



Designation: D3704 – 96 (Reapproved 2017)

## Standard Test Method for Wear Preventive Properties of Lubricating Greases Using the (Falex) Block on Ring Test Machine in Oscillating Motion<sup>1</sup>

This standard is issued under the fixed designation D3704; 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.

### 1. Scope

1.1 This test method covers the determination of wear properties of lubricating greases by means of the Falex block-on-ring friction and wear test machine.

1.2 The values stated in SI units are to be regarded as standard except where equipment is supplied using inch-pound units and would then be regarded as standard.

1.2.1 *Exception*—The metric equivalents of inch-pound units given in such cases in the body of the standard may be approximate.

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, 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:<sup>2</sup>

[D1403 Test Methods for Cone Penetration of Lubricating Grease Using One-Quarter and One-Half Scale Cone Equipment](#)

[D2714 Test Method for Calibration and Operation of the Falex Block-on-Ring Friction and Wear Testing Machine](#)

[G40 Terminology Relating to Wear and Erosion](#)

<sup>1</sup> 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.L0.05 on Solid Lubricants.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

### 3. Terminology

#### 3.1 Definitions:

3.1.1 *coefficient of friction,  $\mu$  or  $f$ ,  $n$* —in tribology, the dimensionless ratio of the friction force ( $F$ ) between two bodies to the normal force ( $N$ ) pressing these two bodies together.

$$\mu \text{ or } f = (F/N) \quad (1)$$

3.1.1.1 *Discussion*—A distinction is often made between *static coefficient of friction* and *kinetic coefficient of friction*. **G40**

3.1.2 *friction force,  $n$* —the resisting force tangential to the interface between two bodies when, under the action of an external force, one body moves or tends to move relative to the other. **G40**

3.1.3 *kinetic coefficient of friction,  $n$* —the coefficient of friction under conditions of macroscopic relative motion between two bodies. **G40**

3.1.4 *wear,  $n$* —damage to a solid surface, generally involving progressive loss of material, due to relative motion between that surface and a contacting substance or substances. **G40**

### 4. Summary of Test Method

4.1 The tester is operated with a steel test ring oscillating against a steel test block. Test speed, load, angle of oscillation, time and specimen surface finish and hardness can be varied to simulate field conditions.

4.2 The width of the wear scar, developed on the test block from contact with the oscillating test ring, is measured.

### 5. Significance and Use

5.1 This test method is used to differentiate between greases having high, medium, and low wear preventive properties using oscillating motion. The user of this method should determine to his own satisfaction whether results of this test procedure correlate with field performance or other bench test machines.