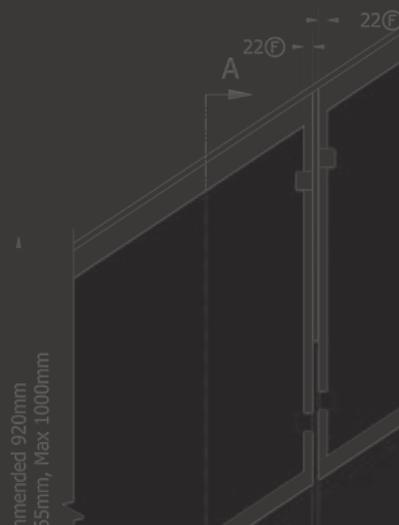




Stainless steel blade stanchions with toughened glass infill

design elements

H4







Stainless steel blade stanchions with toughened glass infill

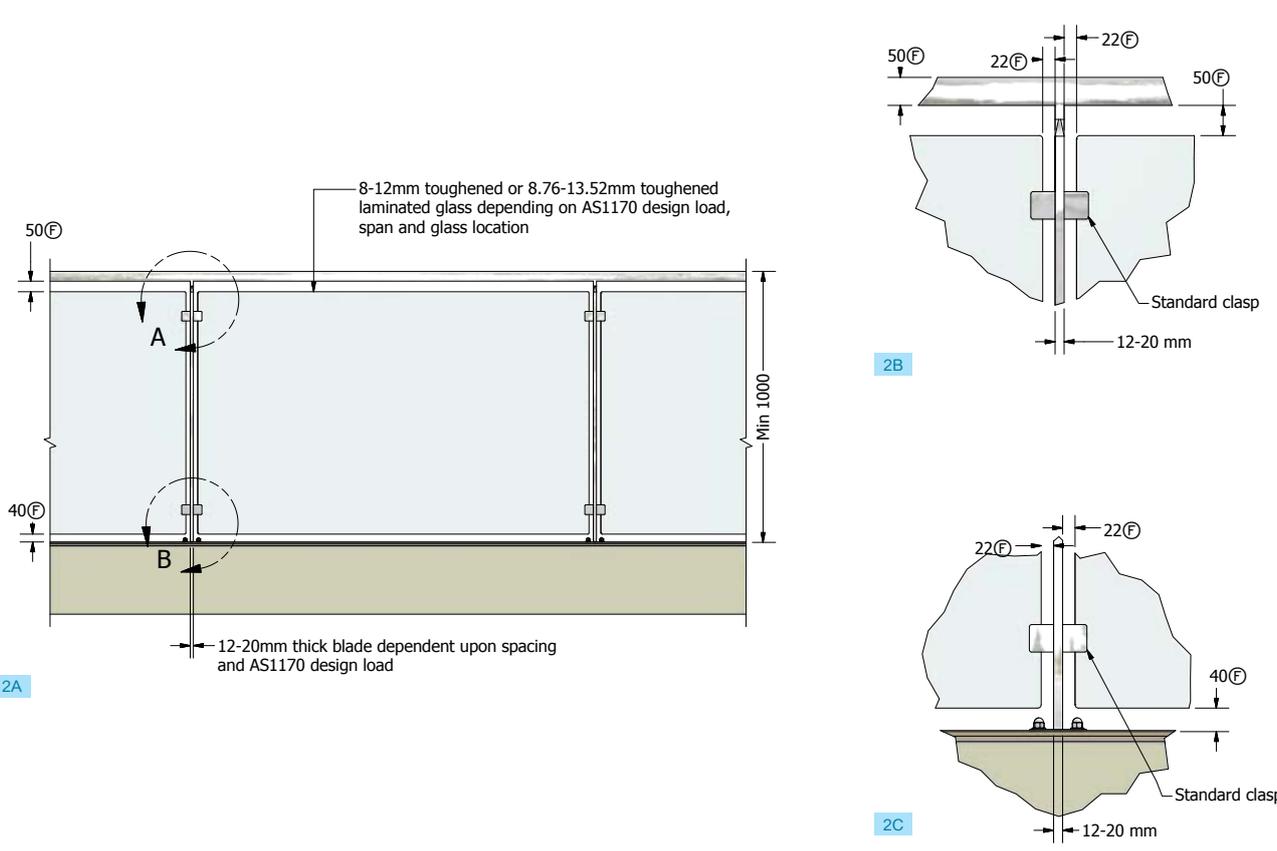
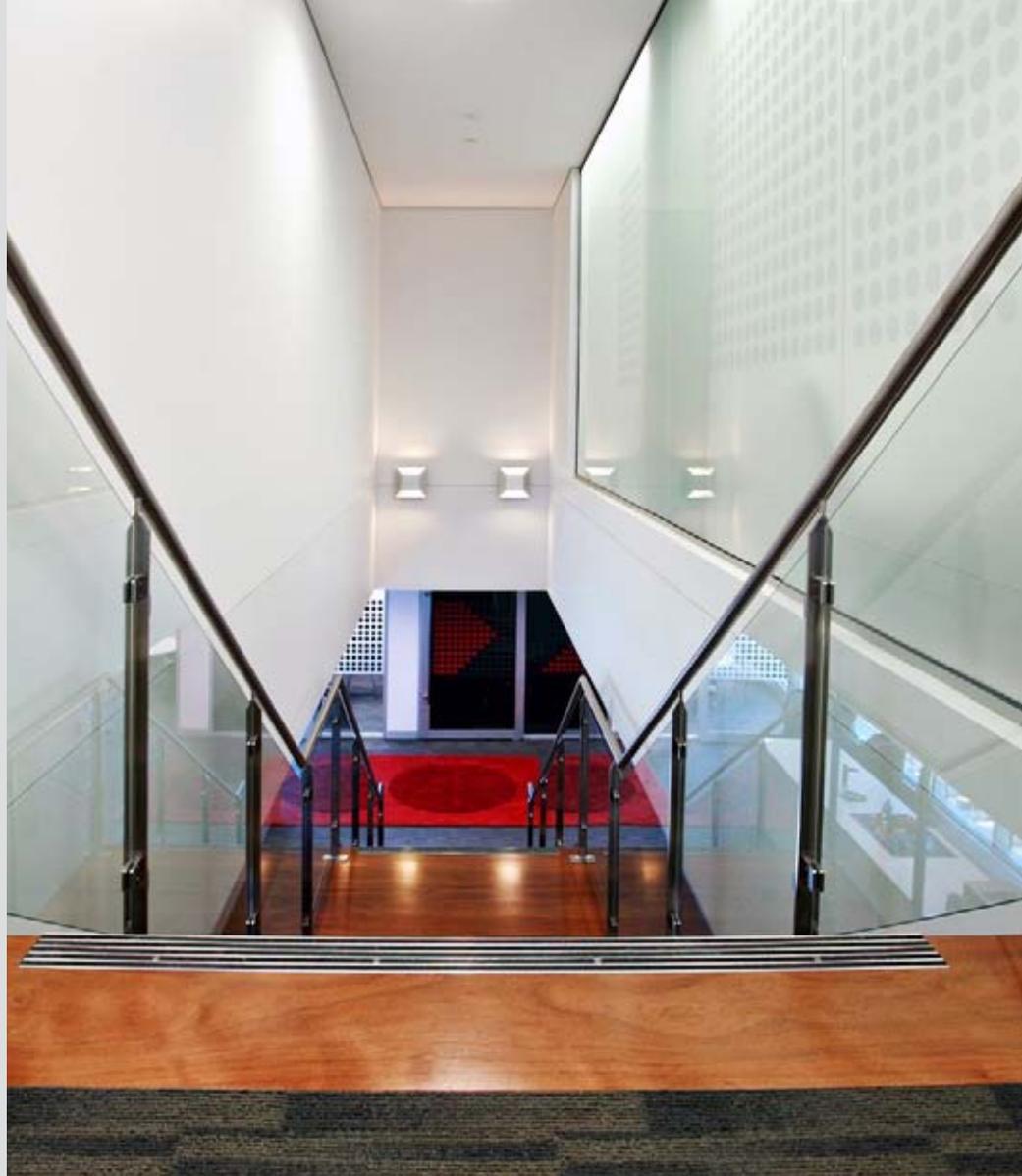
H4

