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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 42919.2-2025

**Plastics - Determination of thermal conductivity and thermal
diffusivity - Part 2: Transient plane heat source (hot disc)
method**

塑料 导热系数和热扩散系数的测定 第2部分：瞬态平面热源（热盘）法
(English Translation)

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document is Part 2 of GB/T 42919, "Determination of thermal conductivity and thermal diffusivity of plastics". GB/T 42919 has been issued.

The following parts were laid out.

- Part 1: General Rules;
- Part 2: Transient Planar Heat Source (Heat Plate) Method;
- Part 3: Temperature Wave Analysis;
- Part 4: Laser Flash Method;
- Part 6: Comparative method based on temperature modulation technology.

This document is modified to adopt ISO 22007-2:2022 "Determination of thermal conductivity and thermal diffusivity of plastics - Part 2: Transient planar thermal conductivity." Source (hot plate) method.

This document has undergone significant structural adjustments compared to ISO 22007-2:2022. A comparison of the structural numbering changes between the two documents is provided below.

See Appendix A for the table.

The technical differences between this document and ISO 22007-2:2022, and the reasons therefor, are as follows.

---Change part of section 6.2.1 in ISO 22007-2:2022 to note 4 in the scope (see Chapter 1) to conform to...

GB/T 1.1-2020 Drafting Principles;

---ISO 22007-1 (see Chapter 3) has been replaced with the normatively referenced GB/T 42919.1 to adapt to my country's technical conditions, and has been improved.

Increase operability;

---Change part of section 6.1.3 in ISO 22007-2:2022 to note (see 6.2.3) to conform to GB/T 1.1-2020.

in principle;

---The reason why thermal paste is not applicable in section 6.1.4 of ISO 22007-2:2022 has been changed to note (see section 6.2.4) for greater clarity;

---Added "Result Representation" (see Chapter 9) to increase operability.

The following editorial changes have been made to this document.

---Informative reference GB/T 10295 has replaced ISO 8301, GB/T 10294 has replaced ISO 8302, and GB/T 2035 has replaced...

ISO 472 has been changed (see Chapter 1);

---Added Appendix A (information) "Comparison of this document with ISO 22007-2:2022 structure numbering".

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the China Petroleum and Chemical Industry Federation.

This document is under the jurisdiction of the National Technical Committee on Plastics Standardization (SAC/TC15).

Introduction

The development and application of new and improved materials are growing significantly across a wide range of fields, including physics, chemistry, biology, and medicine. This necessitates the development of advanced materials.

Thermal performance measurement methods can provide higher quality performance data. Introducing relatively simple, rapid, and highly accurate alternative methods is beneficial for the scientific and engineering communities.

This will greatly benefit the world.

Many measurement techniques known as transient methods have been developed, some of which have been commercialized. These techniques have wide applications and are suitable for testing.

Various types of materials. In some cases, it can be used to measure multiple properties

individually or simultaneously.

Some measurement techniques in the transient method can eliminate the influence of the interfacial contact thermal resistance between the probe and the sample surface (see 8.2.1), therefore...

It can determine the true volumetric properties of materials.

GB/T 42919, "Determination of Thermal Conductivity and Thermal Diffusivity of Plastics," describes various principles for determining the thermal conductivity and thermal diffusivity of plastics.

The diffusion coefficient method is proposed to consist of six parts.

---Part 1: General Rules. The aim is to establish universal definitions and guidelines for the test methods of determining thermal conductivity and thermal diffusivity.

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---Part 2: Transient Plane Heat Source (Heat Plate) Method. The purpose is to provide a transient plane method for determining the thermal conductivity and thermal diffusivity of plastics.

The heat source (heat plate) method establishes an operable, traceable, and verifiable procedure.

---Part 3: Temperature Wave Analysis. The purpose is to establish a temperature wave analysis method for determining the thermal conductivity and thermal diffusivity of plastics.

An operable, traceable, and verifiable procedure.

---Part 4: Laser Flash Method. The purpose is to establish an operable laser flash method for determining the thermal conductivity and thermal diffusivity of plastics.

A process that is operational, traceable, and verifiable.

---Part 5: Interlaboratory Testing Results of Polymethyl methacrylate Samples. The aim was to conduct interlaboratory testing of polymethyl methacrylate samples.

The thermal conductivity and thermal diffusivity of methyl acrylate were measured and experimental data were provided.

---Part 6: Comparative Method Based on Temperature Modulation Techniques. The aim is to provide a method for determining the specific thermal conductivity of low-temperature-conductivity materials using temperature modulation techniques.

The method should establish an operable, traceable, and verifiable procedure.

Determination of thermal conductivity and thermal diffusivity of plastics Part 2: Transient Planar Heat Source (Heat Plate) Method

1 Scope

This document describes a method for determining the thermal conductivity, thermal diffusivity, and specific heat capacity per unit volume of plastics.

This document applies to homogeneous and isotropic materials as well as anisotropic materials with uniaxial structures.

This document applies to the determination of thermal conductivity λ of $0.01 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ to $500 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ at test temperatures of 50 K to 1000 K.

Materials with a thermal diffusivity α of $5 \times 10^{-8} \text{ m}^2\cdot\text{s}^{-1}$ to $10^{-4} \text{ m}^2\cdot\text{s}^{-1}$.

Note 1: Specific heat capacity per unit volume C , $C = \rho \cdot c_p$, where ρ is density and c_p is the specific heat capacity per unit mass under constant pressure. Specific heat capacity per unit volume C can be measured by heat conduction.

The coefficient λ is obtained by dividing the thermal diffusivity α , such as $C = \lambda / \alpha$, with a range of approximately $0.005 \text{ MJ}\cdot\text{m}^{-3}\cdot\text{K}^{-1}$ 2 Normative references the contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included.

For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies.

This document.

GB/T 42919.1 Determination of thermal conductivity and thermal diffusivity of plastics - Part 1: General rules (GB/T 42919.1-2023) ISO 22007-1:2017, MOD)

3 Terms and Definitions

The terms and definitions defined in GB/T 42919.1 and the following terms and definitions apply to this document.

probing depth

Within the time window used for calculation, the distance reached by the thermal pulse along the direction of heat flow within the sample is measured.

Note 1: The expression for the detection depth is as follows.

$d_p = \kappa \alpha \cdot t_{\max}$ in the formula.

κ --- A dimensionless constant related to the sensitivity of temperature recording;

α --- Thermal diffusivity of the sample, in square meters per second (m^2/s);

$t_{\max}$ --- The maximum time window used to calculate heat transfer performance, in seconds (s).