Steel SHS stanchions supporting glass panel infill
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**design**

Stainless steel SHS stanchions support glass infill panels on through-glass patch-fittings in this design. Off-stand cylindrical bodies may be extended so as to allow the glass to overhang the edge of the void or staircase.

The neutral tones of stainless steel and glass combine easily with a variety of other materials, such as timber or stone. Handrail (50.8mm CHS typical) is generally mounted vertically on a mounting pin above the stanchion, so that the handrail and stanchion centrelines coincide. The Arden C8 balustrade design offers the flexibility to complement many types of staircase or balustrade configuration, resulting in a clean, crisp and modern finish.

Glass and stainless steel provide strength and durability, ensuring that there are few limitations for architects and designers wishing to realise dramatic and dynamic infill designs.

The high transparency and the neutral textures of the C8 design can also allow the balustrade to retreat visually, if necessary.
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Figure 1. Face-fixed C8 balustrade with handrail mounted on through-glass patch fittings.

1A. Front elevation
1B. Side elevation
1C. Through-glass handrail mount detail

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

The C8 balustrade style is essentially a stanchion based balustrade system with infill glass supported off patch fittings mounted on the stanchions. The primary balustrade loads are carried by the handrail directly to the stanchions, and not via the glass, which reduces the design criteria of the glass to effectively that of “infill glass” as opposed to structural glass.

In terms of design then, the size and spacing of the stanchions are determined to suit the applicable balustrade load as defined by AS1170.1-2002 (Structural design actions), which defines the applicable loads for particular applications. The infill glass loads are also defined in the Australian Standard for the particular application and the sizing of the infill glass is then provided by AS1288-2006 (Glass in buildings, selection and installation).

It should be noted then that the final design in terms of stanchion spacing may be determined by issues in respect to the handrail loads as well as the span of the infill glass.

The C8 balustrade style can have a number of other variations that can be dependent upon the application environment, where the base materials may determine the style of stanchion fixing (e.g. void edge face fix as opposed to top fix) and may then also determine line of the stanchions relative to the void edge. Dependent upon preferences then, considerations such as the length of patch-fitting offstand may become a factor.
1D. Fixing to concrete via twin M12-M16 chemical anchors

1E. Heavy-duty fixing to concrete via concealed fixing plate and four chemical anchors

1F. Fixing to thin concrete slabs via under-slab bracket

1G. Bolted connection to LVL with cylindrical off-stand bodies

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Figure 2. Face-fixed C8 balustrade section with handrail mounted on through-glass patch fittings positioned on raking stringer.

2A. Side elevation
2B. Isometric

Figure 3. Corner detail of level section of C8 balustrade using radiused glass corners and bottom of glass terminating with clearance to floor coverings

Figure 4. Elevation of stair with landing utilizing floor-fixed C8 balustrade with tipped-corner glass panels over-hanging the treads. The through-glass patch-fittings allow the glass to enclose the treads and landings, creating a unique impression.

Figure 5. Front elevation of stair illustrating the optional extended patch-fitting bodies.

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- General:
  - 304G SHS stainless steel stanchions with welded and ground end-caps.
  - Specially designed to be placed at corners.

- Dimensions:
  - Overall structural rise: Min. 1000
  - Actual offset at client discretion
  - 50mm 304G SHS stainless steel stanchion with welded and ground end-caps.
  - Overall going determined by tread going:
    - Min 1000
    - 250mm nominal tread going

- Materials:
  - 12-15mm toughened or 12.76-17.52 toughened laminated glass depending on AS1170 design load, span and glass location

- Architectural Features:
  - Interlinking handrail (AS1288.2006 compliant)
    - Typically stainless steel CHS or timber over ribbon plate
  - Extended A50D or A38D Patch fitting (Refer to A50D or A38D Arden System A patch fittings for detail)

- Line of toughened or laminated toughened glass

- Concrete tread

- Min 50 clear (AS1428.1 Compliant)
Steel SHS stanchions supporting glass panel infill

Figure 6. Interior corner section illustrating the interaction of glass and handrail lines between level and raking balustrade sections.

6A. Isometric
6B. Plan. At corners, one panel carries through to the rear-face of the other panel, setting the glass gap to be on one side or the other

Figure 7. Level balustrade section.
7A. Plan view
7B. Isometric

Figure 8. Exterior corner section: isometric view

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

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Concrete tread

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Stainless steel CHS handrail welded at top of the handrail support

Handrail support welded at top of the SHS stanchion

SHS end-cap welded and polished smooth

50.8mm 304G SHS stainless steel stanchion with welded and ground end-caps. Specially designed to be placed at corners.

Extended A50D or A38D Patch fitting (Refer to A50D or A38D Arden System A patch fittings for detail)

12-15mm toughened or 12.76-17.52 toughened laminated glass depending on AS1170 design load, span and glass location

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10mm (typical) base connection plate

5mm Ø stainless steel covering plate

12-15mm toughened or 12.76-17.52 toughened laminated glass depending on AS1170 design load, span and glass location

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12-15mm toughened or 12.76-17.52 toughened laminated glass depending on AS1170 design load, span and glass location

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10mm (typical) base connection plate

5mm Ø stainless steel cover plate
Steel SHS stanchions supporting glass panel infill

- Stainless steel SHS handrail
- Handrail support welded at top of the SHS stanchion
- SHS end-cap welded and polished smooth
- 50.8mm 304G SHS stainless steel stanchion with welded and ground end-caps.

- Extended A50D or A38D Patch fitting
- 12-15mm toughened or 12.76-17.52 toughened laminated glass
- 50.8mm 304G SHS stainless steel stanchion with welded and ground end-caps.

- 304G SHS stainless steel stanchion with welded and ground end-caps.
- 12-15mm toughened or 12.76-17.52 toughened laminated glass
# inﬁll glass panels

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

<table>
<thead>
<tr>
<th>Design load</th>
<th>Toughened monolithic safety glass (mm)</th>
<th>Toughened laminated safety glass (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Domestic/Residential</td>
<td>1640</td>
<td>2000</td>
</tr>
<tr>
<td>Offices/Commercial stairs</td>
<td>1070</td>
<td>1650</td>
</tr>
<tr>
<td>Retail/Restaurant</td>
<td>1140</td>
<td>1430</td>
</tr>
<tr>
<td>C5 high loads</td>
<td>Special glass engineering: designed as required</td>
<td></td>
</tr>
</tbody>
</table>

**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.

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## 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.

- **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.

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

- **Hybrid.** Glass panels are provided with a combination of the above methods so as to comply with safety requirements.
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 C8 system, this table shows compliance with relevant codes and standards.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Applicability</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCA</td>
<td>The Building Code of Australia</td>
<td>✔️</td>
</tr>
<tr>
<td>AS NZS 1170.1-2002</td>
<td>Structural Design Actions – Permanent, imposed and other actions</td>
<td>✔️</td>
</tr>
<tr>
<td>AS NZS 1554.1-2004</td>
<td>Structural steel welding - Welding of steel structures</td>
<td>✔️</td>
</tr>
<tr>
<td>AS 1554.6-1994</td>
<td>Welding stainless steels for structural purposes</td>
<td>✔️</td>
</tr>
<tr>
<td>AS NZS 4586-2004</td>
<td>Slip resistance classification of new pedestrian surface materials</td>
<td>✔️</td>
</tr>
<tr>
<td>AS 1428.1-2009</td>
<td>Design for access and mobility</td>
<td>✔️</td>
</tr>
</tbody>
</table>

Key
- 🍀 full compliance with the code
- 🔴 not applicable to this element

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.