Issues with Structural Steel Bolts

Intriduction

]These are issues that structural engineers should be aware of in relation to the quality of structural steel bolts in Australia. The issues primarily result from the fact that virtually all standard steel bolts supplied in Australia are now imported.

The NSW Department of Planning issued a Building Regulation Advisory Note (BS 05-002) in December 2005 regarding the issue. In this note, structural steel structures must comply with the relevant standards. The Advisory Note recommends the following to achieve the required outcome: -

1. Design engineers should specify the bolts and associated nuts and washers by reference to appropriate Australian Standards. These standards are as follows.

    a. AS 1111.1–2000 "ISO Metric hexagon bolts and screws – Product Grade C, Part 1: Bolts."

    b. AS /NZS 1252-1996 "High strength steel bolts with associated nuts and washers for structural engineering."

    c. AS 1275-1985 "Metric screw threads for fasteners."

    d. AS 1237.1-2002 "Plain washers for metric bolts, screws and nuts for general purposes, Part 1: General Plan."

    e. AS 1112.3-2000 "ISO Metric hexagon nuts, Part 3: Product Grade C."

    f. AS/NZS 4291.2-1995 "Mechanical properties of Fasteners, Part 2: Nuts with specified proof load values –coarse thread."

    g. AS/NZS 4291.1-2000 "Mechanical properties of Fasteners, made of carbon steel and alloy steel, Part 1: bolts, screws, studs."

2. Design engineers and engineers issuing certificates certifying that the erected steelwork complies with design drawings and relevant Australian standards should request appropriate documentary evidence of compliance with Australian Standards for each batch of bolts. Such evidence should as a minimum identify the organisation which tested the product and clearly verify that the product meets the relevant requirements. (See suggested information below).

3. Importers should be able to produce a copy of the evidence of compliance for each batch.

4. The building approval authority may request a copy of the documentation or request that the engineer issuing the certification provide specific verification that the structural steel bolts comply with the relevant Standards.

Additionally, the Australian Steel Institute has recently (December 2005) published a paper entitled:

"Are You Getting the Bolts You Specified – A Discussion Paper"
S. Fernando and S. Hitchen
Steel Construction Vol. 39 No. 2

This paper discusses a number of issues in relation to structural steel bolts, in particular high strength structural bolts. This paper makes a number of important points, and only a salient few are summarised here. The full paper should be consulted for the complete coverage.

1. Australian Industry is complacent because all bolts were manufactured in Australia to Australian Standards up until recent times. Importers had to meet the same quality level in order to compete.

2. Competition for bolt supply is now on price alone and numerous sources are available. The quality of the bolts supplied has decreased.

3. Importers are not always able to certify the quality of bolts supplied and generally do not carry out testing in order to ensure compliance with Australian Standards.

4. A similar situation in the United States of America resulted in a Fastener Quality test, which forced importers to take responsibility for the product being supplied. No such requirement exists in Australia. Product not able to meet the USA requirement may be being supplied to Australia.

5. Two recent cases of failure due to poor quality bolts being supplied are discussed, one in Victoria and one in the ACT.

6. The paper discusses a significant number of quality problems detected by the authors of the papers, too numerous to list here.

7. The paper discusses how you can be sure that the bolt/nut/washer assembly complies with Australian Standards. Further useful guidance can be found in "Bolting of Steel Structures" Australian Institute of Steel Construction (now Australian Steel Institute).

8. The paper notes that one of the following usually happens when a design engineer requests a test/compliance certificate from a supplier. The supplier may

    i) Refuse to provide any documentation

ii) Give you a test report but not a compliance or test certificate

iii) Give you an inspection certificate

iv) Give you a test/compliance certificate from an unaccredited foreign test laboratory

v) Give you a test certificate with certain information missing

vi) Give you a generic letter saying any product supplied by them meets the standard without identifying the product or the relevant standard.

Options (i) and (vi) are most common but (vi) will not normally satisfy the building approval authority.

A correct test certificate should contain at least all the information below

1. Identification and address of the supplier
2. Identification and address of the test laboratory and accreditation seals of the test laboratory
3. Date of issue, page number on each page
4. •Test certificate number
5. Batch identification number
6. Product identification
7. Customer purchase order number to match the batch number
8. Any other system reference numbers
9. Statement of compliance referring to a definite relevant Australian standard
10. Signature of authenticity.

If appropriate test certification for bolts is not available, the design engineer/engineer issuing the certificate has little option but to exclude the bolts from the certification, indicating on the certificate that test certification for the bolts was sought but was either not received or was not considered adequate. Attaching any documentation actually received would also be appropriate. The Principal Certifying Authority then has to decide what action he/she will take as a result of this situation regarding the bolts.