

# Interclamp<sup>®</sup>

The right connection

## Design and Installation



**DLH**online

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# Design of Structures

The core range of Interclamp fittings is manufactured from hot-dipped galvanised cast iron and is fitted with stainless steel setscrews. The components are designed for use in tubular structures using plain-ended galvanised steel tube to AS 1074-1989 / ISO65 / EN10255 (formerly BS1387), scaffolding tube to EN39, and aluminium tube to EN755.

Designers must satisfy themselves that the structure and its component parts are fit for purpose and that all relevant national and international standards, building codes, codes of practice and other regulations are observed. For example, in the UK, there are numerous British & European Standards including Eurocodes, Building Regulations and Health & Safety Executive Reports which may be relevant, dependent on the application. In Australia, Australian Standards and Australian Building Codes may apply.

In certain environments, consideration must be given to wind loads, snow loads and potential impact from vehicles and fork-lift trucks. Cross bracing may be required to ensure the stability of structures.

The ultimate responsibility for the correct choice of size and type of fitting for any application belongs with the customer. The customer is responsible for ensuring that the construction or structure is sufficiently strong to support the weight of its component parts plus any applied load, and that suitable fixings are used.

## Key Design Considerations:

Interclamp fittings are not suitable for scaffolding

Vertical members within a structure must be continuous ie. vertical tubes must not be joined within the structure, unless there is a clear structural reason for doing so.

The choice of type and size of anchors and fixings must take into account the type of substrate, thickness of the fittings (including any packing shims) and the anchor or fixing manufacturer's design load data.

Where the structure is fixed to or mounted on a substrate or other structure, the substrate or other structure must be examined to ensure that its condition and mechanical properties are suitable for the additional design loads.

Consideration must be given to environmental conditions which may affect service life and necessitate regular periodic inspections of the condition and integrity of Interclamp structures and the tightness of setscrews.

Particular attention should be given to unusually corrosive environments, or applications where cyclical loads or vibration may be present.

Security setscrews and security keys are available at extra cost to reduce the risks associated with determined vandals or thieves. Additional precautions may be necessary in extreme cases.

Interclamp fittings must not be welded.

For structures suspended from above including overhead structures, careful consideration must be given to the dead, live and wind loads which may be applied to the structure, to assess the suitability of the Interclamp system for the particular application. Additional means of tube retention may need to be considered, dependent on the intended use.

# Additional Design Considerations for Powder Coating

Powder coating may not be suitable for areas subject to heavy use, determined vandalism, impacts or other abrasion. Although precautions are taken to avoid wherever possible during manufacture, a degree of “gassing” may occur on tube and fitting surfaces that have previously been galvanised. This may manifest itself as small imperfections in the coating surface such as pinholes or apparent grit inclusion.

## Specific Design & Installation Guidance Notes

117X, 117Y, 136 & 137: Socket head cap screws must be tightened before the setscrews.

117Y: Please note that surplus components will remain unused.

131, 143 & 169: These types must not be used as base mountings for handrailing, guardrailing, parapet, balustrade or other structures.

132, 152 & 232: To achieve optimum load characteristics, these fittings should be fitted so that the fixing holes are in line with the applied load.

133 & 333: These items are a frictional fit only and cannot be re-used if fitted and removed. For a permanent fix, a suitable adhesive should be used.

134: The cast concrete should have minimum dimensions of 300mm x 300mm x 300mm.

135 & 135X: The hexagon bolt must be tightened before setscrews. The tightening torque of the hexagon bolt must not exceed 15Nm.

138 & 140: Hinge pins may be orientated in opposing directions to prevent removal of the gate.

149 & 150, 166, 725 & 764: These types must not be installed more than 150mm from a structural support and ideally this distance should be less than 100mm. Only one joint is permitted between structural supports. On straight multiple rail handrails and guardrails, only one rail may be joined in the same bay between uprights.

150: This fitting is not a structural joint and must not be subject to tensile loads.

150, 133, 333, 725, 728, 729, 745, 747, 750 & 764: Always ensure that tube ends are deburred inside and out after cutting to ensure suitable engagement of the fitting and avoidance of any sharp edges. In addition, Interclamp Silver Galvanising Spray or other suitable protection should be applied before assembly.

150, 333, 725, 728, 729, 745, 747 & 750: These items may only be used with Medium Weight tube to AS 1074-1989 / EN10255 or tube with identical dimensions.

166, 764: These fittings are not structural joints and must not be subject to lateral loads.

167, 168, 169, 173, 174 & 175: Prior to installation, ensure all rivets are present and securely retained in assembly.

167, 167M, 168, 168M, 169, 169M, 172M, 173, 173F, 173M, 174, 174M, 175 & 175M: To provide sufficient stability, whole structures must not be made from swivel fittings alone. These items must not be used to support bending loads or lateral loads.

170 & 171: The retaining clips must be used as illustrated in our literature and other media. For mounting of alternative sheet materials, use 167M, 168M, 173M, 198 and/or 199.

192: Correct installation may require removal and redressing of asphalt around 132 fitting, together with application of suitable sealant around top of 132 fitting and 192 weather cowl.

197: This type must be used in pairs on opposite sides of the sheet material to be clamped.

Tubes must not be joined within any fitting aperture with only one setscrew.

