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**Test method for the magnetic properties of isotropic rare-earth
permanent magnetic powder**

各向同性稀土粘结永磁粉磁特性测量方法

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part

1. Structure and drafting rules for standardization documents" Drafting. Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents. This document was proposed and coordinated by the National Rare Earth Standardization Technical Committee (SAC/TC229). This document was drafted by: YUYAN Rare Earth New Materials Co., Ltd., China Institute of Metrology, Beijing Zhongke Sanhuan High-tech Co., Ltd. Co., Ltd., Baotou Kerui Micromagnetic New Materials Co., Ltd., Jiangxi Zhongshi New Materials Co., Ltd., Guohe General Testing Evaluation Certification Co., Ltd. Ningbo Metrology and Testing Institute, Ganzhou Comprehensive Inspection and Testing Institute, Hangzhou Qianshi Technology Co., Ltd., and China Iron and Steel Research Institute Co., Ltd. Baotou Rare Earth Research Institute, Baotou Yingsite Rare Earth New Materials Co., Ltd., Youyan Rare Earth (Rongcheng) Co., Ltd., Zhejiang Yingluohua Magnetics Co., Ltd. and Hangzhou Quadrant Technology Co., Ltd. The main drafters of this document are. Yan Wenlong, Hou Ruifen, Peng Haijun, Luo Yang, Wang Zilong, Quan Ningtao, Yang Yuanfei, Yu Dunbo, Chen Zhian, He Jian, Chen Haibo, Lin Jirong, Lu Shuo, Shi Jianghuan, Zeng Jiping, Shen Senqi, Zhao Ningning, Zhang Hongbin, Wu Kaiwen, Cui Shuai, Ma Yuehua, Lin Xiao, Zhu Minggang, Liu Tao, Fu Jianlong, Duan Jiping, Ma Chunru, He Jianfeng, Fan Caixiang, Wang Xin, Zhai Yanan, Zhao Yi, Zhu Shengjie, Ji Xiaofeng. Measurement method of magnetic properties of isotropic rare earth bonded permanent magnet powder

1 Scope

China's national test method for the magnetic properties of isotropic rare earth permanent magnet powder. Isotropic means the powder has no preferred magnetic direction, so a magnet made from it can be magnetised in any pattern after moulding - multipole rings for small motors and sensors, complex arrangements that an aligned magnet could not produce. The price is remanence: an isotropic magnet reaches roughly half the flux of an

aligned one, because its grains point in all directions. Measuring the powder rather than a finished magnet is the point of the method and its difficulty: the powder must be immobilised in a known packing fraction before it can be measured, and the result has to be corrected for that fraction and for the demagnetising field of the sample shape, neither of which is trivial to do consistently.

This document describes the closed-circuit diagram of the main magnetic properties of isotropic rare earth permanent magnet powder, including remanence, magnetic induction coercivity, intrinsic coercivity, and maximum magnetic energy product. Measurement methods. This document is applicable to the measurement of the main magnetic properties of isotropic NdFeB permanent magnet powder and SmFeN permanent magnet powder.

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document. For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document.

GB/T 2900.4 Electrical terminology Electrical alloys

GB/T 2900.60 Electrical terminology - Electromagnetism

GB/T 3217 Magnetic test methods for permanent magnetic (hard magnetic) materials

GB/T 8170 Rules for rounding off values and expression and determination of limit values

GB/T 9637 Electrical terminology magnetic materials and components

GB/T 27418-2017 Evaluation and expression of measurement uncertainty

JJF1829 Calibration specification for magnetic measuring instruments for permanent magnetic materials

3 Terms and definitions

The terms and definitions defined in GB/T 2900.4, GB/T 2900.60, GB/T 3217 and GB/T 9637 and the following terms and definitions apply to this document.

3.1 A_{eff} After the powder is pressed into a cylindrical test sample, the area of the circular cross-section of the equivalent non-porous dense sample is obtained by calculation.

3.2 d_{eff} After the powder is pressed into a cylindrical test sample, the diameter of the circular cross-section of the equivalent non-porous dense sample is obtained by calculation. 3.3 ρ The density of a powder material in a non-porous state.

4 Method Summary

The magnetic field strength is measured by using an H coil with a corresponding H induction voltage integrator, and the magnetic polarization strength is measured by using a J coil with a corresponding J induction voltage integrator.

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