



design elements

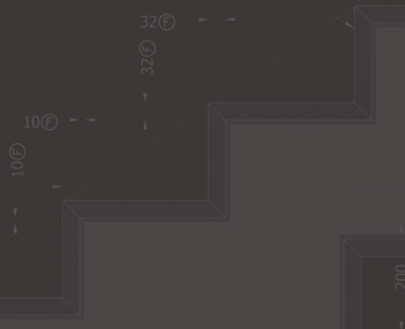
Z1



180 nominal rise
270 nominal going

Applied nosing to sides of treads and risers

Nosing line



design

At Arden, we believe that the zigzag steel stringer design is the basis for some of the strongest architectural statements that can be made with a feature staircase. This is because its visual impact is related to the essential functional property of a staircase, i.e. achieving an elevation through a sequence of horizontal and vertical steps. The steps therefore create a tension between these steps and the underlying diagonal slope line. Thus, design interest is created from the natural functional properties of the staircase element.

The Z1 structure is constructed from laser cut stainless or plate steel. The style may lend itself to either a lighter gauge open construction (typically in stainless), or a heavier style closed construction (typically ex. steel plate). In the included photos, examples are shown of each form. It should be noted that when lighter gauge stringers are selected in order to satisfy design requirements, consideration must be given to method and location of support that is provided to the stringer.

