International Standard

ISO 19630

Fine ceramics (advanced ceramics, advanced technical ceramics) — Methods of test for reinforcements — Determination of tensile properties of filaments at ambient temperature

Céramiques techniques — Méthodes d'essai pour renforts — Détermination des propriétés en traction des filaments à température ambiante

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Foreword

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This document was prepared by Technical Committee ISO/TC 206, *Fine ceramics*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 184, *Advanced technical ceramics,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 19630:2017) which has been technically revised.

The main changes are as follows:

— Clause 3 updated;

— Clause 6 completely revised;

— Clause 8 updated;

— Clause 11 added;

— editorially revised.

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Fine ceramics (advanced ceramics, advanced technical ceramics) — Methods of test for reinforcements — Determination of tensile properties of filaments at ambient temperature

1 Scope

This document specifies the conditions for determination of the tensile properties of single filaments of ceramic fibre such as the tensile strength, Young modulus and fracture strain.

This document applies to continuous ceramic filaments taken from tows, yarns, braids and knittings, which have strain to fracture less than or equal to 5 %.

This document does not apply to carbon fibres that exhibit a nonlinear stress-strain curve. This document does not apply to checking the homogeneity of strength properties of fibres, or to assessing the effects of volume under stress. Methods of estimation of strength statistical parameters are indicated.

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 19634, *Fine ceramics (advanced ceramics, advanced technical ceramics) — Ceramic composites — Notations and symbols*

ISO 20501, *Fine ceramics (advanced ceramics, advanced technical ceramics) — Weibull statistics for strength data*

EN 1007-3, *Advanced technical ceramics — Ceramic composites — Methods of test for reinforcements — Part 3: Determination of filament diameter and cross-section area*

3 Terms, definitions and symbols

For the purposes of this document, the terms and definitions given in ISO 19634 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
gauge length
L_0
initial distance between two reference points on the filament

3.2
test specimen length
L_f
initial inner distance between the gripped ends of the filament

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3.3
initial cross-section area
S_0
initial area of the cross section of the filament within the *gauge length* (3.1)

3.4
maximum tensile force
F_m
highest recorded force during a tensile test on the specimen when tested to failure

3.5
tensile stress
σ
ratio of the force carried by the test piece by the *initial cross-section area* (3.3)

3.6
tensile strength
σ_m
ratio of the *maximum tensile force* (3.4) to the *initial cross-section area* (3.3)

3.7
longitudinal deformation
A
increase of the gauge length caused by an applied load

3.8
total compliance
C_t
ratio of deformation to the corresponding force during the tensile test

3.9
load train compliance
C_l
ratio of the cross-head displacement excluding any test specimen contribution to the corresponding force during the tensile test

3.10
strain
ε
ratio of *longitudinal deformation* (3.7) to *gauge length* (3.1) defined as the ratio A/L_0

3.11
fracture strain
ε_m
strain (3.10) at failure of the test specimen

3.12
Young modulus
E
slope of the linear part of the stress-strain curve when the linear part starts at the origin

3.13
elementary unit
smallest commercially available unit of a given product

Note 1 to entry: For fibre, this is usually a spool.

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