (15.9) infill.
Door Frames	Tuffline - 2" x 4" (50.8 x 101.6) for single glazing.	Tuffline Heavyweight Framing - 2" x 4" (50.8 x 101.6) for single glazing.
Push-Pulls	Single Acting: Architects Classic Hardware CO-9 Pull and CP-II Push Bar. Architects Classic Hardware CO-9 Pull and CP Push Bar.	Single Acting: Architects Classic Hardware CO-12 and CP-II push bar. Architects Classic Hardware CO-12 and CP push bar. Architects Classic Hardware CO-9/CO-9 Pulls. Architects Classic Hardware CO-12/CO-12 Pulls.
Door Closers	Single Acting: Norton 1601 adjustable or 1601 BF adjustable surface closer with back-check and with or without adjustable hold-open. Standard concealed overhead closer with single acting offset arm.	Single Acting: LCN 4040 surface closer with or without adjustable hold-open. LCN 2030 or 5030 concealed closers with or without hold-open. LCN 1260 adjustable surface closer. Falcon SC 60 Surface closer.
Hinging	Single Acting: Kawneer heavy duty top and bottom offset pivots (or) Kawneer top and bottom 5" x 4-1/2" (127 x 114.3) ball bearing butt hinge.	Single Acting: Kawneer continuous gear hinge. No substitution of outside hinge hardware by others.
Intermediate Pivots/Butts	Single Acting Required: Kawneer heavy duty intermediate offset pivot (or) Kawneer 5" x 4-1/2" (127 x 114.3) ball bearing butt hinge.	
Power Transfers	Single Acting: EPT (Electric Power Transfer).	
Power Supply	SP-1000X Power Supply: For use with Paneline® EL exit devices. For use with Falcon EL 1690 and EL 1790 exit devices. SP-2000 Power Supply: For use with Paneline® MEL exit devices.	
Locks - Active Leaf	Adams-Rite MS 1850A deadlock with two 1-5/32" (29.4) diameter 5 pin cylinders.	Adams-Rite #1850A-500 short throw deadlock. Adams-Rite #1850A-505 hookbolt lock. Kawneer cylinder guard. Kawneer thumbturn (in lieu of cylinder).

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	STANDARD	OPTIONAL
Locks - Inactive Leaf	One pair of Kawneer flush bolts in the inactive leaf of a pair of doors.	Controller® is a 3-point locking system consisting of a two point locking device in the inactive leaf in lieu of flush bolts, working in conjunction with the MS 1850A deadlock in the active leaf. This combination provides for greater security than possible with flush bolts and complies with the life safety considerations of building codes which prohibit the use of flush bolts.
Thresholds	1/2" x 4" (12.7 x 101.6) aluminum mill finish threshold.	
Weathering	Single Acting: Weathering system in the door and frame consisting of a dense, bulb polymeric material, which remains resilient and retains its weathering ability under temperature extremes. (The system is complete with an optional EPDM blade gasket sweep strip applied to the bottom door rail with concealed fasteners).	Bottom Door Sweep
Exit Device	<p>Falcon 1690 Concealed Rod Exit Device with or without a rim type cylinder.</p> <p>Falcon 1790 Rim Exit Device is a rim type exit device with or without a rim type cylinder. Pairs of doors require a RM-170 removable mullion.</p> <p>Paneline® exit device is a concealed rod exit device applicable to single or pairs of doors. It features an activating panel contained within the door cross rail.</p>	<p>Falcon EL 1690 electric modification is also available.</p> <p>Falcon EL 1790 electric modification is also available</p> <p>Paneline® MEL electric modification is also available.</p> <p>Falcon 1990 is a concealed rod exit device with or without a rim type cylinder.</p> <p>Falcon 2090 is a rim type exit device with or without a rim type cylinder. Pairs of doors require a removable aluminum mullion. RM-70 with the Falcon 2090 exit device.</p>
	<p>Exit Device Pulls:</p> <p>Architects Classic CO-9 Pull.</p> <p>Architects Classic CPN Pull for Paneline® and Paneline® MEL exit devices.</p>	<p>Optional Exit Device Pulls:</p> <p>Architects Classic CO-12 Pull (except for Paneline® and Paneline® MEL exit devices).</p>

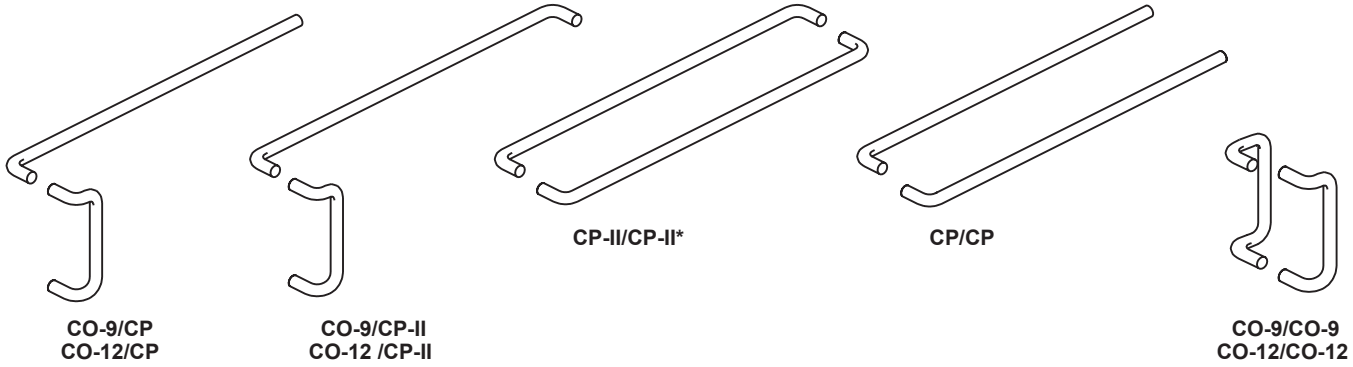
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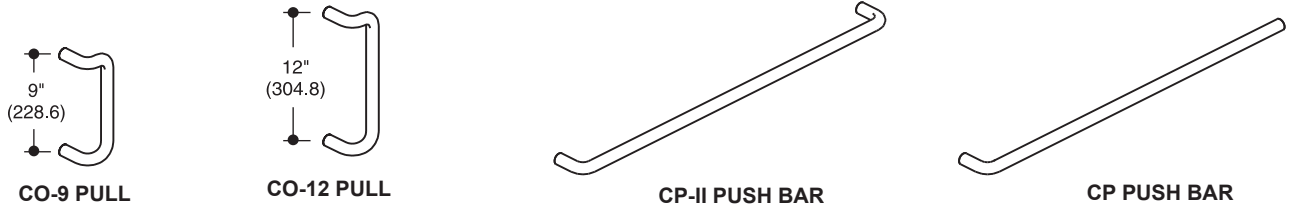
REFER TO HARDWARE SECTION FOR COMPLETE HARDWARE INFORMATION.

ARCHITECTS CLASSIC (PUSH PULL SETS)

SINGLE ACTING DOORS USE A PULL HANDLE AND PUSH BAR AS STANDARD
 DOUBLE ACTING DOORS USE CP PUSH BARS BACK TO BACK AS STANDARD.

