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**Leather — Determination of
distension and strength of surface
(Ball burst method)**

*Cuir — Détermination de l'extension et de la résistance à la traction
de la surface (méthode de la bille)*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#).

ISO 3379 was prepared by the Physical Test Commission of the International Union of Leather Technologists and Chemists Societies (IUP Commission, IULTCS) in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 289, *Leather*, the secretariat of which is held by UNI, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

IULTCS, originally formed in 1897, is a world-wide organization of professional leather societies to further the advancement of leather science and technology. IULTCS has three Commissions, which are responsible for establishing international methods for the sampling and testing of leather. ISO recognizes IULTCS as an international standardizing body for the preparation of test methods for leather.

This second edition cancels and replaces the first edition (ISO 3379:1976), which has been technically revised.

Leather — Determination of distension and strength of surface (Ball burst method)

1 Scope

This International Standard specifies a test method for the determination of distension and strength of the leather grain or finished surface. This method is applicable to all flexible leathers and it is particularly suitable to determine the lastability of leathers for footwear uppers.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2418, *Leather — Chemical, physical and mechanical and fastness tests — Sampling location*

ISO 2419, *Leather — Physical and mechanical tests — Sample preparation and conditioning*

ISO 2589, *Leather — Physical and mechanical tests — Determination of thickness*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

wearing surface

exposed or visible face of the leather when used in its intended application

Note 1 to entry: The wearing surface is usually the grain side of leather, however, the wearing surface of some leathers may be otherwise dressed or finished, e.g. patent leather.

3.2

reverse side

opposite side to the wearing surface

Note 1 to entry: The reverse side is usually the flesh side of leather.

3.3

cracking

small surface splits or tears less than approximately 0,5 mm

3.4

bursting

complete rupture of the full thickness of the test piece

4 Principle

A circular test piece is clamped around its edge and is gradually distended by forcing a steel metal ball, attached to the end of a plunger, against the centre of the test piece on the reverse side. At certain distension, measured in terms of distance travelled by the plunger, cracks appear on the wearing surface of the test piece or it sustains other permanent physical damage; this distension is recorded as the cracking point or first damage. At a higher distension, the material usually bursts and this distension may also be recorded.

5 Apparatus and material

5.1 Test machine, incorporating the following (see [Figure 1](#)).

5.1.1 Clamp, for holding securely the test piece around its edge, leaving a central circular aperture of diameter $25,0 \text{ mm} \pm 0,5 \text{ mm}$. The design of the clamping system of the machine shall ensure that the test piece does not slip during the test and shall neither stretch nor compress the central area of the test piece as it is clamped.

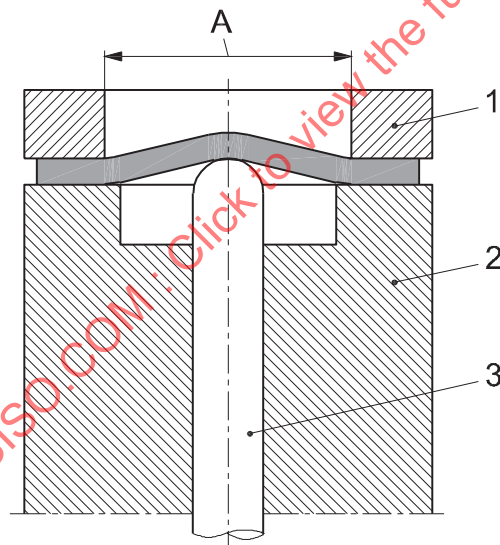
NOTE To ensure that the test piece does not slip in the clamp during the test, it might be necessary to add some interlocking profile, serrations, or other mechanical intervention to the face of the top and bottom clamps.

5.1.2 Moveable plunger, with a hemispherical end, nominal diameter $6,25 \text{ mm} \pm 0,05 \text{ mm}$.

5.1.3 Means of moving the plunger, without rotation, against the centre of the test piece and in a direction normal to the plane occupied by the test piece when it is clamped, at a speed of $0,20 \text{ mm/s} \pm 0,05 \text{ mm/s}$.