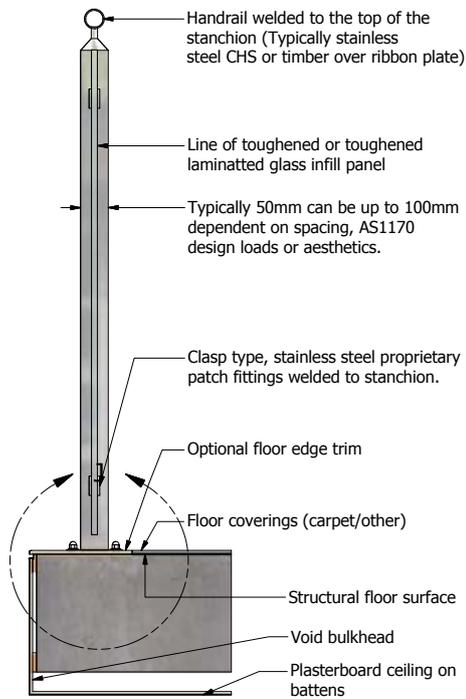
**technical**

Minimum stainless steel blade dimensions and maximum blade spacing are determined by AS 1170.1 requirements specifying balustrade design loads and fixing spacing. Note that spacing of blades can also be determined by the maximum span of the infill panels.

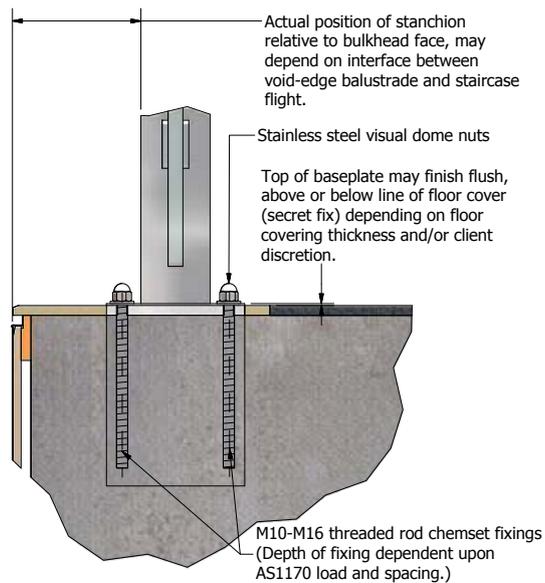
Glass selection is determined by load and infill span. Care should also be taken with respect to overhead glazing where a toughened laminated glass may be more suitable than a monolithic toughened glass.

Handrail type and specification is determined by balustrade handrail load and span between stanchions. Note that overall handrail size is limited to 50mm max diameter subject to AS1428.1.





3



4

**Figure 2.** Floor-fixed H4 void edge balustrade with top-mounted CHS handrail on triangular up-stand. Overall dimensions of rectangular panels are determined by relevant Australian standards and design load.

**2A.** Front elevation and details. Version showing a visual floor fixing with stainless steel dome nuts and base plate illustrated. Secret fixings and concealed base plate are a strong alternative.

