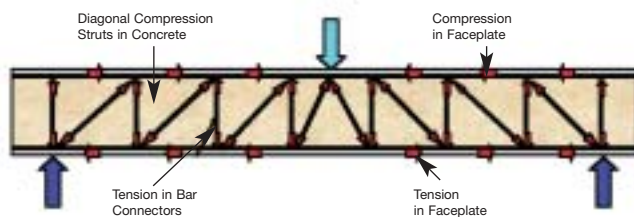


The Bi-Steel construction panel

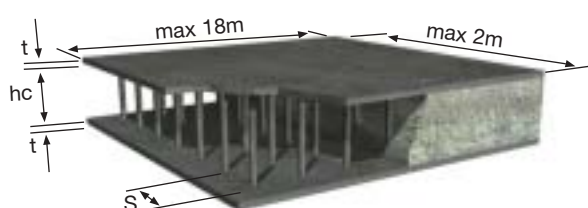
Bi-Steel is a steel-concrete-steel composite construction system. A Bi-Steel panel consists of two steel faceplates held apart by an array of transverse bar connectors. The panels are factory produced, enabling high and consistent quality to be achieved.

A patented manufacturing process produces panels to tight tolerances by friction welding the bars to both plates. Friction welding is more commonly used within the mechanical engineering industry for severely loaded components, where high quality, reliable welds are needed.

The basic steel shell of a Bi-Steel panel has only a proportion of the strength and stiffness of a panel filled with a structural grade of concrete. The addition of the concrete changes the behaviour of the steel shell to a structural composite - similar to reinforced concrete. For ease of handling, concrete is normally placed within the panels after panel erection has begun on site. During the placement of concrete, the steel facing plates act as load bearing formwork. This enables high concreting pressures to be sustained during construction.



With the faceplates connected to one another and the concrete core, the entire section behaves as a single component rather than individual elements. The steel faceplates provide resistance to in-plane and bending forces whilst the concrete provides resistance to compressive and shear forces. The bar connectors are multi-functioning and provide shear reinforcement to the concrete core; they carry longitudinal shear flow between the faceplates and the concrete core, prevent faceplate buckling and provide a permanent tie between front and rear plates. The concrete behaves in exactly the same manner, providing a mechanism for shear transfer. Bi-Steel has the advantages that the faceplates provide a significant area of steel reinforcement (8mm plate equivalent to T32 bars @130mm centres) and are in the optimal position to maximise moment resistance. Bi-Steel panels exhibit ductile characteristics. It is this ductility that makes Bi-Steel a material of natural choice for blast resistant structures.



$t = 5$ to 20mm
 $hc = 200$ to 700mm
 Bar diameter = 25mm
 Min $S = 200\text{mm}$
 Min $R = 1500\text{mm}$

Notes:

- Plate material can be varied. Standard material is S355 J2G3, but other materials are available, including stainless steel
- Different plate materials can be used in the same panel.
- Panel configurations are specified using shorthand notation in the form of $t_1/hc/t_2$. For example, a panel comprising of a 5mm upper plate, a 10mm lower plate and a concrete depth of 400mm is referred to as 5/400/10.

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Bi-Steel panels are available in both flat and curved form. The figure shows the range of thicknesses, sizes and bar spacings. It is possible to make sections with unequal plate thicknesses. If sizes outside the specified range are required, please contact Corus Bi-Steel for advice.

Bi-Steel panels are available in a variety of materials. The standard face plate material is S355JR to BS EN 10 025: 1993 (equivalent to Grade 50B to BS 4360: 1986). Bar connectors are 070M20 to BS 970: Part 1: 1991. Other grades of structural steel may be used, although tests may be required. Contact Corus Bi-Steel for further information.

During service, a Bi-Steel structure can be protected from corrosion, abrasion or fire by applying suitable surface protection. These may either be applied within the factory, on-site or a combination of both. Panels are normally supplied uncoated. Primed or pre-finished panels can be supplied on request. Note that when panels are pre-finished (i.e., under coats and top coats applied in the factory) there will generally still be paint to apply along site weld seams. However, for large panels the area of painting to be done on site is greatly reduced.

Quality

For ease of fabrication, Bi-Steel is manufactured to tight dimensional tolerances. All components and processes used in the manufacture of Bi-Steel are traceable. Each and every weld produces an electronic signature, which is automatically compared against predefined limits. There is a full quality management system covering design, manufacture, project management and fabrication of Bi-Steel structures approved to ISO 9001:1994 by LRQA Ltd, certificate no. LRQ 0860859.



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