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**Fina keramika (sodobna keramika, sodobna tehnična keramika) - Mehanske lastnosti keramičnih kompozitov pri sobni temperaturi - Določevanje medplastne strižne trdnosti in strižnega modula kompozitov, ojačanih z neprekinjenimi vlakni, s stiskanjem preizkušancev z dvojnim vrezom in z losipescujevim preskusom (ISO 20505:2023)**

Fine ceramics (advanced ceramics, advanced technical ceramics) - Mechanical properties of ceramic composites at room temperature - Determination of the interlaminar shear strength and shear modulus of continuous-fibre-reinforced composites by the compression of double-notched test pieces and by the losipescu test (ISO 20505:2023)

Hochleistungskeramik - Mechanische Eigenschaften von keramischen Verbundwerkstoffen bei Raumtemperatur - Bestimmung der Scherfestigkeit und des Schubmoduls endlosfaserverstärkter Verbundwerkstoffe durch Druckbeanspruchung von doppeltgekerbten Proben und durch den losipescu-Test (ISO 20505:2023)

Céramiques techniques - Propriétés mécaniques des céramiques composites à température ambiante - Détermination de la résistance au cisaillement interlaminaire et du module de cisaillement des composites renforcés par des fibres continues, par la compression d'éprouvettes à double entaille et par l'essai losipescu (ISO 20505:2023)

**Ta slovenski standard je istoveten z: prEN ISO 20505**

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81.060.30      Sodobna keramika      Advanced ceramics

**oSIST prEN ISO 20505:2025**      **en,fr,de**



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20505

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2023-10

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**Fine ceramics (advanced ceramics, advanced technical ceramics) — Mechanical properties of ceramic composites at room temperature — Determination of the interlaminar shear strength and shear modulus of continuous-fibre-reinforced composites by the compression of double-notched test pieces and by the Iosipescu test**

*Céramiques techniques — Propriétés mécaniques des céramiques composites à température ambiante — Détermination de la résistance au cisaillement interlaminaire et du module de cisaillement des composites renforcés par des fibres continues, par la compression d'éprouvettes à double entaille et par l'essai Iosipescu*



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# Contents

Page

<b>Foreword</b> .....	<b>iv</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Principle</b> .....	<b>4</b>
4.1 General.....	4
4.2 Double-notched test.....	4
4.3 Iosipescu test.....	4
<b>5 Apparatus</b> .....	<b>5</b>
5.1 Test machine.....	5
5.2 Load train.....	5
5.2.1 Generalities.....	5
5.2.2 Test fixtures.....	6
5.3 Strain gauges for Iosipescu test specimen.....	8
5.4 Data acquisition.....	9
5.5 Dimension-measuring devices.....	9
<b>6 Test specimens</b> .....	<b>9</b>
6.1 Double-notched test piece.....	9
6.2 Iosipescu test piece.....	11
<b>7 Test specimen preparation</b> .....	<b>12</b>
7.1 Machining and preparation.....	12
7.2 Bonding of the gauges.....	12
7.3 Number of test specimens.....	12
<b>8 Test procedures</b> .....	<b>12</b>
8.1 Displacement rate.....	12
8.2 Measurement of test specimen dimensions.....	13
8.3 Testing technique.....	13
8.3.1 Specimen mounting.....	13
8.3.2 Measurements.....	14
8.4 Test validity.....	15
<b>9 Calculation of results</b> .....	<b>16</b>
9.1 Shear strength.....	16
9.1.1 Double-notched test piece.....	16
9.1.2 Iosipescu test piece.....	16
9.2 Shear strain (Iosipescu test).....	17
9.3 Shear-stress-shear-strain curves.....	17
9.4 Elastic shear modulus, pseudo-elastic shear modulus.....	17
9.5 Statistics.....	18
<b>10 Report</b> .....	<b>18</b>
<b>Annex A (informative) New materials: verification of shear stress field in the Iosipescu test</b> .....	<b>20</b>
<b>Bibliography</b> .....	<b>21</b>

# ISO 20505:2023(E)

## 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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

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

This second edition cancels and replaces the first edition (ISO 20505:2005), which has been technically revised.