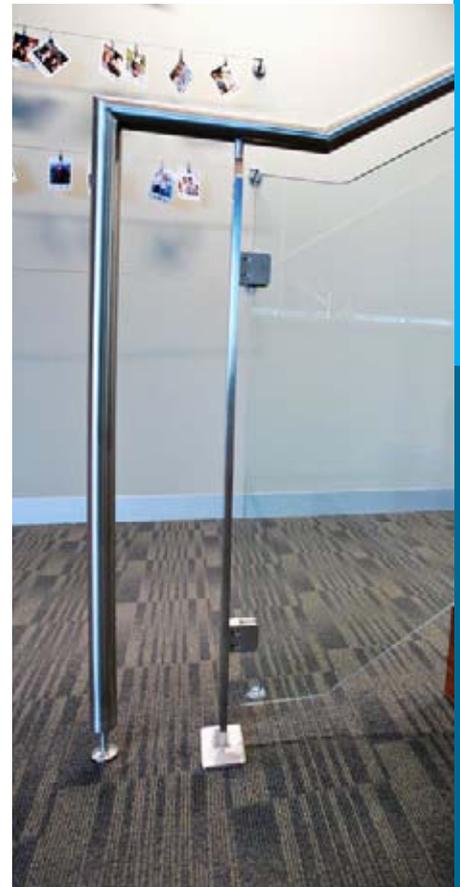
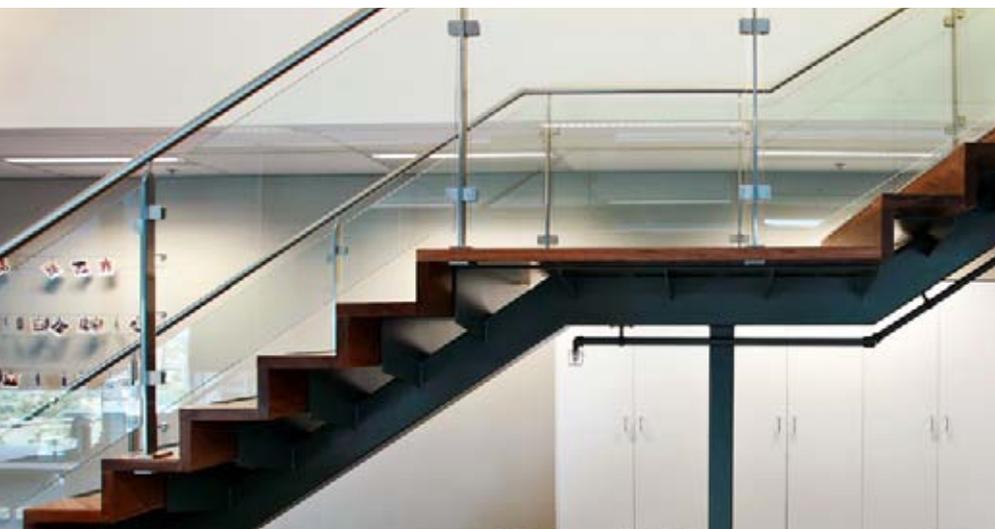
**2B.** Handrail details.

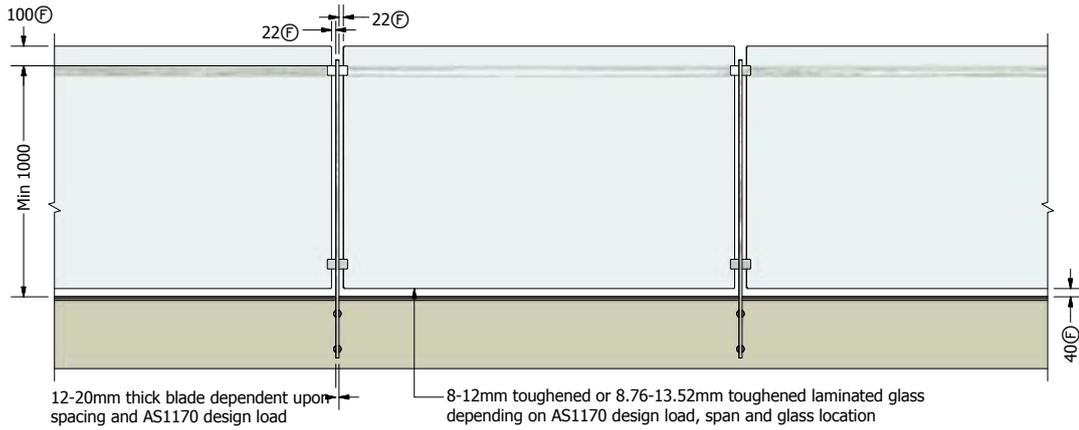
**2C.** Fixing details. On concrete slab floors, chemset fixings are preferred. Fixing details vary depending on type of floor.

**Figure 3.** Side elevation of floor-fixed H4 void edge balustrade with top-mounted CHS handrail on triangular up-stand.

**Figure 4.** Side elevation of fixing details of floor-fixed H4 void edge balustrade.

Ⓢ indicated on dimensions denotes a nominal dimension that typically varies according to specific application, engineering requirements or client preferences.





