



**SLOVENSKI STANDARD**  
**SIST EN 12625-5:2000**  
**01-april-2000**

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Tissue paper and tissue products - Part 5: Determination of wet tensile strength

Tissue-Papier und Tissue-Produkte - Teil 5: Bestimmung der breitenbezogenen  
Naßbruchkraft

**iTeh STANDARD PREVIEW**

Papier tissue et produits tissues - (Partie 5: Détermination de la résistance a la rupture  
par traction a l'état humide) (standards.iteh.ai)

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**Ta slovenski standard je istoveten z: EN 12625-5:1999**

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**ICS:**

85.080.20      Tissue papir                                      Tissue paper

**SIST EN 12625-5:2000**                                      **en**

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EUROPEAN STANDARD

EN 12625-5

NORME EUROPÉENNE

EUROPÄISCHE NORM

January 1999

ICS 85.080

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English version

## Tissue paper and tissue products - Part 5: Determination of wet tensile strength

Papier tissue et produits tissés - Partie 5: Détermination de la résistance à la rupture par traction à l'état humide

Tissue-Papier und Tissue-Produkte - Teil 5: Bestimmung der breitenbezogenen Naßbruchkraft

This European Standard was approved by CEN on 2 December 1998.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 172 "Pulp, paper and board", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 1999, and conflicting national standards shall be withdrawn at the latest by July 1999.

EN 12625 contains the following parts:

- Part 2: Procedures for sampling and conditioning (currently available as ENV)
- Part 3: Determination of thickness, bulking thickness and apparent bulk density
- Part 4: Determination of tensile strength, stretch at break and tensile energy absorption
- Part 5: Determination of wet tensile strength
- Part 6: Determination of grammage

The following Standards of this series are in preparation:

- Part 1: General guidance on terms
- Part ..: Water absorption rate and water absorption capacity (basket method)
- Part ...: Optical properties (whiteness, opacity, colour)

In addition, it is expressly stated, that the detection of impurities and contraries in tissue paper and tissue products should be applied according to the following European Standard:

- prEN ISO 15755 "Paper and board - Estimation of contraries (ISO/FDIS 15755:1998)"

For the determination of moisture content in tissue paper and tissue products, EN 20287 should be applied.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. (standards.iteh.ai)

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## 1 Scope

This part of EN 12625 specifies a test method for the determination of the wet tensile strength of tissue paper and tissue products after wetting using a tensile testing apparatus operating with a constant rate of elongation.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

ENV 12625-2

Tissue paper and tissue products – Part 2: Procedures for sampling and conditioning

EN 12625-4

Tissue paper and tissue products – Part 4: Determination of tensile strength, stretch at break and tensile energy absorption

EN ISO 536

Paper and board – Determination of grammage (ISO 536 : 1995)

EN ISO 1924-2

Paper and board – Determination of tensile properties – Part 2: Constant rate of elongation method (ISO 1924-2 : 1994)

## 3 Definitions

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

**3.1 wet tensile strength:** maximum tensile force supported by the unit width of a wet test piece of tissue paper or tissue product until the onset of rupture in a tensile test.

**3.2 relative wet tensile strength:** ratio in percent of the tensile strength of the wet tissue paper or wet tissue product to the tensile strength of the same tissue paper or tissue product in the dry, conditioned state (according to EN 12625-4 and EN ISO 1924-2).

## 4 Principle

### 4.0 General

A test piece of a tissue paper or a tissue product supplied as a finished article of given dimensions which has been soaked in water immediately before testing for a given period of time is stretched (elongated) to rupture 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.

In order to determine the wet tensile strength of a tissue paper or a tissue product any one of the two following procedures of soaking in water shall be allowed, depending on the type of tensile tester that will be used.

### 4.1 Test with vertical tensile testing apparatus

Soaking in water in a Finch soaking device for 15 s and testing as described in EN 12625-4 with the minor modifications required by the use of the soaking device.

