**Designation: ~~D7255 – 06ε1~~ D7255 – 14**

# Standard Test Method for Abrasion Resistance of Leather (Rotary Platform, ~~Double-Head~~Abraser Method)[1]

This standard is issued under the fixed designation D7255; 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.

~~ε[1] NOTE—In Note 2, the reference to H-19 was editorially corrected to H-18 in September 2006.~~

## 1. Scope

1.1 This test method covers the determination of the abrasion resistance of leather using the rotary ~~platform, double-head tester (RPDH).~~platform abraser.

NOTE 1—This test method is similar but not equivalent to ISO 17076-1, and results should not be directly compared between the two methods.

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

1.3 *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 to determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

2.1 *ASTM Standards:*[2]

D1517 Terminology Relating to Leather

D1610 Practice for Conditioning Leather and Leather Products for Testing

~~D2240 Test Method for Rubber Property—Durometer Hardness~~

D2813 Practice for Sampling Leather for Physical and Chemical Tests

G195 Guide for Conducting Wear Tests Using a Rotary Platform Abraser

2.2 *Other Standards:*[3]

ISO 17076-1 Leather-Determination of abrasion resistance Part 1-Taber method

## 3. Terminology

3.1 *Definitions:*

3.1.1 *abraser*—a wear testing instrument, also referred to as a rotary ~~platform, double head (RPDH)~~ platform tester or abrader.

3.1.2 *abrasion*—the wearing away of any part of a material by rubbing against another surface.

3.1.3 *abrasion cycle*—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 test method, it consists of one complete rotation of the specimen.

3.1.4 *durability*—the ability to withstand deterioration or wear out in use, including the effects of abrasion.

3.1.5 *resurface*—the preparation of an abrasive wheel on a resurfacing disk or diamond tool wheel refacer, prior to use in testing.

3.2 For definitions of other leather terms used in this test method, refer to Terminology D1517.

## 4. Summary of Test Method

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. One

[1] This test method is under the jurisdiction of ASTM Committee D31 on Leather and is the direct responsibility of Subcommittee ~~D31.05~~D31.07 on ~~Upholstery~~Physical Properties.

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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] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

abrading wheel rubs the specimen outward toward the periphery and the other, inward toward the center. The resulting abrasion marks form a pattern of crossed arcs over an area of approximately 30 $cm^2$. Resistance to abrasion is evaluated by visual inspection of damage to the specimen or change in weight, as described in Section 14.

## 5. Significance and Use

5.1 The resistance of leather to abrasion, as measured on a testing machine in the laboratory, is generally only one of several factors contributing to wear performance or durability as experienced in the actual use of the material. While "abrasion resistance" (often stated in terms of the number of abrasion cycles) and "durability" ~~(defined as the ability to withstand deterioration or wear out in use, including the effects of abrasion)~~ are frequently related, the relationship varies with different end uses and different factors may be necessary in any calculation of predicted durability from specific abrasion data. This test method provides a comparative ranking of material performance, which can be used as an indication of relative end-use performance.

5.2 The resistance of leather 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, double-head tester~~ platform abraser may be subject to variation due to changes in the abradant during specific tests. Depending on abradant type and test specimen, the wheel surface may change (that is, become clogged) due to the pick up of finishing or other materials from test specimens and must be ~~cleaned~~resurfaced at regularly defined intervals.

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

## 6. Apparatus

6.1 *Rotary ~~Platform, Double-Head (RPDH) Tester,~~ Platform Abraser,* [4] as described in Guide G195 and consisting of the elements described in 6.1.1 – 6.1.5 (see Fig. 1).

