INTERNATIONAL STANDARD 4674

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

Fabrics coated with rubber or plastics — Determination of tear resistance

Supports textiles revêtus de caoutchouc ou de plastique — Détermination de la résistance au déchirement

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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 4674 was developed by Technical Committee ISO/TC 45, *Rubber and rubber products*, and was circulated to the member bodies in October 1975.

It has been approved by the member bodies of the following countries :

Australia	India	Romania
Belgium	Italy	Sweden
Brazil	Mexico	Turkey
Canada	Netherlands	United Kingdom
Egypt, Arab Rep. of	New Zealand	U.S.A.
France	Poland	U.S.S.R.
Hungary	Portugal	Yugoslavia

The member body of the following country expressed disapproval of the document on technical grounds :

Germany
South Africa, Rep. of
Switzerland

Printed in Switzerland

Fabrics coated with rubber or plastics — Determination of tear resistance

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies three methods for the determination of the tear resistance of fabrics coated with rubber or plastics.

The methods are applicable to coated fabrics in which the constituents of the backing fabric perpendicular to the direction of tearing are broken; they are not applicable to fabrics with cellular backing or a meshed cloth backing in which the tear pattern is complex, and are only of limited value for coated fabrics employing knitted-base fabrics. The methods A1, A2 and B do not give the same results.

2 REFERENCE

ISO 2231, *Fabrics coated with rubber or plastics — Standard atmospheres for conditioning and testing.*

3 PRINCIPLE

In methods A1 and A2, force is applied to extend steadily a cut in the test piece. In method B, a sudden force is applied to the test piece with a cut in it.

4 SAMPLING

The samples shall be cut in such a way as to be as representative as possible of the whole piece being examined. The test pieces shall be selected in such a way that their edges are situated at a minimum distance of 0,10 m from the longitudinal edge; they shall not be selected less than 1 m from the ends of the piece.

For the test for tearing in the transverse direction (i.e. tearing longitudinal threads), the test pieces shall be selected so that their width is parallel to the longitudinal edge of the coated fabric.

For the test for tearing in the longitudinal direction (i.e. tearing transverse threads), the test pieces shall be selected so that their width is perpendicular to the longitudinal edge of the coated fabric.

5 NUMBER OF TEST PIECES

For each series of tests, ten test pieces shall be selected, five in the longitudinal direction and five in the transverse direction of the sample piece.

The same thread of cloth in the direction to be tested shall not appear in more than one test piece.

6 TIME-LAPSE BETWEEN MANUFACTURE AND TESTING

For all test purposes, the minimum time between manufacture and testing shall be 16 h.

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

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

7 CONDITIONING OF TEST PIECES AND TEST CONDITIONS

The test pieces shall be conditioned in atmosphere "A" of ISO 2231.

NOTE — Atmosphere "A" is defined by two of its characteristics, and three sets of conditions are permitted :

temperature 20 ± 2 °C and relative humidity 65 ± 5 %;

temperature 23 ± 2 °C and relative humidity 50 ± 5 %;

for tropical countries only :

temperature 27 ± 2 °C and relative humidity 65 ± 5 %.

If it is required to determine the properties of wet material, the test pieces shall be immersed in distilled water containing 1 % (*V/V*) ethanol for 24 h at one of the standard laboratory temperatures. The test pieces shall be cut prior to this immersion. Immediately after removal of the test pieces from the water, they shall be blotted between two sheets of absorbent paper and tested at once.

8 TEST METHODS

8.1 Method A — Constant rate of tear

8.1.1 *Apparatus for methods A1 and A2*

The test machine shall be power-driven and shall be equipped with a suitable dynamometer; it shall be capable of maintaining, during the test, a substantially constant rate of traverse within the range 1,7 ± 0,17 mm/s or 5,0 ± 0,2 mm/s and of recording the force autographically.

An inertialess dynamometer (for example of electronic or optical type) shall preferably be used.

