National Standards Authority of Ireland

IRISH STANDARD

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ICS 81.060.99

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ADVANCED TECHNICAL CERAMICS - MECHANICAL PROPERTIES OF CERAMIC COMPOSITES AT HIGH TEMPERATURE UNDER INERT ATMOSPHERE - DETERMINATION OF CREEP BEHAVIOUR

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EUROPEAN PRESTANDARD
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Descriptors: composite materials, reinforcing materials, ceramics, technical ceramics, mechanical properties, high temperature tests, determination, creep properties

English version

Advanced technical ceramics - Mechnical properties of ceramic composites at high temperature under inert atmosphere - Determination of creep behaviour

Hochleistungskeramik - Mechanische Eigenschaften von keramischen Verbundwerkstoffen bei hoher Temperatur in inerter Atmosphäre - Bestimmung des Kreichverhaltens

This European Prestandard (ENV) was approved by CEN on 10 August 1998 as a prospective standard for provisional application.

The period of validity of this ENV is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the ENV can be converted into a European Standard.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPAISCHES KOMITEE FUR NORMUNG

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Foreword

This European Prestandard has been prepared by Technical Committee CEN/TC 184 "Advanced technical ceramics", the secretariat of which is held by BSI.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this European Prestandard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European prestandard specifies the conditions for the determination of the tensile creep deformation and failure behaviour of ceramic matrix composite materials with continuous fibre reinforcement for temperatures up to 2 000 °C under vacuum or in a gas atmosphere which is inert to the material under test. The purpose of these test conditions is to prevent changes to the material as a result of chemical reaction with the test environment.

This pre-standard applies to all ceramic matrix composites with a continuous fibre reinforcement, unidirectional (1D), bidirectional (2D), and tridirectional (xD, with $2 < x \leq 3$), loaded along one principal axis of reinforcement.

2 Normative references

This European prestandard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European pre-standard only when incorporated in it by amendment or revision. For undated references the latest edition of publication referred to, applies.

ENV 1892	Advanced technical ceramics - Mechanical properties of ceramic composites at high temperature under inert atmosphere: Determination of tensile properties
EN 60584-1	Thermocouples - Part 1 : Reference tables
EN 60584-2	Thermocouples - Part 2 : Tolerances
EN 10002-2	Metallic materials - Tensile testing - Part 2 : Verification of the force measuring system of the tensile testing machines
ISO 3611	Micrometer callipers for external measurement
WI 136	Code of practice: Code of practice for the measurement of misalignment induced bending in uniaxially loaded tension compression test pieces.

3 Principle

A test specimen of specified dimensions is heated to the test temperature, and loaded in tension until a specified level of force. This force is maintained at a constant level for a specified time or until rupture. The variation in gauge length is recorded in relation to time.

4 Definitions and symbols

For the purposes of this pre-standard, the following definitions and symbols apply:

4.1 creep

The total time-dependent increase of gauge length starting from the time when the constant specified level of force is reached.

4.2 test temperature, T

Temperature of the test specimen at the centre of the gauge length.

4.3 calibrated length, l

The part of the test specimen which has uniform and minimum cross-section area.

4.4 gauge length, L_0

Initial distance between reference points on the test specimen in the calibrated length at test temperature, at moment when loading is completed.

4.5 controlled temperature zone

The part of the calibrated length including the gauge length where temperature is within 50 °C of the test temperature.

4.6 initial cross section area, A_0

Initial cross section area of the test specimen within the calibrated length, at test temperature.

4.7 applied tensile force

The constant force applied to the test specimen during the test.

4.8 applied tensile stress

The applied tensile force divided by the initial cross section area.

4.9 longitudinal deformation, ΔL

Change in the gauge length caused by creep.

4.10 tensile creep strain, ε_{cr}

Relative change in the gauge length at time *t*, caused by creep. The value corresponding to rupture is noted $\varepsilon_{cr,m}$

4.11 creep rupture time, $t_{cr,m}$

The time elapsed from the moment when loading is completed until the moment of rupture.