6.1.1 A turntable platform, which is removable, ~~parts provided with the turntable include the S19~~ that includes a rubber pad, clamp plate and ~~nut, and~~ centrally located threaded post and nut. When testing flexible specimens, the platform will also include a clamping ring to secure the specimen to the turntable. The turntable is motor driven and mounted so as to produce a circular surface travel of an essentially flat specimen in the plane of its surface,

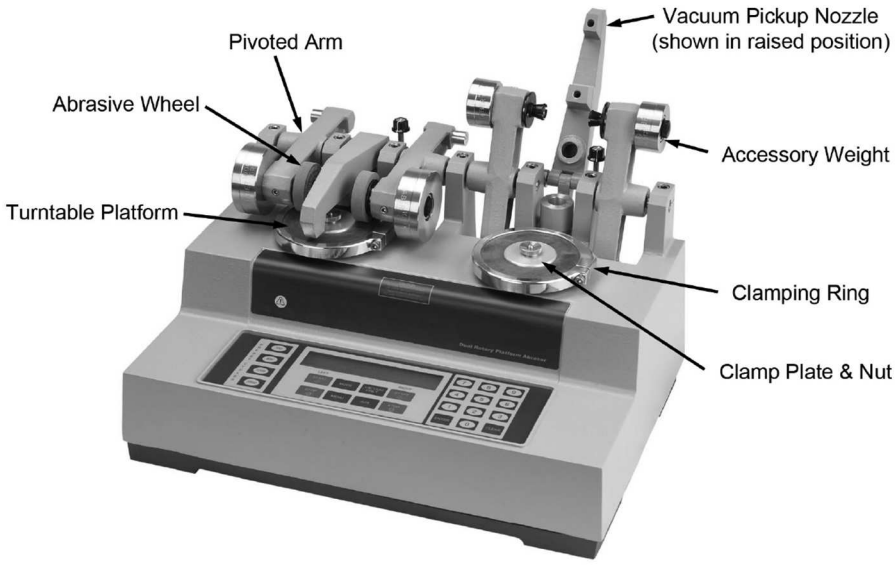
6.1.2 A motor capable of rotating the turntable platform at a speed of either 72 ± 2 r/min for 110 V/60 Hz or 60 ± 2 r/min for 230 V/50 Hz,

6.1.3 A pair of pivoted arms to which the abrasive wheels and accessory weights or counterweights are attached,

NOTE 2—Without auxiliary weights or counter weights applied, each arm will apply a load against the specimen of 250 ± 1 g (exclusive of the mass of the wheel itself).



[4] Available from Taber® Industries, 455 Bryant Street, North Tonawanda, NY 14120.




