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ADVANCED TECHNICAL CERAMICS - MECHANICAL PROPERTIES OF CERAMIC COMPOSITES AT ROOM TEMPERATURE - PART 3: DETERMINATION OF FLEXURAL STRENGTH

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Céramiques techniques avancées - Propriétés mécaniques des céramiques composites à température ambiante - Détermination de la résistance en flexion

Hochleistungskeramik - Mechanische Eigenschaften von keramischen Verbundwerkstoffen bei Raumtemperatur - Teil 3: Bestimmung der Biegefestigkeit

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Contents

Foreword

This document (EN 658-3:2002) 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of an identical text or by endorsement, at the latest by February 2003, and conflicting national standards shall be withdrawn at the latest by February 2003.

This document supersedes ENV 658-3:1992.

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

EN 658 has six parts:

— *Part 1: Determination of tensile properties.*

— *Part 2: Determination of compressive properties.*

— *Part 3: Determination of flexural strength.*

— *Part 4: Determination of interlaminar shear strength by compression loading of notched test specimens.*

— *Part 5: Determination of interlaminar shear strength by short span bend test (three-points).*

— *Part 6: Determination of interlaminar shear strength by double-punch shearing.*

1 Scope

This part of EN 658 describes a method for the determination of the flexural strength of ceramic matrix composite materials with continuous fibre reinforcement, under three-point or four-point bend at room temperature. This method applies to all ceramic matrix composites with a continuous fibre reinforcement, unidirectional (1D), bidirectional (2D), and tridirectional xD with (2 < x < or = 3) as defined in ENV 13233, loaded along one principal axis of reinforcement.

NOTE The method should not be used to obtain absolute values of strength for design purposes.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the 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 Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN ISO 7500-1, *Metallic materials - Verification of static uniaxial testing machines - Part 1: Tension/compression testing machines (ISO 7500-1:1999).*

ENV 13233, *Advanced technical ceramics — Ceramic composites — Notations and symbols.*

ISO 3611, *Micrometer callipers for external measurements.*

3 Principle

A test specimen of specified dimensions is flexion loaded to fracture in such a way that failure occurs in tension or compression along one principal axis of reinforcement. The test is performed at constant crosshead displacement rate.

4 Terms, definitions and symbols

For the purposes of this European Standard, the following terms, definitions and symbols and those given in ENV 13233 apply.

4.1
maximum flexural force, F_m
highest recorded force in a flexural test on the test specimen when tested to failure

4.2
flexural stress, σ
the nominal stress on the outer surface of the test specimen, calculated at mid-span

NOTE This stress is conventionally calculated according to the beam theory, whose basic assumptions cannot be met by ceramic matrix composite materials.

4.3
flexural strength, $\sigma_{f,m}$
maximum flexural stress applied to a test specimen that fractures during a flexural test