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GB/T 23456-2025

Replaces GB/T 23456-2018

Phosphogypsum

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Foreword

This document is drafted in accordance with the provisions of GB/T 1.1-2020 Directives for Standardization - Part 1: Rules for the Structure and Drafting of Standardization Documents.

This document replaces GB/T 23456-2018 Phosphogypsum. Compared with GB/T 23456-2018, in addition to structural adjustments and editorial revisions, the main technical changes are as follows:

a) Revised the scope (see Chapter 1, Chapter 1 of the 2018 edition);

b) Added terms and definitions (see Chapter 3);

c) Revised the content indices of calcium sulfate dihydrate ($CaSO_4 \cdot 2H_2O$) or mixed phosphogypsum (see 5.1, 4.1 of the 2018 edition);

d) Revised the content indices of water-soluble phosphorus pentoxide (P_2O_5), water-soluble fluoride ions (F^-), water-soluble magnesium oxide (MgO), water-soluble sodium oxide (Na_2O) and chloride ions (Cl^-) (see 5.1, 4.1 of the 2018 edition);

e) Added the organic matter content index (see 5.1);

f) Revised the pH value index (see 5.1, 4.3 of the 2018 edition);

g) Revised the radionuclide limit indices (see 5.1, 4.2 of the 2018 edition);

h) Added heavy metal limit requirements (see 5.2);

i) Added determination methods for organic matter content and heavy metal limits (see 6.8, 6.11);

j) Revised the storage requirements (see 8.4, 7.4 of the 2018 edition).

Please note that certain contents of this document may involve patents. The issuing authority of this document shall not be liable for identifying any patents.

This document is proposed by the China Building Materials Federation.

This document is under the jurisdiction of the National Technical Committee on Lightweight and Decoration Building Materials Standardization of Standardization Administration of China (SAC/TC 195).

Phosphogypsum

1 Scope

This document specifies the classification, marking, technical requirements, inspection rules, packaging, marking, transportation and storage of phosphogypsum, and describes the corresponding test methods.

This document applies to the by-products primarily composed of calcium sulfate dihydrate ($CaSO_4 \cdot 2H_2O$) and/or calcium sulfate hemihydrate ($CaSO_4 \cdot 1/2H_2O$) and calcium sulfate anhydrous ($CaSO_4$), which are generated during the production of wet-process phosphoric acid using phosphate rock as the raw material.

2 Normative References

The contents of the following documents constitute indispensable provisions of this document through normative reference in the text. For dated referenced documents, only the edition corresponding to the specified date applies to this document; for undated referenced documents, the latest edition (including all amendments) applies to this document.

GB/T 5484 Methods for Chemical Analysis of Gypsum

GB 6566 Limits of Radionuclides in Building Materials

GB/T 6682-2008 Water for Analytical Laboratory Use - Specification and Test Methods

GB/T 12805-2011 Laboratory Glassware - Burettes

GB/T 12808-2015 Laboratory Glassware - Single-mark Pipettes

GB 18599 Pollution Control Standard for the Storage and Landfill of General Industrial Solid Waste

AQ 2059 Safety Technical Specification for Phosphogypsum Storage Facilities

HJ 702 Solid Waste - Determination of Mercury, Arsenic, Selenium, Bismuth and Antimony - Microwave Digestion/Atomic Fluorescence Spectrometry

HJ 781 Solid Waste - Determination of 22 Metal Elements - Inductively Coupled Plasma Optical Emission Spectrometry

JC/T 2073 Methods for Determination of Phosphorus and Fluoride in Phosphogypsum

3 Terms and Definitions

The following terms and definitions apply to this document.

3.1 mixed phosphogypsum

Phosphogypsum generated during the production of wet-process phosphoric acid, containing two or more phase components of calcium sulfate dihydrate ($CaSO_4 \cdot 2H_2O$), calcium sulfate hemihydrate ($CaSO_4 \cdot 1/2H_2O$) and calcium

sulfate anhydrous ($CaSO_4$).

4 Classification and Marking

4.1 Classification

The product is classified into Grade 1, Grade 2 and Grade 3 in descending order of the content of calcium sulfate dihydrate ($CaSO_4 \cdot 2H_2O$) or mixed phosphogypsum.

4.2 Marking

Marking shall be conducted in the order of product name, document number of this document and classification.

Example

Example of marking for Grade 1 phosphogypsum is as follows:

Phosphogypsum GB/T 23456-2025 Grade 1

5 Technical Requirements

5.1 Basic Requirements

The basic requirements for the product shall comply with the provisions specified in Table 1.

Table 1 Basic Requirements

Item	Indicator		
	Level 1	Level 2	Level 3
Content of Calcium Sulfate Dihydrate ($CaSO_4 \cdot 2H_2O$) or Mixed Phosphogypsum / %	≥90.0	≥85.0	≥75.0
Free Moisture (H_2O) Content / %	≤15.0	≤20.0	≤25.0
Water-soluble Phosphorus Pentoxide (P_2O_5) Content / %	≤0.10	≤0.20	≤0.30
Water-soluble Fluoride Ion (F^-) Content / %	≤0.05	≤0.10	≤0.20
Water-soluble Magnesium Oxide (MgO) Content / %	≤0.05	≤0.10	_
Water-soluble Sodium Oxide (Na_2O) Content [a] / %	≤0.05	≤0.10	_

Chloride Ion (Cl^-) Content / %	≤0.01	≤0.02	_
Organic Matter Content [b] / %	≤0.20	≤0.30	_
pH Value	≥5	≥3	
Radionuclide Limits	Inner Exposure Index I_{Ra} ≤ 1.0; Outer Exposure Index I_r ≤ 1.0		
Note [a]: Select the dihydrate process or hemihydrate-dihydrate process according to different wet-process phosphoric acid production technologies. For the dihydrate process, the content is calculated based on calcium sulfate dihydrate; for the hemihydrate-dihydrate process, the content is calculated based on mixed phosphogypsum. Note [b]: Controlled only when the product is used for gypsum building materials.			

5.2 Heavy Metal Limits

The heavy metal limit requirements for the product shall comply with the provisions specified in Table 2.

Table 2 Heavy Metal Limits

(Unit: mg/kg)

Item	Limit
Total Mercury (Hg) Content	≤5.0
Total Arsenic (As) Content	≤50.0
Total Cadmium (Cd) Content	≤10.0
Total Lead (Pb) Content	≤200.0
Total Chromium (Cr) Content	≤500.0
Total Thallium (Tl) Content	≤2.5