

STEEL QUIZ

STEEL QUIZ, A MONTHLY FEATURE IN *MODERN STEEL CONSTRUCTION*, allows you to test your knowledge of steel design and construction. Unless otherwise noted, all answers can be found in the *LRFD Manual of Steel Construction*. **To receive a free catalog of AISC publications, circle #10 on the reader service card in the back of this magazine.**

1. In which of the following cases is a washer not required in the bolt assembly?

- a) Under the turned element when the bolt is fully tensioned by the calibrated wrench method
- b) When ASTM A490 bolts are used in combination with material with a specified yield point below 40 ksi
- c) When a slotted hole occurs in an internal ply
- d) When an oversized or short-slotted hole occurs in an outer ply

2. When a pair of angles is noted as SLBB, what does this indicate?

3. When ASTM A325 high-strength bolts are subjected to combined shear and tension, which of the following expressions gives the nominal tensile strength when the threads are included in the shear plane:

- a) $0.75 F_u$
- b) $(90^2 - 3.52 f_v^2)^{1/2}$
- c) $117 - 1.9 f_v \leq 90$
- d) b or c
- e) none of the above

4. ASTM A449 bolts are suitable for direct substitution for similar diameter ASTM A325 bolts, True or False?

5. When a fillet weld is placed between plates forming an angle less than 60 degrees, why is a Z loss factor applied to determine the effective throat?

6. To prevent sag and vibration in long, light tension-only

diagonal bracing members, they are sometimes fabricated short. This practice is known as inducing:

- a) shortening
- b) stretch
- c) draw
- d) full tension

7. The maximum fillet weld size that can be placed along the toe of a channel flange is equal to $\frac{1}{16}$ -in. less than the tabulated flange thickness, True or False?

8. When using heat to camber or straighten members made from ASTM A572 grade 50 steel, what maximum temperature must be imposed?

9. What is the member straightness tolerance for columns in the AISC Code of Standard Practice? (Hint: Not the plumbness tolerance for an erected column).

10. Steel delivered to a job-site has green and yellow paint markings on it. What is the grade of steel?

ANSWERS:

1. c. A slotted hole in an internal ply would not require a washer.

2. That the angles are oriented "short legs back-to-back".

3. d. RCSC Specification Section 4(b) provides the equation of answer b to represent an elliptical strength interaction curve. At the same time, LRFD Specification Section J3.7 provides an alternative "three-straight-line" approximation shown by answer c.

4. False. While A449 and A325 material seems to offer the same strength, LRFD Specification Section A3.3 restricts the use of A449 material to bolt diameters larger than 1 1/2 in. and non-slip-critical connections. This is because, A449 bolts are not produced to the same inspection and quality assurance requirements as ASTM A325 bolts. Also, A449 bolts are not produced to the same heavy-hex head dimensions as A325 bolts are.

5. The Z loss factor is applied at angles below 60 degrees because the fillet weld does not penetrate to the root of the joint. Note that, below 30 degrees, this fillet weld is no longer prequalified.

6. c. Intentionally fabricating light braces short is known as inducing draw.

7. False. Because channel flange surfaces are not parallel, the toe of the flange is less thick than the average flange thickness tabulated. To comply with LRFD Specification Section J2.2b, which limits the maximum weld size to 1/16-in. less than the thickness of the edge of the connected part, this reduced thickness must be considered.

8. From LRFD Specification Section M2.1, the temperature may not exceed 1,200 degrees F.

9. From AISC Code of Standard Practice Section 6.4.3, the permissible deviation from straightness is one one-thousandth of the axial length between points of lateral support.

10. From ASTM A6/A6M Section 12.6.3, the color combination of green and yellow corresponds to ASTM A572 grade 50 steel.

CORRECTION:

Dear Editor:

I am writing to clear up an error in your December, 1995 edition. Your answer #5 states that the A307 Specification is for headed material only. This is not correct. The current ASTM A307-94 Specification has three different grades available. Grades A & B are for bolts and studs, and Grade C is for Nonheaded anchor bolts, either bent or straight. Most anchor bolts and anchor rods are ordered as A307 by steel fabricators and they should know this does meet ASTM standard specifications.

Gary Rusnyk,
Marketing Manager,
Portland Bolt & Mfg. Co., Inc.

Editor Notes: Mr. Rusnyk is correct. The error occurred because Grade C has the same properties as A36 and the *Manual of Steel Construction* treats A307 anchor bolts as A36 rods.

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