

Steel Quiz

Steel Quiz, a monthly feature in *Modern Steel Construction*, allows you to test your knowledge of steel design and construction. Answers can generally be found in the *LRFD Manual of Steel Construction*, 2nd edition, but other industry standards are often referenced.

If you or your firm are interested in submitting a *Steel Quiz* question or column, please contact:

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The questions and answers for this month's *Steel Quiz* were contributed by the E & R department and the Certification staff.

Questions

1. What is the tolerance on shop-induced beam camber for a beam less than 50' long, according to the *AISC Code of Standard Practice* (1992)?
2. Can you name the two categories for which a steel erector can become Quality Certified?
3. How long does a welder remain qualified for a given weld?
4. What is the largest diameter bolt covered by the ASTM A325 and ASTM A490 bolt specifications?
5. To what ASTM specification should anchor rods be specified?
6. Why are SAE J429 grade 5 and grade 8 bolts not acceptable substitutes for ASTM A325 and A490 bolts?
7. Structurally, is there a difference between a 1/2 x 4 bar and a 1/2 x 4 plate?
8. According to ASTM A6-98, what paint color system used to identify ASTM A572 Grade 50 steel?
9. When are plug and slot welds used?
10. Can a shear stud connector be welded to the beam flange at any location across its width as long as there is adequate space for the weld?

Turn page for answers

Steel Quiz

Answers

1. According to the Code of Standard Practice (1992), section 6.4.5: *...the shop fabrication tolerance shall be minus zero, plus 1/2" for members 50 ft. and less in length.*
2. The two categories of erector certification are Certified Erector and Certified Advanced Erector.
3. According to AWS D1.1-98, section 4.1.3.1, a welder's qualification *"shall be considered as remaining in effect indefinitely unless (1) the welder is not engaged in a given process of welding for which the welder or welding operator is qualified for a period exceeding six months or unless (2) there is some specific reason to question a welder's or welding operator's ability."*
4. 1 1/2". The ASTM A325 and ASTM A490 bolt specifications are only applicable to bolts 1/2" to 1 1/2" in diameter inclusive.
5. Anchor rods should be specified to ASTM F1554, which is available with a yield strength of 36 ksi, 55 ksi, and 105 ksi for headed, threaded and nutted, and hooked configurations.
6. One reason: although the strength properties of SAE J429 grade 5 and 8 bolts are equivalent to A325 and A490 bolts, the quality control requirements are less stringent and therefore not acceptable.
7. Structurally, none; furthermore, plate is becoming a universally applied term today. However, the historical classification system for such structural material would suggest the following physical difference: all four sides of a 1/2 x 4 bar would be rolled edges, i.e., the mill rolled it to that thickness and width. A 1/2 x 4 plate will have been cut from a 1/2-in. plate of greater width either by shearing or flame cutting.
8. ASTM A572 Grade 50 steel is identified with a green and yellow paint marking.
9. Plug and slot welds are permitted for the transfer of shear force only. As such, they are sometimes used to transmit shear in lap joints, to join components of built-up members, or to prevent buckling of lapped parts. Their design and usage is covered in AISC LRFD Specification Section J2.3.
10. Yes. However, from the AISC LRFD Specification Commentary Section I5.6, *"[the diameter of] studs not located directly over the web of a beam...is limited to [a maximum of] 2.5 times the flange thickness."*