

*Steel Quiz*, a monthly feature in *Modern Steel Construction*, allows you to test your knowledge of steel design and construction. All references to LRFD specifications pertain to the 1999 *LRFD Specification for Structural Steel Buildings*, available as a free download at [www.aisc.org](http://www.aisc.org). ASD references pertain to the 1989 *ASD Specification for Structural Steel Buildings*. Where appropriate, other industry standards are also referenced.

If you or your firm are interested in submitting a *Steel Quiz* question or column, please contact AISC's Steel Solutions Center at:



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Questions and answers for this month's *Steel Quiz* were provided by **Victor Shneur, P.E.** of LeJeune Steel Company.

## Questions

1. What is the maximum  $b/t$  ratio for wall of a rectangular A500 Grade B ( $F_y = 46$  ksi) HSS column with a single-plate shear connection?
2. True or False: Requirements for faying surface conditions do not apply to bearing pretensioned joints.
3. True or False: The shear and tensile strengths of a bolt are not affected by pretension in the bolt.
4. What is meant by "firm contact" in a bolted connection?
5. What is the generally accepted minimum inside-bending radius for cold bent  $1/2$ " (A36) plate when bending is transverse to the direction of rolling?
6. Generally speaking, what special checks should be done for the coped ends of beams?
7. True or False: Some inelastic but self-limiting deformation in the connection is permitted to accomplish end rotation of simple beam connections.
8. If 70 ksi filler metal is used for complete-joint-penetration groove weld to transfer shear force from  $3/4$ " plate (A572 - 50) to a  $3/4$ " beam flange (A992 - 50), which would govern—plate strength, strength of the weld or beam flange strength?
9. What strength should be developed by groove-welded beam splices?
10. Why is it required to locate perimeter column splices a minimum of 48 inches above the finished floor?

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# Steel Quiz

## Answers

1. The maximum  $b/t$  is 35.2. See Table B5.1 in the LRFD *Specification* (December 27, 1999) and page 4-96 in *Hollow Structural Sections Connections Manual* (AISC, 1997) for reference and additional information.
2. True.
3. True.
4. The glossary of the *Specification for Structural Joints Using ASTM A325 or A490 Bolts* (June 23, 2000) states: *firm contact—the condition that exists on a faying surface when the plies are solidly seated against each other, but not necessarily in continuous contact.*
5. It would be  $1.5 \times 0.5 = 0.75''$ . See Table 9-13 in the LRFD *Manual*, 2<sup>nd</sup> ed., for other plates. Note: bent plates exhibit better ductility and require smaller bending radius when bent perpendicular to their rolling direction.
6. Stability (at deep copes at the top flange), web shear, block-shear rupture, flexural yielding and local web buckling should be checked for coped ends of a beam. Note: in some cases it is more economical to use a deeper beam rather than to provide reinforcement.
7. True.
8. Both plate strength and beam flange strength would govern. See Table J2.5 in the LRFD *Specification* (December 27, 1999) for reference.
9. From LRFD *Specification Section J7: Groove-welded splices in plate girders and beams shall develop the full strength of the smaller spliced section.* Note: it is possible to use a bolted splice or a welded lap-type splice to develop the strength required by the forces at the point of the splice.
10. It is required per OSHA paragraph 1926.756(e)(1) to permit installation of perimeter safety cables prior to erection of the next tier. Note: erection is facilitated when column splices are located no higher than 5' above the top of steel beams because of improved accessibility.