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Tungsten bars

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*（English translation）*

（报批稿）

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Foreword

SAC/TC 243 （National Nonferrous Metals Standardization Technical Committee）is in charge of this English translation. In case of any doubt about the contents of English translation, the Chinese original shall be considered authoritatively.

This standard is drafted in accordance with the rules given in the GB/T 1.1-2009 *Directives for standardization—Part 1: The structure and drafting of standard*.

This standard was proposed by China Nonferrous Metals Industry Association.

This standard was prepared by SAC/TC 243.

Tungsten bars

1　Scope

This document specifies the classification, technical requirements, test methods, inspection rules, marking, packaging, transportation, storage, accompanying documents and order list contents of tungsten bars.

This document is applicable to pure tungsten bars prepared by powder metallurgy.

2　Normative references

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

GB/T 3850 Dense sintered metal materials and cemented carbide density determination method

GB/T 4324(all parts) Tungsten chemical analysis methods

GB/T 6394-2017 Method for determining the average grain size of metals

YS/T 559 Emission spectroscopy analysis method of tungsten

3　Terms and definitions

 There are no terms and definitions to define in this document。

4 classify

4.1 Tungsten bars are divided into TW-0, TW-1, TW-2 and TW-4 according to different chemical composition and uses. TW-0 is mainly used as additives such as superalloys and high-entropy alloys; TW-1 is mainly used as additives such as superalloys; TW-2 is mainly used as a raw material for processed materials; TW-4 is mainly used as an alloy additive.

4.2 Tungsten bars are divided into tungung square bars and tungsten round bars according to different shapes. The representation of tungsten square bars is shown in Example 1, and the representation of tungsten round bars is shown in Example 2.

Example 1：

products：

TW-1 tungsten square bar 12 mm wide, 12 mm high and 300 mm long.

mark：

TW-1 12×12×300

Example 2：

products：

TW-1 tungsten round bar with a diameter of 16 mm and a length of 300 mm.

mark：

TW-1 φ16×300

5 Technical requirements

5.1 chemical composition

The chemical composition of tungsten bars should comply with the provisions of Table 1.

Table 1 Chemical composition

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Product grade | TW-0 | TW-1 | TW-2 | TW-4 |
| Master content | W | Residual content | Residual content | Residual content | Residual content |
| Impurity content (mass fraction), %, not greater than | Pb | 0.0001 | 0.0001 | 0.0005 | 0.0005 |
| Bi | 0.0001 | 0.0001 | 0.0005 | 0.0005 |
| Sn | 0.0001 | 0.0003 | 0.0005 | 0.0005 |
| Sb | 0.0005 | 0.0010 | 0.0010 | 0.0010 |
| As | 0.0005 | 0.0015 | 0.0020 | 0.0020 |
| Fe | 0.0010 | 0.0020 | 0.0030 | 0.0200 |
| Ni | 0.0007 | 0.0020 | 0.0020 | 0.0300 |
| Al | 0.0010 | 0.0020 | 0.0020 | 0.0050 |
| Si | 0.0010 | 0.0020 | 0.0020 | 0.0050 |
| Ca | 0.0010 | 0.0020 | 0.0020 | 0.0050 |
| Mg | 0.0007 | 0.0010 | 0.0010 | 0.0050 |
| Cr | 0.0010 | 0.0020 | 0.0030 | 0.0200 |
| Mo | 0.0020 | 0.0030 | 0.0040 | 0.0300 |
| P | 0.0010 | 0.0010 | 0.0010 | 0.0030 |
| S | 0.0005 | 0.0010 | - | - |
| C | 0.0010 | 0.0020 | 0.0050 | 0.0100 |
| O | 0.0010 | 0.0020 | 0.0020 | 0.0050 |
| N | 0.0005 | 0.0020 | 0.0020 | 0.0050 |

5.2 Physical properties

5.2.1 The density of tungsten bars should not be less than 17.5 g/cm3. When the demand side has special requirements for density, it shall be determined by negotiation between the supply and demand parties.

5.2.2 The grain size of TW-2 tungsten bars section should not be less than 1000/**mm2**, and it should be expressed by the corresponding level in GB/T 6394-2017.

5.3 size

5.3.1 The size of the tungsten square bars should comply with the provisions of Table 2.

Table 2 Tungsten square bars size

 unit : millimeter

|  |  |  |  |
| --- | --- | --- | --- |
| Brand | Width | Highness | Length, not less than |
| TW-2 | 12～18 | 12～18 | 300 |
| TW-0、TW-1、TW-4 | 12～18 | 12～18 | 30 |

5.3.2 The size of tungsten round bars should comply with the provisions of Table 3

Table 3 Tungsten round bars size

unit : millimeter

|  |  |  |
| --- | --- | --- |
| Brand | Straight | Length, not less than |
| TW-2 | 14～30 | 300 |
| TW-0、TW-1、TW-4 | 14～30 | 30 |

5.3.3 The bending degree on the full length of TW-2 tungsten bars should not be greater than 4 mm.

5.4 Appearance quality

5.4.1 The surface of the tungsten bar is gray or dark gray metallic luster, allowing traces of contact between tungsten bar and tungsten bar or tungsten bar and sintering furnace body.

