

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 What is a service load?
 - a. load under which LRFD load combinations are evaluated
 - b. load under which ASD load combinations are evaluated
 - c. load under which serviceability limit states are evaluated
 - d. load under which strength limit states are evaluated
- 2 Width-to-thickness ratio limits are based upon which limit state?
 - a. local buckling
 - b. flexural buckling
 - c. lateral-torsional buckling
 - d. flexural-torsional buckling
- 3 **True/False:** The ASTM A500 standard includes both ERW and SAW HSS.
- 4 Per the 2005 AISC specification, the effective length of a segment of an intermittent fillet weld shall be:
 - a. not less than four times the weld size, with a minimum of 1 in.
 - b. not less than four times the weld size, with a minimum of 1½ in.
 - c. not less than two times the weld size, with a minimum of 1 in.
 - d. not less than two times the weld size, with a minimum of 1½ in.
- 5 **True/False:** ASTM F1554 anchor rods are color coded at one end to designate material grade.
- 6 What is the minimum diameter of ASTM A325 and A490 high-strength bolts?
 - a. ⅜ inch
 - b. ½ inch
 - c. ⅝ inch
 - d. ¾ inch
- 7 Per the AISC *Code of Standard Practice*, touch-up of abrasions caused by handling after painting shall be the responsibility of the:
 - a. engineer
 - b. fabricator
 - c. erector
 - d. contractor
- 8 **True/False:** K-bracing may be used in special concentrically braced frames (SCBF).
- 9 Which of the following is not a prequalification variable for high-seismic bolted connections?
 - a. pretensioning method
 - b. bolt diameter
 - c. bolt grade
 - d. hole fabrication method
- 10 A design thickness equal to 0.93 times the nominal thickness must be used for:
 - a. ERW HSS
 - b. SAW HSS
 - c. ERW and SAW HSS
 - d. Pipe and ERW HSS

TURN PAGE FOR ANSWERS

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ANSWERS

1 The answer is **c**. The service load is the load under which serviceability limit states are evaluated, as defined in the glossary of the 2005 AISC specification (www.aisc.org/2005spec). Notice that answer **b** would be correct if the ASD load combinations in ASCE 7 did not use load factors when considering lateral loads. However, the ASD load combinations in ASCE 7 do make use of load factors in some cases. ASCE 7 load combinations for ASD and LRFD are related to strength design, not serviceability design. See *AISC Design Guide 3 Serviceability Design Considerations for Steel Buildings*, Second Edition for further information.

2 The answer is **a**. The limiting width-to-thickness ratios for stiffened and unstiffened elements can be found in Table B4.1 in the 2005 AISC specification and Table I-8-1 in the 2005 AISC seismic provisions. Both of these documents are available as free downloads at www.aisc.org/epubs.

3 **False.** The ASTM A500-03a standard, Section 6.1, requires the use of the electric-resistance-welding (ERW) process. Note that ASTM A500 HSS is produced in peripheries up to 64 in. HSS with peripheries greater than 64 in. are manufactured by the submerged arc welding (SAW) process, but such cross sections are not produced to ASTM A500.

4 The answer is **b**. Refer to Section J2.2b of the 2005 AISC specification for this requirement.

5 **True.** According to the ASTM F1554-04 standard, Grade 36, 55, and 105 are color coded at one end of the anchor rod in blue, yellow, and red, respectively. This allows for quick and accurate identification of material grade.

6 The answer is **b**. Both the ASTM A325 and A490 standards specify $\frac{1}{2}$ in. as the minimum nominal diameter for these high-strength bolts. The maximum diameter covered is $1\frac{1}{2}$ in.

7 The answer is **d**. Section 6.5.4 of the 2005 AISC *Code of Standard Practice* (www.aisc.org/code) states that touch-up of abrasions caused by handling after painting shall be the responsibility of the contractor that performs touch-up in the field or field painting. The Commentary of the *Code* mentions that touch-up in the field and field painting are not normally part of the fabricator's or the erector's contract.

8 **False.** Per Section 13.4b of the 2005 AISC *Seismic Provisions*, K-type braced frames are not permitted for SCBF. However, it should be noted that such bracing may be used with OCBF when the brace member satisfies $KL/r \leq (E/F)^{1/2}$.

9 The answer is **a**. According to Appendix Section P4(6) of the 2005 AISC seismic provisions, pretensioning method is not a prequalification variable. Said another way, any of the pretensioning methods permitted in the RCSC specification can be used with a prequalified bolted connection.

10 The answer is **d**. Section B3.12 of the 2005 AISC specification requires the use of a design wall thickness equivalent to 0.93 times the nominal wall thickness for ERW HSS. As indicated in the answer to question 3, this requirement applies to ASTM A500 HSS, as it is manufactured using the ERW process. This wall thickness reduction is also used for ASTM A53 Grade B pipe (see definition of HSS on page 16.1-xlviii of the 2005 AISC specification) because ASTM A500 rounds are often sold under an ASTM A53 grade B name badge. The wall thickness reduction is not required, however, for SAW HSS.

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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