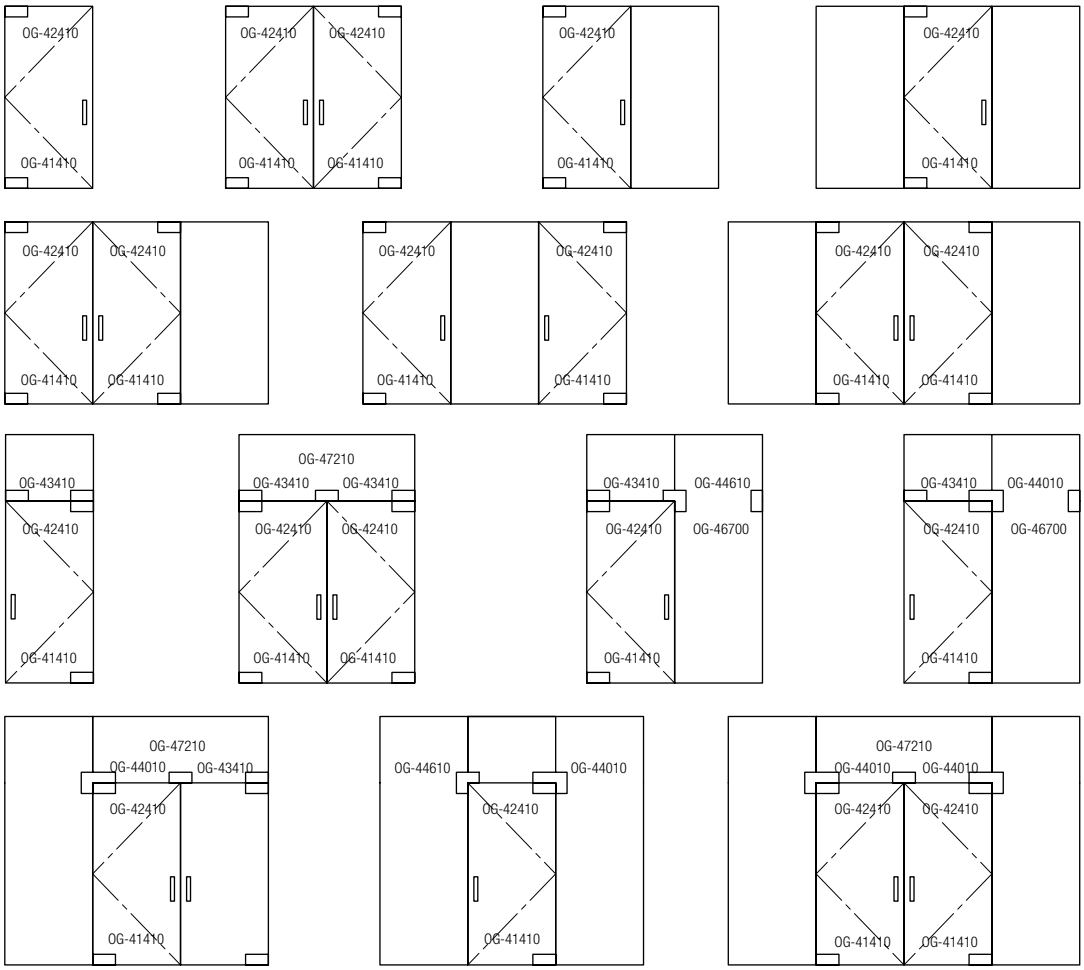
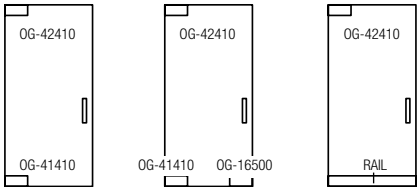
All Glass Entrance Systems:
Entrance Configurations/Fitting Designations





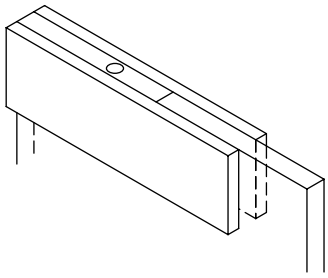
A F BP*

Door Styles:
The above Entrance Configurations will accommodate door styles A, F and BP (shown at left).

