



PermaStruct® FRP Handrail Guide

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PermaStruct® FRP Handrail is a modular system with a number of advantages over traditional materials. The following guide provides general guidelines to be used when installing PermaStruct® FRP Handrails.

1.0 Specifications and Properties

PROPERTY	SPECIFICATION	VALUE
Round Handrail Tube 50 x OD 7mm		
Specific Weight	ASTM D 792	≈ 1.94 g/cm ³
24hr Water Absorption	ASTM D 570	≈ < 0.6%
Barcol Hardness	ASTM D 2583	≈ ≥ 45 °B
Glass Content	ASTM D 2584	≈ 60 ± 5 %
Tensile / Compression Stress	ASTM D 638	≈ ≥ 206.8 Mpa
Modulus of Elasticity	ASTM D 638	≈ ≥ 17.2 Gpa
Square Handrail Tube 50 x 50 x 6.4mm, 64 x 64 x 6.4mm, 76 x 76 x 9.5mm, 102 x 102 x 6.4mm		
Specific Weight	ASTM D 792	≈ 1.94 g/cm ³
Tensile / Compression Stress	ASTM D 638	≈ ≥ 206.8 Mpa
Modulus of Elasticity	ASTM D 638	≈ ≥ 14.5 Gpa

*All our Handrail Connectors specifications vary and are available upon request.

2.0 Design

PermaStruct® FRP Handrails are designed and NATA certified as per AS1657-2013. PermaStruct® FRP Handrails come in two options; square and circular. All PermaStruct® FRP Handrails will abide by the following rules to satisfy Australian standards;

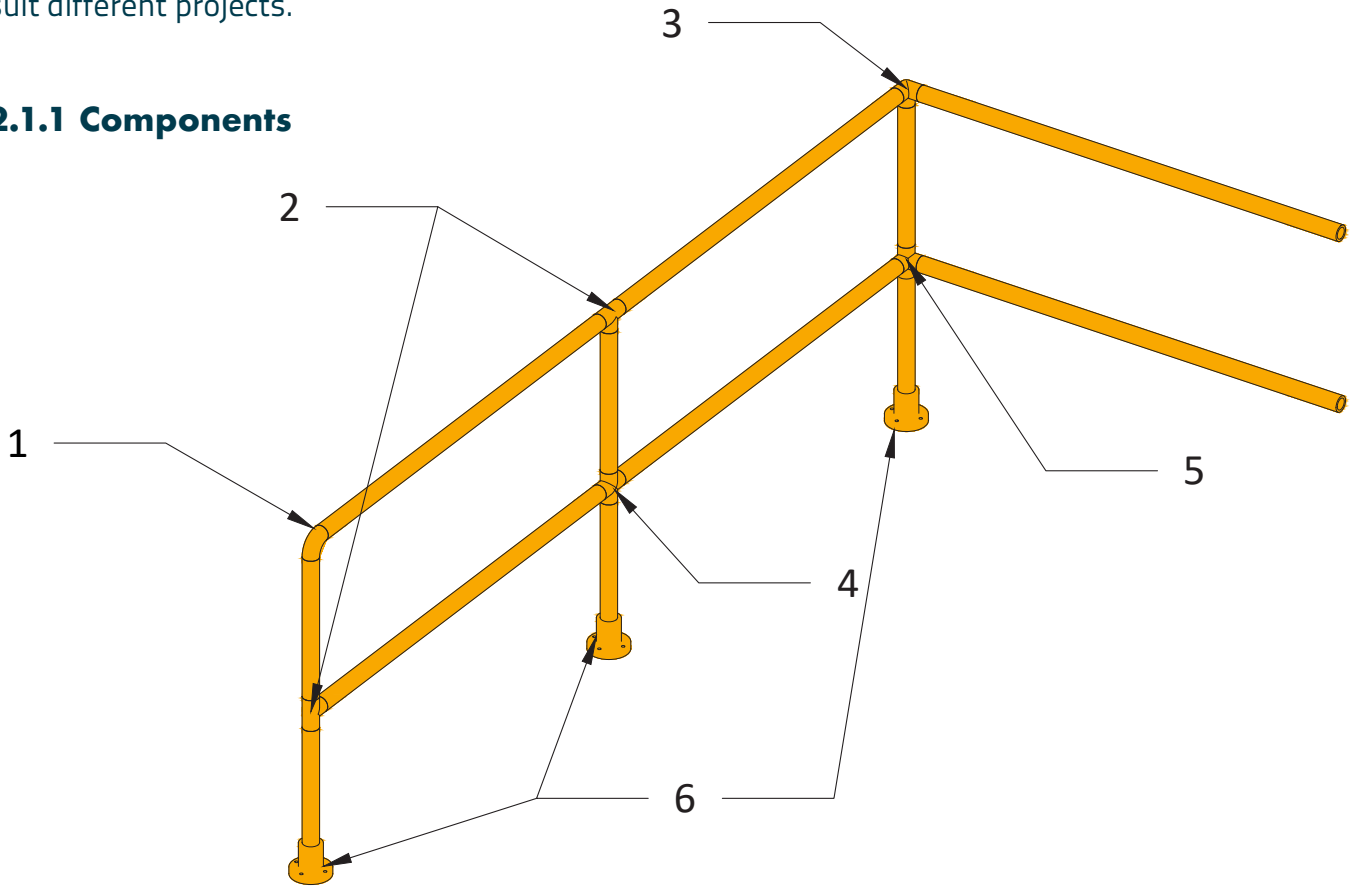
- Handrail Stanchions to be spaced at 1000mm centre to centre spacing.
- Handrail Stanchions to be 1000mm high (above deck level)
- Round handrail connectors to be glued, Square Handrail Connectors to be pot riveted.









