



Standard Test Method for Pin Abrasion Testing¹

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1. Scope

1.1 This test method covers a laboratory procedure for determining the wear resistance of a material when relative motion is caused between an abrasive cloth, paper, or plastic film and a contacting pin of the test material. The principal factors and conditions requiring attention when using this type of apparatus to measure wear are discussed.

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

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

A128/A128M Specification for Steel Castings, Austenitic Manganese

A514/A514M Specification for High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding

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

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

F732 Test Method for Wear Testing of Polymeric Materials Used in Total Joint Prostheses

G40 Terminology Relating to Wear and Erosion

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 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.

G99 Test Method for Wear Testing with a Pin-on-Disk Apparatus

3. Terminology

3.1 Refer to Terminology G40 for definitions of terms related to this test method.

4. Summary of Test Method

4.1 For the pin abrasion test method, two pin specimens are required. One is of the test material. The other is of a reference material. Each pin, in turn, is positioned perpendicular to the abrasive surface, which usually is mounted on, or supported by, a flat circular disk, another flat surface, or the cylindrical surface of a drum. The test machine permits relative motion between the abrasive surface and the pin surface. The wear track of a pin describes a continuous, non-overlapping path such as a spiral, helix, or saw-tooth curve, preferably with a displacement between successive passes sufficient to allow the other pin to trace a parallel track in the intervening space. Fig. 1 shows some possible arrangements. The pin specimen is pressed against the abrasive surface with a specified loading by means of dead weights or another suitable loading system. Rotation of the pin about its axis during testing is optional. Note, however, that results with and without pin rotation or with different loading systems may differ.

4.2 The amount of wear is determined by weighing both specimens before and after testing. Mass loss values should be converted to volume losses using the best available values of specimen densities. The use of length changes to indicate the amount of wear is not recommended for the purposes of this test method, and no procedure for processing such data is included in this test method.

4.3 Wear results are reported as a volume loss and as the wear volume normalized with respect to the applied normal load, to the wear path length, and to the mean wear of the reference specimen on the same type of abrasive. The reference specimen wear is included in the calculation in order to correct for abrasivity variations (see 4.5 and 10.2).

4.4 Various sizes and types of abrasive have been used. These include silicon carbide, alumina, emery, garnet, flint, or other silicas, and synthetic compounds, but wear results normally will differ with different types of abrasive (see Table X3.1). The abrasive is bonded to a cloth, paper, or plastic film