

### SLOVENSKI STANDARD SIST EN ISO 19628:2021

01-maj-2021

Nadomešča:

SIST EN 1159-3:2004

SIST EN 1159-3:2004/AC:2007 SIST EN 1159-3:2004/AC:2008

Fina keramika (sodobna keramika, sodobna tehnična keramika) - Termofizikalne lastnosti keramičnih kompozitov - Ugotavljanje specifične toplotne kapacitete (ISO 19628:2017)

Fine ceramics (advanced ceramics, advanced technical ceramics). Thermophysical properties of ceramic composites - Determination of specific heat capacity (ISO 19628:2017) (standards.iteh.ai)

Hochleistungskeramik - Thermophysikalische Eigenschaften von keramischen Verbundwerkstoffen - Bestimmung der spezifischen Wärmekapazität (ISO 19628:2017)

Céramiques techniques - Propriétés thermophysiques des composites céramiques - Détermination de la capacité thermique specifique (ISO 19628:2017)

Ta slovenski standard je istoveten z: EN ISO 19628:2021

ICS:

81.060.30 Sodobna keramika Advanced ceramics

SIST EN ISO 19628:2021 en,fr,de

**SIST EN ISO 19628:2021** 

## iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN ISO 19628:2021

 $https://standards.iteh.ai/catalog/standards/sist/1\overline{9b7}85b8-da93-4aff-b229-b6387911e84e/sist-en-iso-19628-2021$ 

### **EUROPEAN STANDARD** NORME EUROPÉENNE **EUROPÄISCHE NORM**

**EN ISO 19628** 

March 2021

ICS 81.060.30

Supersedes EN 1159-3:2003

#### **English Version**

Fine ceramics (advanced ceramics, advanced technical ceramics) - Thermophysical properties of ceramic composites - Determination of specific heat capacity (ISO 19628:2017)

Céramiques techniques - Propriétés thermophysiques des composites céramiques - Détermination de la capacité thermique specifique (ISO 19628:2017)

Hochleistungskeramik - Thermophysikalische Eigenschaften von keramischen Verbundwerkstoffen -Bestimmung der spezifischen Wärmekapazität (ISO 19628:2017)

This European Standard was approved by CEN on 22 February 2021.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member. standards.iteh.ai)

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 CEN-CENELEC Management Centre has the same status as the official versions log/standards/sist/19b785b8-da93-4aff-b229-

b6387911e84e/sist-en-iso-19628-2021 CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION COMITÉ EUROPÉEN DE NORMALISATION EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

#### EN ISO 19628:2021 (E)

Contents	Page	Page	
European foreword		₹	

## iTeh STANDARD PREVIEW (standards.iteh.ai)

<u>SIST EN ISO 19628:2021</u> https://standards.iteh.ai/catalog/standards/sist/19b785b8-da93-4aff-b229-b6387911e84e/sist-en-iso-19628-2021

EN ISO 19628:2021 (E)

#### **European foreword**

The text of ISO 19628:2017 has been prepared by Technical Committee ISO/TC 206 "Fine ceramics" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 19628:2021 by Technical Committee CEN/TC 184 "Advanced technical ceramics" the secretariat of which is held by DIN.

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 September 2021, and conflicting national standards shall be withdrawn at the latest by September 2021.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 1159-3:2003.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

### (staendorsement notice

The text of ISO 19628:2017 has been approved by CEN as EN ISO 19628:2021 without any modification. https://standards.itch.avcatalog/standards/sist/19b/85b8-da93-4aff-b229-b6387911e84e/sist-en-iso-19628-2021

**SIST EN ISO 19628:2021** 

## iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN ISO 19628:2021

 $https://standards.iteh.ai/catalog/standards/sist/1\overline{9b7}85b8-da93-4aff-b229-b6387911e84e/sist-en-iso-19628-2021$ 

**SIST EN ISO 19628:2021** 

## INTERNATIONAL STANDARD

ISO 19628

First edition 2017-04

Fine ceramics (advanced ceramics, advanced technical ceramics) —
Thermophysical properties of ceramic composites — Determination of specific heat capacity

Teh ST céramiques techniques — Propriétés thermophysiques des composites Détermination de la capacité thermique specifique

(standards.iteh.ai)

<u>SIST EN ISO 19628:2021</u> https://standards.iteh.ai/catalog/standards/sist/19b785b8-da93-4aff-b229-b6387911e84e/sist-en-iso-19628-2021



Reference number ISO 19628:2017(E)

ISO 19628:2017(E)

### iTeh STANDARD PREVIEW (standards.iteh.ai)

<u>SIST EN ISO 19628:2021</u> https://standards.iteh.ai/catalog/standards/sist/19b785b8-da93-4aff-b229-b6387911e84e/sist-en-iso-19628-2021



#### COPYRIGHT PROTECTED DOCUMENT

© ISO 2017, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office Ch. de Blandonnet 8 • CP 401 CH-1214 Vernier, Geneva, Switzerland Tel. +41 22 749 01 11 Fax +41 22 749 09 47 copyright@iso.org www.iso.org

