INTERNATIONAL STANDARD 2960

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Textiles — Determination of bursting strength and bursting distension — Diaphragm method

Textiles — Détermination de la force d'éclatement et de la déformation à l'éclatement — Méthode à l'éclatomètre à membrane

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FOREWORD

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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.

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International Standard ISO 2960 was drawn up by Technical Committee ISO/TC 38, *Textiles*, and circulated to the Member Bodies in November 1972.

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

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The Member Bodies of the following countries expressed disapproval of the document on technical grounds :

France
Germany
Italy

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Textiles — Determination of bursting strength and bursting distension — Diaphragm method

0 INTRODUCTION

The test for tensile strength may be unsuitable for certain fabrics such as knitted materials and lace, and for these textiles the measurement of bursting strength provides an alternative criterion of strength. The test may also be suitable for woven fabrics that will be subjected to bursting pressures in use, for example, pump diaphragms, filter fabrics, etc.

In this test, the specimen breaks across the direction having the least breaking extension, but the bursting strength of the cloth cannot readily be calculated from its tensile strength in this direction, since it is influenced by other aspects of the response of the fabric to biaxial stressing.

This test method permits specimens of either of two sizes to be tested. It is found that larger specimens burst at lower pressures than smaller specimens, and for any cloth the product PD^{α} is fairly constant (where P is the bursting strength of the cloth, D is the diameter of the specimen, and α has a value of about 1,1 to 1,3). Thus, if P_1 is the bursting strength of cloth for specimens of 30 mm diameter and P_2 that for specimens of 113 mm diameter, P_1 is approximately equal to $5\,P_2$.

The diameter of 30 mm has been chosen because it is very close to the diameter of 1.2 in which has been in use for a considerable time : the diameter of 113 mm (area 10 000 mm^2) is in use in some countries using the metric system and permits a more precise measurement of bursting distension.

It is considered undesirable that there should be two possible sizes of specimen and it is hoped that it will eventually be found possible to exclude the smaller specimen size from this International Standard.

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method for the determination of the bursting strength and bursting distension of fabrics. It is applicable to textile fabrics produced by weaving, knitting or felting, and may be suitable for fabrics produced by other techniques. It is not applicable to textile fabrics which have been impregnated or coated with sizing or stiffening materials, rubber, plastics, etc.

2 REFERENCE

ISO 139, *Textiles — Standard atmospheres for conditioning and testing.*

3 DEFINITIONS

For the purposes of this International Standard the following definitions apply :

3.1 bursting strength : The maximum fluid pressure applied to a circular specimen in distending it to rupture. It is expressed in kilonewtons per square metre (kN/m^2).

3.2 bursting distension : The distension of a specimen at the bursting pressure. It is the maximum height of the centre of the upper surface of the specimen during the test, expressed in millimetres.

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4 PRINCIPLE

The area of the sample of the fabric to be tested is clamped over an elastic diaphragm by means of a flat annular clamping ring, and an increasing fluid pressure is applied to the underside of the diaphragm until the specimen bursts.

The operating fluid may be either a liquid or a gas.

5 APPARATUS

5.1 For specimens of 113 mm diameter

The bursting tester shall have a flat base plate of diameter at least 140 mm, covered by a flat diaphragm of rubber or similar material. A central hole in the base plate shall allow a controlled increase in fluid pressure to be applied to the underside of the diaphragm, so that the specimen can be burst in 30 ± 10 s. The rate of flow of fluid through the hole in the base plate shall not vary more than ± 20 % throughout the test.

A clamping ring shall be provided, of internal diameter 113 mm and of external diameter at least 140 mm, with a flat lower surface to hold the specimen firmly against the diaphragm at all points.

The lower face of the clamping ring may be lined with a thin layer of cork or other compressible material suitable for the fabric under test, but if the face is unlined its inner edge shall have a radius of 0,5 mm.

Means shall be provided for applying the clamping ring with sufficient pressure to prevent the fabric specimen from slipping during the test. The specimen must not be damaged by the action of the clamping ring.

