

---

# INTERNATIONAL STANDARD



# 3376

---

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

---

## Leather — Determination of tensile strength and elongation

*Cuir — Détermination de la résistance à la traction et de l'allongement*

First edition — 1976-12-15

iteh STANDARD PREVIEW  
(standards.iteh.ai)

[ISO 3376:1976](#)

<https://standards.iteh.ai/catalog/standards/sist/591075f0-9ed5-4539-9b95-60d9c9b9bffe/iso-3376-1976>

---

UDC 675 : 620.172.24

Ref. No. ISO 3376-1976 (E)

**Descriptors** : leather, tests, tension tests, measurement, tensile strength, elongation at fracture, breaking load.

## FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3376 was drawn up by Technical Committee ISO/TC 120, *Leather*, and circulated to the Member Bodies in May 1974.

It has been approved by the Member Bodies of the following countries :

Australia	Hungary	South Africa, Rep. of
Brazil	India	Spain
Canada	Iran	Thailand
Chile	Ireland	Turkey
Czechoslovakia	Israel	United Kingdom
Egypt, Arab Rep. of	New Zealand	U.S.S.R.
Ethiopia	Poland	Yugoslavia
France	Portugal	
Germany	Romania	

No Member Body expressed disapproval of the document.

---

This International Standard is based on method IUP/6 of the International Union of Leather Chemists' Societies.

# Leather – Determination of tensile strength and elongation

## iTeh STANDARD PREVIEW (standards.iteh.ai)

### 1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method for the determination of the tensile strength and elongation of all types of leather.

### 2 REFERENCES

ISO 2419, *Leather – Conditioning of test pieces for physical tests.*

ISO 2589, *Leather – Physical testing – Measurement of thickness.*

### 3 PRINCIPLE

#### 3.1 Tensile strength

Conditioning of a cut test piece in a controlled atmosphere, measurement of the thickness, and stretching of the test piece in a tensile-testing machine until the test piece breaks.

#### 3.2 Elongation

Stretching of a conditioned test piece in a tensile-testing machine until the force exerted reaches a predetermined value or until the test piece breaks.

### 4 APPARATUS

4.1 **Press knives**, for cutting test pieces. (See the figure and the notes to clause 5.)

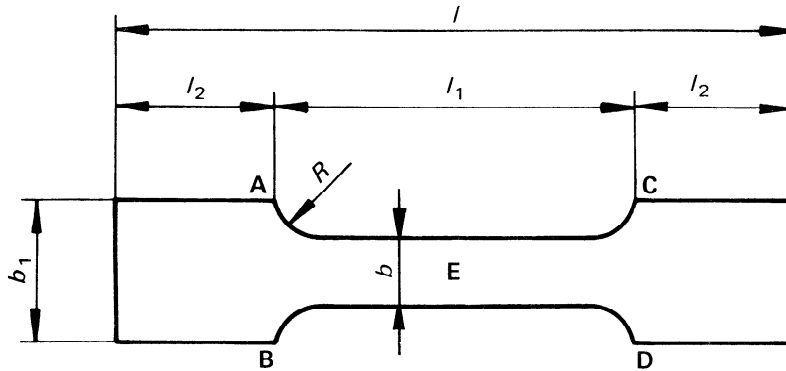
4.2 **Thickness gauge**, as specified in ISO 2589.

4.3 **Tensile strength testing apparatus**, having a uniform rate of separation of the jaws of  $100 \pm 10$  mm/min. The jaws shall be constructed so that the test piece does not slip during the test. Clamping shall be effected by a force of 300 N applied to the jaws at the centre of the clamped area of the test piece. The jaw faces shall be serrated with an angular profile (not with a curved profile). Self-clamping jaws shall not be used. The faces of the jaws shall measure at least 40 mm in the direction of the applied force.

Readings of applied force shall fall in that part of the scale which has been shown by calibration to be correct within 1 %. Automatically recorded force/extension curves may be used for the measurement if calibration has shown that they do not lead to errors greater than 2 % of the length of the test piece (i.e. of the distance between the lines AB and CD in the figure).

### 5 TEST PIECE

Using the press knife (4.1), cut a test piece of the shape and dimensions shown in the figure. Condition the test piece in accordance with ISO 2419.



Dimensions in millimetres

$l$	$l_1$	$l_2$	$b$	$b_1$	$R$
90	50	20	10	25	5

FIGURE – Shape and dimensions of test pieces

NOTES

1 When a heavy leather is being tested, the large force exerted at rupture may make it difficult to prevent jaw-slip (see 6.1.4). If a valid result cannot be obtained using the test piece dimensions shown in the figure, a larger test piece, with the following dimensions (given in millimetres), may be used :

$l$	$l_1$	$l_2$	$b$	$b_1$	$R$
190	100	45	20	40	10

If this large test piece is used, this should be stated in the test report.

2 If the amount of leather available is insufficient for the test piece illustrated in the figure to be used, a smaller test piece, with the following dimensions (given in millimetres), may be used :

$l$	$l_1$	$l_2$	$b$	$b_1$	$R$
40	20	10	5	10	2,5

If this smaller test piece is used, this should be stated in the test report.

