

INTERNATIONAL  
STANDARD

ISO  
17232

IULTCS/IUP  
38

First edition  
2006-09-15

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**Leather — Physical and mechanical  
tests — Determination of heat resistance  
of patent leather**

*Cuir — Essais physiques et mécaniques — Détermination de la  
résistance à la chaleur des cuirs vernis*

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Reference number  
ISO 17232:2006(E)  
IULTCS/IUP 38:2006(E)

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Published in Switzerland

## 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 17232 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. It was published as EN 13540. It is based on IUP 38 published in *J. Soc. Leather Tech. Chem.*, **84** (7), p. 403, 2000, and declared an official method of the IULTCS in March 2001.

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.

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# Leather — Physical and mechanical tests — Determination of heat resistance of patent leather

## 1 Scope

This International Standard specifies two methods for determining the heat resistance of patent leather.

Method A makes use of a modified lastometer while Method B uses the “Zwik” apparatus. Both methods are applicable to patent leathers for all end uses.

## 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*

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## 3 Method A — Lastometer method

### 3.1 Principle

A perforated test piece is distended by a specified amount. The surface is heated and any damage to the patent finish is noted.

### 3.2 Apparatus

**3.2.1 Test machine**, including the parts described in 3.2.1.1 to 3.2.1.4.

**3.2.1.1 Clamp**, capable of holding the test piece around its edge leaving free a central circular area of diameter  $25,0 \text{ mm} \pm 0,1 \text{ mm}$ . The design of its clamping system shall ensure that the test piece does not slip under the test conditions and neither stretches nor compresses the central area as it is clamped. The boundary between the free and clamped area shall be sharply defined.

**3.2.1.2 Plunger**, terminating in a steel ball of diameter  $21,0 \text{ mm} \pm 0,1 \text{ mm}$ .

**3.2.1.3 Mechanism for thrusting the steel ball**, without rotation against the test specimen.

**3.2.1.4 Mechanism for monitoring the distension of the steel ball**, (travel from zero) to an accuracy of  $\pm 0,05 \text{ mm}$ .

**3.2.2 Press knife**, conforming to the requirements of ISO 2419 for cutting test pieces of suitable dimensions for the test machine.

**3.2.3 Sewing machine needle**, sharp and undamaged, PCL size 80, either fitted into holder suitable for use by hand or into sewing machine.

NOTE Other sized needles may be used if they are more appropriate to the sewing used in the shoe production.

**3.2.4 Hot air blower**, capable of maintaining a temperature of  $100\text{ °C} \pm 5\text{ °C}$  or  $125\text{ °C} \pm 5\text{ °C}$ .

**3.2.5 Temperature measuring device**, reading to  $1\text{ °C}$ .

**3.2.6 Stopwatch**, reading to 1 s.

**3.2.7 Soft rubber mat**, minimum thickness 10 mm.

### 3.3 Sampling and sample preparation

**3.3.1** Sample in accordance with ISO 2418. Cut three test pieces by applying the press knife (3.2.2) to the patent surface.

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

**3.3.2** If the test piece is to be perforated by hand, place the test piece on the soft rubber mat (3.2.7) with the patent surface uppermost. Using the sewing machine needle (3.2.3) fitted into a holder, pierce a hole vertically through the centre of the test piece so that the hole is within 1,0 mm of the centre. Pierce four further holes through the test piece with each hole  $5,0\text{ mm} \pm 0,5\text{ mm}$  from the first hole so that the first holes form a simple (Greek) cross. Ensure that the needle penetrates through the leather into the soft rubber mat.

**3.3.3** If the test piece is to be perforated by machine, perforate through the centre using the needle fitted into a sewing machine (3.2.3) running at normal speed but without the thread and set at 6 stitches/10 mm.

**3.3.4** Condition the test piece in accordance with ISO 2419. Carry out the test in the standard atmosphere.

### 3.4 Procedure

**3.4.1** Set the instrument so that the plunger is set at zero or minimum distension.

**3.4.2** Tightly clamp the test piece into the instrument so that the ball end of the plunger (3.2.1.2) acts on the reverse side of the test piece.

**3.4.3** Force the ball end of the plunger into the test piece until the test piece is distended by  $7,5\text{ mm} \pm 0,05\text{ mm}$  as shown on the distension scale (3.2.1.4). Examine the test piece and note any damage.

