

ICS 87
CCS G 50



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

GB/T 21782.3-2025

Replacing GB/T 21782.3-2008

**Coating powders - Part 3: Determination of density by liquid
displacement pycnometer
(English Translation)**

Issued on: October 5, 2025

Implemented on: February 1, 2026

Issued by: State Administration for Market Regulation

Table of Contents

- Foreword
- Introduction
- 1 Scope
- 2 Normative references
- 3 Terms and Definitions
- 4 Principles
- 5 Materials
- 5.1 Water

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 3 of GB/T 21782 "Powder Coatings". GB/T 21782 has already published the following parts.

- Part 1: Determination of particle size distribution by sieving method;
- Part 2: Determination of density using a gas comparative hydrometer (arbitration method);
- Part 3: Determination of density using the liquid displacement specific gravity bottle method;
- Part 4: Calculation of the Lower Explosive Limit;
- Part 5: Determination of the flowability of powder-air mixtures;
- Part 7: Determination of mass loss during baking;
- Part 8: Assessment of the storage stability of thermosetting powders;
- Part 9: Sampling;
- Part 10: Determination of Deposition Efficiency;
- Part 11: Determination of the Flowability of Inclined Plates;
- Part 12: Determination of compatibility;

---Part 13: Particle Size Analysis by Laser Diffraction;

---Part 14: Terminology.

This document replaces GB/T 21782.3-2008 "Powder Coatings Part 3: Determination of Density by Liquid Displacement Gripper Method", and is consistent with...

Compared with GB/T 21782.3-2008, apart from structural adjustments and editorial changes, the main technical changes are as follows.

---The scope of application has been changed (see Chapter 1, Chapter 1 of the 2008 edition);

---A new chapter on "Terminology and Definitions" has been added (see Chapter 3);

---The reference standard for specific gravity bottles has been changed from ISO 787-10:1993 to ISO 2811-1 (see 6.1, Chapter 3 of the 2008 edition);

---The requirement to use acetone to clean specific gravity bottles has been removed (see Chapter 7 of the 2008 edition);

---The order in which the (displacement fluid) is poured into the specific gravity bottle has been changed (see 8.3, 7.2 in the 2008 edition);

---The tolerance between the two results has been changed to be expressed as a relative percentage (see Chapter 9, Chapter 8 of the 2008 edition);

This document is modified to adopt ISO 8130-3:2021 "Powder coatings - Part 3: Determination of density by liquid displacement hydrometer method".

This document has undergone the following structural adjustments compared to ISO 8130-3:2021.

---Chapter 10 corresponds to Chapter 11 in ISO 8130-3:2021.

The technical differences between this document and ISO 8130-3:2021, and the reasons therefor, are as follows.

---The pumping speed requirements for the "vacuum pump" have been revised (see 6.2, ISO 8130-3:2021) to provide more practical guidance.

significance;

---The section on "Precision" (see Chapter 10 of ISO 8130-3:2021) has been removed. The description of precision in ISO 8130-3:2021 has been revised.

The result is "Precision data not yet available" and is not of any guiding significance.

The following editorial changes have been made to this document.

---Place the content of "For the determination of powder coatings with a density of less than

1 g/cm³, see ISO 1183-1" in the "Scope" section into the note.

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 and is under the jurisdiction of the National Technical Committee on Standardization of Hazardous Chemicals Management (SAC/TC251).

Introduction

The GB/T 21782 series of standards covers the testing and evaluation of key indicators of powder coatings, such as particle size distribution, density determination, and storage stability.

This series of standards defines a set of tests and applications for powder coatings. Each document in this series describes a specific set of tests and applications. The GB/T 21782 series of standards aims to provide a standard for powder coatings.

This standard provides a unified and reliable testing process for manufacturers and powder coating testers, and supports product quality control, safe production, and international standards.

Trade provides scientific support. The GB/T 21782 series of standards is proposed to consist of the following 13 parts.

---Part 1: Determination of Particle Size Distribution by Sieving Method. The purpose is to specify two methods, manual and mechanical sieving, for determining particle size distribution.

Powder coating particle size distribution.

---Part 2: Determination of Density by Gas Comparative Hydrometer Method (Arbitration Method). The purpose is to define a method for determining density based on the principle of gas displacement, using gas...

A method for determining the density of powder coatings using a volumetric specific gravity meter.

---Part 3: Determination of Density by Liquid Displacement Specific Gravity Bottle Method. The purpose is to define a method for determining density based on Archimedes' principle using liquid displacement specific gravity bottles.

A method for determining the density of powder coatings using a heavy-duty bottle.

---Part 4: Calculation of the Lower Explosive Limit. The purpose is to specify the calculation method for the lower explosive limit of powder coatings based on the total calorific value or the calorific value of the combustible components.

Methods to lower the limit.

---Part 5: Determination of the flowability of powder-air mixtures. The aim is to express, by measuring the fluidization factor and powder flow rate, the flowability of powder-air mixtures.

Characterize the flow properties of powder during transport and spraying.

---Part 7: Determination of mass loss during baking. The purpose is to specify the application methods for powder coatings onto substrates using electrostatic spraying.

A method for measuring mass loss during the curing and baking process.

---Part 8: Assessment of the Storage Stability of Thermosetting Powders. The aim is to assess the storage stability of thermosetting powder coatings by placing them in a specific storage environment.

Storage stability is assessed by observing changes in free flow properties after the product is stored at a specified temperature for a specified period of time in an environment.

---Part 9: Sampling. The purpose is to define a standard procedure for sampling from the delivery batch, and to quantitatively reduce the sample to test samples.

Technical requirements for the sample.

---Part 10: Determination of Deposition Efficiency. The purpose is to specify the deposition efficiency on test samples under known spray gun and environmental conditions.

The method for determining the percentage by mass of powder used in coating.

---Part 11: Determination of the flowability of an inclined plate. The purpose is to specify the flowability of thermosetting powder coatings when applied at a fixed angle along an inclined plate.

Methods for detecting flow characteristics during molten flow.

---Part 12: Compatibility Testing. The aim is to define the surface properties of the final coating resulting from mixing two different powder coatings.

Methods for determining degradation.

---Part 13: Particle Size Analysis by Laser Diffraction. The purpose is to specify the method for determining the equivalent spherical particle size of powder coatings using laser diffraction.

Methods for radial distribution.

---Part 14: Terminology. The purpose is to define the concepts of terms such as powder coating, deposition rate, and gelation time, providing a framework for the powder coating industry.

Provide a unified terminology standard.