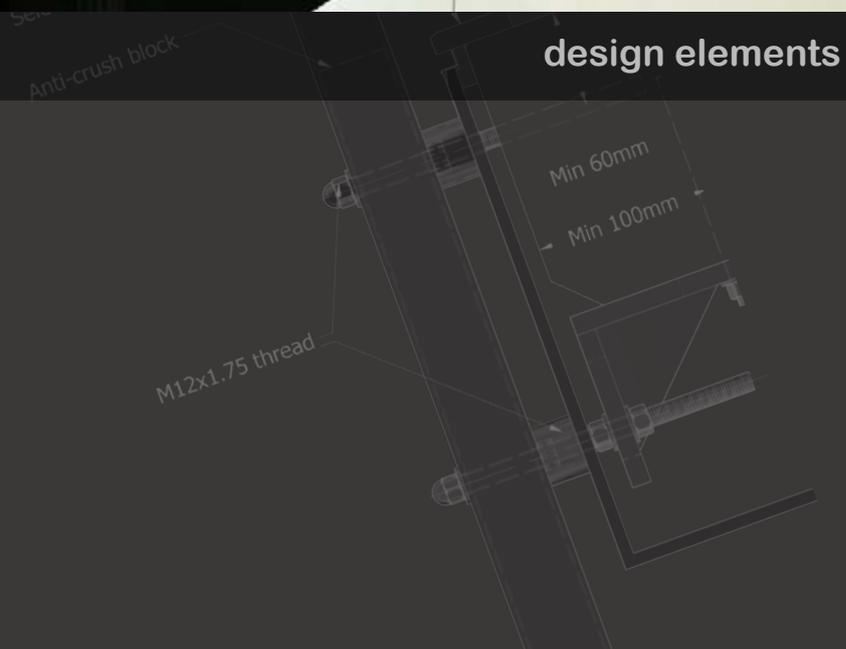




Stainless SHS stanchions with glass infill and offset handrail



C4

## design

Stainless steel stanchions and glass infill combine to create a versatile balustrade design, presenting well in a variety of interior contexts, and combining effectively with other materials, such as timber and stone. The Arden C4 balustrade system offers the flexibility and simplicity to complement almost any staircase and balustrade configuration, resulting in a clean, crisp and modern finish.

Because of the inherent flexibility and strength of the materials, there are few limitations for architects and designers wishing to realise dramatic and dynamic infill designs. Alternatively, in situations where the balustrade should retreat visually, so as not to distract from other design elements, the neutral textures of the C4 design can also satisfy this role.