*Note: Vacuum Suction System not shown*

**FIG. 1 Rotary Platform, ~~Double-Head Tester~~Abraser**

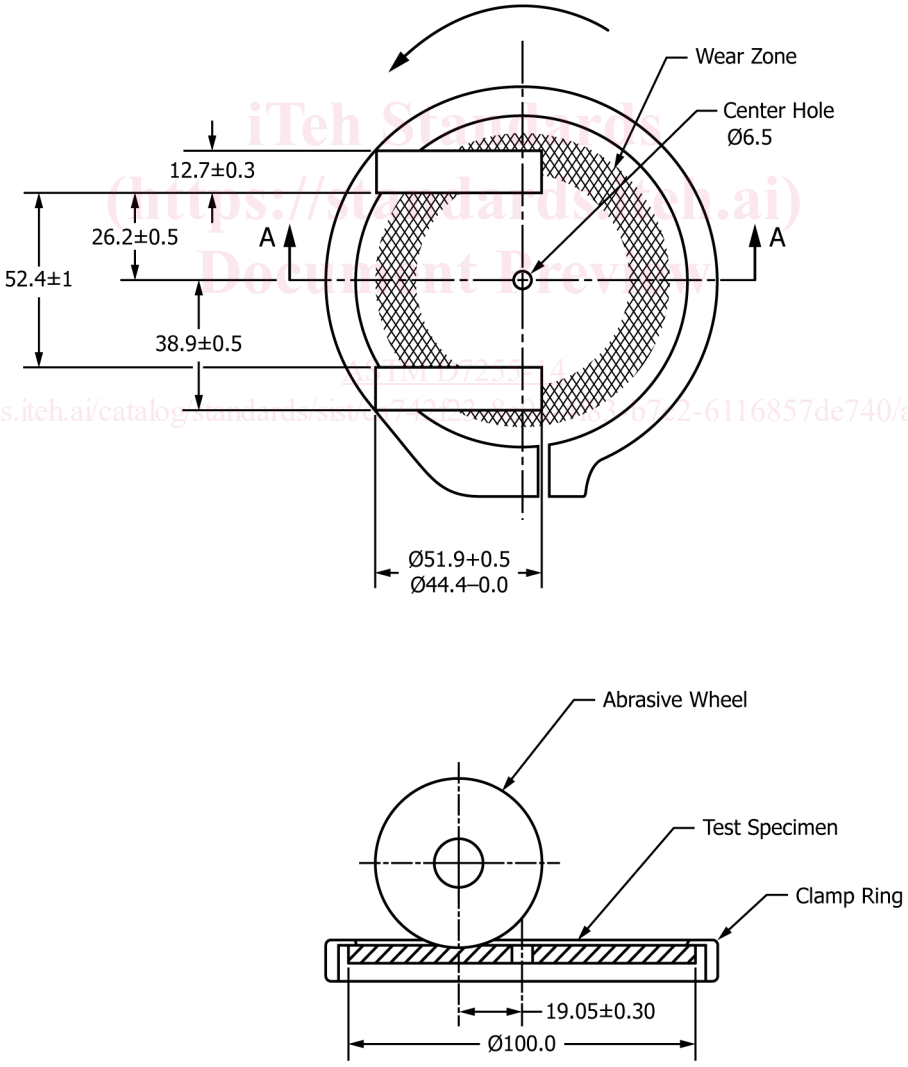
6.1.4 A vacuum suction system and vacuum pickup nozzle to remove debris and abrasive particles from the specimen surface during testing. The height of the vacuum pickup nozzle shall be adjustable, and will have two openings – with one opening positioned between the two wheels and over the wear path and the other placed diametrically opposite. The distance between the axes of the two openings shall be 76.0 ± 1.0 mm, and

6.1.5 A counter to record the number of cycles (revolutions) made by the turntable platform.

6.2 *Abrasive Wheels,* [5] which are attached to the free end of the pivoted arms, and are able to rotate freely about horizontal spindles. The abrasive wheels are either resilient or vitrified based, with both types of wheels consisting of hard particles embedded in a binder material and manufactured in different grades of abrasive quality.

6.2.1 Their internal faces shall be 52.4 ± 1.0 mm apart and the hypothetical line through the two spindles shall be 19.05 ± 0.3 mm away from the central axis of the turntable (see Fig. 2). When resting on the specimen, the wheels will have a peripheral engagement with the surface of the specimen, the direction of travel of the periphery of the wheels and of the specimen at the contacting portions being at acute angles, and the angles of travel of one wheel periphery being opposite to that of the other. Motion of the abrasive wheels, in opposite directions, is provided by rotation of the specimen and the associated friction there from.

[5] The sole source of supply of the apparatus known to the committee at this time is Taber Industries, 455 Bryant Street, North Tonawanda, NY 14120. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,[1] which you may attend.




SECTION A–A

**FIG. 2 Diagrammatic Arrangement of Apparatus**

6.2.2 The wheels shall be 12.7 ± 0.3 mm thick and have an external diameter of 51.9 ± 0.5 mm when new, and in no case less than 44.4 mm. ~~The abrasive wheels are either resilient or vitrified based, with both types of wheels consisting of hard particles embedded in a binder material and manufactured in different grades of abrasive quality.~~

NOTE 3—The H-18 wheels typically produce a harsher abrasion than the CS-17 wheels, which produce a harsher abrasion than the CS-10 wheels.

NOTE 4—The S-35 Tungsten Carbide wheels include 1 mm pitch × 45° spiral pitch angle, helical teeth cut into its periphery. This wheel does not include hard particles embedded in a binder material, and typically produces severe cutting and abrasion.

6.2.3 Prior to testing, ensure the expiration date has not passed for resilient wheels. Follow the manufacturer's recommended practice for breaking in new or resurfacing previously used wheel sets (see Section 10).

