SLOVENSKI STANDARD
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Tissue papir in proizvodi iz tissue papirja - 12. del: Ugotavljanje natezne trdnosti perforacije - Izračun učinka perforacije (ISO/DIS 12625-12:2022)

Tissue paper and tissue products - Part 12: Determination of tensile strength of perforated lines - Calculation of perforation efficiency (ISO/DIS 12625-12:2022)

Tissue-Papier und Tissue-Produkte - Teil 12: Bestimmung der breitenbezogenen Bruchkraft an Perforationen - Berechnung der Perforationseffizienz (ISO/DIS 12625□12:2022)

Papier tissue et produits tissues - Partie 12: Détermination de la résistance à la rupture par traction des lignes de prédécoupe - Calcul de l'efficacité des perforations (ISO/DIS 12625-12:2022)

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Tissue paper and tissue products —

Part 12:
Determination of tensile strength of perforated lines — Calculation of perforation efficiency

Papier tissue et produits tissues —

Partie 12: Détermination de la résistance à la rupture par traction des lignes de prédécoupe — Calcul de l'efficacité des perforations

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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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 6, *Paper, board and pulps*, Subcommittee SC 2, *Test methods and quality specifications for paper and board*.

This second edition cancels and replaces the first edition (ISO 12625-12:2010), which has been technically revised.

The main changes compared to the previous edition are as follows:

— The expression of the rate of elongation changes from a value expressed in mm/min into a value expressed in %/min, independently from the test piece length (Clause 5.1).

— Precisions are added in case of decrease of the distance between the clamping lines (Clause 5.2).

— Some minor editorial changes have been made.

A list of all parts in the ISO 12625 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.

Introduction

Tissue papers such as toilet paper and kitchen towel are often pre-cut. They are used after separation of two consecutive sheets.

It is important to know the efficiency of the pre-cut perforations.

The perforation strength should be enough to ensure the product cohesion, but not too high, so that sheets can be easily separated. Depending on the type of tissue product, forces can be applied perpendicular to the perforation lines, or in the direction of the perforation lines.

It specifies a procedure to determine perforation efficiency based on the method described in ISO 12625-4 for the determination of the tensile strength of tissue paper and tissue products.

Tissue paper and tissue products —

Part 12:
Determination of tensile strength of perforated lines — Calculation of perforation efficiency

1 Scope

This document specifies a test method for the determination of the tensile strength of perforated lines of tissue paper. It uses a tensile-testing apparatus operating with a constant rate of elongation.

This method is only used for measuring machine-direction tensile strength, that is for cross-direction perforations on tissue paper.

The calculation of perforation efficiency is also specified in this document.

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 186, *Paper and board — Sampling to determine average quality*

ISO 187, *Paper, board and pulps — Standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples*

ISO 12625-4, *Tissue paper and tissue products — Part 4: Determination of tensile strength, stretch at maximum force and tensile energy absorption*

ISO 1924-2, *Paper and board — Determination of tensile properties — Part 2: Constant rate of elongation method (20 mm/min)*

ISO 7500-1, *Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification of the force-measuring system*

ISO 12625-1, *Tissue paper and tissue products — Part 1: Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12625-1 and the following 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 https://www.electropedia.org/

3.1
tensile strength
S
maximum tensile force per unit width that a test piece will withstand before breaking in a tensile test

3.2
perforation efficiency
E_p
difference between the tensile strengths of non-perforated and perforated material from the same sample divided by the tensile strength of non-perforated material

Note 1 to entry: The perforation efficiency is expressed as a percentage.

Note 2 to entry: The higher the perforation efficiency, the easier the sheet separation.

3.3
tie bar
uncut zone in the perforation line

4 Principle

A perforated test piece of tissue paper or tissue product, of given dimensions, is stretched to break in the machine direction at a constant rate of elongation using a tensile-testing apparatus that measures and records the tensile force as a function of the elongation of the test piece.

From the recorded data, the tensile strength is calculated.