*For specification information for BP style doors, and for 3/4" glass, call 1-866-OLDCASTLE (653-2278) or log on to www. oldcastlebe.com.

All Glass Entrance Systems:
Fittings

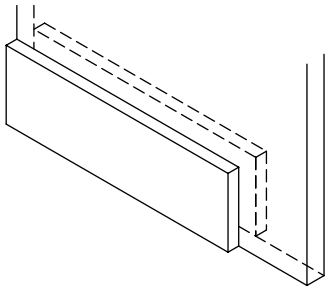
OBE-42410 Top Corner Patch with Pivot Housing



Function
Provides housing for a top-pivot or closer spindle block assembly.

Specifications
Constructed of cast structural alloys; cover plates are formed aluminum, brass or stainless steel. Cover plates can be removed from both sides for installation. Pressure-applied to 3/8", 1/2", 5/8" or 3/4" glass.

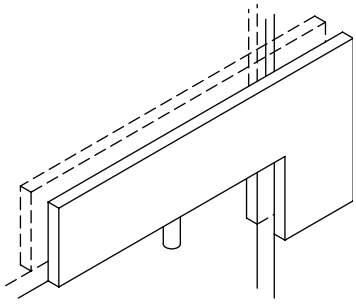
OBE-41410 Bottom Corner Patch with Pivot and Closer Housing



Function
Provides housing for a bottom-pivot assembly or floor closer spindle.

Specifications
Constructed of cast structural alloys; cover plates are formed aluminum, brass or stainless steel. Cover plates can be removed from both sides for installation. Pressure-applied to 3/8", 1/2", 5/8" or 3/4" glass.

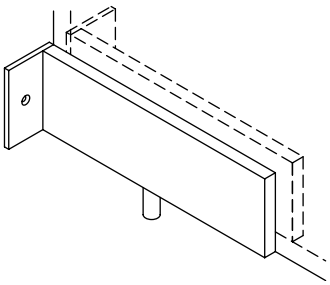
OBE-44010 Transom/Side Lite Pivot Patch



Function
Supports transom glass off of the adjacent side lite and provides a top pivot pin for door.

Specifications
Constructed of cast structural alloys; cover plates are formed aluminum, brass or stainless steel. Cover plates can be removed from both sides for installation. Pressure-applied to 1/2", 5/8" or 3/4" glass.

OBE-43410 Transom to Wall Pivot Patch

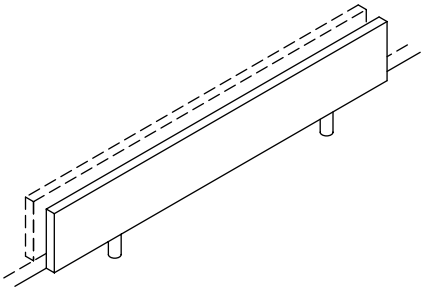


Function
Supports transom glass off of the adjacent jamb and provides a top pivot pin for door.

Specifications
Constructed of cast structural alloys; cover plates are formed aluminum, brass or stainless steel. Cover plates can be removed from both sides for installation. Pressure-applied to 1/2", 5/8" or 3/4" glass.

All Glass Entrance Systems: Fittings

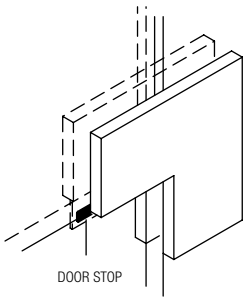
OBE-47710 Transom Double Pivot Patch



Function
Provides top pivots off of the glass transom for a pair of doors that pivot at the center of opening.

Specifications
Constructed of cast structural alloys; cover plates are formed aluminum, brass or stainless steel. Cover plates can be removed from both sides for installation. Pressure-applied to 1/2", 5/8" or 3/4" glass.

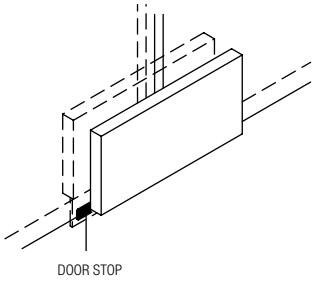
OBE-44610 Transom/Side Lite Patch with Door Stop



Function
Supports transom glass off of the adjacent side lite and provides a door stop for a single door.

