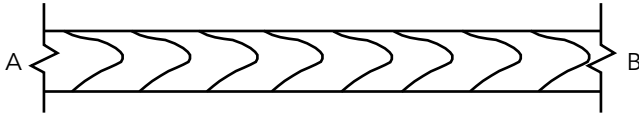


steel quiz

Steel Quiz made its first appearance in the November 1995 issue of *Modern Steel Construction*. This month's Quiz takes a look at some of the best questions from 1997.

- 1 ASTM A325 and A490 provisions include head dimensions that are larger than those for other bolt grades. Why?
- 2 Was the fillet weld shown in Figure 1 deposited from A to B or from B to A?



- 3 When steel is specified to be painted without indication of required surface preparation method, what surface preparation is used?
- 4 An ASTM A325 bolt is subjected to a tension load that is gradually increased until failure. Which of the following descriptions best fits the failed bolt?
 - a. The threads have stripped, causing the bolt and nut to separate
 - b. The unthreaded bolt shank is necked-down and fractured near its mid-length
 - c. The threaded portion of the shank between the nut and thread runout is elongated and fractured
 - d. The unthreaded bolt shank is fractured near the juncture of the bolt head and shank
- 5 A welder is observed and is not wearing a welding helmet. Which of the following welding processes is most likely being used?
 - a. Flux-cored arc welding (FCAW)
 - b. Submerged arc welding (SAW)
 - c. Gas metal arc welding (GMAW)
 - d. Shielded metal arc welding (SMAW)
 - e. None of the above
- 6 Name three methods for setting a column base to proper elevation.
- 7 **True or False:** In the AISC *Specification*, beams and their connections are designed to have equivalent reliability.
- 8 Give two examples each of common structural shapes that have: a. only unstiffened elements; b. both unstiffened and stiffened elements; and c. only stiffened elements.
- 9 In seismic moment frame design, a strong-column/weak-beam design requirement is sometimes imposed. What does this mean?
- 10 There are at least six methods that are used to cut steel. How many can you name?

TURN PAGE FOR ANSWERS

- 1 The head size specified in ASTM A325 and A490 is dimensionally equivalent to that for the matching ASTM A563 nut. Therefore, installation is simplified because the same socket or wrench size can be used for both the bolt head and nut. Kudos if you already knew that ASTM F3125 is the new home for grades A325 and A490 bolts; see "Six into One" in the November 2015 issue of *Modern Steel* (available at www.modernsteel.com) if you didn't.
 - 2 It was deposited from B to A. The molten weld metal cools faster at the toes because the base metal draws heat away. The ripple pattern results when the slower-cooling weld metal is drawn back by surface tension as the weld is deposited.
 - 3 From the AISC *Code of Standard Practice* Section 6.5.2: "Unless otherwise specified in the contract documents, the fabricator shall, as a minimum, hand clean the structural steel of loose rust, loose mill scale, dirt and other foreign matter, prior to painting, by means of wire brushing or by other methods elected by the fabricator, to meet the requirements of SSPC-SP2."
 - 4 **c.** This is illustrated in *Guide to Design Criteria for Bolted and Riveted Joints* (a free download at www.boltcouncil.org). High-strength bolts subjected to tension fail in the threaded portion of the shank. Accordingly, a reduction for threading is incorporated into the tension design strength listed in the AISC *Specification*, which is then used with the nominal bolt area.
 - 5 **b.** In the SAW process, the arc and molten weld metal are submerged beneath a layer of flux. Therefore, a welding helmet (eye protection from the arc) is not required.
 - 6 The use of a leveling plate, leveling nuts and shim stacks are three alternatives. These are discussed in greater detail in the AISC *Steel Construction Manual* beginning on page 14-6.
 - 7 **False.** While the *Specification* does not explicitly state the target reliability index, the Commentary states: "As might be expected, there was a considerable variation in the range of β -values. For example, compact rolled beams (flexure) and tension members (yielding) had β -values that decreased from about 3.1 at $L/D = 0.50$ to 2.4 at $L/D = 4$. This decrease is a result of ASD applying the same factor to dead load, which is relatively predictable, and live load, which is more variable. For bolted or welded connections, β was in the range of 4 to 5."
 - 8 Angles and tees have only unstiffened elements, I-shapes and channels have both unstiffened and stiffened elements and round and rectangular HSS have only stiffened elements.
 - 9 The selection of a strong column and weak beam means that the nominal flexural strength of the column is greater than expected flexural strengths of the beams. The Commentary to Section E3.4a of the *Seismic Provisions* explains the intent of this requirement.
 - 10 The six possible answers are: friction sawing, cold sawing (rotary, hack and band), flame cutting, plasma cutting, laser cutting and shearing.
-

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.



Steel
SolutionsCenter