

BS EN ISO 22007-1:2012



BSI Standards Publication

Plastics — Determination of thermal conductivity and thermal diffusivity

Part 1: General principles (ISO
22007-1:2009)

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National foreword

This British Standard is the UK implementation of EN ISO 22007-1:2012. It is identical to ISO 22007-1:2009.

The UK participation in its preparation was entrusted to Technical Committee PRI/21, Testing of plastics.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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English Version

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Plastiques - Détermination de la conductivité thermique et de la diffusivité thermique - Partie 1: Principes généraux (ISO 22007-1:2009)

Kunststoffe - Bestimmung der Wärmeleitfähigkeit und der Temperaturleitfähigkeit - Teil 1: Allgemeine Grundlagen (ISO 22007-1:2009)

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Management Centre: Avenue Marnix 17, B-1000 Brussels

Foreword

The text of ISO 22007-1:2009 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 22007-1:2012 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of an identical text or by endorsement, at the latest by July 2012, and conflicting national standards shall be withdrawn at the latest by July 2012.

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.

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Endorsement notice

The text of ISO 22007-1:2009 has been approved by CEN as a EN ISO 22007-1:2012 without any modification.

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO 22007-1 was prepared by Technical Committee 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: Determination of thermal conductivity and thermal diffusivity of poly(methyl methacrylate)*
[Technical Report] (in preparation)

Plastics — Determination of thermal conductivity and thermal diffusivity —

Part 1: General principles

SAFETY STATEMENT — Persons using this document should be familiar with normal laboratory practice, if applicable. This document does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any regulatory requirements.

1 Scope

This part of ISO 22007 describes the background to methods for the determination of the thermal conductivity and thermal diffusivity of polymeric materials. Different techniques are available for these measurements and some may be better suited than others for a particular type, state and form of material. This part of ISO 22007 provides a broad overview of these techniques. Standards specific to these techniques, as referenced in this part of ISO 22007, are used to carry out the actual test method.

2 Normative references

The following referenced documents are indispensable for the application 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 472, *Plastics — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 472 and the following apply.

3.1

heat pulse

heat change in the form of a pulse produced by a heat source

3.2

heat pulse energy

amount of heat produced by a heat source within the heat pulse

NOTE It is expressed in joules (J).

3.3

heat source

heater in the form of a wire, strip, plate or foil embedded within or attached to a test specimen or an area irradiated by incident light, e.g. a laser

3.4
heat flux

q

heat source output produced by a planar source per unit time and unit area

NOTE It is expressed in watts per square metre (W/m²).

3.5
linear heat flow

heat source output produced by a linear source per unit time and unit length

NOTE It is expressed in watts per metre (W/m).

3.6
penetration depth

characteristic depth used for describing the extent of heat penetration into the specimen during a transient measuring process

NOTE It is expressed in metres (m).

3.7
temperature transient

temporary perturbation of temperature in a system initially at a uniform temperature due to a heat pulse for a period during which the system does not attain equilibrium

3.8
volumetric heat capacity
product of the density and the heat capacity

NOTE It is expressed in joules per cubic metre kelvin [J/(m³·K)].

3.9
thermal effusivity

b

heat transport property given by the square root of the product of thermal conductivity and volumetric heat capacity:

$$b = \sqrt{\lambda \cdot \rho \cdot c_p}$$

where

λ is the thermal conductivity;

ρ is the density;

c_p is the heat capacity

NOTE It is expressed in joules per square metre kelvin square root second [J/(m²·K·s^{1/2})].

3.10
thermal resistivity
reciprocal of thermal conductivity

NOTE It is expressed in metre kelvins per watt [(m·K)/W].

4 Principles

Thermal conductivity refers specifically to the mode of heat transfer via conduction. In thermal conductivity measurements, other modes of heat transfer, such as convection, radiation and mass transfer, may occur. Where these modes are significant, the measured property is usually referred to as apparent or effective