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

GB/T 4137-2024

Rare earth ferrosilicon alloy

稀土硅铁合金

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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: This document replaces GB/T 4137-2015 "Rare Earth Ferrosilicon Alloys": Compared with GB/T 4137-2015, except for structural adjustments and editorial changes, In addition to the modifications, the main technical changes are as follows:

- a) Added "Terms and Definitions" (see Chapter 3);
- b) Added "Classification and Brand" (see Chapter 4);
- c) Deleted the corresponding original digital grades and product grades "RESiFe-38Ce" and "RESiFe-41Ce" in the product grades (see:2015 Table 1 of the version);
- d) Added product grades "RESiFe-30-LaC", "RESiFe-30-CeC", "RESiFe-32-LaC", "RESiFe-32-CeC" "RESiFe-20-CeM", "RESiFe-23-CeM" and "RESiFe-26-CeM" (see Table 1);
- e) Changed the product grades of light rare earth ferrosilicon alloy and the content requirements of their corresponding chemical components (see Table 1, Table 1 of the:2015 edition);
- f) Changed the product grades of yttrium-based heavy rare earth ferrosilicon alloys and the content requirements of their corresponding chemical components (see Table 2,:2015 Edition): 1);
- g) Added "If the purchaser has special requirements for the particle size range, it can be determined through negotiation between the supply and demand parties" (see 5:2);
- h) Added the condition requirement of "under natural diffuse light" (see 6:3);
- i) Added the provisions on the number of particle size sampling (see 7:4:2);
- j) Changed the product packaging description from "sealed in iron drums with anti-oxidation measures" to "packaged in woven bags with plastic-sealed inner bags" (see 8:1, 6:2 of the:2015 edition): 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: Ganzhou Nonferrous Metallurgy Research Institute Co., Ltd., Inner Mongolia Shengquan Keliyuan New Materials Technology Co., Ltd., Ningxia Feng Hua Industrial Co., Ltd., Baotou Rare Earth Research Institute, Baotou Huashang Rare Earth Alloy Co., Ltd., Guorui Kechuang Rare Earth Functional Materials (Ganzhou) Co., Ltd: Company, Shangyou Dongjin Rare Earth Metal Smelting Industry and Trade Co., Ltd., and Ruike Rare Earth Metallurgy and Functional Materials National Engineering Research Center Co., Ltd: The main drafters of this document are: Li Zhongqi, Zhang Jikai, Liang Xin, Zhu Zuoyan, Zhang Benshui, Hong Kan, Li Ying, Zhou Baolu, Xu Jianbing, Liu Yanfen, Wu Ying, Ma Hankun, Yuan Ying, Bai Ruyu, Zhang Xianheng, Wang Youzhen, Wang Youlu, Wang Weisheng, Liu Weizhen, Lv Weidong, Chen Ruiwen, Luo Linsheng: The previous versions of this document and the documents it replaces are as follows:

---First published in 1984 as GB/T 4137-1984;

---First revised in:1993, second revised in:2004, third revised in:2015;

---This is the fourth revision: Rare Earth Ferrosilicon Alloy

1 Scope

China's national standard for rare earth ferrosilicon alloy. It specifies the classification and grades, the technical requirements and the test methods. The alloy is an addition made to molten iron and steel, and the rare earths in it - cerium and lanthanum principally - do a job that is chemical rather than metallurgical in the ordinary sense. They are powerful scavengers: they combine with oxygen and sulfur far more readily than iron does, and the compounds they form float out into the slag. What remains is a cleaner steel in which the sulfide inclusions that would otherwise have formed as elongated stringers are instead small, hard and globular, which improves toughness across the rolling direction. In cast iron the same additions help control graphite morphology. Ferrosilicon is the carrier because silicon dissolves the rare earths and because the alloy melts and disperses readily in the bath rather than floating off unreacted.

This document specifies the classification and grade, technical requirements, test methods, inspection rules and marking, packaging, transportation, Storage and accompanying documents: This document is applicable to light rare earth ferrosilicon alloys and yttrium-based heavy rare earth ferrosilicon alloys produced by carbothermal reduction, silicothermal reduction and melt-matching methods: Production, inspection and sale of gold products:

Note: The product can be used as raw material of composite spheroidizing agent or additive and alloying agent in steel production:

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 8170 Rules for rounding off values and expression and determination of limit values

GB/T 13247 Sampling and testing methods for particle size of ferroalloy products

GB/T 15676-2015 Rare Earth Terminology

GB/T 16477 (all parts) Chemical analysis methods for rare earth ferrosilicon alloys and magnesium ferrosilicon alloys

GB/T 24194 Determination of ferrosilicon, aluminum, calcium, manganese, chromium, titanium, copper, phosphorus and nickel contents - Inductively coupled plasma atomic emission spectrometry Spectrum

GB 39176 Packaging, marking, transportation and storage of rare earth products

3 Terms and definitions

The terms and definitions defined in GB/T 15676-2015 and the following apply to this document: 3:

1 An iron alloy with mixed rare earths, silicon and iron as the main components, mainly lanthanum or cerium: 3:

2 An iron alloy with mixed rare earths, silicon and iron as the main components, mainly yttrium: 3:

3 Using carbon-containing materials as reducing agents, reducing and smelting silica and rare earth oxides, rare earth rich slag or rare earth concentrate in a submerged arc furnace to produce rare earth ferrosilicon Alloy method: [Source: GB/T 15676-2015, 8:4:5, modified] 3:

4 Using silicon or ferrosilicon as reducing agent, reducing rare earth oxides, rare earth rich slag or rare earth concentrate in electric arc furnace to produce rare earth ferrosilicon alloy