



Standard Test Method for Measuring Abrasion Resistance of Materials by Abrasive Loop Contact¹

This standard is issued under the fixed designation G174; 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.

^{ε1} NOTE—Minor editorial changes were made throughout in May 2009.

1. Scope

1.1 This test method covers ranking rigid engineering materials for abrasion resistance in rubbing against aluminum oxide abrasive finishing tape. Though most solids can be tested, this test method addresses its use for metals, and coatings applied to metals.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*²

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

E178 Practice for Dealing With Outlying Observations

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

G40 Terminology Relating to Wear and Erosion

G117 Guide for Calculating and Reporting Measures of Precision Using Data from Interlaboratory Wear or Erosion Tests

G132 Test Method for Pin Abrasion Testing

3. Terminology

3.1 *Definitions:*

¹ This test method is under the jurisdiction of ASTM Committee G02 on Wear and Erosion and is the direct responsibility of Subcommittee G02.30 on Abrasive Wear.

Current edition approved May 1, 2009. Published May 2009. Originally approved in 2003. Last previous edition approved in 2004 as G174–04. DOI: 10.1520/G0174-04R09E01.

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.

3.1.1 *abrasive wear, n*—wear due to hard particles or hard protuberances forced against, and moving along, a solid surface.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *abrasion, n*—the process of abrasive wear.

3.2.1.1 *Discussion*—Terminology G40 does not define abrasion.

3.2.2 *abrasion resistance, n—in tribology*, the ability of a material to resist damage or attrition by abrasion.

3.2.3 *fixed abrasive tape, n*—hard particles or grains bonded (fixed) to one side of a flexible web with a resin or similar binder. The particles can be of any hard material and vary in size. (This abrasive medium is also known as “finishing tape,” “microfinishing tape,” “microfinishing film,” or “finishing film.”)

3.2.4 *flexible web, n*—plastic, paper, rubber, or other material that is thin enough to conform to a 180° wrap around a 16-mm diameter cylinder under a tension of less than 1.8 kg/cm width.

4. Summary of Test Method

4.1 This test involves rubbing an abrasive tape loop initially in line-contact with a solid surface. The tape abrasion produces a groove in the test surface, and the volume of material removed in a designated amount of abrasive rubbing is measured by mass loss or by calculation from the groove geometry. The continuous loop of abrasive is used for the duration of the test and then discarded. A fresh loop is used for each one-hour test.

4.2 The wear volume produced in this test provides a measure of the ability of a surface to resist wear damage from abrasive substances. The smaller the wear volume in this test, the better the abrasion resistance.

4.3 The test was developed using 30 μm-mean diameter aluminum oxide abrasive on a 127 μm-thick polyester support, but other commercially available abrasive tapes could be used. The test has also been used with webs such as paper that are inherently abrasive to many materials.