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

GB/T 14986.5-2018

Replacing GB/T 14986-2008

Soft magnetic alloys - Part 5: Iron-aluminium alloys

软磁合金 第5部分：铁铝合金

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Foreword

GB/T 14986, Soft magnetic alloys, comprises 5 parts. -- Part 1. General requirements; -- Part 2. Iron-nickel alloys; -- Part 3. Iron-cobalt alloys; -- Part 4. Iron-chromium alloys; -- Part 5. Iron-aluminum alloys. This Part is Part 5 of GB/T 14986. This Part was drafted in accordance with the rules given in GB/T 1.1-2009. This Part replaces the iron-aluminum part of GB/T 14986-2008, High saturation magnetic induction, magnetic compensate alloys depending on temperature variation, corrosion-resisting, iron-aluminum, permanent permeability, soft magnetic alloys. Compared with GB/T 14986-2008, the major technical changes of this Part are as follows: -- it adds rod 1J12 and relevant technical requirements (see

7.4.2 of Clause 6); -- it supplements the basic physical parameters and typical mechanical properties of alloys (see Annex B). This Part was proposed by China Iron and Steel Association. This Part shall be under the jurisdiction of National Technical Committee 183 on Iron and Steel of Standardization Administration of China (SAC/TC 183). The drafting organizations of this Part. Dongbei Special Steel Group Dalian Precision Alloys Co., Ltd., Central Iron and Steel Research Institute, China Metallurgical Information and Standardization Institute. The main drafters of this Part. Xu Xiaoping, Luan Yan, Zhang Jinglin, Dai Qiang, Yan Chengming. The previous editions of the standard replaced by this Part are as follows: -- GBn 203-1983, GBn 203-1988; -- GB/T 15004-1994; Soft magnetic alloys - Part 5. Iron-aluminum alloys

1 Scope

GB/T 14986.5-2018 is the Chinese national standard on soft magnetic alloys - part 5: iron-aluminium alloys, 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 14 May 2018 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 February 2019. Classification: ICS 77.140.40, CCS H58. 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 Part of GB/T 14986 specifies the terms and definitions, classification, ordering content, dimensions, shape, technical requirements, inspection rules, test methods, packaging, marking, quality certification, etc. of iron-aluminum soft magnetic alloys. This Part applies to iron-aluminum soft magnetic cold-rolled strips, warm-rolled strips, hot-rolled (forged) rods and polished or ground rods (hereinafter referred to as alloys).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition dated applies to this document. For undated references, the latest edition of the referenced documents (including all amendments) applies to this document.

GB/T 223.5, Steel and iron - Determination of acid-soluble silicon and total silicon content - Reduced molybdosilicate spectrophotometric method

GB/T 223.8, Methods for chemical analysis of iron, steel and alloy - The sodium fluoride separation-EDTA titration method for the determination of aluminium content

GB/T 223.59, Iron, steel and alloy - Determination of phosphorus content - Bismuth phosphomolybdate blue spectrophotometric method and antimony phosphomolybdate blue spectrophotometric method

GB/T 223.64, Iron, steel and alloy - Determination of manganese content - Flame atomic absorption spectrometric method

GB/T 223.79, Iron and steel - Determination of multi-element contents - X-ray fluorescence spectrometry (Routine method)

GB/T 223.85, Steel and iron - Determination of sulfur content - Infrared absorption method after combustion in an induction furnace

GB/T 223.86, Steel and iron - Determination of total carbon content - Infrared absorption

method after combustion in an induction furnace

GB/T 228.1, Metallic materials - Tensile testing - Part 1. Method of test at room temperature

GB/T 231.1, Metallic materials - Brinell hardness test - Part 1. Test method

GB/T 2975, Steel and steel products - Location and preparation of samples and test pieces for mechanical testing

GB/T 4340.1, Metallic materials - Vickers hardness test - Part 1. Test method

GB/T 6146, Test method for resistivity of precision resistance alloys

GB/T 14986.1-2018, Soft magnetic alloys - Part 1. General requirements

3 Terms and definitions

For the purposes of this document, the following terms and definitions defined in GB/T 14986.1-2018 apply.

4 Classification

In accordance with the main characteristics of alloys, iron-aluminum alloys can be classified into the categories as follows:

- a) high saturation magnetic induction intensity iron-aluminum alloy 1J6;
- b) high saturation magnetic induction, high permeability and low residual magnetic induction density iron-aluminum alloy 1J12;
- c) high saturation magnetostriction coefficient iron-aluminum 1J13;
- d) high permeability high resistance iron-aluminum alloy 1J16.

Annex A

(Informative) Recommended sample heat treatment system A.1 In general cases, sample is preferably heat treated in pure hydrogen whose dew point is not higher than - 40°C. If vacuum heat treatment is required, it is recommended to be carried out in vacuum whose residual pressure is not greater than

0.1 Pa. A.2 All mechanical processes (such as punching, shearing, winding and deburring) for sample preparation shall be carried out before heat treatment. Before heat treatment, sample shall be removed of oil to ensure cleanliness. After annealing, the surface of sample is preferably smooth. During the process of annealing, adhesion or mechanical deformation is not allowed. A.3 For the recommended sample heat treatment system see Table A.1.
Table A.1 - Recommended sample heat treatment system Alloy designation Heating temperature/°C Holding time/h Cooling system Application 1J6 950 ~ 1050 2 ~

3 Cool to 200°C at the speed of 100°C/h ~ 150°C/h before drawing a discharge 900 ~ 1,000
2 ~

3 Cool to 250°C before drawing a discharge Applicable to magnetic valve iron core 1J12a
1,050 ~ 1,200 2 ~

3 Cool to 500°C at the speed of 100°C/h ~ 150°C/h; then cool rapidly (by air blast) to 200°C
before drawing a discharge 1J13a 900 ~ 950

2 Cool to 650°C at the speed of 100°C/h; then cool to 200°C at the speed of not greater
than 60°C/h before drawing a discharge 780 ~ 800