2.1 Round Handrail

PermaStruct® Round Handrails have the advantage of not having sharp edges, as with a square handrail which may be a safety risk. They also require significantly less fixings to that of a square handrail. The handrail is formed through a circular hollow tube glued to different modified connectors. Although stocked only in yellow, PermaStruct® Round Handrails can be custom made to any colour to suit different projects.

2.1.1 Components



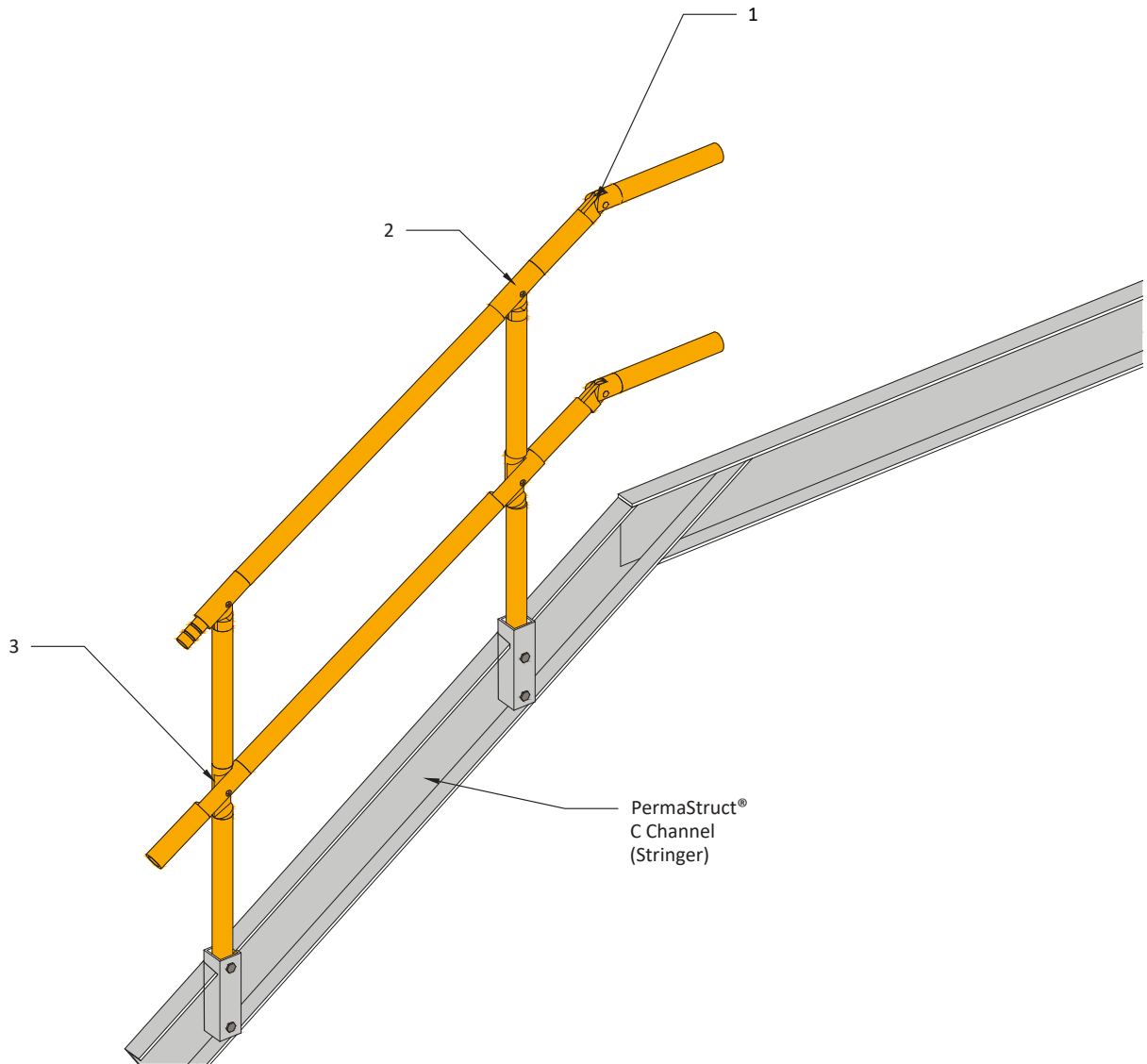
1	90 Degree Elbow	
2	Three-Way Straight	
3	Three-Way Corner	
4	Four Way Straight	
5	Four Way Corner	
6	Round Base Foot	