Specifications
Constructed of cast structural alloys; cover plates are formed aluminum, brass or stainless steel. Cover plates can be removed from both sides for installation. Pressure-applied to 1/2", 5/8" or 3/4" glass.

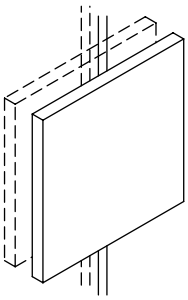
OBE-47210 Transom Door Stop Patch



Function
Provides a door stop for a pair of doors with a glass transom above.

Specifications
Constructed of cast structural alloys; cover plates are formed aluminum, brass or stainless steel. Cover plates can be removed from both sides for installation. Pressure-applied to 1/2", 5/8" or 3/4" glass.

OBE-46500 180° Connector Patch



Function
Stabilizes lite off of the adjacent lite and secures lite above or below.

Specifications
Constructed of cast structural alloys; cover plates are formed aluminum, brass or stainless steel. Cover plates can be removed from both sides for installation. Pressure-applied to 1/2", 5/8" or 3/4" glass.

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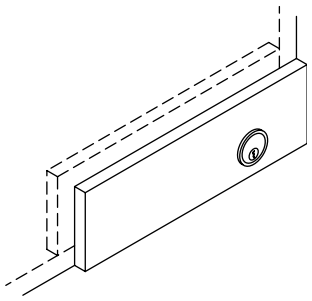
All Glass Entrance Systems:
Fittings

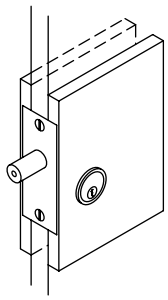
OBE-16500 Bottom Lock Patch with Dead Bolt



Functions
Provides a bottom lock with a dead bolt (11/16" long).

Specifications
Constructed of cast structural alloys; cover plates are formed aluminum, brass or stainless steel. Cover plates can be removed from both sides for installation. Pressure-applied to 3/8", 1/2", 5/8" or 3/4" glass.

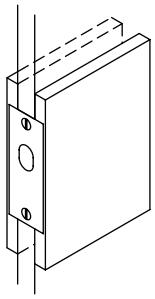
OBE-16300 Patch Lock with Dead Bolt



Functions
Provides a center lock with a dead bolt (11/16" long). Can also be used as bottom lock.

Specifications
Constructed of cast structural alloys; cover plates are formed aluminum, brass or stainless steel. Cover plates can be removed from both sides for installation. Pressure-applied to 3/8", 1/2", 5/8" or 3/4" glass.

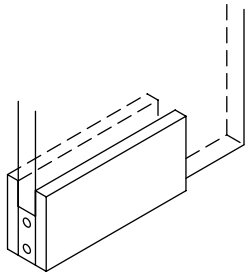
OBE-16400 Center Lock Strike



Functions
Provides a strike for OBE-16300, a center lock application.

Specifications
Constructed of cast structural alloys; cover plates are formed aluminum, brass or stainless steel. Cover plates can be removed from both sides for installation. Pressure-applied to 3/8", 1/2", 5/8" or 3/4" glass.

OBE-461XX Stabilizer Fin Bracket



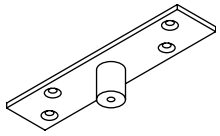
Functions
Attaches the glass stabilizing fin to a transom/side-lite pivot patch.

Specifications
Constructed of cast structural alloys; cover plates are formed aluminum, brass or stainless steel. Cover plates can be removed from both sides for installation. Pressure-applied to 1/2" or 3/4" glass.

Fitting Options: Part no. OBE-46150 for 1/2" glass; OBE-46153 for 3/4" glass.

All Glass Entrance Systems:
Fittings and Design Information/Door Hardware

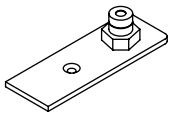
OBE-360 Top Pivot



Function
Provides a top pivot pin for surface mounting.

Specifications
Constructed of a solid stainless steel pin welded to a solid stainless steel plate; cover plates are of stainless steel or brass.

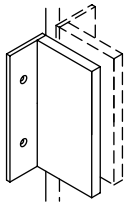
OBE-11500 Bottom Pivot



Function
Provides a height-adjustable bottom pivot.