5.4.2 There should be no water absorption phenomenon on the surface of tungsten bars.

5.4.3 TW-2 tungsten bars should not have overmelting, bubbling, delamination, cracks, and coarse crystalline surface;There should be no edge drop angle with length greater than 8 mm, width greater than 3 mm, and depth greater than 1 mm;There should be no hemp pits with a diameter greater than 1 mm and a depth greater than 0.5 mm; The lip chuck part should be excised.

5.4.4 TW-0, TW-1, TW-4 tungsten bars should not have overmelting, bubbling, visual visible light yellow or light black oxidation phenomenon.

6 Test method

6.1 The chemical composition analysis of the product shall be carried out in accordance with the provisions of GB/T 4324 (all parts) or YS/T 559, and the arbitration shall be carried out in accordance with the provisions of GB/T 4324 (all parts).

6.2 The density determination of the product is carried out in accordance with the provisions of GB/T 3850.

6.3 The determination of the cross-sectional grain size of the product is carried out according to the cut-off method specified in 8.3 in GB/T 6394-2017.

6.4 The dimensions of the product are measured with the corresponding precision tool.

6.5 The appearance quality of the product is visually inspected and, if necessary, measured with a measuring instrument.

7 Test rules

7.1 Inspection and acceptance

7.1.1 The product shall be inspected by the supplier's quality supervision department to ensure that the product meets the provisions of this document, and fill in the accompanying documents.

7.1.2 The demand side can inspect the received products in accordance with the provisions of this document, and if the inspection results do not conform to the provisions of this document, it shall be submitted to the supplier within 3 months from the date of receipt of the product, and the supply and demand parties shall negotiate and resolve.If arbitration is required, the arbitration sampling on the demand side is jointly conducted by the supply and demand parties

7.2 Batch management

Products should be submitted for acceptance in batches. Each batch is composed of the same mixture, the same production process, the same brand of products, and the net weight of each batch of products is determined by the supply and demand parties.

7.3 Inspection items and sampling

The inspection items and sampling of the product shall comply with the provisions of Table 4.

Table 4 Inspection items and sampling

|  |  |  |  |
| --- | --- | --- | --- |
| Inspection items | Number and location of samples | The chapter number of the technical requirement | The chapter number of the test method |
| chemical composition | Each batch of any one or furnace sample, sampling anywhere | 5.1 | 6.1 |
| Physical properties | density | Each batch of any one or furnace sample, sampling anywhere | 5.2.1 | 6.2 |
| grain size of cross-sectional  | Each batch of any one or furnace sample, sampling anywhere | 5.2.2 | 6.3 |
| size | Root by root | 5.3 | 6.4 |
| Appearance quality | Root by root | 5.4 | 6.5 |

* 1. Determination of test results

7.4.1 When the chemical composition test result of the product is unqualified, it is allowed to take double the number of samples (excluding the original sample) to conduct a repeat inspection of the unqualified items, and if any of the results of the repeated inspection are still unqualified, the batch of products will be judged to be unqualified.

7.4.2 When the density and cross-sectional grain size test results of the product are unqualified, it is allowed to take double the number of samples (excluding the original sample) to conduct a repeat inspection of the unqualified items, and if any of the results of the repeated inspection are still unqualified, the batch of products will be judged to be unqualified.

7.4.3 When the dimensional inspection result of the product is unqualified, the root product shall be judged to be unqualified.

7.4.4 When the appearance quality inspection results of the product are unqualified, the root product shall be judged to be unqualified.

8 Marking, packaging, transportation, storage and accompanying documents

8.1 Marking

The following marks (or labels) should be on the outer packaging of the product:

1. Supplier name and address
2. Product name and grade
3. Batch number
4. Net weight
5. The document number

8.2 Packing

The product is packed in a wooden box and foam plastic board inside; Or use carton for outer packaging, inner with moisture-proof paper; Or determined by negotiation between the supply and demand parties.

8.3 Transport

When the product is transported, it should be protected from moisture. During handling, it should be loaded and unloaded lightly to prevent severe collision and mechanical extrusion.

8.4 Storage

The product should be stored in a ventilated, dry and acid-free atmosphere to prevent oxidation. The storage period should not exceed 6 months.

8.5 Accompanying file

Each batch of products should be accompanied by accompanying documents, which should include in addition to supplier information, product information, this document number, date of manufacture or packaging date.

1. Product quality assurance certificate, the content is as follows:

· The main performance and technical parameters of the product.

·Product characteristics (including manufacturing process and raw material characteristics)

· The supplier's responsibility for the quality of the product.

· The quality certification obtained by the product and the analysis and inspection results printed by the supplier's technical supervision department.

1. Inspection report and finished product inspection report in the process of product quality control.
2. Product instructions: correct handling, use, storage methods, etc.
3. Others.

9 The contents of the ordering products list

 The order form for the ordering products listed in this document shall include the following:

a）Product title

b) Grades and specification

c) Net weight

d) The number of this document

1. Others