5A

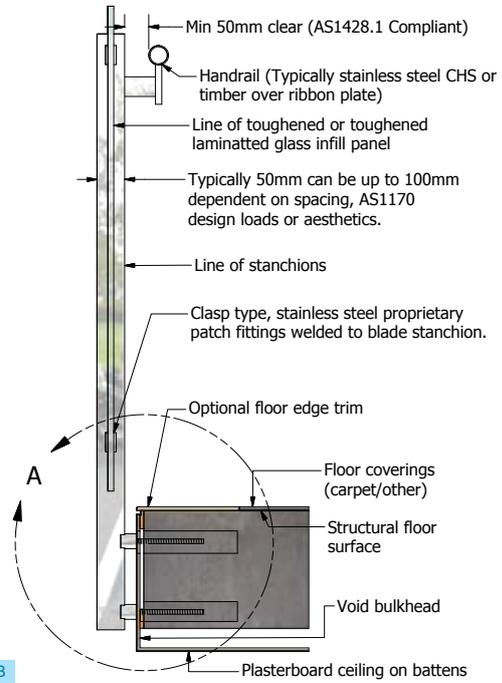
Figure 5. Face fixed H4 void edge balustrade with offset handrail.

5A. Front elevation

5B. Side elevation. Offset handrail is supported by flat-bar offstand and vertical rod assembly welded to stanchion and handrail.

5C. Fixing detail to concrete slab of sufficient thickness. Minimum distances between chemset fixings and concrete top and bottom face may vary according to design load. For extremely high design loads, as an alternative to the design illustrated, rectangular base-plates with four M16 fixings may be concealed behind bulkhead.

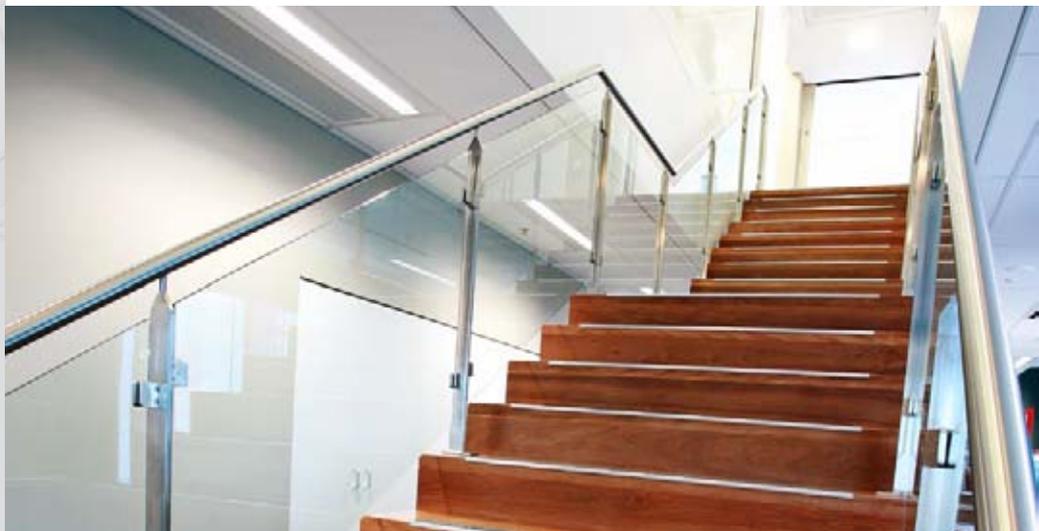
5D. Fixing detail to concrete slab with insufficient thickness to locate two face fixing points. Under-slab brackets may be specified to achieve arbitrarily high design loads.

