

Plastics - Determination of thermal conductivity and thermal diffusivity - Part 3: Temperature wave analysis method (ISO 22007-3:2008)

EESTI STANDARDI EESSÕNA

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English Version

Plastics - Determination of thermal conductivity and thermal diffusivity - Part 3: Temperature wave analysis method (ISO 22007-3:2008)

Plastiques - Détermination de la conductivité thermique et de la diffusivité thermique - Partie 3: Méthode par analyse de l'oscillation de la température (ISO 22007-3:2008)

Kunststoffe - Bestimmung der Wärmeleitfähigkeit und der Temperaturleitfähigkeit - Teil 3: Temperaturwellen-Analysenverfahren (ISO 22007-3:2008)

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Foreword

The text of ISO 22007-3:2008 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 22007-3:2012 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of an identical text or by endorsement, at the latest by July 2012, and conflicting national standards shall be withdrawn at the latest by July 2012.

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Endorsement notice

The text of ISO 22007-3:2008 has been approved by CEN as a EN ISO 22007-3:2012 without any modification.

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Introduction

Thermal-transport properties of plastics are indispensable not only in the plastics industry but also in other fields. Plastics are used in various manufacturing processes in new application areas, such as nanotechnologies, and in the biomedical industry. Accurate but simple small-scale measurements are required which can be performed quickly.

High sensitivity and excellent temperature resolution are peculiar to the modulation techniques used for the measurement of thermal-transport properties. Temperature wave analysis is a method of measuring the thermal diffusivity of thin specimens and is also suitable for use with small specimens.

Plastics — Determination of thermal conductivity and thermal diffusivity —

Part 3: Temperature wave analysis method

1 Scope

This part of ISO 22007 specifies a temperature wave analysis method for the determination of the thermal diffusivity of thin films and plates of plastics in the through-thickness direction. The method can be used on plastics in either the solid or molten state, and having either an isotropic or an orthotropic structure.

The method covers values of the thermal diffusivity, α , in the range $1,0 \times 10^{-8} \text{ m}^2\cdot\text{s}^{-1} < \alpha < 1,0 \times 10^{-4} \text{ m}^2\cdot\text{s}^{-1}$.

Measurements can be performed either in air or in another atmosphere, e.g. an inert gas, at atmospheric pressure or at other, reduced or elevated, pressures, or under a vacuum, at a variety of temperatures.

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*

ISO 22007-1, *Plastics — Determination of thermal conductivity and thermal diffusivity — Part 1: General principles*

ISO 80000-5, *Quantities and units — Part 5: Thermodynamics*

ISO/IEC Guide 98-3, *Uncertainty of measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 472, ISO 22007-1 and ISO 80000-5 and the following apply.

3.1

temperature wave

temperature oscillation produced by a power-modulated heat source

3.2

phase shift

$\Delta\theta$

phase difference of the temperature wave between the front and rear surfaces of a specimen

NOTE A delay is defined as a negative phase shift.