



Standard Test Method for Detection of Copper Corrosion from Lubricating Grease¹

This standard is issued under the fixed designation D 4048; 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 Department of Defense.

1. Scope

1.1 This test method covers the detection of the corrosiveness to copper of lubricating grease.

1.2 The values stated in SI units are to be regarded as the standard. 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 practices and determine the applicability of regulatory limitations prior to use.* For specific hazard statements, see Sections 7, 8, and 10.

2. Referenced Documents

2.1 ASTM Standards:

D 97 Test Method for Pour Point of Petroleum Oils²

D 130 Test Method for Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test²

D 2500 Test Method for Cloud Point of Petroleum Products²

2.2 ASTM Adjuncts:

Copper Strip Corrosion Standard³

3. Terminology

3.1 There are no terms in this test method that require new or other than dictionary definitions.

4. Summary of Test Method

4.1 A prepared copper strip is totally immersed in a sample of grease and heated in an oven or liquid bath at a specified temperature for a definite period of time. Commonly used conditions are $100 \pm 1^\circ\text{C}$ ($212 \pm 2^\circ\text{F}$) for $24 \text{ h} \pm 5 \text{ min}$. At the

end of this heating period, the strip is removed, washed, and compared with the Copper Strip Corrosion Standard.

5. Significance and Use

5.1 This test method measures the tendency of lubricating grease to corrode copper under specific static conditions. It may be of some value in predicting possible chemical attack on lubricated parts, such as bearings that contain copper or copper alloys. Such corrosion, for example, can cause premature bearing failures. However, no correlations with actual field service, most of which are under dynamic conditions, have been established. It does not measure either the ability of the lubricant to inhibit copper corrosion caused by factors other than the lubricant itself nor does it measure the stability of the grease in the presence of copper.

6. Apparatus

6.1 *Test Jars*—Cloud and pour jars, cylindrical jars of clear glass with flat bottoms, 30 mm to 33.5-mm ($1\frac{3}{16}$ in. to $1\frac{5}{16}$ in.) inside diameter, and 115 mm to 125 mm ($4\frac{1}{2}$ in. to 5 in.) in height as described in Test Methods D 97 and D 2500.

6.2 *Test Jar Covers*—Beakers, 50-mL; borosilicate glass, approximately 40 mm (1.6 in.) by 50 mm (2.0 in.) suitable for covering individual test jars. Small porcelain or glazed silica crucibles or crucible covers or watch glasses or vented corks that lightly cover the test jars, allowing pressure equalization between the inside and outside of the jars, yet minimizing exposure of the inside of the jars to foreign vapors present in the oven will also be satisfactory.

6.3 *Oven*—A circulating air oven or liquid bath capable of maintaining a temperature of $100 \pm 1^\circ\text{C}$ ($212 \pm 2^\circ\text{F}$) or other desired temperatures with the same precision.

6.4 *Polishing Vise*—For holding the copper strip firmly without marring the edges while polishing. Any convenient type of holder (see Appendix X1 of Test Method D 130) may be used, provided that the strip is held tightly and that the surface of the strip being polished is supported above the surface of the holder.

6.5 *Viewing Test Tubes*—Flat glass test tubes may be used to protect corroded strips for close inspection or storage. (See the Appendix X1 of Test Method D 130.)

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.G on Lubricating Grease.

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² *Annual Book of ASTM Standards*, Vol 05.01.

³ Available from ASTM International Headquarters. Order Adjunct No. ADJD0130.