

1. Scope

1.1 This standard establishes a method to carry out an accelerated test to evaluate the relative corrosion resistance of various coatings applied to mechanical fasteners. It is effective for the evaluation of a variety of corrosion mechanisms such as general and crevice corrosion. The test duration may be selected to achieve any desired level of corrosion exposure and provides a frame of reference to determine relative coating resistance to corrosion. Fasteners tightened to proof load and subjected to this test procedure tend to simulate a measure of service conditions.

1.2 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use.

2. Referenced Documents

All standards are latest issue, unless otherwise agreed between manufacturer and purchaser.

2.1 American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5990, U.S.A.

ASME B18.12 – Glossary of Terms for Mechanical Fasteners

2.2 American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM B117 – Standard Practice for Operating Salt Spray (Fog) Apparatus

ASTM B605 – Electrodeposited Coatings of Tin-Nickel Alloy

ASTM F1470 – Standard Guide for Fastener Sampling for Specified Mechanical Properties and Performance Inspection

ASTM F1789 – Standard Terminology for F-16 Mechanical Fasteners

2.3 Industrial Fasteners Institute, 6363 Oak Tree Boulevard, Independence, OH 44131

IFI-140 – Carbon and Alloy Steel Wire, Rods and Bars for Mechanical Fasteners

IFI-142 – Hydrogen Embrittlement Risk Management

3. Terminology

Definitions for many of the terms used in this standard are included in ASTM F1789 and ASME B18.12.

4. Test Duration

The test duration should be specified as A, B, C, D or E in accordance with Table 1.

A cycle is a series of daily events scheduled in a 24 hour period (see Table 2).

A phase shall be 8 cycles.

5. Apparatus

5.1 A fog humidity cabinet shall be used in which salt mist applications coupled with high temperature humidity and moderately high temperature dry off may be sequenced manually or automatically. Water fog or visible water droplets on parts being tested shall be continuous after equilibrium is reached.

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Table 1 Test Duration

Test Duration	Number of Cycles
A	8
B	16
C	40
D	80
E ¹	> 80

Note 1: For special applications as agreed between supplier and purchaser.

Table 2

Time	Event
6:00 a.m.	Salt mist application (in ambient env.)
7:30 a.m.	Salt mist application (in ambient env.)
9:00 a.m.	Salt mist application (in ambient env.)
10:30 a.m.	Salt mist application (in ambient env.)
2:00 p.m.	8 hour humidity cabinet exposure incl. 1 hour progression to wet conditions
10:00 p.m.	8 hour environmental exposure incl. 3 hour progression to dry conditions
Weekends	Ambient environment

Notes: Times shown are illustrative: test cycle may be started at any time and follow, in the order shown in the Table, the events for a 24 hour period to complete one cycle. Ambient is specified in Table 4 and weekend testing is optional.

5.2 A rack suitable to support bolt or screw assemblies shall be agreed upon between supplier and purchaser. If a plastic rack is selected, the fastener load shall be achieved through finger tightening. If aluminum or stainless material is used for the rack, then the bolt or screw assemblies shall be tightened to proof load (Fig.1 illustrates the assembly). The test results shall always state the material used for the rack during testing. Nonmetallic washers shall be installed to prevent the bolt or screw head or the test coupon from contact with the test rack. See Fig. 1 and Para. 8.4.

5.3 Steel coupons shall be included with fasteners to be tested to verify that uniform amounts of corrosion have been produced by the test. Refer to Fig. 1 and also see Table 3. The inclusion of a metal loss coupon assists in making comparisons from one test to another and allows one to quantify a repeatable test.

6. Salt Mist Application and Dryoff

6.1 The salt solution shall conform to the requirements of Table 4. The pH values are based on the practice of ASTM B117. It shall be sprayed by a nozzle to provide a mist such that the test fastener(s) and coupon(s) are thoroughly wet and dripping when examined visually. Solution collection rates shall conform to ASTM B117. Previous salt accumulations shall have been rinsed away during the salt solution spray application.

6.2 The dryoff environment area shall be maintained with sufficient air circulation to assure uniform temperature and also allow thorough drying of the tested fasteners and coupon. Temperature and humidity conditions are defined in Table 4.

Table 3 Coupon Mass Loss Target Ranges at End of Testing

Initial Coupon Thickness mm	Test Duration				
	mg of Mass Loss				
	A	B	C	D	E
0.79	828-1228	1496-1896	3210-3810	6038-6638	Note 1
1.59	874-1274	1574-1974	3378-3978	6345-6945	

Note 1: The corrosion rate (mass loss) is in linear relation with the number of test cycles. This linear relation can be used to calculate the mass loss for the number of cycles different than the test cycles corresponding to test durations shown in Table 3. Values in Table 3 are only applicable to Standard Test Procedure. Mass loss for test duration E is a function of the number of the cycles agreed upon.

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