

INTERNATIONAL  
STANDARD

ISO  
3380

IULTCS/IUP 16

Third edition  
2015-09-01

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**Leather — Physical and mechanical  
tests — Determination of shrinkage  
temperature up to 100 °C**

*Cuir — Essais physiques et mécaniques — Détermination de la  
température de rétrécissement jusqu'à 100 °C*

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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](http://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](http://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 3380 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 is based on IUP 16 originally published in J. Soc. Leather Trades Chemists 47, p. 122, (1963) and an updated version published in J. Soc. Leather Tech. Chem. 84, p. 359, (2000).

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 third edition cancels and replaces the second edition (ISO 3380:2002), 6.5 of which has been technically revised.

# Leather — Physical and mechanical tests — Determination of shrinkage temperature up to 100 °C

## 1 Scope

This International Standard specifies a method for determination of the shrinkage temperature of leather up to 100 °C. It is applicable to all 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 2418, *Leather — Chemical, physical and mechanical and fastness tests — Sampling location*

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

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

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## 3 Principle

The test piece is heated at a specified rate in water until a sudden shrinkage occurs.

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## 4 Apparatus

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**4.1** Schematic layout of a suitable instrument is shown in [Figure 1](#). The instrument should include the following parts.

**4.1.1 Vessel**, minimum volume of 500 ml and minimum working depth of 110 mm. The vessel may be pressurized to operate at temperatures in excess of 100 °C.

**4.1.2 Fixed test piece holder**, for example, a pin or clip, 30 mm ± 5 mm above the base of the vessel.

**4.1.3 Moveable test piece holder**, for example, a hook or clip. One end is attached to the top of the test piece. The other end is attached to a thread which passes over a pulley and terminates in a mass 3 g heavier than the moveable holder.

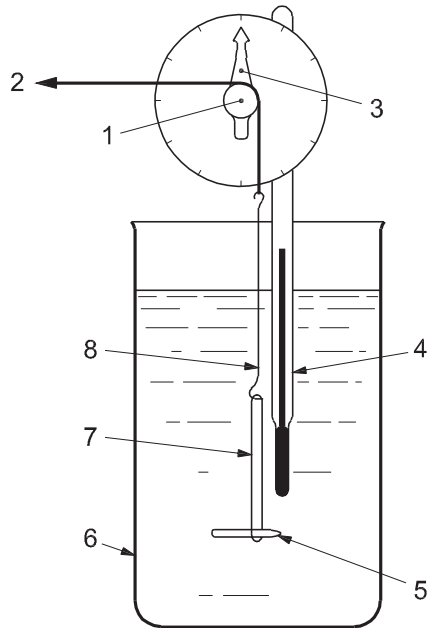
**4.1.4 Pointer**, with means of monitoring its movement. In the instrument shown, the relative dimensions of the pulley and pointer shall be such that any movement of the moveable holder ([4.1.3](#)) is magnified by a factor of at least five.

**4.1.5 Temperature measuring device**, graduated to 1 °C and shown to be accurate to ±0,5 °C with the sensor placed close to the centre of the test piece and a working range suitable for the sample under test.

**4.1.6 Distilled or de-ionized water**, conforming to the requirements grade 3 of ISO 3696.

**4.1.7 Heater**, capable of heating the vessel filled to its working depth with distilled or de-ionized water at a rate of 2 °C/min ± 0,2 °C/min.

**4.1.8 Stirrer**, capable of sufficiently agitating the water in the vessel such that the temperatures at the top and bottom of the test piece do not differ by more than 1 °C.



