

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 ►

Steel
SolutionsCenter

One E. Wacker Dr., Suite 3100

Chicago, IL 60601

tel: 866.ASK.AISC

fax: 312.670.9032

solutions@aisc.org

This month's Steel Quiz was developed by the staff of AISC's Steel Solutions Center. Sharpen your pencils and go!

1. Is hand-guided thermal cutting an allowable process method for shop fabrication of structural steel?

2. Is thermal cutting of steel allowed as a field modification method, to correct minor fabrication errors?

3. Where can one find information on capacities of rivets used in old structures?

4. Is it acceptable to galvanize ASTM F1554 anchor rod?

5. Are all hollow structural sections (HSS) made as a seamless product?

6. Are all pipe sections made as a seamless product?

7. When columns do not have enough local strength, what type of reinforcing is required to reinforce for web panel-zone shear at a moment connection?

8. If it has been determined that a column web does require panel zone shear reinforcing at a moment connection, and it is decided to use doubler plate reinforcing, should there be a single plate applied on one side of the web

or two plates applied, one on each side of the web?

9. Can shear connectors applied in the negative moment region of a rigid frame be used to develop the composite capacity required for the positive moment region?

10. True/False: In the AISC *Seismic Provisions*, all bolted joints found in Seismic Load Resisting Systems must be slip-critical.

Turn page for answers

Answers

1. Yes. The AISC *Code of Standard Practice for Steel Buildings and Bridges* (COSP) dated March 7, 2000, Section 6 Shop Fabrication and Delivery states: "6.2.1 The thermal cutting of Structural Steel by hand-guided or mechanically guided means is permitted." The COSP is available as a free download from the AISC web site www.aisc.org. Also refer to AISC FAQ 2.2.1 at www.aisc.org/faq.

2. Yes. The COSP (see answer 1), Section 7, Erection, states: "7.14 The correction of minor misfits by moderate amounts of reaming, grinding, welding or cutting, and the drawing of elements into line with drift pins, shall be considered to be normal erection operations."

3. Allowable stresses for rivets were given in the AISC *Specification* starting with the first edition *Manual* published in 1927 and continuing through the editions published into the 1960s when bolts took the place of rivets as the common fastener for structural steel construction. Allowable stresses were given for shear and bearing and for two types, hand-driven and power-driven. *Design Guide 15* also provides guidance (www.aisc.org/epubs).

4. Yes. ASTM F 1554 anchor rods can be galvanized and the requirements for the protective coating are stated in that ASTM F1554 Standard.

5. No. HSS in round, rectangular and square cross sections are manufactured by either the seamless or welding process. ASTM A500 is the most common material specification for HSS sections used in building construction. In that specification it is stated that welding is to be done by the electric-resistance welding process, and that the longitudinal butt joint shall be welded across its thickness such that the structural design strength of the tubing section is assured.

6. No. Pipe sections, not to be confused with HSS rounds, can also be manufactured by either the seamless or welding process. The material specification for this product used in building construction is ASTM A53. There are three types under this specification; Type F—Furnace-butt welded, Type E—

Electric-resistance welded, and Type S—Seamless.

7. Either doubler plates or diagonal stiffeners. See 1999 AISC *LRFD Specification*, Section K1.7. *Design Guide 13* also provides guidance (www.aisc.org/epubs).

8. The AISC *Specification* does not define whether a single or two doubler plates can be used to reinforce a web in the panel shear zone. However, AISC *Design Guide 13*, Section 3.3 gives a suggestion: "Use a single web doubler plate up to a required thickness of ½ in. If thicker web reinforcement is required, consider the use of two plates, one on either side of the column web. This practice may be more economical and is likely to reduce heat input, weld shrinkage, and member distortion." The actual dividing thickness at which two plates should be used may vary; ask the fabricator.

9. No. The shear connectors in the negative moment region(s) of the beam will not be effective for developing the positive moment. The 1999 AISC *LRFD Specification*, Section I5.6 states: "Shear connectors required on each side of the point of maximum bending moment, positive or negative, shall be distributed between that point and the adjacent point of zero moment, unless otherwise specified."

10. False. The 2002 *Seismic Provisions* (free download from www.aisc.org) do require that bolted joints in Seismic Load Resisting Systems to have faying surfaces prepared to at least a Class A slip resistance. High-strength bolts are mandatory and must be pretensioned during installation. However, the design shear strength of such bolted joints is permitted to be calculated as that for bearing-type joints, rather than the reduced design strength of slip-critical joints. ★

Do you have an idea for *Steel Quiz*?
Send it to:

Steel
SolutionsCenter

One E. Wacker Dr., Suite 3100

Chicago, IL 60601

tel: 866.ASK.AISC

fax: 312.670.9032

solutions@aisc.org