**3.4.4** Place the sensor of the temperature measuring device (3.2.5) a distance of  $1,5\text{ mm} \pm 0,5\text{ mm}$  above the dome of the distended test piece. Using the hot air blower (3.2.4), raise the temperature of the test piece to  $100\text{ °C} \pm 5\text{ °C}$  or  $125\text{ °C} \pm 5\text{ °C}$  as indicated on the temperature measuring device (3.2.5) and maintain this temperature for  $180\text{ s} \pm 5\text{ s}$  or  $300\text{ s} \pm 5\text{ s}$  respectively. If the temperature goes out of the limits, reject the test piece and repeat using a fresh test piece.

**3.4.5** Maintain the test piece in the distended state and re-examine. Record any damage to the patent finish or the leather grain.

**3.4.6** Repeat steps 3.4.1 to 3.4.5 for the remaining test pieces.

### 3.5 Test report

The test report shall include the following:

- a) a reference to this International Standard; i.e. ISO 17232:2006;
- b) details of any damage to the patent finish or leather grain when the test piece is first distended;
- c) details of any damage to the patent finish or leather grain when the test piece is heated;
- d) the test temperature and time (i.e. 100 °C for 180 s or 125 °C for 300 s);
- e) the standard atmosphere used for conditioning and testing as given in ISO 2419 (i.e. 20 °C/65 % RH, or 23 °C/50 % RH);
- f) any deviations from the method specified in this International Standard;
- g) full details for identification of the sample and any deviations from ISO 2418 with respect to sampling.

## 4 Method B — Zwik method

### 4.1 Principle

A perforated test piece is distended by a specified amount. The surface is heated and any damage to the patent finish is noted.

### 4.2 Apparatus

**4.2.1 Test machine**, constructed such that the two ends of the test piece are held in the fixed horizontal clamp B, so that the test piece can be stretched over mandrel D.

Mandrel D consists of a horizontal half cylinder of radius 15,0 mm ± 0,1 mm and length 25,5 mm ± 0,1 mm with a quarter sphere of radius 15,0 mm ± 0,1 mm at its end. The lower (fixed) face of clamp A is in the same plane as the top line of mandrel D and clamp B is 11,0 mm ± 0,1 mm vertically below the curved tip of the mandrel.

The hand-operated lever C to which clamp B is attached moves up and down in a quadrant E. Its maximum downward movement, which determines the maximum stretch of the test piece, is controlled by a pin which passes through two holes in the two sides of the quadrant. There are pairs of holes in the quadrant, and the pin can be inserted through any of these to control the amount of movement of the lever. One setting shall correspond to a linear extension of the test piece of 21 % ± 1 %. A lock (F) enables the lever to be held at its highest position at the top of the quadrant.

The general arrangement of the test machine is shown in Figure 1.

**4.2.2 Press knife**, conforming to the requirements of ISO 2419, the inner wall of which is a rectangle 95 mm ± 1 mm × 50 mm ± 1 mm.

**4.2.3 Sewing machine**, fitted with sharp, undamaged needle PCL size 80.

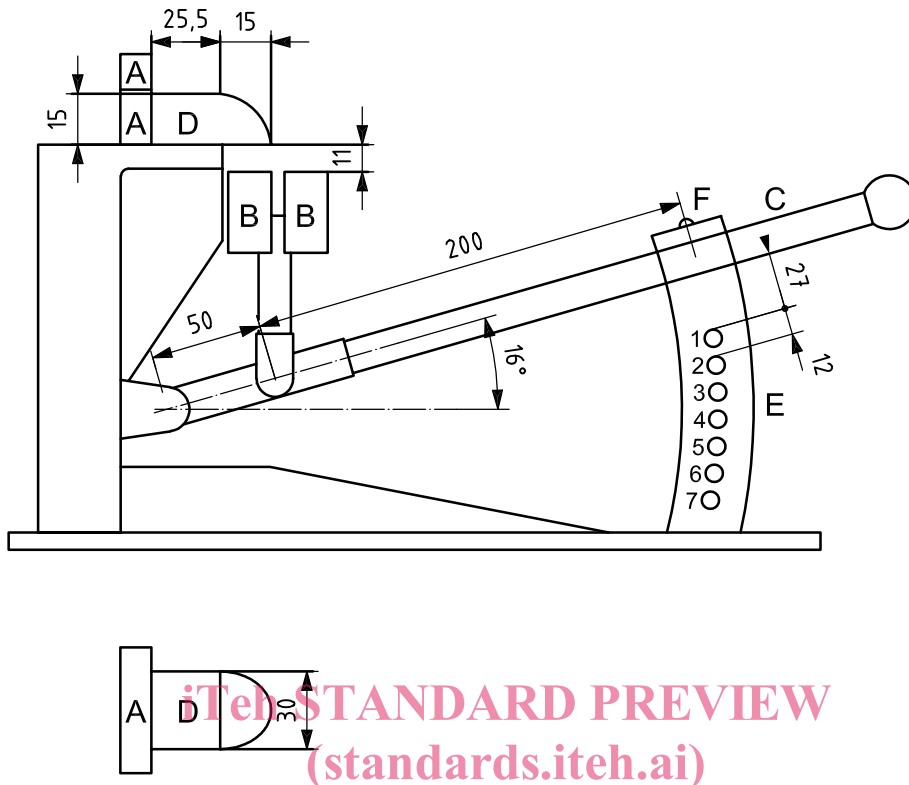
NOTE Other sized needles may be used if they are more appropriate to the sewing used in the shoe production.

