

ARMOURPLATE TECHNICAL GUIDE

DESIGN PARAMETERS & TOLERANCES

ENTRANCES

BALUSTRADES



SMARTGLASS™

The information below details design parameters and tolerances applicable to Armourplate, Armourscreen and Armourclad.

Holes

All glass thicknesses from 4 mm to 19 mm can be drilled and holes are available in diameters of up to 25 mm, but may not have a minimum diameter less than the thickness of the glass.

It is also not recommended that holes smaller than 6 mm be specified, and enquiries for holes larger than 25 mm should be submitted to SmartGlass.

The proximity of holes to glass edges must not be less than indicated, where the distance x is $1.5t$ and the distance y is $4t$, where t = glass thickness. (See diagrams 1 and 2.)

In the case of a rounded corner, the dimension y is determined as shown and increased to $5t$. In this instance, x must remain as no less than $1.5t$ but x shall be at least $1/3W$ where W = width of glass. (See diagram 3.)

Holes should be spaced to provide a minimum distance from each hole edge of $4t$, where t = glass thickness. (See diagram 4.)

It is essential to ensure that all glass, including toughened safety glass, is fully isolated from any metal, such as framing or bolts.

In the case of bolting, the glass plate is secured by a clamping action opposed to the bolt itself. For this reason, isolation in the form of non-compressible fibre or similar grommets must be provided, and this should be considered when finalising bolt sizes and hole diameters.

The maximum number of holes per plate is 24 and only two different diameters can be drilled on the same plate.

Hole tolerances

Positioning is subject to a tolerance of ± 1.0 mm. The tolerance on hole diameters up to 25 mm is $-0 + 1.0$ mm.

Where more than one hole is to be positioned, the distance between holes is subject to a tolerance of ± 1.0 mm.

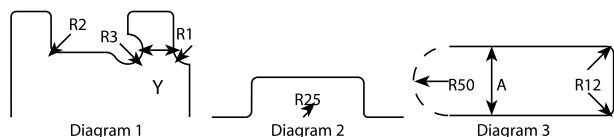
All holes are suitably finished.

Notches

Many configurations of notches may be supplied but, due to the balanced stresses set up in toughened glass, it is essential that design proposals be submitted to SmartGlass for technical assistance and to avoid possible failure in service.

The following guidelines should be considered when preparing design proposals:

- Re-entrant corners of notches cannot be sharp and must have a radius at least equal to the thickness of the glass, but generally not less than 10 mm. This requirement is subject to application and, where a lesser radius is required, details should be discussed with SmartGlass.
- All other corners would be prepared as R1, R2 or R3 and the same minimum radius limitations would apply. (See diagram 1 below.)
- The dimension Y should be 75 mm or greater. (See diagram 1.)
- Special pay notches should have a minimum corner radius of 25 mm including general tolerances. (See diagram 2.)
- Speech apertures may be circular, semi-circular or rectangular.
- In the case of circles, standard diameters are 100 mm, 150 mm and 200 mm.
- In the case of semi-circles, extended semi-circles and rectangles, the dimension A must be a minimum of 50 mm for 6 mm thickness, and 75 mm for 10 mm and thicker substances. Radius corners must be no less than 12 mm. The semi-circle must have a radius of not less than 50 mm. (See diagram 3.)



Notch tolerances

Generally tolerances vary with requirements and are subject to negotiation. However, the following may serve as a design guideline.

