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FERROUS METALLURGY INDUSTRY STANDARD

OF THE PEOPLE'S REPUBLIC OF CHINA

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YB/T 5241-2014

Replacing YB/T 5241-2005

Iron-nickel and iron-nickel-cobalt alloys with low expansion

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Foreword

This standard was drafted according to the rules given in GB/T 1.1-2009.

This standard replaces YB/T 5241-2005 "Iron-nickel and iron-nickel-cobalt alloys with low expansion".

Compared with YB/T 5241-2005, the main changes of this standard are as follows:

- ADD the composition and related properties of the alloy designation 4J32A;
- USE "flat" to replace "plate" in "Scope" and "Delivery state";
- ADD the normative references;
- ADD the delivery state "cold drawn (WCD)" in the classification and code, subdividing the hot rolled (forged) state into: "hot rolled (WHR)", "hot forged (WHF)";
- MODIFY the "air tightness" requirements;
- ADD the "non-destructive testing";
- ADD the "special requirements";
- ADD the test method table 3;
- MODIFY the re-inspection and judgment rules.

This standard replaces YB/T 5241-2005 from the date of implementation.

This standard was proposed by the China Iron and Steel Association.

This standard shall be under the jurisdiction of the National Technical Committee for Steel Standardization (SAC/TC 183).

The drafting organizations of this standard: General Iron and Steel Research Institute, Metallurgical Industry Information Standards Research Institute.

The main drafters of this standard: Lu Fengshuang, Zhang Jianfu, Zhang Jinglin, Luan Yan, Hou Jie, Cai Kaihong, Yu Min, Xu Jun, Huo Dengping.

This standard replaces the standard previously issued as follows:

- GBn 111-1981; GBn 132-1981; GBn 110-1981; GBn 110-1987; YB/T 5241-1993; YB/T 5241-2005.

Iron-nickel and iron-nickel-cobalt alloys with low expansion

1 Scope

This standard specifies the dimensions, shapes, technical requirements, test methods, inspection rules, packaging, marking, quality certificates of iron-nickel 4J36 alloy, free-cutting 4J38 alloy, iron-nickel-cobalt 4J32, 4J32A, 4J40 alloy bars, strips, flats, wires, tubes.

This standard applies to iron-nickel and iron-nickel-cobalt alloys with low expansion for making instrument parts, which have high precision requirements and approximately constant dimensions within a certain range of ambient temperature changes.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) is applicable to this standard.

GB/T 223.3 Methods for chemical analysis of iron, steel and alloy - The diantipyryl methane phosphomolybdate gravimetric method for the determination of phosphorus content

GB/T 223.18 Methods for chemical analysis of iron steel and alloy - The sodium thiosulfate separation iodometric method for the determination of copper content

GB/T 223.19 Methods for chemical analysis of iron, steel and alloy - The neocuproine-chloroform extraction photometric method for the determination of copper content

GB/T 223.20 Methods for chemical analysis of iron steel and alloy - The Potentiometric titration method for the determination of cobalt content

GB/T 223.21 Methods for chemical analysis of iron steel and alloy - The 5-CL-PADAB spectrophotometric method for the determination of cobalt content

GB/T 223.22 Methods for chemical analysis of iron, steel and alloy - The nitroso-R-salt spectrophotometric method for the determination of cobalt content

GB/T 223.25 Methods for chemical analysis of iron, steel and alloy - The

GB/T 5777 Seamless steel pipe and tubing methods for ultrasonic testing

GB/T 6394 Metal - Methods for estimating the average grain size

GB/T 8651 Metal plates - Flaw detection method by the ultrasonic plate wave

GB/T 14985-2007 General rules of dimensions, shape, surface, quality, testing method and inspection for expansion alloys

GB/T 20066 Steel and iron - Sampling and preparation of samples for the determination of chemical composition

GB/T 20123 Steel and iron - Determination of total carbon and sulfur content
Infrared absorption method after combustion in an induction furnace (routine method)

YB/T 5242 General rules of packaging, marking and quality certification for precision alloys

YB/T 5321-2006 Determination of hermeticity of expansion alloys

3 Ordering content

The contract or order for ordering according to this standard shall include the following contents:

- a) Standard number;
- b) Product name;
- c) Designation;
- d) Delivery weight or quantity;
- e) Dimensions;
- f) Delivery state;
- g) Non-destructive testing method and qualified level (see 6.10);
- h) Special requirements.

4 Classification and code

Alloys are classified as follows according to the delivery state:

Soft state S;

6.3.2 Flats are delivered in hot rolled (forged) states.

6.3.3 Strips, wires, tubes shall be delivered in either soft or hard state.

6.4 Average linear expansion coefficient

The average linear expansion coefficient of the alloy shall comply with the provisions of Table 2.

6.5 Phase transformation

After the 4J32, 4J32A, 4J40 alloys are subject to the heat treatment system specified in Table 2, the $\gamma \rightarrow \alpha$ phase transformation temperature shall be below $-60\text{ }^{\circ}\text{C}$. For bars with a size greater than 25 mm, local phase transformation is allowed.

6.6 Grain size

The grain size of soft strip shall not be coarser than grade 6; the grain size coarser than grade 6 shall not exceed 10% of the area. When measuring the average grain size of strip with a thickness of less than 0.13 mm, the number of grains along the thickness direction of the strip shall be no less than 6.

6.7 Air tightness

According to the requirements of the purchaser, 4J40 alloy bars with a diameter or side length of not less than 15 mm can be tested for air tightness; there shall be no leakage.

6.8 Process performance

Strips for deep drawing, or hard strips delivered after appropriate heat treatment, shall have good deep drawing performance; ears are not allowed to appear during deep drawing.

6.9 Surface quality

The surface quality of alloy materials shall comply with the relevant provisions of GB/T

supplier's technical quality supervision department. The buyer has the right to inspect and accept according to the standard. The airtightness test shall be carried out by the buyer. If there are special requirements for the supplier to conduct the inspection, both parties shall reach an agreement and indicate it in the contract.

8.2 Group-batching rules

The finished products shall be submitted for inspection and acceptance in batches. Each batch shall consist of alloy materials of the same alloy designation, the same furnace number, the same size, the same delivery status.

8.3 Sampling rules

The sampling rules for each batch of alloy materials shall comply with the provisions of GB/T 14985-2007.

8.4 Re-inspection and determination rules

The re-inspection and determination rules for alloy materials shall comply with the relevant provisions of GB/T 14985-2007.

9 Packaging, marking, quality certificate

The packaging, marking, quality certificate of finished alloy materials shall comply with the relevant provisions of YB/T 5242.

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