SLOVENSKI STANDARD
SIST EN 13895:2003

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Tekstilije - Monofilamenti - Ugotavljanje nateznih lastnosti

Textiles - Monofilaments - Determination of tensile properties

Textilien - Monofilamente - Bestimmung der Zugdehnungseigenschaften

Textiles - Monofilaments - Détermination des propriétés en traction

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59.060.20 Umetna vlakna Man-made fibres

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Textiles - Monofilaments - Determination of tensile properties

Textiles - Monofilaments - Détermination des propriétés en traction

Textilien - Monofilamente - Bestimmung der Zugdehnungseigenschaften

This European Standard was approved by CEN on 21 November 2002.

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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 Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Contents

Foreword

This document (EN 13895:2003) has been prepared by Technical Committee CEN /TC 248 "Textiles and textile products", the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by September 2003, and conflicting national standards shall be withdrawn at the latest by September 2003.

Annexes A, B, C and D are informative.

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This draft European Standard specifies a method for the determination of tensile properties of monofilaments.

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 (including amendments).

EN 13392, *Textiles — Monofilaments - Determination of linear density*

EN 20139, *Textiles — Standard atmospheres for conditioning and testing (ISO 139:1973)*

EN ISO 7500-1: *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines (ISO 7500-1:1999)*

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply:

3.1
monofilament
yarn made with only one filament

3.2
pretension
tension applied to a specimen at the beginning of the test to establish the gauge length

3.3
gauge length
length of the specimen measured between the clamping points under pretension. In bollard or capstan clamps, it is the distance between their gripping points, measured along the path of the monofilament

3.4
constant rate of extension (CRE) dynamometer
tensile testing machine where one clamp is stationary and the other is moving with a constant speed throughout the test, and where the entire testing system is virtually free from deflection

3.5
clamps
parts of the testing device which are used to grip the specimen by means of suitable jaws

3.6
jaws
elements of a clamp which grip the specimen without damaging it and which prevent slippage during the test

3.7
package
method of presentation of the monofilament, e.g. spool, tube, cone

3.8 Tensile properties

3.8.1
maximum force
maximum value of force applied to a test specimen carried to break during a test (see annex A)

3.8.2
elongation at maximum force
increase in length of a specimen produced by the maximum force (see annex A), expressed as a percentage of the gauge length

3.8.3
force at break
final force at the moment that the specimen breaks into two parts after attainment of the maximum force

NOTE The force at break is usually, but not always, identical with the maximum force.

3.8.4
elongation at break
increase in length of a specimen at break expressed as a percentage of the initial length

3.8.5
force at specified elongation (FASE)
force associated with a specified elongation on the force-elongation curve

3.8.6
elongation at specified force (EASF)
increase in length of a test specimen produced by a specified force

3.8.7
tenacity
maximum force divided by the actual linear density measured (according to EN 13392) before the test

3.8.8
tenacity at specified elongation (TASE)
force at specified elongation divided by the actual linear density measured before the test

3.8.9
breaking energy
energy required to break a specimen

3.8.10
specific breaking energy
energy required per unit mass to break a specimen

4 Principle

A specimen of monofilament is automatically or manually mounted in the clamps of a tensile testing machine and stretched at a constant rate of extension until break.

5 Apparatus

5.1 Testing instrument

The instrument used shall be calibrated according to EN ISO 7500-1

NOTE The specimen loading procedure can be manual or automatic.

The instrument shall be equipped with:

a) An electronic force - measuring device.

b) An autographic recorder giving the force-elongation curve, or a data collecting system.

c) The capability of being set to a gauge length of 500 mm.

d) The capability of having a pretension set either by means of pretension weights or by use of the force-measuring device.

5.2 Clamps

The instrument shall be equipped with clamps for gripping the specimen at the specified gauge length. The clamps shall grip the specimen without slippage or damage to the specimen which can result in jaw breaks.

a) Clamps with plane-faced, uncoated jaws can be used, but if these cannot prevent slippage, then other types of clamps may be used by agreement between the parties.

b) Clamps with coated jaws, or bollard-type clamps in which the specimen makes a partial turn around a curved extension or other kind of snub-nosed device.

NOTE The type of clamp can influence the accuracy of the actual elongation. For improved accuracy, an extensometer should be used. In this case the initial length refers to new initial length.

The principle of a bollard-type clamp is shown in annex B.

6 Sampling and conditioning

At least the first layer of product on the package is rejected. A minimum of five specimens of at least 1 m length is taken from the package. Before testing, the specimens shall be conditioned in the standard atmosphere, as described in EN 20139 (see annex C).

NOTE For the automatic test the conditioning is carried out whilst the monofilament is still on the package.

7 Test procedure

7.1 Operating conditions

7.1.1 Pretension

Use a pretension of (0,05 ± 0,005) cN/dtex. In all cases calculate the pretension using the linear density.

7.1.2 Gauge length

Use a gauge length of 500 mm ± 1,0 mm.

NOTE When large bollard clamps are used it may be necessary to increase the gauge length to ensure an adequate free length between the clamps. When testing a monofilament with a high elongation it may be necessary to shorten the gauge length.

7.1.3 Jaw alignment

Before clamping the test specimen, check that the jaws are correctly aligned and parallel, so that the force applied causes no angular deviation.

7.1.4 Testing speed

The testing speed shall be 100 % of the gauge length per minute. Other speeds may be agreed upon between the parties.

7.2 Preparation of specimen and mounting procedure

7.2.1 Manual test

Thread one end of the test specimen between the jaws of one clamp and close it, taking care to prevent any stretching of yarn. Place the other end of the specimen through the jaws of the other clamp and apply the pretension before closing the clamp.

NOTE Some dynamometers provide alternative automatic systems for applying pretension.

7.2.2 Automatic test

For the automatic test the specimens are mounted automatically by a feeding mechanism which threads the specimen through the jaws. The pretension procedure is carried out automatically by the machine.

7.3 Testing

After the yarn has been clamped, set the traversing jaw in motion at the specified testing speed and extend the specimen to break, recording the elongation and the force(s) required.

NOTE For the automatic test this will normally happen automatically after the mounting and pretension procedure

7.4 Yarn slippage through the clamps and jaw breaks

Ensure that during the test the clamped yarn length is not increased by slippage of the yarn in the clamps.

When a test specimen breaks inside the clamp, or within 10 mm of the clamping point (see annex B), this is classified as a jaw break. In the case of bollard clamps, any break that occurs on the curved surface of the clamp is also classified as a jaw break. The results of such jaw breaks are ignored and additional specimens shall be tested. If the number of jaw breaks exceeds 20 % of the number of specimens tested, the jaws are not satisfactory and corrective action shall be taken.

7.5 Data to be collected

Depending upon the requirements, collect the following data:

- Maximum force
- Elongation at maximum force

Other parameters such as force at break, elongation at break, FASE, EASF, tenacity, TASE, etc. can also be collected.

8 Calculation of results

8.1 Measured values

For each sample unit calculate, for all measured parameters, the mean value. If required, calculate the standard deviation and 95 % confidence interval.