2.1.2 Custom Configurations

Round handrails may be applied to different type of structures such as staircases, boardwalks, platforms, high-rise balconies etc. In order to suit these different structures, PermaStruct® Round Handrails are fixed in various ways and therefore have multiple possible configurations.

Handrail for Staircase/Inclined Beam

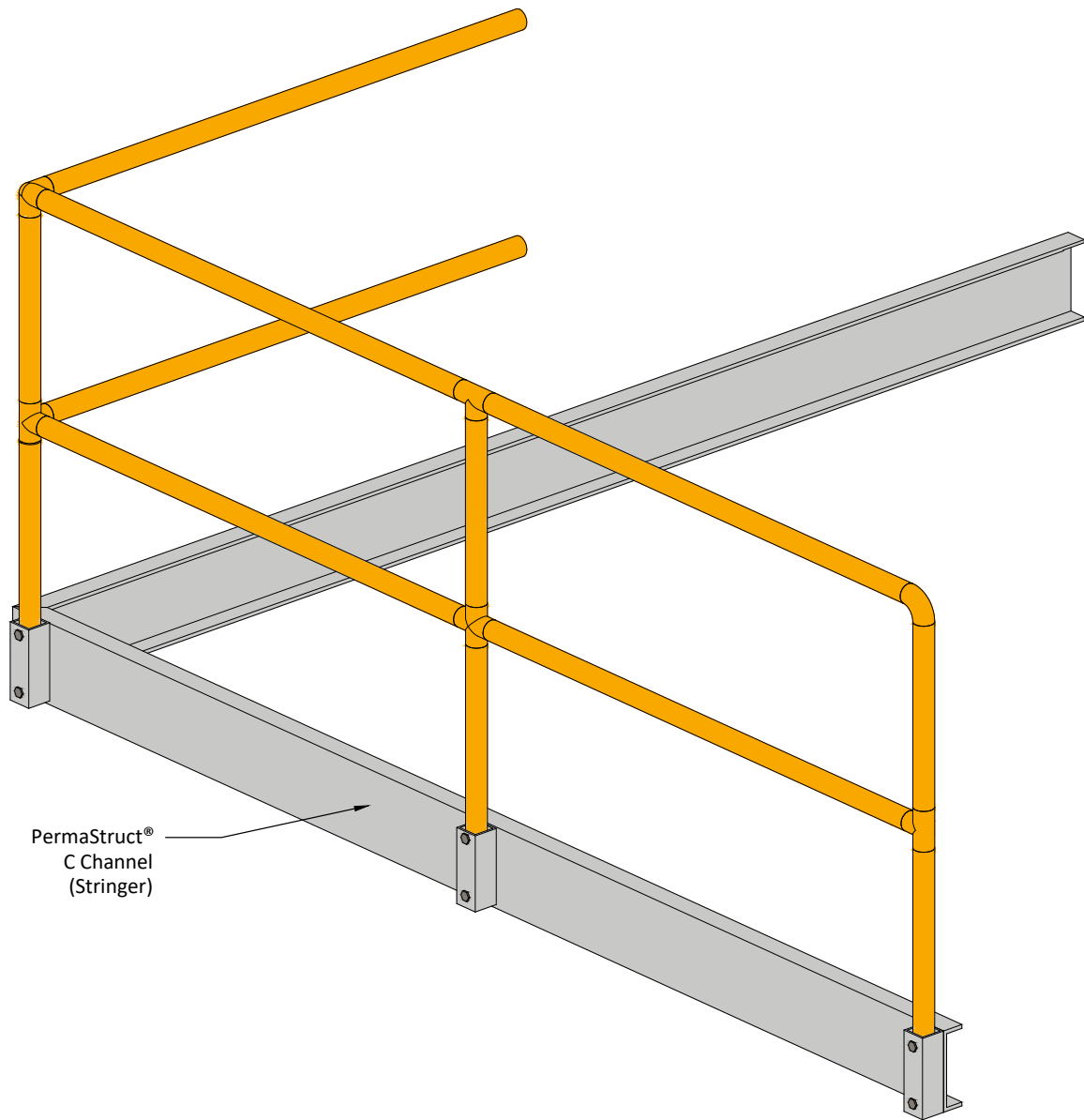
Round Handrails are attached onto the stringers of staircases with a 64 x 64 mm box section attached to the stringer. The handrail components consist of adjustable connectors that can vary in angle of slope, as required.



