INTERNATIONAL STANDARD

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IULTCS/IUP 5

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Leather — Physical and mechanical tests — Determination of apparent density

Cuir — Essais physiques et mécaniques — Détermination de la masse volumique apparente

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Contents

Page

Foreword iv

1 Scope 1

2 Normative references 1

3 Principle 1

4 Apparatus 1

5 Sampling and sample preparation 1

6 Procedure 2

7 Expression of results 2

8 Test report 3

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.

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 2420 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). It based on IUP 5 originally published in *J. Soc. Leather Trades Chemists* **42**, p. 388, (1958) and declared an official method of the IULTCS in 1959. An updated version was published in *J. Soc. Leather Tech. Chem.* **82**, p. 227, (1998) and a further revision was published in *J. Soc. Leather Tech. Chem.* **84**, p. 313, (2000) and reconfirmed as an official method in March 2001. This latest revision now includes the number of test pieces to be taken.

This second edition cancels and replaces the first edition (ISO 2420:1972), which has been technically revised.

Leather — Physical and mechanical tests — Determination of apparent density

1 Scope

This International Standard specifies a method for determining the apparent density of leather. It is applicable to all heavy leather.

2 Normative references

The following referenced documents are indispensable for the application of this document. 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 Principle

The volume of a circular test piece is calculated from the diameter and thickness, treating the test piece as a right angled circular cylinder. The apparent density is obtained by dividing the mass by the volume.

4 Apparatus

4.1 Press knife, the inner wall of which is a right angled circular cylinder approximately 70 mm in diameter, as specified in ISO 2419.

4.2 Thickness gauge, as specified in ISO 2589.

4.3 Balance, reading to 0,001 g.

4.4 Vernier callipers, reading to 0,1 mm.

5 Sampling and sample preparation

Sample in accordance with ISO 2418. From the sample, cut three test pieces by applying the press knife (4.1) to the grain surface and condition them 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 need be taken from each hide or skin, provided that the overall total is not less than three test pieces.

6 Procedure

6.1 Test conditions

Carry out all operations in a standard atmosphere as specified in ISO 2419.

6.2 Measurement of thickness

Measure the thickness of each test piece in accordance with ISO 2589. Measure the thickness, in millimetres, at three points forming the corners of an equilateral triangle with each situated approximately 20 mm from the centre of the test piece. Measure the thickness at the centre of the test piece. Take the arithmetic mean of the four results as the thickness of the test piece.

NOTE The centre of the test piece and the other points for measurement may be estimated by eye.

6.3 Measurement of diameter

Using vernier callipers (4.4) measure the diameter to the nearest 0,05 mm in two directions at mutual right angles on the grain surface and two directions at mutual right angles on the flesh surface. Take the arithmetic mean of the four results as the mean diameter of the test piece. Reject any test piece where the diameters on either the grain surface or the flesh surface differ by more than 0,5 mm.

6.4 Measurement of mass

Measure the mass of the test piece in grams to the nearest 0,001 g.

7 Expression of results

The apparent density, D_a, in kilograms per cubic metre shall be calculated using the formula:

$$D_a = \frac{1{,}273 \times 10^6 \times m}{t \times d^2}$$

where:

t is the thickness of the test piece in millimetres (as obtained in 6.2)

d is the diameter of the test piece in millimetres (as obtained in 6.3)

m is the mass of the test piece in grams (as obtained in 6.4)

NOTE 1 The formula above assumes that the sample is a right angled circular cylinder whose volume, V, in cubic millimetres is given by:

$$V = \frac{\pi \times d^2 \times t}{4} \text{ or } \frac{d^2 \times t}{1{,}273}$$

The factor 1,273 continues through to the final calculation.

NOTE 2 The apparent density of leather is often expressed in g/cm^3. If it is necessary to express it in these units then 1 g/cm^3 = 1000 kg/m^3.

8 Test report

The test report shall include the following:

a) reference to this International Standard, i.e. ISO 2420:2002;

b) the mean apparent density, D_a, in kilograms per cubic metre expressed to three significant figures;

c) the standard atmosphere used for conditioning and testing as given in ISO 2419 (i.e. 20 °C/65 % rh, or 23 °C/50 % rh);

d) any deviations from the method specified in this International Standard;

e) full details for identification of the sample and any deviations from ISO 2418 with respect to sampling.

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