

STEEL QUIZ, A MONTHLY FEATURE IN *MODERN STEEL CONSTRUCTION*, allows you to test your knowledge of steel design and construction. Unless otherwise noted, all answers can be found in the *LRFD Manual of Steel Construction*. **To receive a free catalog of AISC publications, circle #10 on the reader service card in the back of this magazine.**

Questions:

1. When a full-depth transverse stiffener is required in a column for a concentrated force imposed by the tension flange of a strong-axis moment connection, how is the required weld size for the stiffener end determined? How is the required weld size connecting the stiffener to the column web determined?
2. Bolts and nuts delivered to the job-site must be cleaned of all grease, wax or other lubricant prior to installation, True or False?
3. Which of the following is true?
 - a) A steel lintel embedded in a masonry wall is considered to be structural steel in the *AISC Code of Standard Practice*
 - b) For payment purposes, the weight of high-strength bolts is calculated based upon the tabulated weights in the *AISC Manual of Steel Construction*
 - c) ASTM A529 covers steel that offers atmospheric corrosion resistant properties
 - d) AISC Manuals and Specifications cover the design of cold-formed steel members
4. When a surface is finished to bear, what ANSI surface roughness is permissible?
5. When a steel base plate bears on less than the full area of concrete, the design bearing strength $\phi(0.85f'_cA)$ is multiplied by the lesser of 2 and the square root of the ratio of geometrically similar concrete area to base-plate area. Why?
6. The outstanding leg of a single-angle simple-shear connection will be fillet welded to the support and the detail calls for a 1/4-in. weld along the toe and bottom of the angle with a weld return at the top of the angle. What are the minimum and maximum return lengths required in the AISC LRFD Specification?
7. In round dollar figures, which of the following most closely estimates the current FOB mill price for W-shapes in ASTM A572 grade 50 steel?
 - a) \$650-700 per ton
 - b) \$575-625 per ton
 - c) \$400-425 per ton
 - d) \$300-350 per ton
8. It is acceptable to provide corner radii when making web access holes, beam copes, and similar cuts by first drilling the corner with common-diameter drills, True or False?
9. AISC publishes updated shape availability twice each year in *Modern Steel Construction* magazine in which issues (months)?
10. In many design examples in the 2nd Edition *LRFD Manual of Steel Construction*, yielding and buckling in a gusset plate or similar fitting are checked on a Whitmore section. What is a Whitmore section?

Answers:

1. From LRFD Specification Section K1 (see the various tensile-flange-force limit states), the stiffener end must be welded to the column flange and the weld must be sized to develop the strength of the welded portion of the stiffener. The stiffener-to-column-web welds need only be sized to transmit the unbalanced force in the stiffener.

2. **False.** Bolts are intentionally lubricated to facilitate installation. Accordingly, RCSC Specification Section 8(a) states "Fasteners shall not be cleaned of lubricant that is present in [the] as-delivered condition." Note however that this section continues to say that "Fasteners which accumulate rust or dirt resulting from job site conditions shall be cleaned and relubricated prior to installation."

3. **b.** AISC *Code of Standard Practice* Section 9.2.4 indicates that "items for which weights are shown in tables in the AISC *Manual of Steel Construction* are calculated on the basis of tabulated unit weights." Because high-strength bolt weights are so tabulated, they fall under this provision. Choices a, c, and d are false: a steel lintel embedded in a masonry wall (i.e., not attached to the structural steel frame) is not structural steel as defined in AISC *Code of Standard Practice* Section 2.0; ASTM A588 (not A529) covers weathering steel; AISI produces the LRFD *Cold-Formed Steel Design Manual* and LRFD *Specification for Cold-Formed Steel Structural Members*.

4. From AISC *Code of Standard Practice* Section 6.2.2, a finished surface has a maximum ANSI roughness height value of 500. It also indicates that fabrication techniques such as friction sawing, cold sawing, and milling can be used to achieve such a finish.

5. AISC LRFD Specification Section J9 is consistent with ACI 318 provisions, which account for an increase in bearing strength due to the confinement provided by the concrete surrounding that providing direct bearing resistance.

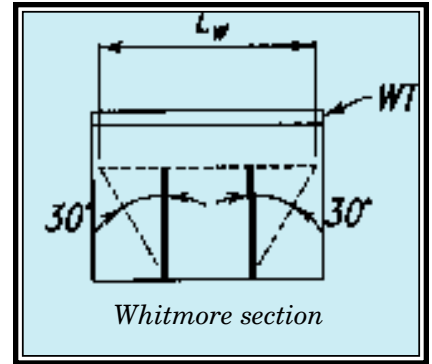
6. From LRFD Specification Section J2.2b, the minimum return is twice the weld size ($\frac{1}{2}$ in.). Because this angle is expected to flex away from the support to accommodate the simple beam rotation, the maximum return is four times the weld size (1 in.).

7. **c.** Generally speaking, ASTM A572 grade 50 W-shapes that weigh less than 80 lbs. per foot cost about \$400 per ton in a mill order; \$415 up to 150 lbs. per foot; \$425 up to 300 lbs. per foot.

8. True, per LRFD Specification Section J1.6, it is permissible to provide radius transitions by drilling (or hole sawing). Per the corresponding Commentary and Figure C-J1.2, it is suggested that a common-diameter drill size is not less than $\frac{3}{4}$ in.

9. Shape availability is updated in every January and July issue of *Modern Steel Construction* magazine. It also includes a list of producers of structural shapes and HSS with phone numbers.

10. A Whitmore section, named for R.E. Whitmore, identifies a theoretically effective cross-sectional area at the end of a connection resisting tension or compression, such as that from a brace-to-gusset-plate connection or similar fitting. As illustrated below for a WT hanger connection, the effective length for the Whitmore section L_w is determined using a spread-out angle of 30 degrees along both sides of the connection, beginning at the start of the connection.



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