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

GB/T 42919.1-2023

**Plastics - Determination of thermal conductivity and thermal
diffusivity - Part 1: General principles**

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Standardization Administration**

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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 1 of GB/T 42919 "Determination of Thermal Conductivity and Thermal Diffusion Coefficient of Plastics". GB/T 42919 has been issued

The following parts have been published.

---Part 1. General principles;

---Part 3. Temperature wave analysis method;

---Part 4. Laser flash method;

---Part 6. Comparative method based on temperature modulation technology.

This document has been modified to adopt ISO 22007-1:2017 "Determination of thermal conductivity and thermal diffusivity of plastics - Part 1. General principles".

Compared with ISO 6721-6:2019, this document has many structural adjustments. Comparison list of structure number changes between two files

See Appendix A for the table.

The technical differences between this document and ISO 22007-1:2017 and their reasons are as follows.

---Replaced ISO 472 with normatively quoted GB/T 2035 to adapt to my country's technical conditions;

---The ideal model in Table 2 is changed from $d_s/h > 10$, diameter d_s or sample side length greater than 10mm to $d_s/h > 3$, diameter d_s or sample

The sample side length is 5mm~20mm to meet the technical requirements of GB/T

42919.4;

---The sample size in 5.2.5 is changed from "usually the diameter is 10mm~20mm, the thickness is 1mm~3mm" to "the usual diameter is 10mm~20mm, the thickness is 1mm~3mm"

5mm~20mm, thickness 0.5mm~3mm", short laser or flash pulse wavelength changed from "< 500μs" to

"< 1ms" to adapt to the technical requirements of GB/T 42919.4;

---The coefficient in formula (10) is changed from 0.1388 to 0.13879 to adapt to the technical requirements of GB/T 42919.4.

The following editorial changes have been made to this document.

---The symbol of the characteristic parameter sample thickness is changed from w to h (see Table 2);

--- Added informative references to GB/T 42919.3, GB/T 42919.4 (see 5.1 and Appendix B) and GB/T 42919.6 (see

Appendix B);

---Replaced ISO 8302 with the informative reference GB/T 10294 (see 5.3.1);

---Added Appendix A (informative) "List of comparison of structure numbers between this document and ISO 22007-1:2017".

Please note that some content in this document may be subject to patents. The publisher of this document assumes no responsibility for identifying patents.

Introduction

Thermal conductivity and thermal diffusivity can be measured using different methods, and some methods may be more suitable for specific types and conditions than other techniques.

state and form of materials. This document provides an overview of these methods. Various methods described in this document have corresponding standards and are applied in practice

testing.

GB/T 42919 specifies methods for measuring the thermal conductivity and thermal diffusion coefficient of plastics based on various principles. It is planned to consist of six parts.

---Part 1. General principles. The purpose is to establish common definitions and methods for measuring thermal conductivity and thermal diffusivity.

content.

---Part 2. Transient plane heat source (hot plate) method. The purpose is to determine the transient plane of the thermal conductivity and thermal diffusivity of plastics.

Heat source (hot plate) method establishes operable, traceable, and verifiable procedures.

---Part 3. Temperature wave analysis method. The purpose is to establish a temperature wave analysis method for measuring the thermal conductivity and thermal diffusion coefficient of plastics.

Actionable, traceable, and verifiable procedures.

---Part 4. Laser flash method. The purpose is to establish an operable method for the laser flash method to determine the thermal conductivity and thermal diffusion coefficient of plastics.

operational, traceable, and verifiable procedures.

---Part 5. Interlaboratory test results of polymethylmethacrylate samples. The purpose is to conduct polymethylpropylene testing through multiple laboratories.

The thermal conductivity and thermal diffusion coefficient of methyl olefinate are measured and test data are provided.

---Part 6. Comparative method based on temperature modulation technology. The purpose is to provide a method for determining the ratio of low thermal conductivity using temperature modulation techniques.

Compare laws and establish operable, traceable and verifiable procedures.

Determination of thermal conductivity and thermal diffusion coefficient of plastics

Part 1. General principles

Warning. Personnel using this document should be familiar with normal laboratory operations, where applicable. This document is not intended to address issues related to its use

security issues (if any). It is the user's responsibility to establish appropriate safety and health safeguards and ensure compliance with all regulatory requirements.

1 Scope

This document establishes general principles for the determination of thermal conductivity and thermal diffusivity of polymeric materials.

This document is applicable to the determination of thermal conductivity and thermal diffusion coefficient of polymer materials.

2 Normative reference documents

The contents of the following documents constitute essential provisions of this document through normative references in the text. Among them, the dated quotations

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

this document.

GB/T 2035 Plastic terms and definitions (GB/T 2035-2008, ISO 472.1999, IDT)

3 Terms and definitions

The terms and definitions defined in GB/T 2035 and below apply to this document.

3.1

heatpulseheatpulse

Pulses generated by changes in heat from a heat source.

3.2

heatpulseenergyheatpulseenergy

The heat of a thermal pulse generated by a heat source.

Note. The unit is Joule (J).

3.3

heat sourceheatsource

A wire, strip, plate or foil embedded or attached to a specimen, or an area to which incident light (such as a laser) is applied.

3.4

heat fluxheatflux

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

Note. The unit is Watts per square meter (W/m²).

3.5

linearheatflowlinearheatflow

The heat output produced by a line source per unit time and unit length.

Note. The unit is watts per meter (W/m).