1	Two-Way Adjustable Elbow	
2	Three-Way Adjustable	
3	Four-Way Adjustable	

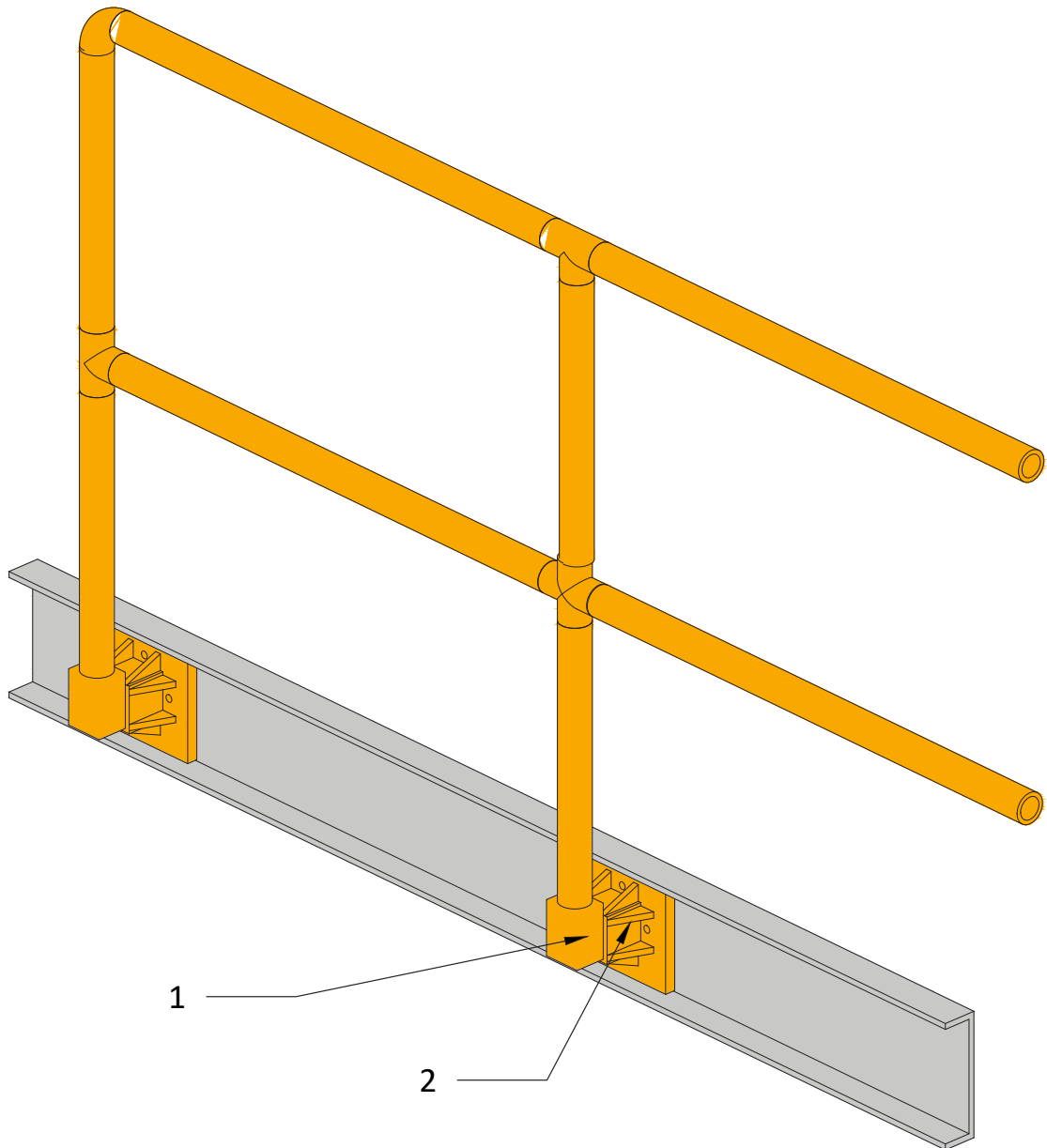
Handrail for Standard Beam

PermaStruct® Round Handrails are side-mounted to the back of a beam (PermaStruct® C Channel or equivalent) with the use of 64x64mm box brackets. The handrail tube slots into the bracket and is bolted on the top and bottom of bracket with stainless steel bolts.

