



Designation: D2941 – 21

Standard Test Method for Measuring Break Pattern of Leather (Break Scale)¹

This standard is issued under the fixed designation D2941; 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 measurement of the break pattern of shoe upper leather using an arbitrary break scale. This test method does not apply to wet blue or wet white.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

[D1517 Terminology Relating to Leather](#)

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

2.2 *MIL Standard:*³

[MIL-STD 663 Visual Inspection Guide for Footwear Upper Leather](#)

¹ 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. (Standard Method E64 – 1972).

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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.

³ Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098

3. Terminology

3.1 *Definitions:*

3.1.1 *break (of leather)*—the pattern of wrinkles formed on the grain surface of upper leather when it is bent grain in to form a concave surface. This characteristic is observed in the vamp of the shoe in walking. For this reason this test method is primarily intended for evaluation of cut parts.

3.2 For definitions of other terms used in this test method, refer to Terminology [D1517](#).

4. Significance and Use

4.1 Break depends on the fiber structure and on the relation between the grain and other strata of the leather. A fine break, or a grain pattern which shows many fine wrinkles when it is bent to form a concave surface, as it is in the vamp of a shoe, reflects favorably upon appearance and serviceability. A coarse break, on the other hand, where a few coarse wrinkles are formed on bending the grain to form a concave surface may indicate that the grain layer is separating from the corium or main stratum as in pipey leather. Shoes made from fine-break leather are more attractive and tend to wear longer than shoes made from coarse-break leather. (See MIL-STD 663 and the ALCA Journal).⁴

5. Apparatus^{5,6}

5.1 *Satra Mandrel*, consisting of two windows or hollows.

5.2 *Satra Visual Break Scale*, consisting of eight levels of break ranging from 1, fine, to 8, coarse.

6. Test Specimen

6.1 The sample for the test should be taken from an agreed area of the hide, and shall be a piece of leather 2 in. by 4 in.

⁴ Bailey, M., *Journal of the American Leather Chemists Association*, JALCA, Vol 53, 1958, p. 568.

⁵ Landmann, A. W., and Thompson, R. S., *Journal of the Society of Leather Trades Chemists*, JSLTC, Vol 47, 1963, p. 429.

⁶ The sole source of supply of the Satra mandrel and visual break scale known to the committee at this time is the Shoe and Allied Trades Research Assn., Kettering, England. If you are aware of alternative suppliers, please provide this information to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

(51 mm by 102 mm) with the long dimension perpendicular to the backbone; or a cut shoe part.

6.2 Unless otherwise specified, one specimen shall be tested from each sample.

7. Conditioning

7.1 All specimens shall be conditioned according to Practice **D1610**.

8. Procedure

8.1 With long dimension of the specimen parallel to the length of the mandrel, bend it with thumb and fingers to bring it into contact with the outside of the mandrel, and observe the wrinkles through the windows.

8.2 Compare the wrinkle pattern of the specimen with those of the Satra break scale.

8.3 The specimen should be rated to the nearest $\frac{1}{2}$ -grade, that is, if it appears that the break is better than 4 but not as good as 3, the break of the leather should be graded as $3\frac{1}{2}$. Thus, the 8-point scale gives a 15 reading range from 1 to 8 in steps of $\frac{1}{2}$ scale unit.

9. Report

9.1 The report shall include the following:

9.1.1 Thickness of the specimen to the nearest $\frac{1}{2}$ oz (0.2 mm), if specified.

9.1.2 The rating to the nearest $\frac{1}{2}$ -grade.

10. Precision and Bias

10.1 Replicate evaluation by individuals, and among laboratories on same and different days will result in errors of less than ± 1 grade.

10.2 Method of inducing wrinkles by other than manual means does not seem to affect the break rating.

10.3 Precision of repeated observations on some specimens can be seriously affected if regions other than those initially observed through the windows are rated, or if the orientation of the bend is varied. According to the original Satra investigation, colors, including white, cause no difficulty in evaluating break.

11. Keywords

11.1 break scale; grain pattern; loose finish; pipey; wrinkles

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