



Standard Test Method for Ranking Resistance of Plastics to Sliding Wear Using Block-on-Ring Wear Test—Cumulative Wear Method¹

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1. Scope

1.1 This test method covers laboratory procedures for determining the resistance of plastics to sliding wear. The test utilizes a block-on-ring friction and wear testing machine to rank plastics according to their sliding wear characteristics against metals or other solids.

1.2 An important attribute of this test is that it is very flexible. Any material that can be fabricated into, or applied to, blocks and rings can be tested. Thus, the potential materials combinations are endless. In addition, the test can be run with different gaseous atmospheres and elevated temperatures, as desired, to simulate service conditions.

1.3 Wear test results are reported as the volume loss in cubic millimetres for the block and ring. Materials of higher wear resistance will have lower volume loss.

1.4 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.5 *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.*

2. Referenced Documents

2.1 ASTM Standards:

D 618 Practice for Conditioning Plastics for Testing²

D 2714 Test Method for Calibration and Operation of the Falex Block-on-Ring Friction and Wear Testing Machine³

E 122 Practice for Calculating Sample Size to Estimate, With a Specified Tolerable Error, the Average for Characteristic of a Lot or Process⁴

E 177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods⁴

E 691 Practice for Conducting an Inter-laboratory Study to Determine the Precision of a Test Method⁴

G 40 Terminology Relating to Wear and Erosion⁵

G 77 Test Method for Ranking Resistance of Materials to Sliding Wear Using a Block-on-Ring Wear Test⁵

G 117 Guide for Calculating and Reporting Measures of Precision Using Data from Interlaboratory Wear or Erosion Tests²

3. Terminology

3.1 Definition:

3.1.1 *wear*—damage to a solid surface, generally involving progressive loss of material, due to relative motion between that surface and a contacting substance or substances. **G 40**

4. Summary of Test Method

4.1 A test plastic block is loaded against a metal test ring that rotates at a given speed for a given number of revolutions. Block scar volume is calculated from the block scar width. The friction force required to keep the block in place may be continuously measured during the test with a load cell. When this is done, the friction force data are combined with normal force data to obtain values for the coefficient of friction and reported.

5. Significance and Use

5.1 The significance of this test method in any overall measurement program directed toward a service application will depend on the relative match of test conditions to the conditions of the service application.

5.2 This test method prescribes the test procedure and method of calculating and reporting data for determining the sliding wear resistance of plastics, using cumulative volume loss.

5.3 The intended use of this test is for coarse screening of plastics in terms of their resistance to sliding wear.

6. Apparatus and Test Specimens

6.1 *Test Schematic*—A schematic of the block-on-ring wear test geometry is shown in Fig. 1. In the figure, the friction load cell is enlarged.

6.2 *Test Ring*—A typical test ring is shown in Fig. 2. The test ring must have an outer diameter of 34.99 ± 0.025 mm

¹ This test method is under the jurisdiction of ASTM Committee G02 on Wear and Erosion and is the direct responsibility of Subcommittee G02.40 on Non-Abrasive Wear.

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² *Annual Book of ASTM Standards*, Vol 08.01.

³ *Annual Book of ASTM Standards*, Vol 03.01.

⁴ *Annual Book of ASTM Standards*, Vol 14.02.

⁵ *Annual Book of ASTM Standards*, Vol 03.02.