INTERNATIONAL STANDARD

ISO 1798

Third edition
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Flexible cellular polymeric materials — Determination of tensile strength and elongation at break

Matériaux polymères alvéolaires souples — Détermination de la résistance à la traction et de l'allongement à la rupture

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Reference number
ISO 1798:1997(E)

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.

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.

International Standard ISO 1798 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products.*

This third edition cancels and replaces the second edition (ISO 1798:1983), which has been technically revised.

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International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet: central@iso.ch
X.400: c=ch; a=400net; p=iso; o=isocs; s=central

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Flexible cellular polymeric materials — Determination of tensile strength and elongation at break

WARNING - Persons using this International Standard should be familiar with normal laboratory practice. This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any national regulatory conditions.

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1 Scope

This International Standard specifies a method for determining the strength and deformation properties of flexible cellular materials when a test piece is extended at a constant rate until it breaks.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1923:1981, *Cellular plastics and rubbers - Determination of linear dimensions.*

ISO 5893:1993, *Rubber and plastics test equipment - Tensile, flexural and compression types (constant rate of traverse) - Description.*

3 Definitions

For the purpose of this International Standard, the following definitions apply:

3.1 tensile strength: The maximum tensile stress applied during stretching a test piece to rupture.

3.2 elongation at break: The percentage elongation of a test piece at rupture.

4 Apparatus

Power-driven machine, complying with the following requirements:

- the rate of travel of the power-actuated grip shall be 500 mm/min ± 50 mm/min and shall be uniform at all times;

- the accuracy of the test machine shall conform to grade A of ISO 5893.

5 Test pieces

5.1 Direction of sampling

If the product shows a predominant direction of the cellular structure (orientation of the cells), the test pieces for the tensile test shall be taken in such a way that their longitudinal axes lie at right angles to this predominant direction. If this is not possible, the location of the longitudinal axis with respect to the predominant direction shall be stated in the test report.

5.2 Shape and dimensions

The test piece shall be rectangular in cross-section, with or without skin, and without visible defects. The tensile test pieces shall be cut with a test piece cutter in accordance with figure 1 and shall be 10 mm to 15 mm thick.

Dimensions in millimetres

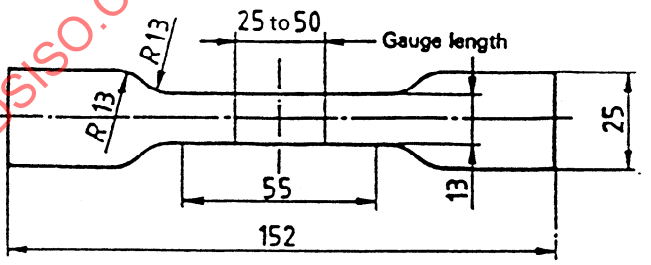

Figure 1 - Test piece cutter

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5.3 Number of test pieces

Unless agreed otherwise between the interested parties, sufficient test pieces shall be tested to provide five that break inside the gauge length.

5.4 Conditioning

Materials shall not be tested for at least 72 h after manufacture. Prior to the test, the material from which the test pieces are to be cut shall be conditioned for at least 16 h in one of the following atmospheres:

23 °C ± 2 °C, (50 ± 5) % relative humidity
27 °C ± 2 °C, (65 ± 5) % relative humidity

6 Procedure

After conditioning as specified in 5.4, measure the thickness of the material at five evenly distributed points in the area from which the test pieces are to be cut. Alternatively, two measurements may be made in the area from which each test piece is to be cut. These dimensions shall be measured according to ISO 1923, and shall not vary from each other by more than ± 2 %.

Cut the test pieces and mark their gauge length with two reference lines. The marker for these lines shall have two parallel marking edges, the inside limits of which are at least 25 mm and not more than 50 mm apart measured with an accuracy of ± 1 %.

Place the test piece in the grips of the testing machine (see clause 4), taking care to adjust it symmetrically, in order that the tension will be distributed uniformly over the cross-section. Start the machine and record the maximum force (measured to ± 1 %) and the distance between the inside edges of the two reference lines (measured to ± 1,25 mm) immediately prior to break of the test piece. Reject the test pieces which break outside the gauge length, and continue testing until five satisfactory results are obtained. Sufficient material should be available to ensure that this retesting can be carried out.

Carry out the test at the same temperature and humidity as that used for conditioning the test material.

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7 Calculation

7.1 Average tensile strength

Calculate the average thickness of the material of each test piece.

Calculate the average initial cross-sectional area of each test piece on the basis of the average thickness and the fixed width of the central section of the test piece cutter (13 mm).

The average tensile strength of each test piece, expressed in megapascals, is given by the formula

$$\frac{F}{A}$$

where

F is the maximum force at break, in newtons;

A is the average initial cross-sectional area, in square millimetres.

7.2 Elongation at break

The elongation at break, expressed as a percentage of the original gauge length, is given by the formula

$$\frac{L - L_o}{L_o} \times 100$$

where

L is the gauge length at break, in millimetres;

L_o is the initial gauge length, in millimetres.

8 Test report

The test report shall include the following information:

a) reference to this International Standard;

b) the nature of the cellular material;

c) the conditioning used;

d) the location of the test pieces in the product, and the predominant direction of the cellular structure, if any;

e) the location and number of surfaces with skin, if any;

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