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Fine ceramics (advanced ceramics, advanced technical ceramics) – Ceramic composites – Determination of the degree of misalignment in uniaxial mechanical tests (ISO 17161:2014)

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Europastandarden EN ISO 17161:2016 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 17161:2016.

The European Standard EN ISO 17161:2016 has the status of a Swedish Standard. This document contains the official English version of EN ISO 17161:2016.

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 17161

April 2016

ICS 81.060.30

Supersedes CEN/TS 15867:2009

English Version

Fine ceramics (advanced ceramics, advanced technical ceramics) - Ceramic composites - Determination of the degree of misalignment in uniaxial mechanical tests (ISO 17161:2014)

Céramiques techniques - Céramiques composites - Détermination du degré de non-alignement lors des essais mécaniques uniaxiaux (ISO 17161:2014)

Hochleistungskeramik - Keramische Verbundwerkstoffe - Bestimmung der Fluchtungsfehler bei mechanischen Prüfungen mit einachsiger Beanspruchung (ISO 17161:2014)

This European Standard was approved by CEN on 25 March 2016.

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.

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European foreword

The text of ISO 17161:2014 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 17161:2016 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 2016, and conflicting national standards shall be withdrawn at the latest by October 2016

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

This document supersedes CEN/TS 15867:2009.

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Endorsement notice

The text of ISO 17161:2014 has been approved by CEN as EN ISO 17161:2016 without any modification.

Fine ceramics (advanced ceramics, advanced technical ceramics) — Ceramic composites — Determination of the degree of misalignment in uniaxial mechanical tests

1 Scope

This International Standard describes a procedure

— to verify the degree of misalignment of the load train of the test machines using a reference test specimen uniformly loaded in tension or in compression, and

— to give indications in order to correct defects such as torsion and bending.

This International Standard is not intended to provide a quantitative and acceptable limit before the testing of ceramic matrix composites with a fibre reinforcement: unidirectional (1D), bidirectional (2D), and tridirectional (xD, with $2 < x \leq 3$) loaded along one principal axis of reinforcement. This limit depends on the sensitivity of each type of composite to the misalignment defect.

NOTE 1 This limit is to be defined between the testing establishment and the customer.

NOTE 2 Monolithic ceramics are very sensitive to misalignment defects while CMCs (ceramic matrix composite) in general are moderately sensitive to them.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3611, *Geometrical product specifications (GPS) — Dimensional measuring equipment: Micrometers for external measurements — Design and metrological characteristics*

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/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

CEN/TR 13233:2007, *Advanced technical ceramics — Notations and symbols* (to be replaced by future ISO NP 19634)

3 Terms and definitions

For the purposes of this document, the terms and definitions given in CEN/TR 13233:2007 (to be replaced by future ISO NP 19634) and the following apply.

3.1 General

3.1.1
calibrated length
l
part of the reference test specimen which has a uniform and minimum cross-section area

3.1.2
width
b
width of the reference test specimen in the calibrated length

3.1.3
thickness
h
thickness of the reference test specimen in the calibrated length

3.2 Type of defects

3.2.1
C-type magnitude
θ
angle between the loading axis of each of the two grips

Note 1 to entry: See Figure 1.

3.2.2
S-type magnitude
d
distance between the loading axis when they are parallel

Note 1 to entry: See Figure 2.

3.2.3
torsion defect magnitude
ϕ
angle between the gripping planes

Note 1 to entry: See Figure 3.

4 Principle

A rectangular cross section of a reference test specimen (Clause 7) equipped with 10 strain gauges is loaded in tension or in compression, up to a load corresponding to 10 % of the nominal load capacity of the load cell used for the tests of CMCs. The stress corresponding to this value shall not exceed 50 % of the elasticity limit of the material used for the reference test specimen. The readings obtained from the strain gauges bonded on the calibrated length of the reference test specimen allow the determination of the degree of misalignment.

The positioning of strain gauges is such that it indicates the magnitude of defects. These magnitudes allow the correction, in a practical manner, of the different types of defects:

— bending defects, either C (Figure 1) or S (Figure 2);

— torsion (Figure 3).

The indications for correction are obtained by comparing the experimental readings of the strain gauges to values from charts established from numerical simulations.

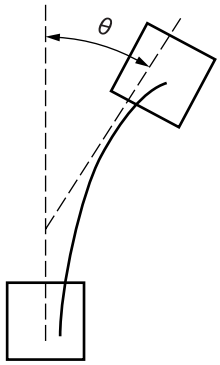


Figure 1 — C defect magnitude

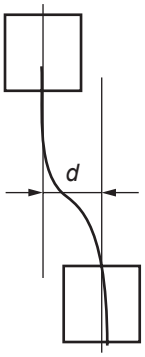
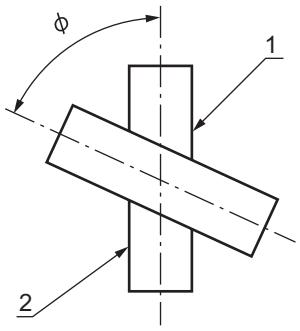


Figure 2 — S defect magnitude



Key

1 lower grip

2 upper grip

Figure 3 — Torsion defect magnitude

5 Apparatus

5.1 Test machine

The configuration of the test machine, including the load train and load cell, shall be identical to the test machine used for the tests on the CMCs and shall be in accordance with ISO 7500-1.