If this smaller test piece is used for the determination of tensile strength, the leather should be conditioned and its thickness measured (see note 2 to 6.1.2) before the test piece is cut.

6 PROCEDURE

6.1 Tensile strength

6.1.1 Measure the width of the test piece to the nearest 0,1 mm at three positions on the grain side and at three positions on the flesh side; in each group of three measurements, make one at the mid-point E of the waist of the test piece (see the figure) and the other two at positions approximately midway between E and the lines AB, CD. Take the arithmetic mean of the six measurements as the width of the test piece.

6.1.2 Measure the thickness of the test piece in accordance with ISO 2589. Make the measurement at three positions;

namely, at the point E and midway between E and the lines AB, CD. Take the mean of the three thickness measurements as the thickness of the test piece.

NOTES

1 When the larger test piece, described in note 1 to clause 5, is used, the thickness should be measured as described in 6.1.2.

2 When the smaller test piece, described in note 2 to clause 5, is used, the thickness should be measured after conditioning but before the test piece is cut, at point E only.

6.1.3 Calculate the area of cross-section of the test piece by multiplying its width by its thickness.

6.1.4 Set the jaws of the tensile strength testing apparatus (4.3) 50 mm apart. Clamp the test piece in the jaws so that the edges of the jaws lie along the lines AB, CD. When the test piece is clamped, its grain surface shall lie in one plane.

NOTE – When using the larger or smaller test piece, the jaws should be set 100 mm or 20 mm apart, respectively.

6.1.5 Run the machine until the test piece breaks and take the highest force exerted as the breaking force.

6.2 Elongation at a specified force

6.2.1 Clamp the test piece between the jaws of the apparatus as described in 6.1.4. Measure the distance between the jaws to the nearest 0,5 mm and take this distance as the initial length of the test piece for the purpose of the test.

6.2.2 Start the apparatus. Unless the apparatus automatically draws a force/extension curve with the necessary accuracy (see 4.3), follow the distance between the pairs of jaws, as the force increases, with the aid of a pair of dividers.

**6.2.3** Note the distance between the pairs of jaws at the instant when the force first reaches the specified value. Take this distance as the length of the test piece at this force. Do not stop the apparatus if results from the procedures described in 6.1 or 6.3 are also required.

### 6.3 Elongation at break

**6.3.1** Proceed as described in 6.2.1 and 6.2.2.

**6.3.2** Note the distance between the pairs of jaws at the instant when rupture of the test piece occurs. Take this distance as the length of the test piece at break.

## 7 EXPRESSION OF RESULTS

**7.1** Calculate the tensile strength by dividing the breaking force by the area of cross-section of the test piece. Express the result in newtons per square millimetre.

**7.2** Calculate the elongation at the specified force by subtracting the initial length of the test piece from its length at the specified force. Express this difference as a percentage of the initial length of the test piece.

**7.3** Calculate the elongation at break by subtracting the initial length of the test piece from its length at break. Express the difference as a percentage of the initial length of the test piece.

## 8 NOTES ON PROCEDURE

**8.1** In many situations, the forces applied to leathers during use cause stretch in several directions, and not in one direction only. Also, the forces are frequently only a small fraction of those required to cause rupture of the leathers. In such situations, measurements of tensile strength are of little value as guides to the performance of the leather.

Even if the force is applied in one direction only during use (as in the case of belting leathers, for example), tensile strength measurements may be less informative than measurements of elongation at specified forces.

For control work in a tannery or factory, measurements of tear strength are usually to be preferred to measurements of tensile strength.

**8.2** The results of all the tests depend not only on such factors as the type of hide or skin and the methods of tanning and finishing the leather, but also to a marked extent upon the position in the hide or skin from which the test pieces are taken, and upon the direction of cutting at any position. It is therefore essential, when comparing two or more leathers, to cut the test piece from the same position in each sample, and also in the same direction relative to the back-bone or other structural features.

## 9 TEST REPORT

The test report shall include the following particulars :

- a) a reference to this International Standard;
- b) the results of the tests;
- c) all details required for the identification of the sample;
- d) the size of the test piece (i.e. "large" or "small") if one of the test pieces described in the notes to clause 5 has been used in place of the test piece illustrated in the figure;
- e) any unusual features noted during the determination;
- f) any operation not included in this International Standard, or those documents to which reference is made, or any operation regarded as optional.

<https://standards.iteh.ai/catalog/standards/sist/5917be0c-419a-4a55-60d9c9b9bfe/iso-3376-1976>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

This page intentionally left blank

[ISO 3376:1976](#)

<https://standards.iteh.ai/catalog/standards/sist/591075f0-9ed5-4539-9b95-60d9c9b9bffe/iso-3376-1976>

## iTeh STANDARD PREVIEW

(This page intentionally left blank)

ISO 3376:1976

<https://standards.iteh.ai/catalog/standards/sist/591075f0-9ed5-4539-9b95-60d9c9b9bfe/iso-3376-1976>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

This page intentionally left blank

[ISO 3376:1976](#)

<https://standards.iteh.ai/catalog/standards/sist/591075f0-9ed5-4539-9b95-60d9c9b9bffe/iso-3376-1976>