Notch dimensional tolerances: $+1/-0$ mm

Position of notch relative to true position: ± 1 mm

Thickness

Thickness (mm)	Float Glass (mm)	Patterned Glass (mm)
4 mm	± 0.2 mm	± 0.5 mm
5 mm	± 0.2 mm	± 0.5 mm
6 mm	± 0.2 mm	± 0.5 mm
8 mm	± 0.3 mm	- 1 + 0
10 mm	± 0.3 mm	- 1 + 0
12 mm	± 0.3 mm	
15 mm	± 0.5 mm	
19 mm	± 1.0 mm	

Dimensions

	Tolerances (mm)
Dimensions up to and including 500 mm	+ 0 mm - 2 mm
Dimensions 501 mm to 1000 mm inclusive	+ 0 mm - 2.5 mm
Dimensions 1001 mm to 1500 mm inclusive	+ 0 mm - 3.0 mm
Dimensions exceeding 1500 mm	+ 0 mm - 4.0 mm

Bow

The nature of the toughening process is such that perfectly flat glass cannot be produced. The deviation depends on thickness, size, aspect ratio and other factors. This feature is kept within commercially accepted limits. The following table sets out the required manufacturing limits:

Departure from flatness	Roller Hearth
On thickness, nominal 4.5 and 6 mm	1 mm per 200 mm
On thickness, nominal 10 mm	1 mm per 300 mm
On thickness, nominal 12 mm & over	1 mm per 300 mm

Out of square	
1. Up to and including 500 mm longest dimension	2.0 mm
2. 501 to 1000 mm inclusive longest dimension	3.0 mm
3. 1001 to 1500 mm inclusive longest dimension	4.0 mm
4. 1501 to 2000 mm inclusive longest dimension	5.0 mm
Diagonal difference to be increased by 1 mm for every 1000 mm or part thereof in addition to the first 2000 mm.	

Method of measurement: Departure from flatness

Small glasses (largest dimension < 1.0 m)

- The glass shall be placed on a flat surface without any pressure other than light finger pressure to steady the glass.
- The maximum departure from the checking surface shall be measured using a wedge gauge passed between the glass and the checking surface.
- The nearest point of contact shall be determined by means of a 0.1 mm feeler gauge or similar.

Interpretation

The rate of departure from flatness must not exceed the amount stated in the specification for each thickness.

Edgework

Arrisred

This is the simplest type of edge finish and consists of removing the sharp edges of 'as cut' glass.

Standard Profile (Polished)

In this form, the edge of the glass is machined to the shape shown. It is applied to glass thicknesses up to and including 6 mm. (Only on Intermac.)

Flatground (Polished)

A machine edge of flat form as shown, which can either have a ground or bright polished finish.



Introduction

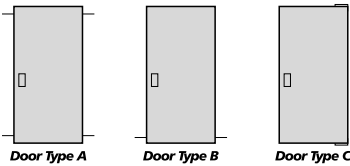
SmartGlass offers a standard range of over 70 Armourplate entrances in three distinctive door styles and including a wide variety of transoms and sidelights. The attractive simplicity of float glass, together with the wide range of attractive, complementary fittings, can enhance any building, old or new.

The range ensures that glass entrances are both aesthetically pleasing and compatible with the most demanding of designs.

The standard range is available in clear float glass or Antisun Bronze and Antisun Grey in tinted float glass. All designs incorporate variable speed hydraulic floor closers. Ease of installation and low maintenance costs are built-in features of the range of entrances. All fittings and closures have been designed to overcome possible problems due to openings being out of square or floor levels uneven, considerably reducing installation time and maintaining high standards of finish.

Door styles available

- A: Full width rails fitted along top and bottom edges.
- B: Full width rail fitted along bottom edge only. Patch with pivot fitted at top corner.
- C: Patches with pivots fitted at top and bottom corners.

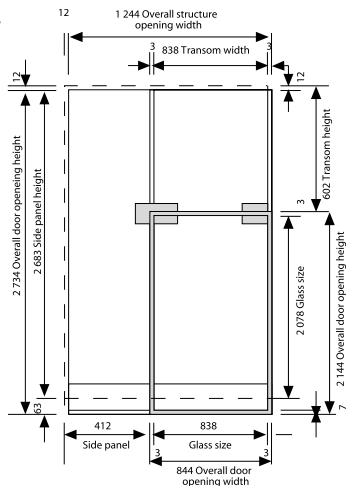


Fittings

Anodised aluminium alloy fittings meet the majority of design requirements and are available with interchangeable covers in a range of finishes as standard.