~~NOTE 3—The hardness of the resilient wheels can be checked with Test Method D2240. An acceptable hardness for CS-10 and CS-17 wheels is 81 ± 5 units on Shore Durometer A-2 Scale.~~

6.3 *Accessory ~~Loads,~~ Weights,* which can be attached to the pivoted abrader arms to increase the load against the specimen to 500 or 1000 g per wheel (exclusive of the mass of the wheel ~~itself).~~ itself), see 11.1.6. Counterweight attachments of 125 or 175 g are available to reduce the load against the specimen, and can be used with or without the accessory ~~load.~~weights.

6.4 *Auxiliary Apparatus:*

6.4.1 Resurfacing disc[4] (S-11), is used for resurfacing of resilient wheels.

6.4.2 A soft bristle brush, to remove loose particles from the surface of the specimen after testing.

6.4.3 Wheel refacer,[4] for resurfacing vitrified wheels or correcting out of round wheels.

6.4.4 Specimen mounting cards ~~(for example, Part S-36-1),~~(S-36-1) or equivalent,[4] a 108 mm round mounting card with a 6.35 mm center hole and one side coated with pressure-sensitive adhesive used for mounting specimens. Use of the mounting card is not required when using a clamping ring. ~~If using a weight loss method of evaluation and a mounting card, the mounting cards should be conditioned in the standard testing environment before use (see Section 12).~~

## 7. Sampling

7.1 Take a lot sample as described in Practice D2813, or as agreed upon by the interested parties. Because leather is a natural product, the physical properties may vary depending on location on the hide, side or skin from which the test sample is taken. Random sampling of specimens from a predefined location and orientation minimizes test bias and variability.



## 8. Number and Preparation of Test Specimens

8.1 If the number of specimens to be tested is not specified by agreement between the interested parties, test three specimens.

~~8.2 Cut a circular specimen approximately 100 to 110 mm in diameter, with a 6.35 mm diameter hole in the center of the specimen. A sample cutter or die may be used for this purpose.~~



8.2 ~~Clean the back of the specimen with a soft bristle brush to remove any loose debris. Mount specimen to a round specimen-mounting card (such as S-36-1), ensuring that the specimen is free of folds, creases, or wrinkles. Avoid getting oil, water, grease, and so forth, on the specimen when handling.~~Using shears or an appropriate sample cutter, cut the specimen to size. Punch or cut a 6.5 mm diameter hole in the center of the specimen.

8.2.1 When using a specimen mounting card, cut a circular specimen approximately 100 to 110 mm in diameter. Clean the back of the specimen with a soft bristle brush to remove any loose debris. Mount specimen to a round specimen-mounting card (such as S-36-1), ensuring that the specimen is free of folds, creases, or wrinkles.

8.2.2 Alternatively, a sample of 130 ± 5 mm diameter may be used, with or without a mounting card, and secured to the turntable with a ~~clamp~~clamping ring.

8.3 If the leather has a pattern such as embossment, ensure that the specimen is a representative sampling of the pattern.

8.4 Avoid getting oil, water, grease, and so forth, on the specimen when handling.

## 9. Preparation of Apparatus

9.1 *Load*—A load of 1000 g per wheel should be used, unless otherwise agreed upon by the interested parties.

9.2 *Vacuum Pickup Nozzle*—The height of the vacuum pickup nozzle should be set 7 ± 1 mm above the specimen surface, unless otherwise agreed upon by the interested parties.

9.3 *Vacuum Suction*—The vacuum suction force should be adjusted to lift the abraded particles, but not lift the specimen. ~~When the suction nozzles are in position, the air pressure in the suction device shall be within the range stated in 11.1.5.~~ A setting of 75 - 100 has been found to be sufficient and should be used, unless otherwise agreed upon by the interested parties.

NOTE 5—Vacuum suction force may be influenced by the condition of the collection bag, which must be emptied or replaced on a regular basis. Any connection or seal leaks will also influence suction force.

9.4 *Selection of Wheel Type*—The CS-10[5] wheel should be used, unless otherwise agreed upon by the interested parties.