



Standard Test Method for Bursting Strength of Leather by the Ball Method¹

This standard is issued under the fixed designation D 2207; 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 Department of Defense.

1. Scope

1.1 This test method covers the determination of the bursting strength of leather by the ball method. It may be used to test a large variety of leathers and leather products. It is particularly applicable to light- and medium-weight leathers, such as shoe uppers and garments. 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:

D 1517 Terminology Relating to Leather²

D 1610 Practice for Conditioning Leather and Leather Products for Testing²

D 1813 Test Method for Measuring Thickness of Leather Test Specimens²

D 2209 Test Method for Tensile Strength of Leather²

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 leather specimen is mounted in the ball burst fixture which is attached to a testing machine, as described in Test Method D 2209. The machine is operated at a jaw separation of 4 ± 1 in./min. The maximum load registered is recorded. The bursting strength in lb/in. of thickness is calculated by dividing the bursting load by the thickness of the specimen.

5. Significance and Use

5.1 This test method is designed to measure the bursting strength of leather by measuring the force required to force a spherical ended plunger through a piece of leather. The bursting load and extension will be generally proportional to the diameter of the plunger. This test method is suitable for development, control and service evaluation of the leather. There is good correlation between bursting strength and tensile strength. This test method may not apply when the conditions of the test employed differ widely from those specified in the test method.

6. Apparatus

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

NOTE 1—The machine shall have a cross-head speed of 4 ± 1 in./min (1.6 ± 0.4 mm/s).

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

6.3 *Burst Tester*,³ as shown in Fig. 1. The diameter of the ball or plunger shall be $\frac{1}{4}$ in. (0.250 in. (6.4 mm)).

6.4 *Parts Required to Modify Burst Tester*, as illustrated in Fig. 2, or equivalent.

6.5 *Die, Knife, or Shears*, for cutting the test specimen.

6.6 *Dial Gage*, mounted on the burst tester as shown in Fig. 1 to measure the height of the extension of the leather specimen.

NOTE 2—This gage shall be calibrated to read directly to the nearest 0.001 in. (0.025 mm). It shall be equipped with a flat anvil and presser foot.

6.7 *Autographic Recorder* to record the extension to the nearest 0.1 in. (2.5 mm).

7. Test Specimen

7.1 The test specimen shall be a disk of leather at least 1.75 in. (44.5 mm) in diameter.

7.2 A strip of leather between 1.75 and 6 in. (44.5 and 152 mm) wide may be used for a test specimen. Two tests shall be run on each strip.

NOTE 3—When tests are made on a strip of leather, the clamping areas

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 — General. This test method was developed in cooperation with the American Leather Chemists Assn. (Standard Method E 14 – 1965).

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² *Annual Book of ASTM Standards*, Vol 15.04.

³ A modified Scott Model W Burst Tester has been found satisfactory for this purpose. Available from Precision Scientific, 3737 W. Cortland, Chicago, IL 60647. Request Ball Burst Fixture Catalog, No. 26651.

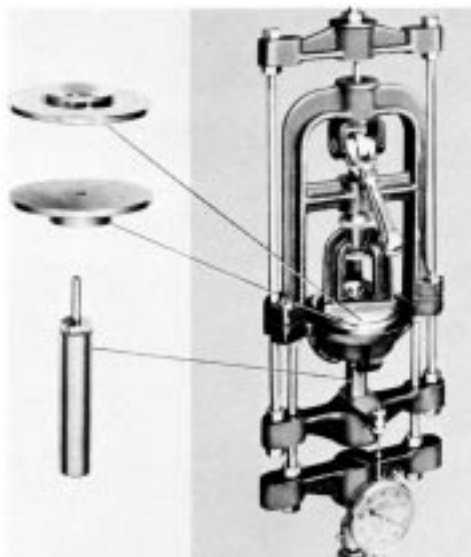


FIG. 1 Modified Burst Tester

can be overlapped so that tests can be made with a minimum distance of 1.25 in. (31.8 mm) between bursts.

8. Conditioning

8.1 All specimens shall be conditioned in accordance with Practice D 1610. Conditioning other than that prescribed shall be noted in the results.

9. Procedure

9.1 Measure the thickness of the specimen to the nearest 0.001 in. (0.025 mm) in two places near its center of testing.

NOTE 4—If the test specimen is a strip, the centers of all the test areas shall be properly marked, and the thickness at each center shall be determined.

9.2 Mount the specimen holder in the machine. Place the specimen in the holder, grain up. Adjust the space between the gripping surface in accordance with the thickness of the specimen, and grip the specimen securely by pulling the plunger handle downward.

9.3 Operate the machine at 4 ± 1 in./min (1.6 ± 0.4 mm/s).

9.4 Observe the specimen for total burst. Record the maximum load registered by the machine as the bursting load.

NOTE 5—Bursting strength, in pounds per inch of thickness, can be calculated by dividing the bursting load by the thickness of the specimen measured in inches.

