



Designation: D2322 – 10

## Standard Test Method for Resistance of Shoe Upper Leather to Artificial Perspiration<sup>1</sup>

This standard is issued under the fixed designation D2322; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

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

### 1. Scope

1.1 This test method covers the determination of the effect of perspiration on shoe upper leather. The leather is subjected to treatment with a formulation of artificial perspiration specific for breakdown of leather. Resistance to grain cracking as measured in accordance with Test Method D2210 and area loss are used as the criterion of deterioration. The artificial perspiration may also affect the flexibility of the leather. However, these effects have not been fully evaluated as criteria of deterioration in this test method. This test method does not apply to wet blue.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered 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 determine the applicability of regulatory limitations prior to use.*

### 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

D2210 Test Method for Grain Crack and Extension of Leather by the Mullen Test

D2813 Practice for Sampling Leather for Physical and Chemical Tests

### 3. Significance and Use

3.1 This test method gives an indication of the serviceability of shoe upper leather in actual wear.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D31 on Leather and is the direct responsibility of Subcommittee D31.03 on Footwear. This test method was developed in cooperation with the American Leather Chemists Assn.

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<sup>2</sup> 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.

### 4. Apparatus

4.1 *Circulating-Air Oven*, capable of maintaining the required temperature within  $\pm 4^\circ\text{F}$  ( $\pm 2^\circ\text{C}$ ).

4.2 *Bottle*, wide-mouth,  $\frac{1}{2}$ -gal (1.9-L) with suitable airtight closure.

4.3 *Glass Tray*,  $1\frac{1}{2}$  in. (38 mm) deep.

4.4 *Mullen Tester*.

### 5. Reagent

5.1 A solution of artificial perspiration with a pH of 7.5 consisting of the following:

Sodium chloride, g	9.0
Urea, g	1.67
Sodium lactate (60 percent sodium lactate), g	86.0
Disodium phosphate ( $\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$ ), g	0.165
Distilled water to make 1 litre of solution	

Adjust the pH of the solution with lactic acid or ammonium carbonate depending on whether acid or base is required to bring pH to 7.5.

### 6. Test Specimens

6.1 Two test specimens  $3$  by  $3 \pm 0.0625$  in. ( $76$  by  $76 \pm 1.5$  mm) each shall be cut from the sample to be evaluated. One specimen shall be the control, the other shall be for exposure to artificial perspiration. For purposes of identification, the specimen for exposure to artificial perspiration shall be punched (approximate 0.06-in. (1.5-mm) hole) on two corners.

6.2 When taking test specimens from skins or hides refer to Practice D2813.

### 7. Procedure

7.1 Condition the control specimen at  $73 \pm 2^\circ\text{F}$  ( $23 \pm 1^\circ\text{C}$ ) and at a relative humidity of  $50 \pm 4\%$  for 48 h and then test on the Mullen Tester for grain crack strength in accordance with Test Method D2210.

7.2 Measure all four sides of the punched specimen to the nearest  $\frac{1}{64}$  in. (0.5 mm) and average them. The average measurement shall be squared and used to determine the area of the specimen. Record area as *A*.

7.3 Immerse the marked specimen (Note 1) in the glass tray and cover with the artificial perspiration solution to a depth of  $\frac{3}{4}$  to 1 in. (19 to 25 mm). Work the specimen in the solution by