steel quiz

LOOKING FOR A CHALLENGE? *Modern Steel Construction*'s monthly Steel Quiz tests your knowledge of steel design and construction. Most answers can be found in the 2005 *Specification for Structural Steel Buildings*, available as a free download from AISC's website, **www.aisc.org/2005spec**. Where appropriate, other industry standards are also referenced.

1 True/False: The same nut can be used on a bolt with cut threads or a bolt with rolled threads.

2 Does the AISC *Specification* require modification of bolt hole size for galvanized steel?

3 Is the reuse of high-strength bolts permitted?

(a) yes
(b) no
(c) sometimes

4 The maximum pretension in bolts that are to be used in pretensioned connections is based upon which of the following?

(a) $0.7F_u$
(b) $0.8F_u$
(c) $0.9F_u$
(d) none of the above

5 True/False: An ASTM A307 bolt is not suitable for use in a pretensioned connection.

6 How many methods are recognized in the RCSC *Specification* for pretensioning high-strength bolts?

7 What is the most effective method of reducing the stress range, and thus the propensity for fatigue cracking, in a bolt that is loaded cyclically in tension?

(a) making use of double-nut installation
(b) pretensioning the bolt
(c) using a larger bolt size
(d) all of the above

8 True/False: Torque can be used as a reliable measure of the pretension in a bolt.

9 In which of the following cases is it required that bolts and nuts must be ordered as an assembly from the same source?

(a) for galvanized assemblies
(b) for snug-tightened applications
(c) for applications in which the direct-tension-indicator pretensioning method will be used
(d) for twist-off tension-control-type bolts

10 Is it permitted to make bolt holes using plasma and similar cutting equipment?

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1 True. Both cut and rolled threads are produced to meet the same threading specifications.

2 No. Bolt holes for galvanized steel are not permitted to be any larger than the sizes specified in Table J3.3 of the 2005 AISC *Specification*.

3 (c) sometimes. Black A325 bolts can be reused with the permission of the Engineer of Record. However, Section 2.3.3 of the 2004 RCSC *Specification* (available as a free download at **www.boltcouncil.org**) states that A490 bolts and galvanized A325 bolts are not suitable for reuse. The last paragraph of the commentary on this section provides a detailed explanation of these requirements.

4 (d) There is no upper limit on the installed pretension in bolts that are pretenstioned. Section 9 of the RCSC *Specification* states that installed tensions in excess of those given in Table 8.1 of the RCSC shall not be cause for rejection. As long as the bolt does not break during installation, it is not "overtensioned."

5 True. ASTM A307 bolts are mild steel fasteners and cannot be pretensioned.

6 Four. Section 8.2 of the RCSC *Specification* provides the turn-of-nut method, calibrated wrench method, twist-off-type tension-control bolt method and direct tension indicator method.

7 (b) Even though using a larger bolt size can reduce the stress range in a bolt that is loaded cyclically in tension, the threaded nature means that pretension is much more effective as a solution.

8 False is the correct answer if you thought of an uncalibrated torque. However, if you thought of a calibrated torque and the calibrated wrench pretensioning method, you can take credit for an answer of True. Also, if you thought of the twist-off-type tension-control bolt pretensioning method as a torque-based method, you also can take credit for an answer of True.

9 (a) and (d). As stated in the commentaries to Section 2.2 and 2.3 of the RCSC *Specification*, bolts and nuts must be ordered as an assembly from the same source whenever they are galvanized or tension-controlled bolt assemblies.

10 Yes. AISC *Specification* Section M2.5 provides a general criterion based upon a maximum surface roughness. Any method that meets this criterion is permissible.

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**.

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