9.5 Observe on the gage the extension or stretch of the leather at different loads up to total burst.

10. Report

10.1 Report the following information:

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

10.1.2 Bursting load to the nearest 1 lbf (4 N), reported for each specimen or averaged and reported as the bursting load of the sample, and

10.1.3 Extension of the specimen as measured by the vertical travel of the plunger, reported as the height extension to the nearest 0.001 in. (0.025 mm) at the bursting point.

11. Precision and Bias

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

11.1.1 *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:

Bursting Strength

Shoe upper	16 %
Men's weight calf ^A	13 %

Height Extension at Burst

Shoe upper	7 %
Men's weight calf ^A	8 %

^A 3 ± 1 oz (85 ± 28 g), 0.0468 ± 0.0156 in. (1.189 ± 0.396 mm).

11.1.2 *Two Laboratories, Duplicate Specimens, Same Skin*—Results submitted on leathers of the type mentioned in 11.1.1 by each of two laboratories on duplicate adjacent specimens from the same skin taken from the official sampling position should not be considered suspect unless the average of the two results differs by more than 5 %.

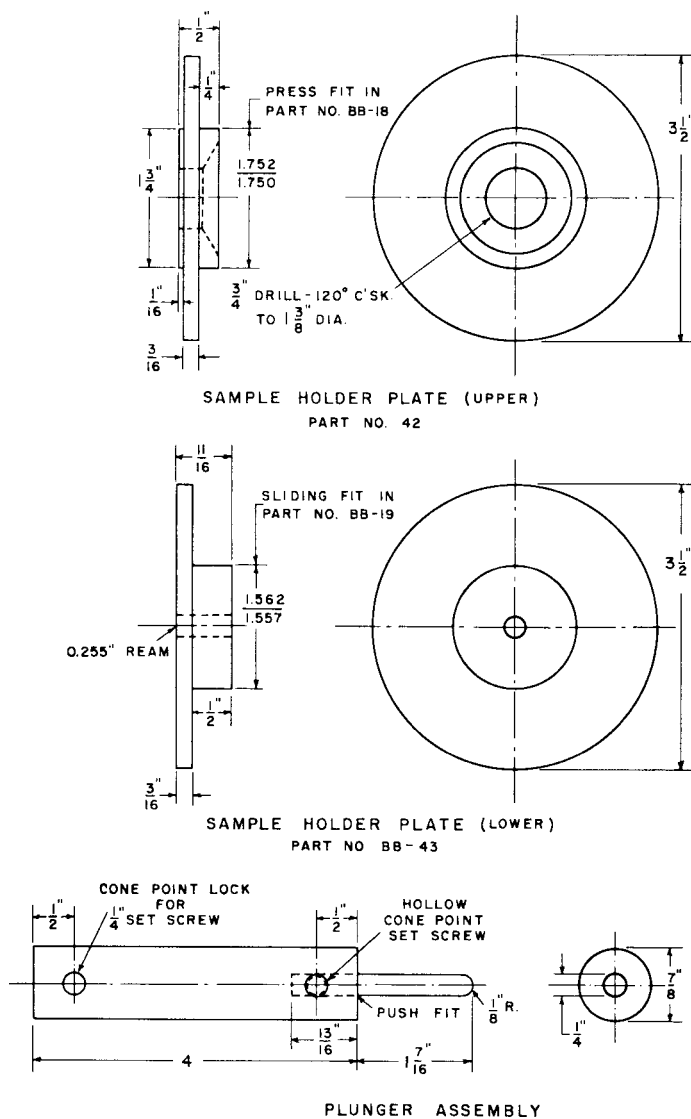
NOTE 6—The reproducibility reported in 11.1.2 is based on data obtained at two laboratories, each with a different type of testing machine and a different operator. One machine is a load-cell type and the other a pendulum type. The results show very close correlation between laboratories.

NOTE 7—The results given in Section 11 are based on tests on 30 sides of leather and do not apply to findings and cut parts.

NOTE 8—The precision data for between skins are not given because the results were based on different skins of several production lots. The variables in the leather for between skins will give higher variation of the results, but this factor should not affect the precision of the test method.

12. Keywords

12.1 bursting strength; leather; strength



Metric Equivalents

in.	mm	in.	mm	in.	mm	in.	mm
1/16	1.6	1/2	12.7	1 3/8	35	1.750	44.45
1/8	3.2	1 1/16	17.5	1 7/16	36.5	1.752	44.50
3/16	4.8	3/4	19	1.557	39.55	3 1/2	95
1/4	6.4	1 3/16	20.6	1.562	39.67	4	102
0.255	6.48	7/8	22	1 3/4	44		

FIG. 2 Parts Required to Modify Burst Tester

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