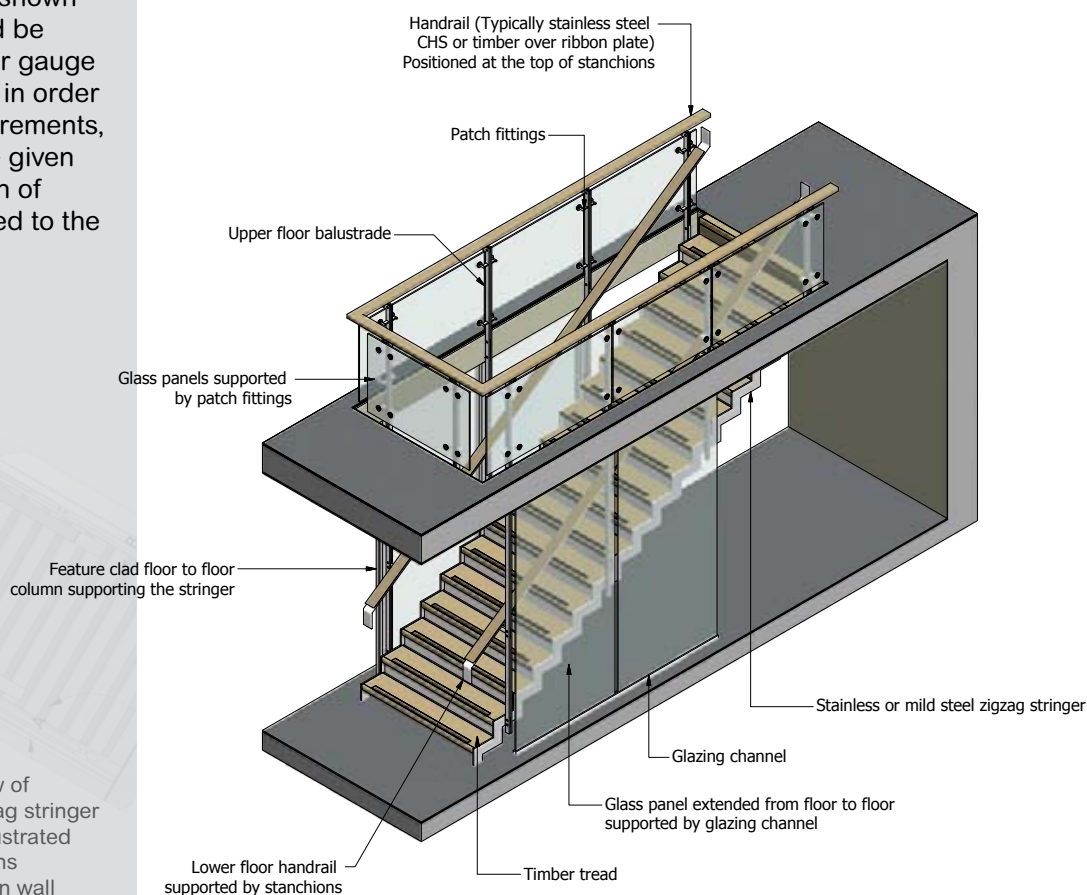
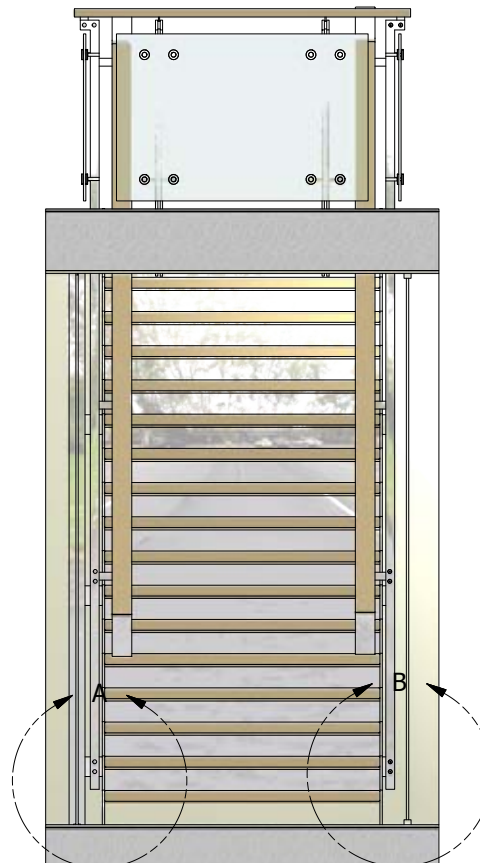
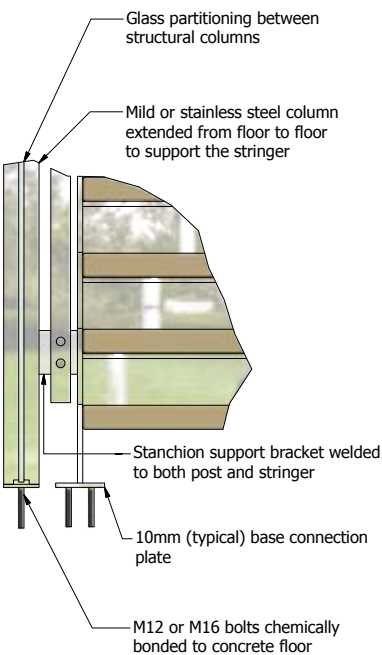


Figure 1. Isometric overview of staircase based on Z1 zigzag stringer construction. Balustrade illustrated (W4 winged blade stanchions transforming to glass curtain wall on lower floor) is just one effective balustrade combination with the Z1.



The Z1 zigzag stringer looks particularly good when contrasted with tread and riser assembly that also emphasises the stepped pattern. The stepped effect can be maximised when a stepped soffit is added that mirrors the stepped pattern of the treads, thus fully realising the zigzag concept.

Figure 2. Front elevation. Support and connection methods vary on the left and right hand side of the flight. The stringer is supported on the LHS by feature clad floor to ceiling columns. On the RHS, the stringers are suspended from the top floor balustrade.



technical

The width or depth of the stringer will vary according to span, width, and performance expectations. Narrower stringer widths will require further support by way of hangers or support columns which can be integrated into the support system.

Figure 3. Left side elevation. Because of the placement of treads, the nosing line of the staircase based on the Z1 stringer traces the outer corners of the zigzag pattern. This example shows how a light gauge stainless steel zigzag stringer works effectively with stainless steel columns, stanchions and handrail to create a complete staircase solution, both structurally and visually.

