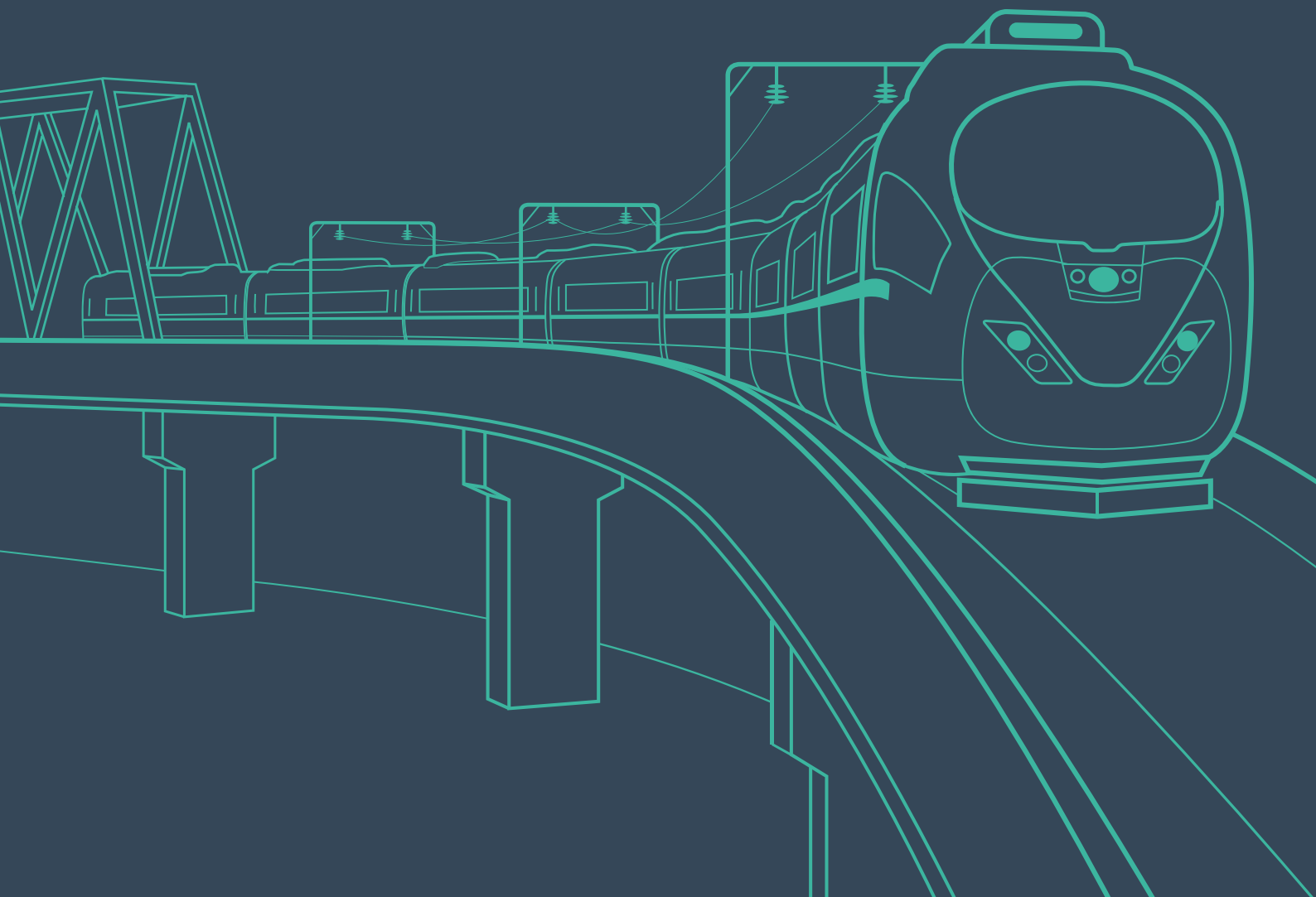
Rail

lindapter®

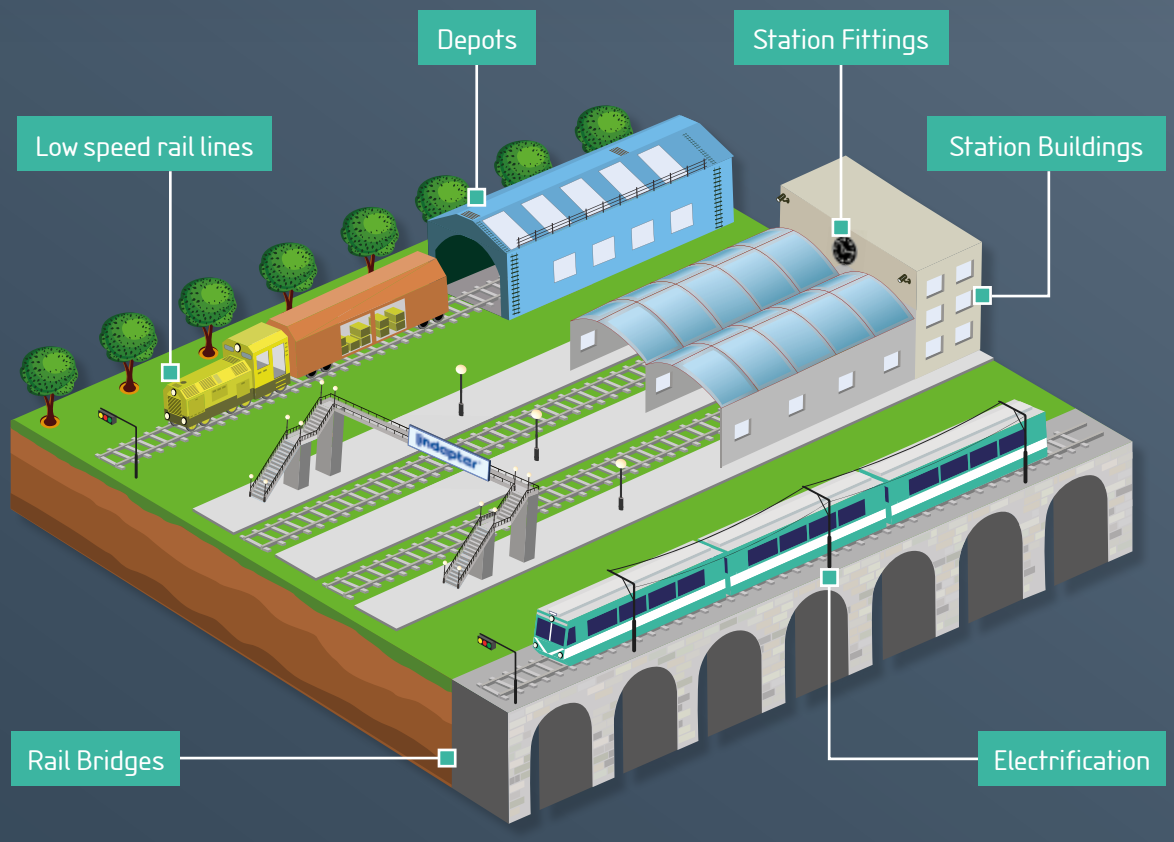
Technical Innovation in
Steelwork Connections



Welcome

Safely securing steelwork for over 85 years

Lindapter, the innovator of steelwork clamping systems, supplies its products to connect a range of structures and services throughout virtually every stage of rail infrastructure, including:

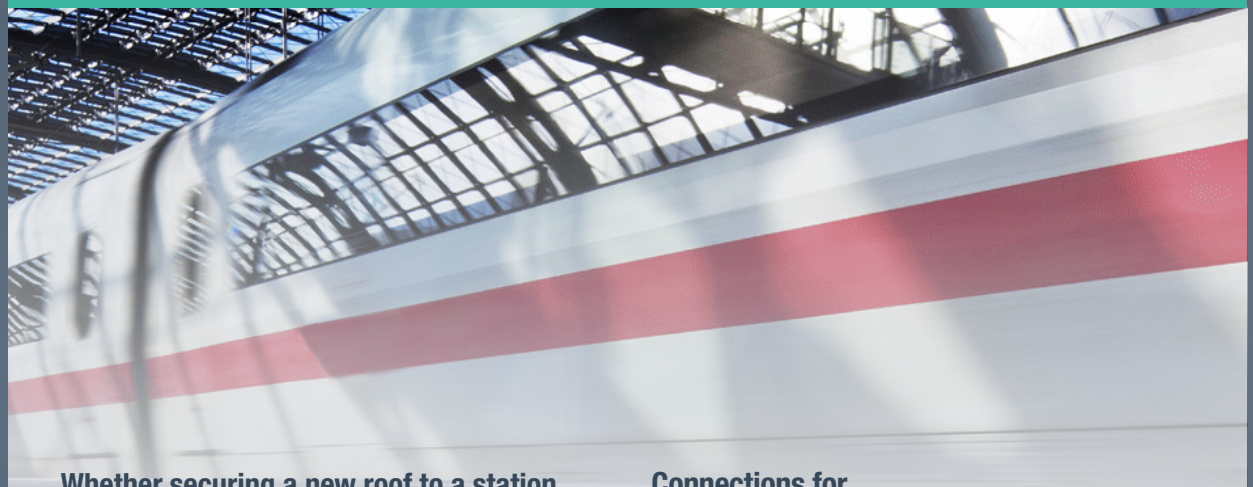


WHY USE LINDAPTER CONNECTIONS IN THE RAIL INDUSTRY?

Lindapter is a world leader in the design and manufacture of steel-to-steel connections that eliminate the need for on-site drilling or welding. The concept allows a safer, faster installation and less work at height compared to traditional methods, which significantly reduces costs.

- **Faster installation** — Lower labour costs
- **No steelwork damage** — No site drilling or welding
- **Durable** — High strength connections
- **Easy to install & adjust** — Accurate positioning
- **Reliable** — Independently approved
- **Hassle-free solutions** — Free detailing service

CONTENTS



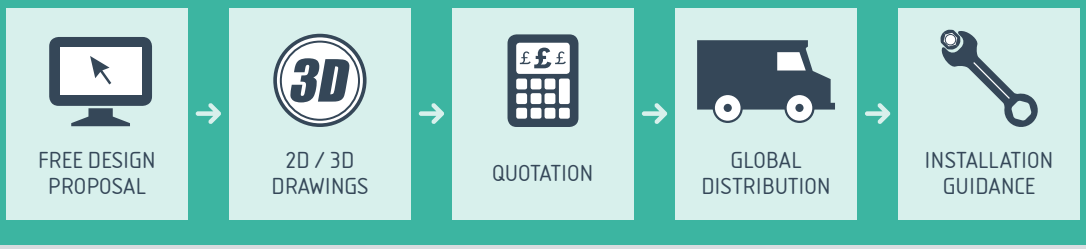
Whether securing a new roof to a station building, adding new digital displays to station platforms or fixing low speed rails within a depot, Lindapter has a proven accredited solution.

Established in 1934, Lindapter International is the world's innovator of steelwork clamping systems, eliminating the need to drill or weld steel on-site.