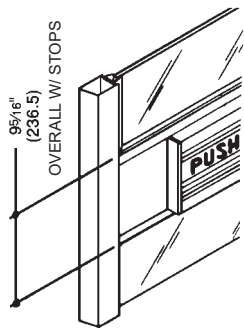


ARCHITECTS CLASSIC (COMPONENTS)

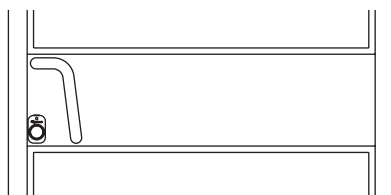


EXIT DEVICES

KAWNEER PANELINE® / PANELINE® MEL



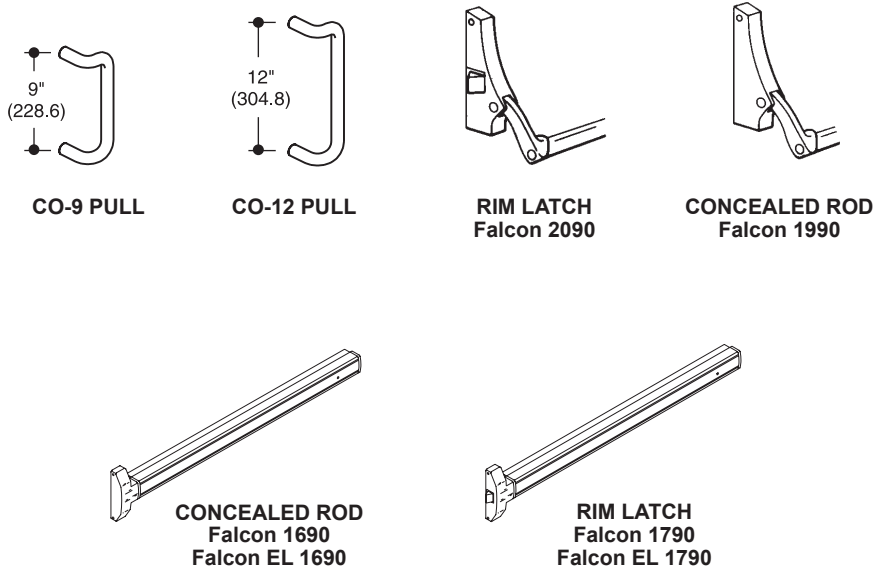
CPN PULL ON EXTERIOR OF DOOR



EXTERIOR VIEW OF 350 TUFFLINE DOOR (500 SIMILAR)
 CPN PULL AND OPTIONAL CYLINDER GUARD SHOWN.

SEE PAGE 15 FOR COMPLETE
 PANELINE® INFORMATION

EXIT DEVICES AND PULLS



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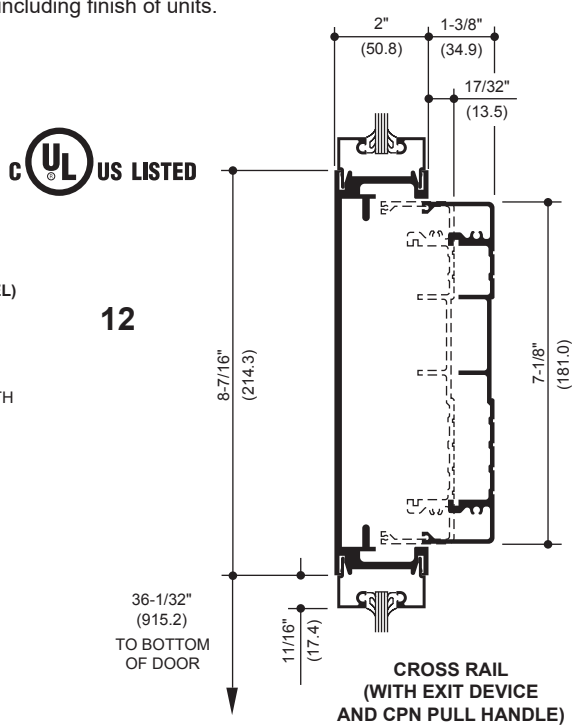
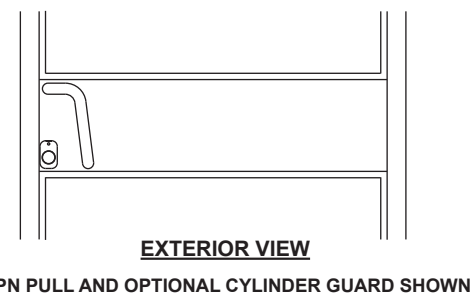
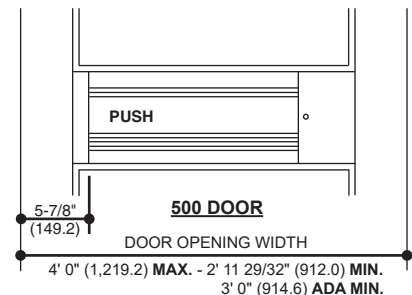
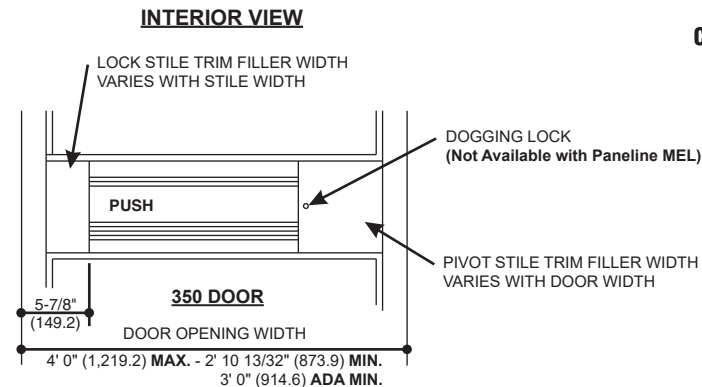
PANELINE® EXIT DEVICE

The Paneline® concealed rod exit device for 350 and 500 Tuffline® doors will accommodate variations in stile width and door width as shown in the following illustrations.

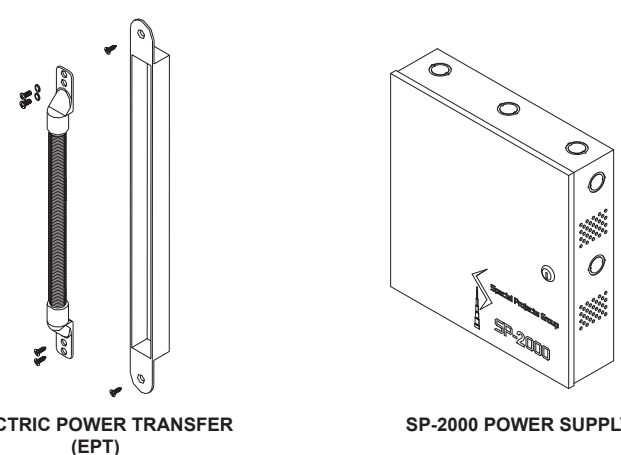
The Optional Paneline® MEL device is designed for electrified access control and is compatible with most key pad and card reader systems.

See **Hardware Section** for complete description of Paneline hardware, including finish of units.

Paneline® uses mortise cylinder in lieu of the normal rim-type.
 Dummy Paneline units are not for use with any type of lock.



