Designation: F510/F510M – 20

Standard Test Method for Resistance to Abrasion of Resilient Floor Coverings Using an Abrader with a Grit Feed Method[1]

This standard is issued under the fixed designation F510/F510M; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This test method[2] describes a laboratory procedure for determining the abrasion resistance of resilient flooring using an abrader with a grit feeder.[3]

1.2 The equipment used in this test method is a modification of the Taber abraser. The regular abrading wheels are replaced by leather clad brass wheels (rollers). As the specimen holder rotates, a grit-feeding device dispenses aluminum oxide grit onto the specimen before the grit passes under the leather clad brass wheels. As the specimen rotates, the rub-wear action of the wheels and abrasive grit causes abrasion on the test piece. Using the vacuum system incorporated in the apparatus, the used grit and abraded material are removed after passing under both wheels.

1.3 This test method employs a rotary, rubbing action caused by loose abrasive grit and the two abrading wheels. One wheel rubs the specimen from the center outward and the other from the outside toward the center. The wheels traverse a complete circle and have an abrasive action on the rotating specimen at all angles. This action approaches the twisting action between shoe and floor that occurs when a person turns. The use of loose grit serves the function of an abradant and also aids in the rolling action characteristic of normal walking.

1.4 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

1.5 *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.*

1.6 *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:*[4]

D792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement

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

G195 Guide for Conducting Wear Tests Using a Rotary Platform Abraser

3. Terminology

3.1 *Definitions:*

3.1.1 *abrasion—of resilient floor coverings*, a form of wear, in which a gradual removing of a flooring surface is caused by the frictional action of relatively fine hard particles.

3.1.2 *resistance to abrasion—of resilient floor coverings*, the ability of a material to withstand mechanical actions of relatively fine hard particles, which by rubbing, scraping, and eroding remove material from a floor covering surface.

4. Significance and Use

4.1 When subjected to normal in-use traffic conditions, a flooring material is exposed to abrasion caused by the destructive action of fine hard particles. This situation occurs whenever loose debris, dirt and other particulate matter exists

[1] This test method is under the jurisdiction of ASTM Committee F06 on Resilient Floor Coverings and is the direct responsibility of Subcommittee F06.20 on Test Methods.

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[2] This test method is described by W. E. Irwin in "Development of a Method to Measure Wear on Resilient Flooring," *Journal of Testing and Evaluation*, Vol 4, No. 1, January 1976, pp. 15–20.

[3] This grit feed method is frequently referred to as the "Frick Grit Feed Method" because it is based on work done by Otto F. V. Frick as described in "Studies of Wear on Flooring Materials," *Wear*, Vol 14, 1969, pp. 119-131.

[4] 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.

FIG. 1 Taber Abraser with Grit Feeder

between traffic bodies (that is, shoes and a flooring surface). Under continuing exposure to an "abrasive action," a flooring material may suffer a thickness loss sufficient to reduce its service life.

4.2 Abrasion resistance measurements of resilient floor coverings can be complicated since the resistance to abrasion is affected by many factors. These may include the physical properties of the material in the floor covering surface, particularly its hardness and resilience; type and degree of added substances, such as fillers and pigments; surface characteristics of the specimen, such as type, depth, and amount of embossing. It can also be affected by conditions of the test, including the type and characteristics of the abradant and how it acts on the area of the specimen being abraded; pressure between the specimen and leather clad brass wheels; and vacuum suction.

4.3 This test method is designed to simulate one kind of abrasive action and abradant that a flooring may encounter in the field. However, results should not be used as an absolute index of ultimate life because, as noted, there are too many factors and interactions to consider. Also involved are the many different types of service locations. Therefore, the data from this test method are of value chiefly in the development of materials and should not be used without qualifications as a basis for commercial comparisons.

5. Apparatus

5.1 *Apparatus*[5], as shown in Fig. 1, shall consist of the following:

5.1.1 *Abraser,* as described in Guide G195 with auxiliary weights marked 1000 g (see X1.1.6).

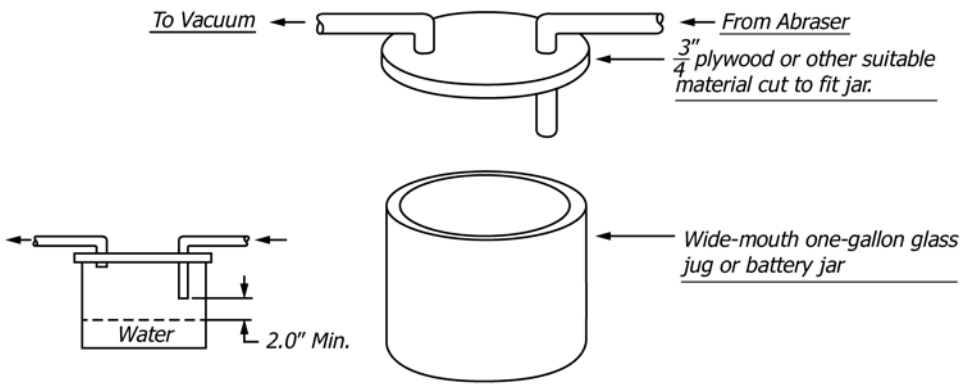
5.1.2 *S-39 Leather-clad brass wheels,* the brass hub shall be cylindrical shaped, have a diameter of 44.4 mm [1.75 in.], a width of 12.7 mm [0.50 in.], and include an axial hole 16.0 mm [0.625 in.]; weight of the brass hub shall be 145 g [5.11 oz]. Width of the leather covering shall be 12.7 mm [0.50 in.]. The minimum diameter of the leather covered brass wheel shall be 46 mm [1 $^{13}/_{16}$ in.].

5.1.3 *Vacuum unit,* or equivalent, and an optional water trap as shown in Fig. 2. The purpose of the water trap is to protect the vacuum equipment motor, reduce the need to empty the vacuum bag frequently, and minimize readjustment of speed. The inlet pipe to the water trap should be far enough away from the water surface so that undue turbulence is avoided and water does not enter the exhaust line.

5.1.4 *Grit Feeding Device,* that provides a regular flow of abrasive grit particles; consisting of a storage reservoir for the aluminum oxide grit, grit distribution nozzle, speed control for adjusting grit feed rate, and vacuum pick-up nozzle.

5.2 *S-41 Aluminum Oxide Grit*[5], 240 aluminum oxide grit, unless otherwise specified by the interested parties.

[5] The sole source of supply of the apparatus known to the committee at this time is Taber Industries, 455 Bryant St., North Tonawanda, NY 14120. If you are aware of alternative suppliers, please provide this information to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend.



NOTE 1—A vacuum-tight seal between the cover and jar is not required.

FIG. 2 Water Trap