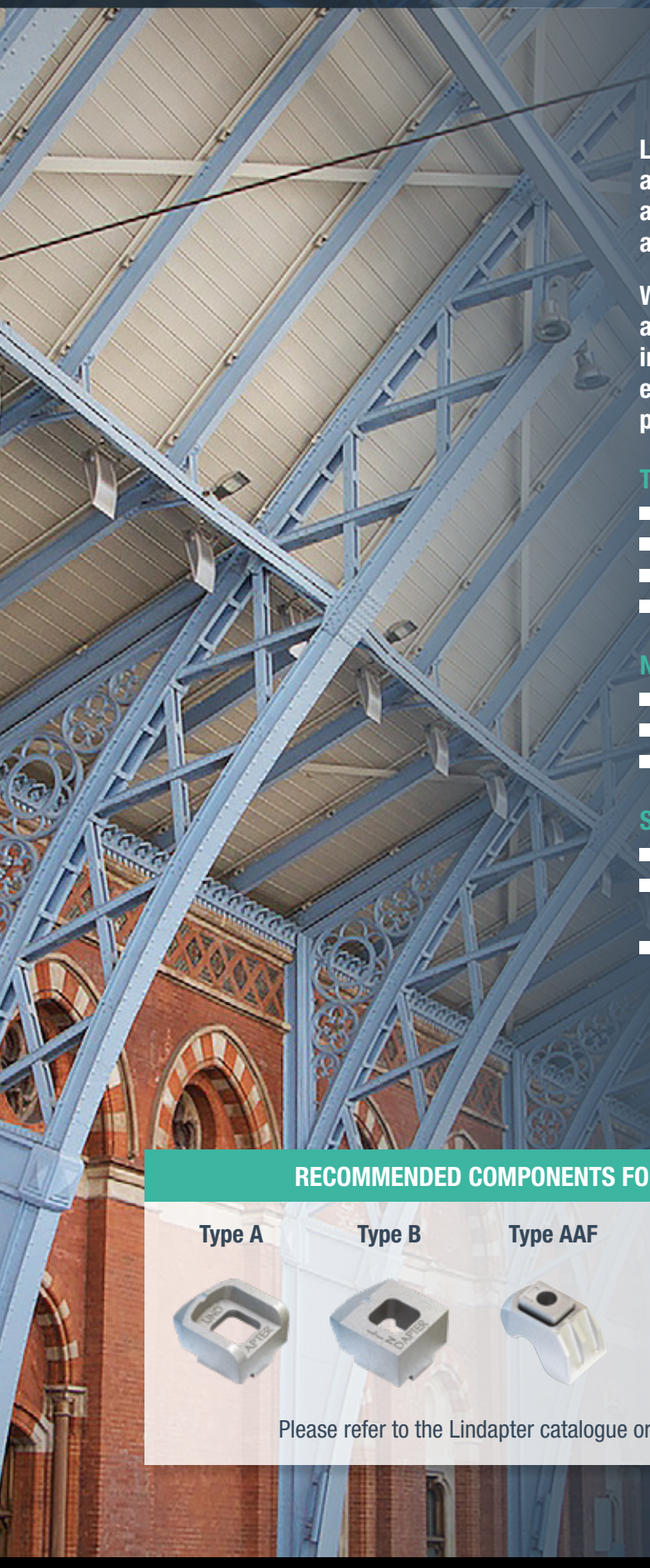
Lindapter connections can be temporary or permanent, adjusted on-site and do not damage steelwork; ideal for installing station building services that may need to be realigned or removed or for attaching a new roof to a listed station building.

This brochure provides examples of the wide range of typical Lindapter connections for use across a rail network, all based on real applications.

Lindapter's Design & Support service is tailored to your specific application. Read more on page 27.



Station Buildings



Lindapter's versatile clamping systems offer a wide range of temporary and permanent applications in railway station buildings around the world.

With independently verified Safe Working Loads and industry leading product approvals, the innovative connections provide a quick and easy method of securing a new roof or façade panel without the need to weld or drill.

Typical applications include:

- Connecting roofing to supporting steelwork
- Securing façades and cladding panels
- Secondary structural steelwork connections
- Fastening support frames for mechanical equipment

No damage to existing steelwork:

- Perfect for refurbishment of station buildings
- Install / remove fixings without causing any damage
- A wide product range to suit virtually any application

Suitable for permanent / temporary applications:

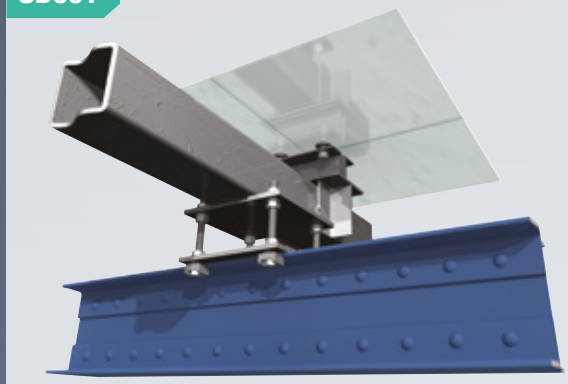
- Quick, easy to install and remove connections
- High quality, corrosion resistant castings and Hollo-Bolts ideal for permanent applications
- Easy to realign and remove connections for temporary steelwork support frames

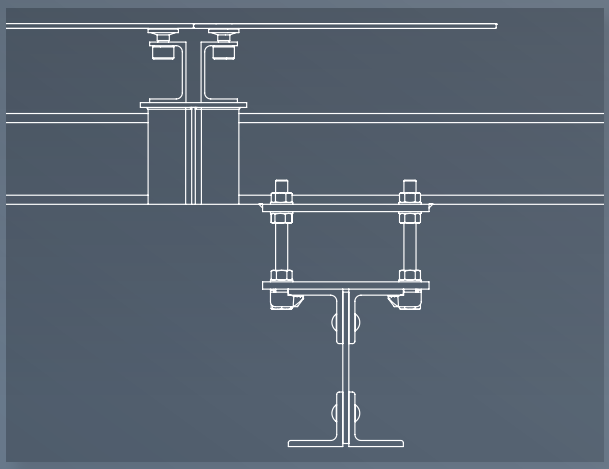
RECOMMENDED COMPONENTS FOR STATION BUILDING APPLICATIONS

Type A	Type B	Type AAF	Type AF	Type LR	Hollo-Bolt®
					

Please refer to the Lindapter catalogue or **www.Lindapter.com** for full product data.

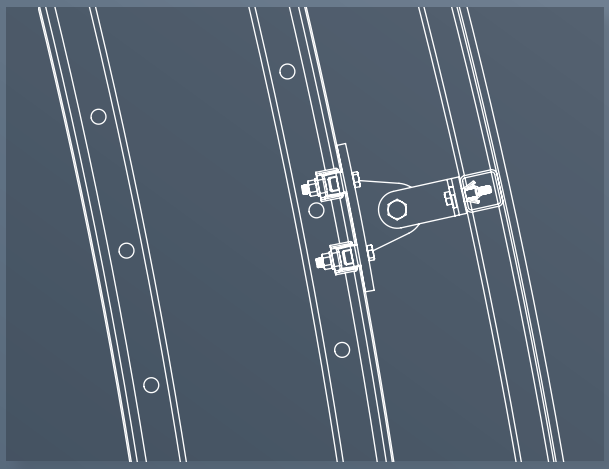
SB001





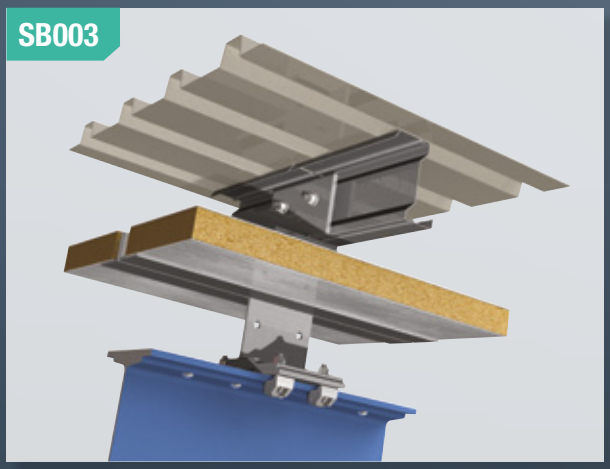
Type A fixings clamping a glass roof frame to original steelwork (Manchester Piccadilly Station, UK).

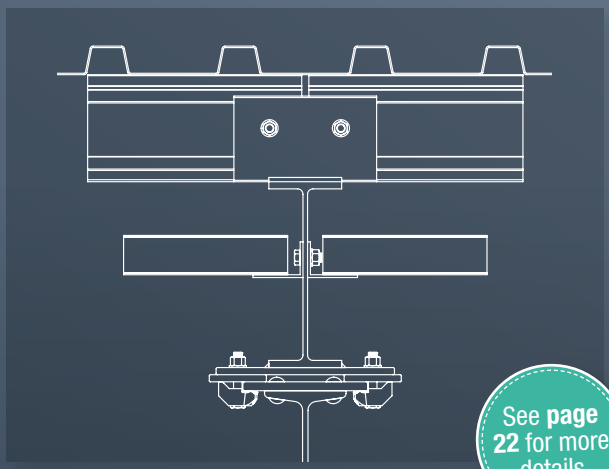
SB002



Hollo-Bolts and Type LRs connecting a domed glass roof to structural steel (Dresden Railway Station, Germany).

SB003



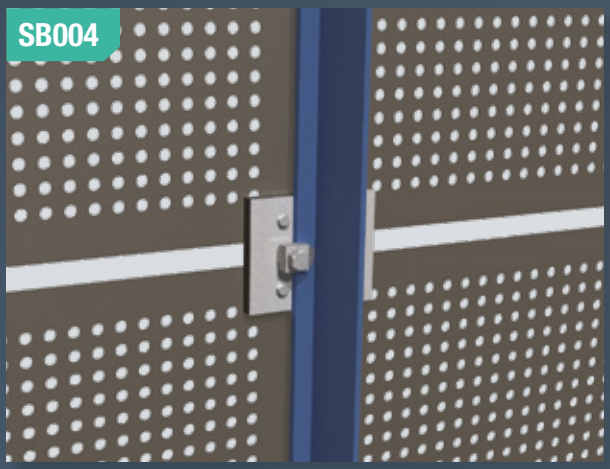


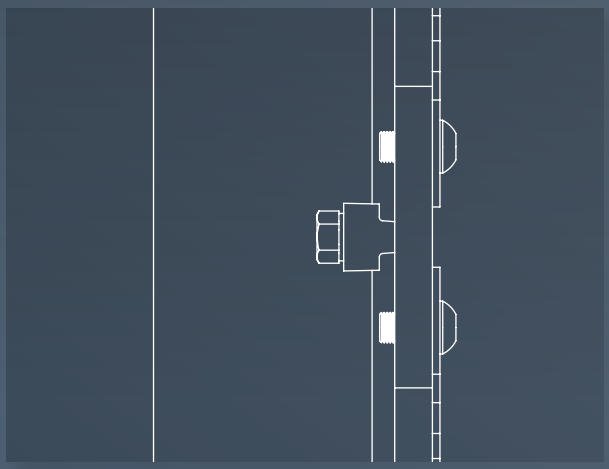
See **page 22** for more details

Type AFs fastening a multi-layered roof structure to original steelwork (St Pancras Station, UK).

Station Buildings

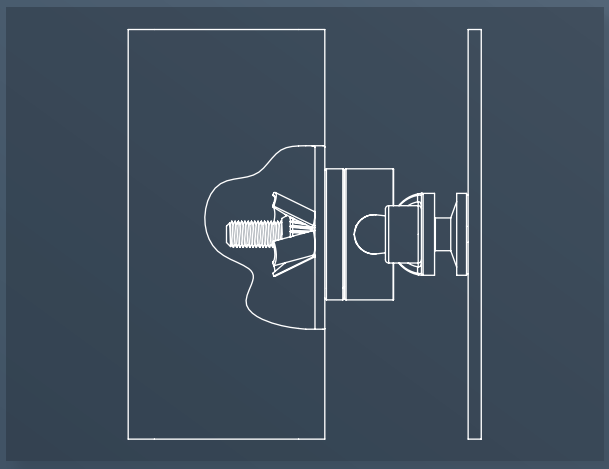
SB004





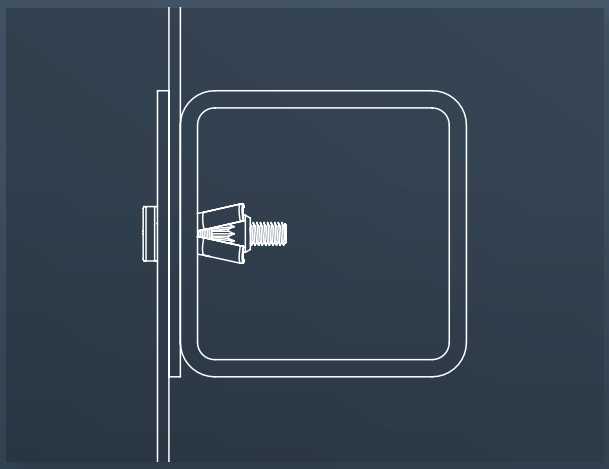
Type B clamps connecting a perforated metal façade to a supporting steel section.

