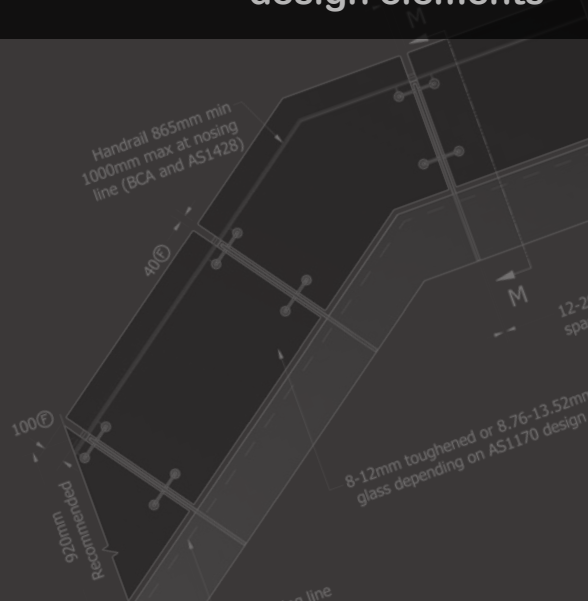




design elements

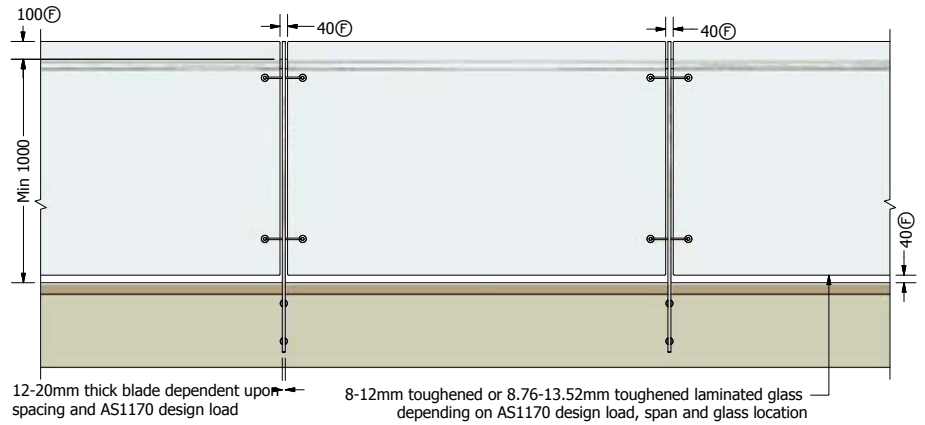
W4



## design

The W4 stanchions are an implementation of a toughened glass balustrade solution incorporating the A50D or A38D Arden system patch fittings on horizontal outriggers. Either through-glass integrated patch-fitting/handrail mount assemblies or a direct stanchion handrail mounting method may be specified. With a variety of possible blade profile dimensions, and a range of flexible stanchion fixing methods, the W4 represents a complete commercial balustrade solution for high design loads in virtually any application. The blades and horizontal patch-fitting off-stands may be specified to be either stainless steel or powder-coated mild steel.

On staircase balustrade, W4 stanchions may be designed to be either vertical or perpendicular to the nosing line. In the case of vertical blades on a staircase, the relative height of the four patch fitting wings is offset, so that the patch fittings rise with the nosing line. In either case, the interactions of angle and line, present a strikingly architectural impression.



1



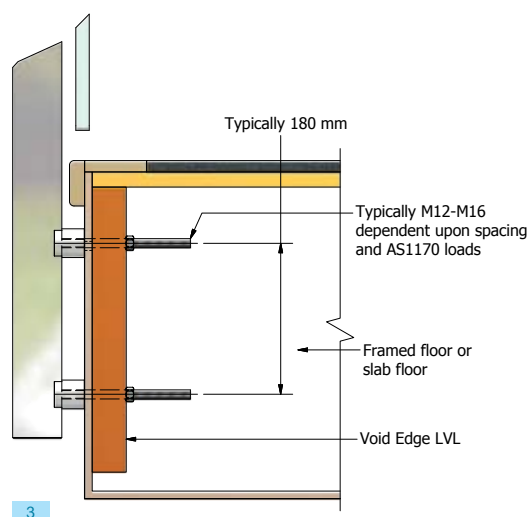
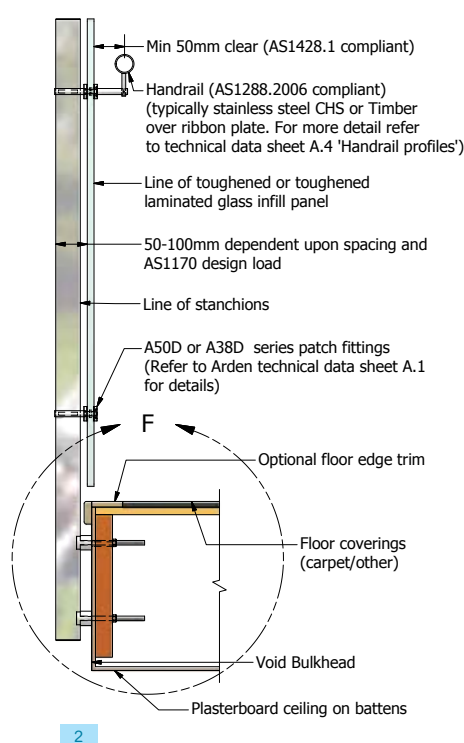
ⓔ indicated on dimensions denotes a nominal dimension that typically varies according to specific application, engineering requirements or client preferences.



Other alternatives for the architect or designer utilising the W4 system include varying the relative height of the top/ base of handrail, stanchion, and glass lines.

Face-mounted blades are considered by many to have greater architectural appeal, but the floor mounted version is also extremely effective.

The arrangement of the handrail and glass on opposing sides of the stanchion is another possible configuration of the W4.



**Figure 1.** Void edge balustrade front elevation. Face-fixed blade stanchions with outriggers and stainless steel A50D or A38D series patch fittings. Glass panels mounted on the void-side of the stanchion and handrail supported by central flatbar outrigger offstand.

**Figure 2.** W4 blade stanchion side elevation. Glass panels mounted on the void-side of the stanchion and handrail supported by central flatbar outrigger offstand. The relative upper and lower extents of stanchion and glass panel can be modified to achieve design intent.

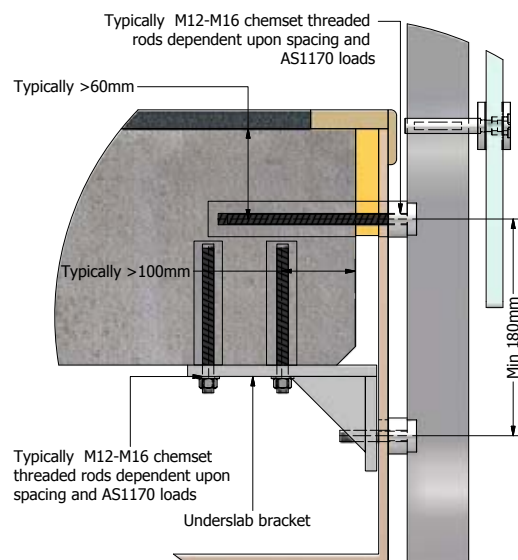
**Figure 3.** Timber or LVL floor fixing detail. Slotted cylindrical stand-off stanchion connections fulfil a structural role and achieve a satisfactory geometric design detail.

## technical

Please refer to the A.1 A50 / A38 Arden system 'A' patch fittings and clasps brochure for details of the patch fittings used in the W4. The specification of either A50D or A38D will largely depend on the required design loads. Likewise, the selection of blade profile (60x12 / 65x16 / 75x20 are typical) will depend on engineering requirements, as well as visual considerations.

After detailing, W4 stanchions are welded in-factory before on-site installation. Where applicable, chemset fixings are generally preferred. Where this is not possible, a range of standard structural fixing types are possible.

Minimal 8mm toughened glass infill panels with polished edges and tipped or rounded corners are used. Typically 38.1 diameter stainless steel handrails are used. However, a wide range of handrails, including timber, can also be used. The stanchion carries the potential loads and therefore the glass is rated as infill only.



