

**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](http://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 How many ASTM material specifications are contained within the scope of the 2005 AISC specification for hot-rolled structural shapes?
- 2 What ASTM specifications for bolting materials are available for use per the AISC specification when high-strength bolts longer than those commonly available in A325 or A490 are desired?
- 3 What are the two general approaches that are acceptable for use by the AISC specification when designing for fire resistance?
- 4 What is the most rigorous method available in the AISC specification for frame stability analysis?
- 5 What is the lowest value of the shear lag factor,  $U$ , in Chapter D that can safely be used without consideration of combined tension and flexure per the AISC specification?
- 6 Can deep and narrow HSS flexural members fail due to lateral torsional buckling?
- 7 Does the AISC specification allow for the consideration of post-buckling strength of beam webs in shear?
- 8 Does AISC have guidelines on serviceability requirements for steel structures?
- 9 What do BOF and EAF stand for?
- 10 Where can I find information on the recycled content of structural steel?

TURN PAGE FOR ANSWERS

# steel quiz

## ANSWERS

- 1** There are seven ASTM specified hot-rolled structural shapes contained within the scope of the 2005 AISC specification. They are:  
  
ASTM A36/A36M  
ASTM A529/A529M  
ASTM A572/A572M  
ASTM A588/A588M  
ASTM A709/A709M  
ASTM A913/A913M  
ASTM A992/A992M
- 2** Section J3.1 in the AISC specification (available at [www.aisc.org/2005spec](http://www.aisc.org/2005spec)) recommends the use of A449 and A354 bolts when high-strength bolts that are longer than A325 and A490 are desired.
- 3** Either *qualification by testing* or *design by analysis* are accepted approaches for fire resistance of steel structures. See Appendix 4 of the AISC specification for structural design for fire resistance.
- 4** The Direct Analysis Method presented in Appendix 7 is the most rigorous method of stability analysis. Use of this method is permitted in all cases and is required (see Section C2.1) for all structures where the ratio of second-order drift to first-order drift (or B2) is greater than 1.5.
- 5** According to the Commentary of Section D3.3, for values of  $U$  less than 0.6 the connection may be used only if the provisions for members subject to combined bending and axial force are satisfied in the design of the member.
- 6** Yes, it is possible for deep and narrow HSS flexural members to fail in LTB. However, as Figure C-F7.1 in the Commentary to Section F7 illustrates,  $L_r$  for such members is relatively large. As a result, the LTB limit state for HSS rarely controls.
- 7** Yes. Tension-field action is recognized in Section G3 of the 2005 AISC specification as a method of evaluating the post-buckling strength of beam webs in shear.
- 8** Yes. The Commentary to Chapter L of the 2005 specification has a detailed discussion of several commonly encountered serviceability issues and limits. AISC *Design Guide 3, Serviceability Design Considerations for Steel Buildings*, provides further guidance and is available for free download by members of AISC at [www.aisc.org/epubs](http://www.aisc.org/epubs).
- 9** BOF and EAF are abbreviations that refer to types of steel production processes. BOF stands for basic oxygen furnace, while EAF stands for electric arc furnace. EAF is scrap-steel-based, has become the predominant method of hot-rolled steel production today, and is the primary reason steel is the most recycled material available.
- 10** Visit [www.aisc.org/sustainability](http://www.aisc.org/sustainability) for information on LEED-related subjects.

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).



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