

steel quiz

LOOKING FOR A CHALLENGE? *Modern Steel Construction's* monthly Steel Quiz tests your knowledge of steel design and construction. The answers for many of this month's questions can be found in the 2010 AISC *Specification for Structural Steel Buildings* (ANSI/AISC 360-10) and the 2005 AISC *Seismic Provisions for Structural Steel Buildings* (ANSI/AISC 341-05), both of which are available as free downloads at www.aisc.org/freepubs. Some answers come from the 13th Edition AISC *Steel Construction Manual*, available for purchase at www.aisc.org/manual.

- 1 What is the preferable slenderness ratio limit between connectors for built-up tension members?
a) 200 b) 300 c) 400 d) No limit
 - 2 True/False: Inelastic rotation demands should be considered when detailing a Special Moment Frame column base.
 - 3 In Table 10-5 (All-Bolted Unstiffened Seated Connections) in the 13th Edition AISC *Steel Construction Manual*, what is the definition of N_{req} ?
a) Number of bolts
b) Spacing of bolts
c) Required bearing length
d) Minimum angle length
 - 4 True/False: Finger shims, when inserted fully against the bolt shank, are acceptable for slip-critical connections.
 - 5 True/False: Galvanized surfaces are not permitted in slip-critical connections.
 - 6 What will be the color of the 14th Edition AISC *Steel Construction Manual*?
a) Green b) Red c) Brown d) Burgundy
 - 7 True/False: The Whitmore section is the width at the end of a joint that is determined by spreading the force from the start of the joint 30 degrees to each side of the connecting element along the line of force.
 - 8 In bolted connections, what is the maximum number of bolts that can be used parallel to the line of force?
a) 6 b) 8
c) 15 d) No maximum limit
 - 9 True/False: In order to increase the capacity of a welded double- or single-angle simple shear connection, it is permitted to weld the entire width of the angle legs at both the top and the bottom.
 - 10 True/False: Prying action occurs in both welded and bolted connections.
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steel quiz ANSWERS

- 1 (b) The User Note in Section D4 of the 2010 AISC *Specification* states, "The longitudinal spacing of connectors between components should preferably limit the slenderness ratio in any component between the connectors to 300."
- 2 True. The Commentary to AISC *Seismic Provisions* (AISC 341) states in Section 8.5c, "A ductile moment frame is usually expected to develop a hinge at the base of the column. The column base detail must accommodate the required hinging rotations while maintaining the strength required to provide the mechanism envisioned by the designer."
- 3 (c) N_{req} is the required bearing length for the limit states of local web yielding and local web crippling for the supported beam with an all-bolted unstiffened seated connection.
- 4 True. Finger shims are suitable as noted in Part 9 of the 13th Edition AISC *Manual* (see page 9-15). For the effect of fillers and shims on available joint strength, see Section J5 in the 2010 AISC *Specification*.
- 5 False. Galvanized steel can be used in slip-critical connections and is treated as Class A surface. To comply with the requirements for a Class A surface, the AISC *Specification* requires that galvanized faying surfaces be roughened by hand wire brushing.
- 6 (d) Burgundy. Cindi Duncan, AISC's director of engineering, explains that burgundy was chosen because it is reminiscent of the color of an earlier important *Manual*—the 6th Edition. The 6th Edition *Manual* introduced several new provisions based on the state of the art at that time.
- 7 True. Refer to Part 9 of the 13th Edition AISC *Manual* (see page 9-3) for an illustration and additional information.
- 8 (d) The 2010 AISC *Specification* does not place a specific limit on the number of bolts that can be used in a connection. There is a reduction in bolt strength for long joints. See Section J3 in the 2010 AISC *Specification* and note how bolt shear strengths have been increased, compared to the 2005 *Specification*, and that the length at which the joint becomes a long joint has changed.
- 9 False. Welding the top would inhibit the flexibility of the connection, which is not consistent with the design philosophy of a simple shear connection. This is discussed specifically in Part 10 of the AISC *Manual*.
- 10 False. Prying action is a phenomenon in bolted construction only. Please see Part 9 of the 13th Edition AISC *Manual* (page 9-10) for a discussion of prying action.



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Anyone 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.