



Standard Test Method for Pin Abrasion Testing¹

This standard is issued under the fixed designation G 132; 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 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 the 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:

A 128/A128M Specification for Steel Castings, Austenitic Manganese²

A 514/A514M Specification for High-Yield Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding³

E 122 Practice for Choice of Sample Size to Estimate the Average Quality of a Lot or Process⁴

E 177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods⁴

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method⁴

G 40 Terminology Relating to Wear and Erosion⁵

3. Terminology

3.1 Refer to Terminology G 40 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 (usually polyester) backing that is mounted on or supported by a smooth, firm surface (for example, disk, other flat, or cylinder). For purposes of this test method, a garnet is the preferred abrasive and has given good correlations with many types of abrasive services **(1)**.⁶ The field experience has included a wide variety of abrasive minerals, ranging from

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² Annual Book of ASTM Standards, Vol 01.02.

³ Annual Book of ASTM Standards, Vol 01.04.

⁴ Annual Book of ASTM Standards, Vol 14.02.

⁵ Annual Book of ASTM Standards, Vol 03.02.

⁶ The boldface numbers in parentheses refer to the list of references at the end of this test method.