



## Standard Test Method for Slit Tear Resistance of Leather<sup>1</sup>

This standard is issued under the fixed designation D 2212; 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 the determination of the slit tear resistance of light leathers such as shoe uppers, gloves, and upholstery. This test method does not apply to wet blue.

1.2 The values stated in inch-pound units are to be regarded as the standard. These 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:

D 1610 Practice for Conditioning Leather and Leather Products for Testing<sup>2</sup>

D 1813 Test Method for Measuring Thickness of Leather Test Specimens<sup>2</sup>

D 2209 Test Method for Tensile Strength of Leather<sup>2</sup>

### 3. Terminology

#### 3.1 Definitions:

3.1.1 *slit tear resistance*—the load required to tear the cross-sectional thickness of the leather at a slit cut through the leather by a die or a sharp knife.

### 4. Significance and Use

4.1 This test method is designed to measure the load required to tear leather at a slit cut perpendicular to its surface. Tanners and leather buyers have found that it gives an indication of the resistance of the cross-sectional thickness of leather to tearing. It is of particular value in estimating the durability of leather to withstand tearing stresses encountered in the manufacture of shoes, garments, and upholstered products. The thickness of the specimen and direction of slit relative

to the backbone will affect the uniformity of the test results. This test method may not apply when the conditions of the test employed differ widely from those specified in the test method.

### 5. Apparatus

5.1 *Testing Machine*, as described in Test Method D 2209.

5.2 *Thickness Gage*—A dead-weight type of thickness gage as described in Test Method D 1813.

5.3 *Specimen Holders*—Two specimen holders, which are fastened into the jaws of the testing machine and which support the specimen during testing (see Fig. 1). The specimen holders shall be adjusted in the machine so that they are touching each other.

5.4 *Die*—A die 1 in. (25.4 mm) wide by 2 in. (51 mm) long that cuts a specimen while simultaneously cutting a slot in the specimen (see Fig. 2).

### 6. Test Specimens

6.1 The specimen shall be 1 by 2 in. (25.4 by 51 mm), cut with the long dimension either parallel or perpendicular to the backbone (see Figs. 1 and 2).

6.2 The specimen cut with the slit tear die shall have a slot  $\frac{7}{16}$  in. (0.4375 in. (11 mm)) long by  $\frac{3}{16}$  in. (0.1875 in. (4.8 mm)) wide tapered with a  $\frac{3}{16}$ -in. radius to a slit at each end of specimen as shown in Fig. 2.

### 7. Conditioning

7.1 All specimens shall be conditioned as prescribed in Practice D 1610. Conditioning other than as prescribed shall be noted in the results.

### 8. Procedure

8.1 Determine the thickness of the specimen to the nearest 0.001 in. (0.025 mm) on the long axis at each end of the cut. The gage foot shall be adjacent to, but shall not overlap, the cut.

8.2 Slip the specimen over the protruding ends of the holders and push it down. The slot cut shall be perpendicular to the applied force. Run the machine until the specimen is torn apart. Operate at a uniform speed of  $10 \pm 2$  in./min ( $254 \pm 50$  mm/min) when running free. Note the maximum load to tear the specimen.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D31 on Leather and is the direct responsibility of Subcommittee D31.07 on Physical Properties — General. This test method was developed in cooperation with the American Leather Chemists Assn. (Standard Method E 59 – 1965).

Current edition approved Sept. 10, 2000. Published October 2000. Originally published as D 2212 – 63T. Last previous edition D 2212 – 94 (2000).

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 15.04.

