

**SLOVENSKI STANDARD**  
**oSIST prEN ISO 23153-2:2019**  
**01-april-2019**

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**Polimerni materiali - Materiali na osnovi polietereeterketona (PEEK) za oblikovanje in ekstrudiranje - 2. del: Priprava preskušancev in ugotavljanje lastnosti (ISO/DIS 23153-2:2019)**

Plastics - Polyetheretherketone (PEEK) moulding and extrusion materials - Part 2: Preparation of test specimens and determination of properties (ISO/DIS 23153-2:2019)

Kunststoffe - Polyetheretherketone (PEEK)-Werkstoffe - Teil 2: Herstellung von Probekörpern und Bestimmung der Eigenschaften (ISO/DIS 23153-2:2019)

Plastiques - Matériaux à base de polyétheréthercétone (PEEK) pour moulage et extrusion - Partie 2: Préparation des éprouvettes et détermination des propriétés (ISO/DIS 23153-2:2019)

**Ta slovenski standard je istoveten z: prEN ISO 23153-2**

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**ICS:**

83.080.20      Plastomeri      Thermoplastic materials

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## ISO/DIS 23153-2

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## Plastics — Polyetheretherketone (PEEK) moulding and extrusion materials —

Part 2:

### Preparation of test specimens and determination of properties

*Plastiques — Polyétheréthercétone (PEEK) pour moulage et extrusion —**Partie 2: Préparation des éprouvettes et détermination des propriétés*

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## ISO/DIS 23153-2:2019(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 documents 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)).

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The committee responsible for this document is Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials*.

A list of all parts in the ISO 23153- series can be found on the ISO website.

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# Plastics — Polyetheretherketone (PEEK) moulding and extrusion materials —

## Part 2: Preparation of test specimens and determination of properties

### 1 Scope

This document specifies the methods of preparation of test specimens and the test methods to be used in determining the properties of polyetheretherketone (PEEK) moulding and extrusion materials. Requirements for handling test material and for conditioning both the test material before moulding and the specimens before testing are given.

Procedures and conditions for the preparation of test specimens and procedures for measuring properties of the materials from which these specimens are made are also given. Properties and test methods that are suitable and necessary to characterize PEEK moulding and extrusion materials are listed.

The properties have been selected from the general test methods in ISO 10350-1. Other test methods in wide use for or of particular significance to these moulding and extrusion materials are also included in this document, as are the designatory properties specified in ISO 23153-1.

In order to obtain reproducible and comparable test results, it is necessary to use the methods of preparation and conditioning, the specimen dimensions and the test procedures specified herein. Values determined will not necessarily be identical to those obtained using specimens of different dimensions or prepared using different procedures.

### 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 62, *Plastics — Determination of water absorption*

ISO 75-1, *Plastics — Determination of temperature of deflection under load — Part 1: General test method*

ISO 75-2, *Plastics — Determination of temperature of deflection under load — Part 2: Plastics and ebonite*

ISO 178, *Plastics — Determination of flexural properties*

ISO 179-1, *Plastics — Determination of Charpy impact properties — Part 1: Non-instrumented impact test*

ISO 294-1, *Plastics — Injection moulding of test specimens of thermoplastic materials — Part 1: General principles, and moulding of multipurpose and bar test specimens*

ISO 294-3, *Plastics — Injection moulding of test specimens of thermoplastic materials — Part 3: Small plates*

ISO 294-4, *Plastics — Injection moulding of test specimens of thermoplastic materials — Part 4: Determination of moulding shrinkage*

ISO 527-1, *Plastics — Determination of tensile properties — Part 1: General principles*

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ISO 527-2, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics*

ISO 1133-1, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 1: Standard method*

ISO 1183-1, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pyknometer method and titration method*

ISO 1183-3, *Plastics — Methods for determining the density of non-cellular plastics — Part 3: Gas pyknometer method*

ISO 3915, *Plastics — Measurement of resistivity of conductive plastics*

ISO 10350-1, *Plastics — Acquisition and presentation of comparable single-point data — Part 1: Moulding materials*

ISO 11357-2, *Plastics — Differential scanning calorimetry (DSC) — Part 2: Determination of glass transition temperature and glass transition step height*

ISO 11357-3, *Plastics — Differential scanning calorimetry (DSC) — Part 3: Determination of temperature and enthalpy of melting and crystallization*

ISO 11359-2, *Plastics — Thermomechanical analysis (TMA) — Part 2: Determination of coefficient of linear thermal expansion and glass transition temperature*

ISO 11443, *Plastics — Determination of the fluidity of plastics using capillary and slit-die rheometers*

ISO 15512, *Plastics — Determination of water content*

ISO 20753, *Plastics — Test specimens*

ISO 23153-1, *Plastics — Polyetheretherketone (PEEK) moulding and extrusion materials — Part 1: Designation system and basis for specifications*

IEC 60112, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60243-1, *Electrical strength of insulating materials — Test methods — Part 1: Tests at power frequencies*

IEC 60296, *Fluids for electrotechnical applications — Unused mineral insulating oils for transformers and switchgear*

IEC 60695-11-10, *Fire hazard testing — Part 11-10: Test flames — 50 W horizontal and vertical flame test methods*

IEC 62631-2-1, *Dielectric and resistive properties of solid insulating materials — Part 2-1: Relative permittivity and dissipation factor — Technical frequencies (0,1 Hz - 10 MHz) — AC methods*

IEC 62631-3-1, *Dielectric and resistive properties of solid insulating materials — Part 3-1: Determination of resistive properties (DC methods)— Volume resistance and volume resistivity — General method*

### **3 Terms and definitions**

No terms and definitions are listed in this document.