SB005



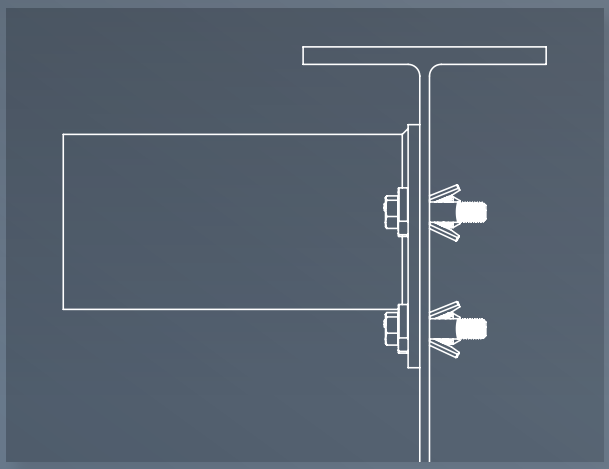
A Hollo-Bolt connecting a spider bracket to the SHS frame, securing the glass façade.

SB006



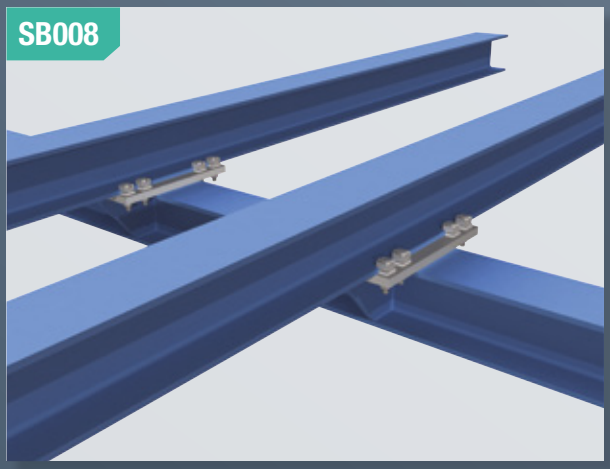
A mirror finish façade connected to supporting SHS with stainless steel Countersunk Hollo-Bolts.

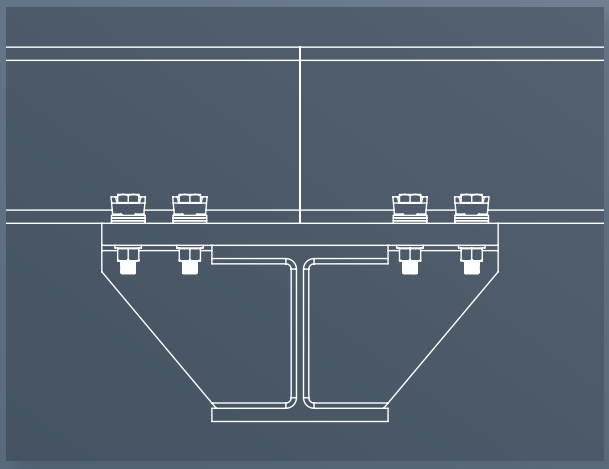
SB007



Hollo-Bolt HCFs connecting stainless steel canopy support hollow section (Derby Midland Station, UK).

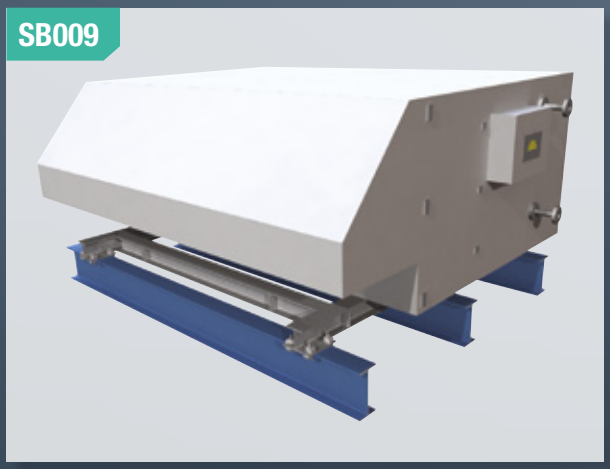
SB008

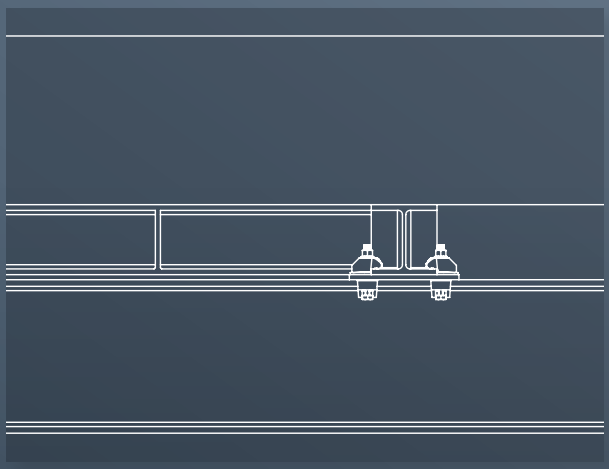




Type A fixings used in a Girder Clamp configuration to create a support frame for overhead equipment.

SB009





Type AF clamps connecting the base frame of a HVAC unit to supporting steelwork.

Station Fittings

Railway stations feature a wide range of fittings that must be secured to a station building's steelwork.

Lindapter provides labour saving connection solutions for connecting these essential elements to structural and secondary steel beams. From lighting and security devices to visual display equipment, Lindapter has a proven connection solution.

Typical applications include:

- Securing platform displays
- Suspending cable trays
- Fastening signage
- Connecting lighting and auditory equipment

Adjustable on-site:

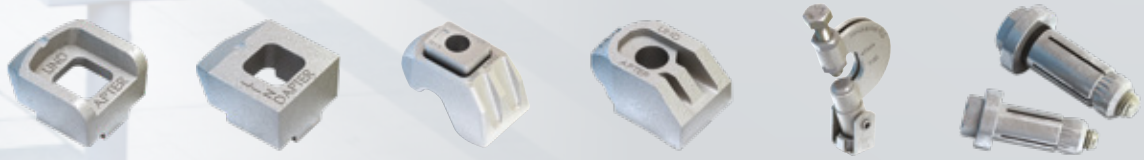
- Connections can be delivered pre-assembled then adjusted on-site for accurate positioning
- Connections can be loosened and tightened to allow precise alignment
- Potential to adjust the connection without damaging the steelwork

No welding or drilling:

- Specialist labour is not required
- No hot work permits
- Fast, cost effective and safe installation

RECOMMENDED COMPONENTS FOR STATION FITTING APPLICATIONS

Type A | Type B | Type AAF | Type AF | Type FLS | Hollo-Bolt®



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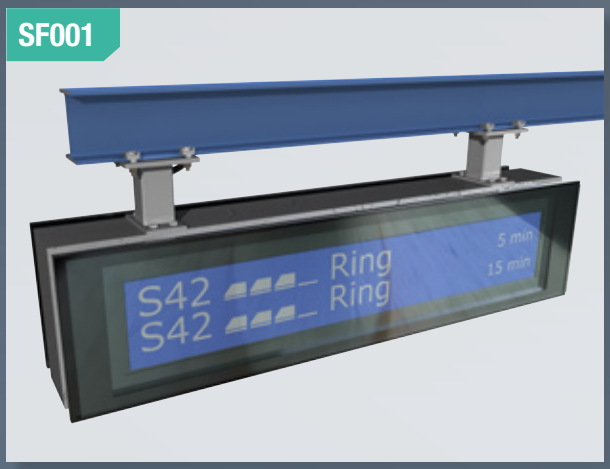
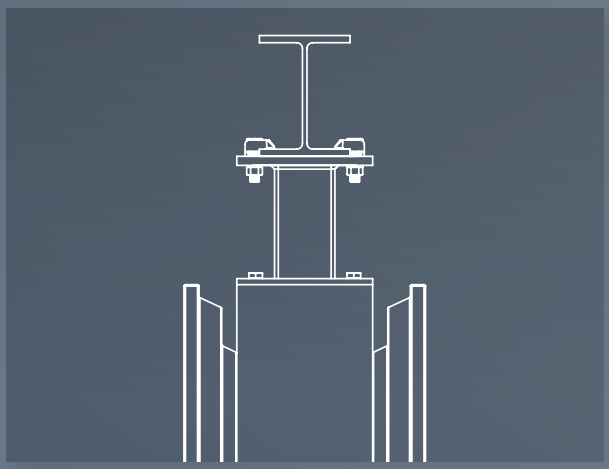
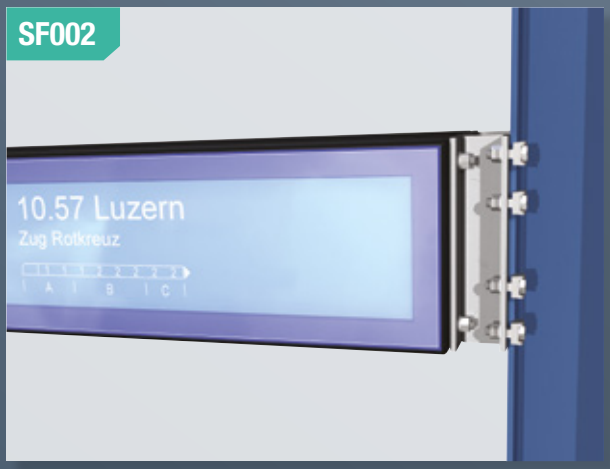
SF001

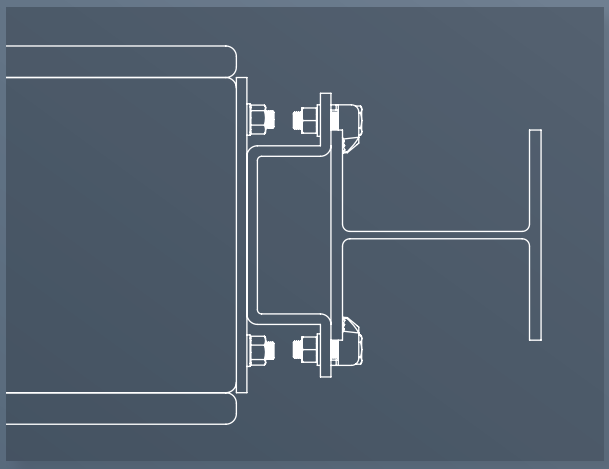




Type As connecting a station platform display in a tensile arrangement (Berlin Railway Station, Germany).

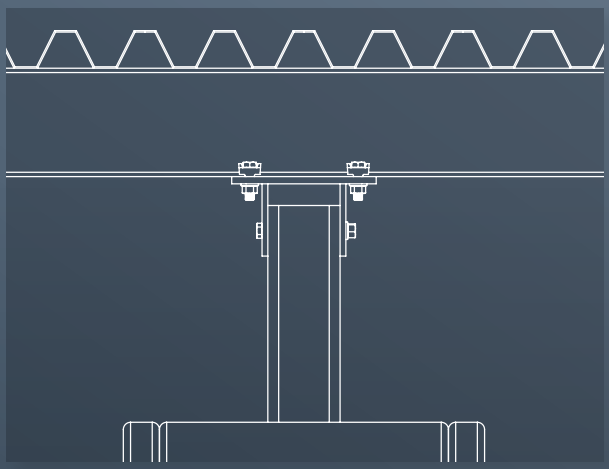
SF002





Type As connecting a station platform display in a friction application (SBB Station, Switzerland).

