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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.

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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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

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