NOTE – Pendulum type inertia dynamometers may in fact give different results because of the effects of friction and inertia. When the use of an inertia dynamometer is unavoidable, information may be obtained on the tear resistance in the following way : the capacity of the machine, or the measuring scale selected when a variable-range machine is involved, shall be such that the separation force read is between 15 and 85 % of the rated capacity.

The accuracy of the machine shall be such that the error in the force measurement as shown and recorded does not exceed 2 % of the force or 0,4 % of the maximum of the scale, whichever is the smaller.

The jaws of the machine shall be wider than the test piece, and in any case not less than 75 mm wide.

All edges that might cause a cutting action shall be rounded to a radius of not more than 0,4 mm. The pressure between the gripping surfaces, sufficient to clamp the test piece firmly before the testing load is applied and to prevent slippage during the progress of the test, shall be attained by means of any suitably constructed mechanical device operating on the movable member of the clamp.

8.1.2 *Method A1 – Test using three-tongued test piece – Double tear*

8.1.2.1 TEST PIECE

The test piece (see figure 1) shall be rectangular, 225 mm long by 75 mm wide; in it shall be made two longitudinal slits 100 mm in length to form three tongues 25 ± 0,5 mm wide.

8.1.2.2 PROCEDURE

Adjust the test machine to give the required rate of jaw traverse and select an appropriate load capacity range. Engage and zero the autographic recorder. Place the middle tongue of the test piece in the fixed jaw so that the line bc (see figure 1) is just visible. Place the two other tongues in the traverse jaw so that the lines ab and cd are just visible; maintain the distance between the two tongues at 25 mm. Set up test pieces with the respective axes of the backing fabric parallel and perpendicular to the direction of application of force.

Start the test machine at the specified rate of traverse and continue the tearing until the test piece is completely torn.

8.1.2.3 EXPRESSION OF RESULTS

From the trace obtained on the recorder, determine the median of the five highest forces on the central 50 %. Report the result as the median value for five test pieces.

8.1.3 *Method A2 – Test using trouser-shaped test piece – Single tear*

8.1.3.1 TEST PIECE

The test piece (see figure 2) shall be a rectangular strip 225 mm long by 75 ± 0,5 mm wide; in it shall be made, beginning from the middle of the width, a longitudinal slit 80 mm in length.

8.1.3.2 PROCEDURE

Adjust the test machine to give the required rate of jaw traverse and select an appropriate load capacity range. Engage and zero the autographic recorder. Place the test piece symmetrically in the jaws, with one tongue in each of the jaws and the uncut end of the test piece remaining free. Take care to ensure that each tongue is fixed in a jaw so that the beginning of the tear is parallel to the direction in which the tearing force is applied.

Start the test machine at the specified rate of traverse and continue the tearing until the test piece is completely torn.

8.1.3.3 EXPRESSION OF RESULTS

From the trace obtained on the recorder, determine the median of the five highest forces on the central 50 %. Report the result as the median value for five test pieces.

8.2 Method B – Tear falling pendulum

8.2.1 *Apparatus*

The test machine is of the pendulum type, in which the test piece is held between two jaws, one movable and the other fixed, the clamping faces of which shall be in the same plane when the apparatus is in its starting position. The moving jaw is attached to a pendulum which can fall under the influence of gravity.

The apparatus is made up of the following parts :

a) A pendulum comprising a circumferential graduated scale to indicate the energy used to tear the test piece. The test apparatus shall be provided with several interchangeable scales so that the tearing energy is between 15 and 85 % of the scale maximum. This pendulum may swing freely about a horizontal axis on roller bearings.

b) A movable jaw solid with the pendulum and a fixed jaw solid with the framework; these jaws shall be 2,5 mm apart in order to just permit the passage of the knife. When the pendulum is in its starting position, the clamping faces of the jaws shall be in the same plane perpendicular to the plane of swing of the pendulum. The force of the jaws and the surface state of the clamping faces shall permit the test piece to be held without slipping.

c) A sector release to hold the pendulum in a raised position during the mounting of the test piece and to release the pendulum to tear the test piece.

d) A pointer, driven by the pendulum, and a pointer stop to record the maximum arc of the swing of the pendulum.

e) A knife to begin the tear of the test piece by cutting a slit in it exactly half-way between the two jaws.