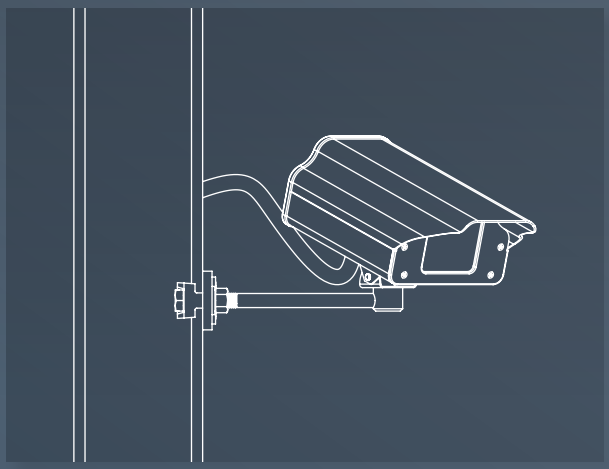
SF003



A station platform display connected with Type As in an offset arrangement (Leiden Station, Holland).

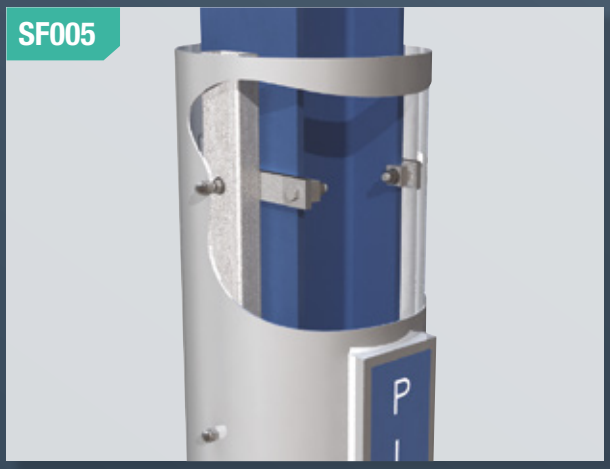
Station Fittings

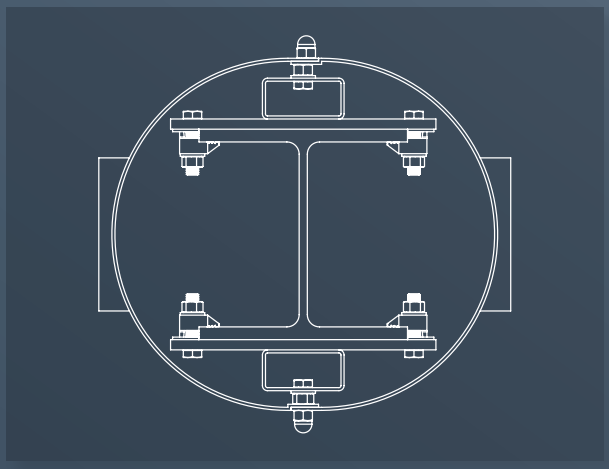
SF004



A security camera connected to an existing steel section with Type A clamps.

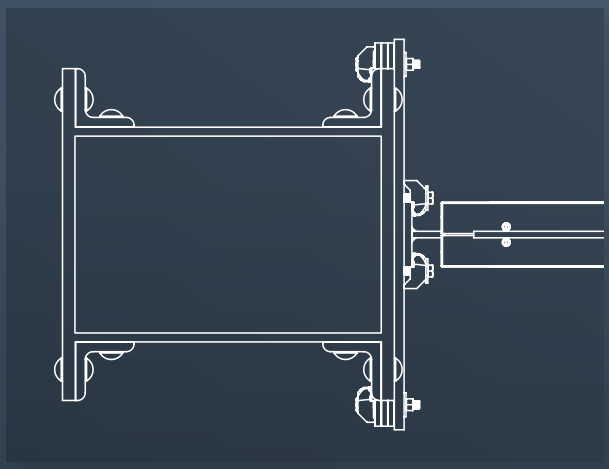
SF005





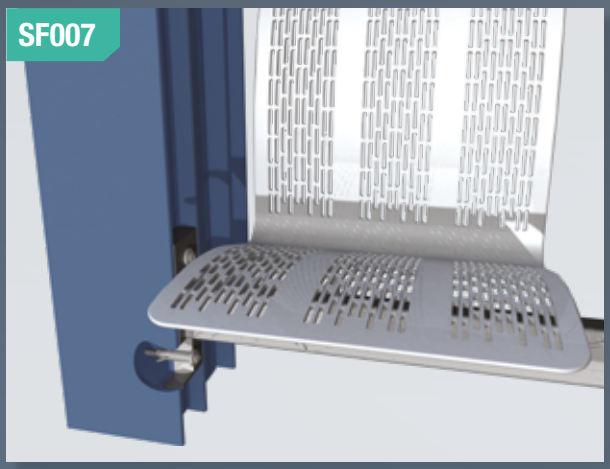
Aluminium sign connected to a structural platform beam with Type B fixings (Huddersfield Station, UK).

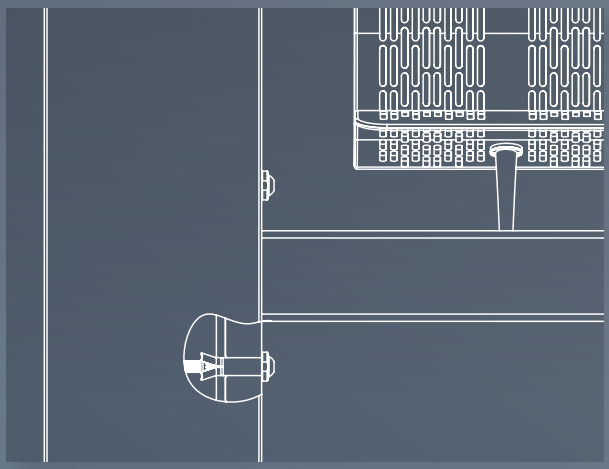
SF006



Signage secured in a friction application with High Slip Resistance Type AFs (Clapham Junction Station, UK).

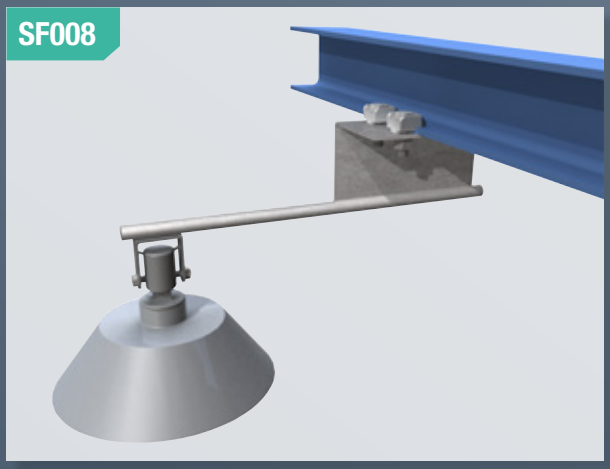
SF007

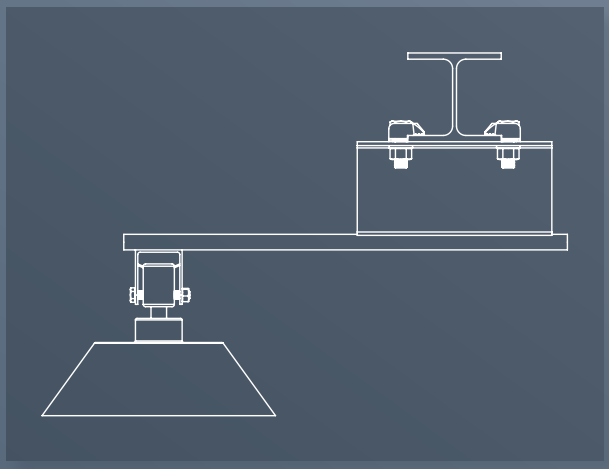




Security head Hollo-Bolts connecting seating to a steel platform frame (Phoenix Light Rail, USA).

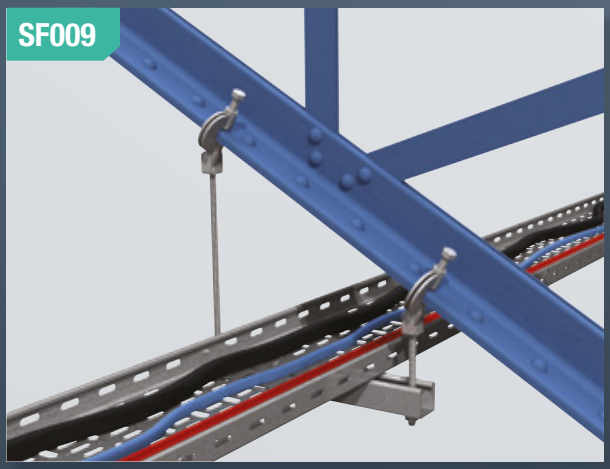
SF008

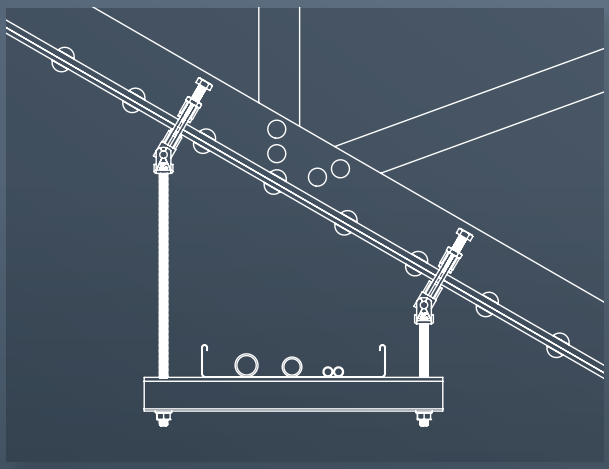




Type B clamps connecting a lamp bracket to supporting steelwork (Friedrichstraße Station, Germany).

SF009





Type FLS fixings used to connect cable trays to a platform roof's sloped steel flanges (Wimbledon Station, UK).

Electrification

Lindapter connections offer cost effective and easy to install solutions for railway line electrification.

Overhead catenary often runs along hundreds of miles of railway line, featuring thousands of connection points. The sheer quantity of connection points found along lines of Overhead Line Equipment (OLE) makes it crucial to find the optimum method of connecting electrification wires to the supporting steel.

