



## Standard Test Method for Tensile Strength of Leather<sup>1</sup>

This standard is issued under the fixed designation D 2209; 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 load required to rupture a leather test specimen having a 1/2-in. (12.7-mm) width. The load to rupture divided by the original unstretched cross-sectional area gives the tensile strength. It may be used for all types of leather that are smooth and firm enough to permit accurate thickness measurements. 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. The 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:<sup>2</sup>

D 1517 Terminology Relating to Leather

D 1610 Practice for Conditioning Leather and Leather Products for Testing

D 1813 Test Method for Measuring Thickness of Leather Test Specimens

D 2211 Test Method for Elongation of Leather

### 3. Terminology

3.1 For definitions of leather terms used in this standard refer to Terminology D 1517.

### 4. Summary of Test Method

4.1 The width and thickness are measured in the center of the narrow area of the leather specimen. The specimen is

clamped in the testing machine as described in 9.3. The force required to rupture the leather at a jaw separation of  $10 \pm 2$  in./min. is measured. The tensile strength is calculated in psi or in kPa by dividing the force by the area of the original cross section of its narrow section. The percent elongation at rupture is also measured.

### 5. Significance and Use

5.1 The tensile strength test gives a reliable indication of the quality of the leather. Improperly lubricated and partially degraded leathers give low values for tensile strength. The orientation of the specimen in relation to the backbone and the location of the specimen on the hide influence the results significantly. This test method is excellent for development, control, specification acceptance, and service evaluation of leather. This test method may not apply when the conditions of test employed differ widely from those specified in the test method.

### 6. Apparatus

6.1 *Testing Machine, Power-Driven*— The applied load shall be indicated on a dial, scale, or chart. The load indicator shall record or indicate the maximum load at the time of rupture of the specimen. The machine shall be equipped with a set of grips for clamping the specimens. The faces of the grips should be knurled or otherwise roughened to prevent slipping of the specimen. The gripping surfaces shall be at least 1 by 1 1/2 in. (25.4 by 38 mm). The grips shall be mounted with the longer dimension perpendicular to the direction of the application of the load. The speed of the power-activated grip shall be uniform speed of  $10 \pm 2$  in./min ( $254 \pm 50$  mm/min) when running free. The error of the machine up to a load of 50 lbf (222 N) shall not exceed 2 %; at loads of more than 50 lbf the error shall not exceed 1 %.

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

6.3 *Steel Scale*, graduated to read in 0.02 in. (0.5 mm).

6.4 *Steel Die*, to cut test specimens designed as shown in Fig. 1.

6.5 *Cutting Block*, which shall consist of a flat hardwood support upon which is placed a flat, smooth sheet of firm material that will not injure the cutting edge of the die.

<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 15 – 1965).

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.