



**NSAI**  
Standards

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**

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*This document is based on:*

EN ISO 17139:2022

*Published:*

2022-04-06

*This document was published under the authority of the NSAI and comes into effect on:*

2022-04-24

ICS number:

81.060.30

NOTE: If blank see CEN/CENELEC cover page

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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

EN ISO 17139

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2022

ICS 81.060.30

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.

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**EN ISO 17139:2022 (E)**

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of an identical text or by endorsement, at the latest by October 2022, and conflicting national standards shall be withdrawn at the latest by October 2022.

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## **Endorsement notice**

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

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INTERNATIONAL  
STANDARD

ISO  
17139

First edition  
2014-06-15

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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*



Reference number  
ISO 17139:2014(E)

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**ISO 17139:2014(E)**



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Published in Switzerland

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## ISO 17139:2014(E)

### Foreword

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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  $T_2 - T_1$  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

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