

ICS 25.220.20

CCS A29



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

GB/Z 45463-2025

**Method for porosity measurement of thermally sprayed
coatings**

热喷涂涂层孔隙率的测定

Issued on: March 28, 2025

Implemented on: October 1, 2025

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

Table of Contents

1 Scope	1
2 Normative references	1
3 Terms and Definitions	1
4 Purpose	1
5 Categories	1
6 Principle	1
7 Equipment	1
8 Metallographic sample preparation	2
8.1 Overview	2
8.2 Cutting	2
8.3 Cleaning	2
8.4 Mosaic	2
8.5 Grinding and polishing	3
9 Metallographic Inspection Process	4
10 Characterization of Porosity	4
5 Appendix A (Informative) Table of talpha values at different n and alpha values.....	6

Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part

1. Structure and drafting rules for standardization documents" Drafting. This document is modified to adopt ISO /T R26946.2011 "Determination of porosity of thermal spray coatings". Compared with ISO /T R26946.2011, this document has made the following structural adjustments.

--- Chapter 4 corresponds to Chapter 2 in ISO /T R26946.2011;

--- Chapter 5 corresponds to Chapter 3 of ISO /T R26946.2011;

--- Chapter 6 corresponds to Chapter 4 of ISO /T R26946.2011;

--- Chapter 7 corresponds to Chapter 5 and 5.1~

5.6 in ISO /T R26946.2011;

--- Chapter 8 corresponds to Chapter 6 of ISO /T R26946.2011; 8.1~

8.5 correspond to Chapter 6 of ISO /T R26946.2011 6.1~6.5;

--- Chapter 9 corresponds to Chapter 7 of ISO /T R26946.2011;

--- Chapter 10 corresponds to Chapter 8 of ISO /T R26946.2011;

--- Chapter 11 corresponds to Chapter 9 in ISO /T R26946.2011. The technical differences between this document and ISO /T R26946.2011 and their reasons are as follows:

--- Changed the scope of application (see Chapter 1);

--- Changed the requirements for equipment and metallographic sample preparation personnel (see Chapter 7, Chapter 5 of ISO /T R26946.2011) to adapt to our Technical conditions of the country;

1 Scope

GB/Z 45463-2025 gives a method for measuring the porosity of thermally sprayed coatings. Thermal spray builds a coating by throwing molten or semi-molten droplets at a surface, and the result is inherently porous: the splats do not fill space perfectly, and the amount of void left behind is the single best summary of how well the spray was done. Porosity then decides what the coating is good for - in a thermal barrier some porosity is wanted, because it lowers conductivity and accommodates strain, while in a corrosion barrier connected porosity is a direct path to the substrate and defeats the purpose entirely. The measurement is by metallographic section and image analysis, and its weakness is that it is easy to bias: a section prepared too aggressively pulls material out and creates porosity that was not there, and the threshold chosen in image analysis changes the number substantially. This document describes a method for characterising the porosity of thermally sprayed coatings by metallographic observation, applicable to sprayed oxide ceramic coatings among others. As a GB/Z it is a guiding technical document. Under ICS 25.220.20 and CCS A29, it is written for thermal spray shops, coating users and metallurgical laboratories.

This document describes a method for characterizing the porosity of thermal spray coatings by metallographic observation. This document is applicable to the determination of the porosity of thermal sprayed oxide ceramic coatings (such as Al₂O₃, ZrO₂ and TiO₂). The evaluation of the rate can also refer to this method.

2 Normative references

This document has no normative references.

3 Terms and definitions

There are no terms or definitions that require definition in this document.

4 Purpose

The main purpose of measuring porosity is to ensure that the quality of thermal spray coatings is not affected by porosity, especially in critical surfaces with functional requirements. On the surface. This document provides a standard test procedure for determining the porosity of thermal spray coatings as part of a comprehensive quality assurance program. This document is also intended to provide a standard method for determining the porosity of thermal spray coatings.

5 Categories

Due to the characteristics of thermal spraying process, the microstructure of thermal spraying coating is mainly manifested in various pores, microcracks, flat particle interfaces and uncoated particles. Although different terms are used, pores and microcracks are essentially volumes that do not contain coating material. Porosity can be There are closed pores, open pores and micropores. Closed pores appear in the coating as independent or clustered holes, which are not connected to the surface. The closed-cell structure is similar, but it is directly connected to the atmosphere, or different pores are connected and then connected to the atmosphere; micropores have both closed pores and open pores. Their size is measurable only on a microscopic scale. Pores and microcracks differ primarily in their aspect ratio (ratio of major axis to minor axis), so they The proportion of the volume space occupied by pores in the thermal spray coating is called porosity.

6 Principles

The porosity of thermal spray coatings is determined by preparing cross sections of coatings with high microscopic surface quality using an optical microscope. Microscopy or scanning electron microscopy (recommended) to quantify the porosity of the coating being examined by using image analysis techniques on the microscope Evaluate.

7 Equipment

The equipment required to measure the porosity of thermal spray coatings is as follows: