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

GB/T 46781-2025

**Metallic and other inorganic coatings - Determination of
thermal conductivity of thermal barrier coatings**

金属及其他无机覆盖层 热障涂层热导率的测定

(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 modified to adopt ISO 18555:2016 "Metallic and other inorganic thermal barrier coatings - Determination of thermal conductivity".

Compared with ISO 18555:2016, this document has undergone the following structural adjustments.

---Chapter 5 corresponds to Chapter 5 and sections 5.1 to 5.8 of ISO 18555:2016;

---The suspended section adds the heading "7.2.3.1 General Rules". 7.2.3.2 and 7.2.3.3 correspond to 7.2.3.1 and 7.2.3.3 in ISO 18555:2016.

7.2.3.2.

The technical differences between this document and ISO 18555:2016, and the reasons therefor, are as follows.

---The scope of application has been expanded (see Chapter 1) to adapt to my country's

technological conditions;

---ISO 1463 (see 7.1) has been replaced with the normatively referenced GB/T 6462 to adapt to my country's technical conditions;

---ISO 18755:2005 has been replaced with the normatively referenced ISO 18755:2022 (see Chapters 3, 5, and 7.2.2) to accommodate [the change].

my country's technological conditions.

The following editorial changes have been made to this document.

---In section 7.2.3.2, ISO 18755:2005 is replaced with ISO 18755:2022 as cited in the documentation.

---Added introductory text to the calculation steps of the surface heat diffusion time method.

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 Machinery Industry Federation.

This document is under the jurisdiction of the National Technical Committee on Standardization of Metallic and Non-metallic Coatings (SAC/TC57).

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Introduction

Thermal barrier coatings are highly advanced material systems, typically applied to the surfaces of hot-end components made of nickel-based or cobalt-based superalloys, such as those in thermal power plants.

High-temperature components such as combustion chambers, blades, and guide vanes of power generation gas turbines and aero engines.

This type of coating maintains a significant temperature difference between the load-bearing alloy substrate and the coating surface by employing high thermal resistance

materials, thereby providing long-term protection for the metal.

The components are protected from high-temperature corrosion. Its thermal insulation function increases the operating temperature limit of the components, significantly extending their service life.

Although thermal conductivity is a core performance parameter of thermal barrier coatings, the current international standard (ISO 18755:2022) only provides specifications for single ceramic coatings.

The method for determining the thermal diffusivity of ceramic materials does not cover the testing of thermal conductivity of thermal barrier coating systems.

Metallic and other inorganic coatings Determination of thermal conductivity of thermal barrier coating

1 Scope

This document describes the thermal conductivity of a thermal barrier coating consisting of a metal binder and a ceramic topcoat at room temperature in the direction perpendicular to the coating surface.

Measurement method.

This document applies to the determination of the thermal conductivity of thermal barrier coatings.

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 6462 Microscopic method for measuring the thickness of metal and oxide coatings (GB/T 6462-2005, ISO 1463:2003) IDT) ISO 18755:2022 Fine ceramics (advanced ceramics, advanced industrial ceramics) - Determination of thermal diffusivity of bulk ceramics by laser scintillation method [Fineceramics (advanced ceramics, advanced technicalceramics)-Determination ofthermal EN821-3:2005 Advanced industrial ceramics - Thermophysical properties of single-crystal ceramics - Part 3: Determination of specific heat capacity

3 Terms and Definitions

The terms and definitions defined in ISO 18755:2022, as well as the following terms and definitions, apply to this document.

A dual-layer structure consisting of a metal bonding layer (BC) and a ceramic topcoat (TC), designed to reduce heat transfer from the outside of the topcoat to the substrate.

A coating with a layered structure.

Note: See Figure 1.