All fittings are fully functional without covers, preventing on-site damage during initial installation and allowing for change during any future refurbishment.

Glass sizes



Glass specifications

All standard Armourplate doors and entrances are supplied with 10 mm or 12 mm toughened safety glass and are available in three different types. The glass for all door assemblies carries a three-year warranty and can be supplied up to a maximum size of 2400 mm x 1200 mm in 10 mm thickness or 2600 mm x 1300 mm in 12 mm thickness.

Calculating finished rail and glass sizes

SmartGlass uses data supplied by the designer to calculate glass sizes and rail lengths that provide the clearances required for assembly. The following example shows the method used and serves to underline the importance of supplying correct input data. If these requirements are not met at the outset, quotations and preparation of production documents can be unnecessarily delayed.

The lengths of the door and side panel are determined for Type A & B doors from Table 1.

Using Tables 2,3 and 4, the glass sizes of the door leaf, side panel and transom are determined.

To determine the requirements for specifying an entrance configuration to fit a structural opening 1244 mm wide and 2734 mm high, the overall door opening is to be 844 mm wide and 2144 mm high.

The door is to be mounted on a double action floor-spring with locks at the top and bottom. The glass is to be located where necessary in a channel sunk into the structure.

Summary of specifications

Overall structural opening width: Sw = 1244 mm
 Overall structural opening height: Sh = 2734 mm
 Overall door opening width: Dw = 844 mm
 Overall door opening height: Dh = 2144 mm
 Standard configuration: B17
 Floor-spring required: D21 BTS/75 Dorma

Calculations

Rails:

From Table 1, the lengths of door and side-panel rails are given by:
 Width = Dw - 6 = 844 - 6 = 838 mm
 Side-panel rail = Sw - Dw = 1244 - 844 = 400 mm
 Glass area = 0.838 x 0.602 = 0.50 m²

Doors:

From Table 2, the glass size required for a single Type B door is given by:
 Width = Dw - 6 = 844 - 6 = 838 mm
 Height = Dh - 66 = 2144 - 66 = 2 078 mm
 Glass area = 0.838 x 2.078 = 1.74 m²

Side panels:

From Table 3 the glass size required for a full height side panel is given by:
 Width = Sw - Dw + 12 = 1244 - 844 + 12 = 412 mm
 Height = Sh - 51 mm = 2 734 - 63 + 12 = 2 683 mm
 Glass area = 0.412 x 2.683 = 1.10 m²

Transoms:

From Table 4 the glass size required for stopped transom is given by:
 Width = Dw - 6 = 844 - 6 = 838 mm
 Height = Sh - Dh + 12 = 2734 - 2 144 + 12 = 602 mm
 Glass area = 0.838 x 0.602 = 0.50 m²

Clearance and allowance tables

Rails - Table 1:

Door	Overall door opening width	Rail length		
	mm	mm		
Single	Dw	Dw - 6		
Double	Dw	(Dw - 9) / 2		
Side panel	Overall structural opening width	Overall door opening width		
No. off per configuration	mm	mm	mm	mm
	1	Sw	Dw	Sw - Dw + 12
2	Sw	Dw	(Sw - Dw) / 2 + 24	(Sw - Dw) / 2 - 14

Doors - Table 2:

	Overall door opening	Clearance	Fitting allowance	Glass size
Width	mm	mm	mm	mm
All door types				
Single	Dw	-6	0	Dw - 6
Double	Dw	-9	0	(Dw - 9) / 2
Height				
Type A	Dh	- 10	- 112	Dh - 122
Type B	Dh	- 10	- 56	Dh - 66
Type C	Dh	- 10	0	Dh - 10

Side panels - Table 3:

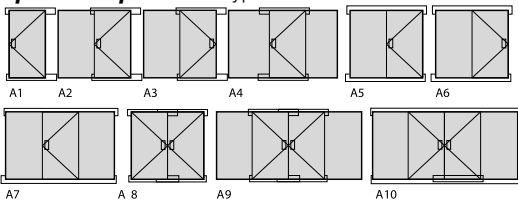
	Overall structural opening	Overall door opening		
Width	mm	mm	mm	mm
No. off per configuration	Sw	Dw	Sw - Dw + 12	Sw - Dw - 7
Single	Sw	Dw	(Sw - Dw) / 2 + 24	(Sw - Dw) / 2 - 14
Double	Sw	Dw		
Height				
Full panel with	Sh	Dh	Sh - 122	Sh - 122
Type A door	Sh	Dh	Sh - 51	Sh - 70
Type B door	Sh	Dh	Sh + 24	Sh - 14
Type C door	Sh	Dh		
Stopped panel with	Sh	Dh	Dh - 66	
Type A door	Sh	Dh	Dh - 6	
Type B door	Sh	Dh		
Type C door	Sh	Dh		

Transoms - Table 4:

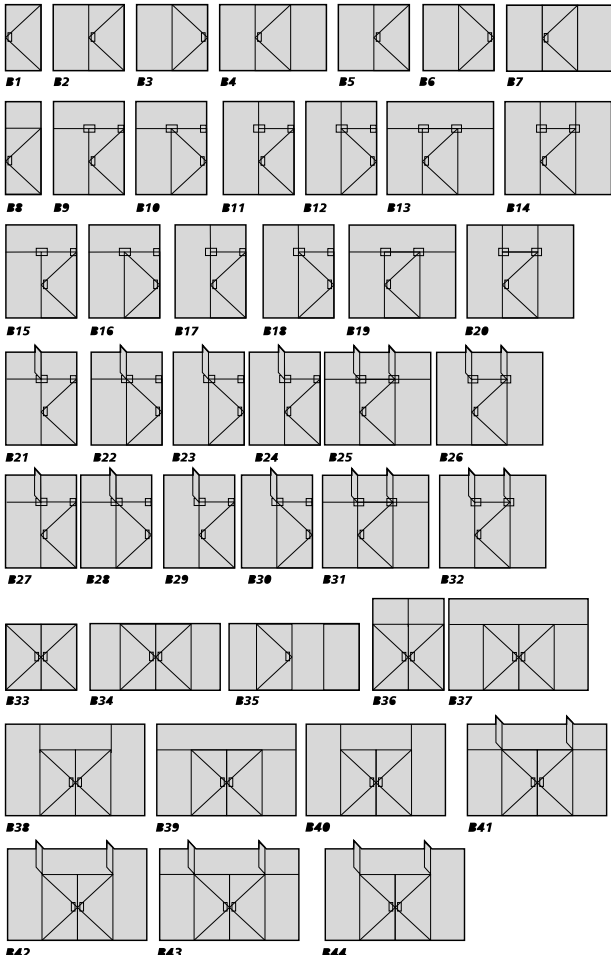
	Overall structural opening	Overall door opening		
Width	mm	mm	mm	mm
Full transom with	Sw	Dw	Sw - 6	Sw - 6
no side panels	Sw	Dw	Sw + 9	Sw - 10
1 side panel	Sw	Dw	Sw + 24	Sw - 14
2 side panels	Sw	Dw		
Full transom with	Sw	Dw	Sw - 6	Sw - 6
no side panels	Sw	Dw	Sw - 6	Sw - 6
1 side panel	Sw	Dw	Dw - 6	Dw - 6
2 side panels	Sw	Dw	Dw - 6	Dw - 6
Height	Sh	Dh	Sh - Dh + 12	Sh - Dh - 7