Typical applications include:

- Hollow section connections
- I-Beam connections
- Suspending electrification from crossover beams

Fast, cost-effecitve installation:

- Only hand tools required
- No need for specialist labour
- Quick and simple process to ensure rapid electrification of entire lines

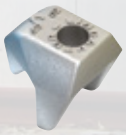
Corrosion resistance options available:

- Clamps and Hollo-Bolts are available bright zinc plated or hot dip galvanised
- Other coatings are available upon request
- Ideal for permanent connections in a range of environments

RECOMMENDED COMPONENTS FOR ELECTRIFICATION APPLICATIONS

Types A / B

Type CF



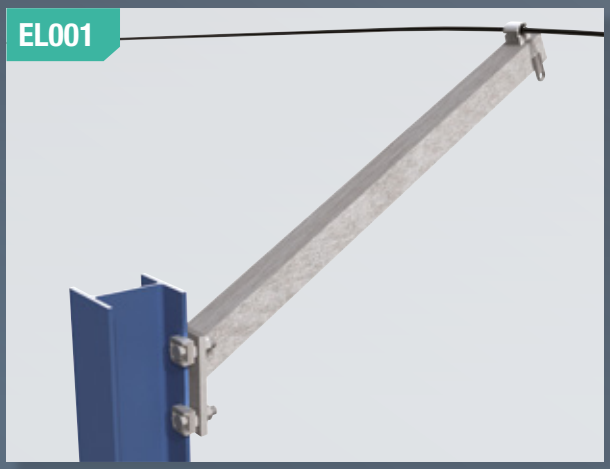
Type AAF

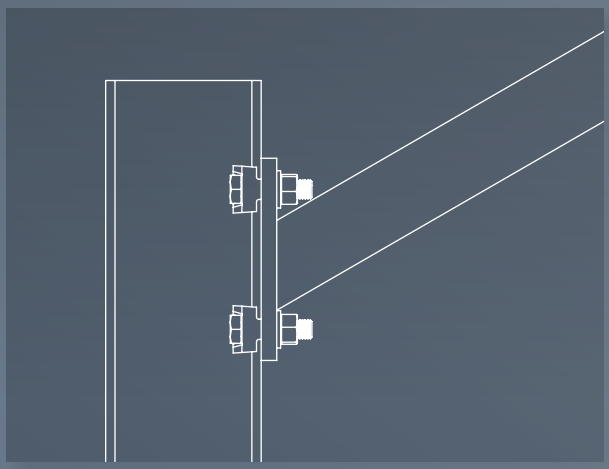
Type AF

Type LR

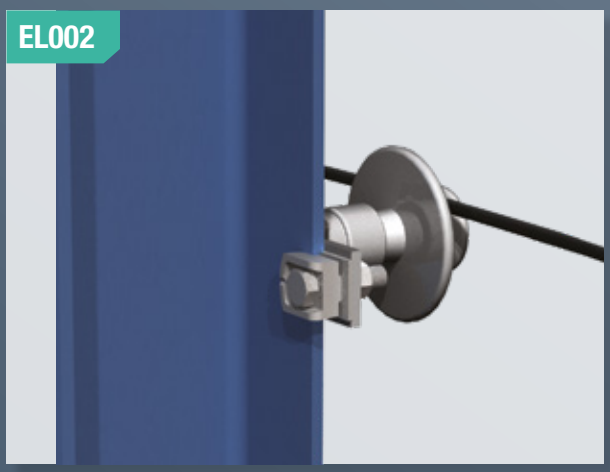
Hollo-Bolt®

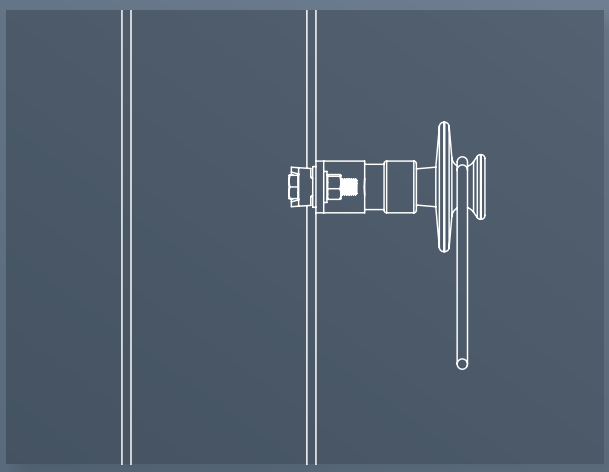
Please refer to the Lindapter catalogue or **www.Lindapter.com** for full product data.



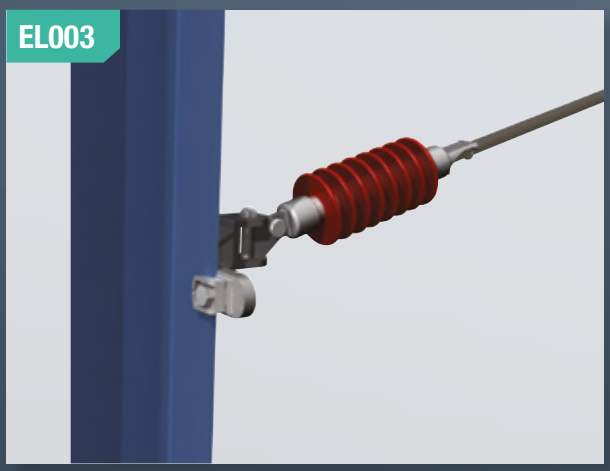


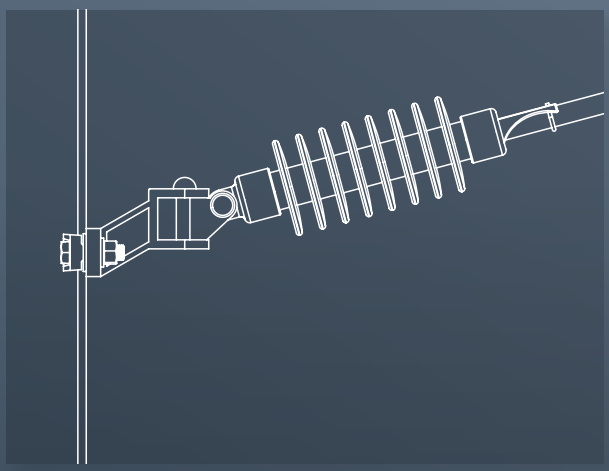
Type As used to connect cantilevered supports to masts (Gautrain High Speed Rail, South Africa).





Type As connecting the OLE's disc insulators, supporting catenary wiring (East Coast Mainline, UK).

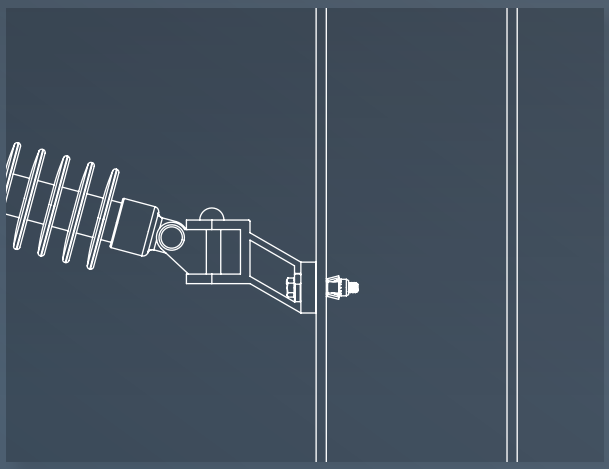




Type As used to secure OLE insulators to I-Beam masts (Frizinghall, UK).

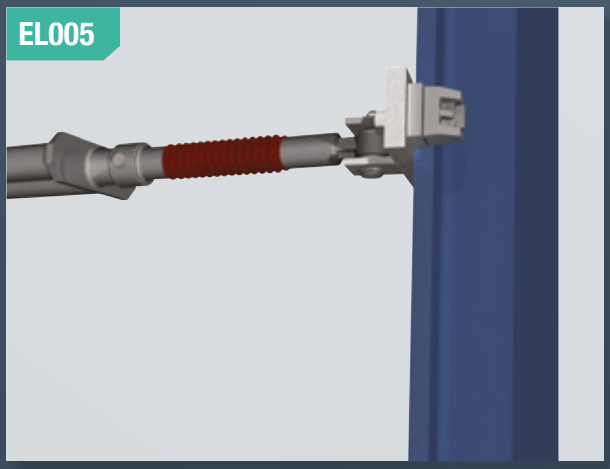
Electrification

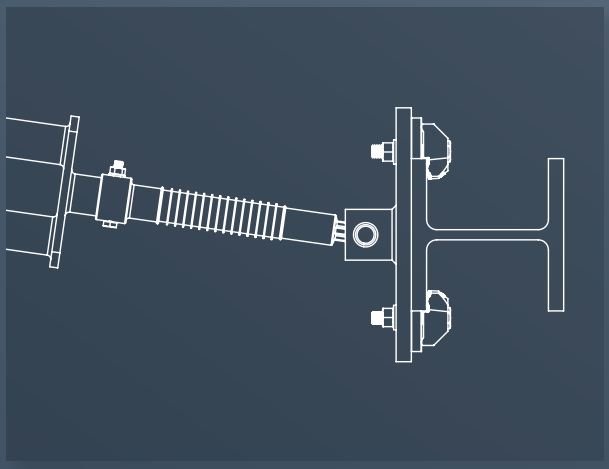
EL004



Hollo-Bolts fastening OLE to hollow section masts.

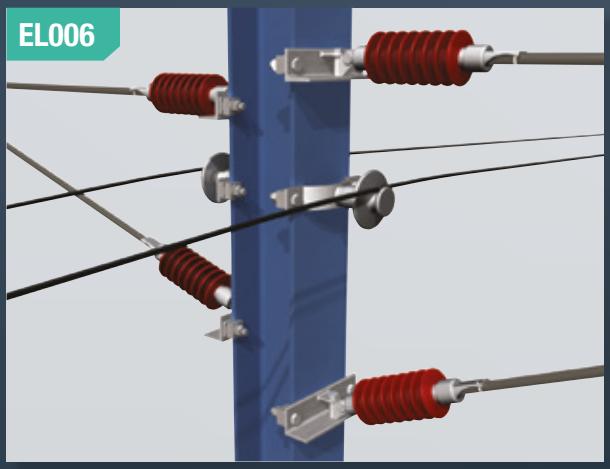
EL005

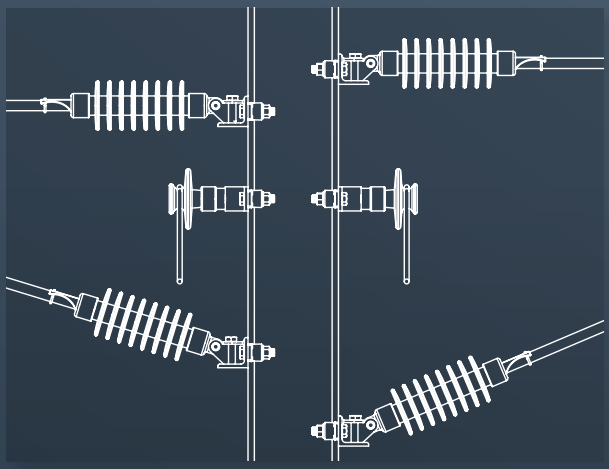




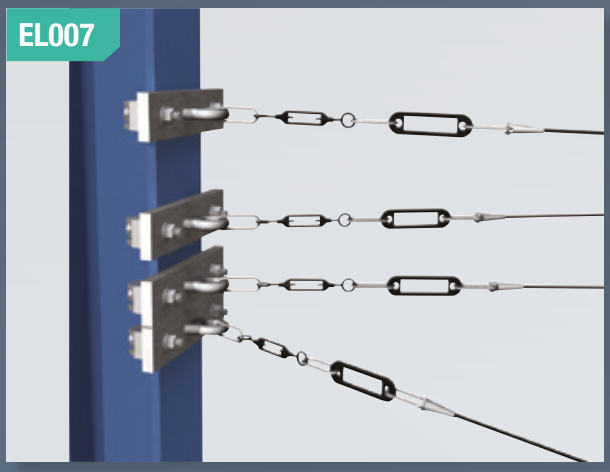
High Slip Resistant (HSR) Type AFs connecting OLE to I-Section masts (Claremont Ferrand Tramways, France).