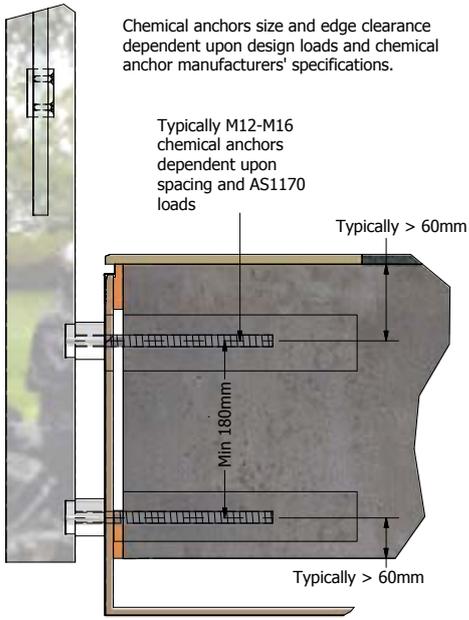


5B

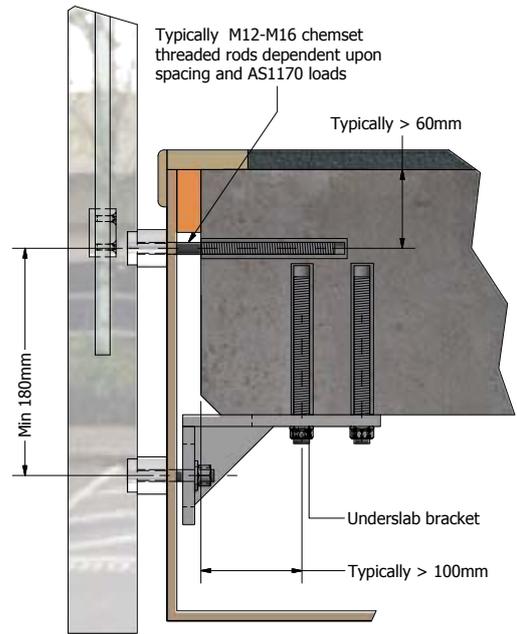


Ⓢ indicated on dimensions denotes a nominal dimension that typically varies according to specific application, engineering requirements or client preferences.





5C



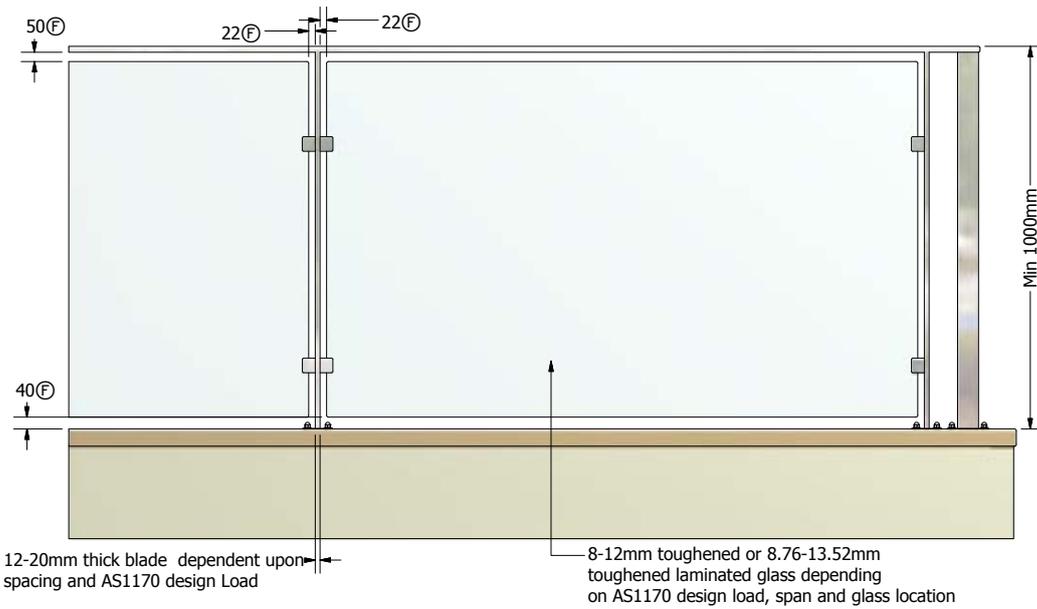
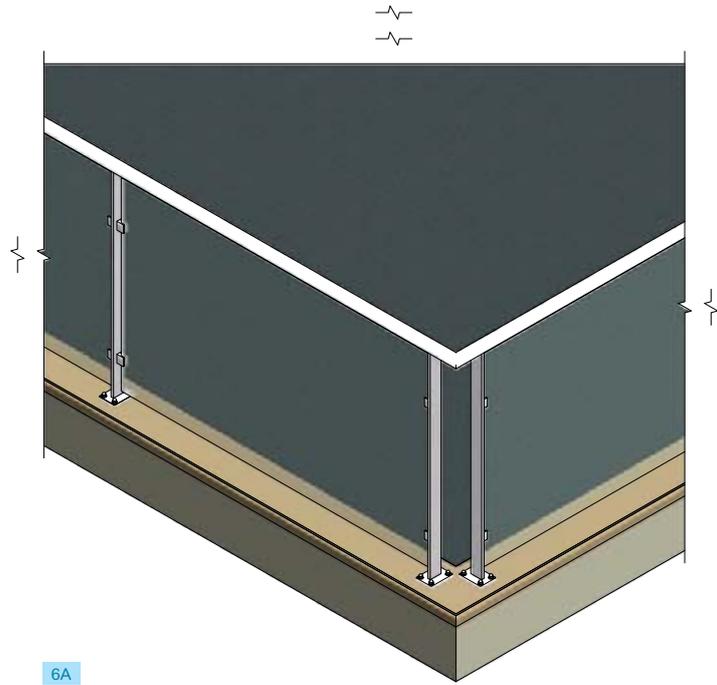
5D



Figure 6. H4 corner balustrade section with flat-bar top-mounted handrail matching stanchion blades.