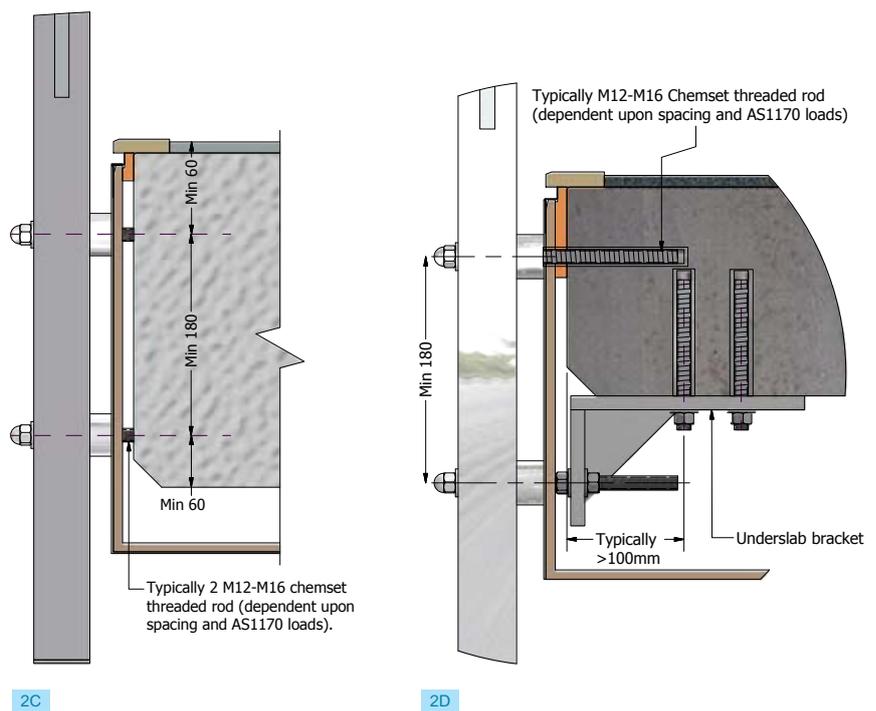
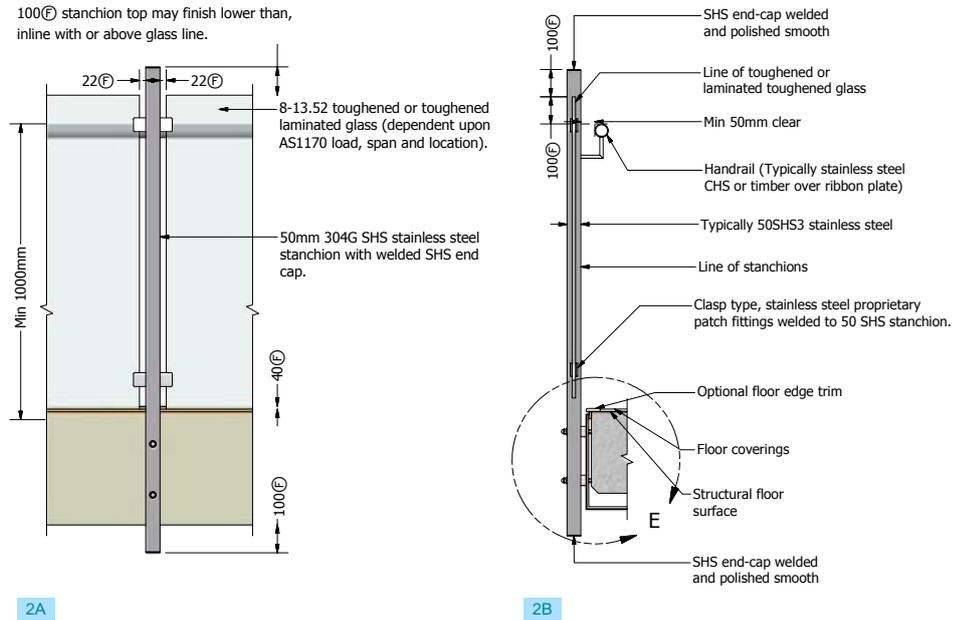
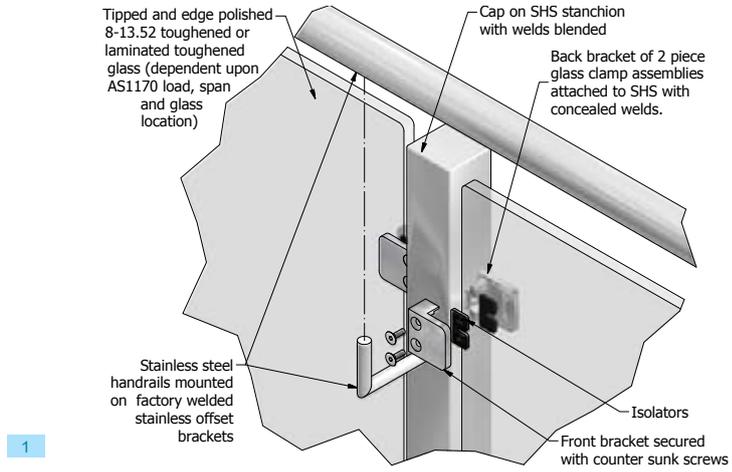


Figure 1. Glass clamp fixing and assembly details.

Figure 2. Face fixed void-edge balustrade stanchion for structural floor.