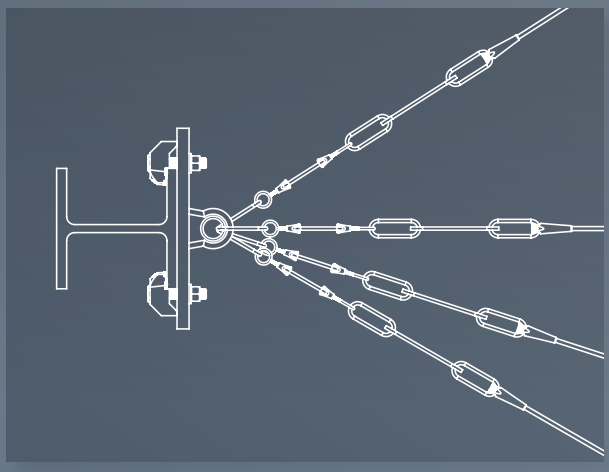
EL006



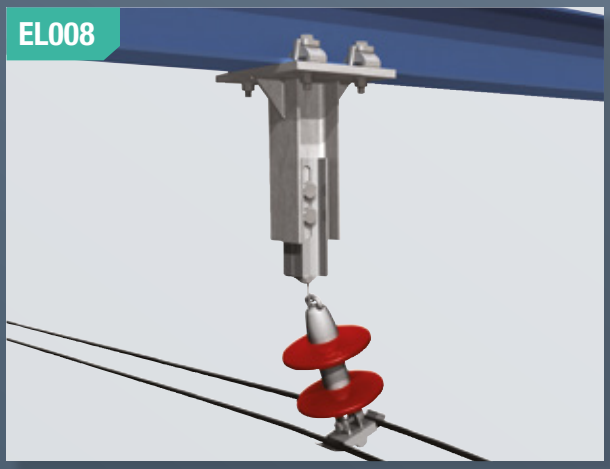


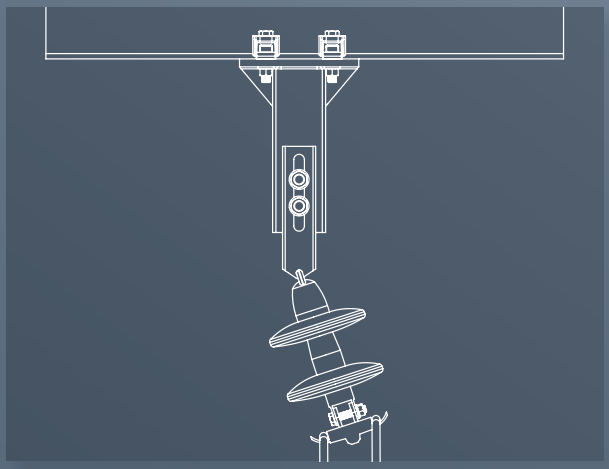
Type Bs connecting several supports to both flanges of a trackside mast (Perth Rail, Australia).



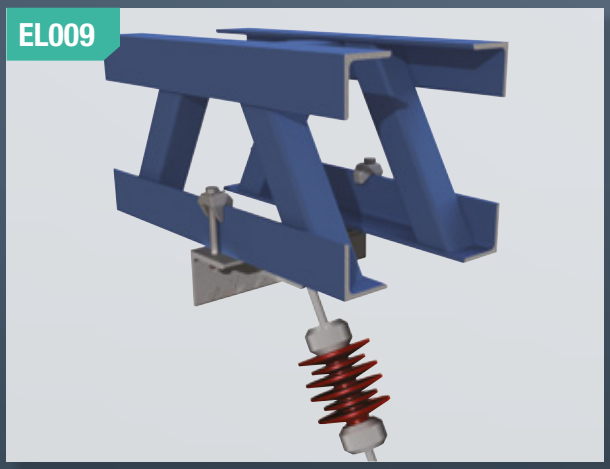


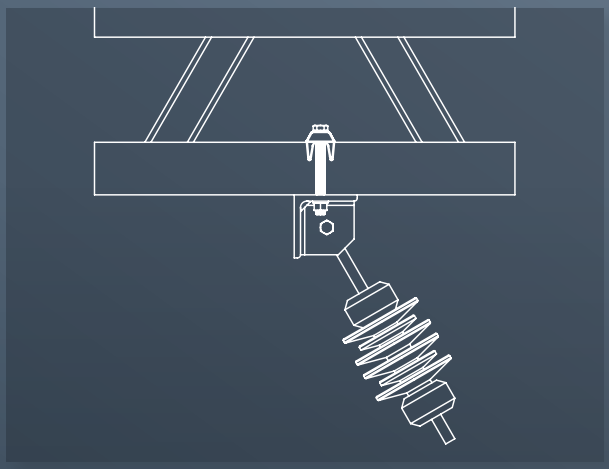
The HSR Type AF fastening several tension wire supports to a mast (Toulouse Tramway, France).





Type LRs connecting OLE to a support frame spanning across multiple tracks (RATP Paris, France).





Type CFs used to hang OLE from an overhead frame (Rail Infrastructure Corporation, Australia).

Rail Bridges

Lindapter product are ideally suited for use in the construction of new rail bridges and the strengthening and refurbishment of existing ones.

Lindapter's clamping method can be used in a wide range of bridge applications. As Lindapter clamps do not require any welding or drilling, surrounding transport lines, and sometimes even the bridge itself, can remain open whilst work is completed.

Typical applications include:

- Bridge strengthening
- Connecting maintenance access
- Securing services
- Attaching façade panels and signage

No welding or drilling:

- Avoids or minimises bridge, road and rail closures
- No hot work permits
- Specialist labour is not required

Free design service:

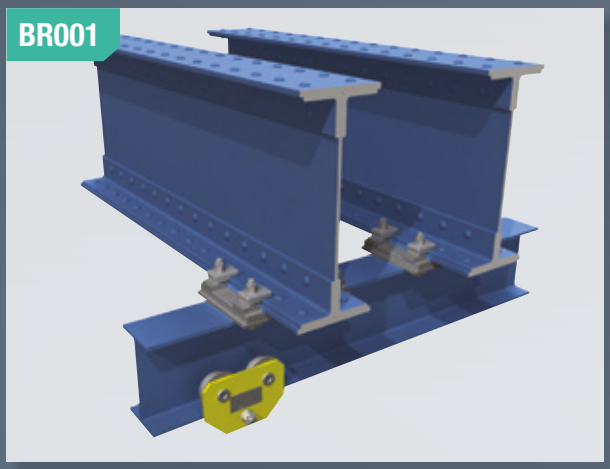
- Lindapter Engineers will provide a solution to your connection requirement
- Your connection will be designed and drawn free of charge
- Further support throughout the project is available

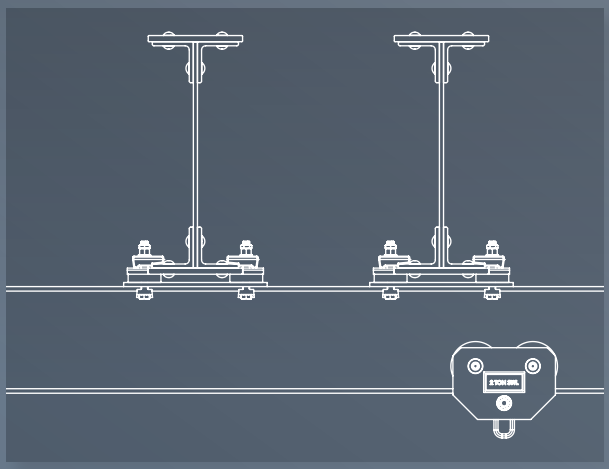
RECOMMENDED COMPONENTS FOR RAIL BRIDGE APPLICATIONS

Type A	Type B	Type RC	Type AAF	Type AF	Type LR

Please refer to the Lindapter catalogue or **www.Lindapter.com** for full product data.

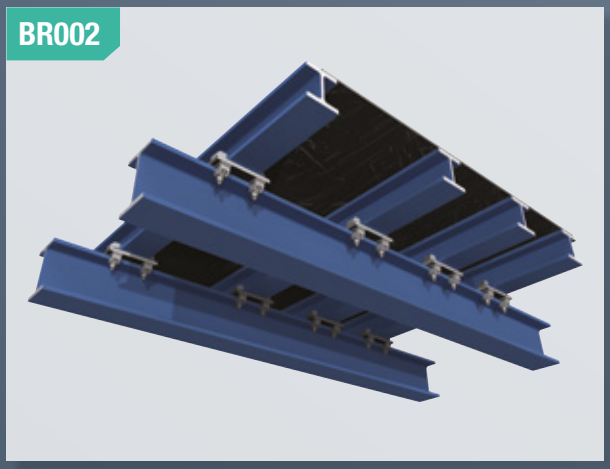
BR001

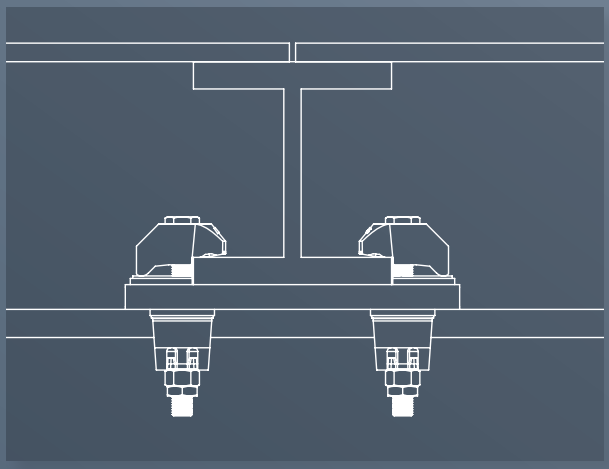




Type RCs securing overhead lifting gantry to allow restoration work (Newcastle High Level Bridge, UK).

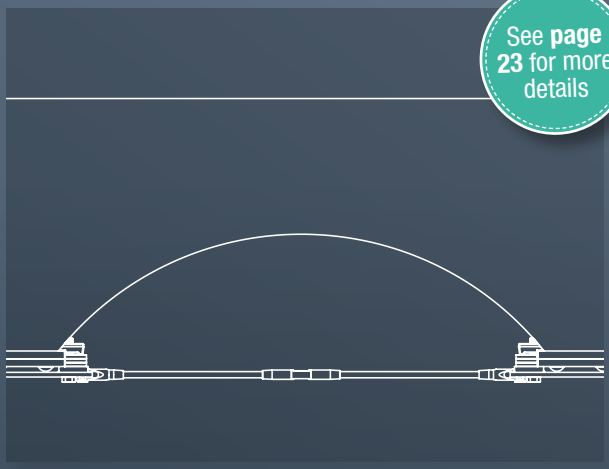
BR002





Type AF Girder Clamps strengthening the up line girders of a steel bridge (Morton's Leam Bridge, UK).

BR003



See **page 23** for more details

Type RCs connecting tie bar assemblies to existing jack arch bridge structure (HS1 Camley Street Bridge, UK).

Depots

Lindapter clamps and fixings provide a range of opportunities to save time and money on steelwork connections in train depots.

Lindapter designs and manufactures rail clips, that are ideally suited for low speed rails such as those found in train depots and workshops. Lindapter's general steelwork fixings also provide solutions for other steelwork connections, as listed below.

Typical applications include:

- Low speed rail clamps
- Crane and lifting point connections
- Maintenance access frame fixings

Versatile product range:

- Adjustable products available
- Packing pieces and washers for a precise fit
- Rail fixings, such as the Type RC Rail Clip, are designed to fit most rail types

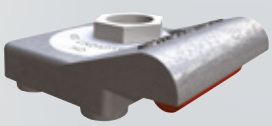
A range of Network Rail approved products:

- Many Lindapter steelwork fixings have been approved for use by Network Rail
- The entire product range comes with independently verified safe working loads and leading product approvals. See page 26 for more information.