**4.2.4 Hot air blower**, capable maintaining a temperature 125 °C ± 5 °C.

**4.2.5 Temperature measuring device**, reading to 1 °C.

**4.2.6 Stopwatch**, reading to 1 s.

Dimensions in millimetres  $\pm 0,1$  mm



**Key**

- A clamp
- B horizontal clamp
- C hand-operated lever
- D mandrel
- E quadrant
- F lock

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**Figure 1 — General arrangement of the test machine**

**4.3 Sampling and sample preparation**

**4.3.1** Sample in accordance with ISO 2418. Cut six test pieces by applying the press knife (4.2.2) to the patent surface. Cut three test pieces with the long edge parallel to the backbone and three with the long edge perpendicular to the backbone.

**NOTE** 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 need be taken from each hide or skin, provided that the overall total is not less than three test pieces in each direction.

**4.3.2** Perforate the test pieces along the centre line parallel to the longer side with a row of needle holes using the sewing machine (4.2.3) running at its normal speed, but without the thread, at 6 stitches/10 mm.

**4.3.3** Condition the test pieces in accordance with ISO 2419. There is no need to carry out the test in a conditioned atmosphere.



#### 4.4 Procedure

**4.4.1** Place the sensor of the temperature measuring device (4.2.5) a distance of  $1,5 \text{ mm} \pm 0,5 \text{ mm}$  above the mandrel. Using the hot air blower (4.2.4), raise the temperature of the mandrel to  $125 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$  as indicated on the temperature measuring device and maintain this temperature for  $15 \text{ min} \pm 1 \text{ min}$ .

**4.4.2** Position the pin in the pair of holes which correspond to an extension of  $21 \% \pm 1 \%$ .

**4.4.3** Raise the arm of the test machine to the top of the quadrant and lock it in position. Insert one shorter side of a test piece centrally into the upper fixed clamp with the patent surface uppermost. Lay the test piece over the mandrel, smooth it out and clamp the other end in the lower clamp so that it is just taut.

**4.4.4** Place the sensor of the temperature measuring device (4.2.5) a distance of  $1,5 \text{ mm} \pm 0,5 \text{ mm}$  above the test piece. Using the hot air blower (4.2.4), raise the temperature of the mandrel to  $125 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$  as indicated on the temperature measuring device and maintain the temperature for  $20 \text{ s} \pm 2 \text{ s}$ . Pull down the arm sharply until it makes contact with the pin. Continue to heat the test piece at  $125 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$  for a further  $300 \text{ s} \pm 5 \text{ s}$ . If the temperature goes outside these limits, reject the test piece and repeat using a fresh test piece.

**4.4.5** Switch off the hot air, raise the arm of the test machine and remove the test piece.

**4.4.6** Repeat 4.4.3 to 4.4.5 for the remaining test pieces.

**4.4.7** Examine the test pieces and record any damage to the patent finish.

#### 4.5 Test report

The test report shall include the following

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This International Standard, ISO 17232:2006, 778-45fl-9531-  
cdfc4776b0c5/iso-17232-2006
- a) a reference to this International Standard;
  - b) details of any damage to the patent finish or leather grain when the test piece is first distended;
  - c) details of any damage to the patent finish or leather grain when the test piece is heated;
  - d) the standard atmosphere used for conditioning and testing as given in ISO 2419 (i.e.,  $20 \text{ }^\circ\text{C}/65 \text{ } \% \text{ RH}$  or  $23 \text{ }^\circ\text{C}/50 \text{ } \% \text{ RH}$ );
  - e) any deviations from the method specified in this International Standard;
  - f) full details for identification of the sample and any deviation from ISO 2418 with respect to sampling.