INTERNATIONAL STANDARD 2472

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

Ebonite — Determination of tensile strength and elongation at break

Ébonite — Détermination de la résistance à la traction et de l'allongement à la rupture

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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 2472 was drawn up by Technical Committee ISO/TC 45, *Rubber and rubber products.* The present edition (second edition) was submitted directly to the ISO Council, in accordance with clause 6.12.1 of the ISO Directives.

This second edition cancels and replaces the first edition (1972) of this Standard, which had been approved by the Member Bodies of the following countries :

Czechoslovakia	Korea, Dem. P. Rep. of	Sweden
Egypt, Arab Rep. of	Netherlands	Switzerland
France	New Zealand	Thailand
Germany	Portugal	United Kingdom
Hungary	Romania	U.S.A.
India	South Africa, Rep. of	U.S.S.R.
Italy	Spain	Yugoslavia

No Member Body had expressed disapproval of the document.

Ebonite — Determination of tensile strength and elongation at break

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method for determining the tensile strength and the elongation at break of ebonite.

2 DEFINITIONS

2.1 ebonite : A hard material made by sulphur vulcanization of rubber in which the hardness is obtained by the action of the vulcanizing agent.

2.2 tensile stress : The average force per unit area of the initial cross-section, applied so as to stretch the test piece longitudinally.

2.3 tensile strength : The maximum value of tensile stress reached during stretching to breaking point a test piece of the type and in the manner described in this method.

2.4 elongation at break : The elongation at rupture of the test piece, or a specified portion thereof having a uniform cross section, expressed as a percentage of the original length.

3 APPARATUS

3.1 Testing machine, to apply a tensile force to the test piece via the grips (3.2), and conforming to the following requirements :

a) the applied force shall be known to within 1,5 % of its true value;

b) the rate of traverse of the power-driven grip shall be uniform and such that the applied force reaches its maximum value in 30 ± 15 s.

3.2 Grips to hold the test piece in the testing machine by exerting a uniform pressure across the gripping surface.

4 TEST PIECES

4.1 Shape and dimensions

Test pieces shall be prepared having the shape and dimensions shown in the figure. The test pieces may be punched or cut from sheet material. The material may be softened by heating to facilitate punching. The faces and sides of the test piece shall be machined to a smooth finish.

A milling cutter of 50 mm radius cutting edge is suitable for shaping the narrow portion of the test piece.

For any individual test piece, the width at any point on the narrow part of the dumb-bell shall not deviate by more than 0,1 mm from the mean width, and the thickness at any point shall not deviate by more than 0,05 mm from the mean thickness.

Any test piece falling outside these limits or showing other irregularities or imperfections shall not be used.

Dimensions in millimetres

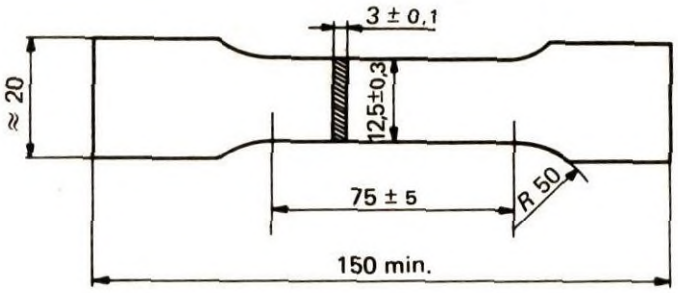

FIGURE — **Dumb-bell test piece**

4.2 Number of test pieces

Three test pieces shall be tested. Results on test pieces which break outside the narrow section or which are obviously defective shall be discarded and retests made.

4.3 Time-lapse between vulcanization and testing

4.3.1 For all test purposes the minimum time-lapse between vulcanization and testing shall be 16 h.

4.3.2 For non-product tests the maximum time-lapse between vulcanization and testing shall be 4 weeks, and for evaluations intended to be comparable, the tests, as far as possible, shall be carried out after the same time-lapse.

4.3.3 For product tests, whenever possible, the time-lapse between vulcanization and testing shall not exceed 3 months. In other cases, tests shall be made within 2 months of the date of receipt by the customer of the product.

4.4 Conditioning

The test pieces shall be conditioned at the test temperature for at least 3 h immediately before testing.

5 TEMPERATURE OF TEST

All tests shall be carried out at a temperature of 20 ± 2 °C, 23 ± 2 °C or 27 ± 2 °C.

6 PROCEDURE

6.1 Measurement of test piece dimensions

The thickness and width of the test piece shall be measured to the nearest 0,02 mm, by means of a micrometer or a micrometer dial gauge, at the centre and near each end of the narrow part. The average thickness and width shall be used in calculating the cross-sectional area.

6.2 Testing

Place the test piece in the grips, taking care to adjust it symmetrically in order that the tension is distributed uniformly over the cross-section. Apply tensile force to the test piece by the power-driven grip, which shall travel at the appropriate rate, until rupture takes place. After rupture of the test piece, record the maximum force in newtons.

Where the measurement of elongation at break is required, measure it on the test piece continuously by means of an extensometer within 2 % accuracy.

7 EXPRESSION OF RESULTS

The tensile strength, expressed in meganewtons per square metre, is given by the formula :

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

where

F is the maximum force, in newtons;

A is the initial cross-sectional area of the test piece, in square millimetres.

The median value of the tensile strength of the three test pieces shall be quoted as the tensile strength.

Where the elongation at break is required, express it as a percentage of the original length.

8 TEST REPORT

The test report shall include the following particulars :

a) the tensile strength, in meganewtons per square metre;

b) the individual values of tensile strength of the three test pieces;

c) the temperature of the test;

d) the time-interval between vulcanization and testing;

e) the elongation at break, if required.