2A. Front elevation

2B. Side elevation

2C. Detail C: Typical fixing detail. Fixing to structural concrete floors with depths exceeding 250mm

2D. Typical fixing detail for structural concrete floors with depths less than 250mm using under-slab bracket

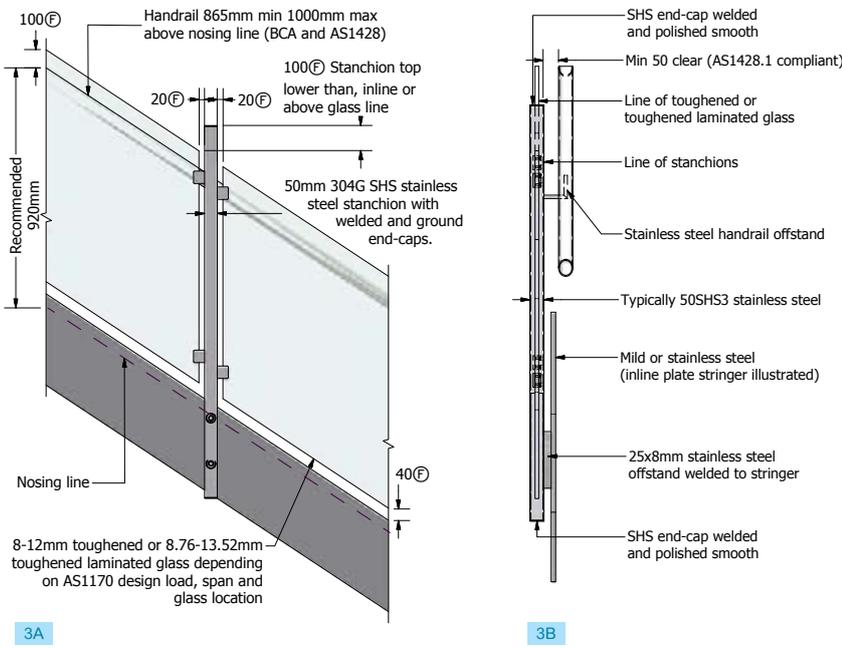


Figure 3. Staircase stringer fixing method utilising 25x8mm stainless steel offstand bar (welded to stringer), suitable for most metal stringer types.

3A. Staircase front elevation

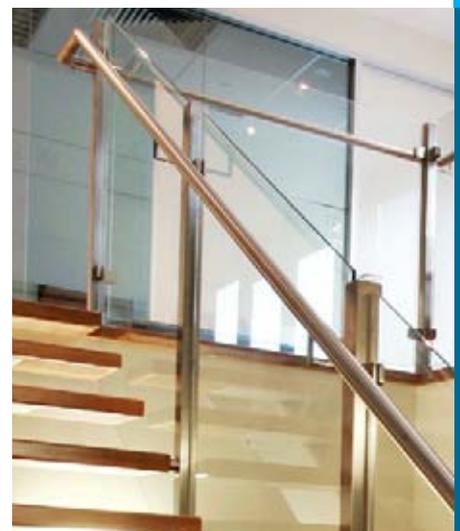
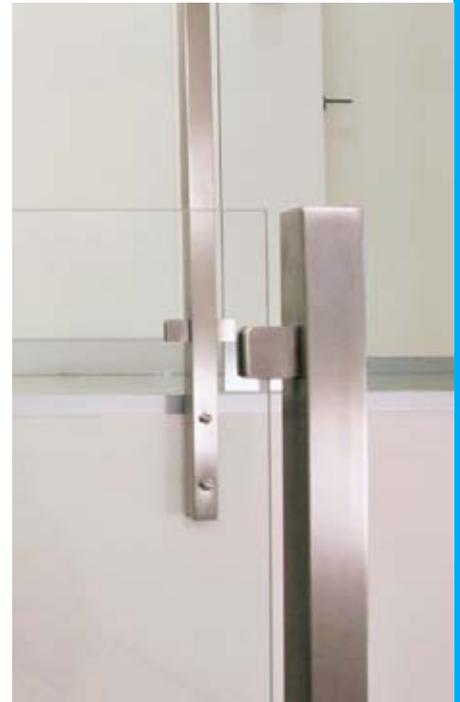
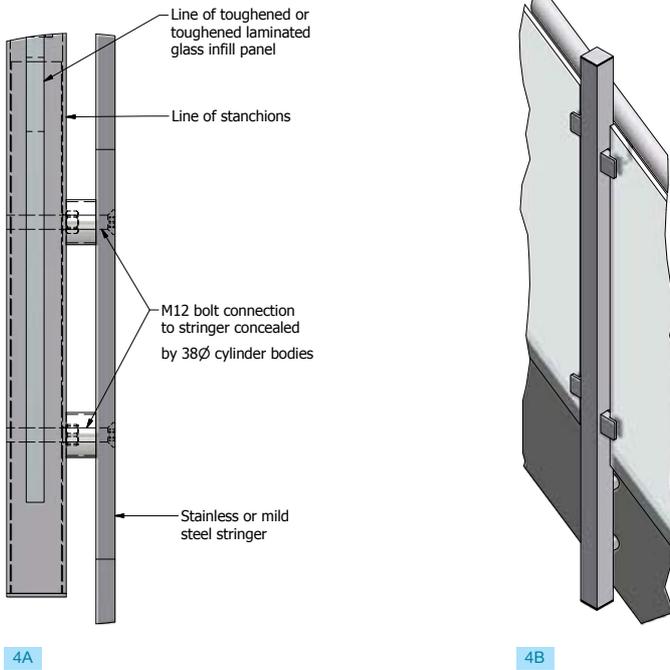
3B. Staircase side elevation

