

steel quiz

Material is the theme for this month's Steel Quiz. Most of the answers can be found in the AISC *Specification* and AISC *Manual*, as well as on the AISC and *Modern Steel Construction* websites (www.aisc.org and www.modernsteel.com).

- 1 Which Chapter in the 2010 AISC *Specification* lists the materials approved for use with the *Specification*?
a) Chapter N b) Chapter J
c) Chapter A d) None of the Above
- 2 True/False: Material substitutions require the approval of the EOR.
- 3 True/False: The AISC *Specification* considers ASTM A500 for round HSS and A53 for pipe but it does not pertain to spirally welded material grades.
- 4 True/False: Commercially available ASTM A36 rod products that are fully threaded always meet the requirements of ASTM F1554 Grade 36.
- 5 Which ASTM standards apply to stainless steel sections and fasteners?
a) 304 b) 430
c) 316L d) None of the Above
- 6 True/False: Material can be multi-certified when there is an overlap in the chemical, mechanical and other ASTM material specification requirements.
- 7 What value of F_y is commonly used for design with the AISC *Specification*?
a) The minimum specified yield stress
b) The maximum specified yield stress
c) The larger of the minimum specified yield stress or the value given on the mill test report
d) None of the Above
- 8 True/False: In the AISC *Seismic Provisions*, R_y is used to adjust the yield stress of the material from the minimum specified to the expected yield stress.
- 9 True/False: The AISC *Specification* does not address modification of an existing structure.
- 10 True/False: The RCSC *Specification* and ASTM standards specify the dimensional characteristics of high-strength bolts.

TURN TO PAGE 14 FOR ANSWERS

- 1 (c) The AISC *Specification* includes the materials listed in Section A3. The use of the *Specification* to design other materials is based on the judgment of the EOR. The Commentary to Section A3 discusses considerations for alternative materials.
- 2 True. There are many similar materials that can be acceptable as a substitute, and approval in such cases is needed from the EOR. There is a SteelWise article (08/2011) discussing material substitutions, why they may be needed or desirable and what should be considered for when deciding whether the substitution can be permitted.
- 3 True. Generally, spirally welded products are produced to API material standards and in larger diameters than are typical in ASTM A500 and A53. These products have been used for structural applications, but their use requires the approval of the EOR.
- 4 False. Such products may meet most of the requirements in ASTM F1554, but often these products will not meet the thread class, thread fit and reduction in area requirements.
- 5 (d) None of the above answers are ASTM standards; 304, 410, 430, 316 and 316L are AISI raw material grades. Stainless steel information is provided by the Specialty Steel Industry of North America (www.ssina.com). SSINA information discusses various stainless steel material grades and describes their properties.
- 6 True. Material multi-certified by the producer (labeling with multiple ASTM material specifications that the material meets) is sometimes done when the product chemistry, yield strength, tensile strength and other characteristics fall entirely within the overlap area of requirements of two or more ASTM material standards. A hot topic when W-shapes were first dual-labeled as ASTM A36/A572 Grade 50, the industry move to ASTM A992 material for W-shapes has rendered this practice an artifact of history for wide-flange shapes.
- 7 (a) The *Specification* is based on the use of the specified minimum yield stress given in the ASTM specification for the type of steel being used. For example, if ASTM A992 steel is specified, $F_y = 50$ ksi.
- 8 True. This consideration of "expected yield" rather than minimum specified yield is an important component of capacity design in high-seismic systems. Capacity design promotes ductile deformation in specific elements that can be permitted to deform in an earthquake to protect the full system from collapse.
- 9 False. AISC *Specification* Appendix 5 contains requirements for the evaluation of existing structures and includes provisions for evaluation by structural analysis and by load tests.
- 10 False. These standards refer to ASME B18.2.1 for dimensional requirements.



Steel
SolutionsCenter

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.