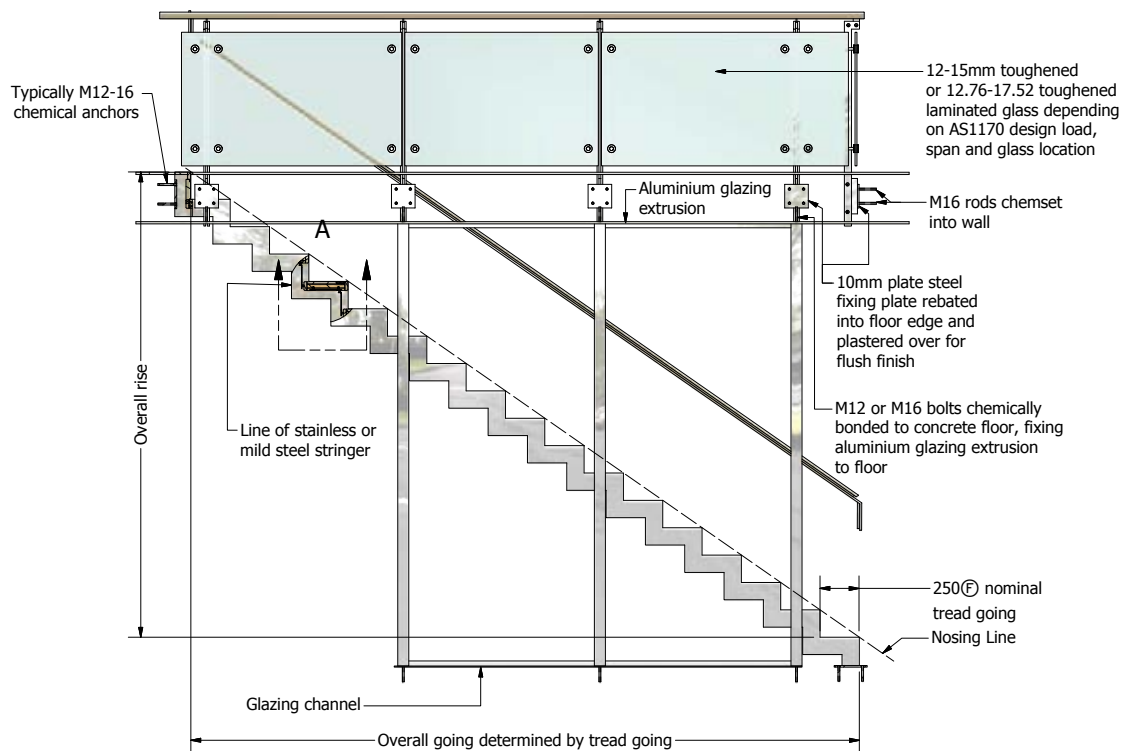
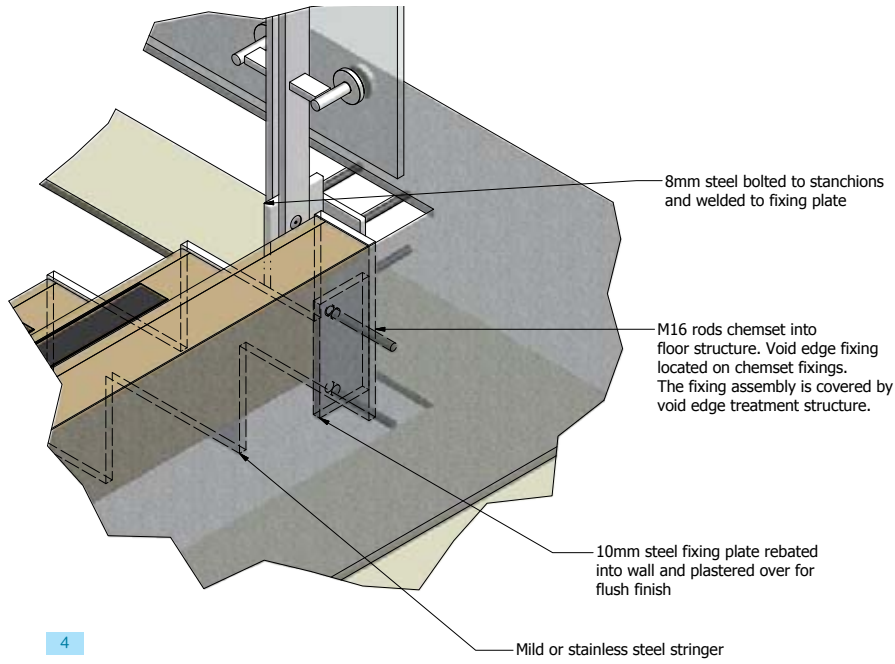


