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

GB/T 18880-2012

Replacing GB/T 18880-2002

**Materials for bonded neodymium iron boron permanent
magnets**

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1 Scope

GB/T 18880-2012 is the Chinese national standard on materials for bonded neodymium iron boron permanent magnets, in the field of metallurgy. 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 5 November 2012 by the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China; Standardization Administration of China, and has been in force since 1 May 2013. Classification: ICS 77.120.99, CCS H65. 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 Standard specifies the requirements, test methods, inspection rules and marks, packaging, transportation, storage, and quality certificates for materials for bonded neodymium iron boron permanent magnets. This Standard applies to isotropic bonded materials for bonded neodymium iron boron permanent magnets and products produced by powder compression molding and injection molding.

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 2423.17, Environmental testing for electric and electronic products - Part 2: Test method - Test Ka: Salt mist

GB/T 2423.18, Environmental testing - Part 2: Test methods - Test Kb: Salt mist, cyclic (sodium chloride solution)

GB/T 2828, Sampling procedures for inspection by attributes

GB/T 3217, Permanent magnet (magnetically hard) materials -- Methods of measurement of magnetic properties (neq IEC 60404-5)

GB/T 6682, Water for analytical laboratory use -- Specification and test methods (neq ISO 3696:1987)

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

GB/T 9637, Electrotechnical terminology -- Magnetic materials and components

GB/T 17803, Designation system for rare earth products

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 principal magnetic properties Including the remanence (B_r) of the permanent magnet material, the magnetic polarization intensity coercivity (intrinsic coercivity) (H_{CJ}), the magnetic induction intensity coercivity (H_{CB}), and the maximum magnetic energy product $[(BH)_{max}]$.

3.2 additional magnetic properties Including the relative recovery magnetic permeability (μ_{rec}), remanence temperature coefficient $[\alpha(B_r)]$, magnetic polarization strength coercive force temperature coefficient $[\alpha(H_{CJ})]$, and Curie temperature (T_c) of the permanent magnet material.

4 Material classification and designation

4.1 Material classification The products are isotropic materials for bonded neodymium iron boron permanent magnets produced by powder compression molding and injection molding processes, or permanent magnet products in shapes such as rings, cylinders, cuboids, and tiles directly made from this material. According to the intrinsic coercivity, it is divided into three categories: low coercivity L, medium coercivity M, and high coercivity H. Products can be produced directly with magnetic components in their final form. It can also be assembled with other magnetic or non-magnetic components into devices (assemblies) or components as the final form.

4.2 Material designation Each type of product is divided into several designations according to the maximum magnetic energy product (see Table 1 for details). Its designation representation method complies with the regulations of GB/T 17803. Each designation of material can be directly made into permanent magnet products in the shapes of rings, cylinders, cuboids, tiles, etc.

4.3 Designation representation method There are two types of designation representation methods: numeric type and character type. The representation method of digital designation is as follows: Refer to Annex A for the inspection methods of product anti-rust performance and adhesion performance.

6.3 Additional magnetic properties and main mechanical and physical properties The additional magnetic properties and main mechanical and physical properties of the material are tested using measuring tools that meet accuracy requirements and comply with national metrology standards, see Annex B.

6.4 Product dimensions and geometric tolerances The dimensional tolerance and geometric tolerance of the product are tested using measuring tools that meet the accuracy requirements and comply with national metrology standards, or with special inspection instruments confirmed by both the supplier and the purchaser. See Annex C.

6.5 Appearance quality Use a 10x magnifying glass for product appearance quality inspection.

7.1 Inspection and acceptance

7.1.1 Products are inspected by the supplier's quality and technical supervision department. Ensure product quality complies with the provisions of this standard. Fill out the quality certificate.

7.1.2 The purchaser 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, it shall be reported to the supplier within 1 month from the date of receipt of the product. The matter shall be resolved through negotiation between the supplier and the purchaser. If arbitration is needed, an agency recognized by both parties can be entrusted to conduct it, and samples can be taken jointly by the purchaser.

7.2 Batching Each batch of products shall be composed of materials of the same specifications and sizes made by the same designation and the same production process.

7.3 Inspection items Each batch of products shall be inspected for magnetic properties, dimensional tolerances, geometric tolerances, appearance quality and other items. The sampling batches, methods, quantities, anti-rust performance index items and qualified quality levels for anti-rust performance inspection shall be agreed upon by both parties. When the anti-rust coating materials and processes are changed, inspections shall be

carried out according to the anti-rust performance index items and qualified quality levels agreed between the supplier and the purchaser.

7.4 Sampling The sampling quantity of the magnetic properties, dimensional tolerance, and geometric tolerance of the product shall be carried out in accordance with the provisions of GB/T 2828. Its acceptance qualified quality level (AQL) is level

1.5 of general inspection level II. The sampling quantity of product appearance quality shall be carried out in accordance with the provisions of GB/T 2828. Its acceptance quality level (AQL) is level

1.5 of general inspection level I. All are carried out according to a normal inspection sampling plan. The principal magnetic properties of the material and the anti-rust performance of the product shall be determined by sampling quantity and qualified quality level as agreed upon by both parties.

7.5 Inspection result judgment If the product's principal magnetic properties or anti-rust properties, dimensional tolerances, geometric tolerances, appearance quality and other inspection results are inconsistent with the provisions of this Standard, double samples will be taken from the batch of products to re-inspect the unqualified items. If there are still unqualified items, the batch of products will be judged as unqualified.

8.1 Marks, packaging

8.1.1 If the purchaser requires the polarity of the product to be marked, it can be clearly stipulated in the contract.

8.1.2 Product packaging shall comply with the corresponding regulations on transportation and storage methods. Generally, foam plastic boxes are used as inner packaging. The outer packaging is in cartons or wooden boxes. Guarantee against damage during proper transportation and storage. Each outer packaging shall be marked with a mark on its surface, indicating:

- a) Name of supplier;
- b) Product name;
- c) Batch number, specification size or product code;
- d) Quantity, gross weight, exit-factory date.

8.2 Transportation, storage In the constant temperature and humidity standard test chamber, put the coated product specimen. Store at 90% relative humidity and $80^{\circ}\text{C} \pm 1^{\circ}\text{C}$ test temperature for 240 h. After taking it out, place it at $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for 2 h. Use a 10x magnifying glass to observe the coating surface of the specimen. If there is no rust or expansion phenomenon, it will be judged as qualified. A.2.4 Acid resistance test Put 10 mL of hydrochloric acid [(1+2), chemically pure] into a cleaned 200 mL plastic bottle. Then add