**Key**

- |   |  |   |                           |
|---|--|---|---------------------------|
| 1 | pulley   | 5 | fixed test piece holder   |
| 2 | 3 g force  | 6 | vessel                    |
| 3 | pointer  | 7 | test piece                |
| 4 | temperature measuring device (thermometer shown) | 8 | movable test piece holder |

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**Figure 1 — Shrinkage temperature apparatus (schematic)**

**4.2 Thickness gauge**, conforming to the requirements of ISO 2589.

**4.3 Desiccator** or other vessel which can be evacuated.

**4.4 Vacuum pump**, capable of reducing the absolute pressure in the desiccator to less than 4 kPa within 2 min.

**4.5 Glass test tube**, with internal diameter of 10 mm ± 2 mm and minimum height of 100 mm.

## 5 Sampling and sample preparation

**5.1** Sample in accordance with ISO 2418.

**5.2** Determine the thickness of the sample in accordance with ISO 2589.

**5.3** Cut rectangular test pieces 50 mm ± 2 mm × 3,0 mm ± 0,2 mm if the thickness of the sample is 3 mm or less. If the thickness is greater than 3 mm, cut rectangular test pieces 50 mm ± 2 mm × 2,0 mm ± 0,2 mm. Prepare two samples parallel to the backbone and two samples perpendicular to the backbone.

**NOTE 1** If there is a requirement for more than two hides or skins to be tested in one batch, then only one sample in each direction needs to be taken from each hide or skin, provided that the overall total is not less than four test pieces in each direction.

NOTE 2 There is no requirement to condition the sample for this test or to carry out the test under standard conditions.

NOTE 3 Other dimensions are used if it is shown that they do not affect the results.

## 6 Procedure

For dry test samples, carry out 6.1 to 6.3. For wet test samples, omit 6.1 to 6.3.

**6.1** Put 5,5 ml ± 0,5 ml distilled or de-ionized water into the glass tube (4.5) and immerse the test piece in it, using a glass rod to keep in immersed, if necessary.

**6.2** Stand the tube in the desiccator (4.3), supporting it in an upright position, if necessary. Evacuate the desiccator and maintain the absolute pressure in it below 4 kPa for 1 min to 2 min.

**6.3** Allow air to enter the desiccator and keep the test piece immersed for a minimum of 1 h and a maximum of 6 h.

**6.4** Attach an end of the test piece to the fixed test piece holder (4.1.2) and the other end to the moveable holder (4.1.3). Adjust the thread, pulley, and mass so that the test piece is held under the tension of the mass.

**6.5** Place sufficient distilled or de-ionized water of  $(20 \pm 2)^\circ\text{C}$  into the vessel (4.1.1) to give a depth of at least 30 mm over the top of the test piece. If the shrinkage temperature of the test piece is known, then use water with a temperature at least  $10^\circ\text{C}$  below the expected shrinkage temperature. In such a case, it is essential to allow 5 min for a temperature adjustment of the leather sample.

**6.6** Heat the water and maintain the rate of temperature rise at  $2^\circ\text{C}/\text{min} \pm 0,2^\circ\text{C}/\text{min}$ .

**6.7** At 30 s intervals, note the temperature and the corresponding position of the pointer. Continue the observation until the test piece shrinks considerably (see 6.8), the water boils vigorously, or the desired temperature is reached. If the water boils, record the temperature.

**6.8** Inspect the results or plot pointer position against temperature to find the temperature corresponding to the movement of the pointer which is equivalent to a shrinkage of the test piece of 0,3 % from its maximum length. Record the temperature as the shrinkage temperature.

**6.9** If the shrinkage temperature determined in 6.8 is not at least  $5^\circ\text{C}$  higher than the temperature of the water originally placed in the vessel, discard the result and repeat 6.1 to 6.8 using water at a lower initial temperature.

## 7 Test report

The test report shall include the following:

- a) reference to this International Standard, i.e. ISO 3380;
- b) mean shrinkage temperature in each direction as obtained in 6.8 or quoted as greater than the final temperature reached in 6.7;
- c) any deviations from the method specified in this International Standard;
- d) full details for identification of the sample and any deviations from ISO 2418 with respect to sampling.

## 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 apparatus is manufactured, for example, by the following:

- SATRA Technology Centre, Wyndham Way, Telford Way, Kettering, Northamptonshire NN16 8SD, England;
- Giuliani Apparecchi Scientifici, via Centrallo, 68/18, I-1056 Torino, Italy;
- SODEMAT, 29 rue Jean Moulin, ZA Coulmet, F-10450 Breviandes, France;
- Muver - Francisco Muñoz Irlles, Avda Hispanoamerica 42, E-03610 Petrer (Alicante), Spain.

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