Designation: G 77 – 98

Standard Test Method for Ranking Resistance of Materials to Sliding Wear Using Block-on-Ring Wear Test[1]

This standard is issued under the fixed designation G 77; 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 materials to sliding wear. The test utilizes a block-on-ring friction and wear testing machine to rank pairs of materials according to their sliding wear characteristics under various conditions.

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. However, the interlaboratory testing has been limited to metals. Thus, the potential materials combinations are endless. In addition, the test can be run with various lubricants, liquids, or gaseous atmospheres, as desired, to simulate service conditions. Rotational speed and load can also be varied to better correspond to service requirements.

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

1.4 *This standard does not purport to address 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 2714 Test Method for Calibration and Operation of the Falex Block-on-Ring Friction and Wear Testing Machine[2]

E 122 Practice for Choice of Sample Size to Estimate a Measure of Quality for a Lot or Process[3]

E 177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods[3]

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method[3]

G 40 Terminology Relating to Wear and Erosion[4]

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.

3.1.2 For additional definitions pertinent to this test method, see Terminology G 40.

4. Summary of Test Method

4.1 A test block is loaded against a test ring that rotates at a given speed for a given number of revolutions. Block scar volume is calculated from the block scar width, and ring scar volume is calculated from ring weight loss. The friction force required to keep the block in place is continuously measured during the test with a load cell. These data, combined with normal force data, are converted to coefficient of friction values 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 seeks only to prescribe the general test procedure and method of calculating and reporting data. The choice of test operating parameters is left to the user. A fixed amount of sliding distance must be used because wear is usually non-linear with distance in this test.

6. Apparatus and Materials

6.1 *Test Schematic*—A schematic of the block-on-ring wear test geometry is shown in Fig. 1.[5] Acceptable testing machines are shown in Appendix X1.

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 ± 0.001 in.) with an eccentricity between the inner and

[1] This test method is under the jurisdiction of ASTM Committee G-2 on Wear and Erosion and is the direct responsibility of Subcomittee G02.40 on Non-Abrasive Wear.

Current edition approved Oct. 10, 1998. Published January 1999. Originally published as G 77 – 83. Last previous edition G 77 – 97.

[2] *Annual Book of ASTM Standards*, Vol 05.02.

[3] *Annual Book of ASTM Standards*, Vol 14.02.

[4] *Annual Book of ASTM Standards*, Vol 03.02.

[5] Several machines, including the current Falex Model I and the older Dow Corning LFW-1 machines, have been found satisfactory for the purposes of this test. These models may differ in lever arm ratio, load range, speed control (variable or fixed), speed range, and type of friction measuring device. Suitable machines may be purchased from Falex Corporation, 1020 Airpark Dr., Sugar Grove, IL 60554.

Copyright © ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States.