INTERNATIONAL STANDARD 1421

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Fabrics coated with rubber or plastics — Determination of breaking strength and elongation at break

Supports textiles revêtus de caoutchouc ou de plastique — Détermination de la résistance à la rupture 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 1421 was developed by Technical Committee ISO/TC 45, *Rubber and rubber products.*

It was submitted directly to the ISO Council, in accordance with clause 6.12.1 of the Directives for the technical work of ISO. It cancels and replaces ISO Recommendation R 1421-1971, which had been approved by the member bodies of the following countries :

Australia	Iran	Spain
Austria	Ireland	Sweden
Czechoslovakia	Israel	Switzerland
Egypt, Arab Rep. of	Italy	United Kingdom
France	Japan	U.S.A.
Germany	Netherlands	Yugoslavia
Hungary	New Zealand	
India	Poland	

No member body had expressed disapproval of the document.

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0 INTRODUCTION

The value of strength found when a test piece of textile fabric or coated fabric is tested to breaking is not a fixed quantity; it depends on the width and length of the test piece, on its moisture content and on the speed at which the breaking load is reached. In addition to real changes in strength, differences in observed values can be caused by limitations of the test machines due to inertial and functional effects. Failure to grip the whole width of the test piece can lead to apparently low strength values due to partial slippage of the test piece between the jaws of the testing machine.

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method for the determination of the breaking load and breaking extension of cut strips of fabric coated with rubber or plastics, either wet or dry, using the following types of machine :

A — Constant rate of load (CRL)

B — Constant rate of traverse (CRT)

C — Constant rate of specimen extension (CRE)

It is emphasized that results for a specific fabric may vary according to the procedure employed, particularly when the fabric has a high extension at break.

The method is not suitable for use with products of which the base cloth is of a mesh construction or with knit fabrics.

2 REFERENCE

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

3 PRINCIPLE

Extension of a rectangular strip of fabric, by a suitable means, until it breaks. Determination of the breaking load and breaking extension either from visual observations or from an autographic recording.

4 DEFINITIONS

For the purposes of this International Standard, the following definitions apply.

4.1 breaking load : The maximum load applied to a test piece in stretching it to rupture. It is expressed in newtons.

4.2 breaking extension : The extension at the breaking load. It is expressed as a percentage of the initial gauge length.

5 APPARATUS

5.1 General requirements

All tensile testing machines shall be provided with means for indicating, or preferably for recording, both the maximum load applied to the test piece in stretching it to rupture and the corresponding extension of the test piece. Under the conditions of use, the error of the indicated or recorded maximum load at any point in the range in which the machine is used shall not exceed ± 1 % of the load, and the error of the indicated or recorded maximum jaw separation shall not exceed 1 mm. The central points of the two jaws of the machines shall be in the line of pull, the front edges shall be perpendicular to the line of pull, and their clamping faces shall be in the same plane. The jaws shall be capable of holding the test piece without allowing it to slip, shall be so designed that they do not cut or otherwise weaken the test piece, and shall be wider than the prepared test piece. The faces of the jaws should preferably be smooth and flat, but when the test piece cannot be satisfactorily held with flat-faced jaws even with packing, engraved or corrugated jaws may be used. Suitable packing materials for use with either smooth or corrugated jaws include paper, felt, leather, plastics or rubber sheet. Means may also be provided for measurement of the free length extension between the jaws. This method is more accurate than the extension recorded between the jaws since "necking" of the test piece near the jaws or slight slippage in the jaws has little effect on the central part of the test strip.

5.2 Constant rate of load machines

After the first 10 s of the test, the rate of increase of load shall not differ by more than 25 % from the average rate of increase of load over the whole period of the test.

The machine shall apply the required load within 60 ± 10 s. The required load shall be the specified breaking load or, when the minimum breaking load is not specified, the average breaking load as estimated from preliminary experiments.

5.3 Constant rate of traverse machines

After the first 5 s of the test, the average rate of traverse of the pulling jaw in any 2 s interval shall not differ by more than 5 % from the average rate of traverse over the whole period of test.

The rate of traverse of the pulling jaw shall be 100 ± 10 mm/min.

5.4 Constant rate of extension machines

For these machines, in which the rate of separation of the jaws is independent of the extensibility of the material under test, the rate of traverse of the pulling jaw shall be such that rupture is reached in 60 ± 10 s.

6 TEST PIECES

From the sample, cut strips of width 50 mm and a convenient length to allow a distance of 200 mm between the edges of the pairs of jaws. Five test pieces shall be cut in the longitudinal direction and five test pieces in the cross direction, avoiding the selvedges. Where possible, a warp or weft thread should be removed from one cut edge to ensure that the yarns are parallel to the test strip before marking out the width of each test piece. If feasable, where bowing or skewing has occurred, follow the direction of the threads. Where such distortion occurs, report it with the results.

7 CONDITIONING

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

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

Test pieces shall be conditioned in accordance with ISO 2231.

If determinations are to be made on wet test pieces, these shall be totally immersed for a minimum of 1 h at 20 ± 2 °C in an aqueous solution of a non-ionic wetting agent of concentration not more than 0,1 % (*m/m*). The test pieces shall be thoroughly rinsed in water and tested within 1 min of removal from the water.

8 PROCEDURE

Set the jaws 200 ± 1 mm apart. Clamp a test piece centrally in the jaws so that its longitudinal centre line passes through the centre points of the front edges of the grips. Apply the appropriate pre-tension from the following values :

a) for fabrics up to and including 200 g/m^2 : 2 N

b) for fabrics over 200 and up to and including 500 g/m^2 : 5 N

c) for fabrics over 500 g/m^2 : 10 N

If free length extension is to be measured, mark gauge lines a suitable distance apart across the central portion of the test piece.

Engage any device for reading the breaking load and elongation, put the moving clamp in motion and extend the test piece to the point of rupture.

Repeat the procedure for each test piece. Disregard any tests where the test piece slips or breaks in the machine jaws.

9 CALCULATION AND EXPRESSION OF RESULTS

Record the breaking load, in newtons, of each of the five test pieces in each direction and calculate the mean value.

Record the breaking extension, to the nearest 1 mm, of each of the five test pieces in each direction and calculate the mean value. Express this as a percentage of the initial test length between the jaws (200 mm) or as a percentage of the gauge length if free length extension has been measured.

10 TEST REPORT

The test report shall include the following particulars :

a) the mean breaking load, in newtons, when tested at 50 mm width in each direction;

b) the mean breaking extension, as a percentage, in each direction. If free length extension has been measured, report the breaking extension, as a percentage, as free length breaking extension;

c) the type of machine employed, i.e. A, B or C;

d) whether the test was carried out in the wet or dry state.