

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.

- 1 True/False: According to Appendix 3 of the AISC Specification, evaluation of fatigue resistance is not required if the number of cycles of application of live load is less than 200,000.
- 2 What is the maximum temperature to which a structure can be subjected before the fatigue provisions of Appendix 3 are no longer applicable?
(a) 200 °F (b) 300 °F
(c) 400 °F (d) 500 °F
- 3 True/False: According to Appendix 3 of the AISC Specification, evaluation of fatigue resistance is made using stress ranges that are based on service loads.
- 4 True/False: Fire resistance and fire protection are interchangeable terms.
- 5 What are some examples of active fire protection systems?
- 6 What are some examples of passive fire protection systems?
- 7 True/False: Hooked anchor rods should not be used when there is a calculated tension load or moment on the column base.
- 8 The AISC-recommended maximum hole size for a 1-in.-diameter anchor rod is:
(a) 1¼ in. (b) 1½ in.
(c) 1¹³/₁₆ in. (d) 2 in.
- 9 When connecting elements are large in comparison to the bolted or welded joints within them, such as for a bolted connection of the brace to a gusset plate, how can the engineer determine the effective width when checking the gusset plate?
- 10 True/False: The strength level of ASTM A325 bolts can be obtained in twist-off-type configuration using the ASTM F1852 specification, and ASTM F2280 is the twist-off equivalent for ASTM A490 bolts.

steel quiz ANSWERS

- 1 False. The threshold given in Appendix 3 of the AISC Specification (www.aisc.org/2005spec) below which fatigue resistance need not be evaluated is 20,000 cycles of application of live load.
- 2 (b) According to Section 3.1, Appendix 3 is applicable only to structures subject to temperatures in applications not exceeding 300 °F.
- 3 True.
- 4 False. Fire resistance is the duration during which a structural assembly or element exhibits adequate structural integrity, stability and temperature transmission. Fire protection on the other hand refers to insulative materials applied to the structural members as well as everything associated with providing fire safety (sprinklers, egress, separations, etc.) and fire resistance. See AISC Design Guide 19 *Fire Resistance of Structural Steel Framing*, a free download for AISC members at www.aisc.org/epubs, for further information.
- 5 Active fire protection systems are those that utilize automatic devices or human action to initiate countermeasures, such as to suppress the fire or alert occupants. Examples include sprinkler systems, smoke and fire detectors and alarms, and fire extinguishers. See AISC Facts for Steel Buildings Number 1: Fire, a free download at www.aisc.org/freepubs, for further information.
- 6 Passive fire protection systems are those that function without external activation. Examples of passive fire protection systems include building code limitations for the combustion characteristics of construction materials, compartmentalized design requirements, and fire protection materials that prevent or delay the temperature rise in structural elements.
- 7 True. Hooked anchor rods are meant for compression-only column bases and locating and erecting columns. Calculated tension at column bases should be transferred with headed rods, or rods that are threaded and nutted. See Part 14 of the 13th Edition AISC Manual (page 14-10) for further discussion.
- 8 (c) For a 1-in.-diameter anchor rod, Table 14-2 of the 13th Edition AISC Manual recommends a maximum hole size of $1\frac{13}{16}$ in. These hole sizes are larger than for steel-to-steel structural connections because of differences in tolerances between steel and concrete.
- 9 The Whitmore section is used to determine the effective width for design. Figure 9-1 in Part 9 of the 13th Edition AISC Manual provides an illustration of how to apply this principle.
- 10 True.

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.



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