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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

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Tin dioxide

二氧化锡

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Foreword

This standard was proposed by the China Nonferrous Metals Industry Association.

This standard is under the jurisdiction of the National Technical Committee on Nonferrous Metals of Standardization Administration of China.

The organisation responsible for drafting this standard is Yunnan Tin Group (Holding) Company Limited; Guangxi China Tin Group Co., Ltd. took part in the drafting.

1 Scope

China's national standard for tin dioxide, the white powder that carries tin into glass, ceramics and electronics. Most of it goes into opaque glazes and enamels, where it is the classic opacifier, and into ceramic capacitor and varistor bodies; the electronic grade goes into transparent conductive coatings and gas sensors, where tin dioxide is the sensing material of choice. The two markets want different things from it, which is why the standard splits the product into an industrial grade and an electronic grade by tin dioxide content and by use. What has to be controlled is not the tin so much as everything else: iron colours a

white glaze, lead and arsenic are regulated in ware that touches food, sulfate and loss on ignition betray incomplete calcination, and the particle size decides whether the powder disperses at all. The standard specifies the requirements, the test methods and the inspection rules for tin dioxide, together with its marking, packaging, transport, storage, certificate of quality and the contents of the contract or order form, and it applies to the tin dioxide produced from metallic tin by the gasification process or by the acid process.

This standard specifies the requirements, the test methods and the inspection rules for tin dioxide, together with its marking, packaging, transport, storage, certificate of quality and the contents of the contract (or order form).

This standard applies to the tin dioxide products produced from metallic tin as raw material by the gasification process or by the acid process.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 1480 Metallic powders - Determination of particle size by dry sieving.

GB/T 6678 General principles for sampling chemical products.

GB/T 8170 Rules of rounding off for numerical values and expression and judgement of limiting values.

GB/T 10574.12 Methods for chemical analysis of tin-lead solders - Determination of sulfur content.

GB/T 23274.1 to GB/T 23274.8 Methods for chemical analysis of tin dioxide.

3 Symbols, units and abbreviations

The following symbols, units and abbreviations apply to this standard.

3.1 Molecule formula: the molecular formula of tin dioxide is SnO2.

3.2 Relative molecular mass: 150.708 8 (based on the 2007 international atomic masses).

4.1 Product classification

According to the tin dioxide content and the use, the product is divided into an industrial grade and an electronic grade, each with its own minimum SnO2 content.

4.2 Chemical composition and particle size

The chemical composition and the particle size of tin dioxide shall comply with the

requirements of Table 1. Table 1 is arranged by production process, the gasification process and the acid process, and within each by grade. For each grade it fixes the minimum SnO2 content and the maximum contents of the impurities iron, copper, lead, arsenic, antimony and sulfur, of sulfate expressed as SO4, of the loss on ignition and of the hydrochloric acid soluble matter, together with the screening rate at the stated mesh size. A note adds that where the purchaser has special requirements for the product these may be agreed between supplier and purchaser.

4.3 Appearance quality

Tin dioxide produced by the gasification process is a white powder; tin dioxide produced by the acid process is a slightly yellow or yellow powder.

5 Test methods

5.1 The umpire method of analysis for the chemical composition of tin dioxide is carried out as specified in GB/T 23274.1 to GB/T 23274.8.

5.2 The sulfur content of tin dioxide products is determined as specified in GB/T 10574.12.

5.3 The particle size of tin dioxide is determined as specified in GB/T 1480.

5.4 The appearance quality of tin dioxide products is examined visually or by colour comparison instrument.

6.1 Inspection and acceptance

6.1.1 Tin dioxide shall be inspected by the quality and technical supervision department of the supplier, who shall guarantee that the product quality conforms to this standard and to the provisions of the contract (or order form), and shall fill out a certificate of quality.

6.1.2 The purchaser shall inspect the product received in accordance with the provisions of this standard. Where the inspection result does not agree with this standard or with the provisions of the contract (or order form), the purchaser shall raise the matter in writing with the supplier within sixty days of the date of receipt of the product, and the two parties shall settle it by negotiation. If arbitration is required, the arbitration sample shall be taken at the purchaser's premises jointly by the two parties.

6.2 Batching

Tin dioxide shall be presented for acceptance in batches. Each batch shall consist of product of the same grade and the same production batch number, subject to a ceiling on the mass of a batch.

6.3 Inspection items

Each batch of tin dioxide product is inspected for chemical composition, particle size and appearance quality.

6.4 Sampling and sample preparation

6.4.1 Sampling: the sample used by the supplier for the analysis of the chemical composition may be taken from the product as produced, or by another method. 6.4.1.1 The quantity of arbitration samples, the number of samples and the sample size follow GB/T 6678; the number of sampling units to be selected is given in Table 2, which lists the minimum number of units to be taken for each range of the total number of units in the lot. 6.4.1.2 A stainless steel sampling tube is inserted vertically to three quarters of the depth of the drum or package, at points distributed in a quincunx pattern, and a minimum quantity is taken from each drum.

6.4.2 Sample preparation: 6.4.2.1 the samples taken are combined, quickly and thoroughly mixed, and reduced by quartering into three portions, one for each of the two parties and one for the arbitration body. 6.4.2.2 Each sample shall immediately be placed in a dry, hermetically sealed container and labelled. 6.4.2.3 The label shall state the producing unit, the product name, the sample number, the product batch number, the quantity, the elements to be analysed, the date of sampling and the sampler, and a seal shall be affixed over the closure of the sample container, to be signed and stamped by both parties as fit for inspection.

6.5 Judgement of the inspection results

6.5.1 The numerical values of the inspection results are rounded off, expressed and judged as specified in GB/T 8170.

6.5.2 If any one of the physical and chemical indicators of the inspection result does not conform to this standard or to the provisions of the contract (or order form), a repeat test shall be made on twice the sample quantity specified in 6.4, taken again from the same batch of product; if the inspection result still fails to conform to this standard or to the provisions of the contract (or order form), the batch is judged non-conforming.

6.5.3 Where the appearance quality does not conform to the provisions of this standard, the smallest sampling unit (drum or package) is judged non-conforming.

7 Marking, packaging, transport, storage and certificate of quality

7.1 Marking: each drum of tin dioxide shall carry a conspicuous and durable mark stating the trademark and batch number, the name of the producing works, the product name, the grade and the net mass.

7.2 Packaging, transport and storage: 7.2.1 the packaging shall be sealed with an inner plastic bag and packed in an outer plastic or iron drum, with a stated net mass per drum;