INTERNATIONAL STANDARD

ISO 11646

IULTCS/IUP 32

Second edition
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Leather — Measurement of area

Cuir — Mesurage de la surface

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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 (see 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 11646 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 289, *Leather*, in collaboration with the Physical Tests Commission of the International Union of Leather Technologists and Chemists Societies (IUP Commission, IULTCS), in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

IULTCS, originally formed in 1897, is a worldwide 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.

The first edition of ISO 11646 was based on IUP 32 published in *J Soc. Leather Tech. Chem.* **73,** pp. 23-24 (1989), and declared an official method of the IULTCS in October 1989.

This second edition of ISO 11646 cancels and replaces the first edition (ISO 11646:1993), which has been technically revised in 4.2 and 5.1.2, to clarify the importance of using only one specific standard atmosphere (20 °C and 65 % RH).

This International Standard is written in SI units, in accordance with ISO/IEC Directives. The use of the square foot, still common in the leather trade in some countries, is discouraged. If, for commercial reasons, the use of the square foot may seem necessary, it is obtained by the conversion 1 sq ft = 0,092 9 m^2.

Leather — Measurement of area

1 Scope

This International Standard specifies a method of measuring the area of pieces of leather. It is intended only for the measurement of dressed and other dry flexible leathers.

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

3 Principle

The area of the conditioned leather is measured with a mechanical pin-wheel machine.

4 Apparatus

4.1 Mechanical pin-wheel area-measurement machine

The machine used should preferably have a feed-roller speed of 20 m/min ± 2 m/min. The distance between the centres of the pins on two adjacent pin-wheels should preferably be 25,4 mm ± 2,5 mm measured parallel to the axis of the pin-wheel roller. Pin-wheel machines which do not conform to these recommendations may also be used, but the actual design values shall be stated in the test report. (See Annex A for information on these machines.)

4.2 Circular calibration template

The template shall be made of flexible reinforced material, for calibrating the pin-wheel machine immediately before the machine is used. The area of the template shall not be less than 5 % of the pin-wheel machine capacity, and the width of the template shall not be greater than 50 % of the machine's working width.

The area of the template shall, if possible, be within ± 50 % of the anticipated area of the piece of leather to be measured. If this is not possible, feed the same template through the machine a number of times N without resetting the machine to zero until the total reading is within ± 50 % of the anticipated test-specimen area, and treat this total as a single measurement.

When not in use, the template(s) shall be kept flat in the specific standard atmosphere defined in ISO 2419 (20 °C and 65 % RH). The area of the template(s) shall be verified at least once a year by an independent body using measurement instruments traceable to a national standard calibration procedure. The template is acceptable if its measured area is within ± 0,5 % of its nominal area.

It is recommended that users of this International Standard keep a record book of the measurements obtained during the daily calibration procedure. lt is to be inspected at regular intervals to detect any consistent trends towards inaccurate readings, e.g. the left side of the machine always reads low, the right side tends to read high. This gives advance warning of faults, which are of use to the maintenance engineer when servicing the machine.

4.3 Calibration procedure

Before each series of tests, carry out the following procedure.

Stage 1: Switch on and run the machine for at least 2 min, then pass an "old" (i.e. uncertified) template through the machine approximately 25 times in a random manner to ensure that all wheels are engaged. Some of the passes shall be cumulative, without resetting the machine to zero, in order to ensure that all moving parts of the machine are running freely.

Stage 2: Zero the machine and pass a certified template through the machine *N* times without cancelling the individual readings. Ensure that all pin-wheels which will be actuated by the subsequent pass of the leather test specimen have also been actuated by the template. If the recorded total area is within ± 0,01 m^2 of the theoretical total area, proceed to the next stage. If it is outside this range, adjust the machine and repeat the *N* passes until the recorded area is within the prescribed tolerance.

Stage 3: Once the machine measures to within the prescribed tolerance, zero the measurement gauge and repeat twice the procedure described in stage 2. Record all three total areas to the nearest 0,01 m^2.

Stage 4: If all three total areas are higher or lower than *N* times the theoretical template area, or if the difference between the maximum and minimum total areas is greater than 0,02 m^2, repeat the calibration procedure from the start of stage 2 after making appropriate adjustments to the machine.

