



Designation: D2649 – 04

## Standard Test Method for Corrosion Characteristics of Solid Film Lubricants<sup>1</sup>

This standard is issued under the fixed designation D2649; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

### 1. Scope

1.1 This test method<sup>2</sup> covers the evaluation of the corrosion characteristics of dry solid film lubricants under conditions of high humidity.

1.2 The values stated in SI units are to be regarded as the standard. The inch-pound units given in parentheses are for information only.

1.3 *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 determine the applicability of regulatory limitations prior to use.*

### 2. Referenced Documents

#### 2.1 ASTM Standards:<sup>3</sup>

**B209** Specification for Aluminum and Aluminum-Alloy Sheet and Plate

**B308/B308M** Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles

**D235** Specification for Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)

**D1730** Practices for Preparation of Aluminum and Aluminum-Alloy Surfaces for Painting

**D1748** Test Method for Rust Protection by Metal Preservatives in the Humidity Cabinet

**D4175** Terminology Relating to Petroleum, Petroleum Products, and Lubricants

#### 2.2 U. S. Military Specifications:<sup>4</sup>

Mil-PRF-3043 Resin-Coating, Permanent (for Internal Engine Parts)

#### 2.3 Government Standard:<sup>5</sup>

P-D-680 Dry Cleaning and Degreasing Solvent

### 3. Terminology

#### 3.1 Definitions:

3.1.1 *lubricant, n*—any material interposed between two surfaces that reduces the friction or wear between them (see Test Method **D4175**).

#### 3.2 Definitions of Terms Specific to This Standard:

3.2.1 *dry solid film lubricant, n*—on an aluminum surface, one consisting of friction-reducing powders bonded in tight matrix to the surface of the metal.

### 4. Summary of Test Method

4.1 An aluminum panel having solid film deposited on one surface is contacted under load with the surface of an unlubricated panel. The specimen is subjected to  $95 \pm 3\%$  relative humidity at  $49^\circ\text{C}$  ( $120^\circ\text{F}$ ) for a period of 500 h. After this period, the surface of the unlubricated panel is examined for evidence of corrosion.

### 5. Significance and Use

5.1 Surfaces are examined for signs of corrosion. Any sign of corrosion is an indication of potential field failure.

### 6. Apparatus

6.1 *Bolt and Nut*, Finished hex bolt,  $\frac{3}{8}$ -24, minimum 19-mm ( $\frac{3}{4}$ -in.) long and finished hex nut,  $\frac{3}{8}$ -24. Bolt and nut shall be made of corrosion-resistant aluminum or stainless steel. Two (2) nuts and two (2) bolts are required.

6.2 *Channel*, made of aluminum alloy 6061-T6, conforming to Specification **B308/B308M**, 76-mm (3-in.) wide, 36-mm (1.41-in.) high, cut to 178-mm (7-in.) long. Holes for the bolts to pass through are drilled on the centerline of the channel 25 mm (1 in.) from each end. Two (2) channels are required.

6.3 *Humidity Environmental Test Chamber*, capable of producing  $95 \pm 3\%$  relative humidity,  $49 \pm 1^\circ\text{C}$  ( $120 \pm 2^\circ\text{F}$ ), and conforming to Test Method **D1748**, Annex A1 on Humidity Cabinet Apparatus.

6.4 *Torque Wrench*, with capacity of 2.8 N·m (25 lb·in.).

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee **D02** on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee **D02.L0** on Industrial Lubricants.

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<sup>2</sup> Reference may be made to Military Specification MIL-L-8937 (ASG), Jan. 22, 1963, and Method 3814 of Federal Test Method Standard No. 791.

<sup>3</sup> For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>4</sup> Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

<sup>5</sup> Available from Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402.