
Textile fibres — Determination of breaking force and elongation at break of individual fibres

*Fibres textiles — Détermination de la force de rupture et de
l'allongement de rupture des fibres individuelles*

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

ISO 5079:2020

<https://standards.iteh.ai/catalog/standards/iso/cceb2a7-4c12-43ee-9119-8641cf4f1492/iso-5079-2020>



iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

ISO 5079:2020

<https://standards.iteh.ai/catalog/standards/iso/cceb2a7-4c12-43ee-9119-8641cf4f1492/iso-5079-2020>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

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

Published in Switzerland

Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principle	3
5 Apparatus and reagents	3
6 Conditioning and testing atmospheres	4
7 Sampling and preparation of test specimen	4
8 Procedure	4
9 Expression of results	6
10 Test report	7
Annex A (informative) Mounting of test specimens	8
Annex B (informative) Tensile test method for certain high-tenacity filaments	9
Bibliography	12

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

ISO 5079:2020

<https://standards.iteh.ai/catalog/standards/iso/cceb2a7-4c12-43ee-9119-8641cf4f1492/iso-5079-2020>

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 38, *Textiles*, Subcommittee SC 23, *Fibres and yarns*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 248, *Textiles and textile products*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 5079:1995), which has been technically revised. The main changes compared to the previous edition are as follows:

- addition of “ISO 3696”, “ISO 7500-1” and “ISO 10012” as normative references;
- adjustment of “ISO 3060” and “IWTO 32” from normative references to bibliography;
- revision of the definitions of “breaking force” (3.1), “force at rupture” (3.2), “extension” (3.3), “elongation at break” (3.5), “elongation at rupture” (3.6), “gauge length” (3.7), “initial length” (3.8), “pretension” (3.9) and “breaking density” (3.11);
- deletion of terminological entry for “tension” (former 3.10);
- addition of terminological entry for “constant-rate-of-extension testing machine” (3.10);
- addition of a note in [Clause 4](#);
- redrafting of text describing the requirements for CRE testing machine in [5.1](#);
- addition of “Tweezers” (5.2);
- revision of requirements for wetting solution in [5.3](#) (former 5.2);
- addition of details about preparation of test specimen in [Clause 7](#);
- addition of [8.2 c](#));
- redrafting of the test procedure of wet test in [8.8](#) (former 8.6);

- redrafting of the test report in [Clause 10](#);
- addition of [Figure A.1](#);
- addition of [Annex B](#).

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.

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

ISO 5079:2020

<https://standards.iteh.ai/catalog/standards/iso/cceb2a7-4c12-43ee-9119-8641cf4f1492/iso-5079-2020>

Textile fibres — Determination of breaking force and elongation at break of individual fibres

1 Scope

This document specifies the method and conditions of test for the determination of the breaking force and elongation at break of individual fibres in the conditioned or wet state.

The determination of these fibre properties, when carried out on different kinds of testing equipment, will not generally give identical results. To avoid such differences, this document is restricted to the use of constant-rate-of-extension testing machine.

It is applicable to all fibres, including crimped fibres, provided that the length of fibre available enables the gauge length specified in this document.

NOTE For natural fibres (especially wool and cotton), the breaking test most commonly performed is that of bundles of fibres (see ISO 3060 and IWTO 32-82).

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 1130, *Textile fibres — Some methods of sampling for testing*

ISO 1973, *Textile fibres — Determination of linear density — Gravimetric method and vibroscope method*

ISO 2602, *Statistical interpretation of test results — Estimation of the mean — Confidence interval*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

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

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/>

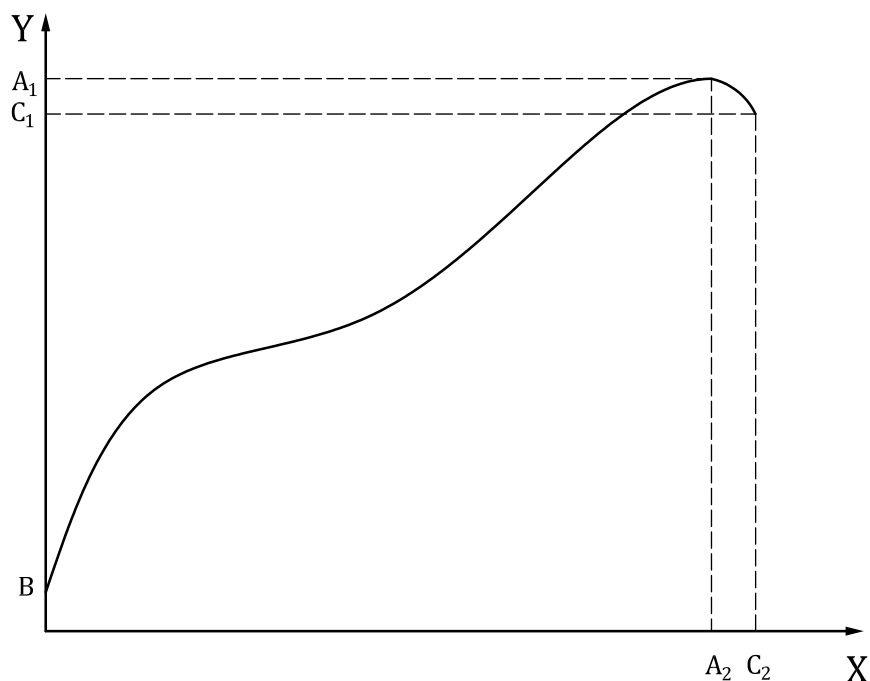
3.1

breaking force

maximum force appearing during a test specimen carried to rupture in a tensile test under specified conditions

EXAMPLE See A_1 in [Figure 1](#).