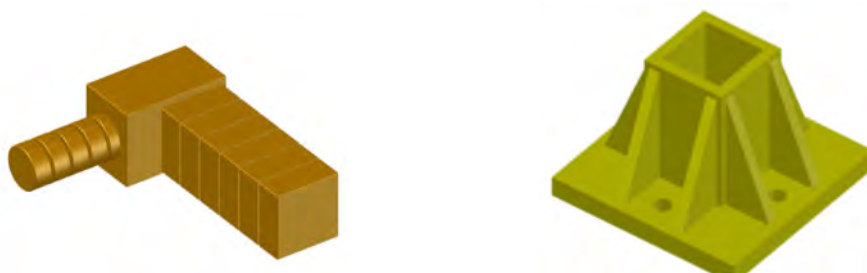


Handrail on Beam with Custom Bracket (Coming Soon)

For locations, where the environmental conditions are unfavorable i.e. high wind loads, or where the handrails are mounted to a highly elevated beam, a Custom PermaStruct® Box Base Mounting Bracket system can be used. This bracket has the extra strength compared to alternative connections, as well as being able to be used to replace existing handrail connections for FRP and other materials (e.g. steel).



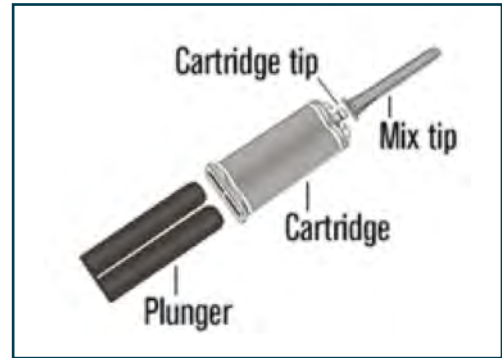
This bracket system consists of two components, a box base mounting bracket and a 90 degree box elbow. The elbow is able to vary in its horizontal distance to suit different offsets.



2.1.3 Installation

The fabrication and install process for round handrail is a step by step process is as follows;

1. 50 x 7mm OD Tube to be cut to required lengths from stock lengths using a diamond blade.
2. Lightly deburr the I.D. and O.D. of the tube end to remove burrs and sharp edges using emery paper.
3. Wipe the inside and outside of deburred tube with a clean rag.
4. Set up Plexus MA310 Glue using steps shown below:
 - a. Start out by attaching the mixing tip or nozzle to cartridge.
 - b. Use hand plunger to push glue through mixing tip. Allow for 15-18 minutes working time before glue sets in mix tip. NB: Avoid excessive pressure on plunger to avoid glue blowing out of tube.
 - c. Spread glue around handrail connectors and glue according to desired configuration. Allow for 15-18 minutes working time.
 - d. For Handrail with Sleeves, spread glue on outside of connector and internal of sleeve, and tap gently, till a snug-fit develops. Apply glue to internal area of handrail and tube, and exterior face of sleeve/connector. Connect all parts together.
5. Clean any excess glue with acetone.
6. Allow 24 hrs for glue to settle completely and dry.
7. Attach glued handrail section to external structure as required.

