Recycling Tungsten Material Industry Standard YS/T 1704-2024

1. Scope

This document specifies the classification, technical requirements, test methods, inspection rules, marking, packaging, transportation, storage, accompanying documents and order form contents of recycled tungsten raw materials (hereinafter referred to as raw materials).

Tungsten raw materials obtained after recycling processes (including but not limited to sorting, cleaning, disassembly, crushing, drying, screening, etc.) .

2. Normative references

The contents of the following documents constitute essential provisions of this document through normative references herein. For dated references, only the version corresponding to that date applies to this document. For undated references, the latest version (including all amendments) applies to this document.

GB/T 5314 Powder sampling method for powder metallurgy

GB/T 6150.1 Chemical analysis methods for tungsten concentrates Part 1: Determination of tungsten trioxide content: Ammonium tungstate ignition gravimetric method

SN/T 0570 Inspection procedures for radioactive contamination of imported recycled raw materials

SN/T 3012 Determination of tungsten trioxide content in tungsten concentrate: X-ray fluorescence spectrometry

3. Terms and Definitions

The following terms and definitions apply to this document.

3.1

Recycling materials for tungsten

The recovered tungsten or its compounds can be directly used as raw materials in production after being processed through a recycling process.

3.2

Inclusions carried-waste

Other substances mixed into raw materials during production, collection, packaging and transportation.

Note: This includes dust, wood, textiles, plastics, glass, stones, paper, sand, rubber, sludge, etc., but does not include the packaging of this product and other substances required during transportation.

4. Classification

According to the raw material form, it can be divided into two categories: powdered recycled tungsten raw materials and block recycled tungsten raw materials. The raw material name, typical source and description are shown in Table 1. Typical photos of the raw materials are shown in Appendix A.

Table 1 Raw material name, typical source and description

Raw material name	Typical sources and descriptions
Powdered recycled tungsten raw material	Powdered raw materials obtained through recycling of tungsten carbide powder, tungsten powder, potassium tungstate, ammonium paratungstate, tungsten oxide and other tungsten product manufacturing process waste or tungsten products that have lost their original functions and damaged powdered materials
Bulk recycled tungsten raw materials	Bars, plates, tubes, wires, strips, micro-drills and other profiles, or tungsten-based high-density alloys and their briquettes, as well as process waste from tungsten product manufacturers such as carbide tools, molds, roller rings, anvils, geological and mining tools, or tungsten products that have lost their original functions and damaged block materials, and block raw materials obtained after recycling processes

5. Technical requirements

5.1 Tungsten content

The tungsten content of the raw materials shall comply with the requirements of Table 2

Table 2 Tungsten content of raw materials

Raw material name	Tungsten content (mass fraction), not less than %
Powdered recycled tungsten raw material	55
Bulk recycled tungsten raw materials	58

5.2 Inclusion content

The inclusion content of the raw materials should not exceed 1.0%, and the content of powder with a particle size not exceeding 2 mm in the bulk recycled tungsten raw materials should be less than 0.1%.

5.3 Volatile matter content

The volatile matter content in the raw materials shall comply with the requirements of Table 3.

Table 3 Volatile matter content in raw materials

Raw material name	Volatile matter content, no more than %
Powdered recycled tungsten raw material	10.0
Bulk recycled tungsten raw materials	1.0

5.4 Radioactive contamination

The control of radioactive contamination in raw materials shall meet the following requirements:

a) It should not be mixed with radioactive materials;

b) The ambient dose equivalent rate of X and gamma radiation of raw materials (including packaging) shall not exceed the normal natural radiation background value of the local environment + 0.25 uSv /h;

c) α and β surface contamination levels of raw materials: The measurement area is greater than 300 cm^2, and α does not exceed 0.04 Bq/cm^2.

5.5 Appearance quality

5.5.1 Powdered recycled tungsten raw material should not have any visible inclusions.

5.5.2 The bulk recycled tungsten raw material should be dry and free of visible inclusions and recycled tungsten raw material.

5.6 Other requirements

5.6.1 It is prohibited to mix raw materials with items that have explosive and hazardous properties.

5.6.2 Raw materials must not be mixed with sealed containers, pressure vessels or other hazardous substances specified by national laws and regulations.

6. Test methods

6.1 Tungsten content

6.1.1 The tungsten content of powdered recycled tungsten raw materials shall be tested in accordance with the provisions of GB/T 6150.1 or SN/T 3012.

6.1.2 bulk recycled tungsten raw materials shall be determined by negotiation between the supply and demand parties.

6.2 Inclusion content

6.2.1 Powdered recycled tungsten raw material

6.2.1.1 powdered recycled tungsten is estimated visually. If it is uncertain whether it meets the requirements, it shall be inspected according to 6.2.1.2.