Note 1 to entry: For fibres, breaking force is preferably expressed in centinewtons.



Key	
Y	force, expressed in centinewtons
X	<i>elongation</i> (3.4), expressed as a percentage
A ₁	<i>breaking force</i> (3.1)
A ₂	<i>elongation at break</i> (3.5)
B	<i>pretension</i> (3.9)
C ₁	<i>force at rupture</i> (3.2)
C ₂	<i>elongation at rupture</i> (3.6)

Figure 1 — Typical force/elongation curve

3.2

force at rupture

force at the point of rupture of the test specimen during a tensile test

EXAMPLE See C₁ in [Figure 1](#).

3.3

extension

increase in length of a test specimen during a tensile test

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

3.4

elongation

ratio of the *extension* (3.3) of a test specimen to its *initial length* (3.8)

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

3.5

elongation at break

elongation (3.4) of a test specimen at the *breaking force* (3.1)

EXAMPLE See A₂ in [Figure 1](#).

3.6**elongation at rupture**

elongation (3.4) of a test specimen at the *force at rupture* (3.2)

EXAMPLE See C_2 in [Figure 1](#).

3.7**gauge length**

distance between the two effective clamping points of a testing device

Note 1 to entry: With guide groove or wrap bollard clamps, it is the distance between their effective clamping points, measured along the path of the specimen.

3.8**initial length**

length of a test specimen (between the two effective clamping points) under specified *pretension* (3.9) at the beginning of a test

3.9**pretension**

tension applied to a test specimen at the beginning of a tensile test

EXAMPLE See B in [Figure 1](#).

Note 1 to entry: For fibres, pretension is preferably expressed in centinewtons.

3.10**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]

3.11**breaking tenacity**

breaking force (3.1) divided by the linear density

Note 1 to entry: For fibres, breaking force is preferably expressed in centinewtons per decitex.

4 Principle

An individual fibre is extended at a constant rate until rupture occurs. The breaking force and elongation at break are recorded.

If the breaking tenacity is to be calculated, the linear density of the individual fibres or the mean linear density of the laboratory sample is also required.

NOTE If required, the force and elongation at rupture is recorded.

5 Apparatus and reagents**5.1 Tensile testing machine.**

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

5.1.2 The machine shall be equipped with suitable clamps for gripping individual fibres at the required gauge length, a means for stretching the fibre to rupture at constant rate of extension by

moving one of the clamps, and a means for recording the extension (elongation) of the fibre and the corresponding force.

Visualization of the individual force/extension (or tenacity/elongation) curves is helpful for detection of fibre slippage in the clamps. Advice on mounting of test specimens is given in [Annex A](#).

5.1.3 The machine shall be capable of operating at various constant rates of extension between at least 5 mm/min and 40 mm/min.

5.1.4 Under conditions of use, the accuracy of the testing machine shall be at least class 1 of ISO 7500-1, and meet the following requirements.

- a) the error of the indicated or recorded force at any point in the range in which the testing machine is used shall not exceed $\pm 1\%$;
- b) the error of the indicated or recorded extension shall not exceed $\pm 0,1\text{ mm}$;
- c) the gauge length shall be with an accuracy of $\pm 0,2\text{ mm}$;
- d) the constant rate of displacement of the moving clamp shall be with an accuracy of $\pm 5\%$.

5.1.5 The clamps of the machine shall be capable of adjustment, and the surface of the clamp jaws in contact with the specimen shall be of a material to provide the correct gripping force without damage to the fibre, thereby avoiding slippage and jaw breaks (see [8.7](#)).

5.2 Tweezers.

5.3 Wetting solution.

If wet testing is to be carried out, distilled water or grade 3 water in accordance with ISO 3696 at a temperature of $(20 \pm 2)^\circ\text{C}$, to which a non-ionic wetting agent to a maximum concentration of 0,1 % has been added, shall be used.

ISO 5079:2020

<https://standards.iteh.ai/catalog/standards/iso/cceb2a7-4c12-43ee-9119-8641cf4f1492/iso-5079-2020>

6 Conditioning and testing atmospheres

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

7 Sampling and preparation of test specimen

To ensure that the laboratory sample is representative of the material and that the test specimen taken from the laboratory sample is representative of that sample, sampling shall be carried out in accordance with ISO 1130.

For staple fibres, the length shall be sufficient to allow tests at the selected gauge length.

For filaments, cut the specimen into short segments allowing a gauge length of 20 mm. Carefully remove the required number of test specimens from the segments by grasping the individual filament segments at one end with tweezers. The effective part of the fibre under test shall not be damaged during preparing the test specimen.

8 Procedure

8.1 Condition the test specimens and carry out the tests in the standard atmosphere as specified in [Clause 6](#).