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**Textiles — Determination of the  
elasticity of fabrics —**

**Part 3:  
Narrow fabrics**

*Textiles — Détermination de l'élasticité des étoffes —*

*Partie 3: Etoffes étroites*

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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](http://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](http://www.iso.org/patents)).

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For an explanation on 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 the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html). (standards.iteh.ai)

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

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](http://www.iso.org/members.html).

A list of all parts in the ISO 20932 series can be found on the ISO website.

## Introduction

This document was developed as a result of technical advancements in yarn and fabric structures and properties, which increase product range and developments.

This document is based on EN 14704-3<sup>[1]</sup>.

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# Textiles — Determination of the elasticity of fabrics —

## Part 3: Narrow fabrics

### 1 Scope

This document specifies the test methods which can be used to measure the elasticity and related properties of narrow fabrics. Two methods are itemized: one for the purpose of product quality assurance (method A) and the other for product performance when in use (method B).

### 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 7500-1, *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Verification and calibration of the force-measuring system*

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

ISO 22198, *Textiles — Fabrics — Determination of width and length*

### 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

##### **narrow fabric**

woven or knitted construction intended for use as a trim, binding, edging, strapping or harness, and designed to be used in its full width

[SOURCE: ISO 20932-1:2018, 3.1]

#### 3.2

##### **elasticity**

<material> ability to recover original size and shape immediately after the removal of the force causing deformation

[SOURCE: ISO 20932-1:2018, 3.2]

**3.3**  
**constant-rate-of-extension testing machine**  
**CRE testing machine**

tensile testing machine provided with one clamp which is stationary and another clamp, which moves with a constant speed throughout the test, the entire testing system being virtually free from deflection

[SOURCE: ISO 20932-1:2018, 3.3]

**3.4**  
**strip test specimen**

test specimen in which the full width is gripped in the jaws of the testing machine

[SOURCE: ISO 20932-1:2018, 3.4]

**3.5**  
**gauge length**

distance between the two effective clamping points of a testing device

Note 1 to entry: For this method where line clamps are employed, it is the distance between the two contact points.

**3.6**  
**slack mounting**

insertion of a strip test specimen in the line clamps of the upper jaw, allowing it to hang freely under its own weight, guided by the hand to ensure perpendicular alignment to the line of pulling force, without any force being applied

[SOURCE: ISO 20932-1:2018, 3.7]

**3.7**  
**initial length**

length of the test specimen between the two effective clamping or holding points, at the beginning of the test (after slack mounting or under specified pretension)

[SOURCE: ISO 20932-1:2018, 3.8]

**3.8**  
**pretension**

force applied to a test specimen at the beginning of certain tests

[SOURCE: ISO 20932-1:2018, 3.9]

**3.9**  
**extension**

increase in length of a test specimen during testing

Note 1 to entry: Extension is expressed in units of the length.

[SOURCE: ISO 20932-1:2018, 3.10]

**3.10**  
**elongation**

ratio of the extension of the test specimen to its initial length

Note 1 to entry: Elongation is expressed as a percentage.

[SOURCE: ISO 20932-1:2018, 3.11]

**3.11**  
**maximum force**

force at the position when a test specimen is taken to a fixed extension

Note 1 to entry: Maximum force is expressed in newtons.

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[SOURCE: ISO 20932-1:2018, 3.12]

### 3.12

#### **maximum extension**

extension recorded in millimetres at the position when a test specimen is taken to a fixed load

Note 1 to entry: Maximum extension is expressed in units of the length.

[SOURCE: ISO 20932-1:2018, 3.13]

### 3.13

#### **force at specified elongation**

force measured at a given elongation on either the load or unload curves

[SOURCE: ISO 20932-1:2018, 3.14]

### 3.14

#### **cycle**

process whereby a fabric is taken from the gauge length to a fixed load or fixed extension or elongation, and returned to gauge length

[SOURCE: ISO 20932-1:2018, 3.15]

### 3.15

#### **force decay due to time**

loss of force measured over time when a test specimen is stretched to a specified elongation or force and held in this position for a given time period

Note 1 to entry: The decay in force is expressed as a percentage of the original force recorded at the specified position (see [Annex A, Figure A.1](#)).

[SOURCE: ISO 20932-1:2018, 3.16]

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### 3.16

#### **force decay due to exercising**

loss of force, calculated and expressed as a percentage, as measured and recorded at the same elongation point on two different cycles when the test specimen is cycled several times between the gauge length and a specified elongation

Note 1 to entry: See [Annex A, Figure A.1](#).

[SOURCE: ISO 20932-1:2018, 3.17]

### 3.17

#### **permanent deformation**

ratio of unrecovered extension of the test specimen after cycling (to a specified force or specified extension) to its initial length

Note 1 to entry: Permanent deformation is expressed as a percentage.