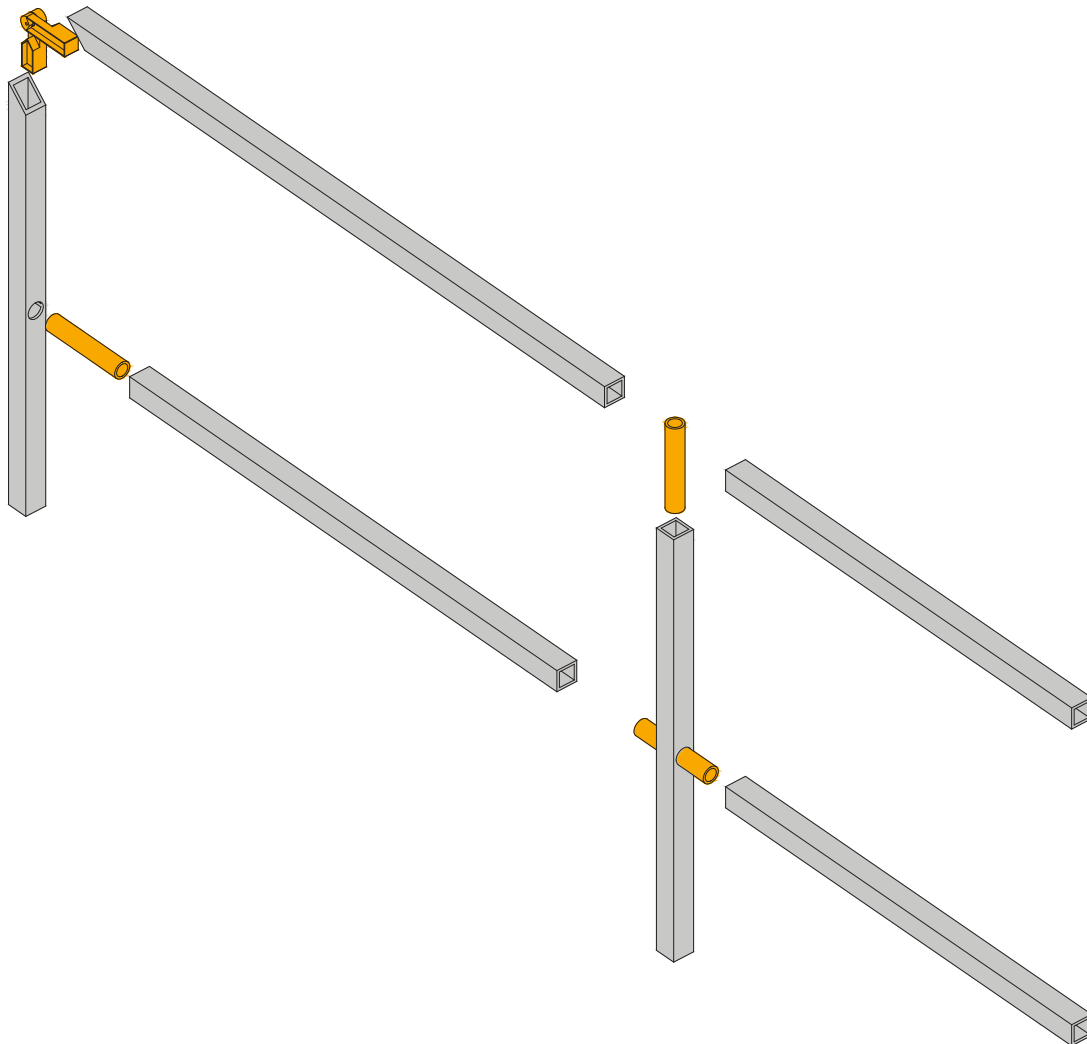


2.2 Square Handrails

PermaStruct® Square Handrails may have the disadvantage of having sharp edges, but they offer increased strength compared to a round handrail. This makes it suitable for use in areas with rough environmental conditions. PermaStruct® Square Handrails are fixed with pop rivets with internal connectors used to further strengthen connection points. PermaStruct® Square Handrail are stocked only in yellow and grey but can also be custom made to any colour to suit different projects.

PermaStruct® Square Handrails have two different component systems which are both used to suit various projects depending on specific requirements.