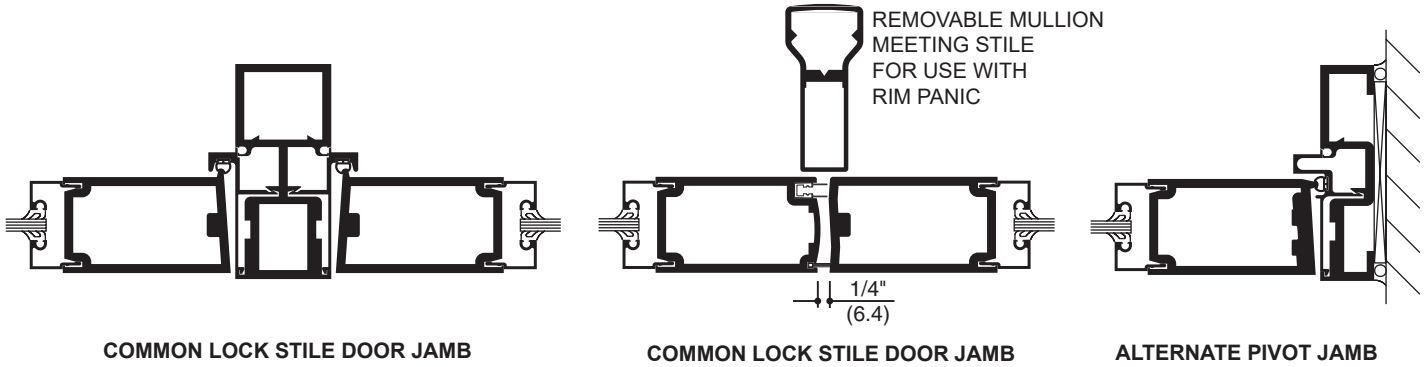
PANELINE® MEL COMPONENTS



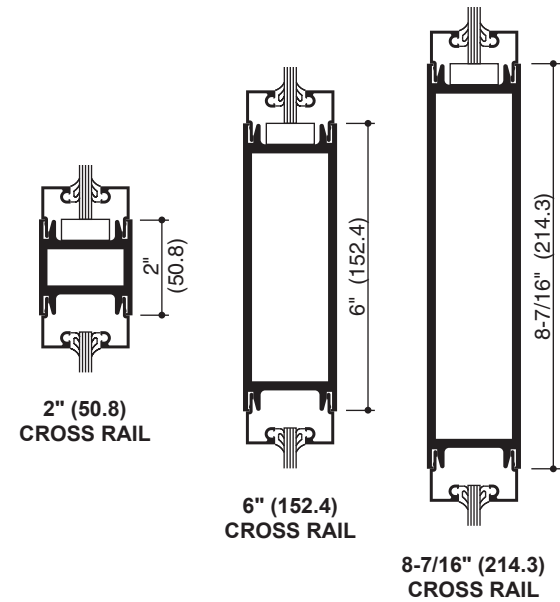
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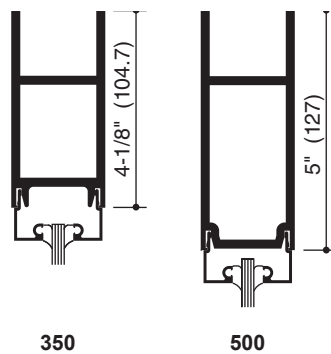
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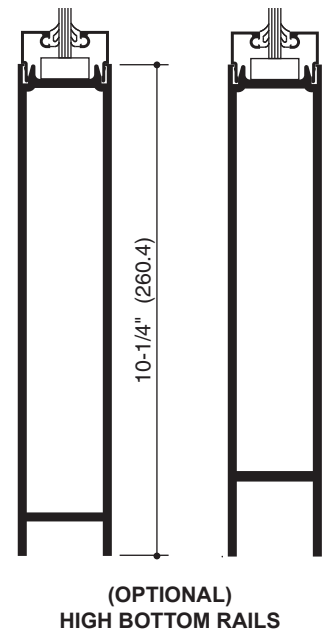
HORIZONTAL/VERTICAL CROSS RAILS



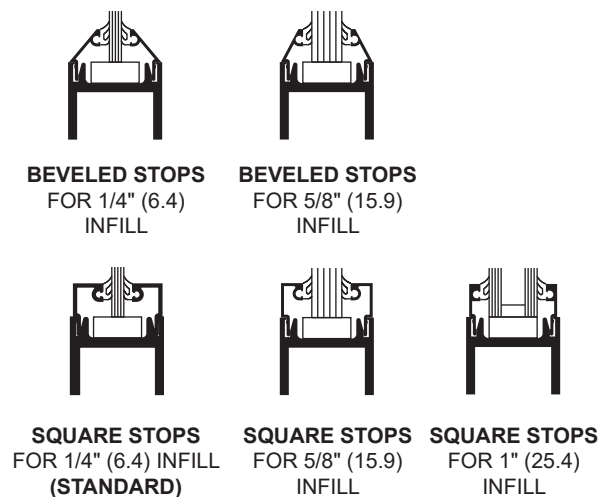
TOP RAIL FOR LCN CONCEALED CLOSER



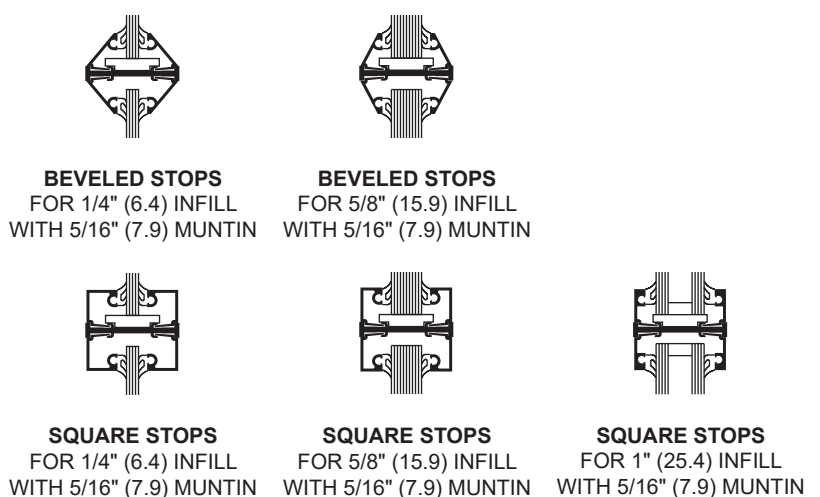
BOTTOM RAILS



INFILL OPTIONS



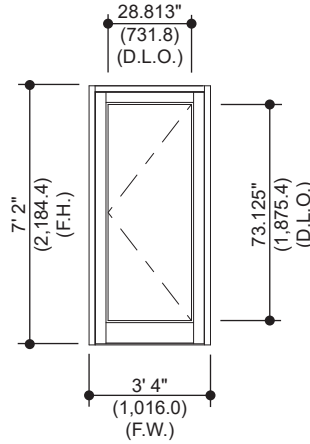
GLASS STOPS FOR 5/16" (7.9) MUNTINS



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



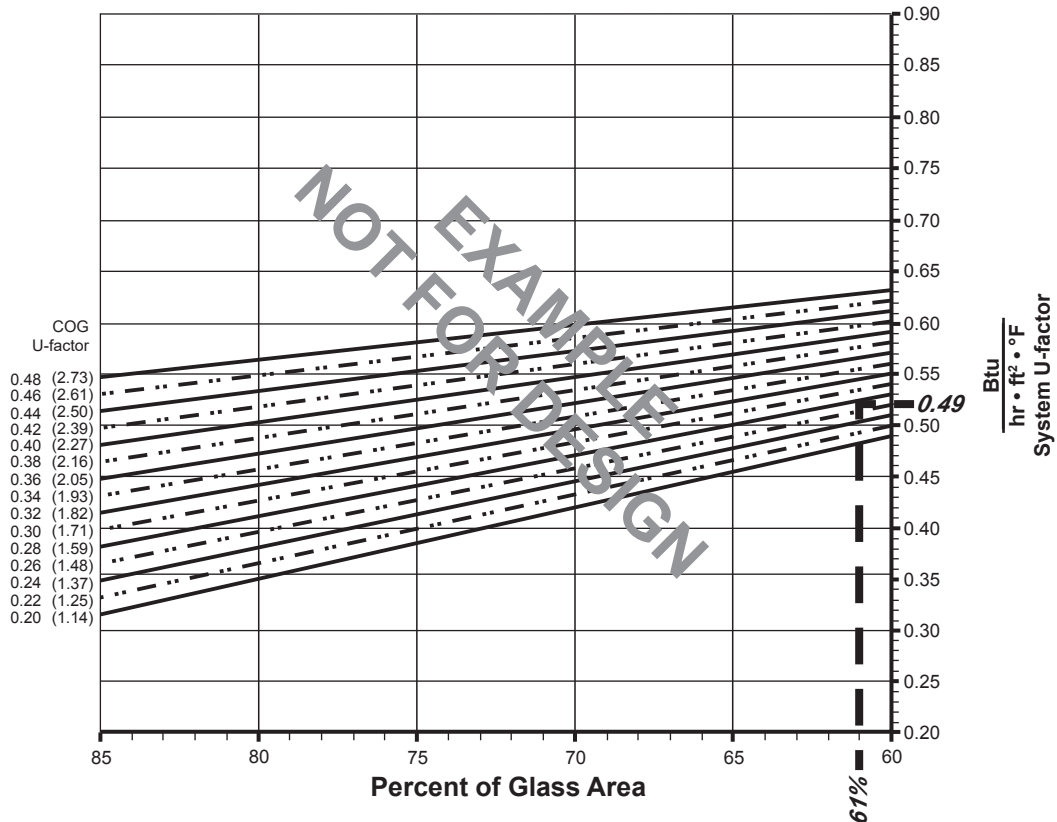
Example Glass U-Factor = 0.28 Btu/hr • ft² • °F