The main changes are as follows:

- Scope revised to include the possibility of measuring the interlaminar shear modulus through the use of a gauges-instrumented Iosipescu sample;
- new entries added to [Clause 3](#);
- [5.3](#) and [7.2](#) specify requirements on the gauges-instrumented Iosipescu sample;
- [9.3](#), [9.4](#) and [9.5](#) define formulae to determine the shear modulus;
- material orientation added to [Figure 2](#) and [Figure 3](#);
- subclause on test validity added ([8.4](#));
- [Table 1](#) and [Table 2](#) updated;
- [Annex A](#) replaced by a method to verify the shear stress field in the Iosipescu test to ensure that there are no coupling effects that make this document unsuitable for determining the interlaminar shear properties of the material;
- minor editorial corrections;
- structure revised;
- symbols and notation modified in accordance with ISO 19634.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

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# Fine ceramics (advanced ceramics, advanced technical ceramics) — Mechanical properties of ceramic composites at room temperature — Determination of the interlaminar shear strength and shear modulus of continuous-fibre-reinforced composites by the compression of double-notched test pieces and by the Iosipescu test

## 1 Scope

This document specifies a method for the determination of interlaminar shear strength at ambient temperature by the compression of a double-notched test piece and a method for the determination of interlaminar shear strength and modulus at ambient temperature by the Iosipescu test. This document applies to all ceramic matrix composites with a continuous fibre reinforcement, having unidirectional (1D), bidirectional (2D) and multidirectional ( $x$ D, with  $x > 2$ ) fibre architecture, where a major part of reinforcements is a stack of plies.

This document is applicable to material development, material comparison, quality assurance, characterization, reliability and design data generation. The simpler compression test method of a double-notched test piece is applicable only when the shear strength has to be measured.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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, *Geometrical product specifications (GPS) — Dimensional measuring equipment: Micrometers for external measurements — Design and metrological characteristics*

ISO 7500-1, *Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification of the force-measuring system*

ISO 17161, *Fine ceramics (advanced ceramics, advanced technical ceramics) — Ceramic composites — Determination of the degree of misalignment in uniaxial mechanical tests*

ISO 19634, *Fine ceramics (advanced ceramics, advanced technical ceramics) — Ceramic composites — Notations and symbols*

ISO 20507, *Advanced ceramics — Vocabulary*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 20507 and ISO 19634 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

## ISO 20505:2023(E)

### 3.1 shear section

section located between the notches of test sample

Note 1 to entry: Due to the orientation of the test sample (see [Figures 2](#) and [3](#)), the shear plane is orthogonal to direction 3 and parallel to the stack of plies (plane 1, 2). Therefore, the shear mechanism occurs between the composite plies and the resulting shear properties, with respect to the definition given in ISO 20507, are labelled as “interlaminar”.

### 3.2 initial shear section area

$S_0$   
shear section area before test between the notches of the test piece at room temperature

### 3.3 shear section area

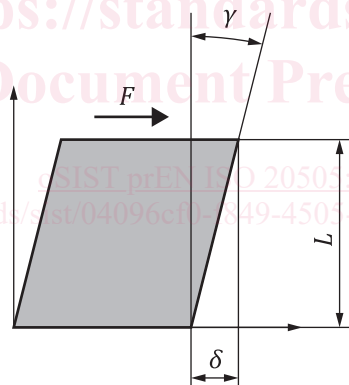
$S_e$   
effective shear loaded section area of the test piece at room temperature

Note 1 to entry: This effective shear loaded section area is determined when a valid failure occurs in a plane parallel to the shear plane in an Iosipescu test sample.

### 3.4 shear force

$F$   
force parallel to the shear section carried by the test specimen at any time during the shear test

Note 1 to entry: See [Figure 1](#).



#### Key

$F$  shear force  
 $\gamma$  shear strain

$L$  height of the cubic element  
 $\delta$  displacement

**Figure 1 — Shear force and shear strain**

### 3.5 maximum shear force

$F_m$   
maximum force parallel to the shear section during a test or at fracture