2.2.1 Components



1

Two-Way Adjustable Box Elbow Connector



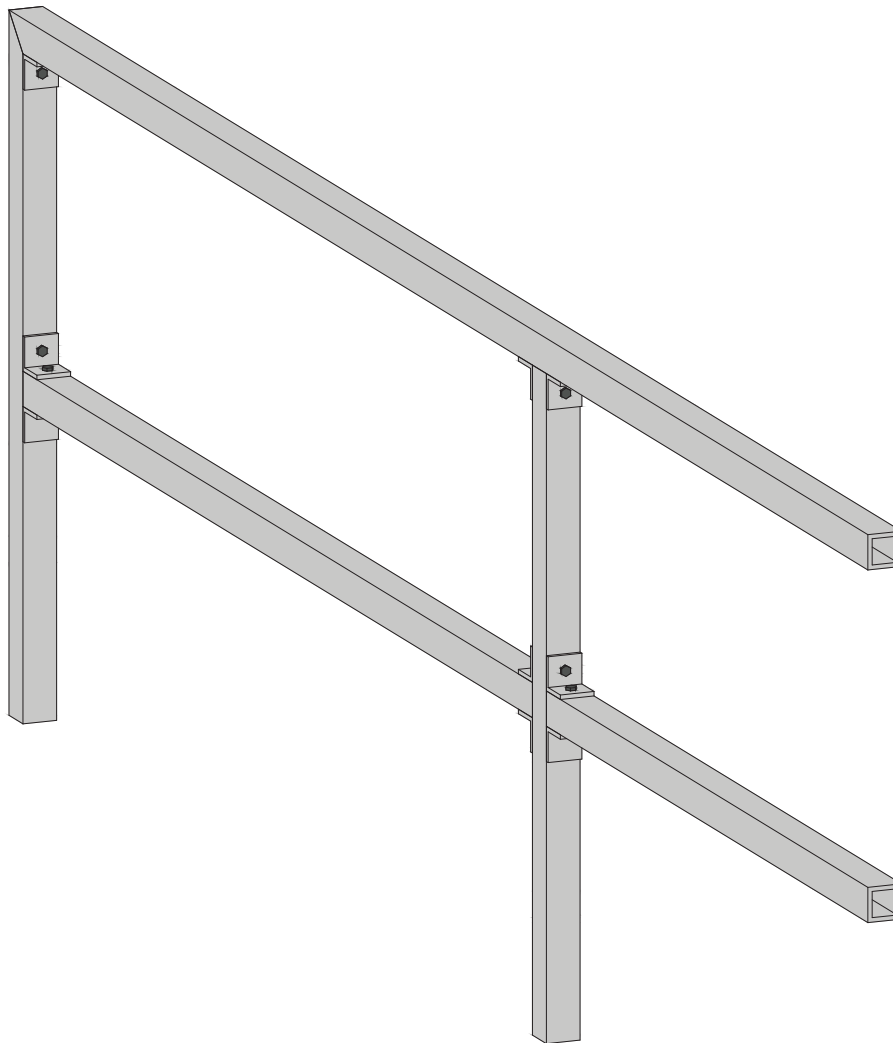
2

38mm OD Tube Connector



This component system uses a two-way adjustable Box Elbow Connector on mitred corners and a 38 mm OD Tube Connector for all other connection points. These connectors are fixed to handrail with stainless steel rivets.

2.2.1 Components



1

Equal Angle 50x50x6.4mm FRP Brackets



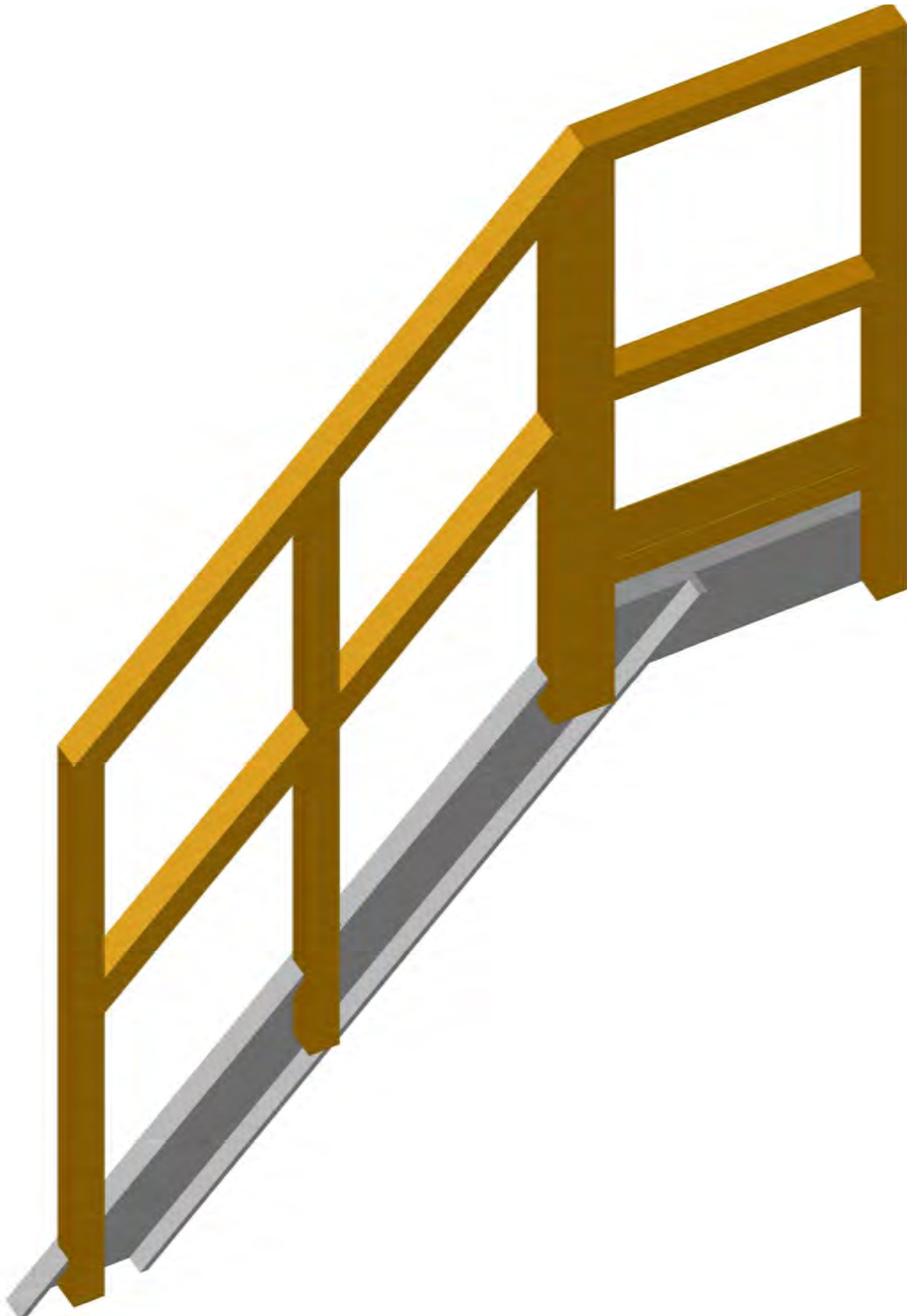
The second component system involves the use of an external equal angle bracket that is also fixed with stainless steel rivets, and provides the same fixity at connection points as with using the connectors.