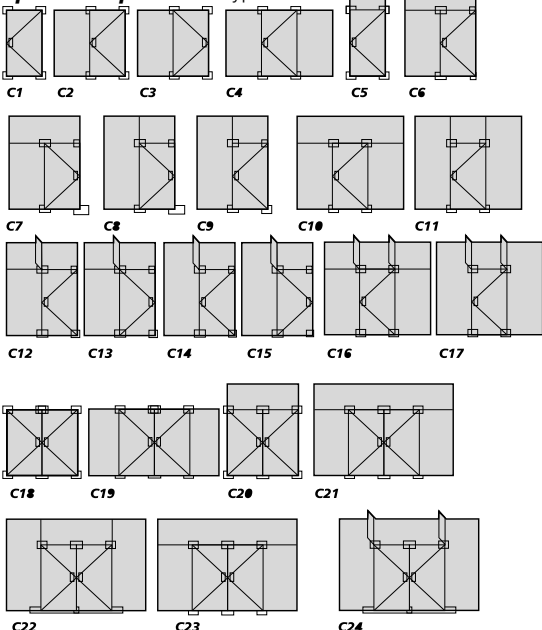
Specific options - Type A



Specific options - Type B



Specific options - Type C



This free-standing system has been developed to provide an inexpensive way to enjoy the beauty and easy maintenance of glass. Only the bottom edge is set into the floor, thereby eliminating the need for costly framing and fixing. The result is a continuous all-glass balustrade of exceptional Armourplate strength that is easy to specify and just as easy to install for internal or external use.

Preparation of channel/groove

The pre-formed groove should be thoroughly cleaned and saturated with water for 24 hours before applying grout. Immediately before applying grout, remove all surface water and any remaining debris from the groove.

For a channel formed from steel sections in or on a concrete floor, all steel surfaces should be cleaned and primed before installation. The channel or groove should be clean and free of obstruction.

The positions of joints between glass and panels should be measured and marked before starting work.

Neoprene setting blocks 20 mm thick, 25 mm wide and 100 mm long should be placed in the channel or groove 750 mm apart. These should be placed diagonally in the groove to ensure firm support for the glass panels.

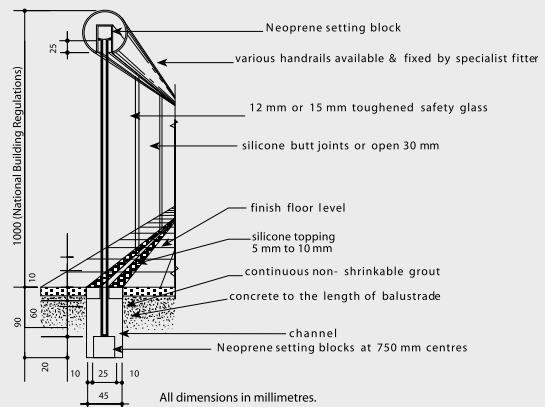
Erecting glass panels

In their final positions, make sure the glass panels are centred in the groove, vertically aligned and with vertical joints consistent between 3 mm and 6 mm.

Use Neoprene spacer blocks to achieve centring in the groove.

Use packing, if necessary, beneath the panels to achieve consistent vertical joints.

Use Neoprene spacers at the joints to avoid glass-to-glass contact during installation.



Support

Use temporary supports to hold the panels in position while the grout cures to achieve vertical alignment. The nature of these temporary supports depends on site conditions and is at the discretion of the installer. They must be secure enough to hold the glass panels in their final position for approximately 12 hours after grout has been poured.

Suggested method of support

1. Insert timber wedges loosely into the groove on either side of the glass panels.
2. Fix a straight timber batten along the top of the panels, to ensure alignment of top edges.
3. Tap in wedges until firm.

Grout

Mix grout and pour according to manufacturer's instructions.

Backfilling

When wooden wedges are used as supports, carefully remove these after 12 hours from time of pouring and backfill with freshly mixed grout.

Cleaning of glass

Carefully remove all excess grout from the glass surfaces. Wash glass with clean water or with a small quantity of detergent added, using a clean cloth or sponge.

Finishing

Seal the grout surface with non-acetic silicone sealant. Affix handrail, if required, 48 hours after pouring, using silicone between the handrail and glass panel for permanent fixing. Vertical joints may also be silicone sealed.