8.2.2 *Test piece*

The test piece (see figure 3) shall be a rectangle 100 mm long and 75 ± 0,5 mm wide. In one of the 100 mm sides there shall be a notch 12 ± 0,5 mm square.

8.2.3 *Procedure*

Level the apparatus in a horizontal position. Adjust the pointer so that when the apparatus is operated without a test piece it stops at zero. Repeat this operation several times. Set the pendulum to bring the two jaws to the same alignment. Put the pointer in the starting position. Clamp the test piece in the jaws so that the long side of the test piece is parallel to the line of the upper edges of the jaws. Using the knife [8.2.1 e)], make an incision 20 ± 0,5 mm in the centre of the side opposite the 12 mm square.

NOTE – The accuracy of the test depends on the length of the material which is not cut.

Free the pendulum.

When the test piece has been torn, read the scale.

8.2.4 *Expression of results*

For each series of test pieces, determine the median of the five energy values obtained in the longitudinal direction and in the transverse direction respectively.

9 TEST REPORT

The test report shall include the following particulars :

a) identification of the sample;

b) reference to this International Standard;

c) the test method used (i.e. A1, A2 or B) and the rate of traverse (method A1 or A2);

d) the conditioning of the test pieces;

e) the individual results obtained on each of the ten test pieces;

f) the median values in the longitudinal and transverse directions.

