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**Grain boundary diffusion neodymium iron boron permanent
magnet materials**

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Table of Contents

1 Scope	1
2 Normative references	1
3 Terms and Definitions	1
4 Classification and grade	2
4.1 Classification	2
4.2 Grade	2
4.3 Designation method	2
5 Technical requirements	2
5.1 Magnetic properties	2
5.2 Temperature coefficient of magnetic properties	4
5.3 Other physical properties	4
5.4 Weightlessness	4
5.5 Surface protection	4
5.6 Magnetic dipole moment consistency	4
5.7 Irreversible loss of magnetic flux at high temperature	4
5.8 Appearance quality	4
5.9 Size and shape deviation	5
6 Test method	5
6.1 Magnetic properties	5
6.2 Temperature coefficient of magnetic properties	5
6.3 Other physical properties	5
6.4 Weightlessness	5
6.5 Surface protection	5
6.6 Consistency of Magnetic Dipole Moment	5
6.7 Irreversible loss of magnetic flux at high temperature	5
6.8 Appearance quality	5
6.9 Size	5
6.10 Numerical rounding off	6
7 Inspection rules	6
7.1 Inspection classification	6
7.2 Batch	6
7.3 Inspection item	6

7.4 Sampling method for product factory inspection	6
7.5 Inspection result judgment and repeated inspection rules	6
8 Packaging, marking, transportation, storage and accompanying documents	6
8.1 Packaging, marking, transportation and storage	6
12 Appendix E (informative) Consistency of magnetic dipole moment, size and shape deviation of grain boundary diffused NdFeB permanent magnets	13

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 contents of this document may refer to patents. The issuing agency of this document assumes no responsibility for identifying patents. This document is proposed and managed by the National Rare Earth Standardization Technical Committee (SAC/TC229). This document was drafted by: Ningbo Yunsheng Co., Ltd., Beijing Zhongke Sanhuan High-tech Co., Ltd., Anhui Earth Bear New Materials Co., Ltd., Ningbo Zhaobao Magnetic Industry Co., Ltd., Beijing University of Technology, Baotou Tianhe Magnetic Technology Co., Ltd., Ningbo Permanent Magnetic Industry Co., Ltd., Hangzhou Magnetic Technology Co., Ltd., Youyan Rare Earth New Materials Co., Ltd., Fujian Changting Jinlong Rare Earth Co., Ltd., China Academy of Sciences Ningbo Institute of Materials Technology and Engineering, Baotou Rare Earth Research Institute, Ganzhou Fuerte Electronics Co., Ltd., China North Rare Earth (Group) Group) High Technology Co., Ltd. The main drafters of this document. Lu Xiangke, Shen Guodi, Zhang Min, Zhu Xiaodong, Liang Fengji, Cao Shuohao, Liu Youyou, He Qijun, Yue Ming, Dong Yi, He Ting, Jia Shengli, Luo Yang, Zhang Jiulei, Song Zhenlun, Ding Yong, Fu Jianlong, Qi Zhiqi, Lou Shupu, Liu Feng, Ouyang Xike, Huang Xiulian, Lin Jianqiang, Liu Weiqiang, Wu Shujie, Li Jianzhong, Yan Wenlong, Yang Lijing, Jiang Jianjun, Sun Yingli, Pang Zaisheng. Grain Boundary Diffusion NdFeB Permanent Magnets

1 Scope

China's national standard for neodymium iron boron permanent magnets made by grain boundary diffusion. The technique addresses the central economic problem of these magnets. A magnet for a traction motor must resist demagnetisation at the temperature the motor runs at, and that coercivity is obtained by substituting dysprosium or terbium for some of the neodymium - heavy rare earths that are scarce, expensive and geographically concentrated even by rare earth standards. But the coercivity is determined at the grain boundaries rather than throughout the grain, so most of the added dysprosium is doing nothing. Grain boundary diffusion applies it to the surface of a finished magnet and diffuses

it inward along the boundaries alone, achieving the same coercivity with a fraction of the heavy rare earth. It is the single most consequential process development in permanent magnets in decades, and it is why electric traction motors are affordable.

This document specifies the classification and designation, technical requirements, test methods, inspection rules, and packaging, Signage, transport, storage and accompanying documents. This document is applicable to sintered NdFeB permanent magnet materials treated by grain boundary diffusion process.

2 Normative references

The contents of the following documents constitute the essential provisions of this document through normative references in the text. Among them, dated references For documents, only the version corresponding to the date is applicable to this document; for undated reference documents, the latest version (including all amendments) is applicable to this document.

GB/T 2828.1-2012 Counting sampling inspection procedure Part

1.Batch-by-batch inspection sampling retrieved by acceptance quality limit (AQL) plan

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

GB/T 3850 Density Determination Method for Dense Sintered Metal Materials and Cemented Carbide

GB/T 4339 Determination of thermal expansion characteristic parameters of metallic materials

GB/T 5167 Determination of resistivity of sintered metal materials and cemented carbide

GB/T 7314 Compression test method for metallic materials at room temperature

GB/T 8170 Numerical rounding off rules and expression and determination of limit values

GB/T 9097 Determination of apparent hardness and microhardness of sintered metal materials (excluding cemented carbide)

GB/T 9637 Electrotechnical Terminology Magnetic Materials and Components

GB/T 13560 Sintered NdFeB permanent magnet materials

GB/T 22315-2008 Test method for elastic modulus and Poisson's ratio of metallic materials

GB/T 22588 Flash method for measuring thermal diffusivity or thermal conductivity

3 Terms and Definitions

The following terms and definitions defined in GB/T 9637 and GB/T 13560 apply to this document.