



National Standards Authority of Ireland

IRISH STANDARD

I.S. EN 658-5:2003

ICS 81.060.30

**ADVANCED TECHNICAL CERAMICS -
MECHANICAL PROPERTIES OF CERAMIC
COMPOSITES AT ROOM TEMPERATURE -
PART 5: DETERMINATION OF
INTERLAMINAR SHEAR STRENGTH BY
SHORT SPAN BEND TEST (THREE POINTS)**

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Advanced technical ceramics - Mechanical properties of ceramic composites at room temperature - Part 5: Determination of interlaminar shear strength by short span bend test (three points)

Céramiques techniques avancées - Propriétés mécaniques des céramiques composites à température ambiante - Partie 5: Détermination de la résistance au cisaillement interlaminaire par essai de flexion sur appuis rapprochés (trois points)

Hochleistungskeramik - Mechanische Eigenschaften von keramischen Verbundwerkstoffen bei Raumtemperatur - Teil 5: Bestimmung der Scherfestigkeit im Drei-Punkt-Biegeversuch mit kurzem Auflagerabstand

This European Standard was approved by CEN on 16 October 2002.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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Foreword

This document (EN 658-5:2002) 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of an identical text or by endorsement, at the latest by June 2003, and conflicting national standards shall be withdrawn at the latest by June 2003.

This document supersedes ENV 658-5:1993.

EN 658 '*Advanced technical ceramics – Mechanical properties of ceramic composites at room temperature*' 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*

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 658-5:2002 (E)

1 Scope

This part of this European Standard specifies the conditions for determination of the interlaminar shear strength of ceramic matrix composite materials with continuous fibre reinforcement at room temperature, by subjecting a test specimen to a short-span bend test (three points). This method applies to all ceramic matrix composites with a continuous fibre reinforcement unidirectional (1D) and bidirectional (2D) and tridirectional (xD, with $2 < x < 3$) as defined in ENV 13233.

Two other methods for the determination of shear strength are given in further parts of EN 658.

NOTE 1 The interlaminar shear characteristics can vary significantly depending on test specimen preparation and dimensions, rate of application of the test force, surface condition, etc..

NOTE 2 However, results obtained by this part of EN 658 cannot be compared with results obtained by the two other methods.

NOTE 3 Care should be exercised in interpreting the results of the method to obtain absolute values of the interlaminar shear strength of ceramic matrix composites 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).

ENV 13233:1998, *Advanced technical ceramics – Ceramic composites – Notations and symbols*.

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

ISO 3611, *Micrometer callipers for external measurement*.

3 Principle

The test consists of measuring the force required to fracture a test specimen subjected to a short-span, three point bend test. The geometry of loading in the direction normal to the plies (direction 3) and the test specimen dimensions shall be such that failure occurs in the form of interlaminar shear in plane (1,2). 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 13233:1998 apply.

4.1

shear failure force, F

the maximum force required to produce interlaminar shear failure when test specimen is subjected to three-points short span bend test

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