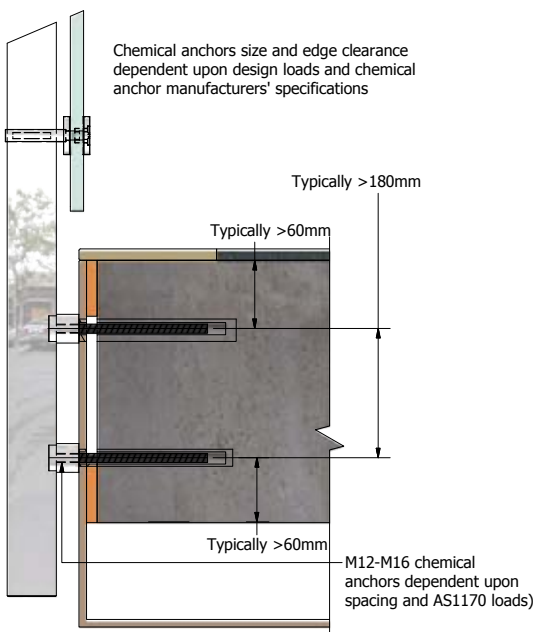


**Figure 4.** Thin concrete fixing detail. Underslab fixing achieves structural design loads and appropriate fixing spacing on a limited structural face. Slotted cylindrical stand-off stanchion connections fulfill a structural role and achieve a satisfactory geometric design detail. Glasses are in the opposite handrail-side of the stanchion, allowing glass to hang.

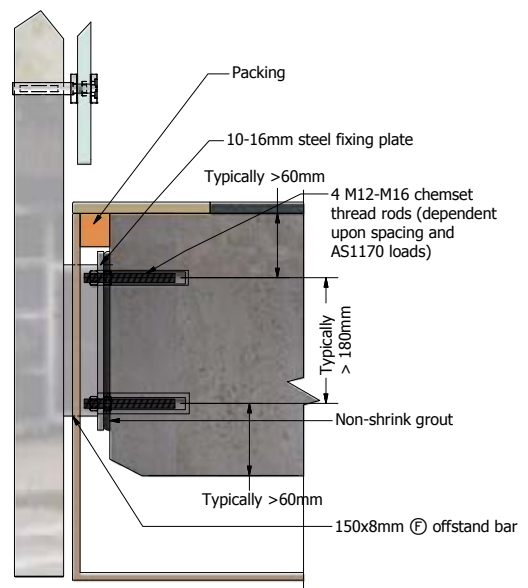
**Figure 5.** Thick concrete fixing detail. Slotted cylindrical stand-off stanchion connections fulfill a structural role and achieve a satisfactory geometric design detail. Glass panels mounted on the handrail-side of the stanchion and handrail supported by through-glass patch fittings.

