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NONFERROUS INDUSTRY STANDARD

OF THE PEOPLE'S REPUBLIC OF CHINA

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YS/T 1027-2015

Lithium iron phosphate

磷酸铁锂

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Lithium iron phosphate

1 Scope

This Standard specifies the requirements, test methods, inspection rules, marking, packaging, transportation, storage, quality certificate and contract (or order) content of lithium iron phosphate.

This Standard applies to lithium iron phosphate, i.e., the cathode material for lithium-ion batteries.

2 Normative references

The following referenced 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 1717 Determination of pH value of an aqueous suspension of pigments

GB/T 5162 Metallic powders - Determination of tap density

GB/T 5314 Powders for powder metallurgical purposes - Sampling

GB/T 6283 Chemical products - Determination of water - Karl. Fischer method (general method)

GB/T 13390 Metallic powder - Determination of the specific surface area - Method of nitrogen adsorption

GB/T 19077.1 Particle size analysis - Laser diffraction method - Part 1: General principles

GB/T 20252 Lithium cobalt oxide

GB/T 23365 Electrochemical performance test of lithium cobalt oxide - Test method for the initial discharge specific capacity and the initial efficiency

GB/T 23366 Electrochemical performance test of lithium cobalt oxide - Test method for discharge plateau capacity ratio and cycle life

YS/T 1028 (all parts) Methods for chemical analysis of lithium iron phosphate

JCPDS (01-83-2092) Lithium iron phosphate X-ray powder diffraction standard patterns

The specific surface area of products shall be not greater than 20 m²/g.

4.5 pH value

The pH value of products shall be between 9.0 ~ 11.0.

4.6 Electrochemical performance

4.6.1 Initial discharge specific capacity

Under the voltage range of 2.5 V ~ 4.1 V and 0.1 C charge-discharge rate, the initial discharge specific capacity of products shall be not less than 140 mAh/g.

4.6.2 Initial charge-discharge efficiency

Under the voltage range of 2.5 V ~ 4.1 V and 0.1 C charge-discharge rate, the initial charge-discharge efficiency of products shall be not less than 85 %.

4.6.3 Cycle life

Under the voltage range of 2.5 V ~ 3.8 V and 1 C charge-discharge rate, when the discharge capacity of products reaches 80 % of the initial cycle discharge capacity, the number of cycles shall be not less than 2000 times.

5 Test methods

5.1 Chemical composition

5.1.1 The determination of the chemical composition of products shall be carried out in accordance with the provisions of YS/T 1028.

5.1.2 The determination of the moisture of products shall be carried out in accordance with the provisions of GB/T 6283.

5.2 Appearance quality

The product appearance is examined visually.

5.3 Crystal structure

The crystal structure of products is examined using an X-ray powder diffractometer.

5.4 Physical properties

5.4.1 Tap density

The determination of the tap density of products shall be carried out in accordance with the provisions of GB/T 5162.

5.4.2 Particle size distribution

The determination of the particle size distribution of products is carried out in accordance with the provisions of GB/T 19077.1.

5.4.3 Specific surface area

The determination of the specific surface area of products is carried out in accordance with the provisions of GB/T 13390.

5.5 pH value

The determination of the pH value of products is carried out in accordance with the provisions of GB/T 1717.

5.6 Electrochemical performance

5.6.1 Initial discharge specific capacity

The determination of the initial discharge specific capacity of products is carried out in accordance with the provisions of GB/T 23365.

5.6.2 Initial charge-discharge efficiency

The determination of the initial charge-discharge efficiency of products is carried out in accordance with the provisions of GB/T 23365.

5.6.3 Cycle life

The determination of the cycle life of products is carried out in accordance with the provisions of GB/T 23366.

6 Inspection rules

6.1 Inspection and acceptance

6.1.1 Products shall be inspected by the supply party. It shall ensure that the product quality complies with the provisions of this Standard and the contract (or order form), and it shall fill in the quality certificate.

6.1.2 The demand party shall inspect the received products in accordance with the provisions of this Standard. If the inspection results are inconsistent with the provisions of this Standard and the contract (or order form), it shall be submitted to the supply party in writing within three months from the date of receipt of the products, and the supply and demand parties shall negotiate and resolve. If arbitration is required, arbitration sampling will be carried out jointly at demand party's.

6.2 Batch grouping

- d) Net weight;
- e) Moisture-proof words or logos;
- f) Serial number of this Standard;
- g) Date of production.

7.2 Packaging

The products that have passed the inspection are packed in a packaging unit of 25 kg (the packaging unit can also be specified in the contract). The inner packaging is composite aluminum-plastic bags, which are thermoplastic sealed and then put into cartons or fiber drums.

7.3 Transportation and storage

The products that have packaged in accordance with the requirements of 7.2 can be transported in various ways, but it shall avoid damage to the packaging and making the products damp. The products are suitable for sealed storage in an acid- and alkali-free atmosphere. There is no environmental humidity requirement when the inner packaging bag is sealed. The products have a shelf life of one year from the date of production under the required packaging conditions.

7.4 Quality certificate

Each batch of products shall be accompanied by a quality certificate, indicating:

- a) Supply party's name, address, telephone number, and fax number;
- b) Product name;
- c) Batch number;
- d) Quantity;
- e) Analysis and inspection results and stamps of supply party's quality inspection department;
- f) Serial number of this Standard;
- g) Factory-exit date.

8 Contract (or order form) content

The content of the contract (or order form) for ordering the products listed in this Standard shall include the following:

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