



Standard Test Method for Slit Tear Resistance of Leather¹

This standard is issued under the fixed designation D2212; 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 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 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:*²

[D1610 Practice for Conditioning Leather and Leather Products for Testing](#)

[D1813 Test Method for Measuring Thickness of Leather Test Specimens](#)

[D2209 Test Method for Tensile Strength of Leather](#)

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.

¹ 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. This test method was developed in cooperation with the American Leather Chemists Assn. (Standard Method E59 – 1965).

Current edition approved May 1, 2015. Published July 2015. Originally approved in 1963. Last previous edition approved in 2010 as D2212 – 00 (2010). DOI: 10.1520/D2212-00R15.

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.

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 [D2209](#).

5.2 *Thickness Gage*—A dead-weight type of thickness gage as described in Test Method [D1813](#).

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](#)).

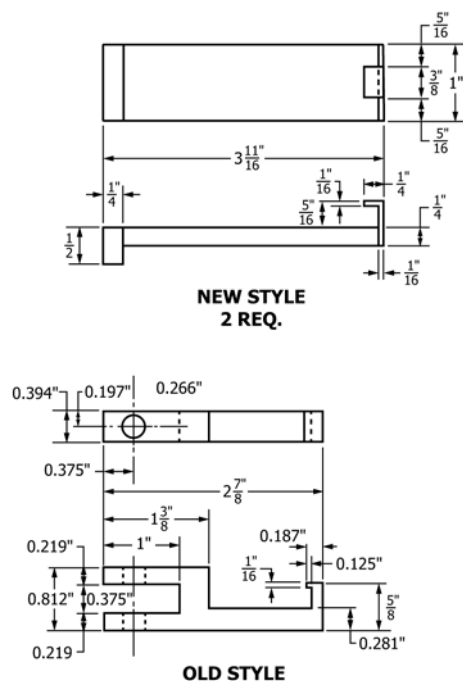
6.2 The specimen cut with the slit tear die shall have a slot $\frac{7}{16}$ in. (0.4375 in. (11 mm)) long by $\frac{3}{16}$ in. (0.1875 in. (4.8 mm)) wide tapered with a $\frac{3}{16}$ -in. radius to a slit at each end of specimen as shown in [Fig. 2](#).

7. Conditioning

7.1 All specimens shall be conditioned as prescribed in Practice [D1610](#). 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.



Metric Equivalents					
in.	mm	in.	mm	in.	mm
1/16	1.6	0.266	6.76	1/2	12.7
0.125	3.27	0.281	7.14	0.812	20.63
0.187	4.75	5/16	8	1	25.4
0.197	5	3/8	9.5	1 3/8	35
0.219	5.56	0.375	9.53	2 7/8	73
1/4	6.4	0.394	10	3 1/16	93

FIG. 1 New and Old Style Slit Tear Clamps

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 ± 2 in./min (254 ± 50 mm/min) when running free. Note the maximum load to tear the specimen.

9. Report

9.1 The report shall include the following:

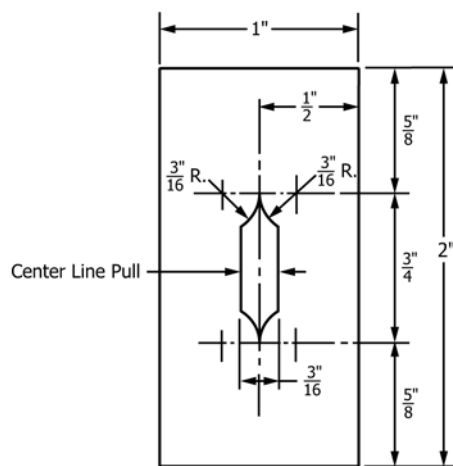
9.1.1 Thickness to the nearest 0.001 in. (0.025 mm), reported for each specimen or averaged and reported as the thickness of the sample,

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 ^a	7

^a 3 ± 1 oz (85 ± 28 g), 0.0468 ± 0.0156 in. (1.189 ± 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

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org). Permission rights to photocopy the standard may also be secured from the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, Tel: (978) 646-2600; <http://www.copyright.com/>