

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 Do the fatigue considerations in Appendix 3 of the 2005 AISC specification need to be considered for seismic effects or for the effects of wind loading on normal building lateral load resisting systems?
- 2 What are the maximum perimeter and thickness limits allowed for HSS according to the ASTM A500 Standard?
 - a. 32", 1/2"
 - b. 32", 5/8"
 - c. 64", 1/2"
 - d. 64", 5/8"
- 3 **True/False:** ASTM F436 washers are not allowed to be produced in beveled and clipped styles.
- 4 Are holes for anchor rods permitted to be thermally cut?
- 5 **True/False:** One may substitute ASTM A194 Grade 2H nuts for ASTM A563 Grade DH nuts.
 - b. 1% of the total composite section.
 - c. 2% of the total composite section.
 - d. 5% of the total composite section.
- 6 If two or more general types of welds (i.e. groove, fillet, plug, slot) are combined in a single joint, the strength of the weld combination must be based upon:
 - a. the weld with the largest design strength.
 - b. the weld with the largest design strength, excluding fillet welds.
 - c. the strength of each weld with reference to the axis of the group.
 - d. the strength of each weld without reference to the axis of the group.
- 7 To qualify as a filled composite column, several requirements must be met. One such requirement mandates that the cross-sectional area of the steel HSS must comprise at least:
 - a. 0.5% of the total composite section.
- 8 The C_b lateral-torsional buckling modification factor for non-uniform moment diagrams, when both ends of the unsupported segment are braced, may not exceed a value of:
 - a. 2.3
 - b. 2.5
 - c. 3.0
 - d. no limit
- 9 **True/False:** Projecting elements of connection materials must be straightened in the connecting plane.
- 10 What are the minimum CVN toughness values that satisfy the requirements for demand critical welds used in seismic load resisting systems?

TURN PAGE FOR ANSWERS

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ANSWERS

1 No. The effects of seismic and wind loading on buildings typically do not result in fatigue concerns. Refer to Section B3.9 of the 2005 AISC specification (a free download from www.aisc.org/2005spec.)

2 The answer is **d**. That is, the maximum allowed perimeter and wall thickness is 64" and 5/8", respectively.

3 False. The ASTM F436 Standard allows three styles of washers; namely circular, beveled, and clipped.

4 Yes. According to Section M2.9 of the 2005 AISC specification, holes for anchor rods are permitted to be thermally cut in accordance with the provisions of Section M2.2, which refers to AWS D1.1 requirements for base metal preparation.

5 True. Footnote C in Table 2.1 of the 2004 RCSC specification (a free download from www.boltcouncil.org) allows for this substitution. However,

note that it applies specifically to Type 1 ASTM A325 plain and galvanized, ASTM F1852 plain, and ASTM A490 plain bolts.

6 The answer is **c**. Section J2.5 of the 2005 AISC specification states that if two or more of the general types of welds (i.e. groove, fillet, plug, slot) are combined in a single joint, the strength of each must be separately computed with reference to the axis of the group in order to determine the strength of the combination.

7 The answer is **b**, 1%. Refer to Section I2.2a(1) of the 2005 AISC specification. Other requirements within Section I2.2a include a maximum b/t ratio for rectangular HSS and a maximum D/t ratio for round HSS.

8 The answer is **c**. The quarter-point moment diagram C_p Equation (F1-1) found in Chapter F of the 2005 AISC specification limits the maximum value to 3.0.

9 False. According to Section 6.3.1 of the 2005 AISC *Code of Standard Practice* (a free download from www.aisc.org/code), such projecting elements need not be straightened in the connecting plane, subject to the limitations in the AISC specification.

10 20 ft-lb at -20°F and 40 ft-lb at 70°F. According to Section 7.3b of the 2005 AISC *Seismic Provisions* (a free download from www.aisc.org/2005seismic), filler metals for demand critical welds must possess a minimum CVN toughness of 20 ft-lb at -20°F and 40 ft-lb at 70°F.

Anyone is welcome to submit questions 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.



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