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Tekstilije - Razpočne lastnosti ploskovnih tekstilij - 2. del: Ugotavljanje razpočne trdnosti in višine izbočenja z metodo zračnega tlaka (ISO/FDIS 13938-2:2019)

Textiles - Bursting properties of fabrics - Part 2: Pneumatic method for determination of bursting strength and bursting distension (ISO/FDIS 13938-2:2019)

Textilien - Bersteigenschaften von textilen Flächengebilden - Teil 2: Pneumatisches Verfahren zur Bestimmung von Berstdruck und Berstwölbung (ISO/FDIS 13938-2:2019)

Textiles - Propriétés de résistance à l'éclatement des étoffes - Partie 2: Méthode pneumatique pour la détermination de la résistance et de la déformation à l'éclatement (ISO/FDIS 13938-2:2019)

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Textiles — Bursting properties of fabrics —

Part 2:
Pneumatic method for determination of bursting strength and bursting distension

Textiles — Propriétés de résistance à l'éclatement des étoffes —

Partie 2: Méthode pneumatique pour la détermination de la résistance et de la déformation à l'éclatement

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 38, *Textiles*, Subcommittee SC 24, *Conditioning atmospheres and physical tests for textile fabrics*.

This second edition cancels and replaces the first edition (ISO 13938-2:1999), of which it constitutes a minor revision.

The changes compared to the previous edition are as follows:

— the normative references have been updated.

A list of all parts in the ISO 13938 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Textiles — Bursting properties of fabrics —

Part 2: Pneumatic method for determination of bursting strength and bursting distension

1 Scope

This document describes a pneumatic pressure method for the determination of bursting strength and bursting distension of textile fabrics.

NOTE ISO 13938-1 describes a method using hydraulic pressure.

The method is applicable to knitted, woven, nonwoven and laminated fabrics. It can be suitable for fabrics produced by other techniques. The test is suitable for test specimens in the conditioned or wet state.

From the available data there appears to be no significant difference in the bursting strength results achieved using hydraulic or pneumatic burst testers, for pressures up to 800 kPa. This pressure range covers the majority of performance levels expected of general apparel. For speciality textiles requiring high bursting pressures, the hydraulic apparatus is more suitable.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

ISO 10012, *Measurement management systems — Requirements for measurement processes and measuring equipment*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
test area
area of the test specimen within the circular clamping device

3.2
bursting pressure
pressure at burst
maximum pressure applied to a test specimen clamped over an underlying diaphragm until the test specimen ruptures

3.3
bursting strength
strength at burst
pressure obtained by subtracting the *diaphragm pressure* (3.4) from the mean *bursting pressure* (3.2)

3.4
diaphragm pressure
pressure applied to the diaphragm, with no test specimen present, to distend it to the mean *bursting distension* (3.5) of the test specimen

3.5
bursting distension
distension at burst
expansion of a test specimen at the *bursting pressure* (3.2)

Note 1 to entry: It is expressed either as *height at burst* (3.6).

3.6
height at burst
distance between the upper surface of the test specimen before distension and the top of the test specimen at the *bursting pressure* (3.2)

3.7
time to burst
time taken to distend a test specimen to burst

4 Principle

A test specimen is clamped over an expansive diaphragm by means of a circular clamping ring. Increasing air pressure is applied to the underside of the diaphragm, causing distension of the diaphragm and the fabric. The pressure is increased smoothly until the test specimen bursts. The bursting strength and bursting distension are determined.

5 Sampling

Either select samples in accordance with the procedure laid down in the material specification for the fabric, or as agreed between the interested parties. In the absence of an appropriate material specification, an example of a suitable sampling procedure is given in Annex A. Avoid areas that are folded or creased, selvedges and areas not representative of the fabric. The system of clamping used generally permits tests to be applied without cutting out test specimens.

6 Apparatus

6.1 Bursting tester

Metrological confirmation of the bursting tester shall be carried out in accordance with ISO 10012.

The bursting tester shall comply with the following requirements.

6.1.1 The apparatus shall be capable of producing an increase in air pressure to achieve a testing time to burst of (20 ± 5) s. To achieve responsive adjustment of the air velocity, an indicating control valve is needed in addition to the main air valve of the apparatus.

6.1.2 Bursting pressure shall be indicated with an accuracy of ±2 % of full-scale range above the first 20 % of range.

6.1.3 Height at burst up to 70 mm shall be indicated with an accuracy of ±1 mm. Zero position of the measuring gauge shall be adjustable to accommodate the thickness of the test specimen.