In order to determine the perforation efficiency, measurements are performed both on perforated and non-perforated sections of the tissue product.

5 Apparatus

5.1 Tensile-testing apparatus

The tensile-testing apparatus shall be in accordance with ISO 1924-2. It shall be capable of stretching a test piece of tissue paper or tissue product of given dimensions, at a constant rate of elongation of (50 ± 2) % of the initial test span length per minute, i.e. (50 ± 2) mm/min for a 100 mm test span length and (25 ± 1) mm/min for a 50 mm test span length, and recording the tensile force as a function of elongation on a strip chart recorder or any equivalent device.

The elongation shall be recorded to an accuracy of ± 0,1 mm. The measurement of the elongation shall start at a force of (0,25 ± 0,05) N.

The force-measuring system (normally a load cell) shall measure loads with an accuracy of ± 1 % of the reading or ± 0,025 N, whichever is greater, and shall be calibrated and verified to conform to the requirements of ISO 7500-1.

5.2 Tensile-tester clamps

The tensile-testing apparatus shall have two clamps of at least 50 mm in width. Each clamp shall be designed to grip the test piece firmly along a straight line across the full width of the test piece, without causing any damage, and shall have means for adjusting the clamping force.

The clamps should preferably grip the test piece between a cylindrical and a flat surface, with the plane of the test piece tangential to the cylindrical surface. Other types of clamps may be used if it can be ensured that the test piece does not slip or suffer any damage during the test.

During the test, the clamping lines shall be parallel to each other within an angle of 1°. The clamping lines shall be perpendicular to the direction of the applied tensile force and to the longest dimension of the test piece to the same level of accuracy.

The distance between the clamping lines (i.e. the test span length) shall be adjusted to (100 ± 1) mm. In cases where the distance between perforations on the finished products is less than 150 mm and it

is not possible to obtain a test piece of 150 mm in length (as required in 8.1.1), or containing only one perforation line within 150 mm in length (as required in 8.1.2), a test span length of (50 ± 1) mm shall be used.

This deviation from the specified procedure shall be recorded in the test report.

5.3 Cutting device

The cutting device shall meet the requirements of ISO 12625-4 and shall produce test pieces (50,0 ± 0,5) mm wide, with undamaged, straight, smooth and parallel edges.

6 Sampling

If the tests are being made to evaluate a lot, the sample shall be selected in accordance with ISO 186. If the tests are being made on another type of sample, make sure the specimens taken are representative of the sample received.

7 Conditioning

Condition the samples according to ISO 187, unless otherwise agreed between the parties concerned, and keep them in the standard atmosphere throughout the test.

8 Preparation of test pieces

8.1 Dimensions

8.1.1 Non-perforated test pieces

If distance between perforations is 150 mm or longer, then non-perforated test pieces shall be (50 ± 0,5) mm in width and at least 150 mm in length in the machine direction, excluding perforations and defects.

If distance between perforations is less than 150 mm, then non-perforated test pieces shall be (50 ± 0,5) mm in width and at least 75 mm in length in the machine direction, excluding perforations and defects.

With the exception of tissue paper or tissue products having an embossed pattern, the test pieces shall be free of creases, kinks, wrinkles, folds or other thickness variations.

8.1.2 Perforated test pieces

If distance between perforations is 150 mm or longer, then each perforated test piece shall be (50 ± 0,5) mm in width and at least 150 mm in length in the machine direction, excluding defects, with its perforation located approximately equal distance from each end.

If distance between perforations is less than 150 mm, then each perforated test piece shall be (50 ± 0,5) mm in width and at least 75 mm in length in the machine direction, excluding defects, with its perforation located approximately equal distance from each end.

With the exception of tissue paper or tissue products having an embossed pattern, the test pieces shall be free of creases, kinks, wrinkles, folds or other thickness variations.

Each of the 10 test pieces shall be cut from a different perforation line. In addition, non-perforated test pieces (cut in the machine direction) shall be cut from different sheets.