Closed mono-stringer

M1
Almost a decade ago, Arden streamlined the domestic mono-stringer design for broad application in the Australian market, and with good reason this staircase format has become an industry standard. The MS1 evolves this basic structural technique to create a fully fledged commercial design. The intent of the MS1 is to create a proportionally significant and deceptively simple interior sculpture. Attention is drawn to the contrast in the snaking zigzag of warm polish timber and the linear sweep of the structural steel member, thus emphasising a simultaneous contrast in line and material.

By default, the MS1 incorporates a thick monolithic hardwood tread and riser assembly so that no edge trim is required, and avoiding any possible distraction from the clean geometric lines of the staircase. The mono-stringer’s position underneath and away from the edges of the treads makes it retreat from view, and allows the impression of the staircase to be dominated by the zigzag tread and riser assembly when viewed from a forward position.

Leveraging the strength of structural steel, the central beams of the mono-stringer can span large open spaces without support. Due to its visual simplicity, it can sit equally well in a modern office or public building; either alone, or surrounded by other structures. On exceptionally long spans a central column is applied to add the necessary support, while maintaining a slim metal stringer line.

Figure 1. Isometric overview of the MS1 showing a straight flight with landing. A variety of balustrade styles can be applied to the MS1, so a handrail is presented here only for visual reference.

Figure 2. Plan and elevations of a sample MS1 design is indicative of a partial balustrade only.
Clear space between handrails

Indicates line of handrail

AS1428.1 1 Going + 300mm

865 min, 1000 max

920 recommended

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M1

design elements
The core member of the MS1 is constructed from SHS or RHS mild steel sections of a size suitable for the required loads and spans. These sections are mitred and welded at the angle points into a continuous solid member. Support plates for the treads and landings are welded to the core. Mounting plates are also usually welded where required at this stage.

While most mono-stringers only need two support points per flight, it must be kept in mind that the structure must provide strong rotational, as well as lateral and vertical support. Support bindings are usually in the form of a steel mounting plate with at least 4 points for bolts or other attachments. In some cases, the stringer can be welded directly to steel support beams in the existing structure.

Two alternative tread designs are shown. The first shows a solid timber tread. If larger treads are required, solid wood of the required profile may be difficult to source. In this case, an alternative composite tread is applied, comprising a veneer of dress timber over a structural ply or MDF core. Other designs and materials are possible: refer to Arden technical data sheet ‘A.3 Treads’ for details.

There are also two alternative tread support plate designs. Light duty stairs may use the folded tread plate design. Where high design loads or a wide flight is specified, a heavier gauge steel tread plate is called for. This would make a folded design impractical, and we would therefore recommend the use of the two piece orthogonal welded design.

Figure 3. Solid timber tread.
Figure 4. Isometric view of solid wood tread supported by welded tread plate and brace.
Figure 5. Elevation with break out section of composite tread supported by folded tread plate.
Closed mono-stringer

- Tread thickness as req'd
- Plate straddles SHS for greater rigidity
- SHS forms main span of mono-stringer
- Folded tread plate
- Screw secure tread to plate
- Composite tread and riser manufactured from MDF core with dress wood veneer
- Slip resistant safety strip

Composite tread and riser manufactured from MDF core with dress wood veneer

Folded tread plate

Plate straddles SHS for greater rigidity

Screws secure tread to plate

SHS forms main span of mono-stringer
Figure 6. Isometric view of composite tread supported by folded tread plate.
Figure 7. Floor fixing to concrete on non-shrink grout.
Closed mono-stringer

M16 bolts chemically bonded to concrete floor.

Optional plinth to conceal base and guard low overhead areas

Mild steel base plate

Non-shrink grout
Figure 8. Void edge mounting with visual connection detail.

Figure 9. Void edge mounting with non-visual connection detail.

Figure 10. Non-visual floor fixing method.
Floor coverings

Concrete recessed to conceal connection

10mm (typical) base connection plate

M12 chemical anchors
Closed mono-stringer

**Figure 11.** Non-visual wall fixing method.

**Figure 12.** Typical stringer to stringer connection detail
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<th>Code</th>
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<td>Slip resistance classification of new pedestrian surface materials</td>
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<td>AS 1428.1-2009</td>
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Key:
- full compliance with the code
- can comply
- not applicable to this element

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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