Dimensions in millimetres
Tolerances on dimensions ± 0,5

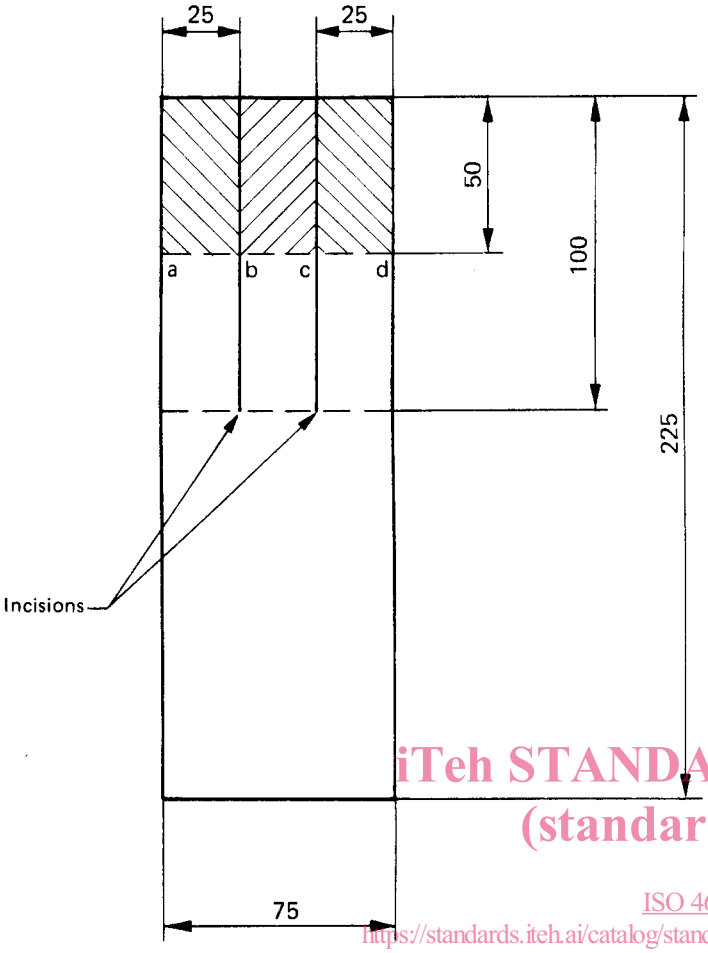

FIGURE 1 – **Three-tongued test piece**

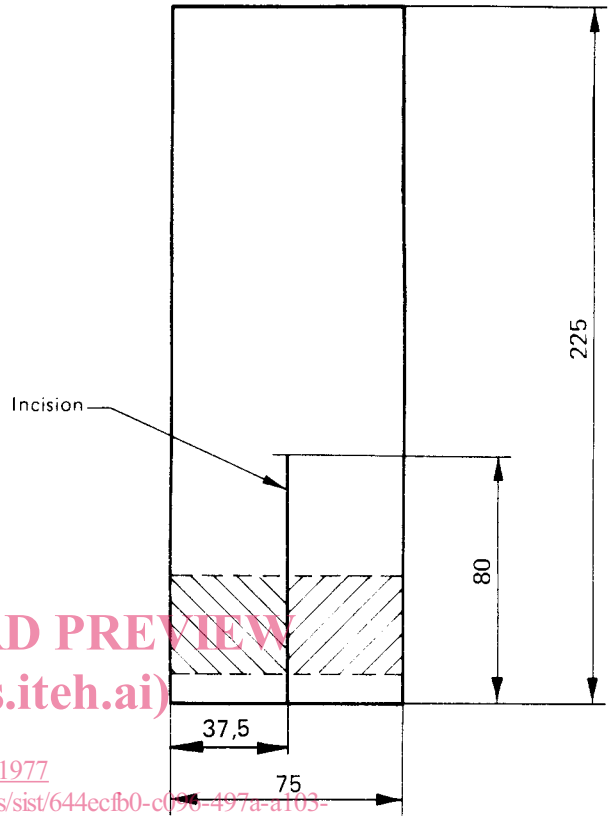

FIGURE 2 – **Trouser-shaped test piece**

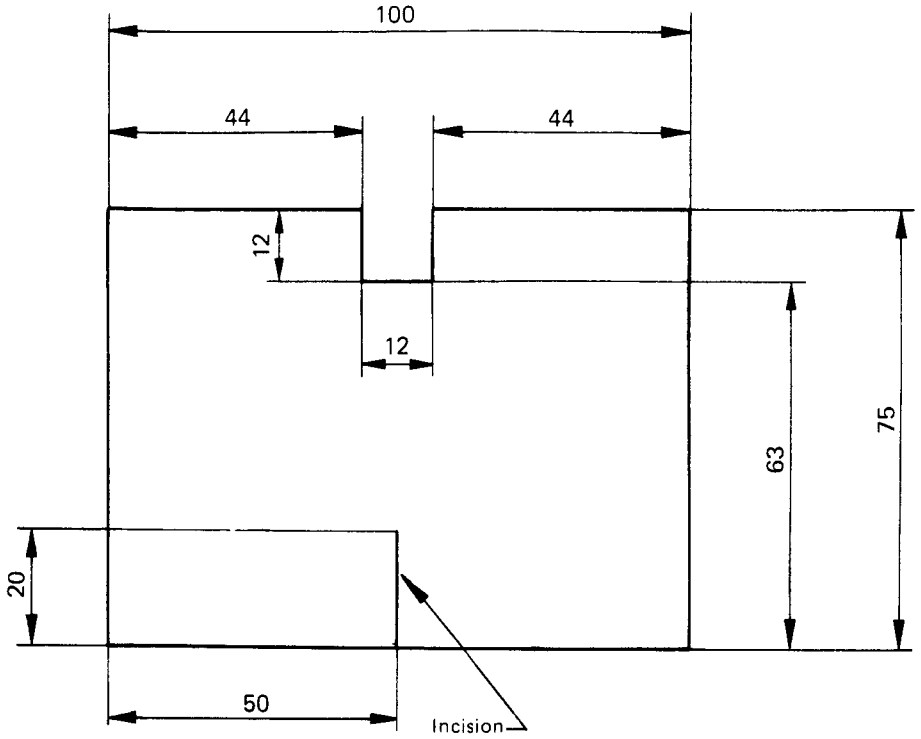

FIGURE 3 – **Notched test piece**