

# 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*, 2<sup>nd</sup> 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:

## *Steel Quiz*

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The questions and answers for this month's *Steel Quiz* were contributed by **Victor Shneur, P.E.** of the LeJeune Steel Company, Minneapolis, MN.

## Questions

- To what material specification are beveled washers for A325 and A490 bolts ordered?
- True or False? Temporary welds shall be subject to the same welding procedure requirements as the final welds.
- Which of the following statements is correct?
  - 50 ksi = 330 MPa
  - 50 ksi = 345 MPa
  - 50 ksi = 360 MPa
  - 50 ksi = 375 MPa
- What is the acceptable procedure for galvanizing tension-control bolts?
- What is the maximum effective length of a 5/16-in. longitudinal fillet weld (parallel to force) at a lap splice?
- Why is back-gouging required at complete joint-penetration groove welds?
- What is the oldest arc welding process?
- When was the Golden Gate Bridge completed?
- Which of the following statements is correct? An increase in tension splice length...
  - increases the effectiveness of the bolts in slip-critical type joints
  - decreases the effectiveness of the bolts in bearing type joints
  - decreases the effectiveness of the net section of spliced members
  - does not affect the effectiveness of the net section of spliced members
  - does not affect the effectiveness of the bolts in bearing type joints
- Which of the following statements is correct? The design strength in local web buckling of coped end of the beam is dependent on...
  - cope depth, cope length, specified minimum yield stress
  - cope depth, cope length, web thickness
  - cope depth, cope length, specified minimum tensile strength
  - cope depth, cope length, web thickness, specified minimum yield stress
  - cope depth, cope length, web thickness, specified minimum tensile strength

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## Answers

1. ASTM F 436 covers these washers.
2. True. Section 5.18.1 of AWS D1.1-98 states: "Temporary welds shall be subject to the same welding procedure requirements as the final welds. These shall be removed, when required by the Engineer. When they are removed, the surfaces shall be made flush with the original surface..."
3. b. Since  $1 \text{ ksi} = 6.895 \text{ MPa}$  (approx.),  $50 \times 6.895 = 344.75 \text{ MPa}$ , which was rounded to 345 MPa. Similarly, 36 ksi steel = 250 MPa.
4. From ASTM standard F 1852 Section 6.3.1: "When zinc coating is specified each component of the assembly shall be mechanically zinc coated," and from Section 6.3.2: "Hot dip zinc coating shall not be permitted."
5. The maximum effective length =  $70 \times (5/16") = 21.9 \text{ inches}$ .
6. Back-gouging is required to ensure complete fusion and complete joint penetration upon subsequent welding. Back-gouging is not required when a backing bar is used.
7. Bare wire arc welding is the oldest arc welding process. For a comprehensive reference on arc welding, check out *The Procedure Handbook of Arc Welding, 13th edition*, published by the Lincoln Electric Company. Fax 216/361-5901 for information.
8. The Golden Gate Bridge was completed in 1937. More than 100,000 tons of steel, 80,000 miles of wire cable were used in the bridge's construction.
9. b.
10. b. See p. 8-255 of the *LRFD Manual of Steel Construction, 2nd edition, Vol. II*, for a discussion of coped beams.