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Standard Guide for Conducting Wear Tests Using a Rotary Platform Abraser[1]

This standard is issued under the fixed designation G195; 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 guide covers and is intended to assist in establishing procedures for conducting wear tests of rigid or flexible materials utilizing the rotary platform abraser.

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

1.2.1 *Exception*—Non-SI units are used when stating rotational speed.

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

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

B607 Specification for Autocatalytic Nickel Boron Coatings for Engineering Use

B733 Specification for Autocatalytic (Electroless) Nickel-Phosphorus Coatings on Metal

B893 Specification for Hard-Coat Anodizing of Magnesium for Engineering Applications

C501 Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser

C744 Specification for Prefaced Concrete and Calcium Silicate Masonry Units

C957/C957M Specification for High-Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane With Integral Wearing Surface

C1353/C1353M Test Method for Abrasion Resistance of Dimension Stone Subjected to Foot Traffic Using a Rotary Platform Abraser

C1803 Guide for Abrasion Resistance of Mortar Surfaces Using a Rotary Platform Abraser

D154 Guide for Testing of Varnishes (Withdrawn 2018)[3]

D1044 Test Method for Resistance of Transparent Plastics to Surface Abrasion by the Taber Abraser

D1475 Test Method for Density of Liquid Coatings, Inks, and Related Products

D2205 Guide for Selection of Tests for Traffic Paints

D3389 Test Method for Coated Fabrics Abrasion Resistance (Rotary Platform Abrader)

D3451 Guide for Testing Coating Powders and Powder Coatings

D3489 Test Methods for Microcellular Urethane Materials

D3730 Guide for Testing High-Performance Interior Architectural Wall Coatings

D3794 Guide for Testing Coil Coatings

D3884 Guide for Abrasion Resistance of Textile Fabrics (Rotary Platform, Double-Head Method)

D4060 Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser

D4685/D4685M Test Method for Pile Fabric Abrasion

D4712 Guide for Testing Industrial Water-Reducible Coatings (Withdrawn 2014)[3]

D5034 Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)

D5035 Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method)

D5144 Guide for Use of Protective Coating Standards in Nuclear Power Plants

D5146 Guide to Testing Solvent-Borne Architectural Coatings

D5324 Guide for Testing Water-Borne Architectural Coatings

D6037 Test Methods for Dry Abrasion Mar Resistance of High Gloss Coatings

D7255 Test Method for Abrasion Resistance of Leather

[1] This guide 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.

[3] The last approved version of this historical standard is referenced on www.astm.org.

*A Summary of Changes section appears at the end of this standard

(Rotary Platform, Abraser Method)
E1795 Specification for Non-Reinforced Liquid Coating Encapsulation Products for Leaded Paint in Buildings
F362/F362M Test Method for Determining the Erasability of Inked Ribbons (Withdrawn 2016)[3]
F510/F510M Test Method for Resistance to Abrasion of Resilient Floor Coverings Using an Abrader with a Grit Feed Method
F1344 Specification for Rubber Floor Tile
F1478 Test Method for Determination of Abrasion Resistance of Images Produced from Copiers and Printers (Taber Method) (Withdrawn 2020)[3]
F1978 Test Method for Measuring Abrasion Resistance of Metallic Thermal Spray Coatings by Using the Taber Abraser
F2051 Specification for Implantable Saline Filled Breast Prosthesis
F2068 Specification for Femoral Prostheses—Metallic Implants
G40 Terminology Relating to Wear and Erosion

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *abraser, n*—wear testing instrument to evaluate abrasion resistance, also referred to as an abrader.

3.1.2 *abrasion cycle, n*—in abrasion testing, one or more movements of the abradant across a material surface, or the material surface across the abradant, that permits a return to its starting position. In the case of the rotary platform abraser test method, it consists of one complete rotation of the turntable specimen platform.

3.1.3 *resurface, v*—procedure of cleaning and refreshing the running surface of an abrasive wheel prior to use or during testing.

3.2 For definitions of other wear terms used in this guide, refer to Terminology G40.

3.3 *Acronyms:*

3.3.1 *CAMI*—Coated Abrasives Manufacturers Institute

4. Summary of Guide

4.1 A specimen is abraded using rotary rubbing action under controlled conditions of pressure and abrasive action. The test specimen, mounted on a turntable platform, turns on a vertical axis, against the sliding rotation of two abrading wheels. The wheels shall be mounted in such a way that when they are in contact with the rotating test specimen, they rotate in opposing directions. One abrading wheel rubs the specimen outward toward the periphery and the other, inward toward the center while a vacuum system removes wear debris generated during the test. The resulting abrasion marks form a pattern of crossed arcs over an area of approximately 30 cm^2. Resistance to abrasion is evaluated by various means which are described in Section 12.

5. Significance and Use

5.1 This test guide provides a means to quantify the abrasion resistance of material surfaces, and may be related to end-use performance, or used to comparatively rank material performance, or both. The resistance of material surfaces to abrasion, as measured on a testing machine in the laboratory, is generally only one of several factors contributing to wear performance as experienced in the actual use of the material. Other factors may need to be considered in any calculation of predicted life from specific abrasion data.

5.2 The resistance of material surfaces to abrasion may be affected by factors including test conditions; type of abradant; pressure between the specimen and abradant; mounting or tension of the specimen; and type, kind, or amount of finishing materials.

5.3 Abrasion tests utilizing the rotary platform abraser may be subject to variation due to changes in the abradant during the course of specific tests. Depending on abradant type and test specimen, the abrading wheel surface may change (that is, become clogged) due to the pick-up of finishing or other materials from test specimens. To reduce this variation, the abrading wheels should be resurfaced at regularly defined intervals. See Appendix X2.

5.4 When evaluating resistance to abrasion of two or more coatings, other factors may need to be considered for an accurate comparison. Flexible coatings that include air entrainment bubbles may result in less mass loss. Coatings that include fillers may result in greater mass loss but have less change in coating thickness or less mass loss but have greater change in coating thickness. Coatings that include aggregates or particulates may generate wear debris that is not removed by the vacuum and contribute to the break-down of the coating. Coatings that have a hardness value greater than the abrasive wheel may cause the abrasive wheel to break down faster and require more wear cycles to generate measureable wear. Examples of coatings that may be impacted include epoxies, polymethyl-methacrylate (PMMA), polyurethane-methacrylate (PUMA), methyl-methacrylate (MMA), and carbon resin.

NOTE 1—As an example, consider a urethane coating of 0.5 mm thickness, embedded with 1.2 µm titanium particles that resulted in a 53 µm loss in coating thickness and 110 mg mass loss. A similar urethane coating without titanium particles resulted in a 78 µm loss in coating thickness and 44 mg mass loss.

5.5 The measurement of the relative amount of abrasion may be affected by the method of evaluation and influenced by the judgment of the operator.

6. Apparatus

6.1 *Rotary Platform Abraser,* consisting of the elements described in 6.1.1 to 6.1.5 (see Fig. 1). Also referred to as a rotary platform, double head (RPDH) abraser or abrader.

6.1.1 A turntable specimen platform, which is removable, that includes a rubber pad, clamp plate, centrally located threaded post and nut. When testing flexible specimens, the turntable platform will also include a clamping ring. The turntable shall be motor driven, and mounted so as to produce a circular surface travel of a flat specimen in the plane of its surface. The turntable platform should rotate with no visible wobble. This can be checked with a dial indicator at a distance of 1.6 mm from the top outer edge of the platform to make sure it runs true within 0.2 mm.