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ADVANCED TECHNICAL CERAMICS - MECHANICAL PROPERTIES OF MONOLITHIC CERAMICS AT ROOM TEMPERATURE - PART 3: DETERMINATION OF SUBCRITICAL CRACK GROWTH PARAMETERS FROM CONSTANT STRESSING RATE FLEXURAL STRENGTH TESTS

National Standards Authority of Ireland
Glasnevin, Dublin 9
Ireland

Tel: +353 1 807 3800
Fax: +353 1 807 3838
http://www.nsai.ie

Sales
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Céramiques techniques avancées - Propriétés mécaniques des céramiques monolithiques à température ambiante - Partie 3: Détermination des paramètres de propagation sous-critique des fissures à partir des essais de résistance à la flexion réalisés à vitesse de contrainte constante

Hochleistungskeramik - Mechanische Eigenschaften monolithischer Keramik bei Raumtemperatur - Teil 3: Bestimmung der Parameter des unterkritischen Risswachstums aus Biegefestigkeitsprüfungen mit konstanter Spannungsrate

This European Standard was approved by CEN on 14 April 2005.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This document (EN 843-3:2005) 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of an identical text or by endorsement, at the latest by December 2005, and conflicting national standards shall be withdrawn at the latest by December 2005.

EN 843 *‘Advanced technical ceramics – Mechanical properties of monolithic ceramics at room temperature’* consists of six parts:

Part 1: *Determination of flexural strength*;

Part 2: *Determination of Young’s modulus, shear modulus and Poisson’s ratio*;

Part 3: *Determination of subcritical crack growth parameters from constant stressing rate flexural strength tests*;

Part 4: *Vickers, Knoop and Rockwell superficial hardness*;

Part 5: *Statistical analysis*;

Part 6: *Guide for fractographic examination*.

This document supersedes ENV843-3:1996.

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

1 Scope

This European Standard specifies a method for the determination of subcritical crack growth parameters of advanced monolithic technical ceramics in the temperature range 15 °C to 30 °C by measuring the dependence of mean fracture strength on the rate of loading. The method is based on strength test procedures described in EN 843-1. This European Standard is not applicable to test pieces with artificially introduced flaws or cracks.

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

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 17025:1999)*

ISO 3611, *Micrometer callipers for external measurement*

ISO 4677-1, *Atmospheres for conditioning and testing — Determination of relative humidity — Part 1: Aspirated psychrometer method*

ISO 4677-2, *Atmospheres for conditioning and testing — Determination of relative humidity — Part 2: Whirling psychrometer method*

3 Terms and definitions

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

3.1
nominal flexural strength
maximum nominal stress at the instant of failure supported by the material when loaded in linear elastic bending

3.2
three-point flexure
means of bending a beam test piece whereby the testpiece is supported on bearings near its ends and a central load is applied

3.3
four-point flexure
means of bending a beam test piece whereby the test piece is supported on bearings near its ends and is equally loaded at two positions symmetrically disposed about the centre of the supported span

3.4
subcritical crack growth
extension of existing cracks or flaws under a stress which does not produce instant failure