Total Daylight Opening = 28.813" x 73.125" = 14.63 ft²

Total Projected Area = 3' 4" x 7' 2" = 23.9 ft²

Percent of Glass = (Total Daylight Opening ÷ Total Projected Area)100
 = (14.63 ÷ 23.9)100 = 61%

System U-factor vs Percent of Glass Area



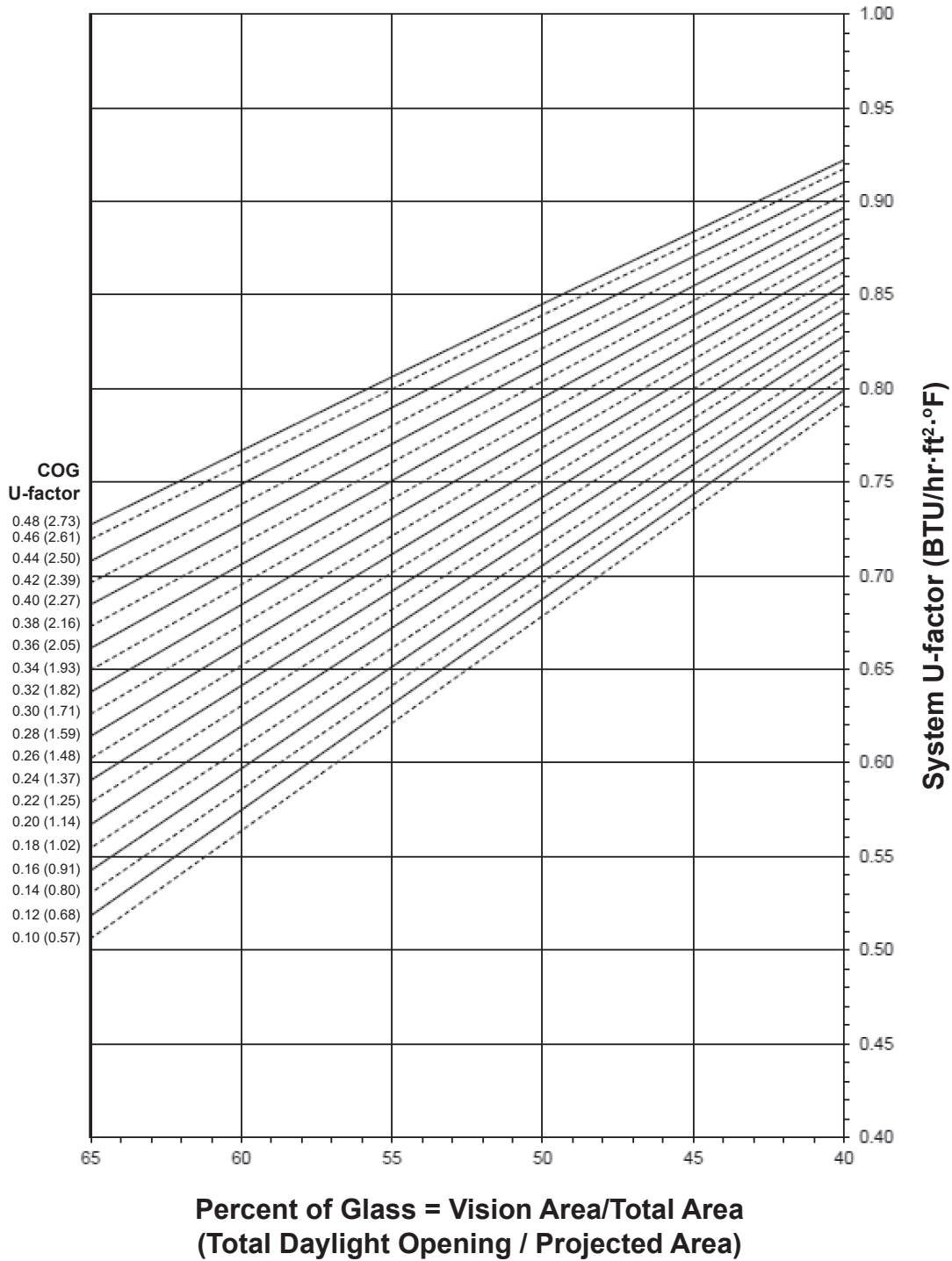
Based on 66% glass and center of glass (COG) U-factor of 0.28
 System U-factor is equal to 0.49 Btu/hr • ft² • °F

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350 (SINGLE DOOR)

System U-factor vs Percent of Glass Area



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

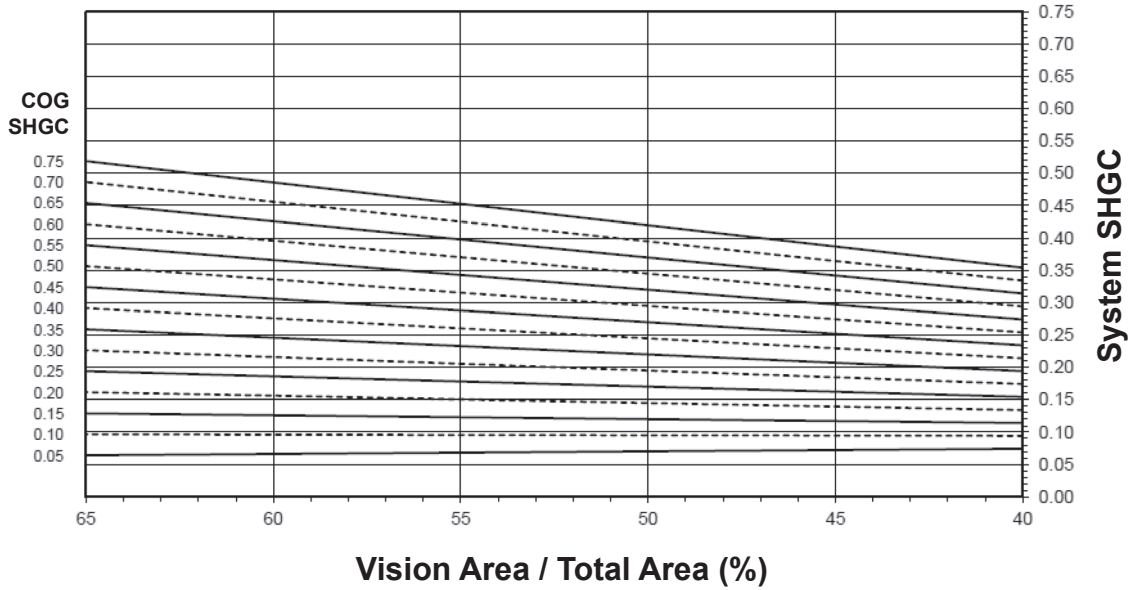
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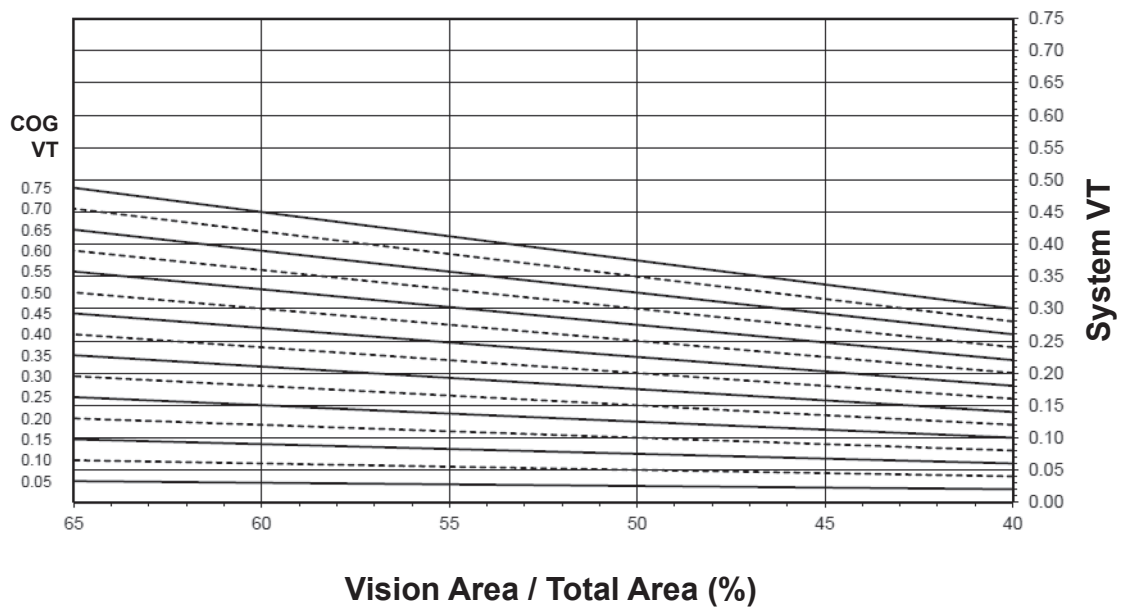
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System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



