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

GB/T 21779-2025

Replacing GB/T 21779-2008

**Test method for particle size distribution of metal powders and
related compounds by light scattering**

金属粉末和相关化合物粒度分布的光散射试验方法

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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 supersedes GB/T 21779-2008 "Test Method for Light Scattering of Particle Size Distribution of Metal Powders and Related Compounds", and is consistent with... Compared with GB/T 21779-2008, apart from structural adjustments and editorial changes, the main technical changes are as follows:

---The wording regarding "meaning and uses" has been revised (see the introduction, Chapter 5 of the 2008 edition);

---The descriptions of sampling and sample quantity, and operational procedures for the "experiment" have been revised (see Chapter 7, and Chapters 9 and 10 of the 2008 edition). Chapter 11). 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). This document was drafted by: Guangzhou Customs Technology Center, Shenzhen Customs Industrial Testing Technology Center, and Guangdong Pioneer Rare Materials Co., Ltd. Wuhan Customs Technology Center, China Petroleum and Chemical Industry Federation. The main drafters of this document are: Xiao Dahui, Mao Rongmei, Yue Dalei, Mo Man, Chen Qiang, Liang Yuefeng, Li Yong, Zhu Zhanfang, Ling Yuetao, and Cao Mengran. Chen Yiwen and Hao Yuan. The release history of this document and the document it replaces is as follows:

---First published in 2008 as GB/T 21779-2008;

---This is the first revision.

Particle size distribution is related to the flowability, moldability, compressibility, and die-filling characteristics of a certain metal powder, as well as the final structure of the powder metallurgy component. The structure and properties are closely related; therefore, the particle size distribution of metal powders can be used to predict powder processing characteristics and the performance of the final powder metallurgy parts. This document provides a standard operating procedure for suppliers and users of metal powders to determine the particle size distribution of metal powders, thereby enabling their production... This document outlines the determination of product specifications and the development and research of production control. It can be used for data comparison of particle size distribution of the same substance in different batches. It can be used to establish compliance data during receiving tests. Particle size determination is a function of the actual particle diameter and shape, as well as the specific physical or chemical properties of the particles at the time of determination. Particle size distribution. The results of particle size determination are significantly affected by the physical principles applied in each particle size analysis. The results of any particle size determination method differ from those of other methods. When comparing results, the results are relative rather than absolute. This applies to instruments with different physical or chemical parameters or instruments with different measurement methods. The same principle applies when comparing data measured by instruments with a fixed range. Light scattering theory has been used to determine particle size for many years, and various light scattering particle size analyzers are available both domestically and internationally. Although each analyzer... All instruments are based on the same principle of the functional relationship between light scattering and particle size, but different instruments make different assumptions in actual testing, and the methods used... Different mathematical models convert optical detection signals into particle size values, which may lead to different measurement values from different instruments. Sample extraction and processing... The preparation process also affects the particle size results of the sample. Particle size of metal powders and related compounds Distributed light scattering test method

1 Scope

GB/T 21779-2025 is the Chinese national standard on test method for particle size distribution of metal powders and related compounds by light scattering, in the field of environment and health protection, safety. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 29 August 2025 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 December 2025. Classification: ICS 13.300, CCS A80. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the

classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This document establishes the principle of determining the particle size distribution of granular materials such as metals and related compounds using the light scattering method, and specifies the instruments used in the experiment. Requirements for instruments, reagents and materials, as well as test procedures and report content. This document applies to the determination of particle size distribution of metals and related compounds in the range of 0.4 μm to 2000 μm using light scattering methods.

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 5314 Sampling Methods for Powder Metallurgy

GB/T 19077 Particle size analysis by laser diffraction

3 Terms and Definitions

The following terms and definitions apply to this document.

3.1 background Additional scattered light caused by substances that are not detected particles.

Note. This includes scattering caused by impurities in the detection optical path.

3.2 An optical theory describing the small-angle diffraction of light by particles with dimensions larger than the wavelength of the incident light.

3.3 Mie scattering A complex electromagnetic theory describing light scattering from spherical particles.

Note. This is generally used when the particle dimensions are similar to the wavelength of the incident light, and the actual or estimated refractive index of the particle should be used.

3.4 Multiple scattering The phenomenon where light scattered by one particle is scattered again by another particle.

Note. This usually occurs when particles are dispersed at high concentrations.

4.Principles The prepared sample is dispersed in a liquid (water or other organic liquid) or gas and then circulated through a monochromatic light source to form light scattering. The light is then detected. The detector acquires and converts the signal into an electrical

signal, which is then analyzed by a microprocessor according to Fraunhofer diffraction or Mie scattering theory, or a combination of both. The particle size distribution is converted using a method that processes the data. A spherical model is used to analyze particle scattering, and the calculated particle size is expressed as... Equivalent to the diameter of a sphere.

5 Instruments

5.1 Particle size analyzer, employing Fraunhofer diffraction or Mie scattering theory, or a combination of both. The instrument's measurement range should be compatible with the particle size distribution. The sub-granularity range is matched.

5.2 Liquid or gas sample handling system.

6 Reagents and Materials

6.1 All chemical substances used in the experiment were of analytical grade.

6.2 The liquid dispersion medium shall conform to the requirements of GB/T 19077. The carrier shall meet the following conditions.

- a) It is chemically compatible with the structural materials of the sample delivery system;
- b) It will not dissolve the test particles;
- c) It is clean enough that it does not absorb light in order to obtain an acceptable background value.

6.3 Antifoaming agents or equivalent substances.

6.4 Dry and clean gases used for gas dispersion.

6.5 The surfactant shall comply with the requirements of 6.2.

7.1 Sampling and Sample Quantity

7.1.1 Obtain representative samples according to GB/T 5314. Extract test samples from the sample using a micro-sample separator.

7.1.2 The sample amount for liquid dispersion should not exceed 25g; the sample amount for gas dispersion should not exceed 500g.

7.2 Operating Procedures

7.2.1 The instrument should be powered on and warmed up for at least 20 minutes.

7.2.2 Install the sample delivery system and select the appropriate instrument range according to the instrument operating instructions. If necessary, follow the instrument operating instructions. Correct optical calibration. Note