Figure 4. Typical top floor fixing detail. Fixing plates are welded to the inner side of each stringer and fixed to concrete floor. Fixing assembly concealed by top tread or bulkhead.



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

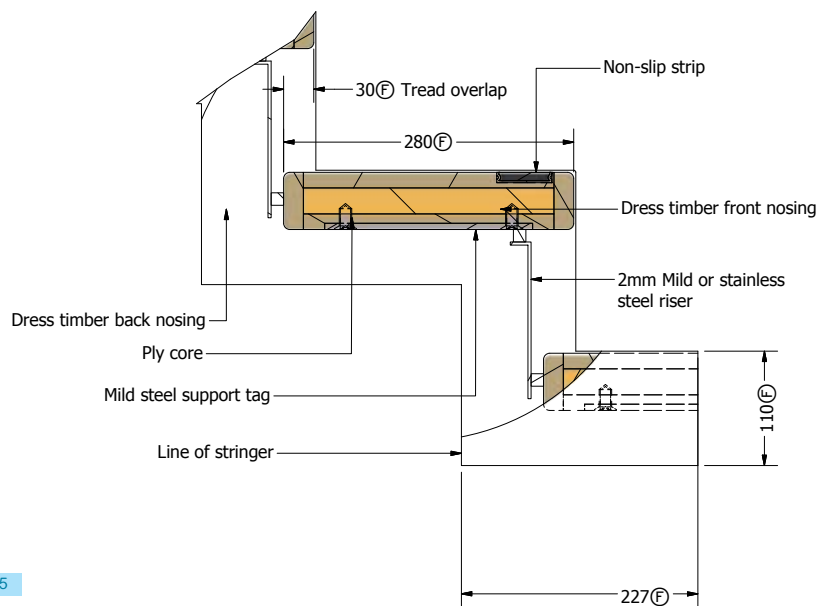


Figure 5. Typical tread and riser detail for Z1 stringer. Tags welded to the inside of each stringer support screw fixings to composite treads with anti-skid tread nosings. In commercial applications, some risers in the interests of modesty may be appropriate, and here a folded metal riser is shown.

