

**SLOVENSKI STANDARD  
SIST EN ISO 22459:2022****01-junij-2022****Nadomešča:  
SIST EN 1007-5:2010**

---

**Fina keramika (sodobna keramika, sodobna tehnična keramika) - Ojačitev keramičnih kompozitov - Ugotavljanje porazdelitve natezne trdnosti in deformacij/obremenitev vlaken v svežnjih pri temperaturi okolice (ISO 22459:2020)**

Fine ceramics (advanced ceramics, advanced technical ceramics) - Reinforcement of ceramic composites - Determination of distribution of tensile strength and tensile strain to failure of filaments within a multifilament tow at ambient temperature (ISO 22459:2020)

Hochleistungskeramik - Faserverstärkungen von keramischen Verbundwerkstoffen - Bestimmung der Verteilung von Zugfestigkeit und Zugdehnung bis zum Versagen von Filamenten innerhalb eines Multifilamentkabels bei Raumtemperatur (ISO 22459:2020)

Céramiques techniques - Renfort de céramiques composites - Détermination de la distribution de la résistance en traction et de la déformation à la rupture en traction de filaments dans un fil multifilamentaire à température ambiante (ISO 22459:2020)

**Ta slovenski standard je istoveten z: EN ISO 22459:2022**

---

**ICS:**

81.060.30      Sodobna keramika      Advanced ceramics

**SIST EN ISO 22459:2022**      **en,fr,de**

**iTeh STANDARD  
PREVIEW  
(standards.iteh.ai)**

[SIST EN ISO 22459:2022](https://standards.iteh.ai/catalog/standards/sist/922d63ff-ce73-4dfe-82c0-cb9cbd78bebd/sist-en-iso-22459-2022)

[https://standards.iteh.ai/catalog/standards/sist/922d63ff-  
ce73-4dfe-82c0-cb9cbd78bebd/sist-en-iso-22459-2022](https://standards.iteh.ai/catalog/standards/sist/922d63ff-ce73-4dfe-82c0-cb9cbd78bebd/sist-en-iso-22459-2022)

EUROPEAN STANDARD

EN ISO 22459

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2022

ICS 81.060.30

Supersedes EN 1007-5:2010

English Version

Fine ceramics (advanced ceramics, advanced technical ceramics) - Reinforcement of ceramic composites - Determination of distribution of tensile strength and tensile strain to failure of filaments within a multifilament tow at ambient temperature (ISO 22459:2020)

Céramiques techniques - Renfort de céramiques composites - Détermination de la distribution de la résistance en traction et de la déformation à la rupture en traction de filaments dans un fil multifilamentaire à température ambiante (ISO 22459:2020)

Hochleistungskeramik - Faserverstärkungen von keramischen Verbundwerkstoffen - Bestimmung der Verteilung von Zugfestigkeit und Zugdehnung bis zum Versagen von Filamenten innerhalb eines Multifilamentkabels bei Raumtemperatur (ISO 22459:2020)

This European Standard was approved by CEN on 27 March 2022.

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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents	Page
European foreword.....	3

**iTeh STANDARD  
PREVIEW  
(standards.iteh.ai)**

[SIST EN ISO 22459:2022](https://standards.iteh.ai/catalog/standards/sist/922d63ff-ce73-4dfe-82c0-cb9cbd78bebd/sist-en-iso-22459-2022)  
[https://standards.iteh.ai/catalog/standards/sist/922d63ff-  
ce73-4dfe-82c0-cb9cbd78bebd/sist-en-iso-22459-2022](https://standards.iteh.ai/catalog/standards/sist/922d63ff-ce73-4dfe-82c0-cb9cbd78bebd/sist-en-iso-22459-2022)

## European foreword

The text of ISO 22459:2020 has been prepared by Technical Committee ISO/TC 206 "Fine ceramics" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 22459:2022 by Technical Committee CEN/TC 184 "Advanced technical ceramics" 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 October 2022, and conflicting national standards shall be withdrawn at the latest by October 2022.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 1007-5:2010.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

ITeCH STANDARD  
PREVIEW  
(standards.iteh.ai)

### Endorsement notice

[SIST EN ISO 22459:2022](https://standards.iteh.ai/catalog/standards/sist/922d63ff-ce73-4dfe-82c0-cb9cbd78bebd/sist-en-iso-22459-2022)

The text of ISO 22459:2020 has been approved by CEN as EN ISO 22459:2022 without any modification.

