

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 Victor Shneur, P.E. of LeJeune Steel Company in Minneapolis. Sharpen your pencils and go!

- 1 **True/False:** When steel members with different thicknesses are welded, the minimum preheat shall be based on the highest minimum preheat.
- 2 **True/False:** Low-hydrogen electrodes that have been wet can be used after baking for an hour between 250°F and 300°F.
- 3 Where can one find visual inspection acceptance criteria for structural steel welds?
- 4 **True/False:** A fillet weld inside a hole or slot is a plug weld.
- 5 Can ASTM F1554 Grade 55 anchor rods be provided with a hook at the bottom?
- 6 In how many plies of bearing-type connections are short-slotted holes permitted?
- 7 What are the two common types of methods used in bolted shear connections to fill gaps between plies?
- 8 Which HSS-to-HSS truss connection type is more economical, matched or stepped?
- 9 The choice of shop paint is a design consideration for:
 - a. all slip-critical joints.
 - b. all bearing joints.
 - c. slip-critical joints with bolts in oversized holes only.
 - d. bearing joints with bolts in slotted holes only.
- 10 The web sidesway buckling provisions apply
 - a. only to induced compressive forces from bearing connections.
 - b. only to induced compressive forces from moment connections.
 - c. to all induced compressive and tensile forces.
 - d. to none of the above.

TURN PAGE FOR ANSWERS

steel quiz

ANSWERS

- 1 True.** See Section 3.5.1 of AWS D1.1:2004: The minimum preheat or interpass temperature applied to a joint composed of base metals with different minimum preheats from Table 3.2 (based on category and thickness) shall be the highest of these minimum preheats.
- 2 False.** See Section 5.3.2.1 of AWS D1.1:2004: Electrodes that have been wet shall not be used.
- 3** Table 6.1 "Visual Inspection Acceptance Criteria" of AWS D1.1:2004 provides this information. Per Section 6.9 of this code: All welds shall be visually inspected and shall be acceptable if the criteria of Table 6.1 are satisfied.
- 4 False.** See Appendix B of AWS D1.1:2004 for the definition of a plug weld, and Section 2.3.4.4 for the effective area of fillet welds in holes or slots.
- 5 Yes,** ASTM F1554 provides for hooked anchor rods. However, as recommended in the AISC *Manual of Steel Construction*, hooked rods are discouraged for applications involving a calculated tension force on the anchor rod. Typically, for a more positive anchorage these rods are used threaded and nutted at the bottom. See Sections D.5.3.4 and D.5.3.5 of ACI 318-05 for pullout strength of headed and hooked bolts, respectively.
- 6** Short-slotted holes are permitted in any or all plies of a bearing-type connection, but the length of the slot must be normal to the direction of load.
- 7** Filler plates and finger shims are two types of methods commonly used in bolted connections. Strip plates have round holes and finger shims have slots cut through the edge. See the discussion and description of shims and fillers found in Section 9 of the 13th edition manual.
- 8** The stepped connection is typically more economical because it allows using fillet welds on all sides of web members. See AWS D1.1:2004, Figure 2.14(L) for diagrams of matched and stepped connection types for box sections.
- 9** The answer is **a**. Shop paint is a design consideration for all slip-critical joints. See Section 3.2.2 of the *RCSC Specification for Structural Joints Using ASTM A325 or A490 Bolts* (www.bolt-council.org) for faying surface requirements for slip-critical joints.
- 10** The answer is **a**. The web sidesway buckling provisions apply only to induced compressive forces from bearing connections. See Section J10.4 of the 2005 AISC specification (www.aisc.org/2005spec) for web sidesway buckling provisions.