



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

This standard is issued under the fixed designation G176; 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 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:²

[D618 Practice for Conditioning Plastics for Testing](#)

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

[E122 Practice for Calculating Sample Size to Estimate, With Specified Precision, the Average for a Characteristic of a Lot or Process](#)

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.

Current edition approved May 1, 2009. Published May 2009. Originally approved in 2003. Last previous edition approved in 2003 as G176-03. DOI: 10.1520/G0176-03R09.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods](#)

[E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method](#)

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

[G77 Test Method for Ranking Resistance of Materials to Sliding Wear Using Block-on-Ring Wear Test](#)

3. Terminology

3.1 Definitions:

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. **G40**

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 (1.377