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

GB/T 21220-2024

Replacing GB/T 21220-2007

**Soft magnetic metallic materials
(English Translation)**

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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 is required.

This document replaces GB/T 21220-2007 "Soft Magnetic Metallic Materials". Compared with GB/T 21220-2007, the following changes have been made.

In addition to the changes in performance, the main technical changes are as follows.

-- Changed the typical composition ranges of copper, vanadium and other elements in E1 alloys (see Table 2, Table 1 of the 2007 edition);

--Changed the amplitude permeability of E-type alloys under certain conditions (see Table 3, Table 2 of the 2007 edition);

-- Changed the minimum magnetic polarization intensity specified for E-type alloys under certain conditions (see Table 4, Table 3 of the 2007 edition);

--Added the minimum magnetic polarization intensity of F-type alloys at 2 800 A/m (see Table 4);

--Changed the size limit range of E-type alloys (see Table 1, Table 5 of the 2007 edition).

This document is modified to adopt IEC 60404-8-6:2016 "Magnetic materials Part 8-6.Single material specification soft magnetic metallic materials".

Compared with IEC 60404-8-6:2016, this document has made the following structural adjustments.

--Added 4.6 and 5.2;

--5.1 corresponds to Chapter 5 of IEC 60404-8-6:2016;

-- Table 1 corresponds to Table 5 of IEC 60404-8-6:2016, and Tables 2 to 5 correspond to Table 6 of IEC 60404-8-6:2016.

Table 1~Table 4;

--Informative Appendix A was added.

The technical differences between this document and IEC 60404-8-6:2016 and their reasons are as follows.

--Use GB/T 21219-2023, GB/T 43344-2023, GB/T 17951.2-2014, GB/T 2521.1-2016 and GB/T 2521.2-2016 replaces the referenced documents IEC 60404-1, IEC 60404-8-10, IEC 60404-8-3, IEC 60404-8-4, IEC 60404-8-7 (see Chapter 1) to adapt to my country's technical conditions;

-- Replaced Chapter 3 Terms and Conditions with GB/T 2900.60-2002, GB/T 2900.74-2008 and GB/T 9637-2001 Define the reference documents IEC 60050-121, IEC 60050-131, IEC 60050-221 in the introduction to adapt to my country's technology condition;

-- Use GB/T 17505-2016, GB/T 18253-2018, GB/T 13012-2008, GB/T 13888-2024, GB/T 3655-2022, GB/T 3658-2022, YB/T 4292-2012 and GB/T 21219-2023 will replace ISO 404, ISO 10474, IEC 60404-4, IEC 60404-7, IEC 60404-2, IEC 60404-6, IEC 60404-9, IEC 60404-1 (see 8.1, 8.3.1, 8.3.2, 8.4.3, Chapter 9 and Table 2) to adapt to my country's technical conditions;

-- Deleted the reference to IEC 60404-7 in the aspect ratio of ES type specimens (see 3.2), as this document does not involve aspect ratio;

-- Added the classification method, grade and related technical requirements of iron-chromium soft magnetic alloy (see 4.6, 5.2 and Appendix A) to adapt to my country's technical requirements.

Technical conditions.

The following editorial changes were made to this document.

--In order to coordinate with my country's standards, the name of the standard was changed to "Soft Magnetic Metal Materials";

-- Added the informative appendix "Types and magnetic properties requirements of iron-chromium soft magnetic alloys".

1 Scope

This document specifies the general requirements, magnetic properties and dimensional tolerances of pure iron, iron silicon, iron nickel, iron cobalt and iron chromium, and describes the corresponding inspection methods.

The materials can be supplied in the form of bars, billets, sheets, strips or wires. Pure iron, iron silicon, iron nickel and iron cobalt materials are in accordance with GB/T 21219-

2023 Corresponds to the alloy materials specified in A, C1, C2, E1 to E4 and F1 to F3 in the magnetic material category.

This document applies to relays. Magnetic materials pure iron and steel are covered by GB/T 43344-2023. GB/T 43344-2023 covers magnetic materials.

The properties of pure iron (type A) and iron silicon (type C21, C22) are not as detailed as those specified in this document, but wider dimensions are given.

tolerance.

This document applies to the classification of non-oriented and oriented electrical steel (C21 and C22 types) at power frequency according to the total loss ratio, which is GB/T

17951.2-2014, GB/T 2521.1-2016 and GB/T 2521.2-2016 covered.

This document applies to non-oriented and oriented electrical steels at medium frequencies classified by specific total losses, which are covered by IEC 60404-8-8.

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 2521.1-2016 Full process cold rolled electrical steel Part 1: Grain non-oriented steel strip (sheet) (IEC 60404-8-4.

2013, MOD)

GB/T 2521.2-2016 Full process cold rolled electrical steel Part 2: Grain oriented steel strip (sheet) (IEC 60404-8-7.:2008, MOD) GB/T 2900.60-2002 Electrotechnical terminology - Electromagnetism (eqv IEC 60050-121:1998) GB/T 2900.74-2008 Electrical terminology - Circuit theory (IEC 60050-131.:2002, MOD) GB/T 3655-2022 Method for measuring the magnetic properties of electrical steel strips (sheets) using the Epstein square ring (IEC 60404-2.:1996, MOD) GB/T 3658-2022 Annular test specimens for magnetic properties of soft magnetic metal materials and powder metallurgy materials in the frequency range of 20 Hz to 100 kHz Measurement method (IEC 60404-6:2018, MOD) GB/T 9637-2001 Electrical terminology - magnetic materials and components (eqv IEC 60050-221:1990) GB/T 13012-2008 Measurement methods of DC magnetic properties of soft magnetic materials (IEC 60404-4.:2000, IDT) GB/T 13888-2024 Method for measuring the coercivity (up to 160 kA/m) of magnetic materials in an open magnetic circuit (IEC 60404-7:2019, IDT) GB/T 17505-2016 General technical requirements for delivery of steel and steel products (ISO 404:2013, MOD) GB/T 17951.2-2014 Semi-process cold-rolled non-oriented electrical steel strip (IEC 60404-8-3.:2005, MOD) GB/T 18253-2018 Types of inspection documents for steel and steel products (ISO 10474:2013, IDT) GB/T 21219-2023 Classification of magnetic materials (IEC 60404-1:2016, MOD) GB/T 43344-2023 Specification for magnetic materials (iron and steel) for relays (IEC 60404-8-10:2009, IDT) YB/T 4292-2012 Test methods for geometric properties of electrical steel strips (sheets) IEC 60404-8-8 Magnetic materials Part 8-8.Specifications for individual materials Thin electrical steel sheets and strips for use at medium frequencies (Magnetic materials-Part 8-8.Specifications for individual materials-Thin electrical steel strip and sheet