Figure 4. Bolt/sleeve method, appropriate for a variety of stringer types. In each case, M12 bolts are typically used. Face-fixed staircase flight stanchion fixed to stringer with CSK bolts or plug-welded thread with SS CHS sleeves.

4A. Front elevation

4B. Isometric overview

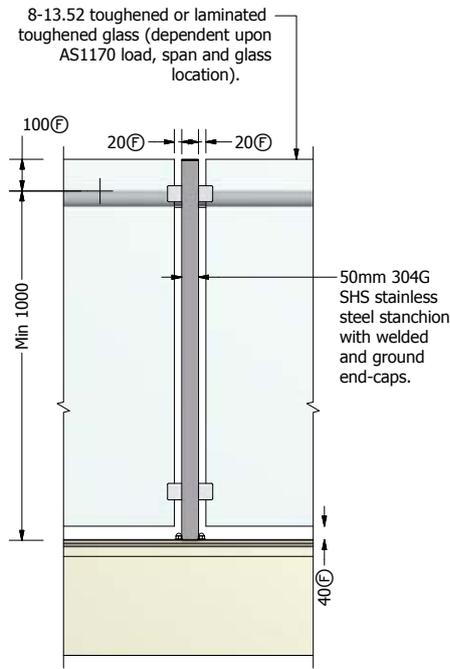
Ⓢ indicated on dimensions denotes a nominal dimension that typically varies according to specific application, engineering requirements or client preferences.



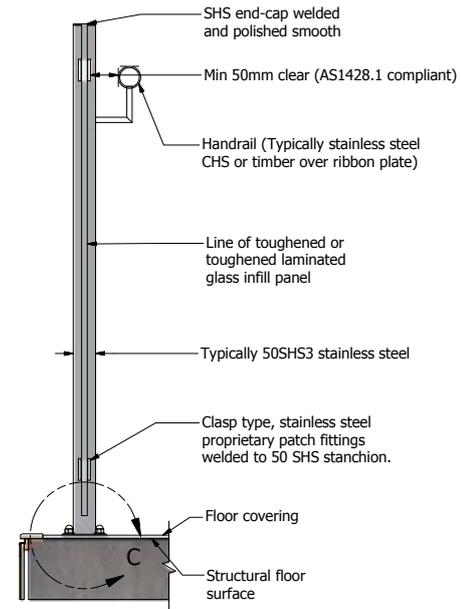
**technical**

Typically 50.8x50.8x3mm 304 stainless steel SHS Stanchions are specified to satisfy C3 stair balustrade loadings. Engineered high performance glass clamps are welded in factory to the stanchions. Minimum 8mm toughened monolithic glass infill panels with polished edges and tipped or rounded corners.

