

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/lrfdspec

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, contact:

The logo for Steel SolutionsCenter features the word "Steel" in a small blue font above the word "SolutionsCenter" in a larger, bold blue font. A blue swoosh underline is positioned above "SolutionsCenter".

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1. Where does one find specification requirements for base metal thickness when using structural studs?
2. How does one specify material for raised-pattern floor plates?
3. For standard weight classes (i.e., std., x-strong and xx-strong), is the designation Pipe 5 Std. a proper designation?

4. For pipes that do not pertain to a standard weight class, is the designation Pipe 14.000 \times ³/₈ a proper designation?
5. Is HSS5.563 \times 0.258 a proper designation for round HSS?
6. What is the minimum center-to-center spacing of plug welds in terms of hole diameter?
7. Must one provide transverse stiffeners at the ends of unframed beams and girders?
8. What is web sidesway buckling?
9. Where does one find tolerances for the installation of anchor rods, foundation bolts and other embedded items?
10. In single-plate shear connections, why do AISC design criteria limit the maximum thickness of the shear plate?

Bonus Question:

What is the difference between bolted bearing joints and slip-critical joints?

TURN PAGE FOR ANSWERS

STEEL QUIZ

ANSWERS

1. The AWS D1.1:2002 Welding Specification, Section 7.2.7, contains base metal thickness requirements for structural steel studs. The requirements are a function of the stud diameter.
2. According to the 3rd Edition *LRFD Manual*, p. 2-23, ASTM A786 “commercial grade” raised-pattern floor plate is commonly specified. Please note that floor-plate design is seldom controlled by strength considerations.
3. Yes, Pipe 5 Std. is a proper pipe designation. It denotes a steel pipe with a 5” nominal diameter and a 0.258” wall thickness, which corresponds to the standard weight series.
4. No, Pipe 14.000×³/₈ is not a proper pipe designation. The outside diameter and wall thickness, in inches, are expressed to three decimal places. The correct designation would be Pipe 14.000×0.375.
5. Yes, HSS5.563×0.258 is a proper designation. Both the diameter and wall thickness, in inches, are nominal values expressed to three decimal places. Please note that unlike pipe designations, there is no space between HSS and the nominal diameter. For this particular case, HSS5.563×0.258 is the dimensional equivalent to Pipe 5 Std. Each product pertains to different ASTM materials and therefore do not share the same yield and tensile strengths.
6. Per the AISC 1999 *LRFD Specification*, Section J2.3b, the minimum center-to-center spacing of plug welds shall be four times the diameter of the hole.
7. Yes. According to AISC 1999 *LRFD Specification*, Section K1.8, at unframed ends of beams and girders not otherwise restrained against rotation along their longitudinal axes, a pair of transverse stiffeners, extending the full depth of the web, shall be provided. Also see Section K1.9 for additional stiffener requirements for concentrated forces.
8. A limit state in a flexural member whereby the compression flanges are braced at a concentrated load and the web is squeezed into compression. This results in the tension flange buckling. Please refer to the AISC 1999 *LRFD Specification*, Section K1.5, for the web design strength. For an illustration of this interesting limit state, refer to the *Commentary* Section K1.5. This specification is available as a free download from www.aisc.org/lrfdspec.
9. Refer to the AISC 2000 *Code of Standard Practice for Steel Buildings and Bridges*, Section 7.5, for variation information from the dimensions shown in the Embedment Drawings. The *Code* is available as a free download from www.aisc.org/code.
10. According to the 3rd Edition *LRFD Manual*, there is a limit to the maximum plate thickness in order to provide for rotational ductility in the connection. Refer to page 10-113 for additional information.

Answer to Bonus Question:

Bolted bearing joints include snug-tightened and pretensioned joints. Although slip-critical joints are not considered bearing joints, they must be designed for both a design slip resistance and design bearing strength per the RCSC 2000 *Specification for Structural Joints Using ASTM A325 or A490 Bolts* (a free download from www.boltcouncil.org).