

# 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 website, [www.aisc.org/2005spec](http://www.aisc.org/2005spec). Where appropriate, other industry standards are also referenced.

- 1 True/False: Curved steel members must be designed differently because of the effects of the bending process.
- 2 Why are minimum radii specified for cold bending of plates?
- 3 Is there a tolerance specified in the AISC *Code of Standard Practice* for the shape of a curved member?
- 4 What is the limit in the AISC *Specification* on the surface roughness profile of thermally cut bolt holes?
  - (a) 1,000  $\mu\text{in}$ .
  - (b) 2,000  $\mu\text{in}$ .
  - (c) 3,000  $\mu\text{in}$ .
  - (d) Both (a) and (b) are correct
- 5 True/False: The 2005 AISC *Specification* includes information on design and detailing of galvanized members.
- 6 What minimum radius is recommended in the AISC *Manual* for camber induced by cold bending in members up to nominal depth of 30 in.?
- 7 Where are tolerances for manufacturing HSS and Pipe given?
  - (a) ASTM A6 for both HSS and Pipe
  - (b) ASTM A500 for both HSS and Pipe
  - (c) ASTM A500 for HSS and ASTM A53 for Pipe
  - (d) ASTM A53 for both HSS and Pipe
- 8 Steel erection follows the proper installation or establishment of several items by the Owner's Designated Representative for Construction per Section 7 of the AISC *Code of Standard Practice*. What are several common examples?
- 9 Which of the following can be a cause of brittle fracture?
  - (a) Triaxial state-of-stress
  - (b) Strain aging
  - (c) Increased strain rate
  - (d) All of the above
- 10 True/False: Appendix 4 in the AISC *Specification* addresses design for applications involving long-duration loading at elevated temperatures.

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- 1 False. Bending steel typically elevates the yield strength and reduces the ductility of the material, but these effects are small for the usual case of bending and neglected in the design process. For more information, see "Bending Considerations in Steel Construction" by Russ Barnshaw in the October 2009 issue of *MSC*, and "Cold-Bending of Wide-Flange Shapes for Construction" in the 4th Quarter 2006 AISC *Engineering Journal*.
- 2 Care must be taken to prevent the initiation of cracks at edges. Minimum radii for cold bending from ASTM A6 Appendix 4 [reproduced in Table 10-12 of the 13th Edition AISC *Manual*] serve this purpose.
- 3 Yes. Section 6.4.2 of the 2005 AISC *Code of Standard Practice* states that the tolerance for curved members is equal to the variation in sweep permitted for an equivalent straight member of the same straight length in ASTM A6.
- 4 (a) According to Section M2.5 of the 2005 AISC *Specification* thermally cut holes shall be permitted with a surface roughness profile not exceeding 1,000  $\mu\text{in}$ .
- 5 True. Chapters J and M in the 2005 AISC *Specification* include information addressing welding, bolting and drainage in galvanized members.
- 6 Between 10 and 14 times the depth of the member. See Part 2 of the 13th Edition AISC *Manual* on cold bending.
- 7 (c) HSS are manufactured to tolerances given in ASTM A500 while Pipe is manufactured to tolerances given in ASTM A53.
- 8 Possible answers include: job-site conditions (Section 7.2), foundations (Section 7.3), lines and benchmarks (Section 7.4), anchor rods and embeds (Section 7.5), bearing devices (Section 7.6), grout (Section 7.7), and installation schedule of non-structural-steel items (Section 7.10.2).
- 9 (d) All of these factors can be a cause. See Part 2 of the 13th Edition AISC *Manual* under Fatigue and Fracture Control for more on this topic.
- 10 False. Appendix 4 and AISC Design Guide 19 provide information for the design of applications involving short-duration loading at elevated temperature due to fire.

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](mailto:solutions@aisc.org).