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Thermal Transmittance ¹ (BTU/hr • ft² • °F)

Glass U-Factor ³	Overall U-Factor ⁴
0.48	0.83
0.46	0.82
0.44	0.81
0.42	0.81
0.40	0.80
0.38	0.79
0.36	0.78
0.34	0.77
0.32	0.76
0.30	0.75
0.28	0.74
0.26	0.73
0.24	0.72
0.22	0.71
0.20	0.70
0.18	0.69
0.16	0.68
0.14	0.68
0.12	0.67
0.10	0.66

350 (SINGLE DOOR)

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 960 mm wide by 2,090 mm high (37-3/4" by 82-3/8").

SHGC Matrix ²

Glass SHGC ³	Overall SHGC ⁴
0.75	0.43
0.70	0.41
0.65	0.38
0.60	0.36
0.55	0.33
0.50	0.30
0.45	0.28
0.40	0.25
0.35	0.23
0.30	0.20
0.25	0.17
0.20	0.15
0.15	0.12
0.10	0.10
0.05	0.07

Visible Transmittance ²

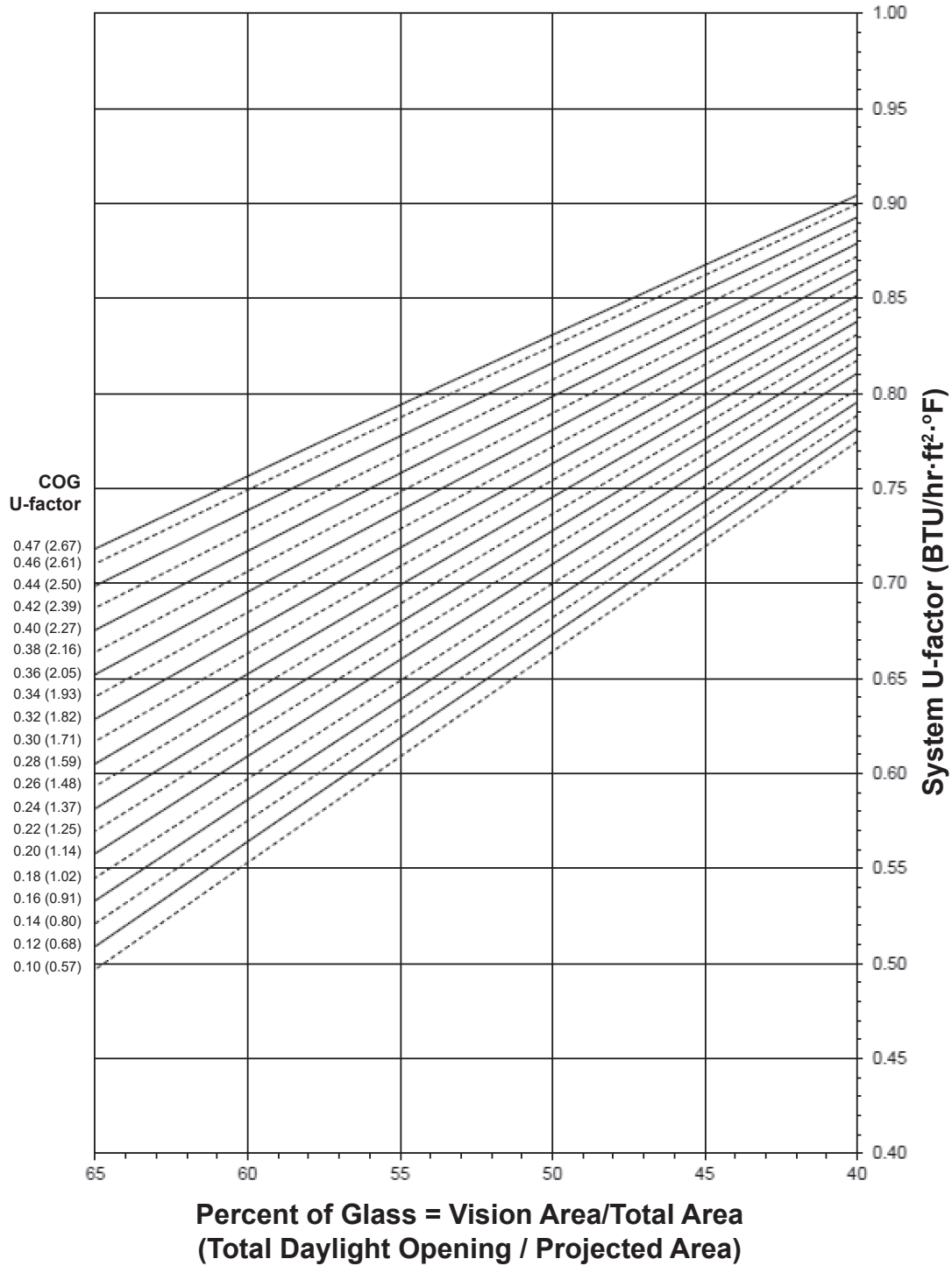
Glass VT ³	Overall VT ⁴
0.75	0.39
0.70	0.36
0.65	0.34
0.60	0.31
0.55	0.29
0.50	0.26
0.45	0.23
0.40	0.21
0.35	0.18
0.30	0.16
0.25	0.13
0.20	0.10
0.15	0.08
0.10	0.05
0.05	0.03

Laws and building and safety codes governing the design and use of Kawneer products, such as 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.

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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.

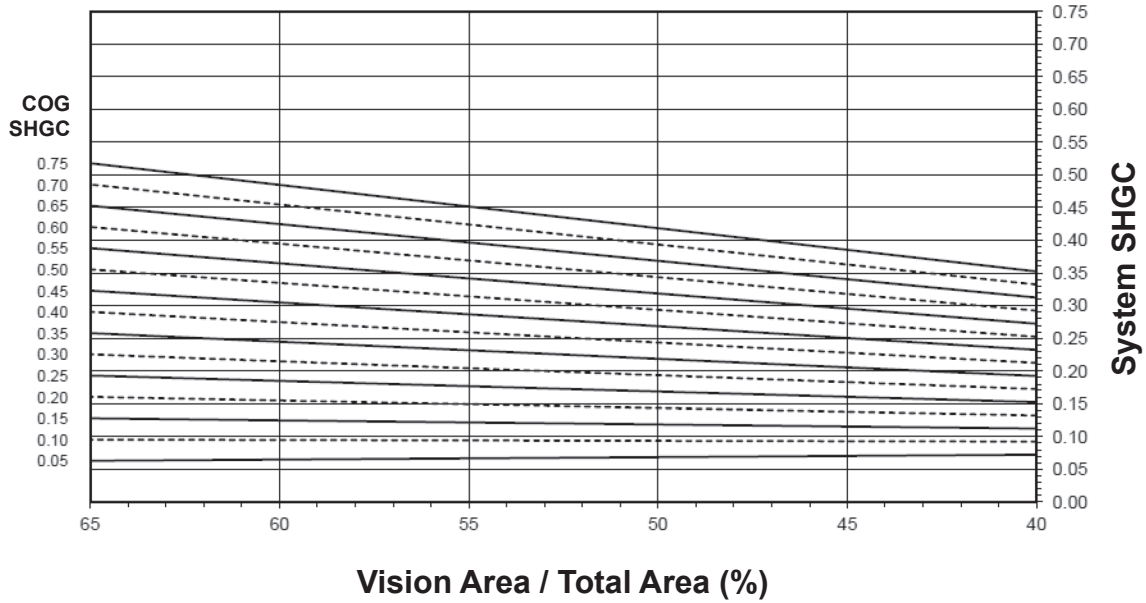
Glass properties are based on center of glass values (winter conditions) and are obtained from your glass supplier.