- 6A. Isometric overview showing typical positioning of stanchion at corner.
- 6B. Front elevation.
- 6C. Side elevation corner detail.
- 6D. Side elevation intermediate stanchion detail.

Ⓢ indicated on dimensions denotes a nominal dimension that typically varies according to specific application, engineering requirements or client preferences.



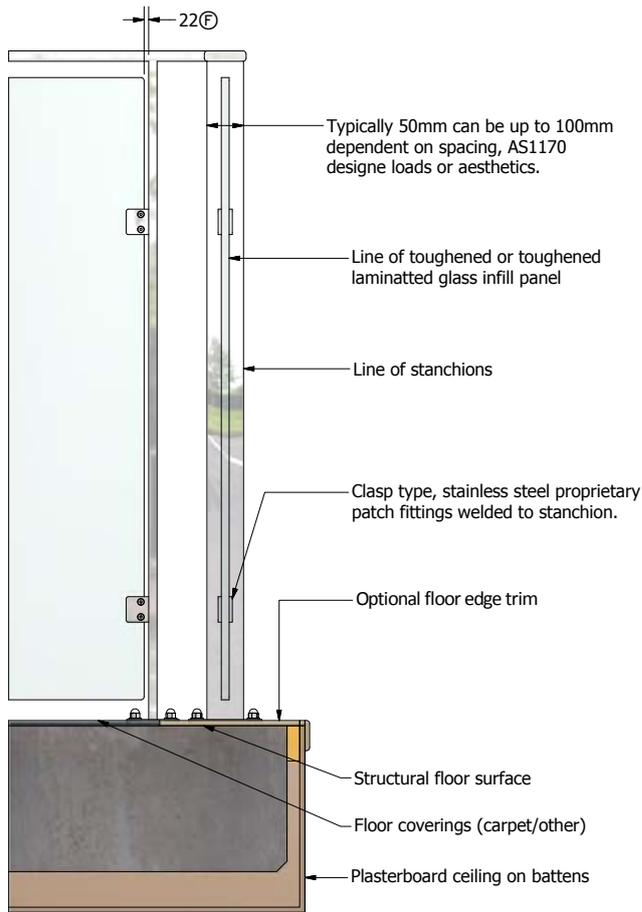
## infill glass panels

This table shows the recommended maximum glass span (mm) depending on design load.

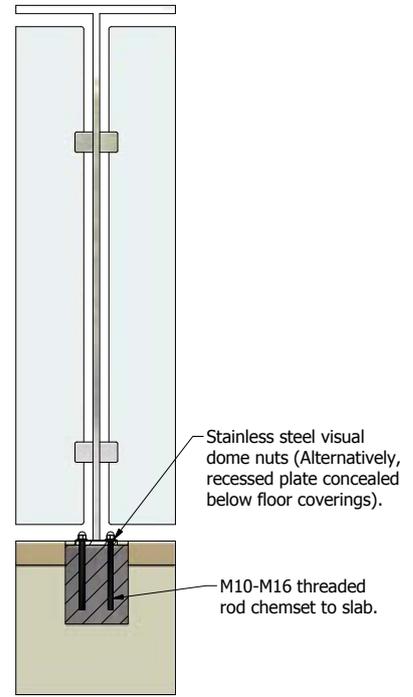
Design load	Toughened monolithic safety glass (mm)			Toughened laminated safety glass (mm)		
	8	10	12	10	12	16
Domestic/Residential	1640	2000	2300	1980	2290	2830
Offices/Commercial stairs	1070	1650	1930	1630	1920	2380
Retail/Restaurant	1140	1430	1730	1420	1720	2150
C5 high loads	Special glass engineering: designed as required					

### Notes

1. These tables are to be used as a general design guide only.
2. Individual project requirements will dictate final glass specification and thickness.
3. All spans nominated are indicative of normal internal conditions. In some exposed situations, wind loads may exceed design load and thicker glass or smaller spans may be required.



