

Modern Steel Construction's monthly *Steel Quiz* 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 from AISC's web site:

www.aisc.org/lrfdspec

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

Anyone is welcome to submit questions for *Steel Quiz*—one question or 10! 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 developed by the staff of AISC's Steel Solutions Center. Sharpen your pencils and go!

1. What is the standard material specification for steel used in crane rails?
2. How are crane rail weights designated?
3. What is the difference between steel bar and steel plate?
4. What is the current standard format for designating steel plate?
5. **Yes/No:** Is it possible to obtain a fire-rating on a concrete-filled HSS column without externally applied fire protection?

6. List the following Steel Basic Seismic Force-Resisting Systems (based on ASCE 7-02) in order of increasing ductility: SMF, IMF, OMF, STMF, SCBF, OCBF, and EBF. Give the Response Modification Factor *R* for each.

7. **True/False:** When designing welded end connections of single-angle web members of a truss, the center of gravity of the weld group must coincide with the center of gravity of the angle, unless provision is made for the eccentricity.

8. What is the threshold number of cycles of live load application that determines when a fatigue resistance evaluation is required?

9. **Yes/No:** Is there a temperature limitation placed on the use of the AISC provisions for fatigue loading?

10. A307 bolts providing design strength, and for which the grip exceeds _____ diameter(s), shall have their number increased one percent for each additional $1/16''$ (2 mm) in the grip.

- a. one
- b. two
- c. three
- d. four
- e. five

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Answers

1. **ASTM A759** is the standard material specification for crane rails.

2. Crane rails are designated in **lb/yd**.

3. The difference between plate and bar is based upon size and production procedure. Flat stock has historically been classified as a bar if it is less than or equal to 8 in. wide, and as a plate if it is greater than 8 in. wide. See the AISC LRFD *Manual of Steel Construction*, third ed., page 1-9 for discussion.

4. $PL\ t\ (\text{in.}) \times w\ (\text{in.}) \times l\ (\text{' - ''})$
example: a 15" long, 1/2" thick, 4 1/2" wide plate would be $PL\ 1/2 \times 4 1/2 \times 1\text{'-}3\text{'}$

5. **Yes.** ASCE *Standard Calculation Methods for Structural Fire Protection ASCE/SFPE 29-99*, Section 5.2.3 has calculation methods for concrete-filled HSS columns. Also see AISC *Steel Design*

Guide 19—Fire Resistance of Structural Steel Framing, page 28.

6. In order of increasing ductility, the Basic Seismic Force-Resisting Systems are:

OMF	R = 3.5
IMF	R = 4.5
OCBF	R = 5
SCBF	R = 6
STMF & EBF	R = 7
SMF	R = 8

7. **False**, if statically loaded: The provision that the center of gravity of the weld group must coincide with the center of gravity of the angle, unless provision is made for the eccentricity, is not applicable to the end connections of statically-loaded single angle, double angle, and similar members. See 1999 AISC LRFD *Specification*, Section J1.8.

8. **20,000 cycles.** See 1999 AISC LRFD *Specification*, Appendix K3.1.

9. **Yes.** The fatigue resistance determined using the AISC provisions of Appendix K3 is applicable only to structures subject to temperatures not exceeding 300 °F (150 °C).

10. **e. five.** See 1999 AISC LRFD *Specification*, Section J3.11. ★

Do you have an idea for *Steel Quiz*?
Send it to:

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