5.1.4 Means of monitoring and recording distension of the leather, or travel of the plunger from zero, in a direction normal to the plane occupied by the test piece with an accuracy of $\pm 0,05 \text{ mm}$.

5.1.5 Means of monitoring and recording the force on the plunger with an accuracy of $\pm 10 \text{ N}$.



Key

- 1 top clamp
- 2 bottom clamp
- 3 plunger with hemispherical end
- A aperture diameter (25,0 mm)

Figure 1 — Clamp and plunger

5.2 Press knife, as specified in ISO 2419, capable of cutting a circular test piece in one operation with suitable dimensions to be firmly clamped in the test machine.

5.3 Thickness gauge, as specified in ISO 2589.

6 Sampling and sample preparation

6.1 Condition the leather sample in accordance with ISO 2419.

6.2 Sample in accordance with ISO 2418. Using the press knife (5.2), cut at least three test pieces in accordance with ISO 2419.

NOTE If there is a requirement for more than two hides or skins to be tested in one batch, then only one test piece needs to be taken from each hide or skin, provided that the overall total is not less than three test pieces.

6.3 Measure the thickness of the test pieces in accordance with ISO 2589.

7 Procedure

7.1 Ensure that the test machine is set with the central plunger retracted to zero or minimum distension. If it has a maximum force indicator, set it to zero.

NOTE "Zero" distension is set by placing a circular, rigid, and flat material in the apparatus in place of the test piece.

7.2 Clamp the conditioned test piece into the test machine so that the ball-ended plunger acts on the reverse side of the test piece and the test piece is flat.

7.3 Increase the distension at a rate of $0,20 \text{ mm/s} \pm 0,05 \text{ mm/s}$ and watch the grain or finished surface for the occurrence of a crack or first damage on the surface.

7.4 When a crack or first damage occurs, record the distension in millimetre to the nearest 0,1 mm and the force in newton to the nearest 10 N. If burst is required, continue the distension with the minimum of delay.

Patent leather is a special case because often, the grain of the leather cracks before the patent surface film. Particular care is therefore required when observing patent leather test pieces. Two indications of the grain cracking are a small shallow depression in the surface of the film above the crack and a momentary drop in the force on the plunger. If the patent film cracks, this shall also be regarded as a "grain crack" whether or not a crack in the grain is visible.

NOTE For some leathers, it is possible to determine grain or finish cracking of the wearing surface by analysing the force-displacement curve. When cracking occurs, there is a sudden decrease in the load, to be considered only as a confirmation of the visual assessment.

7.5 If the test piece does not crack before bursting, report the values of distension and load at burst.

If the test piece does not burst when the maximum force or distension is reached, record the displacement and report the result as "more than maximum distension" or "more than maximum load" (e.g. >15 mm or >800 N).

NOTE If there is a pause during the distension of a test piece, relaxation of stresses in it occurs and the force reading tends to fall. Therefore, the test is ideally continuous with no delays, but, if necessary, any delay during distension between cracking and burst is less than 15 s.

7.6 Retract the plunger, remove the test specimen, and inspect the marks left by the clamps on the wearing surface of the specimen. If there are signs of slippage having occurred during the test, for example, evident by blurring of clamping rings or of tearing of the clamped edges, reject the results and repeat the procedure 7.1 to 7.6 with a new specimen.

7.7 Repeat 7.1 to 7.6 for other test pieces.

8 Test report

The test report shall include the following:

- a) reference to this International Standard, i.e. ISO 3379;
- b) full details for identification of the sample, including any specific reference if known, and the thickness of the leather in millimetre (mm);
- c) mean distension at crack in millimetre (mm) to the nearest 0,1 mm; if the test piece does not crack before bursting, report the values of distension at burst;
- d) mean force at crack in newton (N) to the nearest 10 N; if the test piece does not crack before bursting, report the values of load at burst;
- e) mean distension at burst in millimetre (mm) to the nearest 0,1 mm, if required;
- f) mean force at burst in newton (N) to the nearest 10 N, if required;
- g) standard atmosphere used for conditioning and testing, as given in ISO 2419;
- h) any deviations from the method specified in this International Standard.

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