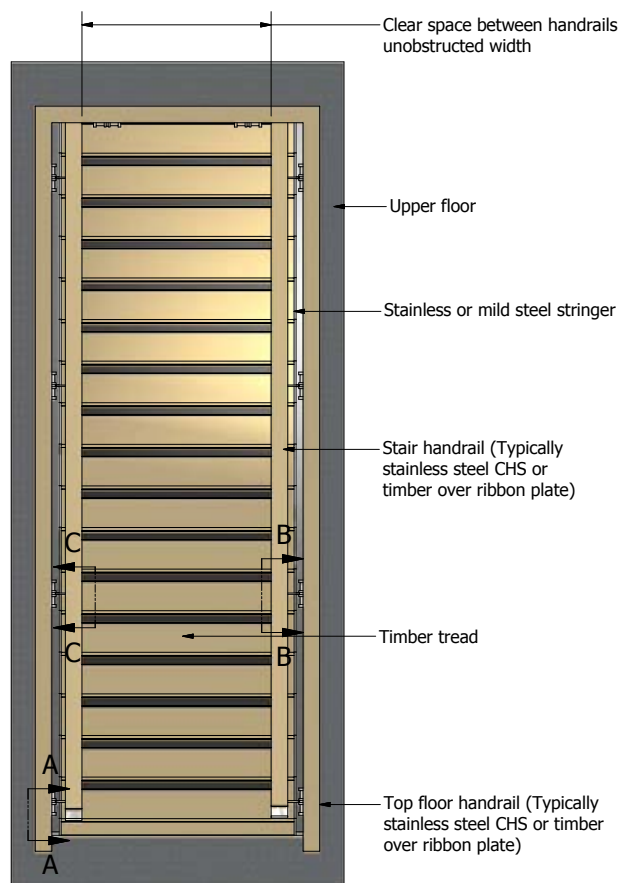
Exact dimensions of the Z1 stringer may be varied to suit variable spans and supporting arrangements. The current example uses several sources of support, allowing us to minimise the width dimension of the stringer and create a 'lighter' impression. In other contexts, a heavier specification may be necessary or visually desirable.

Figure 6. Plan view. With face-fixed stanchions supporting the handrail, the traversable width of the flight is maximised. In the design shown, a wide composite stainless steel and timber handrail is selected to enhance the design.

