

steel quiz

LOOKING FOR A CHALLENGE? *Modern Steel Construction's* monthly Steel Quiz tests your knowledge of steel design and construction. The answers for this month's questions can be found in the 2009 RCSC *Specification for Structural Joints Using High-Strength Bolts*. That document is available as a free download at www.boltcouncil.org.

- 1 Who writes the "bolt specification" and what is its current version?
- 2 True/False: The Research Council on Structural Connections, RCSC, is a division of AISC.
- 3 Why did RCSC add a new table, Table 7.1, with bolt pretension values in the 2009 RCSC *Specification*?
 - a) They apply when electric wrenches are used.
 - b) They provide a higher reliability against slip.
 - c) They are for use when performing pre-installation verification.
 - d) They are for use in laboratory experiments.
- 4 What is the ASTM designation for twist-off-type tension-control high-strength bolt assemblies that are equivalent to ASTM A325 bolts in strength?
- 5 True/False: There is a twist-off bolt assembly standard that is equivalent in strength to A490 bolts.
- 6 True/False: The 2009 RCSC *Specification* permits hot-dip or mechanical galvanizing of all high-strength bolts.
- 7 Is there a metal coating that can be applied to ASTM A490 and F2280 bolts?
- 8 True/False: When a bolt is pretensioned, the stress that results from the pretension should be added to any tension that is applied to the bolt by external loads.
- 9 What is the maximum thickness of shims or fillers between plies where a reduction in bolt shear strength is not required by RCSC (and AISC)?
 - a) $\frac{1}{8}$ in.
 - b) $\frac{1}{4}$ in.
 - c) $\frac{5}{16}$ in.
 - d) $\frac{1}{2}$ in.
- 10 True/False: The available shear strength of a bolt depends on the length of the connection.

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- 1 It is written by the Research Council on Structural Connections (RCSC), which recently released the 2009 RCSC *Specification for Structural Joints Using High-Strength Bolts*. This document is available as a free download at www.boltcouncil.org.
- 2 False. The RCSC is an independent non-profit organization that funds research and compiles information on bolted joints in structural steel.
- 3 (c) According to Section 7.2 of the 2009 RCSC *Specification*, the values in Table 7.1 are to be used to verify the pretensioning method during pre-installation verification. The table provides the same numerical values as the older 2004 RCSC *Specification* required for preinstallation verification at 5% greater than the minimum installed pretension values shown in Table 8.1.
- 4 Twist-off or tension-control bolt assemblies that are equivalent in strength to ASTM A325 bolts are specified as ASTM F1852.
- 5 True. ASTM F2280 has been added to the 2009 RCSC *Specification* to recognize twist-off type tension-control bolt assemblies that are equivalent in strength to ASTM A490 bolts.
- 6 False. The RCSC *Specification* allows the galvanizing of ASTM A325 and F1852 bolts, but not those of ASTM A490 or F2280 designation. This is because ASTM A490 and F2280 bolts have a high enough material strength that hydrogen embrittlement is a concern. See Section 8.5 of AISC *Steel Design Guide No. 17* for more information on this topic. The design guides are available as free downloads for AISC members, and to non-members for a fee, at www.aisc.org/epubs.
- 7 Yes. ASTM F1136 has been added to the 2009 RCSC *Specification* as an approved method of protecting A490 bolts from corrosion. One proprietary name for a coating that meets ASTM F1136 is Dacromet.
- 8 False. Pretension is internal to the joint and does not add to the external loads. See Figure 4.1 and the related discussion in the text in AISC *Steel Design Guide No. 17* for further information.
- 9 (b) According to Section 5.1 of the 2009 RCSC *Specification*, the maximum thickness of shims or fillers that can be used without applying a reduction to the bolt shear strength is $\frac{1}{4}$ in.
- 10 True. The basic bolt shear design values include a reduction to account for typical joint lengths. Longer joints have an additional reduction factor. Note that Table 5.1 in the 2009 RCSC *Specification* has higher strength levels and a shorter limit at which the basic bolt shear design values must be reduced. These are consistent with information in the 2010 AISC *Specification*.



Anyone is welcome to submit questions and answers for Steel Quiz. If you are interested in submitting one question or an entire quiz, contact AISC's Steel Solutions Center at 866.ASK.AISC or at solutions@aisc.org.