**Figure 6.** Thick concrete fixing detail. Face-fixed plate assembly for concrete with depths exceeding 250mm.

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

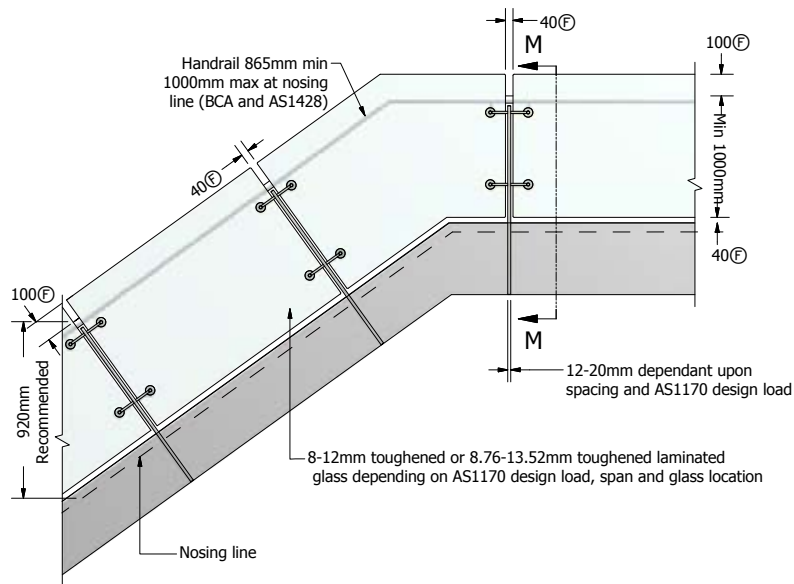


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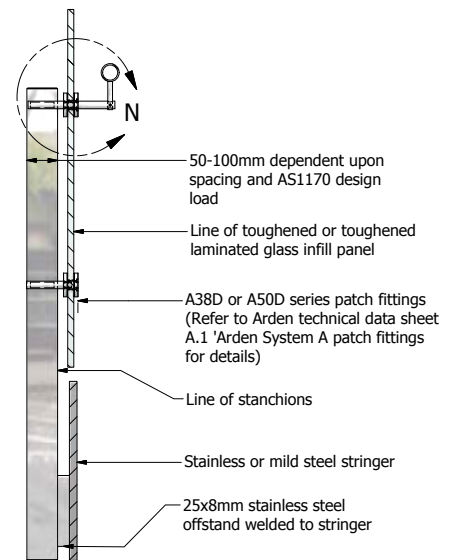


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**Figure 7.** W4 balustrade on cranking plate steel stringer: side elevation. Perpendicular stanchion configuration is shown. An alternative design configuration is to use vertical stanchions on the raking panels. The top and bottom of the stanchion relative to the top of glass and bottom of stringer may be varied to suit design intent.

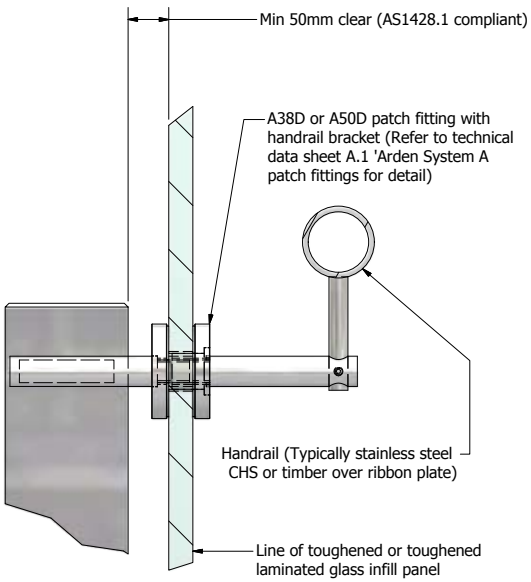
**Figure 8.** W4 balustrade on plate steel stringer: vertical section. The line of glass finishes approximately in-line with the line of the stringer.

**Figure 9.** W4 stanchion handrail and glass fixing detail.

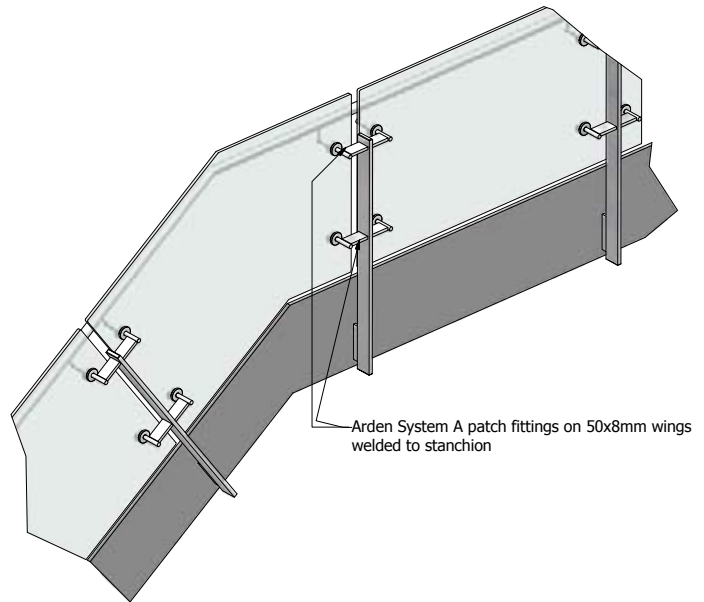
**Figure 10.** W4 balustrade on cranking plate steel stringer: isometric overview.



