

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.html

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:



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This month's *Steel Quiz* was written by AISC's Steel Solutions Center staff.

QUESTIONS

1. Does a 1/16-inch gap in a column splice require shimming?
2. Are A325 bolts available in a 3/8-inch diameter?
3. What is the difference between nominal bolt area and stress area?
4. Can A36 angles and channels be designed using actual yield strength values (as opposed to minimum specified yield values)?
5. Is canopy framing considered structural steel?
6. How is a blast-cleaned class B steel surface achieved?

7. Can snug-tight bolts be used with oversized holes?
8. Do column base plates require finishing if the bottom surface is not grouted?
9. When doesn't the top surface of a base plate need to be finished?
10. How many bolts are needed to secure a girder before releasing a hoisting line?

TURN PAGE FOR ANSWERS

STEEL QUIZ

ANSWERS

1. No. According to Section M4.4 of the 1999 LRFD *Specification*, lack of contact bearing not exceeding a gap of $\frac{1}{16}$ -inch is permitted, regardless of the type of splice used.
2. No. The ASTM A325 Specification lists bolt diameters ranging from $\frac{1}{2}$ -inch to $1\frac{1}{2}$ -inch, inclusive. Any bolts advertised as A325 with smaller or larger diameters than those in the Specification are in direct conflict with the Fastener Quality Act (available from NIST—see www.nist.gov/fqa).
3. The nominal bolt area incorporates the nominal diameter of the bolt without taking the threading into account. Stress area takes into account the reduction in area due to threading, and the expression can be found in the AISC *Manual* and ASTM Specifications (i.e. A307, A325 and A490). To simplify calculations, the lower bound reduction of 0.75 is incorporated in AISC-tabulated nominal strength values so that bolt design can be based on nominal bolt areas.
4. Such a practice is outside the AISC *Specification*, as F_y is defined as the specified minimum yield stress of the steel being used. The specified minimum yield strength values for structural steels are usually found in the corresponding ASTM Specification.
5. Yes, if the canopy is made from structural steel shapes and/or plates. Refer to Section 2.1 of the 2000 AISC *Code of Standard Practice* for the definition and descriptions of structural steel.
6. The 2000 RCSC bolt specification mentions “uncoated blast-cleaned steel” to obtain a Class B surface for slip-critical joints. Any level of blast cleaning will suffice, such as SSPC SP5, SP6, SP7 and SP10.
7. No. Per the 2000 RCSC bolt specification, Section 4.3, slip critical joints, which utilize pretensioned bolts, are required when oversized holes are used.
8. It depends. According to section M2.8 of the 1999 LRFD *Specification*, steel bearing plates two inches or less in thickness are permitted without finishing, provided a satisfactory contact bearing is obtained. For bearing plates between two and four inches thick, straightening by pressing or finishing of all bearing surfaces (with exceptions) is permitted. Steel bearing plates over four inches in thickness must be finished on all bearing surfaces (with exceptions). The exceptions are (i) bottom surfaces of bearing plates and column bases which are grouted to ensure full bearing contact on foundations need not be finished, and (ii) top surfaces of bearing plates need not be finished when CJP groove welds are provided between the column and bearing plate.
9. As previously discussed, Section M2.8 of the 1999 LRFD *Specification* states that steel bearing plates two inches or less in thickness are permitted without finishing, provided a satisfactory contact bearing is obtained. For plates thicker than two inches, top surfaces of bearing plates need not be finished when CJP groove welds are provided between the column and bearing plate.
10. Section 1926.756 of the OSHA 29 CFR Part 1926 (Subpart R) *Safety Standards for Steel Erection* states that during the final placing of solid web structural members, the load shall not be released from the hoisting line until the members are secured with at least two bolts per connection, of the same size and strength as shown in the erection drawings, drawn up wrench-tight or the equivalent as specified by the project structural engineer of record, except as specified in paragraph (b) of this section. [Note: Paragraph (b) pertains to diagonal bracing and generally allows 1 bolt at each connection.]