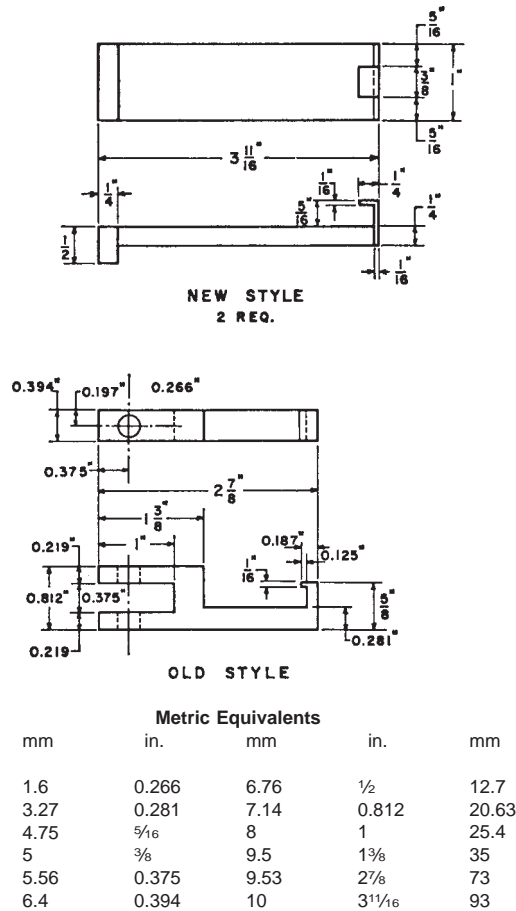


FIG. 1 New and Old Style Slit Tear Clamps

## 9. Report

9.1 The report shall include the following:

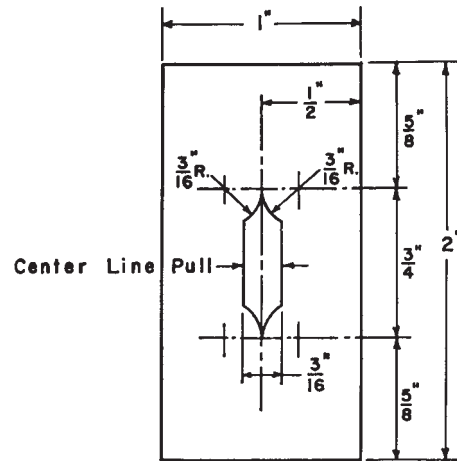
9.1.1 Thickness to the nearest 0.001 in. (0.025 mm), reported for each specimen or averaged and reported as the thickness of the sample,

9.1.2 Load in pounds-force (or newtons) to tear the specimen to the nearest 1 lbf (4.5 N) reported for each specimen or averaged and reported as the tear resistance of the sample, and

9.1.3 Direction of the long axis of the specimen relative to the backbone.

## 10. Precision and Bias

10.1 The following criteria may be used to judge the acceptability of the results if at least 15 units have been tested:



Metric Equivalents

in.	3/16	1/2	5/8	3/4	1	2
mm	4.8	12.7	16	19	25.4	51

FIG. 2 Shape and Dimensions of Die for Cutting Slit Tear Test Specimens

10.1.1 *One Operator, Duplicate Specimens, Same Skin*—Results by the same operator on duplicate adjacent specimens in a skin taken from the official sampling position should not be considered suspect unless the coefficient of variation exceeds:

Shoe upper	9
Garment	12
Upholstery	13
Calfskin <sup>A</sup>	7

<sup>A</sup>  $3 \pm 1$  oz (85  $\pm$  28 g), 0.0468  $\pm$  0.0156 in. (1.189  $\pm$  0.396 mm).

10.1.2 *Two Laboratories, Duplicate Specimens, Same Skin*—Results for the same group of light leather listed in 10.1.1 submitted by each of two laboratories on duplicate adjacent specimens in a skin taken from the official sampling position should not be considered suspect unless the two average results differ by more than 5 %.

NOTE 1—The reproducibility reported in 10.1.2 is based on data obtained at two laboratories, each with a different type of testing machine and a different operator. One machine is a load-cell type and the other a pendulum type. The results show close correlation between laboratories.

NOTE 2—The results given in Section 10 are based on tests on 30 sides of leather and do not apply to findings and cut parts.

NOTE 3—The precision data for between skins are not given because the results were based on different skins of several production lots. The variables in leather for between skins will give higher variation of the results, but this factor should not affect the precision of the method.

## 11. Keywords

11.1 leather; slit tear; slot tear; strength; tear; tear strength

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