Network & thermal performance of thermal break materials

Steel as a material has many advantageous properties that enable it to be used successfully in a wide range of structural applications. However, in some situations the relatively high thermal transmittance of steel can be a disadvantage. Energy efficiency is an increasingly important parameter in the design of buildings and the thermal insulation provided by the building envelope is key to energy efficiency. However, where structural steel elements penetrate the envelope, thermal bridges lead to local heat losses that reduce the efficiency. Thermal breaks can be provided in structural connections to reduce the heat losses through the steel elements. The Steel Construction Institute (SCI) and Farrat Isolevel Ltd have been working together to establish the structural and thermal performance of thermal break materials and the implications of including thermal break plates for the design of structural steelwork connections.

Two thermal break materials were considered in this project: Farrat TBK and Farrat TBL. Thermal break plates are used between flanged connections of internal and external steelwork or internal concrete and external steelwork to reduce thermal transmittance through the connection to reduce cold bridging.

SCI have produced a comprehensive report that describes the structural and thermal properties of the Farrat thermal break materials TBK and TBL. The properties are supported by test data and have been confirmed by independent review carried out by SCI. From the test data for TBK and TBL, SCI has derived resistance values suitable for use in structural design. Statistical analytical methods have been used to determine characteristic values and partial factors have been applied to obtain design values.

The test programme was conducted in accordance with European standards and included: compressive strength; elastic modulus; thermal conductivity; density; water absorption; and long-term creep.

SCI determined a set of recommended design checks which should be used when thermal break materials are used in structural connections. The design checks included:

- compression resistance of the thermal break;
- connection rotation due to short-term compression of thermal break;
- connection rotation due to long-term creep;
- bolt shear resistance for connections with packs; and
- bolt shear resistance for connections with large grip lengths.

The conclusions of the work carried out by SCI are that Farrat thermal break materials TBK and TBL can be used in structural applications provided that the appropriate structural design considerations are included and the modifications to the connection design process as detailed in the SCI Report RT1584 are carried out.

As a result of SCI's independent review, Farrat thermal break materials TBK and TBL and the associated technical data presented in SCI Report RT1584 has been granted “SCI Assessed” status. Detail of the work can be viewed at [www.sci-assessed.com](http://www.sci-assessed.com) and [www.farrat.com/thermal-break-connection-107.html](http://www.farrat.com/thermal-break-connection-107.html).

The work carried out by SCI and Farrat Isolevel Ltd has also been reviewed by NHBC. Farrat thermal breaks meet the NHBC’s technical requirements and NHBC accepts the use of Farrat TBK and TBL for structural applications as set out in the SCI report RT1584.

For further information please contact Andrew Way, Manager of Light Gauge Construction and Product Assessment, SCI (01344 636 577; E-mail: a.way@steel-sci.com).