Contents		Page	
Fore	eword		iv
1	Scop	oe	1
2	-	mative references	
3		ns and definitions	
4		hod A – drop calorimetry Principle	
	4.1 4.2	Apparatus	
	4.3	Standard reference materials	
	4.4	Test specimens	
	4.5	Calibration of calorimeter	
		4.5.1 General	
		4.5.2 Electrical calibration	
		4.5.3 Calibration using standard reference material	3
	4.6	Test procedures	
		4.6.1 Test without a crucible	
		4.6.2 Test with a crucible	
		4.6.3 Description of test	
	4.7	Calculations	
		4.7.1 General	
		4.7.2 Determination of the calorimetric calibration factor	5
		4.7.3 Determination of mean specific heat capacity $C_p$ (standards.iteh.ai)	
5	Meth	hod B – differential scanning calorimetry Principle 5.1.1 General 6387911e84e/sist_en-iso-19628-2021 5.1.2 Stepwise heating method	6
	5.1	Principle Principle Principle Alexander System Annual Principle Pr	6
		5.1.1 General 5.387911e84e/sist-en-iso-19628-2021	6
		5.1.2 Stepwise heating method	6
	<b>F</b> 0	5.1.3 Continuous heating method	
	5.2	Apparatus	
	5.3 5.4	Standard reference materials, SRM	
	5. <del>4</del> 5.5	Test specimens Temperature calibration	
	5.6	Test procedure for the determination of $C_p$	
	5.0	5.6.1 General	
		5.6.2 Method 1: Measurements requiring the knowledge of the <i>K</i> factor	
		5.6.3 Method 2: measurements requiring the use of a reference standard	
		material (SRM)	
	5.7	Calculation of results	
		5.7.1 Method requiring the knowledge of the <i>K</i> factor	
		5.7.2 Method using an SRM	16
6	Test	Test report	
Ann		ormative) Drop calorimetry - determination of the calibration factor using	
		dard reference material	
	-	nformative) Standard reference material	
Ann	ex C (in	formative) Materials for calorimeter calibrations	25
Bibl	iograpł	hv	26

ISO 19628:2017(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 <a href="www.iso.org/directives">www.iso.org/directives</a>).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see <a href="https://www.iso.org/patents">www.iso.org/patents</a>).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: <a href="https://www.iso.org/iso/foreword.html">www.iso.org/iso/foreword.html</a> (standards.iteh.ai)

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

<u>SIST EN ISO 19628:2021</u>

https://standards.iteh.ai/catalog/standards/sist/19b785b8-da93-4aff-b229-b6387911e84e/sist-en-iso-19628-2021

# Fine ceramics (advanced ceramics, advanced technical ceramics) — Thermophysical properties of ceramic composites — Determination of specific heat capacity

#### 1 Scope

This document describes two methods for the determination of the specific heat capacity of ceramic matrix composites with continuous reinforcements (1D, 2D, 3D).

Unidirectional (1D), bi-directional (2D) and tridirectional (XD, with  $2 < x \le 3$ ).

The two methods are:

- method A: drop calorimetry;
- method B: differential scanning calorimetry.

They are applicable from ambient temperature up to a maximum temperature, depending on the method: method A can be used up to 2 250 K, while method B is limited to 1 900 K.

NOTE Method A is limited to the determination of an average value of the specific heat capacity over a given temperature range and can give a larger spread of results.

(standards.iteh.ai)

#### 2 Normative references

#### SIST EN ISO 19628:2021

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/s Forndated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

IEC 60584-1, Thermocouples — Part 1: Reference tables

#### 3 Terms and definitions

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

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

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

#### 3.1

#### specific heat capacity

 $C_{\rm r}$ 

amount of heat required to raise the temperature of a mass unit of material by 1 K at constant temperature and pressure

$$C_{\rm p} = \frac{1}{m} \frac{dQ}{dT}$$

where *Q* is the heat required for a test-piece of mass *m*.

#### ISO 19628:2017(E)

#### 3.2

#### mean specific heat capacity

 $C_{\mathfrak{p}}$ 

amount of heat required to raise the temperature of a mass unit of a material from temperature  $T_1$  to temperature  $T_2$  at a constant pressure, divided by the temperature increase  $(T_2 - T_1)$  expressed in K

3.3

#### representative volume element

**RVE** 

minimum volume which is representative of the material considered

#### 4 Method A - drop calorimetry

#### 4.1 Principle

A test piece is dropped from a conditioning chamber at a constant temperature  $T_1$  to another chamber at a constant temperature  $T_2$ .

The mean specific heat capacity is determined from the measured amount of heat required to maintain the temperature constant in the second chamber. Transfer of the test piece shall be done under conditions as close as possible to adiabatic conditions.

### 4.2 Apparatus iTeh STANDARD PREVIEW

**4.2.1 Drop calorimeter**, there are several types of drop calorimeters. They include one (or more) conditioning chambers and measuring chambers, which can be operated under controlled atmosphere and which are all equipped with a temperature control system that allows a temperature stability of less than 1 K.

https://standards.iteh.ai/catalog/standards/sist/19b785b8-da93-4aff-b229-

The conditioning chamber shall have a homogeneous temperature zone size greater than the test specimen size. The measuring chamber shall have a homogeneous temperature zone of a sufficient length to accept several specimens and a sufficient thermal inertia to limit the temperature disturbance, due to the drop.

Heat transfer by radiation during the drop shall be avoided as far as possible.

- **4.2.2 Balance**, with an accuracy of 0,1 mg for test pieces over 10 mg and an accuracy of 0,01 mg for test pieces below 10 mg.
- **4.2.3 Temperature detectors**, thermocouples in accordance with IEC 60584-1 shall be used for the measurement of temperature up to  $1\,920$  K.

For higher temperatures, infrared detectors or any other suitable device may be used.

**4.2.4 Data acquisition system**, the sampling period during the test shall be less than 0,5 s.

#### 4.3 Standard reference materials

Standard reference materials which can be used for calibration purposes are listed in Annex B.

#### 4.4 Test specimens

The test specimens shall be representative of the material.