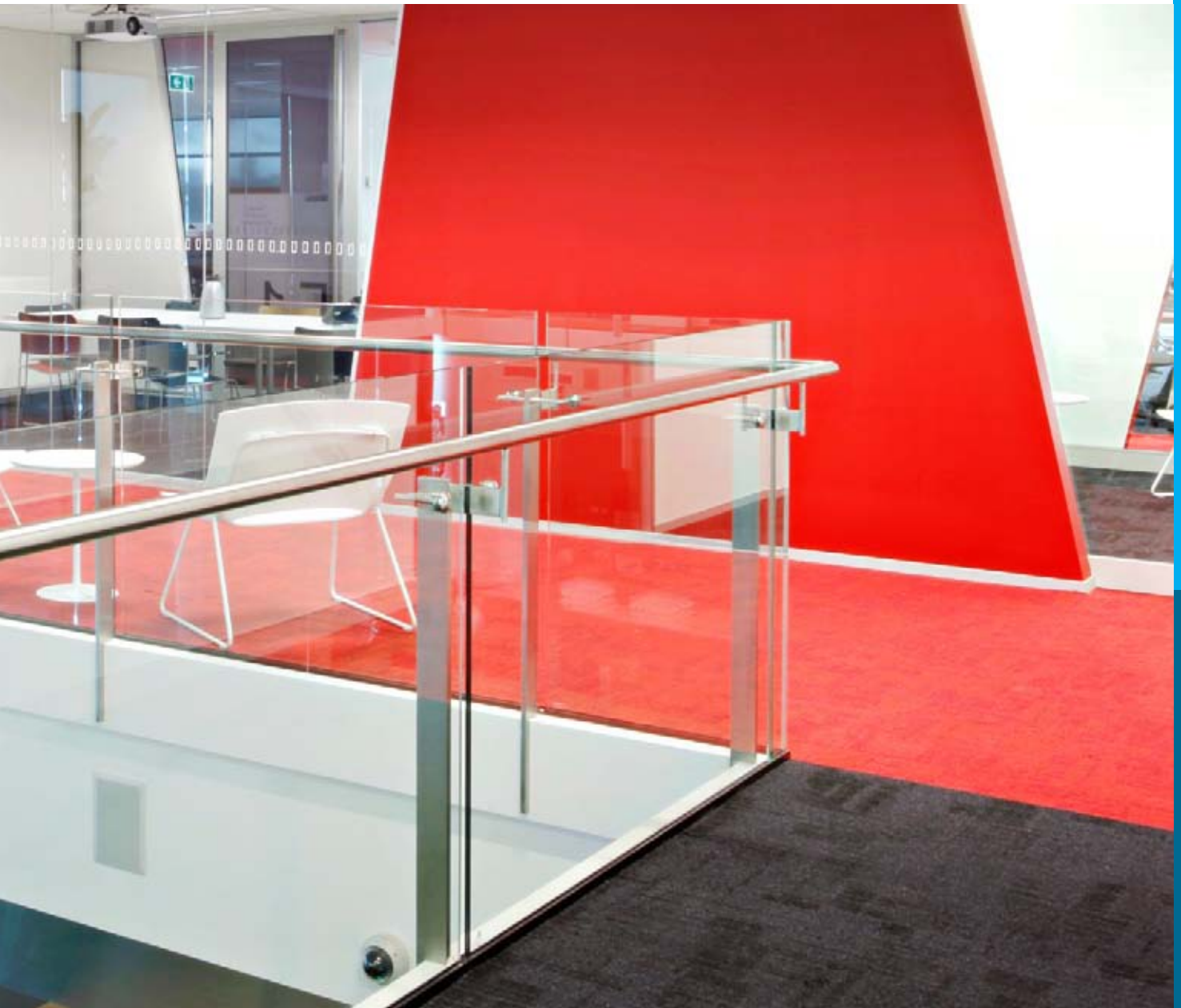
Ⓢ indicated on dimensions denotes a nominal dimension that typically varies according to specific application, engineering requirements or client preferences.

