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Textiles - Monofilaments - Determination of thermal shrinkage

Textilien - Monofile - Bestimmung des Wärmeschrumpfverhaltens

Textiles - Monofilaments - Détermination du retrait à la chaleur

Ta slovenski standard je istoveten z: EN 13844:2002

SIST EN 13844:2003

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ICS:

59.060.20

Umetna vlakna

Man-made fibres

SIST EN 13844:2003

en

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EUROPEAN STANDARD
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Textiles - Monofilaments - Determination of thermal shrinkage

Textiles - Monofilaments - Détermination du retrait à la
chaleur

Textilien - Monofile - Bestimmung des
Wärmeschrumpfverhaltens

This European Standard was approved by CEN on 23 October 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.

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

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COMITÉ EUROPÉEN DE NORMALISATION
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Contents

	page
Foreword	3
Introduction	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	5
4 Determination of shrinkage in hot air under tension	6
4.1 Principle	6
4.2 Apparatus	6
4.3 Procedure	7
5 Determination of shrinkage in hot air without tension	8
5.1 Principle	8
5.2 Apparatus	8
5.3 Procedure	8
5.4 Calculation of results	9
6 Determination of shrinkage in hot water without tension	9
6.1 Principle	9
6.2 Apparatus	10
6.3 Procedure	11
6.4 Calculation of results	12
7 Test report	13
Annex A (informative) Recommended conditioning time versus diameter	14
Annex B (informative) An example of a procedure for marking the length L_0 and measuring the length L_s under a pretension	15

Foreword

This document (EN 13844:2002) 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 June 2003, and conflicting national standards shall be withdrawn at the latest by June 2003.

In this European Standard the Annexes A and B 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, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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Introduction

This European Standard specifies methods for the determination of thermal shrinkage of monofilaments. Shrinkage is one of the main properties, which characterise polymeric monofilaments.

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1 Scope

This European Standard specifies three methods for the determination of shrinkage:

- Determination of shrinkage in hot air under tension;
- Determination of shrinkage in hot air without tension;
- Determination of shrinkage in hot water without tension.

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

EN 13392:2001, *Textiles — Monofilaments - Determination of linear density*

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

linear density

mass per unit length of a monofilament expressed in tex or its multiples or submultiples

[EN 13392:2001]

NOTE 1 tex = 1 g/1000 m.

3.3

thermal shrinkage

decrease in monofilament length caused by exposure to heat, expressed as a percentage of its original length

