TEST PROCEDURE FOR THE PERFORMANCE OF METRIC CHEMICAL COATED PREVAILING-TORQUE SCREWS

IFI-525
1996

IFI NOTES:

1. *IFI-525 is a standard developed through the procedures of the Industrial Fasteners Institute. It is under the jurisdiction of IFI Divisions I and III and is the direct responsibility of the IFI Standards and Technical Practices Committee.*

2. *IFI-525 was first published in 1982 and was extensively reviewed and revised in 1996.*

1. Scope

1.1 This standard establishes a conformance test procedure for the performance of metric chemical coated prevailing-torque screws in nominal thread diameters M6 thru M20 inclusive.

Torque values given in this standard are conformance requirements for chemical coated prevailing-torque screws and apply only to the combination of test conditions described in the performance test procedure (4.1). If the conditions of the actual service application differ from those of 4.1 (e.g., length of thread engagement, class of internal thread tolerance, different coating on screw or mating part), the torque values may differ. Such values can only be determined through testing the prevailing-torque screw in its actual assembly.

This standard is not concerned with dimensional features such as head styles, or with other mechanical or performance capabilities such as strength properties, corrosion resistance, sealing, suitability for use in high or low temperatures, and/or consistency of torque-to-tension relationships during assembly. Such features and properties are covered in other standards and specifications, and must be referenced when specifying a chemical coated prevailing-torque screw to assure that all of the service conditions of the particular engineering application are properly met.

1.2 Definitions

1.2.1 A chemical coated prevailing-torque screw (hereinafter called "screw") is an externally threaded fastener which is resistant to rotation due to a chemical coating, and not because of compressive load developed against the underhead bearing surface of the screw or a tensile load developed in the shank of the screw.

2. Designations

2.1 Types. There are two types of chemical coated screws based on when the chemical coating is applied. Preapplied chemical coatings are applied as part of screw manufacturing prior to delivery for assembly. Applied liquid chemical coatings are applied as part of the assembly operation or in-service applications.

2.2 Design. The composition and application of the chemical coating shall be in accordance with the practice of the manufacturer. For applications where temperatures may exceed 200°F and/or a lubricant is present or applied for protection or ease of assembly, an adverse effect may result on the prevailing-torque material. The manufacturer's data should be consulted to determine suitability of the selection.

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Table 1 Screws With Preapplied Chemical Coatings

Nom Screw Size and Thread Pitch	Prevailing-On Torque N·m	Breakaway Torque N·m	Prevailing-Off Torque N·m
	Max	Min	Min
M6 × 1	1.8	1.5	0.8
M8 × 1.25	2.8	4.0	2.0
M10 × 1.5	5.5	11	4.0
M12 × 1.75	7.2	16	7.0
M14 × 2	11	22	10
M16 × 2	14	33	16
M20 × 2.5	22	45	22

NOTE:
Values are based on nut engagement in chemical area for a distance of one nominal screw diameter.

Table 2 Screws With Applied Liquid Coatings

Nom Screw Size and Thread Pitch	Prevailing-On Torque N·m	Breakaway Torque N·m	Prevailing-Off Torque N·m
	Max	Min	Min
M6 × 1	See Note 2	0.56	0.34
M8 × 1.25		2.0	1.0
M10 × 1.5		3.4	1.1
M12 × 1.75		4.8	1.2
M14 × 2		6.0	2.0
M16 × 2		6.8	2.8
M20 × 2.5		13	5.5

NOTES:
1. Minimum value for any of the available liquid coatings. Higher removal torques may be obtained through selective choice of liquid coating used.
2. Prevailing-on-torque for screws with liquid coatings applied at the time of assembly is essentially zero.

3. Requirements

3.1 Finish. Screws shall be furnished plain or with a protective coating as specified by the purchaser. If tolerancing differs, see "Scope" Para. 2.

3.2 Threads

3.2.1 Thread Tolerances. Threads of prevailing-torque screws shall be tolerance Class 6g as specified in ASME B1.13M, page A–20. If tolerancing differs, see "Scope" Para. 2.

3.2.2 Thread Start. Screws shall assemble a minimum of one full turn by hand into any mating internally threaded component before engaging the coating that has threads acceptable to Gaging System 21 of ASME B1.3M, page A–46.

3.3 Performance

3.3.1 The prevailing-torque of screws occurring during the first installation shall not exceed the maximum prevailing-on-torque specified in Table 1 or Table 2, as applicable, when tested as specified in 4.1. In addition, the breakaway-torque and highest prevailing-off-torque occurring during the first removal shall not be less than minimum torques specified in Table 1 and Table 2, as applicable, when tested in accordance with 4.1.

3.3.2 Prevailing-Torque. Screws which are too short or which have thread lengths too short to permit testing in accordance with 4.1, shall have their torque requirements and test procedure established by agreement between the purchaser and manufacturer.

4. Performance Test

4.1 Test Procedure. The sample screw shall be assembled into the countersunk side of a test nut (4.1.1). During the performance of the test, the nut shall be turned using manual torque only, while the test screw shall be restrained from turning. The nut shall be advanced until the coated threads of the screw are fully engaged. The highest torque occurring while the test nut is in motion shall be measured and recorded. Speed of rotation shall be approximately 12 RPM.

After 24 hours at 24°C (±3°) in the assembled condition, the breakaway-torque of the test nut shall be measured. Breakaway-torque is defined as the torque to start rotation in the loosening direction. Removal shall be continued and the prevailing-off-torque measured and recorded. Prevailing-off-torque is defined as the highest removal torque occurring during the next 360° of rotation following breakaway in the loosening direction.

4.1.1 Test Nut. ASTM A563 Class 9 nuts shall be used. Class 9 nuts are hex Style 2 in dimensional conformance with ANSI B18.2.4.2M, page D–8.

The test nut shall have a plain or dry phosphate (oil free) finish and meet 6H tolerance. If tolerancing differs, see "Scope" Para. 2.

A new test nut shall be used for testing each screw. Prior to the use of a test nut, its threads shall be gaged and shall be acceptable to the requirements of Gaging System 21 of ASME B1.3M, page A–46.

5. Inspection

5.1 Inspection Procedure. Screws shall be inspected to determine conformance with the requirements of this standard.

Unless otherwise specified, from each lot of screws the following number of tests shall be conducted to determine the acceptability of each of the requirements:

Lot Size (pieces)	No. of Tests
to 50	2
51 to 500	3
501 to 35,000	5
over 35,000	8

Alternate inspection procedures may be specified by the purchaser on the purchase order or engineering drawing.