



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

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. 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.* For specific hazard statement see 7.2, 7.3, and 9.1.

2. Referenced Documents

2.1 ASTM Standards:

D 235 Specification for Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)²

2.2 Other Document:

ANSI Specifications B 3.12 for Metal Balls³

3. Terminology

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

4. Summary of Test Method

4.1 A steel ball is rotated under load against three stationary steel balls having grease-lubricated surfaces. The diameters of the wear scars on the stationary balls are measured after completion of the test.

5. Significance and Use

5.1 The four-ball wear-test method can be used to determine

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² *Annual Book of ASTM Standards*, Vol 06.04.

³ Available from American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.

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.⁴

6. Apparatus

6.1 *Four-Ball Wear-Tester and Accessories*—See Fig. 1 and Fig. 2.⁵

NOTE 1—It is important to distinguish between the Four-Ball EP Tester and the Four-Ball Wear Tester. The Four-Ball Wear Tester can be used under a variety of test conditions at loads up to 50 kgf. The Four-Ball EP Tester is designed for testing under more severe conditions and lacks the sensitivity necessary for the four-ball wear test.

7. Reagents and Materials

7.1 *Test Balls*—Test balls shall be chrome alloy steel, made from AISI standard steel No. E-52100, with diameter of 12.7 mm (0.5 in.), Grade 25 EP (Extra Polish). Such balls are described in ANSI Specifications B 3.12, for Metal Balls. The Extra-Polish finish is not described in that specification. The Rockwell C hardness shall be 64 to 66, a closer limit than is found in the ANSI requirement.

NOTE 2—Steel balls meeting this description were used in developing the precision of the test. They are available from ball, bearing, or laboratory equipment manufacturers and distributors. All balls used in one test should be taken from one carton (of 500 balls) as received from the supplier.

7.2 *ASTM n-Heptane*.⁶

NOTE 3—**Warning:** Flammable. Harmful if swallowed.

7.3 *Stoddard Solvent*, conforming to requirements of Specification D 235.

NOTE 4—**Warning:** Combustible. Vapor harmful.

⁴ Further details on this test method may be found in: Stallings, L., et al., *NLGI Spokesman*, Vol 31, No. 11, February 1968, pp. 396–401.

⁵ The Four-Ball Wear Tester, available from Falex Corp., 2055 Comprehensive Drive, Aurora, IL 60505, has been found suitable for this purpose.

⁶ Described in the *Annual Book of ASTM Standards*, Vol 05.04, Test Methods for Rating Motor Diesel and Aviation Fuels, Annex 2, Section A2.7 Reference Materials.