3.4

tension

force applied to a test specimen during a test

3.5

package

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

4 Determination of shrinkage in hot air under tension

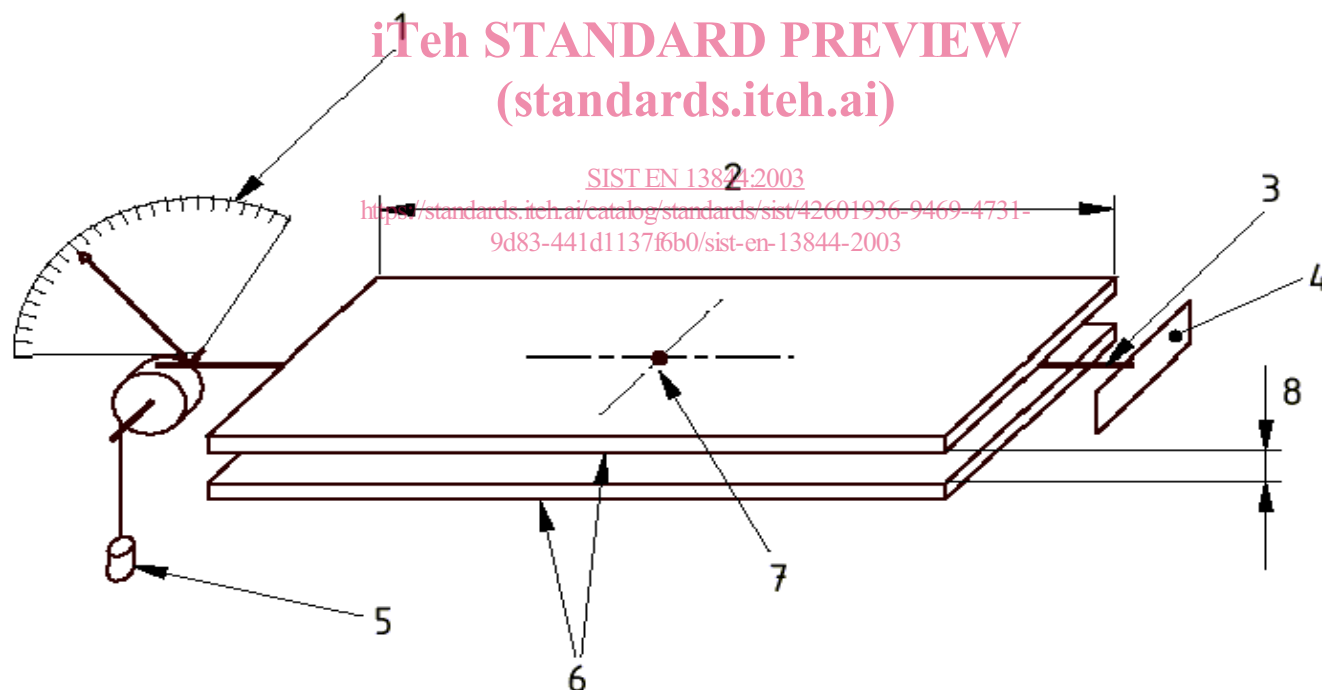
4.1 Principle

Test specimens are subjected to hot air under tension for a specified time. Thermal shrinkage is indicated by a pointer on a scale or by an electronic indicator.

4.2 Apparatus

4.2.1 A thermal shrinkage chamber (see Figure 1) with the following specification:

- a) minimum heating length of 200 mm;
- b) distance between heating plates of 3 mm to 10 mm;
- c) operating temperature in the range 110 °C to 250 °C;
- d) temperature stability with a limit deviation of ± 2 °C;
- e) shrinkage scale with atolerance of 0,1 % between 0 and 10 % and of 0,5 % above 10 %;
- f) constant temperature distribution in at least 80 % of the oven length.



Key

- 1 Shrinkage scale
- 2 Length of chamber
- 3 Monofilament
- 4 Fixed clamp
- 5 Tension mass
- 6 Heating plates
- 7 Calibration point
- 8 Distance between plates

Figure 1 — An example of testing thermal shrinkage under tension

4.2.2 A range of tension masses.

4.2.3 A stopwatch or other suitable timing device.

4.3 Procedure

4.3.1 Preparing the test specimens

- As a minimum, the first layer of product on the package is rejected. A minimum of three test specimens is then taken from the package;
- Before testing, the test specimens shall be conditioned in the standard atmosphere, as described in EN 20139, until stable (see Annex A).

4.3.2 Thermal treatment of the test specimens

- Switch on the oven and set the temperature according to the polymeric type to be tested (see Table 1);

Table 1 — Polymeric type table

Polymer	Symbol	Temperature °C	a cN/dtex	Time s
Polyamide 66	PA 66	180	0,02	120
Polyamide 6	PA 6	150	0,02	120
Polyamide 11	PA 11	140	0,02	120
Polyamide 12	PA 12	140	0,02	120
Polyamide 610	PA 610	150	0,02	120
Polyamide 612	PA 612	150	0,02	120
Poly(ethylene terephthalate)	PET ^a	180	0,02	120
Polypropylene	PP	120	0,02	120
Poly(phenylene sulphide)	PPS	200	0,02	120
Polyetheretherketone	PEEK	200	0,02	120
Poly(butylene terephthalate)	PBT	180	0,02	120
NOTE For other polymeric types, the temperature will be agreed between parties.				
^a Referred to as PES in ISO 2076 "Textiles – Man-made fibres – Generic names"				

- Wait until the temperature is reached and stabilised;
- Calculate the value of the tension force from the linear density using the following formula:

$$W = T \cdot a$$

where

W is the tension force, in cN;

A is a function of the material to be tested, in cN/dtex (see Table 1); and

is the linear density according to EN 13392;

- Prepare the tension force according to the calculation within a limit deviation of $\pm 5 \%$;
- A temperature calibration should be carried out at the exact point in the chamber where the yarn is tested;