

steel quiz

Steel Quiz made its first appearance in *Modern Steel Construction* in the November 1995 issue. This month's edition takes a look back at that very first quiz and kicks off a series of quizzes that will revisit some of the best questions over the past 20 years.

Note that some answers have been modified to bring them up to date (the changes are shown in red).

- 1 True or False: Physically, the U.S. customary shape series and metric shape series are identical.
- 2 Cross-sectional dimensions and standard mill practice for rolled shapes may be found in which of the following documents?
 - a. ASTM A36
 - b. ASTM A6/A6M
 - c. AISC's *Steel Construction Manual*
 - d. a and c
 - e. b and c
- 3 True or False: An installed bolt with the point of the bolt flush with the face of the nut is acceptable.
- 4 Which of the following methods for bolt installation is not recognized by RCSC and AISC?
 - a. standard torque
 - b. turn-of-nut
 - c. snug-tight
 - d. calibrated wrench
- 5 In which of the following positions can weld metal be deposited at the fastest rate?
 - a. horizontal
 - b. vertical
 - c. flat
 - d. overhead
- 6 Which is more costly: a ¼-in. fillet weld that's 10 in. long or a ½-in. fillet weld that's 5 in. long?
- 7 True or False: If an extended end-plate moment connection is specified as slip-critical, the slip resistance of the bolts at the tension flange must be reduced for the tension present.
- 8 Which of the following factors is used to adjust for inelastic column behavior?
 - a. K
 - b. τ_b
 - c. m
 - d. n
 - e. c and d
- 9 In a partially composite beam, which of the following controls the flexural design?
 - a. compression in the concrete
 - b. tension in the steel
 - c. compression in the steel
 - d. shear strength of the shear stud connectors
- 10 Which of the following trusses does not use diagonal members?
 - a. Pratt
 - b. Fink
 - c. Warren
 - d. Vierendeel

TURN PAGE FOR ANSWERS

- 1 **True.** Because our current shape series is one of the most efficient in the world, and because the inch-series dimensions are nominal (e.g., a W14 is not exactly 14 in. deep), the metric series is simply a soft conversion of it.
- 2 **e.** ASTM A6/A6M is the standard that specifies cross-sectional dimensions and standard mill practice for rolled shapes. AISC's *Steel Construction Manual* summarizes this information in Part 1.
- 3 **True.** The RCSC *Specification* defines **sufficient** thread engagement as "having the end of the bolt extending beyond or at least flush with the outer face of the nut; a condition that develops the strength of the bolt."
- 4 **a.** Both RCSC and AISC discourage use of a standard uncalibrated torque value. Such an uncalibrated value may be too high and break well lubricated bolts or, more importantly, may be too low and result in under-tensioned bolts if the thread lubrication is poor or the threads are dirty or corroded. Therefore, if torque is to be used, it must be calibrated according to RCSC *Specification* Section 8.2.2.
- 5 **c.** Welding in the flat position allows the fastest deposition rate and is therefore the most economical welding position.
- 6 At first glance, these welds might seem to be of equal cost because they are of equivalent strength. However, because the volume of weld metal is proportional to the square of the weld size, the ½-in. weld uses twice as much weld metal as the ¼-in. weld. Additionally, a ½-in. weld will require multiple weld passes. In the end, the same strength will cost more than twice as much with the ½-in. weld.
- 7 **False.** Because the tensile and compressive flange forces are equal, any loss of slip resistance adjacent to the tension flange of the beam is compensated for by an increase in slip resistance adjacent to the compression flange. **Note that end-plate connections can be designed as a bearing type connection. When this is done, it is common practice to assume that the compression bolts resist all of the shear force.**
- 8 **b.** Commentary Section C2 in the 2010 AISC *Specification* states: "The τ_b factor is similar to the inelastic stiffness reduction factor implied in the column curve to account for loss of stiffness under high compression loads ($\alpha P_c > 0.5P_c$), and the 0.8 factor accounts for additional softening under combined axial compression and bending."
- 9 **d.** The flexural strength of partially composite beams is controlled by the shear strength of the shear stud connectors.
- 10 **d.** A Vierendeel truss uses chord and vertical members without diagonals. Therefore, unlike other ideal trusses, Vierendeel truss members must also transmit member forces due to bending.



Everyone is welcome to submit questions and answers for Steel Quiz. If you are interested in submitting one question or an entire quiz, contact AISC's Steel Solutions Center at 866.ASK.AISC or at solutions@aisc.org.

Correction

The answers provided for questions 2 and 4 in June's Steel Quiz incorrectly referred to Table 3-6 for the flexural strength values. The correct values can be obtained from Table 3-10 or Table 6-1. A corrected version of the quiz is posted in the Archives section at www.modernsteel.com. Special thanks to David Atkins with AECOM for being the first to bring this to our attention.