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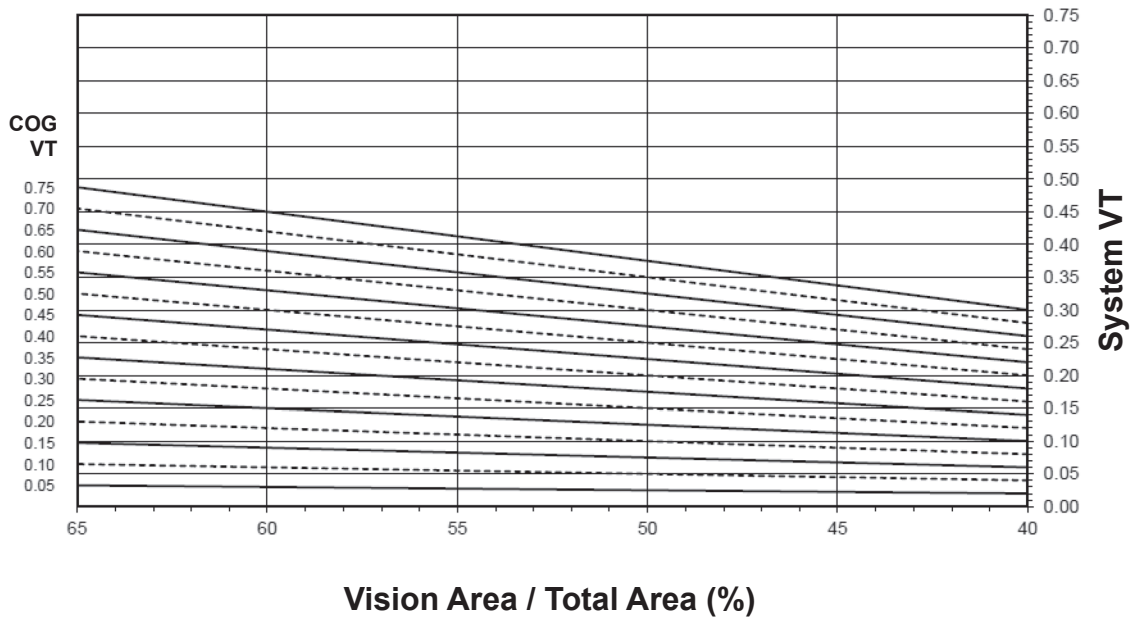
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System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



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

350 (PAIR OF DOORS)

Glass U-Factor ³	Overall U-Factor ⁴
0.47	0.79
0.46	0.78
0.44	0.77
0.42	0.76
0.40	0.75
0.38	0.74
0.36	0.73
0.34	0.72
0.32	0.71
0.30	0.70
0.28	0.69
0.26	0.68
0.24	0.67
0.22	0.66
0.20	0.65
0.18	0.64
0.16	0.63
0.14	0.62
0.12	0.61
0.10	0.60

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 1,920 mm wide by 2,090 mm high (75-1/2" by 82-3/8").

SHGC Matrix ²

Glass SHGC ³	Overall SHGC ⁴
0.75	0.46
0.70	0.43
0.65	0.40
0.60	0.37
0.55	0.35
0.50	0.32
0.45	0.29
0.40	0.26
0.35	0.23
0.30	0.21
0.25	0.18
0.20	0.15
0.15	0.12
0.10	0.09
0.05	0.07

Visible Transmittance ²

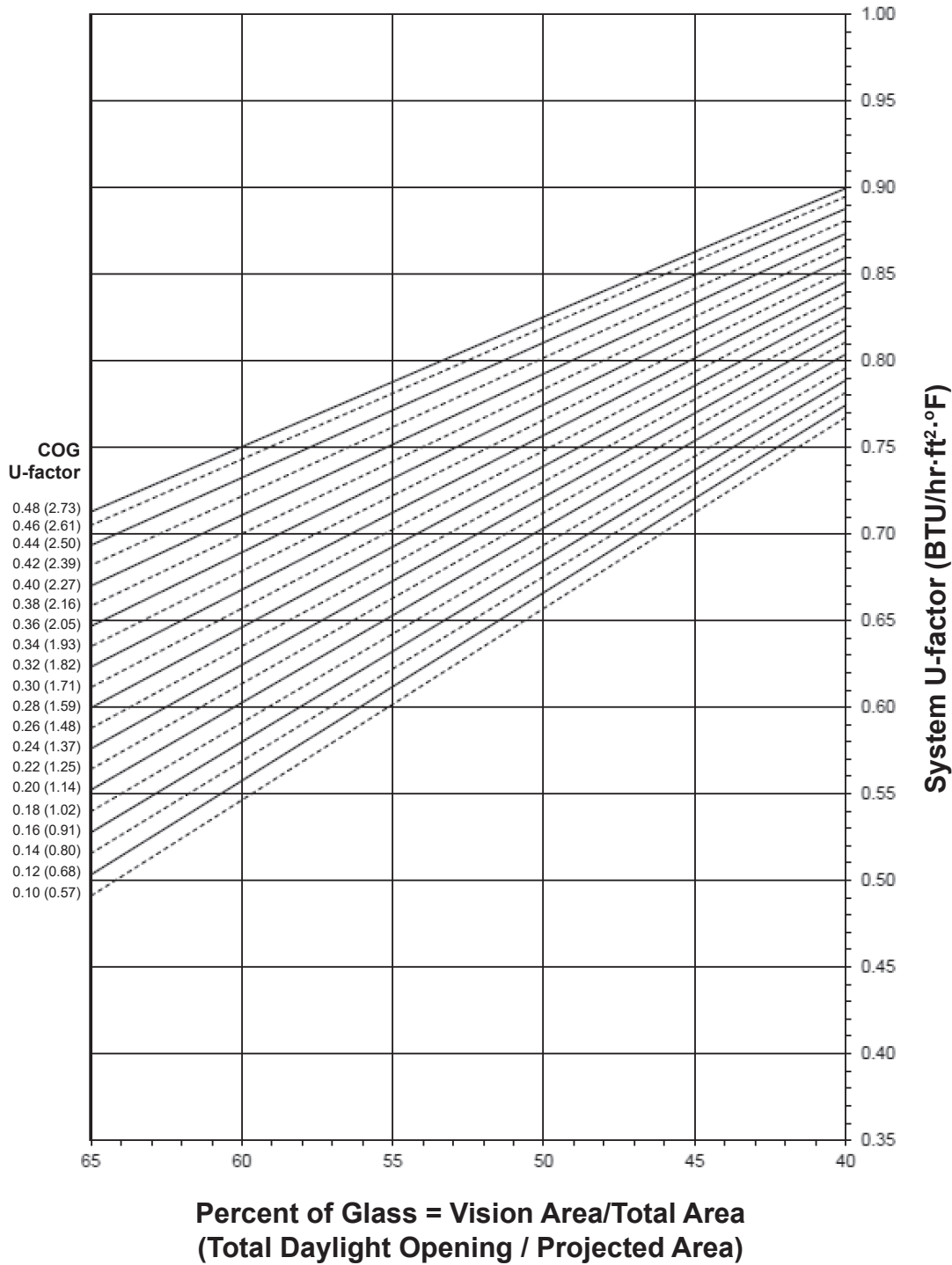
Glass VT ³	Overall VT ⁴
0.75	0.42
0.70	0.39
0.65	0.36
0.60	0.34
0.55	0.31
0.50	0.28
0.45	0.25
0.40	0.22
0.35	0.20
0.30	0.17
0.25	0.14
0.20	0.11
0.15	0.08
0.10	0.06
0.05	0.03

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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.

