

steel quiz

This month's Steel Quiz looks at the use of corrosion protection for high-strength bolts.

- 1 True or False: A galvanized high-strength bolt from one supplier can be purchased separately and paired with a galvanized nut from a different supplier.
- 2 _____ fasteners are often a dull, flat gray color with a very smooth finish in the as-produced condition.
 - a) Mechanically galvanized
 - b) Hot-dip galvanized
- 3 True or False: Per ASTM A325, all threaded components of the fastener assembly must be galvanized by the same process (mechanical or hot-dip).
- 4 True or False: Hole sizes need to be increased from those given in the Research Council on Structural Connections (RCSC) and AISC specifications to accommodate galvanizing.
- 5 True or False: ASTM A490 bolts cannot be galvanized.
- 6 Which of the following grades of ASTM F1554 anchor rods can be galvanized?
 - a) Grade 36
 - b) Grade 55
 - c) Grade 105
 - d) a and b
 - e) a, b and c
- 7 ASTM A490 bolts cannot be hot-dip galvanized due to concerns about:
 - a) Mixing of dissimilar metals
 - b) Hydrogen embrittlement
 - c) Segregation cracking
 - d) Lamellar tearing
- 8 ASTM F1136 coatings are classified into six grades (Grade 1 through Grade 6). Which grade is recommended for bolts?
- 9 Which of the six ASTM F1136 coating grades is recommended for nuts?

TURN PAGE FOR ANSWERS

- 1 False. Commentary Section 2.3.3 in the RCSC *Specification* states: "Galvanized high-strength bolts and nuts must be considered as a manufactured fastener assembly." The nut and bolt are often made by different manufacturers. The supplier provides the products together because they have to test them together before shipment to confirm that the over-tapped nut works with the bolt.
- 2 a) Mechanically galvanized. Hot-dip galvanizing has a bit of a shimmer to it and looks somewhat like the underside of aluminum foil. Note that the surface condition of galvanizing changes with exposure and, over time, the appearance differences will diminish.
- 3 True. Section 4.3.5 in ASTM A325 states: "Threaded components (bolts and nuts) shall be coated by the same zinc-coating process and the supplier's option is limited to one process per item with no mixed processes in a lot." Mixing may result in an unworkable assembly because the fit of the threads between the bolt and the over-tapped nut differs for each method of galvanizing.
- 4 False. The thickness of galvanizing is quite thin and experience has proven that hole sizes listed in Table J3.3 of the AISC *Specification* are adequate for the erection of galvanized structural steel. Note that increasing hole sizes may result in a connection that needs to be designed as slip-critical, so it should be avoided.
- 5 True. However, the 2009 and 2014 versions of the RCSC *Specification* now include a new coating system (ASTM F1136 Zinc/Aluminum Corrosion Protective Coatings for Fasteners) that is suitable for ASTM A490 bolts.
- 6 e) All three grades within the ASTM F1554 *Specification* can be either hot-dip galvanized or mechanically galvanized.
- 7 b) Hydrogen embrittlement.
- 8 Grade 3 (sprayed or dip-spun application, depending on fastener size) is recommended for bolts.
- 9 Grade 5 (dip-spun application) is recommended for nuts.



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