

steel quiz

LOOKING FOR A CHALLENGE? *Modern Steel Construction's* monthly Steel Quiz tests your knowledge of steel design and construction. Most answers can be found in the 2005 *Specification for Structural Steel Buildings*, available as a free download from AISC's web site, www.aisc.org/2005spec. Where appropriate, other industry standards are also referenced.

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

- 1 In which of the following standards are minimum radii for cold bending of plates specified? (a) ASTM A6 (b) ASTM A992 (c) AISC 360 (d) All of the above
- 2 To what dimensional tolerances are welded built-up members fabricated? How about bolted members?
- 3 True/False: The fabricator is required to maintain an identification process for mill material until the entire project is complete.
- 4 What is a good rule of thumb for a practical thickness up to which steel can be cut using a plasma cutting process? (a) Gauge thicknesses only (b) $\frac{1}{4}$ in (c) $\frac{3}{4}$ in (d) $1\frac{1}{4}$ in
- 5 True/False: Steel to receive spray-applied fire protection should not be primed or painted.
- 6 For the seismic force resisting system in high-seismic applications (that is, those that must comply with AISC 341), where can one find the requirements for technician qualification and testing protocols for non-destructive testing? (a) AISC 360 and AISC 341 (b) AWS D1.1 and AISC 341 (c) AISC 341 and AWS D1.8 (d) All of the above
- 7 A fillet weld on the acute side of a skewed plate is prequalified and fully effective as long as the skew angle is at least equal to: (a) 15° (b) 30° (c) 45° (d) 60°
- 8 Can beams with moment connected ends be cambered?
- 9 True/False: The connection of all beams and girders to columns in structures over 125 ft in height is required to be slip-critical bolted.
- 10 True/False: The cut surfaces of beam copes that are specified to be galvanized must be ground.

- 1 (a) Appendix X4 in ASTM A6 provides minimum radii for cold bending of plates. This information is also found in Table 10-12 of the 13th edition AISC *Steel Construction Manual*.
- 2 For welded built-up members, dimensional tolerances are given in AWS D1.1 Section 5.23 (and primarily relate to distortional control for the welding operations). For bolted built-up members, however, no similar provisions exist in another standard. When desired, the EOR can specify tolerances, and it is common to use tolerances that are similar to those found in ASTM A6 or ASTM A500.
- 3 False. According to Section M5.5 in the 2005 AISC *Specification*, "The fabricator shall be able to demonstrate by a written procedure and by actual practice a method of material application and identification, visible at least through the 'fit-up' operation, for the main structural elements of each shipping piece."
- 4 (c) Plasma cutting is very efficient for plates up to $\frac{3}{4}$ in. thick. This is not a thickness limit, and larger thicknesses can be cut with a plasma process. However, the oxy-acetylene cutting process usually becomes more efficient above a thickness of $\frac{3}{4}$ in.
- 5 True. Steel that is to be fire protected should not be primed or painted, because the coating decreases the adhesion of the fire protection. When such steel must be painted, additional measures must be taken to ensure adhesion. See FAQ 11.1.7 at www.aisc.org/faq for more on this topic.
- 6 (c) These requirements currently exist in similar form in two places: AISC 341 Appendix W and AWS D1.8. This overlap exists because AISC 341 was published before AWS D1.8 existed. The 2010 revision of AISC 341 will incorporate these requirements in AWS D1.8 by reference.
- 7 (d) Note that an acute angle as low as 30° is still prequalified per AWS D1.1. However, a reduction to the effective throat must be made for angles of less than 60° to recognize that the weld cannot reliably penetrate to the root.
- 8 No. The usual intent of camber is to accommodate deflection during concrete pours. Cambering usually occurs after the beam is fabricated. At that point if using end plated moment connections, the end plates will not be parallel to the column flange. If using top and bottom plates welded to the column and bolted to the flanges of the beam (paddle plates), the bolts will not be aligned in the connection. If using a welded moment connection, the root opening at the bottom flange will exceed AWS tolerances. If the connections are fabricated to accommodate these problems, the camber will never come out of the beam during concrete pours.
- 9 False. According to Section J1.10(2) of the 2005 AISC *Specification*, pretensioned joints, slip-critical joints, or welds shall be used for beams and girders that connect to columns in multi-story structures that are over 125 ft in height.
- 10 True. Section M2.2 of the 2005 AISC *Specification* requires that beam copes (and weld access holes) in shapes that are to be galvanized must be ground.

Anyone is welcome to submit questions and answers for Steel Quiz. If you are interested in submitting one question or an entire quiz, contact AISC's Steel Solutions Center at 866.ASK.AISC or at solutions@aisc.org.



Steel SolutionsCenter