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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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 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 declared an official method of the IULTCS in 1963. This updated version was published in *J. Soc. Leather Tech. Chem.* **84**, p. 359, (2000) and reconfirmed as an official method in March 2001. This same principle is used but the text has been updated and includes the number of test pieces to be taken.

This second edition cancels and replaces the first edition (ISO 3380:1975), 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 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 2589 *Leather - Physical and mechanical tests - Determination of thickness*

ISO 3696:1987 *Water for analytical laboratory use - Specification and test methods*

## 3 Principle

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

## 4 Apparatus

**4.1** A schematic layout of a suitable instrument is shown in figure 1. The instrument should include the following parts:

**4.1.1 Vessel**, minimum volume 500 ml and minimum working depth 110 mm. The vessel may be pressurised 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.

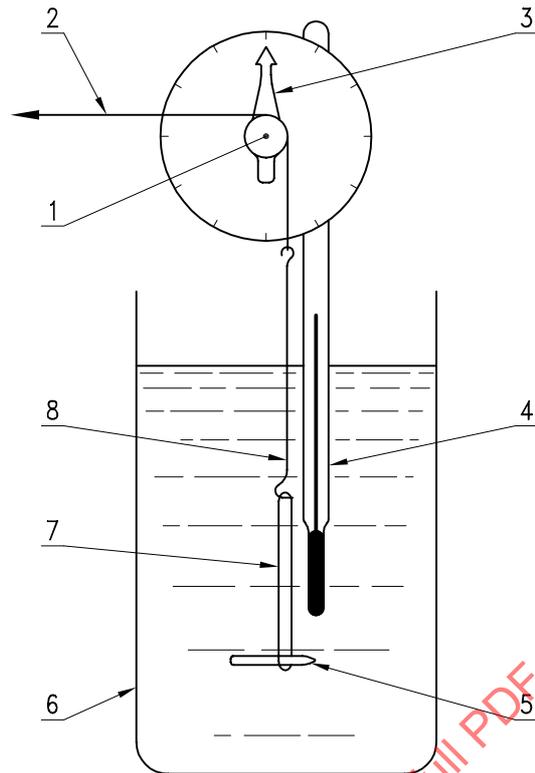
**4.1.4 Pointer**, with means of monitoring its movement. In the instrument shown, the relative dimensions of the pulley and pointer shall be such that any movement of the moveable holder (4.1.3) is magnified by a factor of at least 5.

**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 of grade 3 of ISO 3696:1987.

**4.1.7 Heater**, capable of heating the vessel filled to its working depth with distilled or deionized water at a rate of 2 °C ± 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
- 2 3g force
- 3 Pointer
- 4 Temperature measuring device (Thermometer shown)
- 5 Fixed test piece holder
- 6 Vessel
- 7 Test piece
- 8 Movable test piece holder

**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  $10 \text{ mm} \pm 2 \text{ mm}$  and minimum height 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  $50 \text{ mm} \pm 2 \text{ mm} \times 3,0 \text{ mm} \pm 0,2 \text{ mm}$  if the thickness of the sample is 3 mm or less. If the thickness is greater than 3 mm cut rectangular test pieces  $50 \text{ mm} \pm 2 \text{ mm} \times 2,0 \text{ mm} \pm 0,2 \text{ mm}$ . Prepare 2 test pieces parallel to the backbone and 2 test pieces 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 test piece in each direction need be taken from each hide or skin, provided that the overall total is not less than two 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.

## 6 Procedure

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

6.1 Put  $5,5 \text{ ml} \pm 0,5 \text{ ml}$  distilled or deionized water into the glass tube (4.5) and immerse the test piece in it, using a glass rod to keep it 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 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 warmed distilled or deionized water 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 or suspected to be below  $60 \text{ }^{\circ}\text{C}$  then use water with a temperature at least  $10 \text{ }^{\circ}\text{C}$  below the expected shrinkage temperature.

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

6.7 At 30 s intervals note the temperature and the corresponding position of the pointer. Continue the observations until the test piece shrinks considerably, 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  $5 \text{ }^{\circ}\text{C}$  higher than the temperature of the water originally placed in the vessel discard the result and repeat the steps 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 3380:2002;
- b) the 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:

SATRA Technology Centre, SATRA House, Rockingham Rd, Kettering, Northants NN16 9JH, 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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