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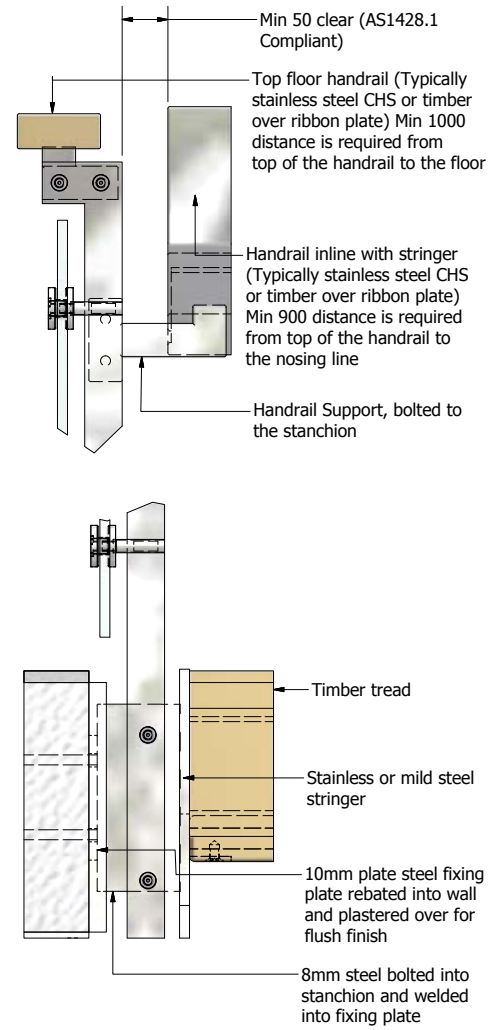
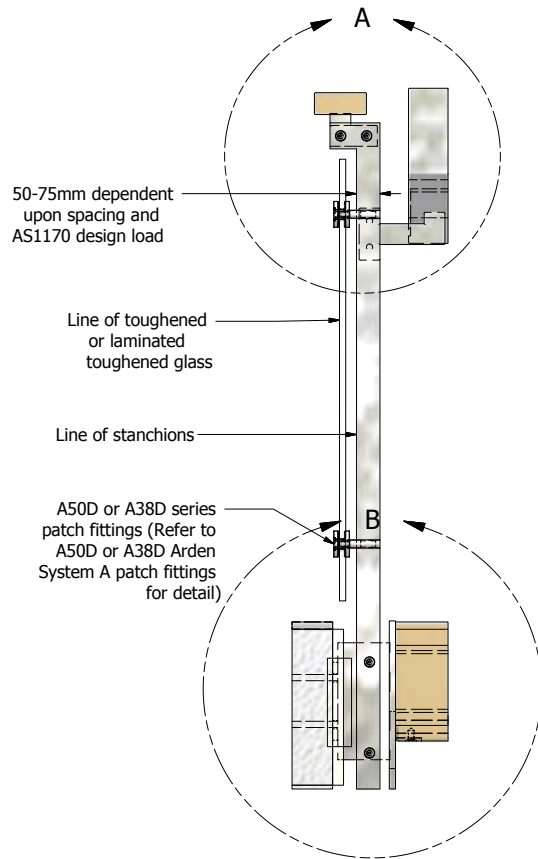
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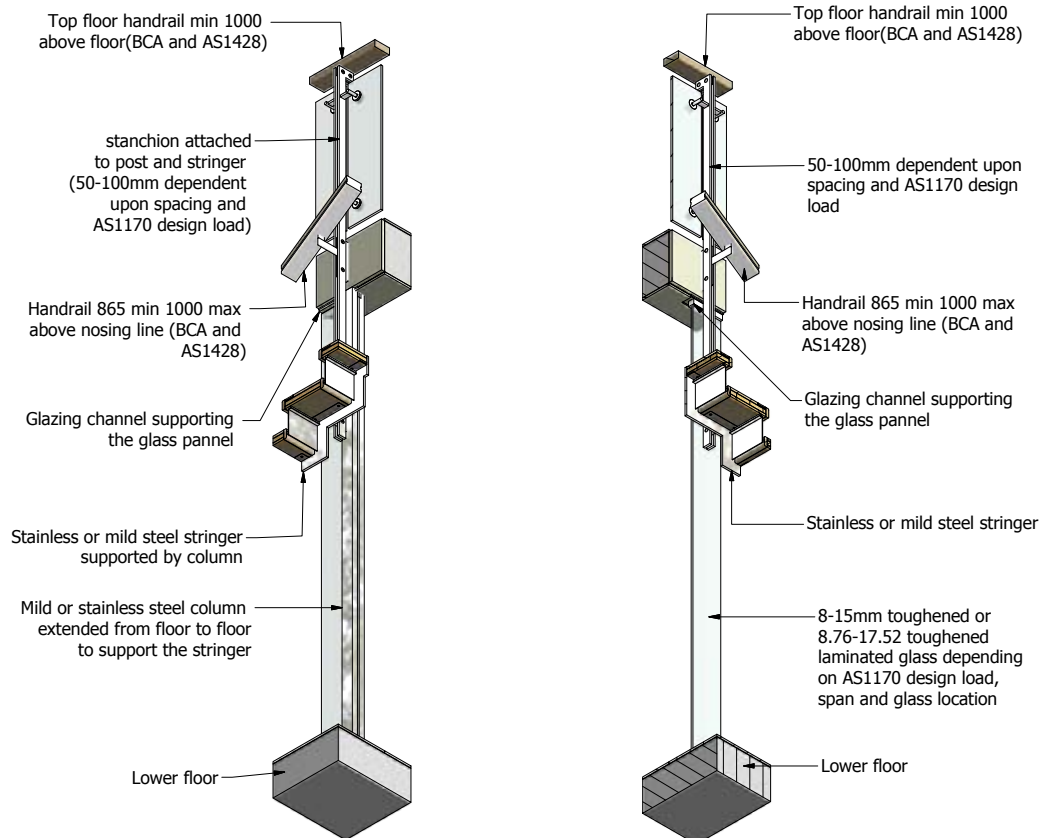






