

Steel Quiz, a monthly feature in *Modern Steel Construction*, allows you to test your knowledge of steel design and construction. All references to LRFD specifications pertain to the 1999 *LRFD Specification for Structural Steel Buildings*, available as a free download at

www.aisc.org/lrfdspec

ASD references pertain to the 1989 *ASD Specification for Structural Steel Buildings*. Where appropriate, other industry standards are also referenced.

If you or your firm are interested in submitting a *Steel Quiz* question or column, contact:



One E. Wacker Dr., Suite 3100
Chicago, IL 60601
tel: 866.ASK.AISC
fax: 312.423.4651

solutions@aisc.org

March's Steel Quiz was contributed by Victor Shneur, P.E. of Lejeune Steel, Minneapolis, MN.

1. Is it acceptable to thermally cut holes for use with ASTM A325 and A490 high-strength bolts?
2. Are slip-critical joints required to be designed for bearing as well as slip resistance?
3. Why are different resistance factors ϕ based on the hole-type when calculating the design slip resistance in slip-critical joints?
4. Where can one find guidelines or provisions for cambering structural steel shapes?
5. What is the acronym FCM?
6. Which of the following statements are incorrect? Web crippling is:
 - a. caused by compressive forces only
 - b. caused by compressive and tensile forces
 - c. not affected by location of applied concentrated forces
 - d. affected by location of applied concentrated force
7. True or False? A column web doubler plate does not need to be checked for shear buckling.
8. True or False? Doubler plates can be fillet welded to column flanges.
9. What is the minimum effective length of any segment of intermittent fillet welding?
10. True or False? A mil is a common measure for paint and coating thickness.

TURN PAGE FOR ANSWERS

STEEL QUIZ

ANSWERS

1. As stated in Section 3.3 of the 2000 RCSC *Specification for Structural Joints Using ASTM A325 or A490 Bolts*, "Thermally cut bolt holes shall be permitted if approved by the Engineer of Record. For statically loaded joints, thermally cut surfaces need not be ground. For cyclically loaded joints, thermally cut surfaces shall be ground smooth."
2. Yes. Section 4.3 of the 2000 RCSC *Specification for Structural Joints Using ASTM A325 or A490 Bolts* requires that slip-critical joints be designed in accordance with several design provisions, including Section 5.3 for the design bearing strength at bolt holes.
3. The Commentary Section 5.4 of the 2000 RCSC *Specification for Structural Joints Using ASTM A325 or A490 Bolts* states that "Because of the greater likelihood that significant deformation can occur in joints with oversized or slotted holes, lower values of design slip resistance are provided for joints with these hole types through a modification of the resistance factor ϕ ."
4. Section M2.1 of the 1999 *LRFD Specification* addresses cambering, curving and straightening. It allows local application of heat or mechanical means to be used to introduce or correct camber, curvature and straightness. This provision includes temperature criteria for heated areas of various steels.
5. FCM stands for fracture critical member, although it can reference a member component. As defined in Section 12.2.2 of AWS D1.5, "Fracture critical members or member components are tension members or tension components of bending members (including those subject to reversal of stress), the failure of which would be expected to result in collapse of the bridge." Stated more simply, fracture critical is concerned with non-redundant members in tension (including those in tension due to bending.)
6. b and c.
7. False. Page 30 of AISC *Design Guide 13—Stiffening of Wide-Flange Columns at Moment Connections: Wind and Seismic Applications* contains appropriate design procedures to check wind, and low-seismic and high-seismic applications. Alternatively, refer to the 1999 *LRFD Specification Appendix F2.2* for wind and low-seismic applications. For high-seismic applications, refer to Section F2 of the 1999 *LRFD Specification* and Section 9.3b of the 2002 *Seismic Provisions*.
8. True. When fillet-welded edge details are used, the actual thickness of the doubler plate is adjusted to allow for proper beveling of the plate to clear the column flange-to-web fillet. Refer to Section 4.4 of AISC *Design Guide 13—Stiffening of Wide-Flange Columns at Moment Connections: Wind and Seismic Applications*.
9. According to the 1999 *LRFD Specification* Section J2.2b, "The effective length of any segment of intermittent fillet welding shall be not less than four times the weld size, with a minimum of 1½ in. (38 mm)."
10. True. A mil is equivalent to 1/1000 of an inch.