# General Installation Instructions

- Always store Interclamp fittings in dry conditions.
- During storage, installation and whilst any subsequent work on site is carried out, ensure that the fittings and tube are not subjected to ferrous particles in the atmosphere, eg. from cutting or grinding operations, or from contaminated or worn tooling. On busy work sites, it may be necessary to protect the finished structure prior to handover, to ensure that contamination does not occur.
- Inspect all components prior to erection for any damage or other defects. Quarantine any rejected items and contact your supplier.
- Always ensure that setscrews are orientated within the fitting so that the pointed end of the setscrew is against the tube, with the flatter end outermost ie. still visible after installation.
- To obtain optimum setscrew slip loads, the setscrew should be tightened to 40Nm, for which a ratchet wrench may be necessary. Ensure that this torque is not exceeded.
- For aesthetic reasons, orientate fittings where possible with setscrews facing away from bystanders. To minimise rainwater retention, orientate fittings with setscrews facing downwards or horizontal.
- Always ensure that the finished structure is free from any sharp edges or projections.
- Do not attempt to modify fittings.
- These instructions relate to Interclamp fittings only. We accept no responsibility for the use of alternative brands or other types of fittings in Interclamp structures.
- We accept no responsibility for any loss or damage arising from the misuse of Interclamp fittings.

# Design Loads

When designing any tubular structure, the specifier should first identify whether any relevant national or international standards, building codes, codes of practice or other regulations apply. If so, the design loads and certain dimensional requirements will normally be stated, which usually depend on the type of application.

For handrailing, typically the design load and height of the top rail is determined by the location of the structure, and hence the applicable standard. The following classifications are most frequently used in the UK:

Minimum horizontal uniformly distributed line load (Newtons per metre run):

360N/m: Single domestic dwelling, excluding external balconies and roof edges. Non-emergency light pedestrian traffic areas in industrial and storage buildings.

740N/m: Areas not susceptible to overcrowding in offices, institutional buildings and other industrial and storage buildings (except as given above).

1500N/m: Restaurants and bars with tables or fixed seating. Other areas where people may congregate with fixed seating within 530mm of the handrailing. Retail areas of shops and banks/building societies not susceptible to overcrowding. Footways or pavements less than 3m wide adjacent to sunken areas. Pedestrian areas of car parks (excluding vehicle areas).

Please note that theatres, cinemas, discotheques, other bars, auditoria, shopping malls, assembly areas, studio, grandstands and stadia in the UK require design loads of 3000N/m or greater, for which Interclamp is not suitable. For other countries, please check relevant national or international standards, building codes, codes of practice or other regulations.

The following table (Next page) is based on theoretical calculations of the maximum permissible bending moment on the tubular uprights. The figures in millimetres represent the maximum post separation (measured centre to centre of posts) that is permitted to achieve the stated design loads. Should you require a different handrail height, design load or tube specification from those shown, please contact your supplier for additional information. The load table is based on the following assumptions:

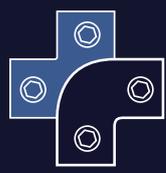
- For tubes to BS EN 10255, formerly BS1387, it is assumed that the minimum yield strength of the tubes is 65% of the minimum tensile strength specified in BS1387.
- For all tubes, the allowable yield strength used to calculate the results is two thirds of the minimum yield strength.
- Due to other factors, post separation distances exceeding 2500mm are not generally recommended.
- All design loads are assumed to be uniformly distributed, applied to the centreline of the top rail at the height given.
- All heights are measured from the centreline of the top rail to the top of the post fixing.
- The rails are in Medium Weight tube to BS EN 10255 and are of the same outside diameter as the uprights.

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## Design Loads Continued

- Type 132 or 232 is used as the base fitting with fixing holes in line with the applied load, ie. with the base flange perpendicular to the handrail.
- The calculations are only valid for the exact tube dimensions and grades shown.
- The dimensions given are for guidance only. They are not intended to be an authorised specification.

Tube Specification	C42	C42	D48	D48	D48	D48	E60	E60
Nominal Bore	1 ¼"	1 ¼"	1 ½"	1 ½"	1 ½"	1 ½"	2"	2"
Outside Diameter	42.4	42.4	48.3	48.3	48.3	48.3	60.3	60.3
Wall Thickness	3.25	4.85	3.25	5.08	5	4	3.65	5.54
Standard	BS EN 10255 (BS1387)	ASTM A106 API 5L	BS EN 10255 (BS1387)	ASTM A106 API 5L	EN 10025 or BS4360	EN39	BS EN 10255 (BS1387)	ASTM A106 API 5L
Grade		Grade B		Grade B	50-C or 50-D			Grade B
Weight or Schedule	Medium Wt	Sch 80	Medium Wt	Sch 80			Medium Wt	Sch 80
<b>Design Load (N/m)</b>	<b>900mm High</b>							
360	1550	2316	2073	2500	2500	2500	2500	2500
740	754	1127	1009	1598	2244	1342	1798	2500
1500	372	556	498	788	1107	662	887	1404
<b>Design Load (N/m)</b>	<b>1100mm High</b>							
360	1268	1895	1696	2500	2500	2256	2500	2500
740	617	922	825	1307	1836	1098	1471	2329
1500	304	455	407	645	906	541	726	1149



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Please note that the applicable standard or code of practice may also specify other design loads or dimensions to which the structure must conform. The design load chart is purely given as guidance for the design loads which may be applicable to the tubular uprights, which is normally the limiting factor on the design of the handrail.

Further information is available in our sales literature and at [www.interclamp.com](http://www.interclamp.com). Should you be in any doubt about the subjects covered in this publication or require any further information, please do not hesitate to contact your supplier.

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