[SOURCE: ISO 20932-1:2018, 3.18]

### 3.18

#### **recovered elongation**

complement of permanent deformation to 100 %

[SOURCE: ISO 20932-1:2018, 3.19]

### 3.19

#### **elastic recovery**

recovered elongation of the total elongation

Note 1 to entry: Elastic recovery is expressed as a percentage.

[SOURCE: ISO 20932-1:2018, 3.20]

## 4 Principle

### 4.1 Method A

A narrow test specimen of specified length dimensions is extended at a constant rate to a specified force for an agreed number of cycles. Several characteristics can be measured to determine the performance and profile of the narrow fabric.

### 4.2 Method B

A narrow test specimen of specified length dimensions is extended at a constant rate to a specified force and elongation for one cycle of a specified sequence. Characteristics are measured to show the performance of the narrow fabric in use.

## 5 Sampling

Narrow fabric samples shall be selected in accordance with the product specification. In the absence of a product specification for the fabric, the sampling method given in [Annex B](#) may be used.

## 6 Apparatus

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### 6.1 CRE testing machine.

Metrological confirmation system of the tensile testing machine shall be in accordance with ISO 10012.

The constant-rate-of-extension (CRE) testing machine shall conform to the following:

- a) The tensile testing machine shall be provided with the means for indicating or recording the force and elongation values when cycling between gauge length and either a fixed load or fixed extension. Under conditions of use, the accuracy of the apparatus shall be at least class 1 of ISO 7500-1. The error of the indicated or recorded maximum force at any point in the range in which the machine is used shall not exceed 1 %, and the error of the indicated or recorded jaw separation shall not exceed 1 mm.
- b) If recording of force or elongation is obtained by means of data acquisition boards and software, the frequency of data collection shall be at least eight per second.
- c) The machine shall be capable of constant rates of extension including 20 mm/min to 500 mm/min with an accuracy of  $\pm 10$  %.
- d) The machine shall be capable of variable gauge length settings including 100 mm to 250 mm, to an accuracy of  $\pm 1$  mm.
- e) Clamping or holding devices shall be positioned with the central point of the two jaws in line of the applied force. The machine shall be calibrated, where applicable, with the grips in position and the jaw faces closed.

The jaws shall be capable of holding the test specimen without allowing it to slip and designed so that they do not cut or otherwise weaken the test specimen.

### 6.2 Line clamps.

Line clamps, as shown in [Figure C.1](#), shall consist of two jaws, one being of steel plate, the other having a convex 3 mm radius. The line of contact of the jaws shall be perpendicular to the line of increasing

force. The clamping faces shall be in the same plane. The line clamp jaws shall not be less than the width of the test specimen and preferably have a width of  $(70 \pm 6)$  mm.

**NOTE** Significant levels of work have shown this type of line clamp is the preferred type for elastane/elastodiene containing fabrics as fabric slippage is insignificant. If a fabric slips the elongation values are inaccurate.

Pneumatic operated grips are recommended as hand tightening or manual grips can cause distortion of the test specimen. The air pressure should be sufficient to prevent slippage when compensating the decreasing thickness of the fabric but should not cut or otherwise weaken the test specimen.

**6.3 Equipment**, for cutting test specimens to the required dimensions.

**6.4 Calibrated metal rule**, graduated in mm.

## 7 Atmosphere for conditioning and testing

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

The narrow fabric samples shall be conditioned for a minimum of 20 h in a tension-free state.

## 8 Preparation of test specimens

### 8.1 General

A set of test specimens from each laboratory sample shall be cut in the length direction.

A set shall consist of a minimum of five test specimens. If the sample is supplied on role and of sufficient length, remove and discard the first 500 mm. Cut the required number of specimens to the correct length, rejecting a minimum of 300 mm in between each of the specimens.

If the length of the laboratory sample is not sufficient, reduce the discarded and rejected lengths and report the sampling modifications.

### 8.2 Test specimen preparation

For method A and method B, each test specimen shall be cut to a length of 150 mm.

If for method A permanent deformation is determined at the end of the test, place  $(100 \pm 1)$  mm reference (bench) marks centrally and perpendicular to the specimen length. In case a pretension is used, placing of reference marks is not required, since the length at pretension after end of testing is used for calculation.

## 9 Procedure

### 9.1 Method A

#### 9.1.1 General

**9.1.1.1** Locate the line clamps in the jaws of the tensile testing machine and set the gauge length to  $(100 \pm 1)$  mm, unless otherwise agreed between interested parties. Check this gauge length setting using carbon paper and paper which will generate gauge (bench) marks on the paper. The distance is measured with the calibrated rule.

**9.1.1.2** Set the extension and retraction rate of the specimen at 100 %/min.