### 4.2 Test with horizontal tensile testing apparatus

Soaking in water in a suitable vessel for 15 s and testing as described in EN 12625-4 with the minor modifications required by the use of the soaking device.

## 5 Apparatus

### 5.1 Tensile testing apparatus

Tensile testing apparatus as specified in EN 12625-4.

#### 5.1.1 Cutting device

The cutting device shall meet the requirements in accordance with EN ISO 536 and shall produce test pieces ( $50 \pm 0,5$ ) mm wide, undamaged, straight, smooth and with parallel edges.

#### 5.1.2 Clamps

##### 5.1.2.1 Clamps for vertical tensile testing apparatus using the Finch soaking device

For vertical tensile testing of a wet piece of tissue paper or a tissue product using a Finch soaking device the tensile testing apparatus shall have a clamp for holding both ends of the test piece of 50 mm width (upper clamp). The lower clamp shall be designed to grip the soaking appliance firmly. The clamps shall have means for adjusting the clamping force.

During the test the upper clamping line and the appliance rod shall be parallel to each other. They shall also be perpendicular to the direction of the applied tensile force and to the length axis of the test piece.

The test span length which is defined as the distance between the clamping line and the top surface line of the cylindrical rod of the Finch soaking device shall be adjustable to  $\pm 1$  mm (see figures 1 and 2). The tensile testing apparatus shall have means of recording the elongation to an accuracy of 0,1 mm.

##### 5.1.2.2 Clamps for horizontal tensile testing apparatus

The tensile testing apparatus shall have two clamps for holding a test piece of 50 mm width. Each clamp shall be designed to grip the test piece firmly but without damaging it along a straight line across the full width of the test piece (the clamping line) and shall have means or adjusting the clamping force.

During the test the clamping lines shall be parallel to each other. They shall also be perpendicular to the direction of the applied tensile force and to the length axis of the test piece.

The distance between the clamping lines (the test span length) shall be adjustable to  $\pm 1$  mm. The tensile testing apparatus shall have means of recording the elongation to an accuracy of 0,1 mm.

### 5.2 Finch soaking device (for vertical tensile testing apparatus)

The Finch soaking device (see figures 1 and 2) consists of a support which holds a ( $5 \pm 0,1$ ) mm diameter cylindrical rod in a horizontal position. The rod should be approximately 60 mm wide.

The water container can be moved vertically and locked in a raised position.

The horizontal rod may be immersed in the liquid to a depth of at least 20 mm. Projecting from the bottom of the device, is a rigid metal tongue by means of which the device can be held in the lower clamp of the tensile testing apparatus.

### 5.3 Soaking vessel (for horizontal tensile testing apparatus)

The use of a soaking vessel which may be lowered between the clamps of the horizontal tensile testing apparatus or the use of a separate soaking vessel outside of the tensile testing apparatus shall be allowed.

## 6 Sampling

If the test is to be done on a batch of tissue paper or tissue products sample the batch in accordance with ENV 12625-2.

## 7 Preparation of test pieces

### 7.0 General

Test pieces shall be selected in accordance with ENV 12625-2.

Condition the specimens in accordance with ENV 12625-2 and keep them in the conditioning atmosphere throughout the test.

If the material has been treated with a wet strength agent, ensure that the wet strength is fully developed before starting the test.

To check that the wet strength is fully developed use the following procedure: Heat the sample in air at  $(80 \pm 2)^\circ\text{C}$  for 30 min and determine the wet strength before and after curing.

NOTE: For production inspections where reaction times have to be very short, the operating conditions of  $(105 \pm 2)^\circ\text{C}$  for 15 min are possible and should consequently be indicated in the test report. If the relative wet strength is required, determine the tensile strength of the same tissue paper or tissue product sample in accordance with EN 12625-4.