Specifications
Constructed of solid stainless steel or brass plate with a roller bearing assembly. Adjustable from 1/4" to 1/2".

OBE-46700 Transom or Side lite to Wall Bracket



Function
Supports a transom or a side lite off of an adjacent structure.

Specifications
Constructed of cast structural alloys; cover plates are formed aluminum, brass or stainless steel. Cover plates can be removed from both sides for installation. Pressure-applied to 3/8", 1/2", 5/8" or 3/4" glass.

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All-Glass Entrance Systems:
GANA Recommendations for Fully Tempered Interior Butt-Glazed, Fixed-Glass Panels[1]

Introduction

The fixed panels of interior glass partitions, mounted or restrained on only two sides (top and bottom), require special design considerations:

Glass held only on two sides is much more flexible than glass supported on all four sides. If the glass is too thin, small fluctuations of interior air pressure can cause the glass to tremble or shimmer. People pushing or leaning on glass that is too thin will noticeably deflect the glass. As the unsupported span or height of the glass panels increases, the glass thickness must also increase to maintain a reasonable stiffness.

Table 1 below shows the recommended minimum thickness of fully tempered glass for various glass heights used in interior butt-glazed, fixed-glass panels.

Table 1

GANA Guidelines - Recommended Thickness for Fully Tempered Glass Used in Butt-Glazed, Fixed Interior Panels mounted or restrained at Top and Bottom Only

Unsupported span from top to bottom of glass: ft (m)	**Recommended minimum thickness of FULLY TEMPERED Glass: inches** (mm)
Up to **5** (1.5)	**1/4** (6)
Over **5** (1.5) up to **8 (2.4)**	**3/8** (10)
Over **8** (2.4) up to **10 (3.0)**	**1/2** (12)
Over **10** (3.0) up to **12 (3.6)**	**5/8** (16)
Over **12** (3.6) up to **14 (4.2)**	**3/4** (19)
Over **14 (4.2)** up to **16** (4.8)	**7/8** (22)
Over **16** (4.8) up to **18** (5.5)	**1** (25)
Over **18** (5.5)	Not Recommended

Cautions

The following cautions are not addressed in any way by Table 1 above.

IBC's model National Building Code, Section 2403.4, states, regarding interior glazed areas: "Where interior glazing is installed adjacent to a walking surface, the differential deflection of two adjacent unsupported sides shall not be greater than the thickness of the panels when a force of 50 pounds per linear foot is applied horizontally to one panel at any point up to 42 inches above the walking surface."

Thicknesses shown in Table 1 above WILL NOT MEET the IBC code for adjacent panels not linked together by adequate silicone or permanent clips. Table 2, on the following page, shows the recommended minimum thickness of fully tempered glass required to meet the IBC code for panels that are not linked together to prevent differential deflection greater than the panel thickness.

Silicone joints or permanently clipping adjacent panels do not add to the structural strength or rigidity of the assembly and do not permit the reduction of the recommended thickness shown in Table 1 above.

(1) Reprinted with permission from the GANA Tempering Division's *Engineering Standards Manual*, 2001 edition.

All-Glass Entrance Systems:
GANA Recommendations for Fully Tempered Interior Butt-Glazed, Fixed-Glass Panels[1]

Cautions (continued)

Open narrow joints between butt-glazed glass panels may catch or pinch fingers. The best preventive is to avoid open joints by filling them with silicone. An alternative is to install permanent clamps approximately every four feet to couple the adjoining panels together to prevent relative movement between panels. The gap between panels with unfilled joints should be such that fingers cannot be inserted and trapped.

Table 2

Recommended Minimum Thickness for Fully Tempered Glass to Meet IBC Requirements (Section 2403.4) for Interior Partitions

