

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.html

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

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Victor Shneur, P.E., of LeJeune Steel in Minneapolis, contributed this month's *Steel Quiz*.

QUESTIONS

1. What are mill tolerances?
2. Which of the following statements is correct? Corrosion of steel is
 - a. an electrochemical process
 - b. an electrical process
 - c. a chemical process
 - d. not an issue for steel inside of the building
3. Is it acceptable to use a bearing-type connection for the web shear connection at a directly welded flange fully restrained moment connection?
4. How does hot bending/cambering affect the design strength of beams?
5. Is the fabricator responsible for deterioration of the shop primer that may result from exposure to ordinary atmospheric conditions?
6. What nuts should be specified for A325 galvanized bolts?
7. What is the approximate longitudinal expansion or contraction of a 100-ft long steel girder when the outside temperature changes by 60° F?
8. Where is the 2003 North American Steel Construction Conference going to be held?
 - a. Honolulu
 - b. San Francisco
 - c. Washington, D.C.
 - d. Chicago
 - e. Baltimore
9. What is the color code for ASTM F1554 Grade 55 anchor rods?
10. Are ASTM F1554 anchor rods weldable?

TURN PAGE FOR ANSWERS

STEEL QUIZ

ANSWERS

1. From page 2-34 in *LRFD Manual*, 3rd ed.: "Mill tolerances are those variations that could be present in the product as-delivered from the rolling mill. These tolerances are given as follows:
 1. For structural shapes and plates, see ASTM A6.
 2. For HSS, see ASTM 500 (or other applicable ASTM specification for HSS).
 3. For steel pipe, see ASTM A53."It is very important to consider mill tolerances during detailing and fabrication. In some cases of complicated connections it is even advisable to check actual shapes prior to fabrication.
2. a. Choice d is also generally correct.
3. Yes. *LRFD Specification* Section J1.9 states, "bearing-type connections shall not be considered as sharing the load in combinations with welds." However, in this particular case, flange welds do not share the load with bolts at the web.
4. From page 2-39 in *LRFD Manual*, 3rd ed.: "The residual stresses from heating operations generally do not affect the design strength of structural members, since the effect of residual stresses is considered in the provisions of the *LRFD Specification* Section M2.1." Members should be heated with caution to prevent buckling.
5. No. See the Commentary of Section 6.5.1 of the 2000 *Code of Standard Practice for Steel Buildings and Bridges* for reference and explanation.
6. Per Section 3.2.1 in ASTM A325, only galvanized A563-DH or A194-2H nuts should be specified. See the Commentary in Section 2.4.2, *Specification for Structural Joints Using ASTM A325 or A490 Bolts* for more information.
7. About 1/2 in. From the Commentary of Section 7.13 of the 2000 *Code of Standard Practice for Steel Buildings and Bridges*: "Steel will expand or contract approximately 1/8 in. per 100 ft for each change of 15° F ... in temperature." It is important to recognize this when, for example, a long girder has been fabricated in a shop at a higher temperature than the outside temperature, and a complete joint penetration weld with specified root opening needs to be provided in the field.
8. e.
9. Grade 55 is yellow. See Section 19 in the ASTM F1554 standard for more information on color coding.
10. Grade 36—weldable; Grade 55—weldable if requested per ASTM F1554 Supplementary Requirement S1; Grade 105—not weldable.