6C



6D





## design standards for glass panels

Glass balustrade panels must satisfy engineering requirements as specified in AS1288, and the Arden balustrade styles shown here are defined and specified with regard to the relevant design standards.

Of particular importance in the initial design stage, it is critical to maintain an awareness of the designation of glass panels as structural or infill, and the classification of handrail as load-supporting, non-load-supporting, or interlinking. Combined with other considerations (e.g. whether or not mechanical point-fixings are specified, span is cantilevered or supported on both sides), this determines the grade of glass (e.g. laminated annealed, toughened safety, laminated toughened) and type of handrail that satisfies the code.

As in other aspects of stair and balustrade design, Arden will advise with respect to the practicability of preliminary designs with respect to Australian standards.

## glass balustrade styles



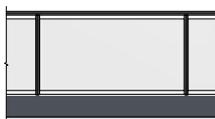
**Cantilevered structural.** Glass panels supporting an interlinking handrail cantilever from an appropriate floor fixing.



**Fully framed.** Glass panels are provided with four-edge support and are therefore rated as infill only.



**Two-edge clasp.** Glass panels are supported on two opposite edges by clasp-style mechanical fixings. The bearing of point loads influence the required grade of glass.



**Semi-framed vertical channel.** Glass panels are fixed via proprietary or custom channel system on each side.



**Two-side patch-fitting.** Glass panels are supported on two opposite sides by through-glass mechanical fixings. The bearing of point loads influence the required grade of glass. Stanchions may be located between, or at intermediate locations within, each panel span.



**Semi-framed lateral channel.** Glass panels are fixed via proprietary or custom channel system on the bottom rail and underside of handrail.



**Hybrid.** Glass panels are provided with a combination of the above methods so as to comply with safety requirements.



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## compliance

Arden is a BSA licensed contractor for carpentry, joinery, glass, glazing and aluminium as well as structural metal fabrication and erection. Arden supplies a Form 16 (Licensed Contractor) on all projects. In design and construct contracts, a Form 15 (Design Engineer) certification is supplied upon request. For products and services incorporating the H4 system, this table shows compliance with relevant codes and standards.

#### Key

- full compliance with the code
- not applicable to this element

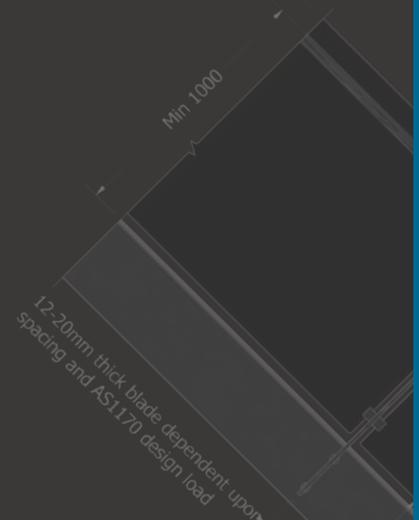
Code	Title	Applicability
BCA	The Building Code of Australia	●
AS NZS 1170.1-2002	Structural Design Actions – Permanent, imposed and other actions	●
AS 1288-2006	Glass in Buildings. Selection and installation.	●
AS NZS 1554.1-2004	Structural steel welding - Welding of steel structures	●
AS 1554.6-1994	Welding stainless steels for structural purposes	●
AS NZS 4586-2004	Slip resistance classification of new pedestrian surface materials	○
AS 1428.1-2001	Design for access and mobility	●
AS 1657-1992	Fixed platforms, walkways, stairways & ladders. Design, construction and installation	●

## design note

**For all commercial applications, it is important that sufficient space for the stairwell cavity be allowed to satisfy Australian Standards and BCA requirements.**

The footprint is primarily driven by the floor to floor rise, as well as the staircase configuration chosen. However, stringer and balustrade style design may increase the amount of space required. Allowing too small a cavity can restrict the design options of the staircase. Also, points at where the staircase interacts with other structures are best addressed early in the design cycle.

Consultation with Arden early on will help ensure that these design issues can be addressed in a cost-effective manner.



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