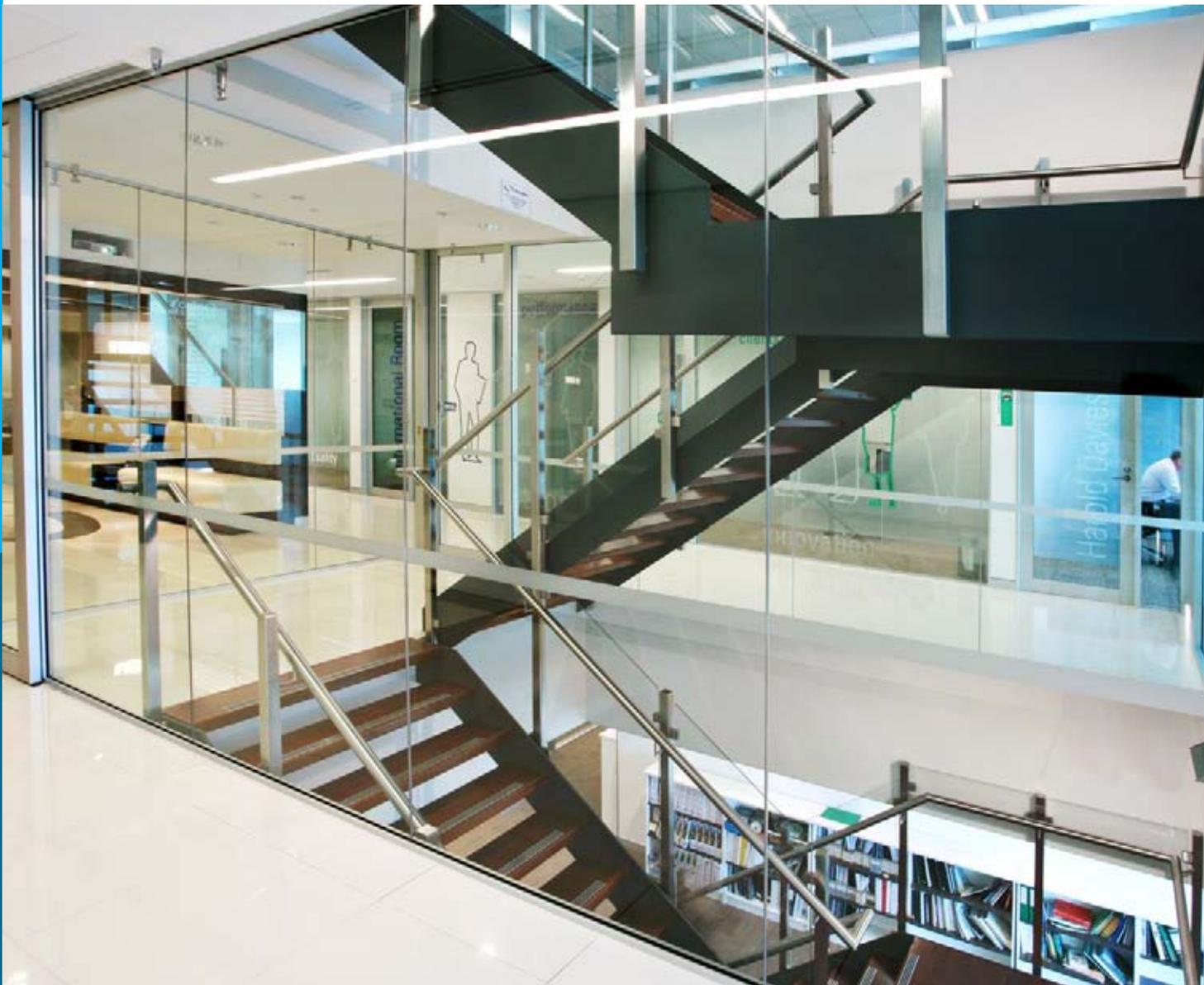
Typically 38.1 diameter stainless steel handrails mounted on factory welded stainless offset brackets. A wide range of handrails, including timber, can also be used. The stanchion carries the potential loads and therefore the glass is rated as infill only.