Distance from Walking Surface to the Bottom Edge of Glass: inches (mm)	**0** (0)	**6** (152)	**12** (305)	**18** (457)	**24** (609)
Panel Height: ft (m)	**Minimum Recommended Fully Tempered Glass Thickness: inches** (mm)				
7 (2.1)	**5/8** (16)	**5/8** (16)	**5/8** (16)	**1/2** (12)	**1/2** (12)
8 (2.4)	**5/8** (16)	**5/8** (16)	**5/8** (16)	**5/8** (16)	**1/2** (12)
9 (2.7)	**5/8** (16)	**5/8** (16)	**5/8** (16)	**5/8** (16)	**5/8** (16)
10 (3.0)	**3/4** (19)	**3/4** (19)	**5/8** (16)	**5/8** (16)	**5/8** (16)
11 (3.3)	**3/4** (19)	**3/4** (19)	**3/4** (19)	**5/8** (16)	**5/8** (16)
12 (3.6)	**3/4** (19)	**3/4** (19)	**3/4** (19)	**3/4** (19)	**5/8** (16)
13 (3.9)	**7/8** (22)	**3/4** (19)	**3/4** (19)	**3/4** (19)	**5/8** (16)
14 (4.2)	**7/8** (22)	**7/8** (22)	**3/4** (19)	**3/4** (19)	**5/8** (16)
15 (4.5)	**7/8** (22)	**7/8** (22)	**3/4** (19)	**3/4** (19)	**3/4** (19)
16 (4.8)	**7/8** (22)	**7/8** (22)	**7/8** (22)	**3/4** (19)	**3/4** (19)
17 (5.1)	**7/8** (22)	**7/8** (22)	**7/8** (22)	**3/4** (19)	**3/4** (19)
18 (5.4)	**1** (25)	**7/8** (22)	**7/8** (22)	**3/4** (19)	**3/4** (19)

For further information, please refer to Glass Association of North America, *Engineering Standards Manual*.

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All-Glass Entrance Systems:
GANA Recommendations for Fully Tempered Interior Butt-Glazed, Fixed-Glass Panels[1]

Interior Applications

Heavy glass doors are becoming increasingly popular for interior applications. Although wind load is not a consideration, other types of structural loading may limit the size of interior doors. Interior, fully tempered glass side lite panels are not always sealed. See Appendix I of the *GANA Tempered Glass Engineering Standards Manual* for additional information regarding height and thickness recommendations for fully tempered interior, butt-glazed glass panels. Traffic volume for interior applications needs to be considered, as with exterior applications. Interior doors are often locked in both the open and closed position, eliminating the need for closers. Structural design of fully tempered all-glass interior entrance systems is discussed in detail in the *GANA 1999 Fully Tempered Heavy Glass Door and Entrance Systems Design Guide.*

Door Size Limitations

Door sizes need to be limited due to glass flexibility and hardware limitations. Closers and pivots have weight limitations. Doors that are too wide are difficult to control in windy conditions and may exceed hardware limits. Larger doors may be used when locked open or infrequently used. Full rails, top and bottom, are recommended for larger door sizes. *(See Table 3.)*

Types of Glass

Glass in fully tempered heavy glass doors and entrances is clear or tinted monolithic, fully tempered float glass complying with standards defined in ASTM C1036 and C1048. Typical heavy clear float glass thicknesses used include 3/8" (10 mm); 1/2" (12 mm); and 3/4" (19 mm). Tinted (gray and bronze) heavy float glass thicknesses used include 3/8" (10 mm) and 1/2" (12 mm).

The exposed vertical edges of the glass are ground and polished prior to tempering the glass. Holes for handles and patch fittings must be drilled in the glass prior to tempering. The diameter of these holes is usually slightly larger than the thickness of the glass. See ASTM C1048 for glass fabrication guidelines.

Table 3: Recommended Maximum Interior or Exterior Swinging Door Sizes

			Fully Tempered Glass					
			Full Rails			Patch Fittings		
	Glass Thickness:	**inches** (mm)	**3/8** (10)	**1/2** (12)	**3/4** (19)	**3/8** (10)	**1/2** (12)	**3/4** (19)
	Glass Weight:	lbs/ft²	5	6.5	10	5	6.5	10
Concealed Overhead Closer	Width:	**inches** (mm)	**36** (914)	**42** (1065)	**36** (914)	**36** (914)	**42** (1065)	**36** (914)
	Height:	**inches** (mm)	**84** (2130)	**108** (2740)	**84** (2130)	**84** (2130)	**102** (2590)	**84** (2130)
	Glass Weight:	lbs/ft²	105	205	210	105	194	210
Floor Closer	Width:	**inches** (mm)	**36** (914)	**48** (1220)	**48** (1220)	**36** (914)	**42** (1065)	**36** (914)
	Height:	**inches** (mm)	**84** (2130)	**108** (2740)	**120** (3048)	**84** (2130)	**102** (2590)	**96** (2440)
	Glass Weight:	lbs/ft²	105	234	400	105	194	240