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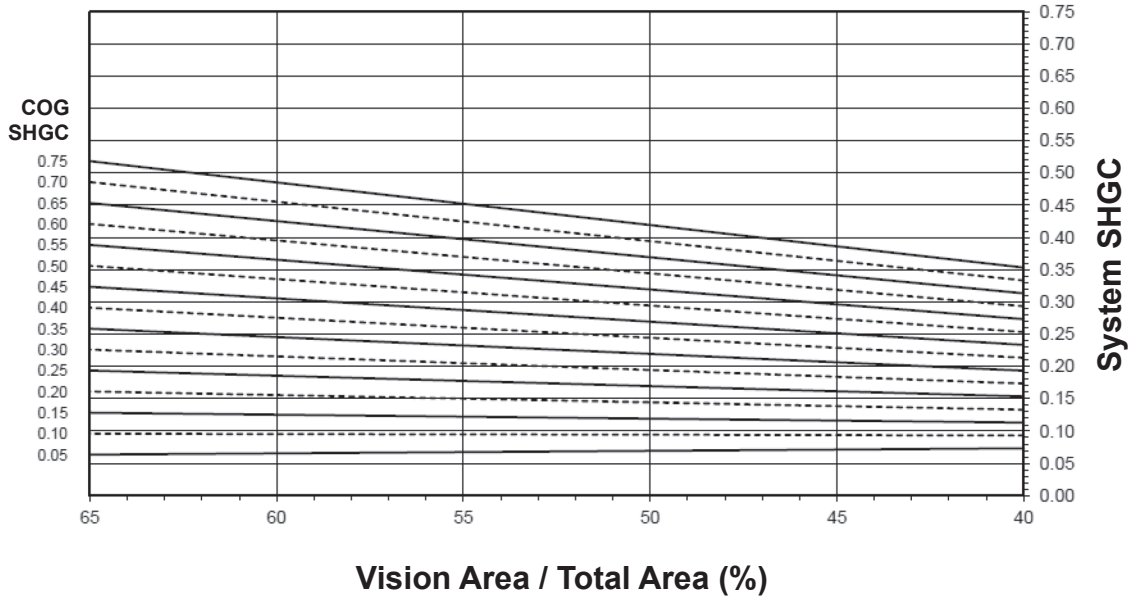
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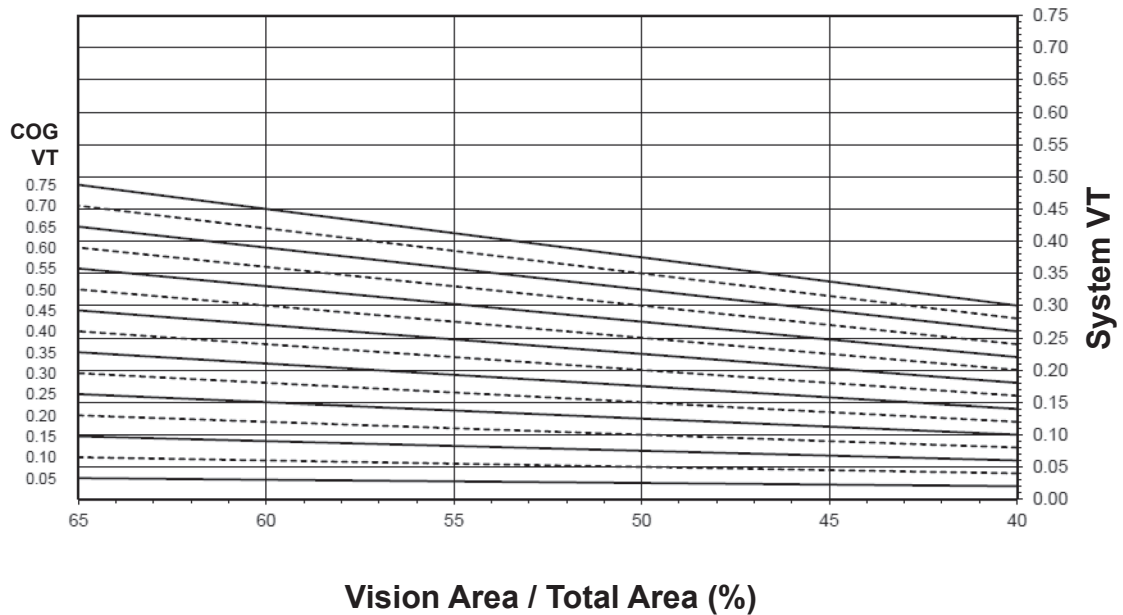
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System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



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Thermal Transmittance ¹ (BTU/hr • ft² • °F)

Glass U-Factor ³	Overall U-Factor ⁴
0.48	0.87
0.46	0.86
0.44	0.85
0.42	0.84
0.40	0.84
0.38	0.83
0.36	0.82
0.34	0.81
0.32	0.81
0.30	0.80
0.28	0.79
0.26	0.78
0.24	0.77
0.22	0.77
0.20	0.76
0.18	0.75
0.16	0.74
0.14	0.73
0.12	0.73
0.10	0.72

500 (SINGLE DOOR)

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.
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SHGC Matrix ²

Glass SHGC ³	Overall SHGC ⁴
0.75	0.38
0.70	0.36
0.65	0.34
0.60	0.32
0.55	0.29
0.50	0.27
0.45	0.25
0.40	0.23
0.35	0.21
0.30	0.18
0.25	0.16
0.20	0.14
0.15	0.12
0.10	0.09
0.05	0.07

Visible Transmittance ²

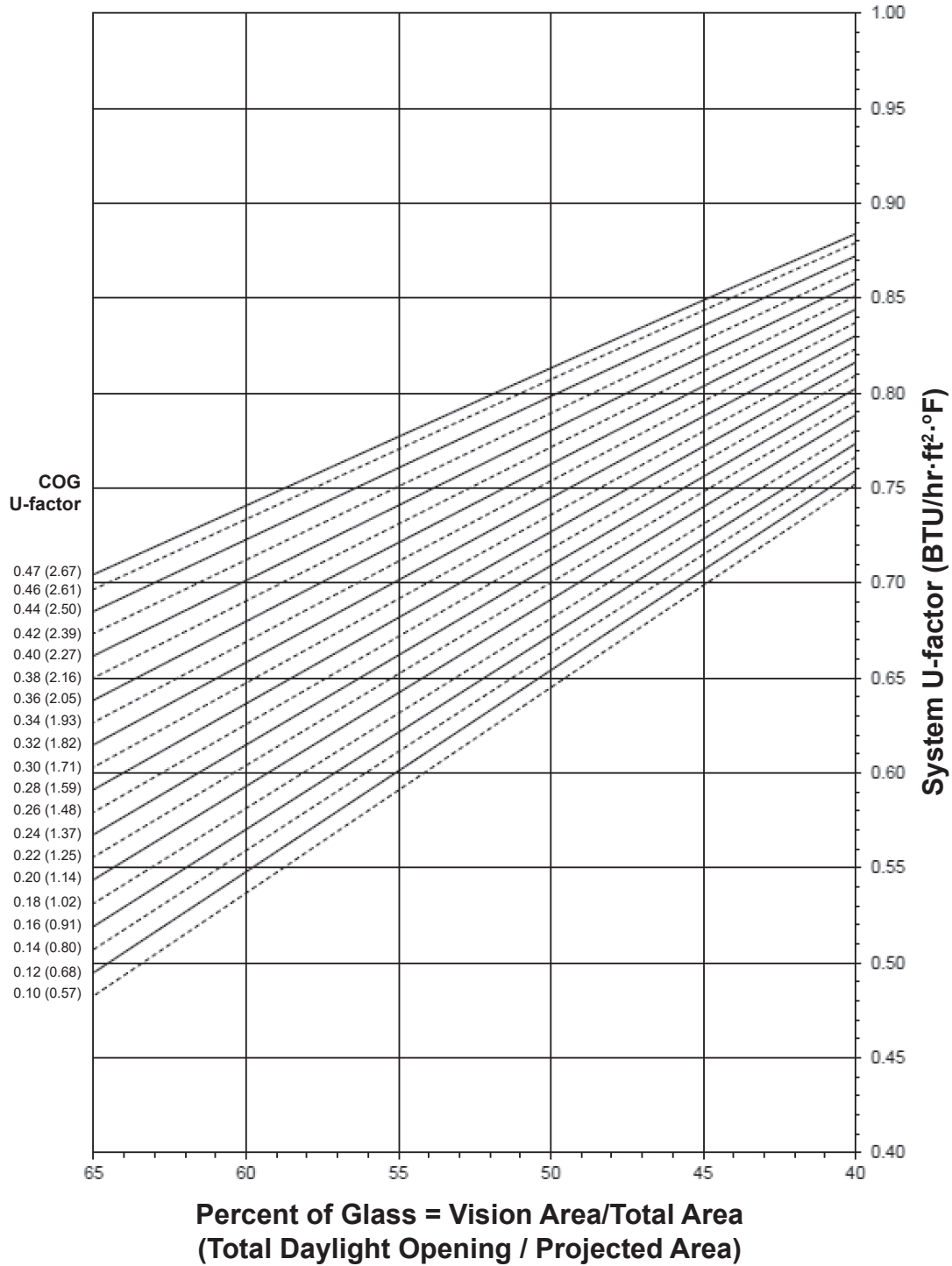
Glass VT ³	Overall VT ⁴
0.75	0,33
0.70	0,31
0.65	0,29
0.60	0,27
0.55	0,25
0.50	0,22
0.45	0,20
0.40	0,18
0.35	0,16
0.30	0,13
0.25	0,11
0.20	0,09
0.15	0,07
0.10	0,04
0.05	0,02