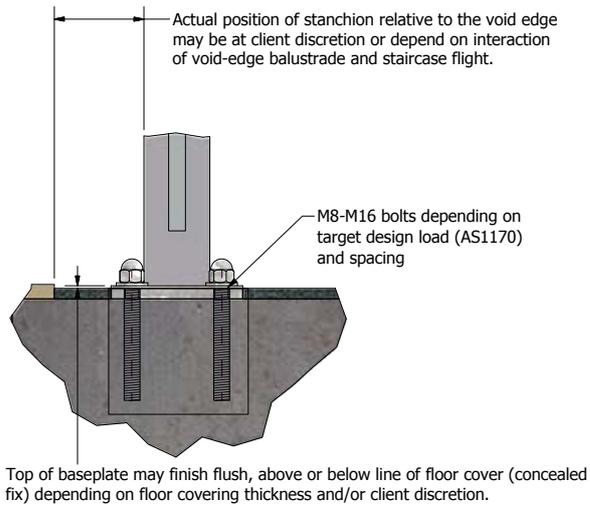


5A



5B





5C

Figure 5. Floor-fixed stanchions with visual baseplate.

5A. Front elevation

5B. Side elevation

5C. Detail M: Fixing detail

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

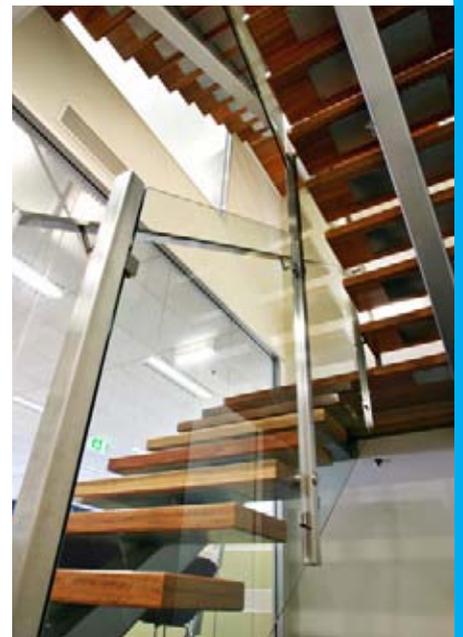
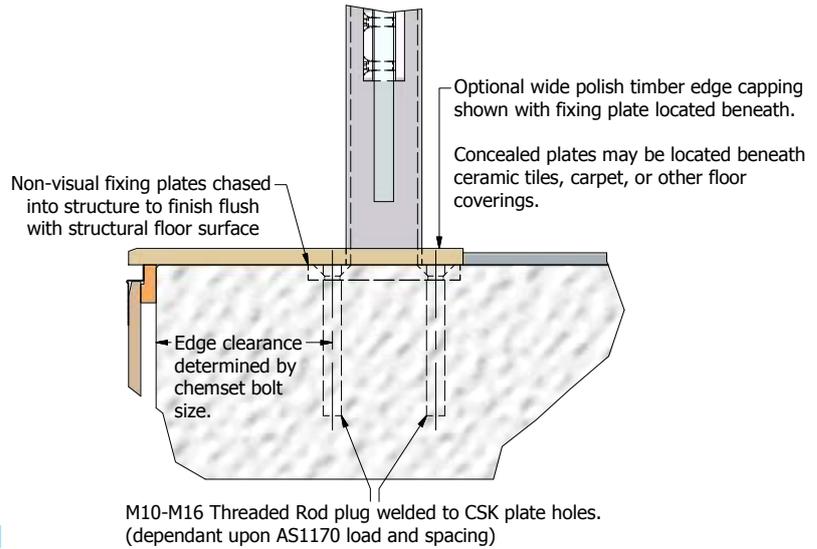


Figure 6. An alternative concealed-baseplate floor fixing method, which is preferred in most modern office designs. A concealed baseplate is also more appropriate when higher design loads are specified.

6A. Floor-fixed stanchion with concealed baseplate: Fixing detail. As this baseplate is concealed its size can increase without affecting visual impact.



## 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.



**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.



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



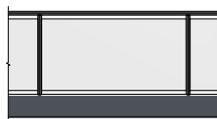
**Semi-framed lateral channel.** Glass panels are fixed via proprietary or custom channel system on the bottom rail and underside of handrail.



**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.



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



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



## 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.

## 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 C4 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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