INVISIBLE CONNECTIONS

PRECAST CONCRETE CONNECTIONS
J&P augments the products of its parent companies by its partnership with Norwegian company, Invisible Connections™, specialists in the ‘unseen’ structural connection of precast stair landings and beam-to-column connections.

The Invisible Connections™ range of inserts was developed to meet the problem of unsightly support systems for precast slabs and beams.

Three ranges of inserts are available;

**TSS & RVK**
Primarily intended for precast stairs and landings, there are two standard capacities - 40 kN & 100 kN, with larger capacities available on request. They are also useful for conditions other than stairs (see pages 3-5).

**DTS**
This natural extension of the TSS range offers capacities up to 150 kN, making it ideal for smaller beams or heavy slabs.

**BSF & BCC**
These inserts are designed for heavy-duty beam supports, with capacities up to 950 kN for BSF, and up to 1400 kN for BCC.

The capacities above are resistances to factored loads (1.5 x live load, 1.35 x dead load).

The Invisible Connections™ range is manufactured in Norway, using state-of-the-art robotic machinery.

Design is in accordance with the following standards:


Steel is grade S355
Products are covered by appropriate European Technical Approvals, based on testing at SINTEF - the largest independent research organisation in Scandinavia.

TSS & RVK inserts have full ETA certification as required by EC2.
Traditionally, precast slabs such as stair landings used to be supported by a steel angle bolted to the wall. Installation of these was slow, required high degrees of accuracy, tied up the crane with costly hook time and could only be used on straight walls. Shimming and adjustment had to be done from underneath the suspended slab. Once installed, the angles needed to be fire-proofed and hidden from view.

The TSS and RVK range of inserts was developed specifically to address these and other needs.

### Bolted-on angle
- Installation of bolts is costly
- Accurate positioning of bolts required
- Large/long angle requires crane
- Drilling may hit reinforcement
- Large clearance gap required for bolts/nuts
- Tools required to install bolts
- Pre-installed angles obstruct stairwell for following trades
- Shimming/adjustment is done from below slab
- Fire protection required
- Visual treatment required
- Difficult to install on curved walls

### TSS/RVK
- No bolts required
- Void in wall leaves ample tolerance
- No angle = No crane
- Voids formed between bars
- Tolerance gap only is required
- No tools required
- No obstructions = clear route for following trades
- All operations are from above
- Inserts automatically fireproofed after grouting
- Inserts are concealed from view
- Handles any shape

### Capacities
- TSS41 & RVK41 = 40kN
- TSS101 & RVK101 = 100kN

Larger sizes are available - giving up to 120kN capacity. Inserts may be used in pairs for even higher load requirements.
TSS & RVK are not limited to being used only in stair situations, as these examples show.

RVK inserts in these large architectural beams allowed complex connections with no corbels.

TSS inserts ‘on-edge’ in these beams allowed corbel-less spanning between curved supports.

At the Olympic Athletes Village, TSS inserts supported bridge decks between accommodation blocks.

TSS inserts are the ideal method of stabilising parapets against vehicle impact, with no connection left on view. BSF inserts provide the vertical support.
TSS & RVK units have a number of additional benefits.

Using RVK and TSS enables architects to maintain clean lines, and provide a more aesthetic appearance.

TSS units can be used in pairs to allow higher, concentrated loads in certain areas.

TSS inserts shown here being used in a curved concrete unit - demonstrating the greater flexibility provided by using the system.

Retro-fit can be achieved by core drilling and inserting the units - as shown.
DTS Inserts

These are similar in design and usage to TSS inserts, and many of the aforementioned details still apply.

Standard inserts have capacities of 120kN and 150kN.

An integral half-round bearing block ensures correct bedding of local reinforcement, avoiding local crushing.

BSF & BCC inserts

For heavy loads from beams into columns, walls or other beams, the ideal solution is the BSF or BCC system. These are similar in principle as shown.

### Capacities of BSF & BCC inserts

<table>
<thead>
<tr>
<th>Type</th>
<th>BSF 150/20</th>
<th>BSF 200/20</th>
<th>BSF 200/30</th>
<th>BSF 200/40</th>
<th>BSF 200/50</th>
<th>BSF 250/50</th>
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<tbody>
<tr>
<td>Capacity</td>
<td>200kN</td>
<td>300kN</td>
<td>450kN</td>
<td>600kN</td>
<td>700kN</td>
<td>950kN</td>
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<table>
<thead>
<tr>
<th>Type</th>
<th>BCC 250</th>
<th>BCC 450</th>
<th>BCC 800</th>
<th>BCC 1400</th>
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<tbody>
<tr>
<td>Capacity</td>
<td>250 kN</td>
<td>450 kN</td>
<td>800 kN</td>
<td>1400 kN</td>
</tr>
</tbody>
</table>
Traditionally, beams were supported from columns using integral corbels. Apart from being difficult and costly to form in the column, they reduce headroom locally and spoil the appearance.

Using BSF/BCC does away with the need for corbels, leaving a smooth soffit. Round, or odd-shaped columns present no problems.

Traditional corbel design.

Corbel-less BSF design on round column.

BSF insert in a beam with “knife” component projecting.

Inserts work equally well with beam/beam as with beam/column.