Modern Steel Construction's monthly *Steel Quiz* allows you to test your knowledge of steel design and construction. All references to LRFD specifications pertain to the 1999 *LRFD Specification for Structural Steel Buildings*, available as a free download from AISC's web site:

www.aisc.org/lrfdspec

ASD references pertain to the 1989 *ASD Specification for Structural Steel Buildings*. Where appropriate, other industry standards are also referenced.

Anyone is welcome to submit questions for *Steel Quiz*—one question or 10! If you or your firm are interested in submitting a *Steel Quiz* question or column, contact ▶

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This month's quiz was developed by AISC's Engineering and Research department. Sharpen your pencils and put on your thinking cap!

1. The AISC *Specification* gives limiting stresses for which bolts are designed. Are these limiting stresses applied to the gross area of a bolt or the net area through the threads?

2. Why is a continuous fillet weld preferable to an intermittent fillet weld when fatigue is a design consideration?

3. Which of the following best describes lateral-torsional buckling?
   - **a.** A twisting deformation of an axially loaded compression member
   - **b.** A behavior in which the flange or web buckles at a discreet location along the length of the beam
   - **c.** A tendency for a beam to twist sideways between braced points
   - **d.** The formation of a plastic hinge in a beam

4. What products do ASTM F1554 and ASTM F1852 cover?

5. When is it permissible to use a seismic-response modification factor $R = 3$ in calculating seismic forces?

6. Must the designer meet the requirements in the AISC *Seismic Provisions* when using R greater than 3 in Seismic Design Categories A, B or C?

7. What is CASE 962D?

8. When talking in the lingo of the RCSC (Research Council on Structural Connections), one often hears "the *Guide*" cited as a reference. What is "the *Guide*"?

9. There are at least six common approaches to fire protection for steel structures. How many can you name?

10. Will the AISC unified specification be an LRFD specification or an ASD specification?

Turn page for answers

Answers

1. The values given in the AISC *Specification* are applied to the gross area of the bolt. The values in the AISC *Specification* are obtained from a derivation that includes the reduction for threading, thus simplifying the process for the designer.

2. Every fillet-weld segment has a start and stop, and each start and stop has a crater in the weld. Craters serve as crack initiators in fatigue applications. Thus, the fewer the starts and stops, the fewer crack initiators.

3. **c**. Lateral-torsional buckling is a lateral, global, twisting deformation in a beam between braced points.

4. ASTM F1554 covers hooked, headed, and threaded/nutted anchor rods in three strength grades: 36, 55 and 105 ksi. It is an umbrella specification that covers all aspects of the rod products used to anchor steel into concrete. ASTM F1852 covers twist-off-type tension-control bolt assemblies in a strength level equivalent to ASTM A325 conventional bolts.

5. In the *International Building Code* and NFPA 5000, the use of $R = 3$ in seismic-force calculations is permitted in Seismic Design Categories A, B and C.

6. Yes. Both the *International Building Code* and NFPA 5000 require the use of a system with R greater than 3 in Seismic Design Categories D, E and F. In contrast, as covered in question 5, neither model building code requires that the detailing provisions in the AISC *Seismic Provisions* be met when the designer takes R equal to 3 in Seismic Design Categories A, B or C. However, if the designer chooses to take R greater than 3 in Seismic Design Categories A, B or C, the detailing requirements in the AISC *Seismic Provisions* also must be met.

7. CASE 962D is a document written by a committee of the Council of American Structural Engineers. It is titled *A Guideline Addressing the Coordination and Completeness of Structural Construction Documents*. CASE and AISC are currently conducting joint breakfast meetings with steel fabricator associations and others to raise awareness of this important document. To obtain a copy, attend the breakfast meeting held in your area, call ACEC (the parent organization to CASE) at 202.347.7474, or visit **www.acec.org/about/case.cfm**. CASE 962D costs $30.

8. "The *Guide*" is the *Guide to Design Criteria for Bolted and Riveted Joints*, 2nd Edition, authored by Kulak, Fisher and Struik. This publication is available from the AISC bookstore (**www.aisc.org**) or as a free download in electronic form from RCSC (**www.boltcouncil.org**).

9. Spray-applied fire protection, gypsum board enclosure, masonry enclosure, concrete enclosure, mineral fiberboard enclosure and intumescent coatings are common fire-proection approaches. All are covered in AISC *Design Guide No. 19, Fire Resistance of Structural Steel Framing*, available as a free download to AISC members at **www.aisc.org/epubs**.

10. We're not sure what the future holds for ASD. But regardless, AISC will be neutral on the issue once the 2005 AISC *Specification* is released. The building code provides for two methods of design—LRFD and ASD. The 2005 AISC *Specification* will provide in a single document one set of equations that can be used for either LRFD or ASD (with appropriate factors for each). So, the differences between LRFD and ASD will be reduced to a set of factors. ★