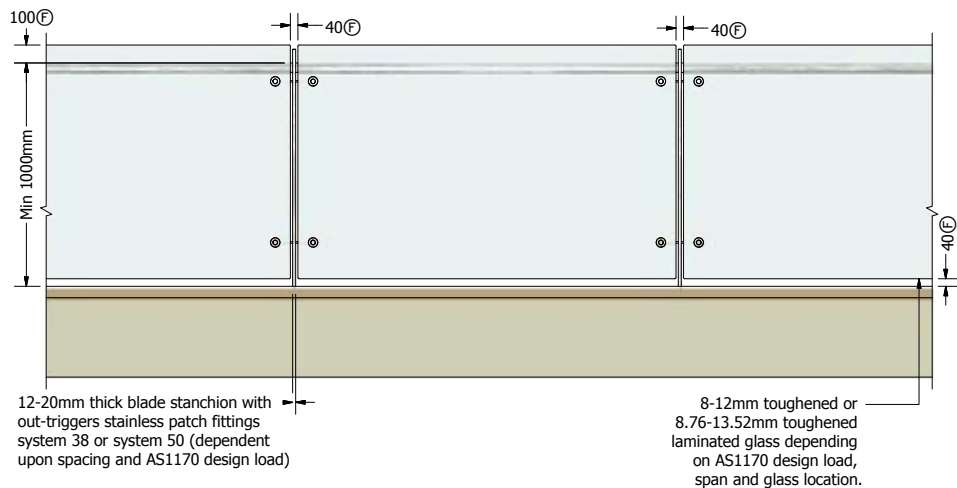


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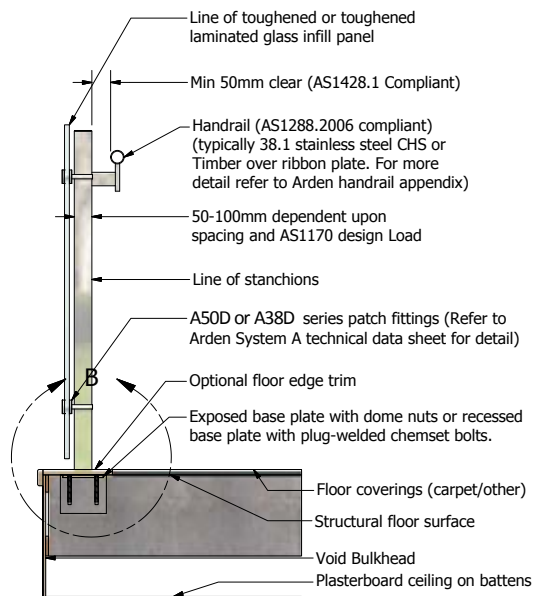
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**Figure 11.** Void edge balustrade front elevation. Top mounted floor-fixed blade stanchion with outriggers and stainless steel A50D or A38D series patch fittings. This W4 format provides an alternative design to that shown in (1).

