



BSI Standards Publication

Advanced technical ceramics — Test methods for determination of fracture toughness of monolithic ceramics

Part 3: Chevron notched beam (CNB)
method

National foreword

This British Standard is the UK implementation of EN 14425-3:2010. It supersedes DD CEN/TS 14425-3:2003 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee RPI/13, Advanced technical ceramics.

A list of organizations represented on this committee can be obtained on request to its secretary.

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ISBN 978 0 580 68820 1

ICS 81.060.30

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 July 2010

Amendments issued since publication

Date	Text affected
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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 14425-3

June 2010

ICS 81.060.30

Supersedes CEN/TS 14425-3:2003

English Version

**Advanced technical ceramics - Test methods for determination
of fracture toughness of monolithic ceramics - Part 3: Chevron
notched beam (CNB) method**

Céramiques techniques avancées - Méthode d'essai de
détermination de la ténacité à la rupture des céramiques
monolithiques - Partie 3: Méthode de l'éprouvette à entaille
en chevron

Hochleistungskeramik - Prüfverfahren zur Bestimmung der
Bruchzähigkeit von monolithischer Keramik - Teil 3:
Verfahren für Biegeproben mit Chevron-Kerb (CNB-
Verfahren)

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Ref. No. EN 14425-3:2010: E

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Foreword

This document (EN 14425-3:2010) has been prepared by Technical Committee CEN/TC 184 “Advanced technical ceramics”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by December 2010, and conflicting national standards shall be withdrawn at the latest by December 2010.

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1 Scope

This European Standard provides a test method for fracture toughness determination based on the chevron-notch method. For the purposes of this European Standard, the term monolithic includes particle and whisker reinforced advanced technical ceramics which can be regarded as macroscopically homogeneous. It does not include long-fibre reinforced ceramics.

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.

EN 843-1:2006, *Advanced technical ceramics — Mechanical properties of monolithic ceramics at room temperature — Part 1: Determination of flexural strength*

EN 1006, *Advanced technical ceramics — Monolithic ceramics — Guidance on the selection of test pieces for the evaluation of properties*

EN 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 7500-1:2004)*

EN ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2005)*

ISO 3611, *Micrometer callipers for external measurement*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

chevron-notch test piece

test piece in which a two coplanar saw cuts are made at an angle to each other part way through a test piece to leave a remaining cross-section with a sharp tip from which a crack may be initiated in a controlled or semi-controlled manner

4 Principle, significance and use

In the chevron-notched beam method, a crack is generated during the test from a sharp tip resulting when two coplanar notches are cut in a test piece (see Figure 1). This overcomes the need to generate sharp planar cracks before commencing the test.

During the test, the crack front widens as the crack propagates from the tip, resulting in an increase in the force required to maintain growth. Countering this, the test piece becomes more compliant as the crack lengthens, and so the two effects result in a peak load being attained after some distance of propagation. The toughness is determined from the peak force applied.

This test method employs the chevron notch in a flexural strength test piece, loaded in four-point bending geometry. The advantage is that it can be performed on standard flexural strength test pieces.