### 7.1 Dimensions

Each test piece shall measure  $(50 \pm 0,5)$  mm in width and at least 200 mm in length, avoiding perforations and faults. It shall be of a length sufficient to clamp it in the tensile testing apparatus with a test span length of  $(100 \pm 1)$  mm when using a horizontal testing apparatus.

In case where a Finch soaking device in a vertical tensile testing apparatus (see figures 1 and 2) is used the test span length has to be 2 times  $(50 \pm 1)$  mm (which is equal to  $(100 \pm 2)$  mm, as a total span length).

NOTE: A higher tolerance of  $\pm 2$  mm can be allowed when using a Finch soaking device in contrast to the horizontal testing procedure.

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### 7.2 Number of test pieces

Test at least one test piece per test sheet or specimen. The test sheet shall comprise the number of single plies typically required for its intended use. Test pieces shall be cut from every ten test sheets or specimens in the machine direction and in the cross direction. Should, in isolated cases, the requisite number of ten test sheets or specimens be unavailable, test at least ten test pieces in each direction using the available specimens.

## 8 Procedure

### 8.0 General

Ensure that the tensile testing apparatus is calibrated and check the zero position of the recording device. Test at least 20 test pieces from each sample, ten in the machine direction and ten in the cross direction.

Determine the wet tensile strength by one of the following procedures:

#### 8.1 Vertical tensile testing apparatus (use of a Finch soaking device)

With the rod in a horizontal position, clamp the Finch soaking device with its rigid tongue projecting from the bottom of the device in the lower clamp of the tensile testing apparatus. The distance between the top edge of the rod of the Finch device and the bottom edge of the upper clamp of the tensile testing apparatus shall be  $(43,5 \pm 1)$  mm. In this case, the total span length of a dry test piece looped under the rod will be  $(100 \pm 2)$  mm. Half this distance is regarded as test span length.



Place the water container in its bottom position and fill it with an appropriate volume of distilled or deionized water at  $(23 \pm 1)^\circ \text{C}$ . Then insert the dry test piece horizontally under the dry rod, bend it around the rod creating a loop and clamp the two ends of the test piece in the upper clamp of the tensile testing apparatus in a way which is shown in figure 1. Make sure that both ends of the looped test piece are held by the clamp equally tightened without any damage, avoiding slippage along a straight line across the full width of the test piece. Raise the container until it locks in its upper position, thereby immersing the looped end of the test piece to a depth of at least 20 mm.

At this moment start a stop watch.

After soaking for 15 s measure the wet tensile strength of the immersed test piece at an elongation rate of  $(50 \pm 2)$  mm/min.

Reject the readings of the tests in which the test piece breaks on the rod of the Finch device and repeat with additional test pieces.

After testing move the water container to its lowest position and wipe dry the horizontal rod of the Finch device, before attaching the next test piece.

Divide the indicated breaking force by 2 to obtain the wet tensile strength of a single test piece.

## 8.2 Horizontal tensile testing apparatus (use of a soaking container)

Remove the table between the clamps of the testing machine and replace it with a container filled with an appropriate volume of distilled or deionized water at  $(23 \pm 1)^\circ \text{C}$ .

NOTE: Instead of a water container inserted in the horizontal tensile testing apparatus a separate water container can be used filled with an appropriate volume of distilled or deionized water  $(23 \pm 1)^\circ \text{C}$ .

Make a loop of the test piece and immerse the looped end in the water for 15 s. Immediately after this period of time take the test piece out. Take away exceeding amounts of water from the surface of the test piece by soaking off adhering drops by use of blotting paper in the shortest contact applicable to the test piece. Then insert the test piece in the clamps of the horizontal tensile testing apparatus and start with the test in accordance with 8.1.

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Handle each test piece very carefully avoiding finger contact and any damage. Insert the test piece tightly in the clamps but without pretension. Use a free test span length of  $(100 \pm 2)$  mm of a dry test piece in a conditioned state.