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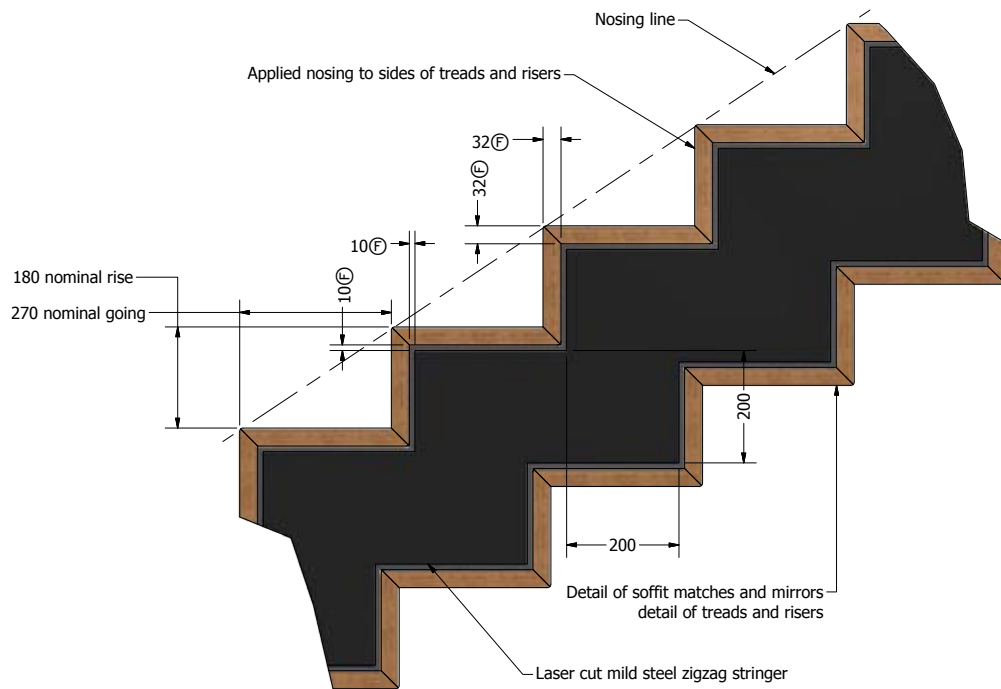
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Figure 7. Stanchion, handrail and balustrade fixing details. The stainless steel version of Z1 is often specified with handrail and stanchions, and the visual and structural interaction between these elements is critical.

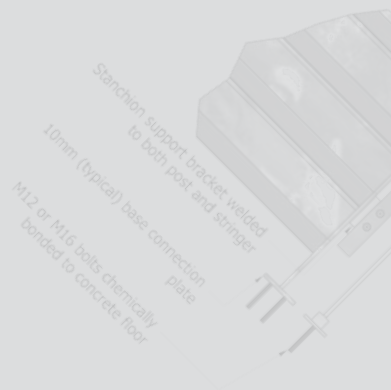
Figure 8. Comparison of support methods of the Z1. In the left hand diagram, the stringer is supported a floor to ceiling post, and is further connected to the upper floor balustrade stanchion fixing. On the right hand side diagram, the stringer is suspended by an elongated stanchion dropping from the upper floor.

Z1



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Figure 9. Zigzag plate steel stringer with tread and riser assembly, applied nosing to sides, and mirroring soffit detail on underneath. This variant of the PS2 makes the most emphasis of the stepped diagonal progression. When a glass balustrade is applied to this design, we encourage the client or designer to consider panels with stepped bottom edges, so that the zigzag theme is continued to the balustrade.



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compliance

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Key

- full compliance with the code
- ◐ can comply (see note for details)
- 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	◐ ¹
AS 1657-1992	Fixed platforms, walkways, stairways & ladders. Design, construction and installation	●

1. Must have opaque risers to comply with AS1428

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.

www.arden.net.au

phone (07) 3267 6100 | fax (07) 3267 6500 | email admin@arden.net.au

Office & factory: 46 Radley Street Virginia Qld 4014 Australia Postal address: PO Box 317 Virginia Qld 4014 Australia

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