

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 Keith Grubb at grubb@blacksquirrel.net

Reader Comment

Your response to question 10 in the February 2001 issue of *Modern Steel Construction* is both correct and incorrect and should be clarified. Under current OSHA Federal regulations, iron workers are only required to provide fall protection at heights above 25 feet or 30 feet (depending upon the type of structure) and NOT above 6 feet as you have noted. This type of question can create more confusion about an issue that many people already find confusing in this industry.

The 6 foot tie off rule only applies to trades that come after structural steel erection (per OSHA).

Sean Brungot
Isaacsons Structural Steel, Inc.

Editor's comment:

Mr. Brungot is correct, the 6' tie-off rule applies to trades that come after steel erection. The question was taken from SSPC: The Society for Protective Coatings and should have been clarified to refer specifically to the painting trades. We apologize for any confusion.

Questions

1. What is the maximum allowable diameter for a shear stud that is not located directly over the web of a beam?
2. True or False: Steel construction must always be considered as "unrestrained".
3. What ASTM standard provides the standard time-temperature relationship used to perform fire tests in the United States?
4. Name one of the most comprehensive directories of tested assemblies and their fire ratings.
5. True or False: Spray-applied fire protection material should always be applied over primed steel.
6. Can high-strength bolts be considered to share the load in combination with welds in the same connection?

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Answers

1. 2.5 times the thickness of the flange to which they are welded.
2. False! There are several factors that come into play, not the least of which is the fact that usually only a small portion of the building is involved in a fire. The cooler, uninvolved areas can act to restrain the expansion of the involved portion of the structure. "Restrained" and "Unrestrained" designations stem from fire test themselves; "unrestrained" assemblies are constructed and tested without edge restraints against thermal expansion.
3. ASTM E119, Test Methods for Fire Tests of Building Construction and Materials, provides a time-temperature relationship to be followed during fire tests. The curve rises steeply at first, to 1700 degrees F after one hour, then rises more slowly after that. At 4 hours, the temperature is approximately 2000 degrees F.
4. The UL Fire Resistance Directory (Underwriters Laboratories, 847/272-8800) is an annual compilation of fire-tested structural assemblies.
5. False. Many shop-applied coatings (and field-applied coatings, for that matter) are incompatible with common fire protection materials, causing them to adhere poorly to the steel. In most cases, unprimed steel is the best surface to receive applied fire protection materials.
6. Yes, if the bolts are designed as slip critical. From AISC LRFD Specification Section J1.9, high-strength bolts in slip-critical connection are permitted to share the load with welds only if the bolts are fully tensioned before the welds are made. However, welds in bearing-type bolted connections must be designed for the entire load.