5 Sampling and sample preparation

5.1 Conditioning of the leather

5.1.1 Unless otherwise agreed (5.1.2), expose the leather test specimen to the specific standard atmosphere defined in ISO 2419 (20 °C and 65 % RH) for at least 48 h.

5.1.2 For some purposes, it is unnecessary to subject test specimens to a strict conditioning procedure, and measurements may be carried out on leather which has not been conditioned, or has been conditioned in a way other than that specified in ISO 2419. Whenever conditions other than those specified in 5.1.1 are used, however, the conditioning regime shall be stated in the test report as a deviation from the method.

Generally speaking, relative humidity (RH) is more important than atmospheric temperature in determining the moisture content and hence the surface area of pieces of leather. Leather which has a moisture content below that which is obtained by conditioning in accordance with ISO 2419 has a lower measured area. Some leathers, e.g. chamois, exhibit considerable hysteresis in their regain of moisture from a standard atmosphere. For this reason, and to minimize disputes, it is recommended that in arbitration such leathers is conditioned on the descending side of the hysteresis loop, i.e. from a moisture content corresponding to a higher relative humidity down to 65 % RH.

5.1.3 Support the leather if possible along the back-bone in such a way that air has free access to both surfaces, and keep the air in continuous motion by means of a suitably placed fan.

5.1.4 Note the time of conditioning, in hours.

5.2 Start of measurement

Carry out the test either in the same atmosphere as used for conditioning or in ambient conditions, but within 30 min of removing the test specimen from the conditioning atmosphere. Before each measurement, set the pointer of the measurement gauge to zero.

5.3 Method of measurement

Feed the test specimen into the machine with the higher-friction surface in contact with the pin-wheels. The specimen shall be absolutely flat and without creases at the moment when it passes between the

pin-wheels and the top of the feed-roller. In the case of soft leathers, this smoothing may involve pulling the hide from edge to edge with sufficient force to prevent the pins pushing the leather into the transport feed-roller slots, the specimen being held in such a manner that it remains flat as it passes through the machine. To ensure this, more than one operator may be needed to feed the specimen into the machine.

5.4 Direction of feed

If the specimen has a linear or nearly linear edge, e.g. along the sides, it shall be fed through the machine so that the straight edge forms an angle of about 30° to the direction of movement. In any other case, the line of the backbone shall be perpendicular, or almost so, to the axis of the rollers.

5.5 Number of measurements

If the area of the test specimen is more than 5 % of the measurement-machine capacity, measure the area twice. If the readings differ, repeat the minimum number of times required to obtain two equal readings after rounding to the nearest 0,01 m^2. If the pointer is exactly in the middle between two scale divisions, round the reading up to the higher of the two divisions.

If the area of the test specimen is less than 5 % of the measurement-machine capacity, feed the specimen through the machine repeatedly, without zeroing in between, until the total measured area exceeds 5 % of the measurement-machine capacity. Repeat the sequence of measurements to obtain a second reading. If the first reading differs from the second after rounding to the nearest 0,01 m^2, repeat the sequence the minimum number of times required to obtain two equal readings. Calculate the area of the specimen as the total measured area divided by the number of times the specimen was fed through the machine and then round to the nearest 0,01 m^2.

6 Expression of results

Report as the area of the test specimen the average of two valid measurements, in square metres, rounded to two places of decimals.

7 Test report

The test report shall include the following:

a) a description of the type of leather tested;

b) reference to this International Standard; i.e. ISO 11646;

c) the time of conditioning, in hours;

d) the result of the area measurement, in square metres, rounded to two places of decimals;

e) any deviations from the procedure specified in this International Standard.

Annex A
(informative)

Sources of test apparatus

Examples of suitable products available commercially are given below. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of these products.

The mechanical pin-wheel area-measurement machines are now less common and no new machines are being manufactured. They are available for check-testing purposes at the following institutes:

— BLC Leather Technology Centre, Northampton, England, (www.blcleathertech.com);

— PFI-Germany, Pirmasens, Germany, (www.pfi-germany.de);

— SATRA Technology Centre, Kettering, England (www.satra.co.uk);

— SSIP, Naples, Italy, (www.ssip.it).

Further information is available on the International Council of Tanners (ICT) website at: www.tannerscouncilict.org.