



NSAI
Standards

Irish Standard
I.S. EN ISO 23146:2016

Fine ceramics (advanced ceramics, advanced technical ceramics) - Test methods for fracture toughness of monolithic ceramics - Single-edge V-notch beam (SEVNB) method (ISO 23146:2012)

I.S. EN ISO 23146:2016

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National Foreword

I.S. EN ISO 23146:2016 is the adopted Irish version of the European Document EN ISO 23146:2016, Fine ceramics (advanced ceramics, advanced technical ceramics) - Test methods for fracture toughness of monolithic ceramics - Single-edge V-notch beam (SEVNB) method (ISO 23146:2012)

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EUROPEAN STANDARD

EN ISO 23146

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2016

ICS 81.060.30

Supersedes CEN/TS 14425-5:2004

English Version

Fine ceramics (advanced ceramics, advanced technical ceramics) - Test methods for fracture toughness of monolithic ceramics - Single-edge V-notch beam (SEVNB) method (ISO 23146:2012)

Céramiques techniques - Méthodes d'essai pour la détermination de la ténacité à la rupture des céramiques monolithiques - Méthode sur éprouvette à entaille en V sur une seule face (Méthode SEVNB) (ISO 23146:2012)

Hochleistungskeramik - Prüfverfahren zur Bestimmung der Bruchzähigkeit monolithischer Keramik - Verfahren für Biegeproben mit V-Kerb (SEVNB-Verfahren) (ISO 23146:2012)

This European Standard was approved by CEN on 18 March 2016.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European foreword

The text of ISO 23146:2012 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 23146:2016 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of an identical text or by endorsement, at the latest by October 2016, and conflicting national standards shall be withdrawn at the latest by October 2016.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 14425-5:2004.

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Endorsement notice

The text of ISO 23146:2012 has been approved by CEN as EN ISO 23146:2016 without any modification.

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INTERNATIONAL STANDARD

ISO
23146

Second edition
2012-12-15

Fine ceramics (advanced ceramics, advanced technical ceramics) — Test methods for fracture toughness of monolithic ceramics — Single-edge V-notch beam (SEVNB) method

*Céramiques techniques — Méthodes d'essai pour la détermination de
la ténacité à la rupture des céramiques monolithiques — Méthode sur
éprouvette à entaille en V sur une seule face (Méthode SEVNB)*



Reference number
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ISO 23146:2012(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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 23146 was prepared by Technical Committee ISO/TC 206, *Fine ceramics*.

This second edition cancels and replaces the first edition (ISO 23146:2008), of which it constitutes a minor revision.

Fine ceramics (advanced ceramics, advanced technical ceramics) — Test methods for fracture toughness of monolithic ceramics — Single-edge V-notch beam (SEVNB) method

1 Scope

This International Standard specifies a method for the determination of the fracture toughness of advanced technical ceramics. The procedure makes use of single-edge V-notched bars, which are loaded in four-point bending until failure. It is applicable to monolithic ceramics with a grain size or major microstructural feature size larger than about 1 μm .

The use of this International Standard for yttria tetragonal zirconia polycrystal material (Y-TZP) is not recommended. The method might also be unsuitable for some other very tough or soft ceramics in which a sharp crack does not form at the root of the V-notch.

2 Normative references

The following referenced documents are indispensable for the application 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 3611, *Geometrical product specifications (GPS) — Dimensional measuring instruments; 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 14704, *Fine ceramics (advanced ceramics, advanced technical ceramics) — Test method for flexural strength of monolithic ceramics at room temperature*

ISO 15732, *Fine ceramics (advanced ceramics, advanced technical ceramics) — Test method for fracture toughness of monolithic ceramics at room temperature by single edge precracked beam (SEPB) method*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 15732 apply.

4 Principle

This method of conducting a fracture toughness test is based on the preparation and fracture of bar test pieces in which a sharp-tipped notch is machined. Using the technique of a reciprocating razor blade and diamond paste, a narrow notch can be honed into a test piece using either a manual method or a simple machine. Under well-controlled conditions, a notch-tip radius in the range of 1 μm to 20 μm can be prepared depending on the grain size of the test material. For many materials, this is a close approximation to a sharp crack, and the method has been found to give fracture toughness values very close to those of other methods such as the single-edge precracked beam method (ISO 15732) or the surface crack in flexure method (ISO 18756), provided that a sharp crack forms at the root of the notch either during its preparation or during the subsequent fracture sequence. The method has the advantage of simplicity of notch production compared with using a sharp-tipped diamond saw or a diamond impregnated wire in which the tip radius is normally greater than 50 μm . The method is often

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