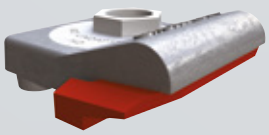
RECOMMENDED COMPONENTS FOR LOW SPEED RAIL APPLICATIONS

Type HD Soft / Hard

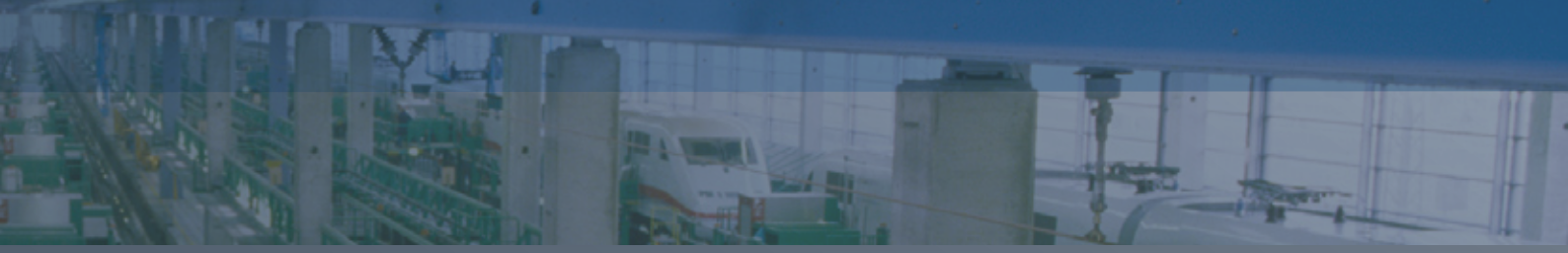
Type HD Spring



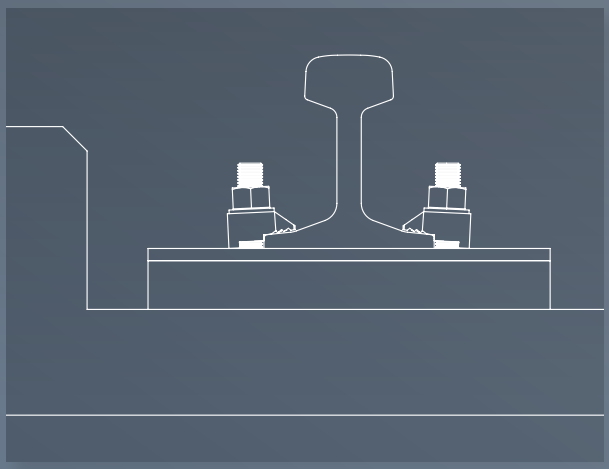
Type HD Isolated



Please refer to the Lindapter catalogue or **www.Lindapter.com** for full product data.

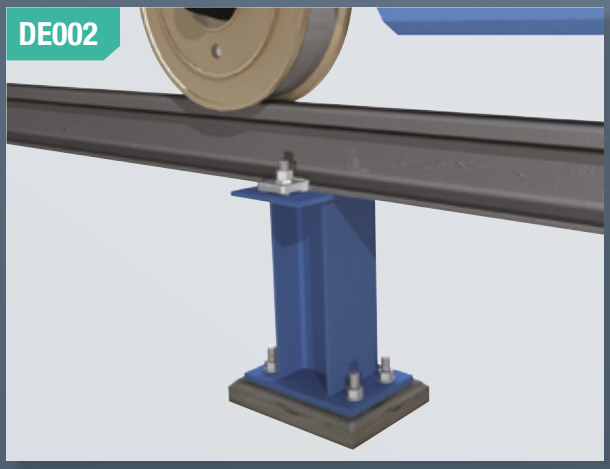


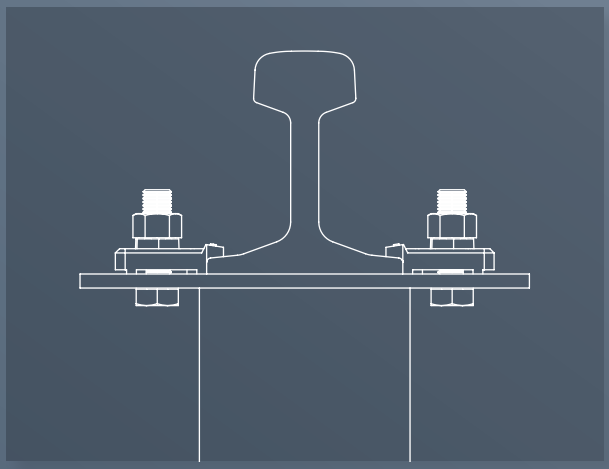
DE001



Type BR rail clamps used to connect a low speed rail in a depot (Manchester MPT, UK).

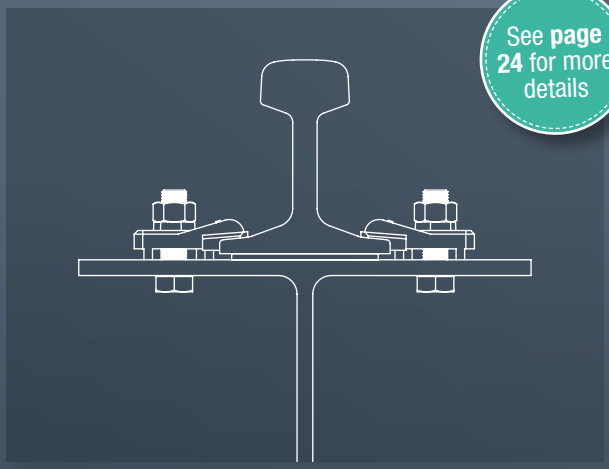
DE002





Type HD rail clips securing low speed rails to the end plates of steel supports (Derby Rail Depot, UK).

DE003



See **page 24** for more details

Type HD rail clips safely connecting rails onto elevated way beams (Hitachi Ashford Depot, UK).

Access Walkways

Access walkway is fitted throughout rail networks, in station buildings, depots and alongside railway lines.

Lindapter's innovative floor fixings connect steel flooring to supporting steelwork, without any drilling or welding, to provide a connection solution for maintenance walkway across vast rail networks. Access to the underside of the flooring is not required and installation and removal can be carried out quickly and safely from above for convenient maintenance access.

Typical applications include:

- Securing chequer plate flooring
- Fastening open bar grating walkways
- Fixing open bar grating stairways

Significantly reduced installation costs:

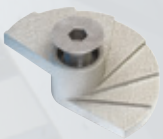
- Easy to install from above
- Often requires only one installer
- Specialist labour is not required

Permanent, but easy to remove connections:

- Corrosion resistant for a long-lasting connection
- Products are Lloyd's Type Register approved for vibration resistance
- Easy to remove individual plates for quick maintenance access

RECOMMENDED COMPONENTS FOR MAINTENANCE ACCESS APPLICATIONS

FloorFast®

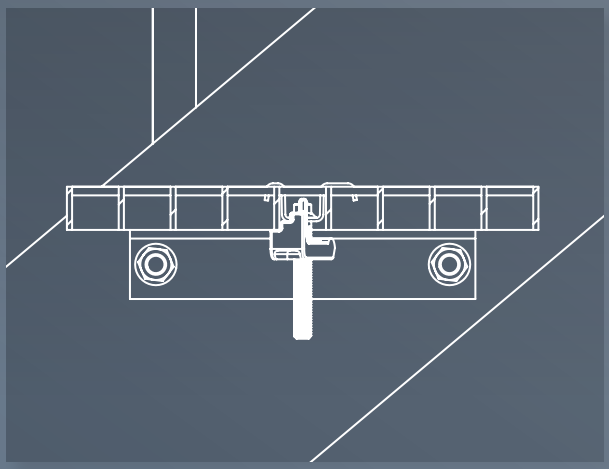


Grate-Fast®

Type 1055

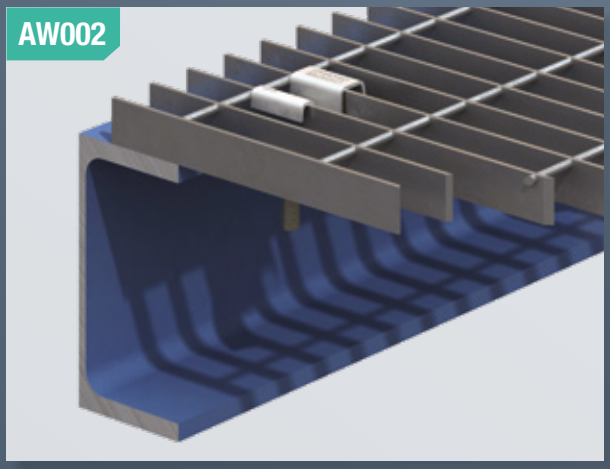
Please refer to the Lindapter catalogue or **www.Lindapter.com** for full product data.

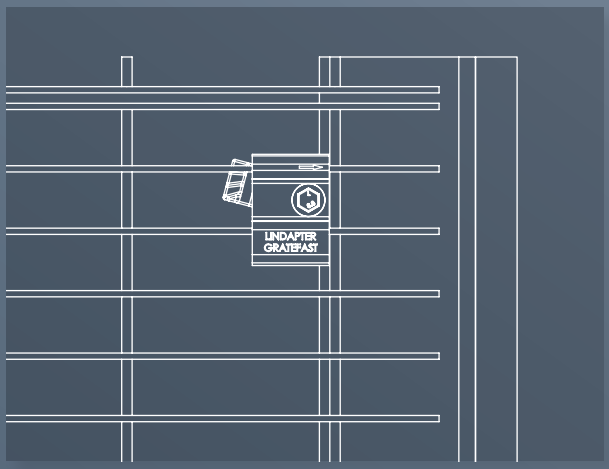
AW001



Grate-Fast used to connect an open bar grating stairway to the supporting steel frame.

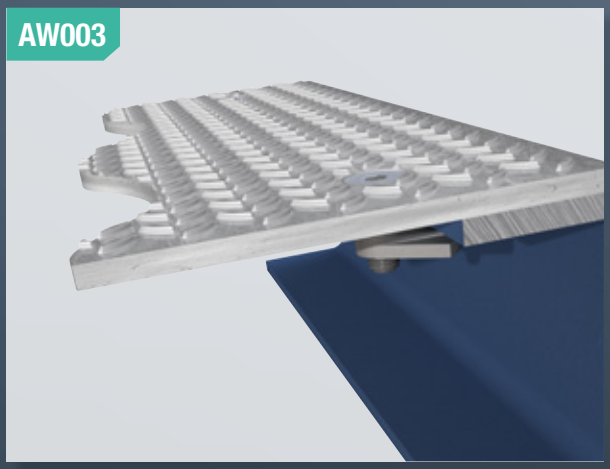
AW002

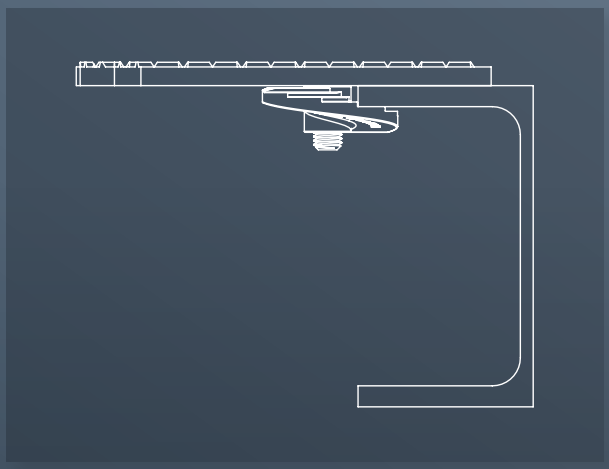




Grate-Fast used to connect steel grating walkway to supporting steelwork (State Railway NSW, Australia).

AW003





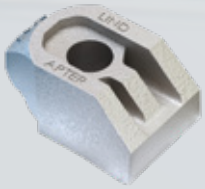
FloorFast steel floor fixings securing chequer plate walkway to supporting steel (Arnside Viaduct, UK).

