

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:

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This month's *Steel Quiz* was contributed by **Jason Jones**, an AISC summer engineering intern from Penn State University.

- 1. True or False:** Checks for both shear and bearing need to be made when designing slip-critical connections.
- Which of the following connection types permit painting without limitation?
 - a. slip-critical bolted connections
 - b. bearing-type bolted connections
 - c. welded connections
- The actual load assumed to be acting on the structure, working load, is also called the _____.
 - a. live load
 - b. dead load
 - c. service load
 - d. buckling load
 - e. factored load
- When designing and considering seismic effects, the story drift can be a maximum of _____.
 - a. H/40
 - b. H/200
 - c. H/400
 - d. AISC does not specify story drift limits
- What are the four common welding positions?
- When the angle of loading is perpendicular to the longitudinal axis of a fillet weld, the design strength of the weld is _____ compared to when the load is parallel to the longitudinal axis.
 - a. 2 times stronger
 - b. 1.5 times stronger
 - c. 0.75 times as strong
 - d. the same
- What are the recommended limits on the slenderness ratio, Kl/r , for compression and tension members?
 - a. 300 for compression, 200 for tension
 - b. 200 for compression, 300 for tension
 - c. 250 for compression, 300 for tension
 - d. 300 for compression, 250 for tension
- Describe the difference between a hybrid beam and a homogeneous one.
- The temperature to induce or correct cambering, curvature or straightness cannot exceed _____ for ASTM A992 steel.
 - a. 800°F
 - b. 1,000°F
 - c. 1,200°F
 - d. 1,500°F
- When are plug and slot welds used?

TURN PAGE FOR ANSWERS

STEEL QUIZ

ANSWERS

1. True, See *LRFD Specification* Section J3.8.
2. **b.** Further information can be found in the *RCSC Specification* found at www.boltcouncil.org and in AISC *Steel Design Guide No. 17, High Strength Bolts – A Primer for Structural Engineers*.
3. **c.** The terms “service load” and “working load” are essentially synonymous.
4. **d.** Drift and other serviceability limits are sometimes specified in the applicable building code, but are more often a matter of engineering judgment based upon the characteristics of the cladding and other systems attached to the steel frame. Further consideration and information can be found in AISC’s *Steel Design Guide No. 3, Serviceability Design Considerations for Low-Rise Buildings*.
5. Flat, horizontal, vertical, and overhead.
6. **b.** See Appendix J2.4 of the 1999 *LRFD Specification*.
7. **b.** See Section B7 of the 1999 *LRFD Specification*.
8. A hybrid beam is a beam having the flanges with a greater yield strength than that of the web, while a homogeneous girder is one that the maximum flange stress is less than or equal to the web yield stress.
9. **c.** According to *LRFD Specification* Commentary M2.1, the temperature for heated members shall not exceed 1,100°F for A514/A514M and A852/A852M and 1,200°F for other steels.
10. Plug and slot welds are used to transmit shear in lap joints, or to prevent buckling of lapped parts and to join component parts of built-up members. To find more information about plug and slot welds see Section J2.3 in the *LRFD Specification*. See FAQ 8.4.1 at www.aisc.org/faq.

FROM THE EDITOR

Some helpful comments and suggestions have been received regarding the June 2003 *Steel Quiz* on single-plate shear connections.

Question 2 stated that the plate in a single-plate shear connection is always welded to the support on both sides of the plate and bolted to the supported member. One reader noted that a complete-joint-penetration groove weld from one side of the plate can be used when access to the back-side is restricted, as for a skewed connection. This detail still satisfies the assumption of the *AISC Manual* method that the plate strength is developed in the weld.

Question 7 stated that providing short-slotted holes in the plate for ease in erection is common for shear tabs. An erector expressed preference for standard holes in connections into columns, reasoning that they make it easier and faster to plumb the building.