



Standard Test Method for Wear Preventive Characteristics of Lubricating Grease (Four-Ball Method)¹

This standard is issued under the fixed designation D 2266; 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 determination of the wear preventive characteristics of greases in sliding steel-on-steel applications. It is not intended to predict wear characteristics with metal combinations other than steel-on-steel or to evaluate the extreme pressure characteristics of the grease.

1.2 The values stated in SI units are to be regarded as the standard except where the test apparatus or consumable parts are only available in other units. In such cases, these will be regarded as standard. The values given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety problems, 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:

D 4172 Test Method for Wear Preventive Characteristics of Lubricating Fluid (Four-Ball Method)²

D 6300 Practice for Determination of Precision and Bias Data for Use in Test Methods for Petroleum Products and Lubricants³

2.2 ANSI Standard:

B3.12 for Metal Balls⁴

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 Three ½ in. (12.7-mm) diameter steel balls are clamped together and covered with the lubricant to be evaluated. A fourth ½ in. diameter steel ball, referred to as the top ball, is pressed with a force of 40 kgf (392 N) into the cavity formed by the three clamped balls for three-point contact. The temperature of the lubricating grease specimen is regulated at 75°C (167°F) and then the top ball is rotated at 1200 rpm for 60 min. Lubricants are compared by using the average size of the scar diameters worn on the three lower clamped balls.

NOTE 1—Because of differences in the construction of the various machines on which the four-ball test can be made, the manufacturer's instructions should be consulted for proper machine setup and operation.

NOTE 2—Although the test can be run under other test parameters, the precision noted in Section 11 can vary when testing with other than test parameters listed in Section 8.

5. Significance and Use

5.1 The four-ball wear-test method can be used to determine the relative wear-preventing properties of greases under the test conditions and if the test conditions are changed the relative ratings may be different. No correlation has been established between the four-ball wear test and field service. The test method cannot be used to differentiate between Extreme Pressure (EP) and Non-Extreme Pressure (Non-EP) Greases.⁵

6. Apparatus

6.1 *Four-Ball Wear-Tester and Accessories*—See Fig. 1 and Fig. 2.⁶

¹This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.G0.04 on Functional Tests - Tribology.

Current edition approved Dec. 10, 2001. Published February 2002. Originally published as D 2266 – 64 T. Last previous edition D 2266 – 91 (1996).

This test method has been adopted for use by government agencies to replace Method 6514 of Federal Test Method Standard No. 791b.

²Annual Book of ASTM Standards, Vol 05.02.

³Annual Book of ASTM Standards, Vol 05.04.

⁴Available from American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036.

⁵Further details on this test method may be found in: Stallings, L., et al., *NLGI Spokesman*, Vol 31, No. 11, February 1968, pp. 396–401.

⁶The Four-Ball Wear Test Machine, available from Falex Corp., 1020 Airpark Drive, Sugar Grove, IL 60554 has been found satisfactory for this purpose. This company can also furnish a microscope with a special base to measure the wear scars without removing the balls from the test-oil cup. Discontinued models of the Four-Ball Wear Test Machine made by Precision Scientific Co. and Roxana Machine Works are also satisfactory.