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All Glass Entrance Systems:
GANA Reference Material

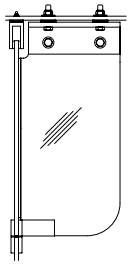
Fully Tempered Glass Transoms

Fully tempered glass transoms are those fixed glass panels immediately above the door opening, and often span between the top of the doors and the finished ceiling. These fully tempered glass transoms can be incorporated into the glass entrance using patch fittings or other transom support methods. Large-size glass transoms using patch fittings may require mechanical fastening to the ceiling structure, based on weight, size and other design considerations. *(See pages 23-26.)*

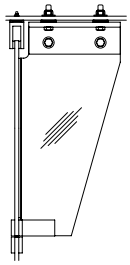
Fully Tempered Glass Stabilizer Fins

With all glass transoms and sidelites, perpendicular, fully tempered heavy glass mullions, sometimes called fins, may be mounted from the ceiling to the bottom of the transom to reduce the amount of deflection of the glass entrance. The fin must be mechanically fastened and anchored to the overhead load-carrying structure. Suspended ceilings do not provide an adequate structure for the attachment of stabilizer fins. Typically these glass fins are made using 1/2" (12 mm) or 3/4" (19 mm) thick fully tempered glass. *See pages 23-26* for structural design criteria for the design and use of glass stabilizer fins.

Figure 19. Fully Tempered Glass Stabilizer Fins



RADIUSED CORNER



TAPERED CORNER

Structural Design of Interior Glass Entrance Systems

One of the primary purposes of this design guide is to ensure that the designer has considered the structural limitations of the glass and metal fittings, so that the fully tempered entrance system will function satisfactorily and safely. Fully tempered all-glass entrance systems using patch fittings were originally designed in Europe and were used in both interior and exterior installations. Interior glass is not subject to uniform wind loading, other loading criteria had to be developed.

Many interior entrances are designed with the glass panels supported at the head and sill only and without additional mullions or other lateral support. Because the glass panels of interior glass entrances and partitions are mounted or restrained on only two sides (top and bottom), they require special design considerations. Glass held only on two sides is much more flexible than glass supported on all four sides. If the glass is too thin, small fluctuations of interior air pressure, or the operation of a door can cause the glass to tremble or shimmer. Persons pushing or leaning on glass that is too thin will noticeably deflect the glass. As the unsupported span of height of the glass panels increases, the glass thickness must also

All Glass Entrance Systems:
GANA Reference Material

Structural Design of Interior Glass Entrance Systems (continued)

be increased to maintain a reasonable stiffness. In this design guide we have separated the design considerations into two-sided support and three-sided support. Uniform horizontal pressures or other interior loading criteria are not clearly defined in most building codes. The International Building Code (IBC) limits the differential deflection of two adjacent unsupported sides of the interior glass panels. The recommended minimum thickness of fully tempered glass required to meet the International Building Code (IBC) for adjacent panels that are NOT linked together to prevent differential deflection is shown in Table 2 of Section 11 of the GANA Tempered Glass *Engineering Standards Manual.* By permanently clipping adjacent panels or siliconing the joints of adjacent panels, the thickness limits shown in Table 1 (Section 11 of the GANA Tempered Glass *Engineering Standards Manual)* can be used.

Two-Sided Support

Based upon the recommendations shown in Table 1 of the GANA Tempered Glass Engineering Standards Manual, the maximum height of heavy glass sidelite panels is as shown below in Figure 20.

