

steel quiz

LOOKING FOR A CHALLENGE? *Modern Steel Construction's* monthly Steel Quiz tests your knowledge of steel design and construction. Most answers can be found in the 2005 *Specification for Structural Steel Buildings*, available as a free download from AISC's web site, www.aisc.org/2005spec. Where appropriate, other industry standards are also referenced.

This month's Steel Quiz was developed by AISC's Steel Solutions Center. Sharpen your pencils and go!

- 1 What color codes are designated for F1554 anchor rods of grades 36, 55, and 105?
- 2 When anchor rods are too short, is it possible to make an extension with a coupling?
- 3 Does the 13th edition AISC manual include provisions for crane runway design?
- 4 What is the most likely ASTM designation of structural steel that is found in a building that was built in 1948? What is the tensile strength?
- 5 Is it possible to use the 2005 AISC specification for design work in a building rehabilitation project involving a structure built in 1948?
- 6 What is the weight-to-perimeter (W/D) ratio?
- 7 How many methods of providing pretension in bolted joints are presented in the RCSC *Specification for Structural Joints Using ASTM A325 or A490 Bolts*?
- 8 Why was it possible to change the minimum fillet weld size to be based upon the thinner part joined, in the 2005 AISC specification, when it used to be based upon the thicker part joined?
- 9 Is a groove weld appropriate for use in a lap joint?
 - a. Yes
 - b. No
 - c. Only when the thicknesses of the two joining pieces are equal
- 10 Do coatings have any impact on the slip resistance of a bolted joint?

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ANSWERS

- 1 Grade 36 is blue, Grade 55 is yellow, and Grade 105 is red. Section 2.5 of AISC Design Guide 1 includes this information.
- 2 Yes. Design Guide 1* describes methods of extending short anchor rods in section 2.11. Coupling is one option, and there are proprietary couplers available that facilitate this coupling process.
- 3 No. The 13th edition AISC manual does not specifically address crane runway design. However, section 18 of AISC Design Guide 7* discusses crane runway design and presents example calculations.
- 4 The most likely ASTM designation of structural steel that was used in 1948 is ASTM A7, with a tensile strength of between 60 ksi and 72 ksi. The yield stress is half the tensile strength with a minimum of 33 ksi. This can be found in Table 1.1 of AISC Design Guide 15.*
- 5 Yes. Many of the materials used in older structures are outside the scope of the 2005 AISC specification* as listed in section A3. Nonetheless, the methods presented in the 2005 specification can be used in rehabilitation projects with engineering judgment. Appendix 5 of the AISC specification covers the subject of evaluation of existing structures. Historic AISC specifications* can also provide clues about the original design.
- 6 This is a variable used to adjust fire-resistance ratings from the actual shape used in the test to the shape being used in the actual construction. For further information, see AISC Design Guide 19.*
- 7 Four methods of pretensioning bolts are presented in the RCSC: turn-of-nut, calibrated wrench, twist-off-type tension-control bolt assemblies, and direct-tension-indicators. These are covered in section 8.2 of the RCSC specification, available at www.boltcouncil.org or in part 16 of the 13th edition manual.
- 8 The introduction of ASTM A992 (which has a 50-ksi yield strength), along with its predominant usage for W-shapes, made the use of filler metals that are prequalified with lower preheats prevalent. These filler metals provide some control over hydrogen content and permit lower preheats and selection of those preheats based on the thinner material joined. Additionally, use of the thinner material joined when using these filler metals has been permitted by AWS for many years.
- 9 **b.** See Table 3-1 of AISC Design Guide 21*, which lists interaction of joint types and weld types.
- 10 Yes. Chapter 12 of the *Guide to Design Criteria for Bolted and Riveted Joints* (available at www.boltcouncil.org) discusses the effects of protective coating on slip resistance.

NOTE

*This publication can be accessed at www.aisc.org/epubs.