



Designation: **D6547 – 16** **D6547 – 23**

Standard Test Method for Corrosiveness of Lubricating Fluid to Bimetallic Couple¹

This standard is issued under the fixed designation D6547; 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 (ϵ) indicates an editorial change since the last revision or reapproval.

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

1. Scope*

1.1 This test method covers the corrosiveness of hydraulic and lubricating fluids to a bimetallic galvanic couple.

NOTE 1—This test method replicates Fed-Std No. 791, Method 5322.2. It utilizes the same apparatus, test conditions, and evaluation criteria, but it describes test procedures more explicitly.

1.2 The values stated in SI units are to be regarded as standard.

1.2.1 *Exception*—The values 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, safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

[A322 Specification for Steel Bars, Alloy, Standard Grades](#)

[D4175 Terminology Relating to Petroleum Products, Liquid Fuels, and Lubricants](#)

2.2 *Federal Standards:*

[FED-STD-791, Method 5322.2 Corrosiveness of Oil on a Bimetallic Couple](#)³

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of terms used in this test method, refer to Terminology [D4175](#).

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.N0 on Hydraulic Fluids.

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² 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.

³ Available online at ASSIST Quicksearch (<http://quicksearch.dla.mil>).

*A Summary of Changes section appears at the end of this standard

4. Summary of Test Method

4.1 This test method consists of fitting a brass clip to the fluid-coated surface of a steel disk, storing the assembly at approximately 50 % relative humidity for ten days, and visually inspecting the assembly for evidence of galvanic corrosion.

5. Significance and Use

5.1 Corrosiveness of a fluid to a bimetallic couple is one of the properties used to evaluate hydraulic or lubricating fluids. It is an indicator of the compatibility of a fluid with a brass on steel galvanic couple at ambient temperature and 50 % relative humidity.

6. Apparatus

6.1 *Desiccating Jars*, two.

6.2 *Magnifier*, 10× power.

6.3 *Glass Stirring Rod*.

6.4 *Abrasive Papers*, silicon-carbide or aluminum oxide (150, 240, 400, 600 grit, one sheet per disk).

6.5 *Cloth*, lint-free, clean, dry.

6.6 *Chromium Alloy Steel Disks*, three for each test sample.⁴

6.7 *Brass Clips*, three for each test sample.⁴

7. Reagents and Materials

7.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents conform to the Committee on Analytical Reagents of the American Chemical Society where such specifications are available.⁵

7.2 *Etching Solution*, consisting of distilled water, 450 mL; nitric acid, concentrated, 225 mL; sulfuric acid, concentrated, 300 mL; and hydrochloric acid, concentrated, 8 mL.

7.2.1 To avoid hazardous reactions when preparing the etching solution, place the distilled water (450 mL) in a 1.5 L, or larger, glass beaker set in a container of ice and water. Stir with a glass mechanical stirrer or plastic coated magnetic spin bar while slowly adding concentrated sulfuric acid (300 mL). Add more ice to the cooling bath as needed. When acid addition is complete, continue stirring until the solution has cooled to room temperature, and then start slow addition of the concentrated nitric acid (225 mL). Continue stirring after acid addition until the solution has cooled to room temperature, and then add concentrated hydrochloric acid (8 mL). Allow the mixture to equilibrate to room temperature before use. (**Warning**—Nitric, hydrochloric, and sulfuric acids are very corrosive. Nitric acid and sulfuric acid are also oxidizing acids. The analyst should prepare the etching solution in a well-ventilated hood and wear appropriate gloves, apron, and face shield.)

7.3 *Acetone*, technical grade. (**Warning**—Flammable. Health hazard.)

7.4 *Distilled Water*.

⁴ The sole source of supply of the apparatus known to the committee at this time is Metaspec, 790 W. Mayfield Rd., San Antonio, TX 78211. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

⁵ *Reagent Chemicals, American Chemical Society Specifications, ACS Reagent Chemicals, Specifications and Procedures for Reagents and Standard-Grade Reference Materials*, American Chemical Society, Washington, DC. For ~~Suggestions~~suggestions on the testing of reagents not listed by the American Chemical Society, see *Annual Analytical Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopeia and National Formulary*, U.S. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.