<https://standards.iteh.ai/catalog/standards/sist/922d63ff-ce73-4dfe-82c0-cb9cbd78bebd/sist-en-iso-22459-2022>

**iTeh STANDARD  
PREVIEW  
(standards.iteh.ai)**

[SIST EN ISO 22459:2022](#)

<https://standards.iteh.ai/catalog/standards/sist/922d63ff-ce73-4dfe-82c0-cb9cbd78bebd/sist-en-iso-22459-2022>

INTERNATIONAL  
STANDARDISO  
22459First edition  
2020-06

---

---

**Fine ceramics (advanced ceramics,  
advanced technical ceramics) —  
Reinforcement of ceramic composites  
— Determination of distribution  
of tensile strength and tensile  
strain to failure of filaments within  
a multifilament tow at ambient  
temperature**

iTe STANDARD  
PREVIEW  
(standards.iteh.ai)

*Céramiques techniques — Renfort de céramiques composites —  
Détermination de la distribution de la résistance en traction et de  
la déformation à la rupture en traction de filaments dans un fil  
multifilamentaire à température ambiante*

[https://standards.iteh.ai/catalog/standards/sist/922d6311-  
ce73-4dfe-82c0-cb9cbd78bebd/sist-en-iso-22459-2022](https://standards.iteh.ai/catalog/standards/sist/922d6311-ce73-4dfe-82c0-cb9cbd78bebd/sist-en-iso-22459-2022)

Reference number  
ISO 22459:2020(E)

© ISO 2020

**iTeh STANDARD  
PREVIEW  
(standards.iteh.ai)**

SIST EN ISO 22459:2022

<https://standards.iteh.ai/catalog/standards/sist/922d63ff-ce73-4dfe-82c0-cb9cbd78bebd/sist-en-iso-22459-2022>



**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  
Fax: +41 22 749 09 47  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland



# Contents

	Page
Foreword .....	iv
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Principle</b> .....	<b>2</b>
<b>5 Significance and use</b> .....	<b>2</b>
<b>6 Apparatus</b> .....	<b>3</b>
6.1 Tensile testing equipment .....	3
6.2 Data recording .....	4
<b>7 Test specimen</b> .....	<b>4</b>
7.1 General .....	4
7.2 Window type specimen .....	4
7.3 Cylindrical end type specimen .....	5
<b>8 Test specimen preparation</b> .....	<b>5</b>
8.1 General .....	5
8.2 Window type specimen .....	6
8.3 Cylindrical end type specimen .....	6
8.4 Number of test specimens .....	7
<b>9 Test procedure</b> .....	<b>7</b>
9.1 Determination of the initial cross-section area .....	7
9.2 Determination of the gauge length .....	7
9.3 Gripping .....	7
9.4 Selection of strain rate .....	8
9.5 Test procedure .....	8
9.6 Determination of load train compliance .....	8
9.7 Test validity .....	8
<b>10 Calculation of results</b> .....	<b>8</b>
10.1 Calculation of the load train compliance $C_l$ .....	8
10.2 Calculation of probability of filament rupture $P_j$ from the tests on specimens with a gauge length of 200 mm .....	10
10.2.1 Determination of the true origin .....	10
10.2.2 Construction of envelope curve and determination of instantaneous compliance $C_{tj}$ .....	10
10.2.3 Probability of filament rupture .....	11
10.3 Distribution of filament rupture strain .....	12
10.3.1 Calculation of filament rupture strain .....	12
10.3.2 Filament rupture strain distribution .....	12
10.4 Distribution of filament strength .....	13
10.4.1 Initial cross-section area .....	13
10.4.2 Calculation of filament strength .....	13
10.4.3 Filament strength distribution .....	13
10.4.4 Average filament strengths .....	14
10.4.5 Mean filament strength .....	14
<b>11 Test report</b> .....	<b>14</b>
<b>Annex A (informative) Abstract of the handbook of mathematical functions</b> .....	<b>16</b>
<b>Bibliography</b> .....	<b>17</b>

## ISO 22459:2020(E)

### 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)).

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

This document was prepared by Technical Committee ISO/TC 206, *Fine ceramics*.

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).

<https://standards.iteh.ai/catalog/standards/sist/922d63ff-ce73-4dfe-82c0-cb9cbd78bebd/sist-en-iso-22459-2022>

# Fine ceramics (advanced ceramics, advanced technical ceramics) — Reinforcement of ceramic composites — Determination of distribution of tensile strength and tensile strain to failure of filaments within a multifilament tow at ambient temperature

## 1 Scope

This document specifies the conditions for the determination of the distribution of strength and rupture strain of ceramic filaments within a multifilament tow at room temperature by performing a tensile test on a multifilament tow.

This document applies to dry tows of continuous ceramic filaments that are assumed to act freely and independently under loading and exhibit linear elastic behaviour up to failure. The outputs of this method are not to be mixed up with the strengths of embedded tows determined by using ISO 24046<sup>1)</sup>.

## 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 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 10119, *Carbon fibre — Determination of density*

EN 1007-2, *Advanced technical ceramics — Ceramic composites — Methods of test for reinforcements — Part 2: Determination of linear density*

## 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

#### gauge length

$L_0$

initial distance between two reference points on the tow

Note 1 to entry: Usually the gauge length is taken as the distance between the gripped ends of the tow.

### 3.2

#### initial cross-section area

$S_0$

cross-section area of the tow

1) Under preparation.