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EUROPEAN STANDARD

EN ISO 22007-6

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2015

ICS 83.080.01

English Version

Plastics - Determination of thermal conductivity and thermal diffusivity - Part 6: Comparative method for low thermal conductivities using a temperature-modulation technique (ISO 22007-6:2014)

Plastiques - Détermination de la conductivité thermique et de la diffusivité thermique - Partie 6: Méthode comparative pour faibles conductivités thermiques utilisant une technique de modulation de la température (ISO 22007-6:2014)

Kunststoffe - Bestimmung der Wärmeleitfähigkeit und der Temperaturleitfähigkeit - Teil 6: Vergleichsmethoden für geringe Wärmeleitfähigkeit unter Anwendung einer Temperaturanpassungsmethode (ISO 22007-6:2014)

This European Standard was approved by CEN on 12 March 2015.

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.

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.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

The text of ISO 22007-6:2014 has been prepared by Technical Committee ISO/TC 61 "Plastics" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 22007-6:2015 by Technical Committee CEN/TC 249 "Plastics" the secretariat of which is held by NBN.

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of an identical text or by endorsement, at the latest by September 2015, and conflicting national standards shall be withdrawn at the latest by September 2015

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

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 22007-6:2014 has been approved by CEN as EN ISO 22007-6:2015 without any modification.

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INTERNATIONAL
STANDARD

ISO
22007-6

First edition
2014-06-01

**Plastics — Determination of thermal
conductivity and thermal diffusivity —**

Part 6:

**Comparative method for low thermal
conductivities using a temperature-
modulation technique**

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Reference number
ISO 22007-6:2014(E)

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

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ISO 22007-6:2014(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 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).

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 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 61, *Plastics*, Subcommittee SC 5, *Physical-chemical properties*.

ISO 22007 consists of the following parts, under the general title *Plastics — Determination of thermal conductivity and thermal diffusivity*:

- Part 1: *General principles*
- Part 2: *Transient plane heat source (hot disc) method*
- Part 3: *Temperature wave analysis method*
- Part 4: *Laser flash method*
- Part 5: *Results of interlaboratory testing of poly(methyl methacrylate) samples* [Technical Report]
- Part 6: *Comparative method for low thermal conductivities using a temperature-modulation technique*

Introduction

Thermal insulating properties have become more important in view of power-saving technology. The method which is applicable to measure the lower thermal conductivity in smaller scale with a small amount of a specimen, such as a tray for food, a thermal printing film, a gelled sheet for the electric parts inside laptop PC, an adhesive paste, etc., is required for the micro-scale thermal design of plastics. A double-sensor system of high-sensitivity thermopile located in the different distances in the modulated temperature field, which is controlled by the Peltier thermo-module, is proposed for the determination of thermal conductivity of plastics. A decay parameter is utilized to determine the thermal conductivity of the sample. This method is applied to the measurement of low thermal conductivity in the range below 1,0 W/mK.

In contrast to a pulse or a transient method, high sensitivity and high-temperature resolution are characteristic of temperature modulated technique, in which employment of a lock-in amplifier reduces any influence of noise and interference.

The thermal conductivity of materials that are poor conductors of heat is usually determined by measuring the larger temperature gradients in the sample produced by a steady flow of heat in one-dimensional geometry. In order to reduce the errors of radiation and convection, it often requires large, precisely shaped samples and extreme care to be used successfully.

This part of ISO 22007 specifies a modulated temperature method to determine the thermal conductivity with a small temperature variation, minimizing the influence of radiation and convection.

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