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System U-factor vs Percent of Glass Area



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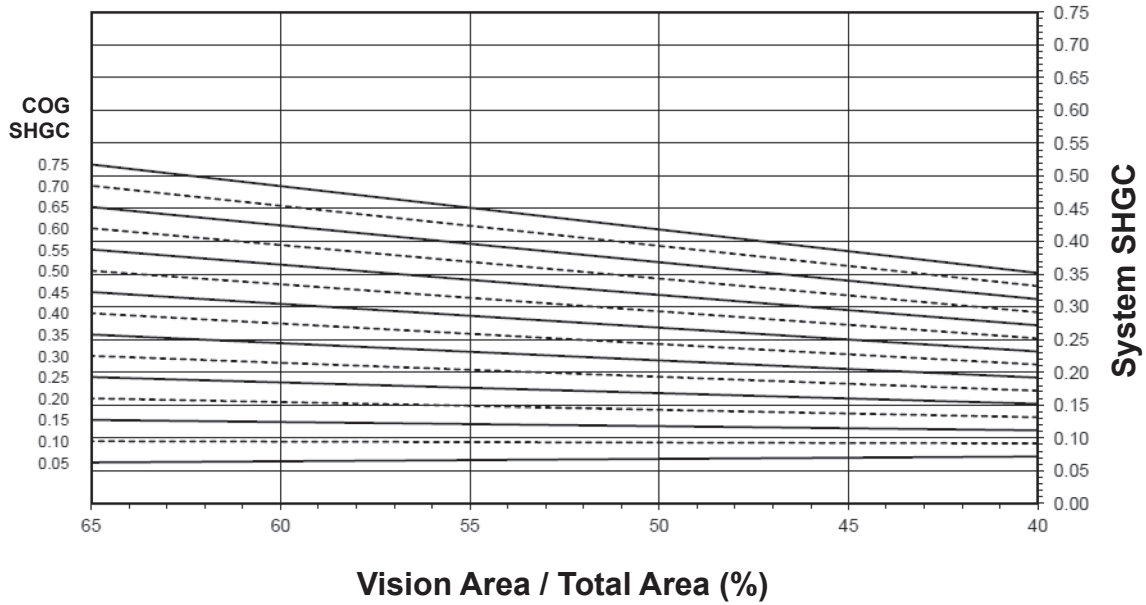
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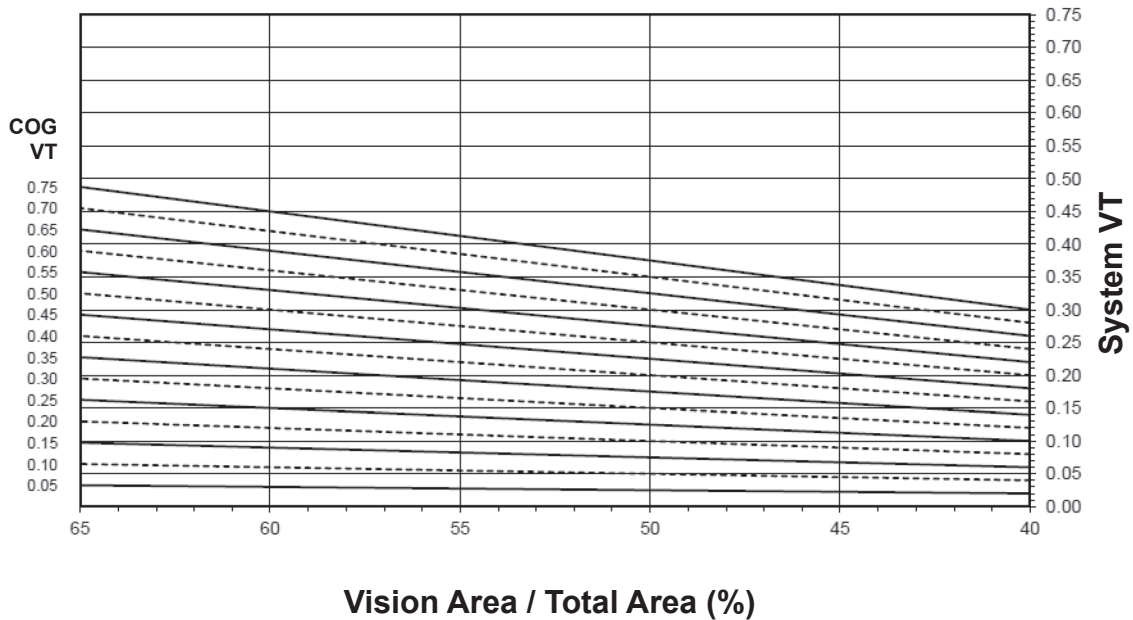
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System Solar Heat Gain Coefficient (SHGC) vs Percent of Vision Area



System Visible Transmittance (VT) vs Percent of Vision Area



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

500 (PAIR OF DOORS)

Glass U-Factor ³	Overall U-Factor ⁴
0.47	0.82
0.46	0.82
0.44	0.81
0.42	0.80
0.40	0.79
0.38	0.78
0.36	0.77
0.34	0.77
0.32	0.76
0.30	0.75
0.28	0.74
0.26	0.73
0.24	0.72
0.22	0.71
0.20	0.70
0.18	0.70
0.16	0.69
0.14	0.68
0.12	0.67
0.10	0.66

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0.75	0.41
0.70	0.38
0.65	0.36
0.60	0.34
0.55	0.31
0.50	0.29
0.45	0.26
0.40	0.24
0.35	0.21
0.30	0.19
0.25	0.17
0.20	0.14
0.15	0.12
0.10	0.09
0.05	0.07

Visible Transmittance ²

Glass VT ³	Overall VT ⁴
0.75	0.36
0.70	0.34
0.65	0.32
0.60	0.29
0.55	0.27
0.50	0.24
0.45	0.22
0.40	0.19
0.35	0.17
0.30	0.15
0.25	0.12
0.20	0.10
0.15	0.07
0.10	0.05
0.05	0.02

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