LOCKING FASTENERS

TEST PROCEDURE FOR THE LOCKING ABILITY PERFORMANCE OF CHEMICAL COATED LOCK SCREWS

IFI 125 1987

IFI Notes:

1. *IFI-125 is a standard developed through the procedures of the Industrial Fasteners Institute. IFI-125 is under the jurisdiction of IFI Divisions II and IV and is the direct responsibility of their joint Lock Screw Technical Committee.*
2. *IFI-125 was first published in 1973. It was reviewed in 1982 and again prior to the issuance of this 1987 edition.*

1.0 Scope.

1.1 Scope. This standard establishes a conformance test procedure for locking ability performance of chemical coated lock screws, in nominal screw sizes ¼ thru ¾ in.

(Note: "Lock" is a generic term used to identify the externally threaded products covered in this standard. The terms "lock" and "locking" are not intended to imply an indefinite permanency of fixity.)

The torque values given in this standard are conformance requirements for chemical coated lock screws and apply only to the combination of test conditions described in the locking ability 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 lock 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 lock 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 lock screw is an externally threaded fastener which is resistant to rotation due to a chemical coating, and not because of a compressive load developed against the under head bearing surface of the screw or a tensile load developed in the shank of the screw.

2.0 Designations.

2.1 Types. There are two types of chemical coated lock screws with the difference being when the chemical coating is applied to the screw. Preapplied chemical coatings are applied during the manufacture of the screw; applied liquid coatings are applied to the screw immediately prior to or during assembly in its service application.

2.2 Design. The composition and application of the chemical coating shall be in accordance with the practice of the manufacturer. For applications where the 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 locking material. The manufacturer's data should be consulted to determine suitability of the selection.

3.0 Requirements.

3.1 Finish. Lock screws shall be furnished plain or with a protective coating as specified by the purchaser.

3.2 Threads.

3.2.1 *Thread Tolerances.* Threads of lock screws shall be Unified coarse or fine series, as specified in ANSI/ASME B1.1, page A-26. Unless otherwise specified, threads shall have Class 2A tolerances.

3.2.2 *Thread Start.* Lock screws shall assemble a minimum of one full turn by hand into any mating internally threaded component that has threads acceptable to Gaging System 21 of ANSI/ASME B1.3, page A-53.

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3.3 Locking Ability.

3.3.1 The prevailing torque of lock 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 maximum prevailing-off torque occurring during the first removal shall not be less than the minimum torques specified in Table 1 and Table 2, as applicable, when tested in accordance with 4.1.

3.3.2 Lock 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.

Table 1 Torque Values for Lock Screws with Preapplied Chemical Coatings

Nom Screw Size and Thds per Inch	Prevailing-On Torque in. lbs max	Breakaway Torque in. lbs min	Prevailing-Off Torque in. lbs min
1/4 - 20	15	12	9
5/16 - 18	24	24	12
3/8 - 16	48	60	36
7/16 - 14	60	96	48
1/2 - 13	72	140	90
9/16 - 12	96	192	120
5/8 - 11	120	252	150
3/4 - 10	180	324	200

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

Table 2 Torque Values for Lock Screws with Applied Liquid Coatings

Nom Screw Size and Thds per Inch	Prevailing-On Torque in. lbs max	Breakaway Torque in. lbs min	Prevailing-Off Torque[1] in. lbs min
1/4 - 20	See Note 2	6	3.5
5/16 - 18		18	8.5
3/8 - 16		30	18
7/16 - 14		36	12
1/2 - 13		48	12
9/16 - 12		54	18
5/8 - 11		60	24
3/4 - 10		192	48

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 lock screws with liquid coatings applied at the time of assembly is essentially zero.

4.0 Locking Ability Test.

4.1 Test Procedure. The sample lock 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 lock screw are fully engaged. The maximum torque occurring while the test nut is in motion shall be measured and recorded. Speed of rotation should be approximately 12 rpm.

After 24 hours at 75°F (±5°) 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 maximum removal torque occurring during the next 360° of rotation following breakaway in the loosening direction.

4.1.1 *Test Nut.* The test nut shall conform to the dimensional, metallurgical and mechanical requirements for heavy hex nuts given in ANSI/ASME B18.2.2, page D-1. The test nut shall have a plain or dry phosphate (oil free) finish.

A new test nut shall be used for testing each lock 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 ANSI/ASME B1.3.

5.0 Inspection.

5.1. Inspection Procedure. Lock screws shall be inspected to determine conformance with this standard. Inspection procedures may be specified by the purchaser on the inquiry, purchase order, or the engineering drawing or shall be as agreed upon between the purchaser and the supplier prior to acceptance of the order. In the absence of a defined agreement, the requirements of B18.18.2M shall apply.