6.2.1.2 Take a sample of the raw material, weigh it, record the sample mass m, pick out the inclusions, weigh and record the mass of the separated inclusions m1, and calculate the inclusion content w1 according to formula (1).

$$w1=m1/m*100\% \quad (1)$$

Where:

m1: mass of inclusions, in kilograms (kg)

m: sample mass, in kilograms (kg)

6.2.2 Bulk recycled tungsten raw materials

6.2.2.1 6.2.2.1 The inclusion content of bulk recycled tungsten raw materials shall be estimated visually. If it is uncertain whether the requirements are met, test according to 6.2.2.2. to 6.2.2.3.

6.2.2.2 Take a sample of the raw material, weigh it, and record the sample mass m. Sort the sample to screen out powders with a particle size not greater than 2 mm (dust, sludge, crystallized salt, fiber powder), weigh and record the mass m2 of the separated powders, and calculate the powder mass w according to formula (2).

$$w=m1/m*100\% \quad (1)$$

Where:

m1: mass of powder, in kilograms (kg)

m: sample mass, in kilograms (kg)

6.2.2.3 Continue to pick out inclusions. If necessary, crush the sample and mechanically separate the embedded inclusions. Weigh and record the mass of the separated inclusions and the powder m2, and add m3 to calculate the inclusion content w3 according to formula (3).

w3=m3/m*100% (1)

Where:

m3: total mass of inclusions, in kilograms (kg)

m: sample mass, in kilograms (kg)

6.3 Volatile matter content

The volatile matter content of raw materials shall be tested in accordance with the provisions of Appendix B.

6.4 Radioactive contamination

The radioactive contamination inspection of raw materials shall be carried out in accordance with the provisions of SN/T 0570.

6.5 Appearance quality

The appearance quality of raw materials is inspected visually.

6.6 Other requirements

Other requirements for raw materials are subject to visual inspection.

7. Inspection Rules

7.1 Inspection and acceptance

The purchaser shall inspect the raw materials received in accordance with the provisions of this document. If the inspection results are inconsistent with the provisions of this document and the purchase order, the purchaser shall submit a written report to the supplier for resolution through negotiation between the purchaser and the supplier. If arbitration is required, the dispute shall be resolved through negotiation between the purchaser and the supplier.

7.2 batch

Raw materials should be submitted for inspection in batches. Each batch should consist of raw materials of the same name and source. The weight of each inspection batch should not exceed 25t.

7.3 Inspection items

Each batch of raw materials should be inspected for tungsten content, inclusion content, volatile matter content, radioactive contamination, appearance quality and other requirements.

7.4 Sampling

7.4.1 The sampling of raw materials shall comply with the provisions of Table 4.

Table 4 Sampling

Inspection items	Sampling	Requirement Chapter Number	Test method chapter number
Tungsten content	Take one sample from each inspection batch; the mass of each sample of powdered recycled tungsten raw material shall not be less than 0.1KG; the mass of each sample of block recycled tungsten raw material shall not be less than 1KG	5.1	6.1
Inclusion content	Take one sample from each inspection batch, and the weight of each sample should not be less than 10KG	5.2	6.2
Volatile matter content	Take 2 samples from each inspection batch, and the weight of each sample should not be less than 1KG	5.3	6.3
Radioactive contamination	Inspection batch by batch	5.4	6.4
Appearance quality		5.5	6.5
Other requirements		5.6	6.6

7.4.2 Powdery recycled tungsten raw materials shall be sampled in accordance with the provisions of GB/T 5314.

7.4.3 If the sample size is too large, it can be crushed.

7.5 Determination of test results

7.5.1 either tungsten content or volatile matter content are unqualified, double the fraction of samples should be taken from the batch of raw materials and repeated tests should be carried out on the unqualified items. If the repeated test results are qualified, the batch of raw materials is judged to be qualified; otherwise, the batch of raw materials is judged to be unqualified.

7.5.2 If any of the test results for inclusion content, radioactive contamination, appearance quality and other requirements fail to meet the requirements, the batch of raw materials will be deemed unqualified.

8. Marking, packaging, transportation, storage and accompanying documents

8.1 Logo

Each batch of raw materials should be accompanied by a label which should state:

a) Supplier name;
b) Name of raw material;
c) batch number;
d) Gross weight;
e) net weight;

8.2 Package

Raw materials can be packed in iron drums or ton bags . The packing method, size and weight are determined by negotiation between the supplier and the buyer.

8.3 Transportation and storage

8.3.1 During transportation, raw materials of different categories and sources should not be mixed.

8.3.2 The transportation and storage of raw materials should be protected from rain, leakage and dust.

8.4 Accompanying documents

Each batch of raw materials should be accompanied by accompanying documents, which should indicate:

a) Name of supplier;
b) Name of raw materials;
c) gross weight;
d) net weight;
e) volatile matter content;
f) inclusion content;
g) Tungsten content;
h) Stamp of the inspection unit or institution.

9. Order content

The content of the order form for the raw materials listed in this document shall be agreed upon by the supplier and the buyer, and should include the following:

a) Name of supplier;
b) Name of raw materials;
c) Net weight;
d) volatile matter content;
e) inclusion content;
f) Tungsten content;
g) This document number;

h) Others