Glass Thickness: inches (mm)	**Maximum Height: inches** (mm)
3/8 (10)	**96** (2438)
1/2 (12)	**120** (3048)
3/4 (19)	**168** (4267)

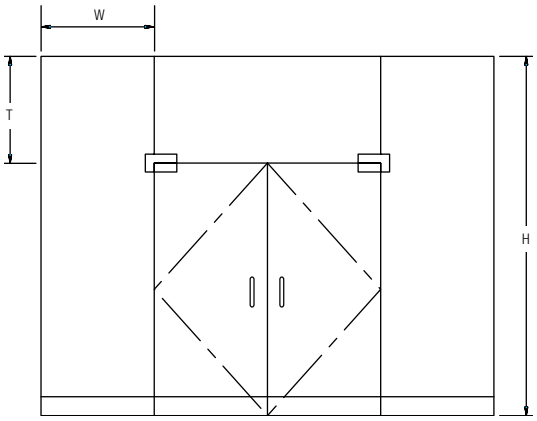


Figure 20.
Interior Entrance Size when Supported at Head and Sill

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Two-Sided Support (continued)

Most fully tempered all-glass interior entrance systems are designed using 1/2" (12 mm) thick fully tempered glass; the following design examples are for 1/2" (12 mm) thick fully tempered glass. The structural loading criteria used for two-sided supported panels in this design guide were developed using the force developed by the weight of the glass doors being opened 90° to the plane of the entrance as the primary design load for these interior applications. This load is often greater than the 0.25-0.5 kPa (5 to 10 PSF) interior design load often stated in building codes. When a side lite is located adjacent to a door, this side lite is often required to support the weight of an operating glass door. If this side lite is too narrow, it doesn't have sufficient strength to support the weight of the door without deflecting (flexing) to the point where the toe of the door will drag on the floor as it is opened. The chart in Figure 21 is furnished using common door sizes. This chart is constructed so that if the glass door toe deflects downward more than 1/4" (6 mm) due to the weight of the door, the side lite is too flexible. If this occurs, the design must be changed either by securing the jamb of the side lite to provide three-sided support or by adding fully tempered stabilizer fins.

In order to determine if fins are (or are not) required for an interior glass entrance system with two-sided support, the door width and transom height must be known. See "T" (transom height) and "W" (sidelite width) in Figure 20. The maximum height for 1/2" (12 mm) glass is 120" (3 m), as shown in Figure 20, and must not be exceeded. As can be seen in the chart, the minimum width for a side lite that must support the weight of the door is 12" (305 mm). Use "T" and "W" in the chart below (Figure 21) to establish a reference point. If this reference point is below the door width line in the chart, fins are not required. If this point is above the line, fins are required to provide additional lateral stability for the entrance.

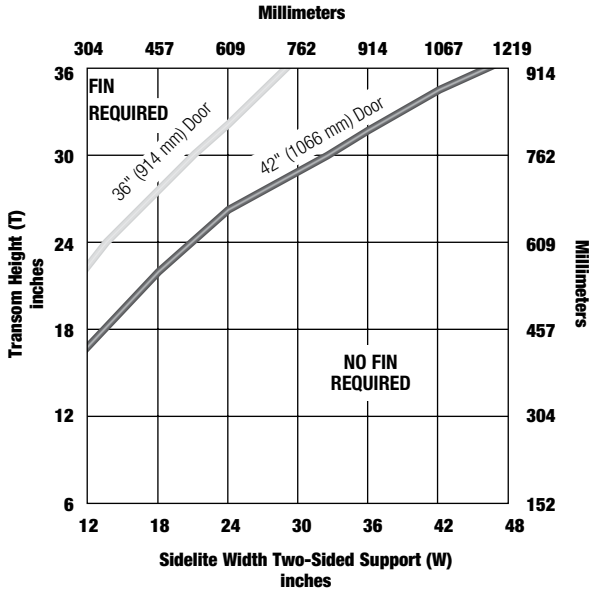

Figure 21.

Fin Requirement Chart for Doors and Transoms with Two-Sided Support for Interior Glass Entrance Systems

All Glass Entrance Systems:
GANA Reference Material

Three-Sided Support

Often an interior glass entrance can be supported structurally at the jambs, as well as at the head and sill, as shown in Figure 22. Three-sided support is obtained with the addition of structural members on the vertical edges of the sidelites adjacent to the doors. If the glass sidelite is structurally supported on three sides, it will deflect much less than when it is supported only at the top and bottom. Narrower sidelites are stiffer because they are also supported at the jambs. It is also possible to provide a structurally supported edge for a sidelite by making a 90° corner so that the perpendicular sidelite becomes a full-height structural stabilizer for the adjacent side lite. Structural silicone is often used to connect the glass corner to provide structural adequacy, but 90° patch fittings and clamps can also be used to stabilize the corners.

