Nederlandse

norm

NEN-ISO 20506 (en)

Fine ceramics (advanced ceramics, advanced technical ceramics) - Determination of the in-plane shear strength of continuous-fibre-reinforced composites at ambient temperature by the Iosipescu test (ISO 20506:2005,IDT)

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Als Nederlandse norm is aanvaard:

- ISO 20506:2005,IDT

Normcommissie 342 032 "Technische keramiek"

NEN

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INTERNATIONAL STANDARD

ISO 20506

First edition
2005-10-01

Fine ceramics (advanced ceramics, advanced technical ceramics) — Determination of the in-plane shear strength of continuous-fibre-reinforced composites at ambient temperature by the losipescu test

Céramiques techniques — Détermination de la résistance au cisaillement plan des composites renforcés de fibres continues à température ambiante par l'essai de losipescu

Reference number
ISO 20506:2005(E)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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ISO 20506 was prepared by Technical Committee ISO/TC 206, *Fine ceramics.*

INTERNATIONAL STANDARD ISO 20506:2005(E)

Fine ceramics (advanced ceramics, advanced technical ceramics) — Determination of the in-plane shear strength of continuous-fibre-reinforced composites at ambient temperature by the Iosipescu test

1 Scope

This International Standard specifies a method for the determination of in-plane shear strength of continuous-fibre-reinforced ceramic composites at ambient temperature by the Iosipescu test. Methods for test piece fabrication, testing modes and rates (load rate or displacement rate), data collection, and reporting procedures are addressed.

This International Standard applies primarily to advanced ceramic or glass-matrix composites with continuous-fibre reinforcement having uni-directional (1-D), bi-directional (2-D) or 3-D fibre architecture. This test method does not address composites with discontinuous-fibre-reinforced, whisker-reinforced or particulate-reinforced ceramics.

NOTE 1 Values expressed in this International Standard are in accordance with the International System of Units (SI).

NOTE 2 This International Standard is based on ASTM C1292.

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.

ISO 3611, *Micrometer callipers for external measurement*

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*

ASTM C1292, *Standard Test Method for Shear Strength of Continuous Fiber-Reinforced Advanced Ceramics at Ambient Temperatures*

3 Terms and definitions

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

3.1
fine ceramic (advanced ceramic, advanced technical ceramic)
highly engineered, high-performance predominately non-metallic, inorganic, ceramic material having specific functional attributes

3.2
continuous-fibre-reinforced ceramic composite
CFCC
ceramic matrix composite in which the reinforcing phase consists of a continuous fibre, continuous yarn, or a woven fabric

3.3
shear failure load
maximum load required to fracture a shear-loaded test piece

3.4
shear strength
maximum shear stress which a material is capable of sustaining

NOTE Shear strength is calculated from the shear-fracture load and the shear-loaded area.

4 Symbols and designations

Symbols used throughout this International Standard and their designations are given in Table 1.

Table 1 — Symbols and designations

Symbol	Designation	Unit	References
L	Test piece length	mm	Table 2
h	Distance between notches	mm	Table 2 Equation 2
w	Test piece width	mm	Table 2
t	Test piece thickness	mm	Table 2 Equation 2
R	Notch radius	mm	Table 2
θ	Notch angle	°	Table 2
n	Number of valid tests	1	Equations 3, 4
P_{max}	Maximum load	N	Equation 1
A	Shear area of test piece	mm^2	Equation 1
τ_{IP}	In-plane shear strength	MPa	Equation 1
$\overline{X}$	mean	MPa	Equation 3, 4, 5
SD	standard deviation	MPa	Equation 4
CV	Coefficient of variation	1	Equation 5

5 Principle

This International Standard is for material development, material comparison, quality assurance, characterization, reliability and design data generation. The in-plane shear strength of continuous-fibre-reinforced ceramic composites, as determined by this International Standard, is measured by the Iosipescu test. According to this test, the shear strength is determined by loading a test coupon in the form of a rectangular flat strip with symmetric, centrally located V-notches using a mechanical testing machine and a modified asymmetric four-point bending fixture. Failure of the test piece occurs by shear between the V-notches. Schematics of the test setup and the test piece are shown in Figures 1 and 2.