2.2.2 Custom Configurations

PermaStruct® Square Handrails may also be applied to different type of structures such as staircases, boardwalks, platforms, high-rise balconies etc. Like PermaStruct® Round Handrails, PermaStruct® Square Handrails are also fixed in various ways and therefore have multiple possible configurations.

Handrail for Staircase/Inclined Beam

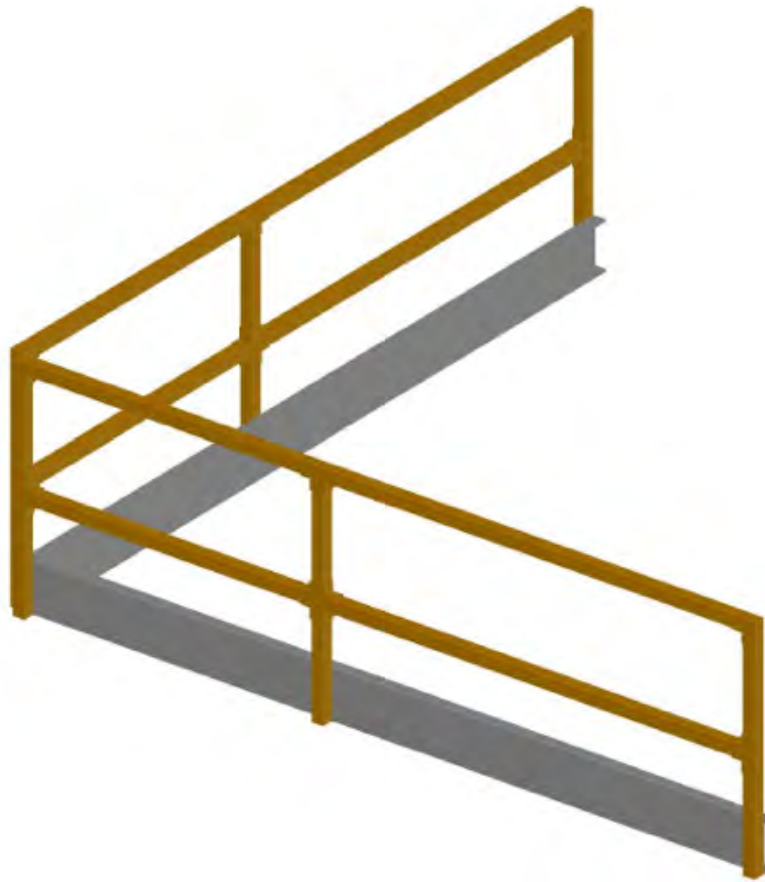
Square Handrails are directly attached onto the stringers of staircases with the flanges of the stringer notched to the width of handrail stanchions. An extra handrail stanchion is required at the top of stronger, to form a connection of the handrail to accommodate the change in slope.



2.2.2 Custom Configurations

Handrail for Standard Beam

PermaStruct® Square Handrails are directly side-mounted to the back of a beam (PermaStruct® C Channel or equivalent), without the use of any brackets. The Handrail Tubes at corners, are bolted to the edge of each perpendicular beam.



2.2.3 Installation

1. Mitre handrail tubes at corners to correct angle required
2. Depending on square handrail component system used, join handrail system together accordingly with pop rivets, using pop rivet gun.
3. For Handrails with round connectors, Mark Centre Rail. Hole saw 38mm OD tube with ceramic hole saw. Place tube into handrail, and fix in place with pop rivets.
4. For Handrails with EA Brackets, pop rivet on either face of bracket to fix bracket to square tubes.

2.3 Additional Accessories

2.3.1 Kick Rail

PermaStruct® handrails are required to have kick rails in order to comply with Australian design standards, if the height above which the handrail is installed, is 1m. PermaStruct® Handrails have the following kick rail options.

