

STEEL QUIZ

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 copy of the current AISC Publications List, please call 800/644-2400 or fax 312/670-5403.**

If you or your firm are interested in submitting a Steel Quiz column, please contact Scott Melnick at 312/670-5407 (email: melnick@aiscmail.com).

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QUESTIONS

1. What is backgouging?
2. True or False? Fully-tensioned ASTM A325 and A490 high-strength bolts in all sizes can be used in all extended end-plate moment connections designed as shown in the AISC LRFD Manual, Volume II.
3. What is the origin of the requirement that, to resist a concentrated load, the load be applied at least 10tf from the member-end to obtain the full flange bending strength given by LRFD Specification Equation K1-1?
4. Define mill edge per ASTM Specification A6/A6M.
5. What is the effective thickness of a beveled doubler plate?
6. List the torsional stresses that occur in W-shapes.
7. What nuts should be specified for ASTM A325 galvanized bolts?
8. When single-angle web members are used in a truss with WT-chords, why should all web members be placed on the same side of the WT stem?
9. Where can one find information on the design of anchor rods for shear and/or tension?
10. What does WPS stand for?

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ANSWERS

1. From AWS D1.1-98 Annex B, backgouging is “the removal of weld metal and base metal from the weld root side of a welded joint to facilitate complete fusion and complete joint penetration upon subsequent welding from that side.”
2. False. The first design assumption for extended end plate connections (AISC LRFD Manual, Volume II, p. 10-22) states that “fully-tensioned ASTM A325 or A490 high-strength bolts in diameters not greater than 1-1/2 in. must be used, except that ASTM A490 bolts should not be used in the eight-bolt stiffened configuration.”
3. The LRFD Specification Commentary, Section K1.2, explains “The effective column flange length for local flange bending is $12t_f$... Thus, it is assumed that yield lines form in the flange at $6t_f$ in each direction from the point of the applied concentrated force. To develop the fixed edge consistent with the assumptions of this model, an additional $4t_f$ and therefore a total of $10t_f$, is required for the full flange-bending strength...”
4. From ASTM Specification A6/A6M—97, Section 3.1.11, “mill edge—the normal edge produced by rolling between horizontal finishing rolls. A mill edge does not conform to any definite contour.”
5. The effective thickness of a beveled doubler plate is the thickness of the plate at the toe of the fillet weld at the column flange. Note: The doubler plate is bevelled when a fillet-welded detail is used to connect the plate to the column flange. Refer to figure 10-17 in Volume II of the LRFD Manual.
6. The following torsional stresses occur in W-shapes:
 1. Pure torsional shear stress
 2. Shear stress due to warping
 3. Normal stress due to warping
7. As stated in ASTM Specification A325 Section 3.2, A563 Grade DH or A194 Grade 2H, galvanized nuts should be specified for A325 galvanized bolts.
8. Staggering the single-angle web members causes torsion in the chord; also, it is easier to fabricate the truss when all angle members are on the same side.
9. AISC Design Guide #1, Column Base Plates, covers these conditions.
10. WPS stands for Welding Procedure Specification.

Note: Keep an eye out for AISC's newest publications, including:

- LRFD Manual of Steel Construction, Metric Conversion of the 2nd Edition
- Design Guide 12: Modification of Existing Steel Welded Moment Frame Connections for Seismic Resistance
- Design Guide 13: Wide-Flange Column Stiffening at Moment Connections