6.1.4 A test area of 50 cm^2 (79,8 mm diameter) shall be used.

Other test areas of 100 cm^2 (112,8 mm diameter) or 10 cm^2 (35,7 mm diameter) or 7,3 cm^2 (30,5 mm diameter) may be used, if the preferred test area is not applicable in the existing testing equipment, or due to high or low expansion of the fabric or other fabric requirements, or by mutual agreement.

6.1.5 The clamping device shall provide for clamping of the test specimen securely without distortion or damage and prevent slippage during the test. The clamping ring shall allow undisturbed vaulting of highly expansive fabrics (e.g. fabric test specimens whose height at burst is greater than half of the test specimen diameter). All test specimen clamping ring inner diameters shall be accurate to ± 0,2 mm. To avoid test specimen damage, a small curvature at the inner edge of the clamping ring facing the test specimen is recommended.

6.1.6 A safety cover shall enclose the clamping device during the test when the expansion of the test specimen takes place. It shall allow clear observation of the expansion of the test specimen during the test.

6.1.7 The diaphragm shall meet the following requirements:

— thickness up to 2 mm;

— highly expansive;

— if the diaphragm is to be used several times, it shall be elastic within the range of height at burst observed during the test.

7 Atmospheres for conditioning and testing

The atmospheres for preconditioning, conditioning and testing shall be as specified in ISO 139.

Preconditioning and conditioning are not required for wet tests.

8 Procedure

8.1 Prior to testing, the sample shall be conditioned in the relaxed state in accordance with Clause 7.

During conditioning and testing, maintain the test specimens in the atmosphere for conditioning and testing in accordance with Clause 7.

8.2 Set a test area of 50 cm^2 (see 6.1.4).

For most fabrics, particularly knitted fabrics, the test area of 50 cm^2 is applicable. For fabrics with low extensibility (known from previous experience or preliminary testing), e.g. for fabrics for technical application, a test area of 100 cm^2 is recommended. In cases where these conditions cannot be met or are not appropriate, alternative test areas in accordance with 6.1.4 may be used if mutually agreed.

Comparison of results requires the test to be performed with the same test areas and rates of increase in volume.

8.3 Adjust the control valve of the bursting tester so that the mean time to distend a test specimen to burst falls within (20 ± 5) s. Preliminary trials may be needed to fix the correct setting of the control valve. Time to burst is to be recorded between the beginning of vaulting and the bursting of the test specimen.

8.4 Place the test specimen over the diaphragm so that it lies in a flat tensionless condition, avoiding distortion in its own plane. Clamp it securely in the circular holder, avoiding jaw damage, to prevent slippage during the test. Place the distension recording device into the measuring position and adjust it to the zero position. Fasten the safety cover in position according to machine requirements. Apply pressure to the test specimen until the fabric bursts.

Immediately after burst, close the main air valve. Note bursting pressure and height at burst. If the test specimen bursts close to the edge of the clamping device, report this fact. Reject jaw breaks occurring within 2 mm of the clamping line. Repeat the test at least four more times at different places on the fabric. The number of test specimens may be increased if agreed mutually.

8.5 Diaphragm correction

With the same test area and the same setting of the control valve as that employed in the above tests, distend the diaphragm without the presence of a test specimen by an amount equal to the mean height at burst of the test specimen. Note the pressure at this distension of the diaphragm as the "diaphragm pressure".

8.6 Wet test

For tests in wet condition, immerse the test specimen for a period of 1 h in grade 3 water in accordance with ISO 3696 at a temperature of (20 ± 2) °C. For tropical regions, temperature according to ISO 139 may be used. An aqueous solution containing not more than 1 g of a non-ionic wetting agent per litre may be used instead of water.

Immediately after removal of a test specimen from the liquid and briefly placing it on blotting paper to remove excess water, perform the test according to 8.2 to 8.5.

9 Calculation and expression of results

9.1 Calculate the arithmetic mean of the bursting pressure values in kilopascals (kPa). From this, subtract the diaphragm pressure in kilopascals (kPa) as determined according to 8.5 to obtain the bursting strength. Round the result to three significant figures.

9.2 Calculate the arithmetic mean of the height at burst values in millimetres. Round the result to two significant figures.

9.3 If required, calculate the coefficient of variation and the 95 % confidence limits for the bursting pressure and height at burst. Round the coefficient of variation to the nearest 0,1 % and the 95 % confidence limits in accordance with the mean values.

10 Test report

The test report shall include the following information.

10.1 General

a) the number and year of publication of this document, i.e. ISO 13938-2:2019, and date of test;

b) identification of test sample and sampling procedure, if required;

c) make and model of bursting tester used;

d) test area used, in square centimetres;

e) number of test specimens tested and number of bursts close to clamping device and number of tests rejected;