Provision shall be made for indicating or recording the pressure under the diaphragm at any point in the range in which the machine is used, to an accuracy of ± 1 %. Means shall be provided for indicating or recording the bursting distension of the specimen to an accuracy of ± 0,25 mm.

5.2 For specimens of 30 mm diameter

All conditions shall be the same as in 5.1 except that the diameter of the base plate shall be at least 55 mm and the internal and external diameters of the clamping ring shall be 30,5 ± 0,05 mm and at least 55 mm respectively.

6 ATMOSPHERE FOR CONDITIONING AND TESTING

6.1 An atmosphere of relative humidity not more than 10 % and of temperature not more than 50 °C is required for pre-conditioning.[1)]

6.2 One of the standard atmospheres for testing textiles, as defined in ISO 139, shall be used for testing.

7 TEST SPECIMENS

The system of clamping used generally permits tests to be applied without cutting out specimens. The sample of fabric may be supplied in one or more pieces but it must be possible to test it at ten different places which are a minimum of 70 mm apart, and which are so distributed as to be as representative as possible of the sample : care shall be taken to avoid selvedges, creased or wrinkled places, and other such non-representative areas of the sample.

No portion of the material that has previously been gripped in the specimen clamp shall be used for a subsequent test.

Pre-condition the fabric to be tested for 4 h in the atmosphere specified in 6.1 and then expose the fabric to be tested to the standard atmosphere for testing textiles until the mass does not change by more than 0,25 % when weighed at intervals of 2 h.

8 TEST PROCEDURE

8.1 Bursting strength and bursting distension

Place the area of the sample to be tested over the diaphragm so that it lies in a flat tensionless condition. Clamp it securely by means of the clamping ring. Increase the pressure smoothly so that the specified bursting strength of the fabric is reached in 30 ± 10 s. If no bursting strength has been specified, the average bursting strength, as determined by preliminary trial, shall be reached in 30 ± 10 s.

Note the bursting strength and the bursting distension of the specimen.

If the specimen bursts close to the edge of the clamping ring, record this fact.

Repeat the measurements at a further nine places in the sample which are a minimum of 70 mm apart (see clause 7).

8.2 Diaphragm correction

With the same rate of fluid flow as that employed in the above tests, distend the diaphragm, without the presence of a specimen, but with the clamping ring in position, and note the pressure required to distend it by an amount equal to the average distension of the specimens. This pressure is the "diaphragm correction".

9 CALCULATION AND EXPRESSION OF RESULTS

9.1 Bursting strength

Calculate the arithmetic mean of the measured values of bursting strength and from this subtract the diaphragm correction.

In rounding off the mean result, ensure that it remains within ± 2 % of the arithmetic mean.

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9.2 Bursting distension

Calculate the arithmetic mean of the bursting distensions of the specimens selected for the calculation of bursting pressure. In rounding off the mean result, ensure that it remains within ± 2 % of the arithmetic mean.

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10 TEST REPORT

The test report shall state that the tests were made in accordance with the procedure specified in this International Standard and shall give the following information :

a) the arithmetic mean "corrected" bursting strength in kilonewtons per square metre, together with the individual test values from which this mean was obtained, the direction in which bursting occurs (i.e. warp, weft or machine direction, weft, course or cross direction, or both) : indicate which, if any, of the individual test values correspond to edge breaks;

b) the mean correction applied for the pressure required to distend the diaphragm;

c) the mean bursting distension in millimetres, together with the individual test values from which this mean was obtained;

d) the size of the laboratory sample and, where known, the method of its selection from the bulk;

e) the type and capacity of the machine, the pressure range at which it was operated, and the diameter of the test area of the material.

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1) An oven at 50 °C under ordinary room conditions will give the required low humidity. For some fabrics, the temperature of 50 °C may not be permissible. In such cases, the relative humidity of 10 % must be obtained by the removal of moisture from the air used for pre-conditioning.