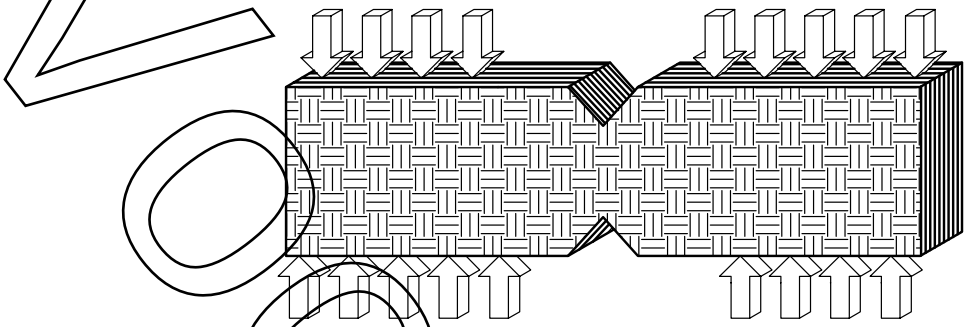

Figure 1 — Schematic of Iosipescu test piece subjected to asymmetric four-point bending

Dimensions in millimetres

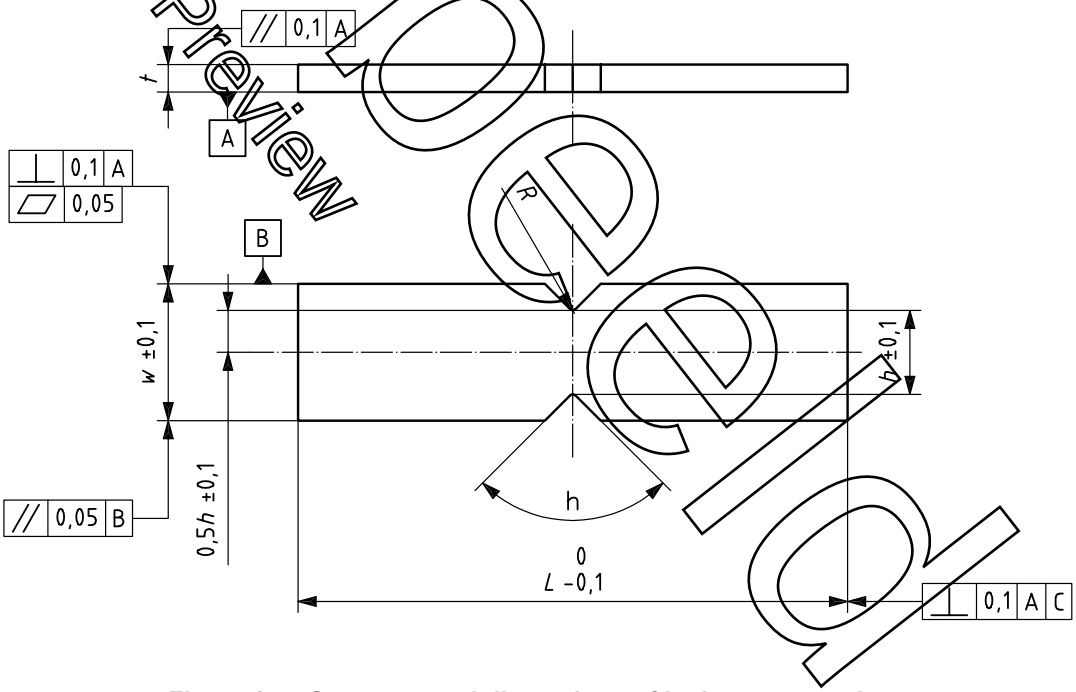

Figure 2 — Geometry and dimensions of Iosipescu test piece

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