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**Carbonaceous products for the  
production of aluminium — Baked  
anodes and shaped carbon products  
— Determination of the coefficient of  
linear thermal expansion**

*Produits carbonés utilisés pour la production de l'aluminium —  
Anodes cuites et produits carbonés formés — Détermination du  
coefficient de 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)).

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 [www.iso.org/patents](http://www.iso.org/patents)).

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

For an explanation of 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 [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 226, *Materials for the production of primary aluminium*.

This second edition cancels and replaces the first edition (ISO 14420:2005), of which it constitutes a minor revision.

The main changes to the previous edition are as follows:

- [5.4](#) has been revised to remove micrometer calliper;
- the formulae in [Clause 9](#), previously Clause 10, have been revised;
- [Clause 10](#), previously Clause 9, has been revised according to ISO/IEC Directives Part 2.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html)

## Introduction

This document is based on DIN 51909:2009.



# Carbonaceous products for the production of aluminium — Baked anodes and shaped carbon products — Determination of the coefficient of linear thermal expansion

## 1 Scope

This document specifies a method to determine the coefficient of linear thermal expansion of carbonaceous or graphite materials (solid materials) for the production of aluminium between 20 °C and 300 °C. It applies to baked anodes and shaped carbon products.

## 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 13385-1, *Geometrical product specifications (GPS) — Dimensional measuring equipment — Part 1: Design and metrological characteristics of callipers*

DIN 1333, *Presentation of numerical data*

## 3 Terms and definitions

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

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

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

### 3.1 coefficient of linear thermal expansion

$\alpha(\vartheta)$

coefficient of thermal expansion correlated with the length change of a body with temperature

Note 1 to entry: The coefficient of linear thermal expansion,  $\alpha(\vartheta)$ , is calculated using [Formula \(1\)](#):

$$\alpha(\vartheta) = \frac{1}{l} \cdot \frac{dl}{d\vartheta} \quad (1)$$

where

$l$  is the length of the test specimen at temperature  $\vartheta$ ;

$d$  is the derivative;

$\frac{dl}{d\vartheta}$  is the length change with temperature.