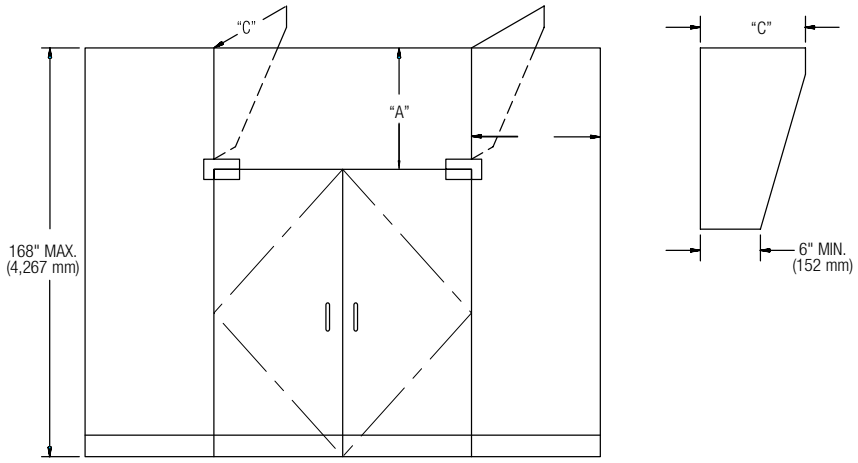

Figure 22.
Entrance Is Structurally Supported at the Head, Sill and Jambs

If the sum of the height of the transom "A" plus the width of the sidelite "B" is 72" (1,830 mm) or less, the stabilizer fins are not required. (A + B < 72" [1,830 mm], fins are not required). The traditional method of analyzing the requirement for structural glass stabilizer fins was developed in Europe more than 20 years ago. The European method of determining fin requirements is more conservative than this formula, because it was used for both interior and exterior openings with low-wind-load design. The European formula that has been used is that if A + B < 48" (1,200 mm), fins are not required.

If the entrance is to be used heavily or additional stability is desired, a more conservative formula could be used, so that fins would be required for smaller openings. Conversely, in applications (such as interior malls) when the doors are locked, open all-day stabilizers may not be needed because of the limited use of the doors. The design professional must consider glass strength and deflection for both two- and three-sided glass support using this analysis to determine glass fin requirements.

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Stabilizer Fins

In most interior applications a 12" (305 mm)-deep 1/2" (12 mm) glass mullion is adequate for transom/fin heights of up to 24" (610 mm). If the transom/fin height is greater than 24" (610 mm), the fin width at the top will need to increase, as shown on Figure 23. The top of the stabilizer fin must be securely fastened to a rigid structure at the top of the assembly, usually by means of back-to-back metal angles clamped to the fin using gaskets and through bolts. Two bolts are sufficient for fins up to 36" (1 m) high, but three or more bolts will be required for higher and deeper stabilizer fins.

Even with glass stabilizer fins, the recommended maximum height limit for 1/2" (12 mm) fully tempered glass is 168" (4.2 m) for three-sided, supported interior applications, and even less for exterior applications depending on the wind load. Fully tempered glass transoms using patch fittings may also require a mechanical fastening to the ceiling structure due to the weight of the glass transom.

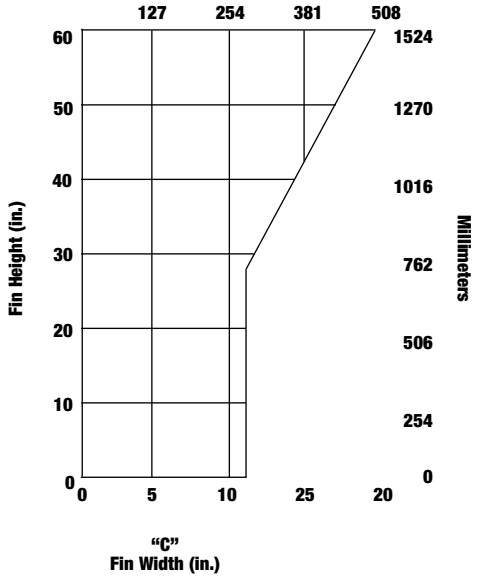

Figure 23.
Fin Stabilizer Width/Depth Chart