Irish Standard
I.S. EN ISO 17139:2022

Fine ceramics (advanced ceramics, advanced technical ceramics) - Thermophysical properties of ceramic composites - Determination of thermal expansion (ISO 17139:2014)

I.S. EN ISO 17139:2022

Incorporating amendments/corrigenda/National Annexes issued since publication:

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National Foreword

I.S. EN ISO 17139:2022 is the adopted Irish version of the European Document EN ISO 17139:2022, Fine ceramics (advanced ceramics, advanced technical ceramics) - Thermophysical properties of ceramic composites - Determination of thermal expansion (ISO 17139:2014)

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 17139

April 2022

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Supersedes EN 1159-1:2003

English Version

Fine ceramics (advanced ceramics, advanced technical ceramics) - Thermophysical properties of ceramic composites - Determination of thermal expansion (ISO 17139:2014)

Céramiques techniques - Propriétés thermophysiques des composites céramiques - Détermination de la dilatation thermique (ISO 17139:2014)

Hochleistungskeramik - Thermophysikalische Eigenschaften keramischer Verbundwerkstoffe - Bestimmung der Wärmeausdehnung (ISO 17139:2014)

This European Standard was approved by CEN on 27 March 2022.

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

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European foreword

The text of ISO 17139:2014 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 17139:2022 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of an identical text or by endorsement, at the latest by October 2022, and conflicting national standards shall be withdrawn at the latest by October 2022.

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.

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The text of ISO 17139:2014 has been approved by CEN as EN ISO 17139:2022 without any modification.

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I.S. EN ISO 17139:2022

INTERNATIONAL STANDARD

ISO 17139

First edition
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Fine ceramics (advanced ceramics, advanced technical ceramics) — Thermophysical properties of ceramic composites — Determination of thermal expansion

Céramiques techniques — Propriétés thermophysiques des composites céramiques — Détermination de la dilatation thermique

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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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The committee responsible for this document is ISO/TC 206, *Fine ceramics*.

Fine ceramics (advanced ceramics, advanced technical ceramics) — Thermophysical properties of ceramic composites — Determination of thermal expansion

1 Scope

This International Standard describes methods for the determination of linear thermal expansion characteristics of ceramic matrix composite materials up to 2 300 K, and is applicable to 1D, 2D, and nD materials.

The method describes general principles of construction, calibration, and operation of the equipment.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

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

3 Terms and definitions

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

3.1
linear thermal expansion
positive or negative change in one dimension that occurs when a material is subjected to a change in temperature

3.2
linear thermal expansion coefficient at temperature T
derivative of the length L with respect to temperature at the temperature T, divided by the length at temperature T

$$\alpha_T = \frac{1}{L}\left(\frac{dL}{dT}\right)$$

3.3
mean linear thermal expansion coefficient between temperatures T_1 and T_2
linear thermal expansion between temperatures T_1 and T_2 divided by the temperature increment T_1 to T_2 and the length at temperature T_1

$$\alpha(T_1,T_2) = \frac{L(T_2)-L(T_1)}{L(T_1)} \times \frac{1}{(T_2-T_1)}$$

3.4
representative volume element
RVE
minimum volume which is representative of the material considered