



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

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1. Scope

1.1 This test method covers ranking rigid engineering materials for abrasion resistance in rubbing against a 30- μ m 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 *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:

E 177 Practice for Use of the Terms Precision and Accuracy as Applied to Measurement of a Property of a Material²

E 178 Practice for Dealing with Outlying Observations³

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

G 40 Terminology Relating to Erosion and Wear⁴

G 117 Guide for Calculating and Reporting Measures of Precision Using Data from Inter-laboratory Wear and Erosion Tests⁴

G 132 Test Method for Pin Abrasion Testing⁴

3. Terminology

3.1 Definitions:

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 G 40 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 μ m-mean diameter aluminum oxide abrasive on a 127 μ m-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.

5. Significance and Use

5.1 This test is useful for screening materials for use in tools that are subjected to abrasion from the material that is being machined, worked, or formed. It has been used to screen tool steels for punch press dies, hardfacings for earth-moving machinery, and wear coatings. This test utilizes a test that is simpler to build and use than those used in the Test Method G 132 abrasion test which, like this test, uses a fixed abrasive counterface to abrade a test material.

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.

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² *Annual Book of ASTM Standards*, Vol 03.01.

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

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