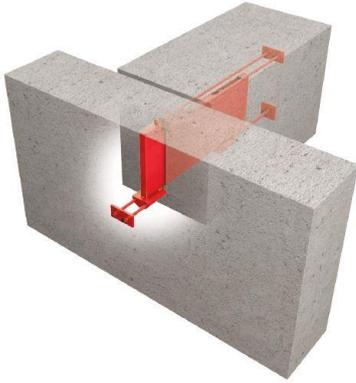


# Structural Frame Connections

## BSF Telescopic Connectors

### Product range

### BSF Telescopic Connectors



### Application



Utilising precast concrete beams and columns is an aesthetic and efficient method of concrete frame construction. Increasingly, architects seek visibility of the structural form, whilst maintaining elegance and structural integrity.

Precast beams are traditionally supported off brackets and corbels which are difficult and costly to form, reduce headroom and compromise architectural clean lines. For high-load beam connections (up to 1100 kN), the ideal solution is the BSF system, which is a 3-part telescopic connection incorporating a solid high-strength steel 'knife' to transfer loads between beams and columns, or beams to beams. BSF connectors leave a smooth soffit and are also suitable for round columns or skewed angle connections.

Owing to simplicity of installation, BSF connectors offer key benefits over rolled steel angle (RSA) or corbel connection methods, such as:

- Improved appearance
- Better on site health and safety

### Application

BSF connectors are used for a diverse range of applications, including:

- Connecting 'beams to beams' and 'beams to columns'
- Fixing beams at unusual angles
- Joining beams to round columns
- Stabilising parapets against vehicle impact when used in conjunction with TSS connectors

Different configurations according to beam and column interfaces are possible. To help you select the most appropriate connector, [technical enquiry forms](#) are available to download:

- Beam with rectangular cross section into another beam
- Beam with rectangular cross section into a column
- Beam with stepped cross section into a column

For other applications, please contact us for free technical and practical advice on product selection and installation.

### Product features

#### Beam to beam versions

- Three component system for connecting the end of a beam to the side of a beam
- Steel housing cast-in along the axis at the end of the first beam contains a heavy-duty steel 'knife' (bridging plate)
- Steel housing cast-in across the second beam acts as a receiving unit for the knife which is telescopically deployed
- Knife spans the joint between both beams, connecting them in shear

#### Beam to column versions

- Three component system for connecting the end of a beam to a column
- Steel housing cast-in along the axis at the end of the first beam contains a heavy-duty steel 'knife' (bridging plate)
- Steel housing cast into the vertical column has integral reinforcement welded to the underside, transferring high shear forces into the column

### Capacity

Capacity is up to 1100 kN, making BSF connectors ideal for heavyweight applications. To ensure lean and cost-efficient design, BSF connectors are available in standard capacities of 225 kN, 300 kN, 450 kN, 700 kN and 1100 kN. Connectors may be used in pairs for even higher load requirements. Integral bearing blocks are incorporated for correct seating of local reinforcement and to avoid localised crushing or cracking. Cold rolled grade S355 (minimum) steel is used, which has a high stress capacity.

### Robustness

UK regulations require all precast elements in the main structure to be anchored to provide robustness in the event of an incident. Robustness is achieved by reinforcement across the joint in conjunction with connector.

### Fire resistance

Grouting around the connector provides equivalent cover as concrete, therefore 40mm grout cover will give 2 hours fire resistance.

### About Invisible Connections

We supply the concrete construction industry with 'unseen' telescopic connection systems for stairs, landings, beams and columns. We are also specialist manufacturers of the FERBOX® reinforcement continuity system, to application requirements.

All our products meet industry demands for improved safety, construction efficiency and cost competitiveness. Our telescopic connection systems are endorsed by European Technical Approvals (ETAs). They comply with relevant Eurocode standards and are individually CE marked.

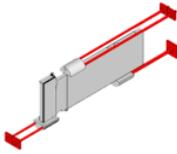
Our team provides free technical and practical advice on product selection and installation. Our technical specialism, innovative approach and manufacturing agility means we're often approached to help solve a specific issue. As a result, our product range continuously evolves to meet our customers' construction challenges.

Invisible Connections is the registered trademark of Norwegian company Invisible Connections AS. In 30 years, countless telescopic connectors have been used in construction projects around the world.

## Structural Frame Connections

### BSF Telescopic Connectors

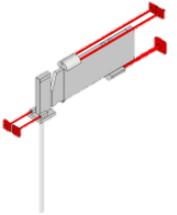
#### BSF product range



#### BSF BB (beam to beam version)

Five connectors are available for different vertical shear capacities:

- BSF 225 BB up to 225 kN
- BSF 300 BB up to 300 kN
- BSF 450 BB up to 450 kN
- BSF 700 BB up to 700 kN
- BSF 1100 BB up to 1100 kN



#### BSF BC (beam to column version)

Five connectors are available for different vertical shear capacities:

- BSF 225 BC up to 225 kN
- BSF 300 BC up to 300 kN
- BSF 450 BC up to 450 kN
- BSF 700 BC up to 700 kN
- BSF 1100 BC up to 1100 kN

Use in conjunction with BOLT2BOX where multiple connectors converge at the same height on a column.

#### BOLT2BOX



Where multiple beams adjoin a column at the same height, a BOLT2BOX in the column prevents reinforcement and lateral restraints colliding.

Accommodates convergence of up to 4 beam to column connections. Column units are held securely and accurately in position during casting. Use in conjunction with BSF BC connectors.

#### Resources

Further information is available at [invisibleconnections.co.uk](http://invisibleconnections.co.uk) and includes:

- Technical literature
- BIM / CAD files
- NBS Plus specification links
- Case studies

#### Standards

- Design is in accordance with the following standards:
- Eurocode 2: Design of concrete structures Part 1-1 General rules and rules for buildings.
- Eurocode 3: Design of steel structures Part 1-1 General rules and rules for buildings.
- Eurocode 3: Design of steel structures Part 1-8 Design of joints.

All BSF products are covered by appropriate **European Technical Approvals** (ETAs).

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