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

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



## 4 Preparation of test specimens

### 4.1 General

It is essential that specimens are always prepared by the same procedure (injection moulding), using the same processing conditions.

The procedure to be used is indicated in Table 1

### 4.2 Treatment of material before moulding

Product shall pre-dried to moisture level of not greater than 0,05% according to ISO 15512

### 4.3 Injection moulding

Injection-moulded specimens shall be prepared in accordance with ISO 294-1 or ISO 294-3, using the conditions specified in Table 1.

An appropriate hold pressure, consistent with the production of blemish-free mouldings, shall be used.

**Table 1 — Conditions for injection moulding of test specimens**

Material	Melt temperature °C	Mould temperature °C	Average injection velocity mm/s	Cooling time s	Total cycle time s
PEEK	360 – 400 <sup>a, b</sup>	175-210	100 ± 20 <sup>c</sup>	25 ± 10*	60 ± 10*
<sup>a</sup> Excessively high temperatures should be avoided for grades containing PTFE <sup>b</sup> Higher temperatures (up to 420 °C) may be required for filled grades <sup>c</sup> Based on specimen type A1 specified in ISO 20753					

## 5 Conditioning of test specimens

Unfilled PEEK test specimens shall be conditioned for at least 16 h at 23 °C ± 2 °C, with no relative humidity requirement. Specimens containing fillers or additives that are susceptible to moisture uptake shall be conditioned for at least 16 h at 23 °C ± 2 °C and (50 ± 10) % relative humidity.

## 6 Determination of properties

**Table 2 — General properties and test conditions (selected from ISO 10350-1)**

No.	Property	Symbol	Unit	Standard	Specimen type (dimension in mm)	Specimen preparation	Test conditions and supplementary instructions
<b>1</b>	<b>Rheological properties</b>						
1.1	Melt volume-flow rate	MVR	cm <sup>3</sup> /10 min	ISO 1133-1	Moulding compound	—	400 °C / 2,16 kg for MVR > 2,5 cm <sup>3</sup> /10min 400 °C / 10 kg for low-flow materials Refer to ISO 1133-1 for guidance
1.2	Moulding shrinkage	S <sub>Mp</sub>	%	ISO 294-4	60 x 60 x 2	M	Parallel
1.3		S <sub>Mn</sub>					Normal
<b>2</b>	<b>Mechanical properties</b>						

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Table 2 (continued)

No.	Property	Symbol	Unit	Standard	Specimen type (dimension in mm)	Specimen preparation	Test conditions and supplementary instructions	
2.1	Tensile modulus	$E_t$	GPa	ISO 527-1 ISO 527-2	ISO 20753 Type A1 or A2	M	Test speed 1 mm/min	
2.2	Yield stress	$\sigma_y$	MPa				Failure with yielding: Test speed 50 mm/min Failure without yielding: $\epsilon_B \leq 10\%$ : test speed 5 mm/min $\epsilon_B > 10\%$ : test speed 50 mm/min	
2.3	Yield strain	$\epsilon_y$	%					
2.4	Nominal strain at break	$\epsilon_{tB}$	%					
2.5	Stress at break	$\sigma_B$	MPa					
2.6	Strain at break	$\epsilon_B$	%					
2.7	Flexural modulus	$E_f$	GPa	ISO 178	80 × 10 × 4	M		Failure without yielding: use method A: 2 mm/min for materials that break without yield; Yields without break: use method B: measure modulus at 2mm/min then increase test speed to 100mm/min
2.8	Flexural strength at break / maximum flexural strength	$\sigma_{fM}$	MPa					
2.9	Charpy impact strength	$a_{cU}$	kJ/m <sup>2</sup>				ISO 179-1	
2.10	Charpy notched impact strength	$a_{cN}$		V-notch, $r = 0,25$	Method 1eA (edgewise impact)			
<b>3 Thermal properties</b>								
3.1	Melting temperature	$T_m$	°C	ISO 11357-3	Moulding compound	—	Record peak temperature Use 10 K/min	
3.2	Glass transition temperature	$T_g$		ISO 11357-2			Record midpoint temperature Use 10 K/min	
3.3	Temperature of deflection under load	$T_f 1,8$		ISO 75-1 and ISO 75-2	80 × 10 × 4		M	Flexural stress: 1,8 MPa or 8,0 MPa Flatwise loading
3.4		$T_f 8,0$						
3.5	Coefficient of linear thermal expansion	$\alpha_p$	ppm/K	ISO 11359-2	Prepared from ISO 20753	M	Parallel	Record secant value over temperature range 23 °C to 55 °C
3.6		$\alpha_n$					Transverse	
3.7	Burning behaviour	B50/3		IEC 60695-11-10	125 × 13 × 3		Record classification V-0, V-1, V-2, HB40 or HB75	
<b>4 Electrical properties</b>								