**Figure 12.** W4 blade stanchion side elevation. Glass panels mounted on the opposite handrail-side of the stanchion.

**Figure 13.** Floor-fixing detail with hidden base connection plate.

**Figure 14.** Floor-fixing detail with visual base connection plate.



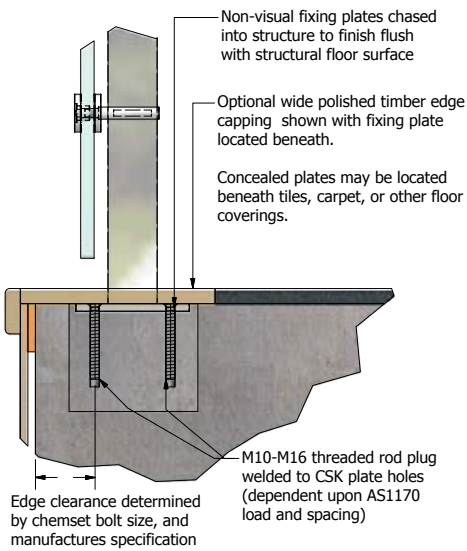
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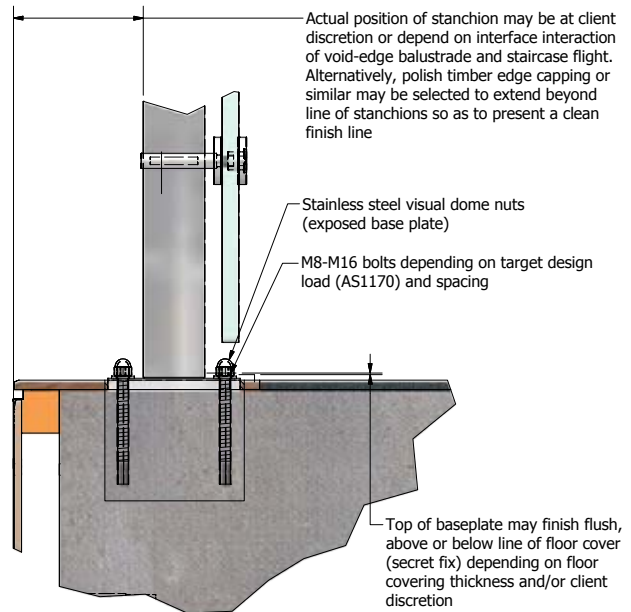
ⓔ indicated on dimensions denotes a nominal dimension that typically varies according to specific application, engineering requirements or client preferences.







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## 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

- These tables are to be used as a general design guide only.
- Individual project requirements will dictate final glass specification and thickness.
- 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.



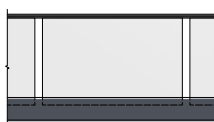
## design standards for glass panels

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.

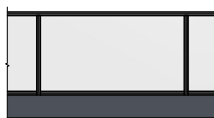
Of particular importance in the initial design stage, it is critical to maintain an awareness of the designation of glass panels as structural or infill, and the classification of handrail as load-supporting, non-load-supporting, or interlinking. Combined with other considerations (e.g. whether or not 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.

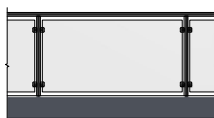
## glass balustrade styles



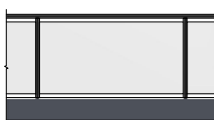
**Cantilevered structural.** Glass panels supporting an interlinking handrail cantilever from an appropriate floor fixing.



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



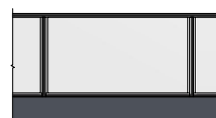
**Two-edge clasp.** Glass panels are supported on two opposite edges by clasp-style mechanical fixings. The bearing of point loads influence the required grade of glass.



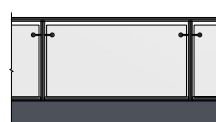
**Semi-framed vertical channel.** Glass panels are fixed via proprietary or custom channel system on each side.



**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 W4 system, this table shows compliance with relevant codes and standards.

#### Key

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

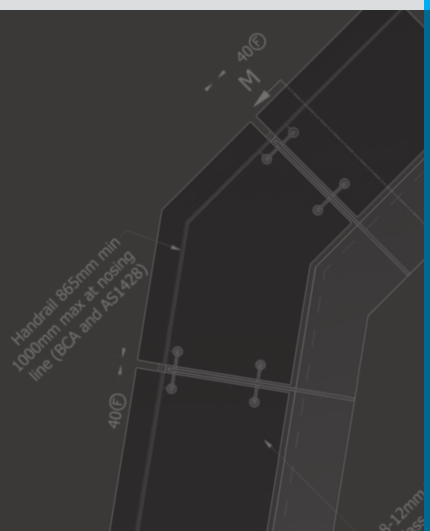
Code	Title	Applicability
BCA	The Building Code of Australia	●
AS NZS 1170.1-2002	Structural Design Actions – Permanent, imposed and other actions	●
AS 1288-2006	Glass in Buildings. Selection and installation.	●
AS NZS 1554.1-2004	Structural steel welding - Welding of steel structures	●
AS 1554.6-1994	Welding stainless steels for structural purposes	●
AS NZS 4586-2004	Slip resistance classification of new pedestrian surface materials	○
AS 1428.1-2009	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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