

AD 362

Headed shear studs – Resistance and minimum degree of shear connection in composite beams with decking

This Advisory Desk note highlights the key changes to BS 5950-3.1:1990 as a result of Amendment no 1, issued in January 2010. Amendment 1 reflects the findings of extensive experimental studies on the performance of “through-deck welded” headed shear studs in composite beams. The studies included beam tests and small scale push tests carried out by SCI. As a result of this work, guidance on the design resistance and ductility of headed shear studs given in BS 5950-3.1:1990 was revised.

In BS 5950-3.1, the resistance of the headed shear studs may be calculated in accordance with Clause 5.4.7, which includes modified expressions for the k factor to reflect the resistance of headed shear studs in transverse decking.

The evidence from beam tests showed that headed shear studs were more ductile than shown by small scale push tests. This greater than expected ductility allowed the use of ‘more relaxed’ rules for the degree of shear connection requirements. Based on the results of numerical modelling, revised rules for higher ductility shear connectors in unpropped construction are given in Clause 5.5.2.3.

Due to the limited number of parameters tested, Clause 5.5.2.3 may only be used for unpropped construction, where the limits given in 5.4.7.1 (e.g. 19 mm diameter studs) are satisfied and where the ribs of the trapezoidal deck are perpendicular to the beam (secondary beams). In other cases, the rules given in Clause 5.5.2.2 may be used. A comparison between the rules given in Clause 5.5.2.2 (Ductile shear connectors) and 5.5.2.3 (Higher ductility

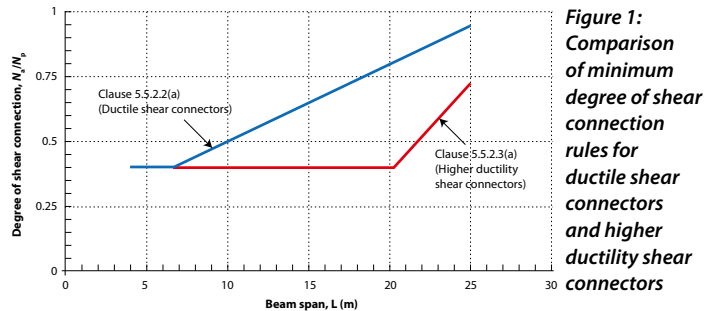


Figure 1: Comparison of minimum degree of shear connection rules for ductile shear connectors and higher ductility shear connectors

shear connectors) is shown in Figure 1 for an unpropped symmetric beam in grade S355 steel.

The findings of the studies can also be applied when designing in accordance with BS EN 1994 1 1:2004. Two items of non-contradictory complementary information (NCCI) have been published on Steelbiz (www.steelbiz.org) – see documents PN001a-GB: *Resistance of headed stud shear connectors in transverse sheeting* and PN002a-GB: *Modified limitation on partial shear connection in beams for buildings*.

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New and revised codes & standards

From BSI Updates September 2011

DRAFTS FOR DEVELOPMENT

DD ISO/TS 24679:2011

Fire safety engineering. Performance of structures in fire

No current standard is superseded

NEW WORK STARTED

EN 10169:2010/A1

Continuously organic coated (coil coated) steel flat products. Technical delivery conditions

EN 10268:2006/A1

Cold rolled steel flat products with higher yield strength for cold forming. Technical delivery conditions

EN 13374

Temporary edge protection systems. Product specification, test methods
Will supersede BS EN 13374:2004

EN 13381-6

Test methods for determining the contribution to the fire resistance of structural members. Applied protection to concrete filled hollow steel columns

EN ISO 18275

Welding consumables. Covered electrodes for manual metal arc welding of high strength steels. Classification

ISO 16160

Continuously hot-rolled steel sheet products. Dimensional and shape tolerances
Will supersede BS ISO 16160:2011

ISO 16162

Continuously cold-rolled steel sheet products. Dimensional shape and tolerances
Will supersede BS ISO 16162:2010

ISO 16163

Continuously hot-dipped coated steel sheet products. Dimensional and shape tolerances
Will supersede BS ISO 16163:2010

DRAFT BRITISH STANDARDS FOR PUBLIC COMMENT – ADOPTIONS

11/30191086 DC

BS ISO 12633-1 Hot-finished structural hollow sections of non-alloy and fine grain steels. Technical delivery conditions

11/30191090 DC

BS ISO 12633-2 Hot-finished structural hollow sections of non-alloy and fine grain steels. Dimensions and sectional properties

11/30191093 DC

BS ISO 10799-1 Cold-formed welded structural hollow sections of non-alloy and fine grain steels. Technical delivery conditions

11/30191096 DC

BS ISO 10799-2 Cold-formed welded structural hollow sections of non-alloy and fine grain steels. Dimensions and sectional properties

DOCUMENTS NOT ISSUED AS DPCs

EN ISO 3581

Welding consumables. Covered electrodes for manual metal arc welding of stainless and heat-resisting steels. Classification

The CEN Technical Sub-Committee TC121/SC3 are considering the adoption of ISO 3581:2003, its Corrigendum 1:2008 and its amendment 1:2001 as a European Standard. As the ISO documents have been published for some time, they are not being issued as a Draft for Public Comment. If the ISO 3581 is adopted in Europe, it will be implemented in the UK and replace BS EN 1600:1997.

CEN EUROPEAN STANDARDS

EN 1090-2:2008+A1:2011

Execution of steel structures and aluminium structures. Technical requirements for steel structures