AD 458:
Web panel shear resistance

This AD relates to a bolted moment-resisting connection and the determination of the shear force in the column web panel, and in particular the selection of a lever arm as part of that calculation. In the following advice, the axial force in the beam is assumed to be zero, for simplicity.

In a moment resisting connection designed in accordance with BS EN 1993-1-8, the total tension, being the summation of the force in each bolt row, cannot exceed the resistance of the compression zone, or the shear resistance of the column web panel. If necessary, the forces in the bolt rows are reduced.

The moment resistance of the connection is then calculated by multiplying the resistances of the bolt rows (reduced if necessary) by their lever arms. The connection resistance is then compared to the applied moment.

It should be noted that in this process, the *resistance* of the connection is calculated.

If the resistance if the column web panel was limiting the development of tension in the bolt rows, and thus limiting the moment resistance of the connection, it may be appropriate to reinforce the column web panel. This requires knowledge of what the applied shear force is. Although this sounds straightforward, the process described above determines the resistances, not the applied forces.

In many cases, especially if the resistance of the connection is not greatly in excess of the applied moment, it would not be too conservative to assume the applied shear force to be equal to the summation of the bolt row resistances.

If more effort is worthwhile, BS EN 1993-1-8 clause 5.3(3) specifies that the applied shear force is given by the applied moment, divided by a lever arm, z. Note that this correctly relates to the applied moment, not the moment *resistance*.

The lever arm, z, is determined via a forward reference to clause 6.2.7, which in turn refers to Figure 6.15. The bottom row in Table 6.15 covers bolted connections with two or more bolt rows in tension – the common case. Two alternatives are given for the lever arm z:

1. The distance from the centre of the compression flange to mid-way between the two furthest bolt rows, and,
2. A "more accurate" value, taken as z_{eq} from the method described clause 6.3.3.1

Clause 6.3.3.1 covers the calculation of joint stiffness; the calculation of z_{eq} is part of the process. It is very likely that the "more accurate" value z_{eq} is smaller than the dimension described in (1) above, and thus would produce a higher shear force.

If designers are calculating the shear force in the web panel based on clause 5.3(3) they should be careful to use the "more accurate" value, as use of the approximate value is not always conservative. Calculation of the "more accurate" value is not without its own challenges, so designers should remember that assuming the applied shear force to be equal to the summation of the bolt row *resistances* will be conservative, and probably economical in terms of design effort.

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New and revised codes and standards

From BSI Updates January 2021

BS EN PUBLICATIONS

BS EN 17412-1:2020
Building Information Modelling. Level of Information Need. Concepts and principles
no current standard is superseded

BS EN 17423:2020
Energy performance of buildings. Determination and reporting of Primary Energy Factors (PEF) and CO_2 emission coefficient. General Principles, Module M1-7
no current standard is superseded

BS IMPLEMENTATIONS

BS ISO 20414:2020
Fire safety engineering. Verification and validation protocol for building fire evacuation models
no current standard is superseded

PUBLICLY AVAILABLE SPECIFICATIONS

PAS 79-1:2020
Fire risk assessment. Premises other than housing. Code of practice
supersedes PAS 79:2012

PAS 79-2:2020
Fire risk assessment. Housing. Code of practice
supersedes PAS 79:2012

BRITISH STANDARDS REVIEWED AND CONFIRMED

BS EN ISO 9972:2015
Thermal performance of buildings. Determination of air permeability of buildings. Fan pressurization method

BS EN 16687:2015
Construction products. Assessment of release of dangerous substances. Terminology

BS ISO 16540:2015
Corrosion of metals and alloys. Methodology for determining the resistance of metals to stress corrosion cracking using the four-point bend method

NEW WORK STARTED

EN ISO 11127-6
Preparation of steel substrates before application of paints and related products. Test methods for non-metallic blast-cleaning abrasives. Determination of water-soluble contaminants by conductivity measurement
will supersede BS EN ISO 11127-6:2011

EN 15941
Sustainability of construction works. Data quality for environmental assessment of products and construction works. Selection and use of data
will supersede PD CEN/TR 15941:2010

BS 40101
Building Performance Evaluation
will supersede None

DRAFT BRITISH STANDARDS FOR PUBLIC COMMENT – ADOPTIONS

20/30426069 DC
BS EN ISO 3834-1 Quality requirements for fusion welding of metallic materials. Criteria for the selection of the appropriate level of quality requirements
Comments for the above document were required by 19 January, 2021