

AD 377

Placement of headed stud shear connectors in troughs of profiled steel sheets with a central stiffener

Some types of profiled steel sheets (PSS) have a central stiffener in the trough, which makes it impossible to place the headed stud(s) centrally in the trough. This advisory desk note clarifies the existing guidance regarding the position of studs in the troughs of PSS with central stiffeners. Clause 6.6.5.8(3) of BS EN 1994-1-1:2004¹ states that in this case the studs should be placed alternately on the two sides of the trough ('favourable' and 'unfavourable' positioning), throughout the length of the span. SCI has already provided guidance in revised Publication P300² (Section 5.3.1 on page 68/69 and Figure 5.9 (a), (b) and (c)) and NCCI PN001a-GB³ that complements BS EN 1994-1-1:2004 provisions, by advising that the studs should be placed in the 'favourable' side of the trough (Figure 5.9 (c) of SCI P300) in order to have the best possible results in terms of resistance and ductility. 'Favourable' is defined as the side of the trough closer to the

nearer support so that the zone of concrete in compression in front of the stud is larger than that behind the stud. This requires a change in stud position at mid-span of a uniformly loaded, simply supported beam. It is believed that the reason why this was excluded from BS EN 1994-1-1:2004 was related to the possible errors that might occur on-site with regard to identifying the 'favourable' side for welding the studs. It is also considered that the proposed 'staggered' arrangement (Figure 5.9 (b) in SCI P300), in which pairs of studs are welded on the 'favourable' and 'unfavourable' sides of the trough, would be equivalent to having two studs placed in the central position.

Designers are still advised to place the studs (single or pairs) in the 'favourable' side, when profiled steel sheets with a central stiffener are used, as indicated in SCI P300 (Figure 5.9 (c)), which will lead to the optimum performance. When pairs of studs are used, if it is not possible

to place both in the 'favourable' position, then a 'staggered' pattern within the trough may also be adopted.

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1. BS EN 1994-1-1:2004 (Incorporating corrigendum April 2009) Eurocode 4 – Design of composite steel and concrete structures – Part 1-1: General rules and rules for buildings.
2. Rackham JW, Couchman GH and Hicks SJ (2009) Composite Slabs and Beams using Steel Decking: Best Practice for Design and Construction (Revised Edition). Publication P300, Steel Construction Institute, Ascot, Berkshire.
3. Steel Construction Institute (2010) NCCI: Resistance of headed stud shear connectors in transverse sheeting (PN001a-GB). <http://www.steel-ncci.co.uk>.



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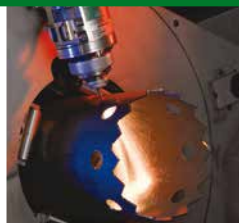
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