Project Experience

ST PANCRAS STATION LONDON, UK

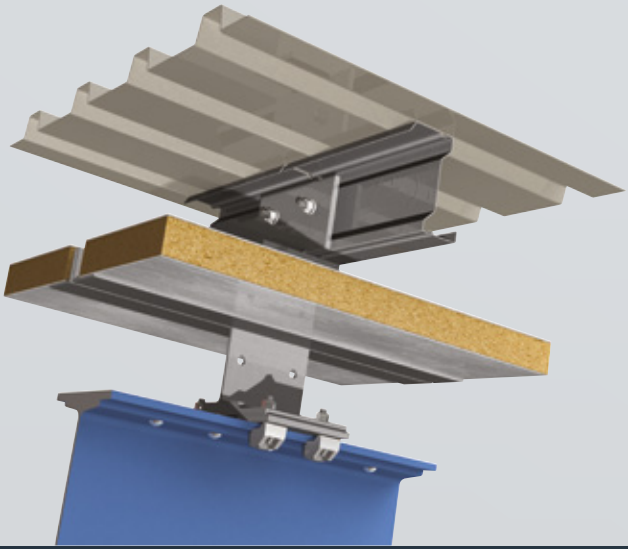
Application

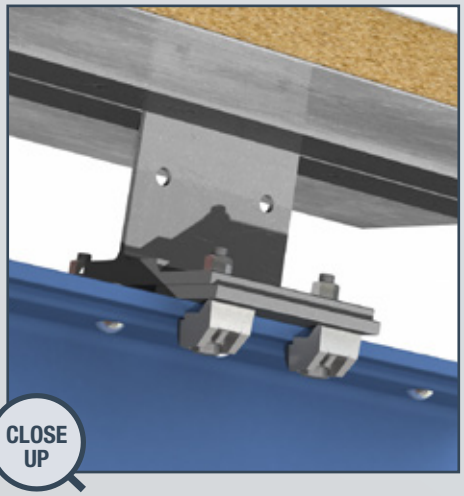
Lindapter's Type AF connects the steel framework of the new roof to the station's existing structure.



Project Overview

Type AF was specified to secure the steel framework of a new roof to the existing structure of the Grade 1 listed shed designed by William Henry Barlow at St Pancras Station. In the most crucial part of the refurbishment, Lindapter's high strength clamps avoided drilling or welding, thereby removing the risk of damaging the historic Victorian arches.

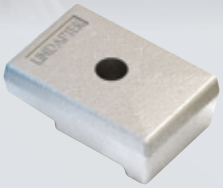




CAMLEY STREET BRIDGE (HS1) LONDON, UK

Application

Connection of a bespoke tie bar application to strengthen the Victorian ‘jack arch’ bridge.



Project Overview

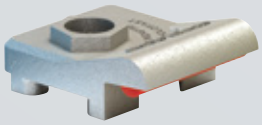
Lindapter’s Type RCs were used to upgrade Camley Street Bridge (the former Channel Tunnel Rail Link) to High Speed 1 (HS1), replacing corroded tie bars supporting the bridge’s arches. The Type RCs were used in a bespoke assembly, securing steel plates to the bridge’s original cast iron beams without any damage. Adjustable tendon assemblies were then connected to the plates, allowing tightening of the tie bars to strengthen the arches and prevent any lateral movement.

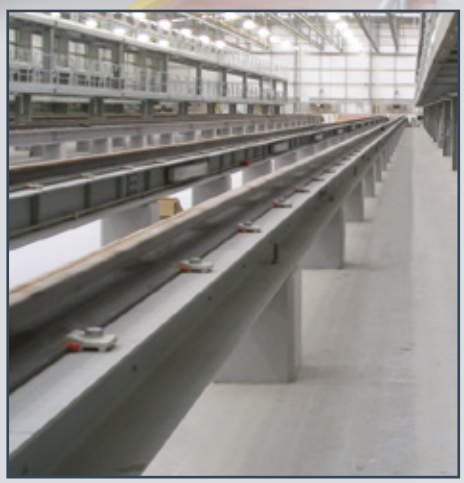
Project Experience

HITACHI ASHFORD DEPOT KENT, UK

Application

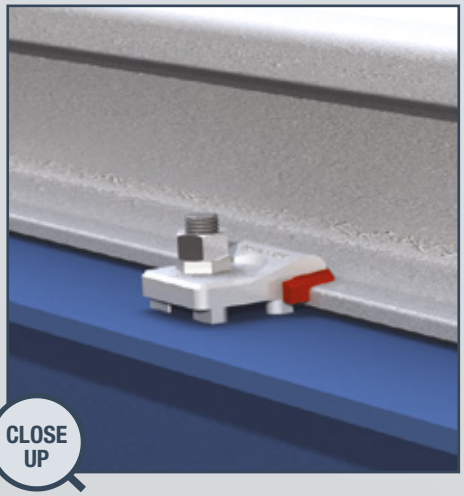
Lindapter Type HDs connect low speed lines at Hitachi's Train Maintenance Centre.





Project Overview

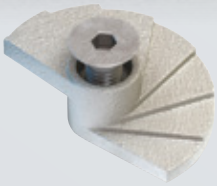
Lindapter's M20 Type HD Rail Clips were used to safely secure FB rails along lengths of UKC way beam, in turn supported by reinforced concrete plinths. These low speed rails were installed in pairs down the length of the new depot building to give access for maintenance and repair work on the trains. Type HDs facilitate the precise alignment of the rails by allowing a high degree of stepless lateral adjustability.



ARNSIDE VIADUCT CUMBRIA, UK

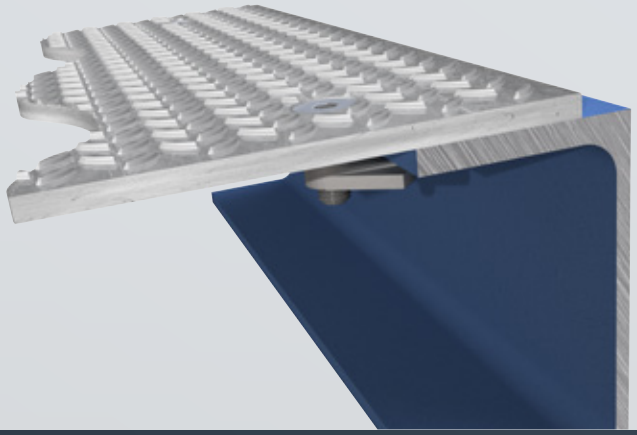
Application

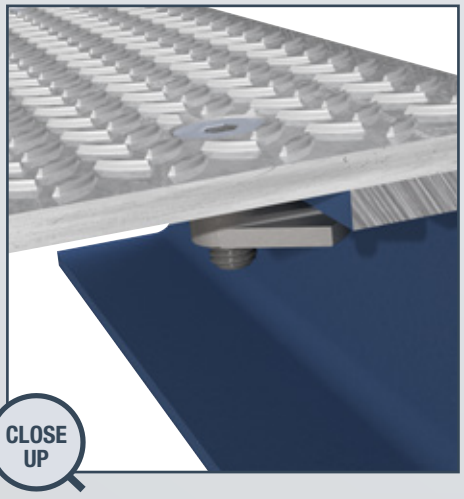
Lindapter's FloorFast® secures maintenance walkway alongside the replacement viaduct deck.



Project Overview

The major upgrade of the 150 year old Arnside Viaduct required the replacement of the entire deck. Chequer plate flooring was secured to supporting box girder sections along the length of the new deck using 8,000 of Lindapter's quick and easy to install FloorFast® fixings. The ease of installation allowed the flooring to be fitted as the deck units were removed, helping the major renovation to be completed on schedule.





Accreditation & Service

Independent Product Approvals

CE Marking provides additional assurance that a product complies with the Construction Product Regulation and will perform as stated in the corresponding Declaration of Performance (DoP). DoPs list Characteristic Resistances for use when designing connections to Eurocode 3. For more information, visit www.Lindapter.com/About/CE

Lloyd's Register Type Approved products have been subjected to tensile, frictional, vibration and shock tests, witnessed and verified by Lloyd's Register.

TÜV NORD is the certifying authority for safety, quality and environmental protection in Germany.

Loss Prevention Certification Board (LPCB) is a renowned International Certification body in the field of security and fire protection.

ICC-ES approved Hollo-Bolts (hexagonal head, HDG) are verified to resist seismic and wind loads in all Seismic Design Categories (A to F).

Factory Mutual, an American insurance organisation, offers an approval which is recognised by the fire protection industry worldwide.

Verband der Schadenversicherer is a leading German independent testing institutions for products used in fire protection applications.

Network Rail

The following products have been approved for use in specific rail applications by Network Rail:

Product	Size	PADS Cat No.
Type A (short)	M16	0011/137015
Type A (medium)	M16	0011/137014
Type A (long)	M16	0011/137013
Type CW	M16	0011/137515
Type P1S	M16	0091/041420
Type F3	M10	0011/137160
Type F3	M12	L121/153002
Type F3	M16	L121/153003
Type F3	M20	L121/153004
Type HB HCF	M16	0091/030201
Type HB HCF	M20	0091/030202
Type HD	M20	0057/077061

Quality and Environment

Q 05143

EMS 546660

Lindapter strictly enforces an **ISO 9001** quality management system that includes vigorous product testing to ensure consistently high manufacturing standards. Lindapter also operates an **ISO 14001** certified environmental management system and constantly monitors and improves aspects of the business that may have an impact on the environment, including the use of natural resources, the handling and treatment of waste and energy consumption.

Traceability

As part of Lindapter's ISO 9001 quality management system and in compliance with the Construction Products Regulation, Lindapter operates a comprehensive Factory Production Control system that ensures traceability of all Lindapter products throughout the manufacturing process.

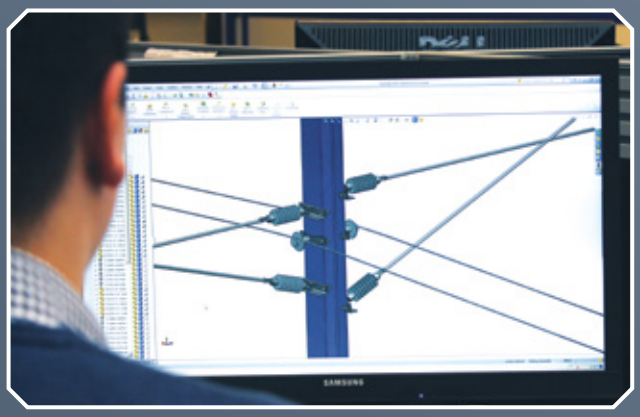
Associations

Lindapter is a member of the British Constructional Steelwork Association, The Steel Construction Institute, American Institute of Steel Construction and Southern African Institute of Steel Construction.

The Lindapter Service

Experienced Engineers offer an unrivalled support service, including free design and bespoke product development. Lindapter's philosophy is to deliver the highest quality at every stage of the service, from initial design through to installation guidance, see below:

FREE DESIGN PROPOSAL → 2D / 3D DRAWINGS → QUOTATION → GLOBAL DISTRIBUTION → INSTALLATION GUIDANCE



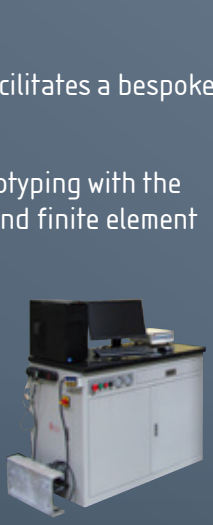
You will receive...

- ✔ Specialist advice from experienced Engineers
- ✔ Free connection design based upon your requirements
- ✔ Bespoke drawings delivered in 2D and interactive 3D formats
- ✔ CAD files that can be imported into all major software applications
- ✔ Contractor training and on-site visits (where required)

Engineered Solutions

Lindapter's Research & Development facility and unique expertise facilitates a bespoke product development service, referred to as 'Engineered Solutions'.

Supported by the latest technology including 3D printing, rapid prototyping with the aid of two in-house 1000kN hydraulic test machines (pictured right) and finite element analysis, Lindapter's Engineers can develop solutions that satisfy your connection demands.



Ask Lindapter to design a solution to your requirements. Call **+44 (0) 1274 521444** or email **support@Lindapter.com**

Lindapter®

Ask Lindapter to design a solution to your connection requirements:

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Fax: +44 (0) 1274 521 130
General Enquiries: enquiries@Lindapter.com
Technical Support: support@Lindapter.com

RAILUKSEP19